

User Manual

# FG-200 HSE/FF Modbus



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# 1 About this guide

Enter topic text here.

## 1.1 Read me first

Please read this guide carefully before using the device to ensure safe and proper use. Softing does not assume any liability for damages due to improper installation or operation of this product.

This document is not warranted to be error-free. The information contained in this document is subject to change without prior notice. To obtain the most current version of this guide, visit the Download Center on our website at: <http://industrial.softing.com/en/downloads>

## 1.2 Target audience

This guide is intended for experienced operation personnel and network specialists responsible for configuring and maintaining field devices in process automation networks. Any person using a FG-200 HSE/FF Modbus must have read and fully understood the safety requirements and working instructions in this guide.

## 1.3 Typographic conventions

The following conventions are used throughout Softing customer documentation:

|   |  |
|---|--|
| Keys, buttons, menu items, commands and other elements involving user interaction are set in bold font and menu sequences are separated by an arrow | Open <b>Start</b> → <b>Control Panel</b> → <b>Programs</b>   |
| Buttons from the user interface are enclosed in brackets and set to bold typeface   | Press <b>[Start]</b> to start the application  |
| Coding samples, file extracts and screen output is set in Courier font type   | <code>MaxDlsapAddressSupported=23</code>   |
| Filenames and directories are written in italic   | Device description files are located in C:<br><i>\&lt;Application name&gt;\delivery\software</i><br><i>\Device Description files</i> |



### CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.



### Note

This symbol is used to call attention to notable information that should be followed during installation, use, or servicing of this device.



### Hint

This symbol is used when providing you with helpful user hints.

## 1.4 Document history

| Document version | Changes since last version   |
|------------------|--|
| 1.00             | First version  |
| 1.01             | <ul style="list-style-type: none"> <li>▪ <a href="#">Installation in hazardous locations</a><sup>(11)</sup>:                             <ul style="list-style-type: none"> <li>- Introduction restructured and subsections implemented.</li> <li>- Preliminary information restrictions in hazardous locations deleted.</li> <li>- Certificate for cULus <a href="#">added</a><sup>(14)</sup>.</li> </ul> </li> <li>▪ New section with certificate copy of UL certificate <a href="#">UL Certificate of Compliance</a><sup>(76)</sup>.</li> </ul> |
| 1.02             | New Corporate Identity implemented.  |
| 1.20             | References to FF-CONF replaced with comConf. Instructions to Modbus mapping and related chapters removed.  |
| 1.30             | New layout and structure of chapters. Simplified mounting, dismounting and configuration instructions. Additional trademark references. Software installation procedure updated.   |

## 1.5 Related documentation

The following documents provide additional product information:

- Communication Configuration Tool - User Guide
- FG-200 HSE/FF Modbus - Datasheet

## 1.6 Document feedback

We would like to encourage you to provide feedback and comments to help us improve the documentation. You can write your comments and suggestions to the PDF file using the editing tool in Adobe Reader and email your feedback to [support.automation@softing.com](mailto:support.automation@softing.com).

If you prefer to write your feedback directly as an email, please include the following information with your comments:

- document name
- document version (as shown on cover page)
- page number

## 2 About FG-200 HSE/FF Modbus

The Softing FG-200 HSE/FF Modbus is a gateway connecting Modbus RTU, Modbus TCP or FOUNDATION fieldbus High Speed Ethernet (HSE) to FOUNDATION fieldbus H1 field devices. It provides fast access to process data, while making use of FOUNDATION Fieldbus advantages such as reduced cabling, central field device parametrization, comprehensive diagnostics or intrinsically safe device segments. For simple installation it is compatible with the R. STAHL bus-Carrier Series 9419 and Fieldbus power supplies Series 9412.

### 2.1 Intended use

The FG-200 can be used for integrating up to four FF H1 links into a Modbus control system (TCP or RTU) or for communication between FF H1 devices and FF HSE network. The gateway can be operated in both hazardous and non-hazardous areas. Any other use is not intended. Follow the instructions in this guide on how to use the FG-200.

### 2.2 Specifications

|                                       |  |
|---------------------------------------|--|
| Power supply                          | 18 VDC...32 VDC; SELV/PELV supply mandatory<br>Typical input current is 200 mA; maximum is 1 A (considering the rush-in current at switch-on).   |
| FF-H1                                 | Four FF-H1 channels, compliant with type 114 of the FF physical layer profile.<br>The Fieldbus voltage range is from 9 VDC...32 VDC. Preferred value is 24 VDC.  |
| Ethernet                              | IEEE 802.3 100BASE-TX/10BASE-T   |
| Minimum ambient operating temperature | -40 °C (see <a href="#">Installation positions</a> <sup>(17)</sup> for the maximum ambient temperature depending on the mounting position)   |
| Storage temperature                   | -40 °C...+85 °C  |
| Relative humidity                     | 10 %...95 % (non-condensing)   |
| Altitude                              | Must not exceed 2,000 m  |
| Location                              | Indoor use only; no direct sunlight  |
| Coating                               | Conformal Coating based on ANSI/ISA-S71.04 G3  |
| Safety standard                       | IEC/EN/UL 61010-1 Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements<br>IEC/EN/UL 61010-2-201 Safety requirements for electrical equipment for measurement, control and laboratory use - Part 2-201: Particular requirements for control equipment (both with CB scheme). |
| Ingress protection                    | IP20   |

### 2.3 System requirements

- 24V power supply
- power conditioner
- PC with operating system Windows 7 or Windows 8.1 (both 32 bit or 64 bit supported)
- Web browser (Microsoft Internet Explorer version 8.0 or higher, Mozilla Firefox version version 35 or higher)

## 2.4 Safety precautions

### Use in hazardous areas

The FG-200 is an electrical equipment with degree of protection Ex nA, approved for use in Zone 2 hazardous areas or in the safe area. The four FF-H1 interfaces are designed according to the protection method Ex ic. Only certified circuits with an according protection method shall be connected to these FF-H1 interfaces.

### Special hints for safe use



- Before setting the FG-200 into operation, the corresponding field has to be marked (e.g. if the device is used in an IC environment, mark the upper field on the type label).



- Use an appropriate permanent pen for signing, e.g. an etching pen.
- More than one marking is not allowed. If you need a second marking, you must replace the existing equipment with a new one.
- An equipment which has been operated under non-intrinsically safe conditions is no longer permitted to be used under intrinsically safe conditions.

The FG-200 HSE/FF Modbus is only approved for intended and appropriate use. In case of noncompliance, the warranty and manufacturer’s liability do no longer apply!



### CAUTION

During operation, the device's surface will be heated up. Avoid direct contact. When servicing, turn off the power supply and wait until surface has cooled down.



### Note

Do not open the housing of the FG-200. It does not contain any parts that need to be maintained or repaired. In the event of a fault or defect, remove the device and return it to the vendor. Opening the device will void the warranty!

## 3 Installation

### 3.1 Hardware installation



#### Note

With an ambient temperature above 55 °C at the place of installation it is likely that the temperatures of connecting cables will increase if the cables are installed in an unfavourable position. In such cases, measure the temperature to ensure that the service temperature of the cables is not exceeded (i.e. 80 °C), or use cables sustaining high temperatures of at least 90 °C.

#### 3.1.1 Installation in hazardous locations

The FG-200 HSE/FF Modbus can be used in hazardous locations and is certified according to ATEX, IEC and North America Approval cULus.



#### WARNING

##### **Use only according to operating conditions from instructions!**

Use the FG-200 in accordance with its designated use only! Otherwise, the manufacturer's liability and warranty will expire. The device is only to be used according to the operating conditions described in these instructions.



#### WARNING

##### **Do not connect or disconnect energized conductors!**

Be aware that energized conductors are not to be connected or disconnected! This can lead to danger of life if potentially explosive atmosphere is present there at that time!

Following general requirements must be observed while installing FG-200 on hazardous locations:

- The details of this document must be observed along with the conditions for use and the applicable details stated on the marking and type labels of each.
- Any selection and operation of the device must be done as per the technical rules.
- Adequate precautions must be taken to prevent unintended actuation or impairment of the device.
- Connectors must not be connected or disconnected when area is known to be hazardous. This can be life threatening in a potentially explosive atmosphere. Open or not securely closed sockets shall not be energized in the Ex-atmosphere!
- Ensure the installed equipment comply with the types of protection applicable to the corresponding zones.
- All connected electrical equipment must be suitable for the respective intended use.

- The operator must ensure protection against lightning in compliance with the locally applicable regulations.
- Electrostatic aspects must be considered when mounting the bus-modules. Electrostatic charges have to be prevented.
- In explosion group IIC and Zone 2 no protected plastic surfaces > 20 cm<sup>2</sup> are allowed; in IIB or dust-Ex, 100 cm<sup>2</sup> may be reached.
- The hazard of any objects falling onto the bus-module must be prevented.
- The FG-200 does not meet the requirements of impact protection and IP54 (according to IEC 60529). It must be installed in a protective enclosure which meets the requirements for resistance to impact and IP as stated in section 26.4 of IEC/EN 60079-0. This enclosure must be fully mounted and intact. If the enclosure is damaged, the operation is not permitted.
- The FG-200 is defined as instruments and apparatus of low energy according to clause 23 of IEC/EN 60079-15; thus the requirement stated in sub-clause C, limiting the transient characteristic to 40% above the rated voltage, has to be adhered to when erecting the equipment.
- When removing the packaging ensure that no dirt can enter the enclosure or the plugs.
- If any vibration during the operation may cause parts of the plugs to loosen, then the plugs have to be provided with a light firm varnish used for securing screws. An extraction force of 0.5 Nm has to be achieved at an equivalent thread.
- To circuits of Zone 2 only such equipment may be connected that is suitable for operation in this zone and has been certified accordingly.
- Components may only be replaced by original spare parts which are also approved for the use in Ex-atmospheres. Spare parts are ordered as complete units giving the material number stated on the device (marking, type label).
- Only such auxiliary components may be used in potentially explosive atmospheres which meet all requirements of European and national directives and legislation.
- The environmental conditions specified in the manual have to be followed strictly.
- The FG-200 is not to be used in systems where cathodic systems for corrosion protection are in place. Although special precautions may allow the use in such systems (additional earthing bridges), the manufacturer has to be consulted in each case.
- The operator has to provide measures for protection against lightning.
- According to the local conditions and in compliance with the environmental rules, the operator is responsible to visually inspect the system and to remove dust settlements in a regularly interval (every 6 months).
- The company installing the device has to ensure that the transient characteristic is limited to 40% above the service voltage.
- Additional precautions have to be taken, if the presence of hydrosulfide, ethylene oxide and/or carbon monoxide is to be expected: those substances are of a vary low ignition energy.
- Icing is not permitted.

**Pair of values for fieldbus voltage and current for Intrinsic Safety Fieldbus (ic):**

|                  | Pair 1          | Pair 2            | Pair 3          |
|------------------|-----------------|-------------------|-----------------|
| Fieldbus Voltage | Ui = 14 Volt DC | Ui = 17.5 Volt DC | Ui = 32 Volt DC |
| Fieldbus Current | Ii = 570 mA     | Ii = 319 mA       | Ii = 100 mA     |

**CAUTION**

Make sure that the sum of power supply voltage and fieldbus supply voltage does not exceed 60 VDC!

**Explosion hazard**

Do not disconnect equipment unless power has been removed or the area is known to be non-hazardous.

**Observe relevant national regulations, standards and directives**

This manual does not supersede the relevant national regulations, standards and directives. These must be observed and have to be applied according to the national conditions!

The equipment was assessed as based on the following standards and editions:

- a) IEC 60079-0:2011 Ed. 6, modified Cor. 2012 + Cor. 2013 / EN 60079-0:2012 + A11:2013
- b) IEC 60079-11:2011 Ed. 6 + Corr. 2012 / EN 60079-11:2012
- c) IEC 60079-15:2010 Ed. 4 / EN 60079-15:2010

If indicated on the device label or by technical documentation, the FG-200 is suitable for use in gas-Ex atmospheres of Zone 2 in the explosion groups IIA, IIB and IIC in temperature class T4, if accommodated in a tested enclosure.

- IECEx marking for explosion protection: Ex nA [ic] IIC T4 Gc.
- ATEX marking for explosion protection: Ⓢ II 3G nA [ic] IIC T4 Gc.

The Ex protection method [ic] corresponds only to the FF-H1 fieldbus interfaces.

The FG-200 HSE/FF Modbus complies with the applicable standards and regulations and meets the requirements of Directive 94/9/EC. The requirements for erecting the device as part of the system in potentially explosive atmospheres (e.g. IEC / EN 60079-14) must be strictly adhered.

**Certificates**

**ATEX** The EC type examination number for ATEX is:

**BVS 15 ATEX E 063 X**

A copy of the certificate is available in section [ATEX Type Examination Certificate](#)<sup>(73)</sup>.

**IECEx** The type examination number for IECEx is: **IECEx BVS 15.0055X**

The certificate can be downloaded from <http://iecex.iec.ch>

If indicated on the device label, the FG-200 is suitable for use in Class 1, Division 2, Groups A, B, C and D hazardous or non-hazardous locations.

The device must be installed in a protective enclosure which meets the requirements for resistance to impact and IP54 according to IEC 60529.

Marking for explosion protection: Class I Div.2 Groups A,B,C,D.

### **Certificate**

**cULus** The cULus Certificate of Compliance number is:

**20151215-E356500**

A copy of the certificate is available in section [UL Certificate of Compliance<sup>\(76\)</sup>](#).

### 3.1.2 Mounting and dismounting



#### Note

Make sure the FG-200 HSE/FF Modbus is mounted in such a way that the power supply can be easily disconnected.



#### Note

Depending on the installation position, the maximum ambient operating temperature may differ. See Section [Installation positions](#)<sup>(17)</sup> for details.

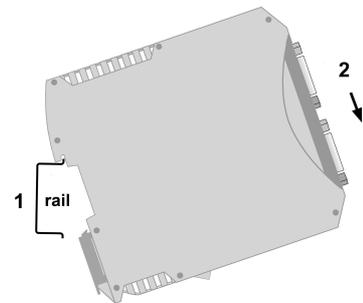


#### Installation and inspection

Installation and inspection must be carried out by qualified personnel only (personnel qualified according to the German standard TRBS 1203 - Technical Regulations for Operational Safety). The definition of terms can be found in IEC 60079-17.

### Mounting

1. Hook the upper notch of the cut-out on the back of the FG-200 HSE/FF Modbus into a 35 mm DIN rail.
2. Press the FG-200 HSE/FF Modbus down towards the rail until it slides into place over the lip of the locking bar.

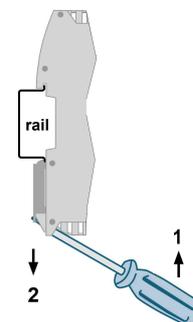


#### Note

Do not put stress on the system by bending or torsion.

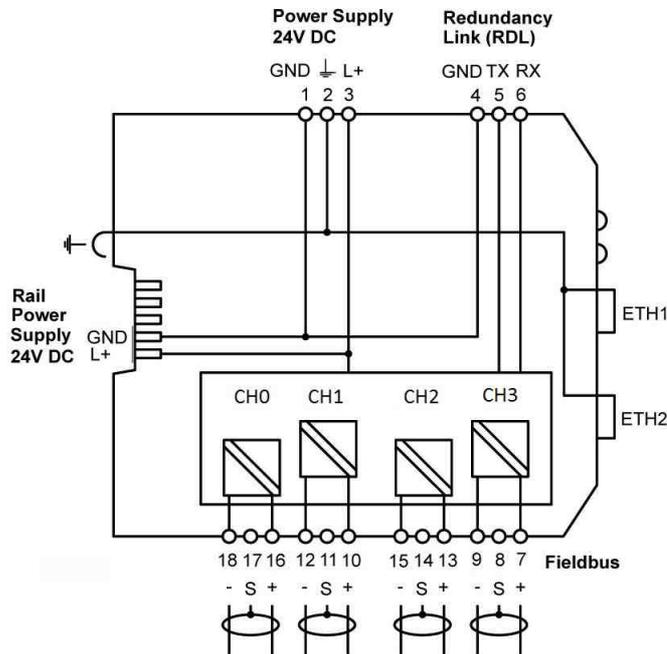
### Dismounting

1. Slide a screwdriver diagonally under the housing into the locking bar.
2. Lever the screwdriver upwards, pull the locking bar downwards - without tilting the screwdriver - and move the gateway upwards off the rail.



### 3.1.3 Connection diagram

The following connection diagram shows the physical interfaces of the FG-200.



### 3.1.4 Connecting the power supply

1. Connect the FG-200 to a 24 V DC power supply.
2. Use different or redundant power supplies for redundant FG-200s.
3. Turn on the power supply. The boot process takes approx. 50 seconds. For indication of proper operation of a FG-200 acting in non-redundant mode or as primary device in redundant mode refer to [LED status indicators](#)<sup>(56)</sup>.

The supply voltage (18 VDC .... 32 VDC) is connected by a 3-pole terminal block. The power supply is connected to the plug connector via flexible wires with a cross section of 0.75 to 1.5 mm<sup>2</sup>. The ground connection wire must have a cross section of 1.5 mm<sup>2</sup>.

|  | Pin | Signal | Description             |
|--|-----|--------|-------------------------|
|  | 1   | GND    | Ground                  |
|  | 2   | ⏚      | Functional earth        |
|  | 3   | L+     | Positive supply voltage |



#### CAUTION

The Functional Earth (FE) connection of the device has to be connected at low inductance with the Protective Earth (PE) of the system.

**Note**

As indicated in the connection diagram, the power can be applied alternatively by a special DIN rail connector (Rail Power Supply). For further information contact Softing Industrial Automation.

### 3.1.5 Installation positions

The FG-200 HSE/FF Modbus can be mounted horizontally and vertically. Depending on the installation position, different ambient operating temperatures ( $T_a$ ) are allowed.

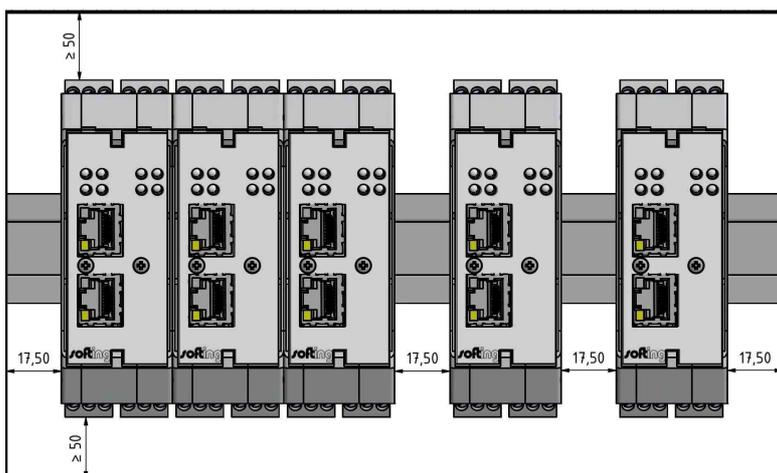
**Minimum distance**

Provide a minimum distance of 50 mm to the air inlet and air outlet to ensure natural convection.

**Rotated installation position**

The maximum permissible ambient temperature values also apply to a 180° rotated installation position.

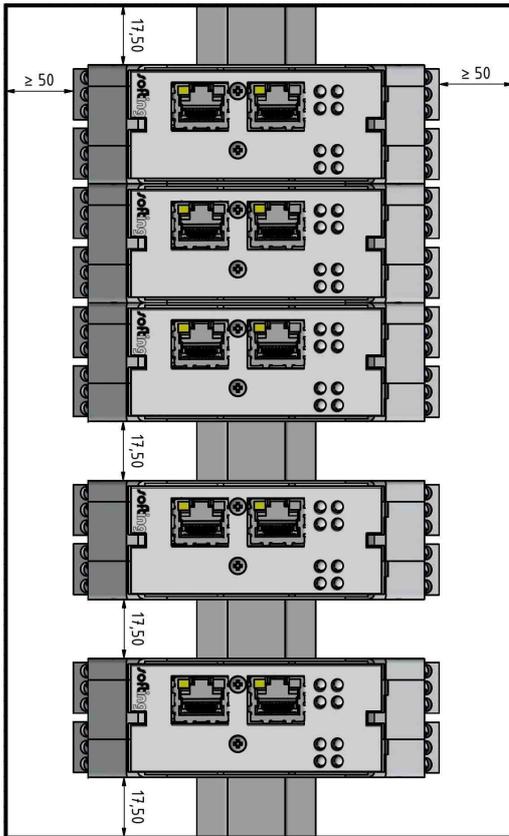
#### Horizontal installation position



#### Maximum ambient temperatures for the FG-200 HSE/FF Modbus

| Number of PA channels used | Maximum fieldbus voltage | Minimum distance | Maximum permissible ambient temperature $T_a$ |
|----------------------------|--------------------------|------------------|---|
| 4                          | 32VDC                    | 0 mm             | 55 °C   |
| 2                          | 24VDC                    | 0 mm             | 60 °C   |
| 4                          | 32VDC                    | 17.5 mm          | 65 °C   |
| 2                          | 24VDC                    | 17.5 mm          | 70 °C   |

**Vertical installation position**



**Maximum ambient temperatures for the FG-200 HSE/FF Modbus**

| Number of PA channels used | Maximum fieldbus voltage | Minimum distance | Maximum permissible ambient temperature T <sub>a</sub> |
|----------------------------|--------------------------|------------------|--|
| 4                          | 32VDC                    | 0 mm             | 40 °C  |
| 2                          | 24VDC                    | 0 mm             | 50 °C  |
| 4                          | 32VDC                    | 17.5 mm          | 55 °C  |
| 2                          | 24VDC                    | 17.5 mm          | 60 °C  |

### 3.1.6 Connecting to the network

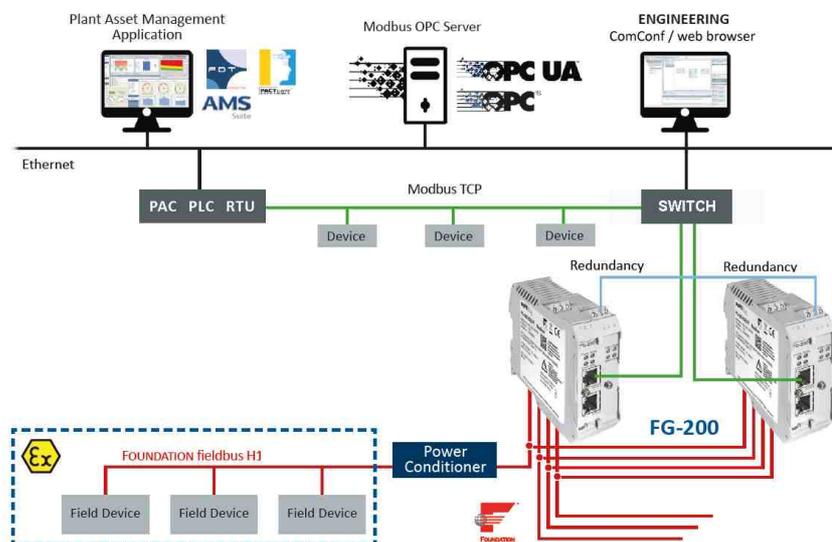
1. Connect the FG-200 to the Modbus TCP network to one of the two Ethernet ports (ETH1 or ETH2).
2. Connect each link of your FOUNDATION fieldbus H1 network via a power conditioner to a Fieldbus Channel port of your gateway (CH0 to CH3).



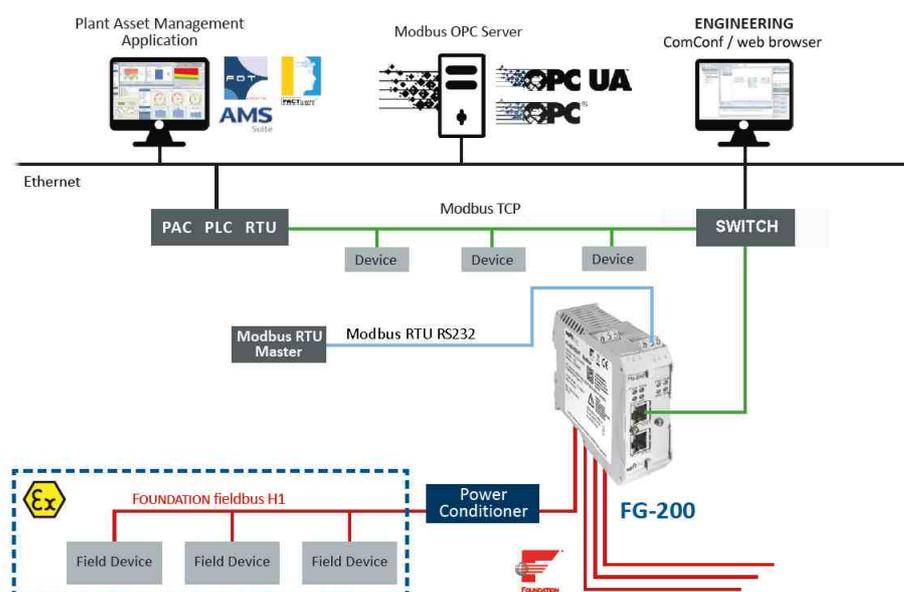
#### Note

When using the FG-200 as linking device you can broadcast High Speed Ethernet (HSE) and Modbus TCP over the same Ethernet port.

#### FG-200 with redundancy connection



#### FG-200 with Modbus connection





**Note**

Your FG-200 cannot operate in both Modbus TCP and Modbus RTU mode at the same time.



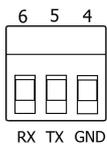
**Note**

When you connect your FG-200 to a Modbus RTU Master you cannot operate the device in redundancy mode.

**3.1.7 Modbus serial connection**

When connecting the FG-200 via serial connection use the connector from your delivery with the following pin assignment:

| Pin No. | Signal | Connector symbol |
|---------|--------|------------------|
| 6       | RX     | +                |
| 5       | TX     | S                |
| 4       | GND    | -                |



**Note**

If you are working with two FG-200 in redundant mode, the serial connection cannot be used, refer to [Use two FG-200s as a redundant set](#)<sup>(21)</sup>.

### 3.1.8 Using two FG-200

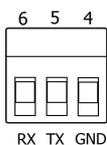
If you intend to use two FG-200 as a redundant set, connect the redundancy link interfaces (RDL) of both FG-200 (primary and secondary) by a cable before you power up the devices. If the redundancy link is not installed before start-up, the FG-200 will operate in non-redundant mode.



#### Note

As the interface is not galvanically isolated make sure that there is no potential difference between the two connected devices.

The maximum cable length is 0.5 m according to EMC requirements. The pin assignment is:

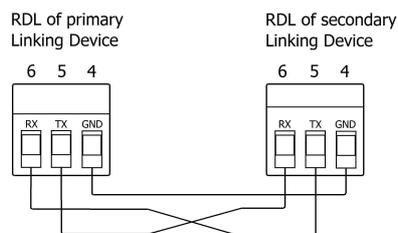


| Pin | Signal | Description                         |
|-----|--------|-------------------------------------|
| 6   | RX     | Receives data from redundant device |
| 5   | TX     | Transmits data to redundant device  |
| 4   | GND    | Ground                              |



#### Note

The receive (RX) and transmit (TX) signals must be cross-linked.



#### Do not power up devices when serial link is missing

If the two FG-200 forming a redundant set are powered while the serial link is missing, both devices will behave like independent, non-redundant Primary Devices. If they operated in redundant mode before and therefore have identical configuration information, both will use the same H1 node addresses, which will cause problems on the H1 links. The ERR (error) LED will blink. In this case, remove the power, install the serial link and apply the power again.

#### Primary device vs. secondary device

When using a redundant set of two FG-200, the device which is powered first will operate as primary device. If both devices are powered at the same time, the one with the lower IP address will operate as primary device.

#### Removing the power supply

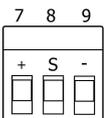
Before you remove the power supply from the primary device make sure the secondary device is operational. In a redundant set of FG-200, removing the power supply, the Ethernet cable or the redundancy link interface cable from the primary device causes a redundancy change-over. Before doing so, make sure that the secondary device is operational (and not still booting due to a prior change-over). Otherwise the system breaks down or the configuration information might get lost. Therefore wait at least one minute between such checks.

### 3.1.9 Connecting FF-H1 interfaces

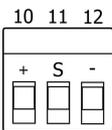
Connect the H1 links to the terminal blocks of the H1 interfaces. Since the FG-200 does not provide power to the H1 links, a power conditioner and a bus termination is required for each H1 link. When using a redundant set of two devices, make sure to connect each H1 link to the same channel (CH 1 .. CH 4) on both FG-200s.

The FG-200 provides four Foundation Fieldbus H1 interfaces. These interfaces are named CH1 to CH4 and are used to connect an FF-H1 bus to the FG-200.

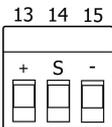
#### FF H1 bus line channel 1

| CH1   | Pin | Signal | Description     |
|---|-----|--------|-----------------|
|  | 7   | +      | Fieldbus +      |
|   | 8   | S      | Fieldbus shield |
|   | 9   | -      | Fieldbus -      |

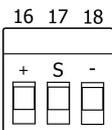
#### FF H1 bus line channel 2

| CH2  | Pin | Signal | Description     |
|--|-----|--------|-----------------|
|  | 10  | +      | Fieldbus +      |
|  | 11  | S      | Fieldbus shield |
|  | 12  | -      | Fieldbus -      |

#### FF H1 bus line channel 3

| CH3   | Pin | Signal | Description     |
|---|-----|--------|-----------------|
|  | 13  | +      | Fieldbus +      |
|   | 14  | S      | Fieldbus shield |
|   | 15  | -      | Fieldbus -      |

#### FF H1 bus line channel 4

| CH4   | Pin | Signal | Description     |
|---|-----|--------|-----------------|
|  | 16  | +      | Fieldbus +      |
|   | 17  | S      | Fieldbus shield |
|   | 18  | -      | Fieldbus -      |



#### Note

The fieldbus shield is not connected directly to functional earth. For EMC reasons, it is only connected via a capacitor. If a direct connection to functional earth or protective earth is required, you need to implement this separately.

### 3.1.10 Powering up the device

Turn on the power supply. The boot process takes a few seconds. For indication of proper operation of a FG-200 refer to [LED status indicators](#)<sup>(56)</sup>.

### 3.1.11 Adding a second FG-200 to form a redundant set of FG-200

For adding a second FG-200 to an already commissioned FG-200 that is operating in the role "Primary, no backup", the following steps are required:

1. Set the IP configuration (IP address and subnet mask) of the second FG-200 using the same IP subnet as the primary device (see [Configuration](#)<sup>(25)</sup>).
2. Connect the H1 links to the terminal blocks of the H1 interfaces. Make sure to connect each H1 link to the same channel (CH 1 .. CH 4) on both FG-200s.
3. Connect the second FG-200 to the Ethernet switch or hub.
4. Connect both RDL interfaces as mentioned in Section [FG-200 redundancy](#)<sup>(21)</sup>.
5. Connect the second FG-200 to a 24 V DC power supply. Use different or redundant power supplies for redundant FG-200s.
6. After turning on the power supply the boot process takes approx. 50 seconds.
7. The second FG-200 will take over the configuration data from the primary device and will start operation in the role "secondary". For more details about proper operation as a secondary device see also the [LED status indicators](#)<sup>(56)</sup>.



#### Hint

Refer to Section [FG-200 redundancy](#)<sup>(21)</sup> for more information on the redundancy concept.

### 3.2 Software installation

When you install a Softing product for the first time, you will be asked if you trust the publisher. Activate the option **Always trust software from Softing AG** if you do not want to be asked in subsequent installations and select **[Install]** to start the installation.

1. Go to the [FG200 product page](#) to download the latest product software.
2. Start by downloading and installing the **Search and Configure** tool.
3. Follow the on-screen installation instructions.
4. Read the license agreement carefully.  
If you have questions, you can **[Cancel]** the installation at this point and contact us. Click **[Print]** if you want to print the license agreement to a PDF or on a printer.
5. Select **I accept the terms in the license agreement** and click **[Next]**.
6. Click **[Install]** to install the selected software application on your PC.  
While the installation is in progress, the status bar of the installation wizard shows the different steps that are being executed. If you want to abort the installation, click **[Cancel]** button. The installation wizard will undo all modifications that have been made to your computer up to this point. Otherwise, wait until the installation is completed.
7. Press **[Finish]** to complete the installation and exit the wizard.



**Note**

Proceed with the installation of the other software packages.

#### Additional installations

Depending on your use case, install one of the following software packages:

- Install the FDT frame application **PACTware** if you are using FDT technology. The PACTware package includes the communication DTM **FFdtm**.
- Install **FFdtm** if you prefer using a different FDT frame application such as FieldCare, FieldMate or others to allow using a CommDTM in another FDT frame application.
- Install **Communication Configuration Tool** (comConf) for a complete network configuration.

## 4 Configuration

The FG-200 is delivered with the pre-configured IP address 192.168.0.10.



### Note

Before connecting the FG-200 to your LAN network, make sure that its IP address is not used by another network station. To assign a new IP address to your PC, you must have administrator rights.

1. Open a browser (e.g. Internet Explorer or Firefox).
2. Enter the URL address **192.168.0.10** and press **Enter**.
3. Login with the following data:  
login name: **administrator**  
login password: **fgadmin**
4. Select **Configuration** → **Settings** → **Internet Protocol**.
5. Change **IP Address** and **Subnet Mask**.
6. Click [**Change Settings and Reboot**]

Configuration > Settings > Internet Protocol

| Change Settings                         |                                  |
|---|----------------------------------|
| Obtain an IP Address from a DHCP Server | <input type="radio"/>            |
| Specify an IP Address                   | <input checked="" type="radio"/> |
| Hostname                                | FG200-FF/HSE Modbus              |
| IP Address                              | 172.17.210.109                   |
| Subnet Mask                             | 255.255.0.0                      |
| Default Gateway                         | 172.17.0.160                     |

Change Settings and Reboot    Read Current Values

7. The FG-200 performs a reboot.

## 5 Working with the FG-200 HSE/FF Modbus

### 5.1 FG-200 acts as a Modbus / FF-H1 Gateway

Main purpose: PLC with Modbus interface accesses IO parameters of FF-H1 field devices

FG-200 supports access to IO parameters of FF-H1 field devices via [client/server connections](#)<sup>61</sup> (CLT/SRV connections) and via [publisher/subscriber links](#)<sup>60</sup> (PUB/SUB links).

When accessing device IO parameters it is not possible to mix CLT/SRV connections and PUB/SUB links. For the selection of the communication mode see below.

#### 5.1.1 FG-200 acts as link active scheduler

If FG-200 acts as a [link active scheduler](#)<sup>60</sup>, no other FF host system is connected to the H1 segment.

For accessing field device parameters CLT/SRV connections as well as PUB/SUB links can be used. PUB/SUB links are the standard way for accessing IO parameters in FF installations. If you want to use PUB/SUB links, you have to configure them using the configuration tool comConf. For more information see the [Configuration Communication Tool User Guide](#).

As there is no other FF host system you have to download the function block schedule into the field devices. You can generate the function block schedule and download it to the field devices by means of comConf.

Before you go online with the comConf update your general settings in the FG-200's web interface. Go to **Configuration → Settings → General Settings**:

Configuration > Settings > General Settings

| General Settings              |                                     |
|-------------------------------|-------------------------------------|
| Enable automatic VCR Creation | <input checked="" type="checkbox"/> |
| Display Blocks                | <input type="checkbox"/>            |
| Enable HSE Alarms             | <input type="checkbox"/>            |
| Link Master Functionality     | <input checked="" type="checkbox"/> |
| Visitor Mode                  | <input type="checkbox"/>            |
| Enable Modbus                 | <input type="checkbox"/>            |
| Enable RTU                    | <input type="checkbox"/>            |

If you have changed your settings click **[Change Settings]** to apply the new values. For more configuration details, see the [Configuration Communication Tool User Guide](#).

#### 5.1.2 FG-200 acts as visitor host

In this case the FG-200 is connected to an H1 segment that is controlled by another FF host system. The links between the FF field devices and the FF host system are working. The FG-200 is not allowed to disturb the operation by reconfiguring working communication paths.

The FG-200 is just allowed to use CLT/SRV connections for reading [contained parameters](#)<sup>61</sup> and function block output parameters. The parameters to be read have to be configured in the Softing Configuration Communication Tool (comConf). See the [comConf User Guide](#) for more details.



#### Important Note

If the FG-200 acts as a visitor host, no comConf project must be downloaded into the FG-200 and the field devices.

### Parameter settings

- Make sure **Enable automatic VCR Creation** is activated.
- Activate or deactivate **Link Master Functionality** depending on the following presumptions:

For this scenario we recommend configuring the Node Address within the range from 252 to 255 for the FG-200. If you want prevent the FG-200 to take an active role in the H1 segments, deactivate **Link Master Functionality**. Usually this is not required if the H1 bus parameters used in the control system are not too slow.

If **Link Master Functionality** is activated make sure that all activated H1 links of the FG-200 are connected to H1 segments with an active host system interface. Otherwise the FG-200 would wait for a 6 minute period for activity on the H1 segments and would then disable the segments without activity i.e. the segments without an active host interface.

### 5.1.3 Configuring the Modbus mapping table

The FG-200 supports the mapping of a set of function block parameters to Modbus registers. The set of available parameters depends on the type of communication (PUB/SUB links or CLT/SRV connections) used for transferring IO data.

The FG-200 selects PUB/SUB links or CLT/SRV connections depending on the downloaded comConf project.

#### Perform mapping on the web server application

Prerequisite: You have downloaded the comConf project.

1. Open the web browser and login.
2. Go to **Configuration → Fieldbus → Blocks** and click **[Reload Live List]**.
3. Select **Configuration → Fieldbus → Devices**.
4. Load the .csv file with the Modbus mapping. Select **Configuration Modbus Mapping Import/Export**. Click **[Import]** and load the file generated by comConf.

Mapped values are now accessible in the configured Modbus registers and can be accessed by a Modbus control.

### 5.1.4 Modbus statistics counter

You can get additional statistic information concerning the Modbus communication state by reading the Modbus registers:

| Modbus Holding Register (addresses base 0) | Modbus Holding Register (addresses base 1) | Meaning  |
|--|--|--|
| 9000                                       | 9001                                       | Redundancy Role: 0: Primary 1: Secondary                           |
| 9001                                       | 9002                                       | Number of received Modbus TCP requests                             |
| 9002                                       | 9003                                       | Number of sent Modbus TCP responses                                |
| 9003                                       | 9004                                       | Number of received Modbus TCP requests with encoding errors        |
| 9004                                       | 9005                                       | Number of received Modbus RTU requests                             |
| 9005                                       | 9006                                       | Number of sent Modbus RTU responses                                |
| 9006                                       | 9007                                       | Number of received Modbus RTU requests with encoding or CRC errors |
| 9007                                       | 9008                                       | Number of current open Modbus TCP sessions                         |
| 9008                                       | 9009                                       | Total number of Modbus TCP sessions                                |
| 9009                                       | 9010                                       | Timestamp for starting Modbus TCP statistic collection             |
| 9010                                       | 9011                                       | Time stamp for starting Modbus TCP statistic collections           |



**Note**

Statistic values from Modbus registers 9001 – 9010 are identical to information available on web pages **Diagnostics → Advanced → Modbus Statistics → TCP** and **Diagnostics → Advanced → Modbus Statistics → Serial**.

Statistic counter values can be reset via web pages.

## 5.2 FG-200 acts as a FF-HSE/ FF-H1 gateway

### 5.2.1 FG-200 acts as an H1 interface used by Emerson AMS System

Emerson provides its AMS Device Manager for calibration, diagnostics and device configuration for various fieldbus technologies. Using the FG-200 enables AMS Device Manager to access FF-H1 devices. As a precondition it is necessary to enable FF-HSE interface in the AMS Device Manager and integrate the FF device descriptions of the FG-200 (CFH-File) and the H1 Devices that have to be accessed.

In order to use the FG-200 the following general settings have to be done via the webserver interface:

#### Configuration > Settings > General Settings

| General Settings              |                                     |
|-------------------------------|-------------------------------------|
| Enable automatic VCR Creation | <input checked="" type="checkbox"/> |
| Display Blocks                | <input type="checkbox"/>            |
| Enable HSE Alarms             | <input type="checkbox"/>            |
| Link Master Functionality     | <input checked="" type="checkbox"/> |
| Visitor Mode                  | <input type="checkbox"/>            |
| Enable Modbus                 | <input type="checkbox"/>            |
| Enable RTU                    | <input type="checkbox"/>            |

#### Configuration > Settings > LD Settings

| Linking Device Settings             |                         |
|-------------------------------------|-------------------------|
| PD Tag                              | FG200_For_AMS_Interface |
| Link ID 1 (Range 0,1000-FFFF)       | 1000                    |
| Link ID 2 (Range 0,1000-FFFF)       | 1001                    |
| Link ID 3 (Range 0,1000-FFFF)       | 1002                    |
| Link ID 4 (Range 0,1000-FFFF)       | 1003                    |
| Node Address (Range 16-247,252-255) | 16                      |

Make sure **Enable automatic VCR Creation** is activated. Otherwise no access to H1 device parameters would be necessary.

Additional settings depend on the user scenario:

#### Offline access (Standalone network FG-200 and H1 devices)

In this scenario the FG-200 would be the primary host device and **Link Master Functionality** is activated. In addition we recommend disabling the **Visitor Mode** and setting Node Address to 16 or 17. Make sure all required H1 Links are activated i.e. a Link ID  $\geq 0x1000$  is assigned for those links.

#### Access in field (H1 devices are used as part of a control system)

For this scenario we recommend configuring the Node Address within the range from 252 to 255 for the FG-200. If you want prevent the FG-200 to take an active role in the H1 segments, deactivate **Link Master Functionality**. Usually this is not required if the H1 bus parameters used in the control system are not too slow.

If **Link Master Functionality** is activated make sure that all activated H1 links of the FG-200 are connected to H1 segments with an active host system interface. Otherwise the FG-200 would wait for a 6 minute period for activity on the H1 segments and would then disable the segments without activity i.e. the segments without an active host interface.

### H1 Device Alarms

AMS Device Manager supports monitoring a subset of H1 device alarms. To make use of this functionality you need to enable this feature in the AMS Device Manager and to configure the FG-200 and the attached H1 devices accordingly. Note that within AMS Device Manager alarms are designated as "Alerts". Activate this setting with **Enable HSE Alarms** in the General Settings web page of the FG-200.

We recommend activating **Visitor Mode** in the **General settings** web page. Thus you disable the alarm configuration of H1 devices. This would prevent an impact on an existing device configuration but could lead to situations where it is not possible to receive alarms from some H1 devices. To display which devices are affected go to **Configuration → Fieldbus → Device** and search in column "Alarm configured" for the respective device.

AMS Device Manager is supporting standard Fieldbus Foundation alarm messaging using the UDP protocol, but it has an preconfigured UDP multicast address (239.255.0.33) and UDP port (45000) for the reception of the alarm messages. This is used as default in the FG-200 but could be altered if a future AMS Device Manager version would expect a different multicast address or UDP port by changing the settings in the following web page.

Configuration > Fieldbus > Advanced > Network Parameters > HSE

| Settings                   |              |
|----------------------------|--------------|
| Alarm Distribution Address | 239.255.0.33 |
| Alarm Distribution Port    | 45000        |

## 6 Using the web interface

After an IP connection between PC and FG-200 has been set up as described in [Configuration](#)<sup>(25)</sup>, you may access the FG-200 from your PC by means of a web browser that supports JavaScript (e.g. Microsoft Internet Explorer).

The internal web server of the FG-200 offers the possibilities to configure the device (such as IP address settings or Modbus mapping), to get diagnostic information on the fieldbus or Modbus as well as to monitor process values of the connected field devices.

### 6.1 Login to webserver

1. Start your web browser with the URL <http://192.168.0.10>. You are prompted to log in with username and password.
2. Enter **administrator** in the field **Username**.
3. Enter **fgadmin** in the **Password** field (default setting - refer also to [Settings - User Accounts](#)<sup>(39)</sup>). The start page is opened - in our example the Information page (refer to [Homepage submenu](#))<sup>(46)</sup>. Depending on the web browser you are using the information presentation may vary slightly:



The menu bar on the left side offers three main menus and several submenus:

- [Information menu](#)<sup>(32)</sup>
- [Diagnostics menu](#)<sup>(33)</sup>
- [Monitor menu](#)<sup>(35)</sup>
- [Configuration menu](#)<sup>(36)</sup>



#### Note

If you erase the FG-200 configuration, the password is reset to its default value.

## 6.2 Information menu

The **Information** menu offers the following menu items:

| Menu item      | Functionality   |
|----------------|---|
| <b>Contact</b> | <p>shows you Softing's contact information in case</p> <ul style="list-style-type: none"> <li>▪ you require general information about the product or</li> <li>▪ you need technical support or</li> <li>▪ you like to provide feedback about the product.</li> </ul> <p><b>Softing Industrial Automation GmbH</b><br/>                     Richard-Reitzner-Allee 6<br/>                     85540 Haar / Germany<br/>                     Tel: + 49 89 4 56 56-0<br/>                     Fax: + 49 89 4 56 56-488<br/>                     Internet:     <a href="http://industrial.softing.com">http://industrial.softing.com</a><br/>                     Email:         <a href="mailto:info.automation@softing.com">info.automation@softing.com</a><br/>                     Support:       <a href="mailto:support.automation@softing.com">support.automation@softing.com</a></p> |
| <b>Version</b> | <p>gives you detailed information about the device/system, the base module (mother board) and the H1 module (daughter board) with the four H1 channels.</p> <p>Both modules as well as the entire device are identified by hardware version numbers and serial numbers. The firmware version and the system id, a manufacturer-specific identifier for the system, are also indicated.</p>  |
| <b>Manual</b>  | <p>provides access to information on how to use the web server. Click <b>[Device Manual]</b> to open the FG-200 HSE/FF Modbus User Manual.</p>  |
| <b>Notices</b> | <p>informs you about the open Source Declaration and the open source software packages used in conjunction with FG-200 HSE/FF Modbus.</p> <p><b>Open Source Declaration:</b><br/>                     The FG-200 HSE/FF Modbus uses the following open source software packages:</p> <ul style="list-style-type: none"> <li>▪ - eCosPro V3.1.41</li> <li>▪ - jQuery V1.7.2</li> </ul> <p>The license declarations and links to source codes for these components are available on the following webpage:<br/> <a href="http://opensource.softing.com/IA/FG-200FF/V1/">http://opensource.softing.com/IA/FG-200FF/V1/</a></p>   |

## 6.3 Diagnostics menu

Click **Diagnostics** to open the following menus:

- [System](#) <sup>(33)</sup>
- [Internet Protocol](#) <sup>(33)</sup>
- [Fieldbus](#) <sup>(34)</sup>
- [Advanced](#) <sup>(34)</sup>

### 6.3.1 System

Click **System** to display system information about the operating system and the hardware status:

- Operating State: operational, good, ...
- System Uptime: Time elapsed since the FG-200 has been booted.
- Memory load: Percentage of memory used.

| Operating System |                |
|------------------|----------------|
| Operating State  | Good           |
| System Uptime    | 4d 23h 28m 49s |
| Hardware State   |                |
| Memory Load      | 8              |
| Flash Load       | 26             |

### 6.3.2 Internet Protocol

Click **Internet Protocol** to display detailed information about the addresses used:

MAC Address: number that acts like a name for the network adapter

IP Address: IP address of the FG-200

IP Address (redundant device):

IP address of the redundant FG-200. Empty if the FG-200 operates in non-redundant mode.

Subnet Mask: IP subnet mask

Default Gateway: Address of the IP gateway to other subnets

Redundancy State: Current role in a redundant set of FG-200; the following values are possible

- Primary, no backup
- Primary
- Secondary

| Internet Protocol            |                    |
|------------------------------|--------------------|
| MAC                          | 00:06:71:2d:00:1a  |
| IP Address                   | 172.17.11.26       |
| IP Address(redundant Device) | Not detected       |
| Subnet Mask                  | 255.255.0.0        |
| Default Gateway              | 0.0.0.0            |
| Redundancy State             | Primary, no backup |

### 6.3.3 Fieldbus

Fieldbus segment diagnostics are provided to give you a quick view of what is attached to the FG-200. It shows how many segments are active. Two tables are displayed: The first table shows the information about the FG-200, the PD Tag as well as the Device ID. The PD Tag can be modified in the [LD Settings submenu](#)<sup>(39)</sup> page. The second table shows which segment (H1 Link) of the FG-200 is occupied and how many FF-H1 devices are connected to each segment. Additionally, for each available FF-H1 device the tag name is shown. This table provides a simple live list of the FF-H1 network. To update this list click the **Fieldbus** menu again.

System and Segment status in detail:

- PD Tag (Physical Device Tag): a unique, configurable and system-dependent name for the device.
- Device ID is set to a unique value for each individual device by the device manufacturer.
- Online: indicates whether a device is online or not.
- Devices: shows number of devices online (including the FG-200).

For each FG-200 up to four H1 Links (segments) are available. And under each H1 Link up to 16 H1 devices are possible.

The following example shows that in segment 1 the FG-200 plus four field devices are online and in segment 3 the FG-200 plus five field devices are online. In the segments 2 and 4 only the FG-200 is online.

**Diagnostics > Fieldbus**

| PD Tag      | FG200_Modbus108                  |           |           |           |
|-------------|----------------------------------|-----------|-----------|-----------|
| Device ID   | 1E6D114210-00-FG200-000150400108 |           |           |           |
| Description | Segment 1                        | Segment 2 | Segment 3 | Segment 4 |
| Online      | ✔                                | ✔         | ✔         | ✔         |
| Devices     | 5                                | 1         | 6         | 1         |

### 6.3.4 Advanced

The Advanced submenu contains additional statistics information. Refer to [Diagnostics - Advanced submenus](#)<sup>(67)</sup> in the Appendix for a detailed description of the different web pages.

## 6.4 Monitor menu

The **Monitor** menu offers the following menu items:

- [Point Pages submenu](#) <sup>(35)</sup>
- [Point Data submenu](#) <sup>(35)</sup>

### 6.4.1 Point Pages submenu

Point Pages displays the output of FF function blocks (value and status) on one or more web pages. Multiple pages can be configured to fit the application and to keep track of the different parts of the plant.

Click **Point Pages** to select the desired part of data. It may be displayed in one or more rows or sites.

pointpage\_0 ▾

| Segment | Device         | Block | Block Desc | Parameter  | Point      | Name | Description | Value      | StatusDescription                         | Status | StatusIcon |
|---------|----------------|-------|------------|------------|------------|------|-------------|------------|---|--------|------------|
| 4       | SoftingDevice2 | MAI   |            | MAI .OUT_1 | MAI .OUT_1 |      |             | 892.109985 | GoodNonCascadeNonSpecific                 | Good   | 🟢          |
| 4       | SoftingDevice1 | AI    |            | AI .OUT    | AI .OUT    |      |             | 87.000000  | GoodNonCascadeUnacknowledgedAdvisoryAlarm | Good   | 🟢          |
| 4       | SoftingDevice1 | DI    |            | DI .OUT    | DI .OUT    |      |             | 0x00       | GoodNonCascadeNonSpecific                 | Good   | 🟢          |



#### Hint

The initial value in column "StatusDescription" is shown offline until a value has been received after the first call-up of this point page.

If a device to which this point page value has been assigned is not online, the text "Unknown Device" in column "Device" is displayed and in "StatusDescription" appears "Offline" for this specific point.

In this case check whether the H1 devices configuration has been changed. Perform a Reload Live List as described in [Blocks submenu](#) <sup>(47)</sup>.

### 6.4.2 Point Data submenu

Click **Point Data** to display all data items from all point pages.

| Segment | Device         | Block | Block Desc | Parameter  | Point      | Name | Description | Value      | StatusDescription                         | Status | StatusIcon |
|---------|----------------|-------|------------|------------|------------|------|-------------|------------|---|--------|------------|
| 4       | SoftingDevice2 | MAI   |            | MAI .OUT_1 | MAI .OUT_1 |      |             | 814.109985 | GoodNonCascadeNonSpecific                 | Good   | 🟢          |
| 4       | SoftingDevice1 | AI    |            | AI .OUT    | AI .OUT    |      |             | 9.000000   | GoodNonCascadeUnacknowledgedAdvisoryAlarm | Good   | 🟢          |
| 4       | SoftingDevice1 | DI    |            | DI .OUT    | DI .OUT    |      |             | 0x00       | GoodNonCascadeNonSpecific                 | Good   | 🟢          |

## 6.5 Configuration menu

The **Configuration** menu offers the following menu items:

- [Settings](#)<sup>36</sup>
- [System Maintenance](#)<sup>41</sup>
- [Page Options](#)<sup>44</sup>
- [Fieldbus](#)<sup>46</sup>
- [Modbus](#)<sup>49</sup>



**Note**

Settings performed on the web interface are not automatically transferred from the primary to the secondary FG-200. The secondary FG-200 must also be configured separately.

### 6.5.1 Settings

The **Settings** menu offers the following submenus:

- [General Settings submenu](#)<sup>36</sup>
- [Internet Protocol submenu](#)<sup>38</sup>
- [LD Settings submenu](#)<sup>39</sup>
- [User Accounts submenu](#)<sup>39</sup>

**Configuration > Settings > General Settings**

| General Settings              |                                     |
|-------------------------------|-------------------------------------|
| Enable automatic VCR Creation | <input checked="" type="checkbox"/> |
| Display Blocks                | <input checked="" type="checkbox"/> |
| Enable HSE Alarms             | <input checked="" type="checkbox"/> |
| Link Master Functionality     | <input checked="" type="checkbox"/> |
| Visitor Mode                  | <input type="checkbox"/>            |
| Enable Modbus                 | <input checked="" type="checkbox"/> |
| Enable RTU                    | <input checked="" type="checkbox"/> |

**Change Settings**

#### Enable automatic VCR Creation

If this feature is activated, the FG-200 establishes the VCR connection by itself.

Examples:

- Softing Communication Configuration Tool ComConf: activate
- Emerson AMS™ Software: activate
- NI-FBUS Configuration Tool: deactivate

**Note**

The feature **Enable automatic VCR Creation** has to be activated when the tool comConf is to be used for the Foundation fieldbus configuration.

**Display Blocks**

This feature enables or disables the [point page](#)<sup>35</sup> functionality.

**Hint**

The use of the point pages creates a lot of traffic of the FF-H1 network. If you do not use this Monitor feature then you can save more H1 bandwidth and faster reaction time over Modbus.

**Enable HSE Alarms**

The FG-200 is able to use the already configured alarm VCRs in the FF-H1 devices or can established new ones. Or it will configure the FF-H1 devices accordingly. The behavior depends whether the Visitor Mode is enabled or not.

**Link Master Functionality**

In case of visitor mode it can make sense to disable the Link Master functionality. If no Link Master is available on a segment connected to an activated H1 Link of the FG-200, a timeout will occur after 6 minutes to indicate this. The FG-200 will not be visible in the HSE live list during this period. To avoid this assure that a Link Master is present for all activated H1 Links or deactivate H1 Links of the FG-200.

**Visitor Mode**

When the FG-200 is in visitor mode it can be connected to a running FF-H1 network with the FF-Host system without affecting the established communication.

**Enable Modbus**

This button enables or disables Modbus TCP.

**Enable RTU (Modbus RTU)**

Modbus RTU runs over the same serial interface (RS232) which is necessary to establish an application with HSE device redundancy. To use redundancy together with Modbus TCP the feature "Modbus RTU" has to be disabled.

**Note**

If you are using Modbus TCP, activate the option **Enable Modbus** only.

If you are using Modbus RTU, activate both options **Enable Modbus** and **Enable RTU**.

The button **[Change Settings]** allows you to update the settings. To see the updated values click **General Settings** again.

The FG-200 is delivered in a default configuration. To change the default internet protocol settings to assigned values of the chosen subnet in which the installation is running, select **Configuration**, then **Internet Protocol**.

A table enabling you to change settings appears. You can click

- **Obtain an IP address from a DHCP server** to obtain a random address chosen from the DHCP server.  
To find out the IP address of the FG-200 you can use the function **Network Livelist** in the comConf tool. The tool is available on your delivery CD-ROM or can be downloaded from the Softing download area.

or

- **Specify an IP Address** to activate the fields in the table below:
  - Host name: configurable name for the host
  - IP Address: must be compatible with the subnet you choose for the PC setting, must be present in any case.
  - Subnet mask: default with 255.255.0.0, no change needed, must be present in any case.
  - Default Gateway: It is not necessary to configure a Default Gateway if the host and FG-200 share the same network.

| Change Settings                         |                                  |
|---|----------------------------------|
| Obtain an IP Address from a DHCP Server | <input type="radio"/>            |
| Specify an IP Address                   | <input checked="" type="radio"/> |
| Hostname                                | FG200-FF                         |
| IP Address                              | 172.17.210.109                   |
| Subnet Mask                             | 255.255.0.0                      |
| Default Gateway                         | 172.17.0.160                     |

**[Change Settings and Reboot]**

When you click this button, the web site shuts down and the system reboots. The input values are checked for consistency. In case of problems the following error may be displayed: Failure: Wrong IP Settings.

The FG-200 reboots after a few seconds and the new values are accepted.

If you change the IP address of the FG-200, the IP connection between PC and FG-200 are lost. You have to use the new IP address to re-establish web access to the FG-200.

If all parameters are correct, the new values are accepted and displayed.

**[Read Current Values]**

If you changed some of the parameters and you are not sure of your changes, click the button **[Read Current Values]**. Input fields which are already filled are shown again.

The LD Settings submenu allows to change

- the PD-Tag of the FG-200
- the Link ID as well as
- the Node Address of the H1 links.

Each FG-200 uses a default PD tag that includes the serial number. The default PD Tag is also used if the configuration is erased via the web server interface or during firmware download.

Configuration > Settings > LD Settings

| Linking Device Settings             |             |
|-------------------------------------|-------------|
| PD Tag                              | FG210_DE109 |
| Link ID 1 (Range 0,1000-FFFF)       | 0000        |
| Link ID 2 (Range 0,1000-FFFF)       | 0000        |
| Link ID 3 (Range 0,1000-FFFF)       | 0000        |
| Link ID 4 (Range 0,1000-FFFF)       | 1000        |
| Node Address (Range 16-247,252-255) | 16          |

Change Settings

This menu allows you to change and confirm account passwords depending on the role. Due to the tasks a user executes in this web site there are several graduations for admission control. The following standard logins and passwords are available.

| Role                            | Login name    | Password    |
|---------------------------------|---------------|-------------|
| Administrator                   | administrator | fgadmin     |
| Service or maintenance engineer | maintenance   | keepitgoing |
| User or operator                | operator      | runit       |
| Executive                       | executive     | showme      |

These passwords can be configured with administrator rights in the following window:

Configuration > Settings > User Accounts

| Change Password            |                      |
|----------------------------|----------------------|
| New Administrator Password | <input type="text"/> |
| Confirm                    | <input type="text"/> |
| New Maintenance Password   | <input type="text"/> |
| Confirm                    | <input type="text"/> |
| New Operator Password      | <input type="text"/> |
| Confirm                    | <input type="text"/> |
| New Executive Password     | <input type="text"/> |
| Confirm                    | <input type="text"/> |

Change Password

Enter the password into the corresponding field(s), confirm your entry and click **[Change Password]** to confirm the modified password(s).

The following tasks can be executed by the specified role:

| Task                                    | Administrator                       | Maintenance                         | Operator                            | Executive                           |
|---|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| Configure network settings              | <input checked="" type="checkbox"/> |                                     |                                     |                                     |
| Set passwords                           | <input checked="" type="checkbox"/> |                                     |                                     |                                     |
| Set time settings and home page options | <input checked="" type="checkbox"/> |                                     |                                     |                                     |
| Restart applications                    | <input checked="" type="checkbox"/> |                                     |                                     |                                     |
| Monitor process values                  | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Monitor diagnostic values               | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |



**Note**

Be careful when changing the administrator password. If you lose your changed administrator password, you cannot perform any configuration or set up task.

## 6.5.2 System Maintenance

The **System Maintenance** menu offers the following submenus:

- [Restart submenu](#)<sup>(41)</sup>
- [Firmware submenu](#)<sup>(41)</sup>
- [Configuration Backup submenu](#)<sup>(42)</sup>
- [Time submenu](#)<sup>(43)</sup>

Allows you to restart the system:

- Click [**Restart Now**] to restart the system.

Allows you to

- erase an existing firmware configuration and to
- select new firmware file(s):

Configuration > System Maintenance > Firmware

| Download Firmware and Reboot |                          |
|------------------------------|--------------------------|
| Erase Configuration          | <input type="checkbox"/> |
| Select Firmware              |                          |

Download Firmware and Reboot



Do not activate the check box **Erase Configuration** unless you want to set up the complete plant configuration using the comConf tool. When activating, the PD tag is set to an empty string and all passwords are reset to standard passwords (refer to [Login to webserver](#)<sup>(31)</sup> for more information).

1. Click [**Browse**] right beside the **Select Firmware** field and browse to your firmware file. Confirm with [**Open**].
2. Then click [**Download Firmware and Reboot**] to download the firmware file and to reboot the system.

The system performs a firmware file check. The download is started. Messages indicate the current download status. A complete download is indicated as successful and the FG-200 reboots:

**Starting FW download, please don't power off the Linking Device.**

```
Decoding Firmware File... OK, decoded 1897284 bytes
Firmware: "FG-200 Firmware VXXX.0.00.socevatest"
Erasing Flash... OK, programming Flash... OK
Now Updating Backup Image
Erasing Flash... OK, programming Flash... OK
Erasing Configuration... OK
Success: Update Complete!
Rebooting... OK
```



**Note**

Do not access the web server of the FG-200 before the "Success" message is displayed in the browser window. If you do so, you will have to clear the cache of your web browser after the boot process has finished, and then re-establish a connection to the web server of the FG-200.

The end of the boot process is indicated by a continuously lit RUN LED for a FG-200 acting in non-redundant mode or for a primary device in redundant mode. For a secondary device it is indicated by a flashing (1 Hz) RUN LED.

Allows you to

- restore a selected system configuration,
- save a selected configuration or to
- erase the current configuration:

Configuration > System Maintenance > Configuration Backup

|                              |  |
|------------------------------|--|
| <b>Restore Configuration</b> |  |
| Select Configuration         | Durchsuchen... Keine Datei ausgewählt. |
| Restore Configuration        | Save Configuration Erase Configuration |

**Restore Configuration**

To restore a previously saved configuration click [**Browse**], select the desired configuration file and confirm with [**Open**].

**Save Configuration**

1. To save your current configuration, click [**Save Configuration**]. An additional window is opened asking you to save the file.
2. Click **Save file** and confirm with [**OK**]. The configuration file is saved to your standard download directory.

**Erase Configuration**

To erase an existing configuration and to reset the FG-200 back to factory default settings click [**Erase Configuration**]. This action causes

- the deletion of the current configuration (whereby the IP configuration is not changed),
- passwords to be deleted and to be reset to their default value.



**Important Note**

When clicking [**Erase Configuration**] the configuration is immediately deleted.

Allows you to

- synchronize date and time between PC and device(s) or
- set a specific date and time for your device:

**Configuration > System Maintenance > Time**

| Current Time                         |                                   |
|--------------------------------------|-----------------------------------|
| Your PC's Time                       | Fri Aug 28 2015 13:43:52 GMT+0200 |
| FG-200 FF Time                       | Sat Jan 01 1972 01:11:21 GMT+0100 |
| Difference                           | -1377689551 seconds               |
| Set Time                             |                                   |
| Time Synchronized by HSE SNTP Server | Not configured                    |
| Set with PC                          | <input checked="" type="radio"/>  |
| Manual Entry                         | <input type="radio"/>             |
| Date (mm/dd/yyyy)                    |                                   |
| Time (hh:mm:ss)                      |                                   |

**Set Time**



#### Note

If an SNTP server is configured, you cannot modify date and time due to automatic time synchronization.

**Current Time** displays

- current time on your PC,
- time on the Softing FG-200 and
- difference between the current PC time and the time on the FG-200.

**Set Time** allows you to

- synchronize the current PC time and the time of the FG-200. Activate **Set with PC** and then click **[Set Time]**. The synchronized time will appear in the table.  
If the FG-200 is connected to a network and if you want to use this feature, you can select a timeserver at your facility or one near you geographically to ensure accurate time adjustments. The device will function properly with this feature disabled but data time stamps are less accurate and time updates must be entered for each FG-200  
or
- set the time manually. To do so, activate **Manual Entry**, then click into the corresponding field **Date** and **Time** and enter the desired values. Confirm your changes by clicking **[Set Time]**. Your entries are then activated.

### 6.5.3 Page Options

The **Page Options** menu offers the following submenus:

- [Point Pages submenu](#) <sup>44</sup>
- [Point Columns submenu](#) <sup>45</sup>
- [Home Page submenu](#) <sup>46</sup>

Point Pages provide a means to view the Output of a Function Block and its status on one or more web pages. It allows to create pages to select information of your whole plant. Multiple pages can be configured to fit the application.

1. Click **Point Pages** to display the current list of Point Pages.

Configuration > Page Options > Point Pages

Save Changes   New Point Page

| Name        | Up | Down | Delete | Edit |
|-------------|----|------|--------|------|
| pointpage_0 |    |      | Delete | Edit |
| pointpage_1 |    |      | Delete | Edit |
| pointpage_2 |    |      | Delete | Edit |

**[Save Changes]** saves your changes.

**[New Point Page]** inserts a new point page line (ascending number, maximum of 20 pages).

**Up** and **Down** sort the selected page into the order you desire (up or downwards).

**[Delete]** deletes the selected page.

**[Edit]** allows to edit the selected point page content. A new window is opened:

Configuration > Page Options > Point Pages

Point Page: pointpage\_0

Save Changes   New Point   Switch to PP Overview

| Point      | Name | Description | Up | Down | Delete |
|------------|------|-------------|----|------|--------|
| MAI .OUT_1 |      |             |    |      | Delete |
| AI .OUT    |      |             |    |      | Delete |
| DI .OUT    |      |             |    |      | Delete |

You can insert a new point with **[New Point]**, edit the selected point, sort the list and delete the point.

## Columns and their meaning

|                                |  |
|--------------------------------|--|
| <b>Point</b>                   | lists the Blocks with OUTPUT parameters (e.g. AI, DI, PID, AO.BKCAL_OUT, AO.BKCAL_OUT). To open the list of configured points click on the arrow right beside the point. Depending on the selection for usage of cyclic communication (in <b>Configuration</b> → <b>General Settings</b> ) the list will contain only those parameters that are configured to be published cyclically. Maximum number of new points is 20. |
| <b>Name</b>                    | contains the parameter name. You can enter any name such as a plant or system tag name for an I/O parameter. Maximum length is 32 characters.  |
| <b>Description</b>             | contains the user description of the parameter name.   |
| <b>[Save Changes]</b>          | saves your changes. To display the new or modified values click <b>[Switch to PP Overview]</b> .   |
| <b>[Switch to PP Overview]</b> | switches back to the main point pages overview window.   |

The point columns submenu opens a table allowing you to enable or disable various point columns. Thus you are able to build the specific point page format you need.

Activate the desired column to make it appear in the point page:

| Columns            | Enable / Disable                    |
|--------------------|-------------------------------------|
| Segment            | <input checked="" type="checkbox"/> |
| Device             | <input checked="" type="checkbox"/> |
| Block              | <input checked="" type="checkbox"/> |
| Block Description  | <input checked="" type="checkbox"/> |
| Parameter          | <input checked="" type="checkbox"/> |
| Point              | <input checked="" type="checkbox"/> |
| Name               | <input checked="" type="checkbox"/> |
| Description        | <input checked="" type="checkbox"/> |
| Value              | <input checked="" type="checkbox"/> |
| Point Status       | <input checked="" type="checkbox"/> |
| Status Description | <input checked="" type="checkbox"/> |
| Status Icon        | <input checked="" type="checkbox"/> |

Set Point Columns

Any deselected point column is disabled and does not appear in the point page (refer also to [Point Pages submenu](#)<sup>(35)</sup> in the **Monitor** menu).

The homepage submenu opens a table allowing you to set the start page of the FG-200 HSE/FF Modbus web interface to one of the following four pages:

- Information - Contact
- Diagnostics - Fieldbus
- Monitor - Point Monitor
- Monitor - Point Pages

Configuration > Page Options > Home Page

| Set Homepage            |                                  |             |
|-------------------------|----------------------------------|-------------|
| Information > Contact   | <input checked="" type="radio"/> |             |
| Diagnostics > Fieldbus  | <input type="radio"/>            |             |
| Monitor > Point Monitor | <input type="radio"/>            |             |
| Monitor > Point Pages   | <input type="radio"/>            | pointpage_0 |

Set Homepage

Select the desired homepage and confirm your selection with **[Set Homepage]**. The next time you log in into your web interface it is opened with the new start page.

If you select **Monitor > Point Pages** you need to select the specific point page you want to be opened from a list.

### 6.5.4 Fieldbus

The **Fieldbus** menu offers the following submenus:

- [Devices submenu](#) <sup>46</sup>
- [Blocks submenu](#) <sup>47</sup>
- [H1 Parameter submenu](#) <sup>48</sup>
- [HSE submenu](#) <sup>48</sup>

The devices submenu opens a table displaying the devices that are connected to the FG-200. The table shows which segment from the FG-200 is connected to how many devices. The devices are displayed with their H1 Node Address, their Device ID and their PD Tag.

**Precondition:** You have activated **Enable HSE Alarms** in **Configuration → Settings → General Settings**.

Additionally there is information about the alarm VCR (VCR address) and the status of the alarm (alarm sending in the H1 device and transferring the alarm from the FG-200 to HSE).

The column Alarm VCR displays the configured H1 endpoint address used for the reception of the alarms.

-  indicates that alarm sending is configured.
-  indicates that no alarm could be configured or - in Visitor mode only - a different endpoint is configured already to the device which must not be overwritten.

## Configuration &gt; Fieldbus &gt; Devices

| Segment | Node | Device ID                    | PD Tag         | Alarm VCR | Alarm Configured |
|---------|------|------------------------------|----------------|-----------|------------------|
| 4       | 21   | 1E6D1100FF_____FBK_110703104 | SoftingDevice1 | 0x27f     |                  |
| 4       | 22   | 1E6D110C00 FBK2____110703011 | SoftingDevice2 | 0x27f     |                  |

Update Alarm VCR

Last Update: Fri Sep 18 2015 10:12:00 GMT+0200

The fields **Node** and **PD Tag** are display fields and cannot be modified.

Click [**Update Alarm VCR**] to update the list, e.g. after a configuration download. Thus, modified node addresses, PD tags or the communication configuration list will reflect the current H1 segment configuration status. Alternatively you can restart the FG-200 to update settings.

The Block submenu displays the block information of all FF-H1 field devices that are connected to the FG-200. Two filters allow for selecting

**Segment** the list of configured segments.

**Device** list of devices connected.

The table shows the corresponding Block Type, Block Name, Description and whether it is enabled or not. Enabled block types are displayed in the point page in the [Monitor menu](#)<sup>(35)</sup>. By default only those blocks are enabled that have a block name. For vendor-specific blocks the profile number is displayed instead of the name.

When naming blocks (up to 32 ASCII-characters) we recommend assigning self-explanatory names that contain information about the location or type (e.g. analog output, digital input).

## Configuration &gt; Fieldbus &gt; Blocks

Segment: 4 Device: 1E6D1100FF\_\_\_\_\_FBK\_110703104

| Block Type        | Block Name | Description | Enable                              |
|-------------------|------------|-------------|-------------------------------------|
| Resource Block V2 | RB2        |             | <input checked="" type="checkbox"/> |
| Profile: 0x8001   | 32769      |             | <input checked="" type="checkbox"/> |
| Profile: 0x8002   | 32770      |             | <input checked="" type="checkbox"/> |
| Profile: 0x8003   | 32771      |             | <input checked="" type="checkbox"/> |
| Profile: 0x8004   | 32772      |             | <input checked="" type="checkbox"/> |
| Analog Input      | AI         |             | <input checked="" type="checkbox"/> |
| Analog Input      | AI_1       |             | <input checked="" type="checkbox"/> |
| Analog Output     | AO         |             | <input checked="" type="checkbox"/> |
| Analog Output     | AO_1       |             | <input checked="" type="checkbox"/> |
| Discrete Input    | DI         |             | <input checked="" type="checkbox"/> |
| Discrete Output   | DO         |             | <input checked="" type="checkbox"/> |
| PID               | PID        |             | <input checked="" type="checkbox"/> |

Set Tag Reload Live List

Last Update: Fri Sep 18 2015 10:12:01 GMT+0200

[**Set Tag**] changes the block tag in the device according to the modifications performed.

**Note**

If you are working with the configuration tool comConf we recommend **not** to modify tags.

[**Reload Live List**] updates information on the blocks and reloads the live list in the comConf with updated information, e.g. after a configuration download. Thus, modified block tags will reflect the current configuration status. Alternatively you can restart the FG-200 to update information on the blocks.

The H1 Busparameter submenu allows to define parameters for the chosen segment (H1 Link). Click **[Change Settings]** to apply your modifications and download it to the FG-200. If the selected H1 segment is active, the settings would also be downloaded to a secondary FG-200 if the FG-200 is acting as primary in a redundant set.

Configuration > Fieldbus > H1 Busparameter

1 ▾

| Change Settings                |                          |
|--------------------------------|--------------------------|
| Node Address                   | 16                       |
| Primary Link Master            | <input type="checkbox"/> |
| First Unpolled Node            | 37                       |
| Number of Unpolled Nodes       | 186                      |
| Slot Time                      | 8                        |
| Max. Response Delay            | 10                       |
| DLPDPU PHL Overhead            | 3                        |
| Min. Inter-PDU Delay           | 16                       |
| Apply Settings to all Segments | <input type="checkbox"/> |

Change Settings

The HSE submenu allows to specify the **Alarm Distribution Address** and the **Alarm Distribution Port**. These parameters are the Multicast Address and the UDP Port that are used by the FG-200 to forward alarms from H1 devices.



**Note**

The default settings "Address = 239.255.0.33" and "Port = 45000" are required for interoperability with Emerson AMS tool.

Changing these parameters would disable the display of alarm conditions in AMS alert monitoring.

If a different HSE host tool should be used, the parameter could be adapted to the values required by that tool.

Click **[Change Settings]** to apply your modifications.

Configuration > Fieldbus > Advanced > Network Parameters > HSE

| Settings                   |              |
|----------------------------|--------------|
| Alarm Distribution Address | 239.255.0.33 |
| Alarm Distribution Port    | 45000        |

Change Settings

## 6.5.5 Modbus

The FG-200 allows traditional control systems access to H1 fieldbus devices as well as over the serial port RS485 and using TCP/IP. These control systems normally include support for the Modbus communication protocol.

The **Modbus** menu offers the following submenus:

- [Communication submenu](#) <sup>49</sup>
- [Import/Export submenu](#) <sup>50</sup>

The Communication submenu allows to configure the Modbus Communication settings.



### Hint

Before you modify settings make sure that the Modbus function is enabled and all parameters are set to a valid value. Therefore consult the manual of your particular Modbus client and adjust the Modbus configuration accordingly.

Most of the settings are self-explanatory and are related to configuring the serial port to match the settings used by the Modbus Master.

If you are using Modbus TCP/IP over the Ethernet, then the communication settings (baud rate, parity, stop bits) can be ignored.

Click **[Change Settings]** to apply your modifications.

| Settings  |                                  |
|---|----------------------------------|
| One Modbus Address                                    | <input type="radio"/>            |
| Single Address  | 0                                |
| Multiple Modbus Address                               | <input checked="" type="radio"/> |
| Modbus TCP Port                                       | 502                              |
| Baud Rate   | 19200                            |
| Parity None   | Even                             |
| Stop Bits   | 1                                |
| Response Delay Time                                   | 0                                |
| Unmapped Register Read Response                       | Illegal Data Address             |
| Unmapped Register Write Response                      | Illegal Data Address             |
| Write Behaviour                                       | Queued                           |
| Floating Point Representation                         | Float                            |
| Use Swapped Floating Point Format                     | No                               |
| Incorporate Values Associated Status As Error         | Yes                              |
| Value Reported For Error (Floating Point)             | NaN                              |
|   | 0                                |
| Value Reported For Error (Rounded and Native Integer) | 0                                |
| Stale count limit                                     | 4                                |
| Scaled Floating Point Maximum Integer Value           | 65534                            |
| Gain value used for scaled representation             | 1                                |
| Offset value used for scaled representation           | 0                                |

Change Settings

In this submenu you can import a Modbus mapping created by comConf.



**Note**

The Modbus mapping table cannot be specified by the user any longer. Current you import a Modbus mapping created by the Softing ComConf.

**[Export]** Saves the imported Modbus Mapping table.

**[Import]** Imports an existing Modbus Mapping table in csv format.

|                                       |   |
|---------------------------------------|---|
| <b>Import CSV File</b>                |   |
| Select CSV File                       | <input type="button" value="Durchsuchen..."/> Keine Datei ausgewählt. |
| <input type="button" value="Import"/> | <input type="button" value="Export"/>                                 |

## 7 Redundancy mode

Redundancy mode is possible in all environments/use cases where the FG-200 acts as link active scheduler.

Redundancy mode is not possible when FG-200 acts as a visitor host or when the serial RS232 interface of the FG-200 is used for Modbus communication.

### 7.1 Redundancy concept

FOUNDATION fieldbus is a distributed control architecture that provides increased availability compared to centralized control architectures.

To improve the availability of the FG-200 HSE/FF Modbus, it is possible to combine two FG-200s which then form a redundant Linking Device:

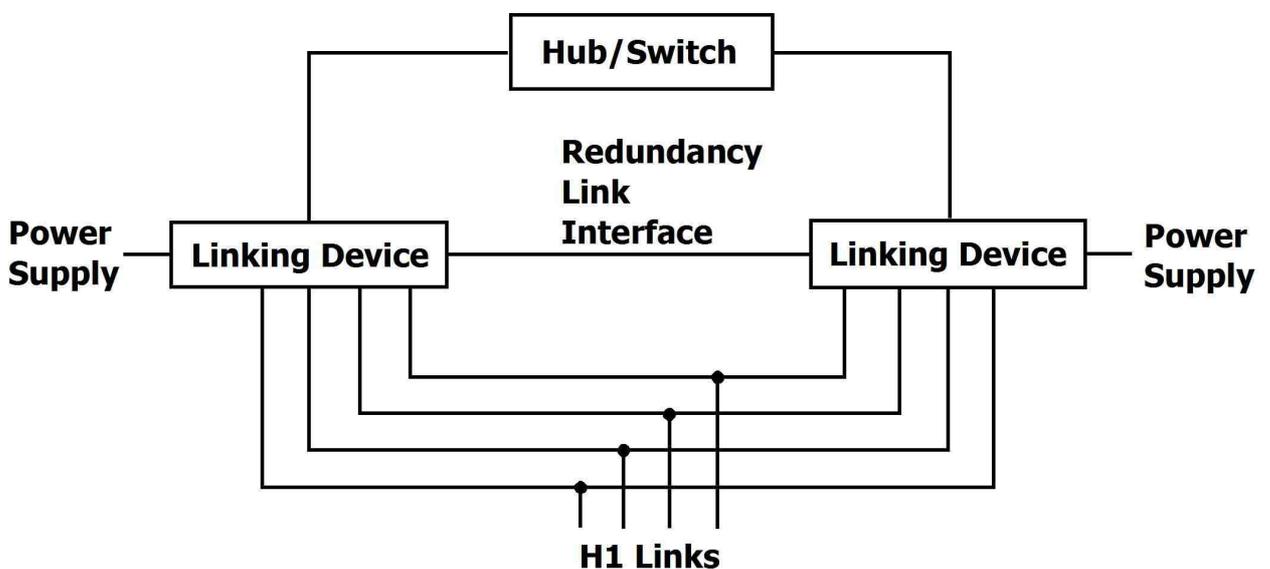


Figure 1: System Topology

A redundant Linking Device (also called "a redundant set of devices") consists of two physical Linking Devices that are connected to the same HSE subnet and to the same H1 links. The redundant set of devices behaves like one logical Linking Device. By duplicating the physical Linking Device, it is possible to tolerate one fault in one of the two devices.

In a redundant set of devices one Linking Device acts as primary device and performs actively all communication functions, including the Link Active Scheduler (LAS) function on the H1 links. In a redundant set it is the primary device that has to be addressed by Hosts and configuration tools.

The second Linking Device, named secondary device, acts as backup device. It receives automatically the same configuration as the primary device, but uses different node addresses on the H1 links and a different IP address on HSE.

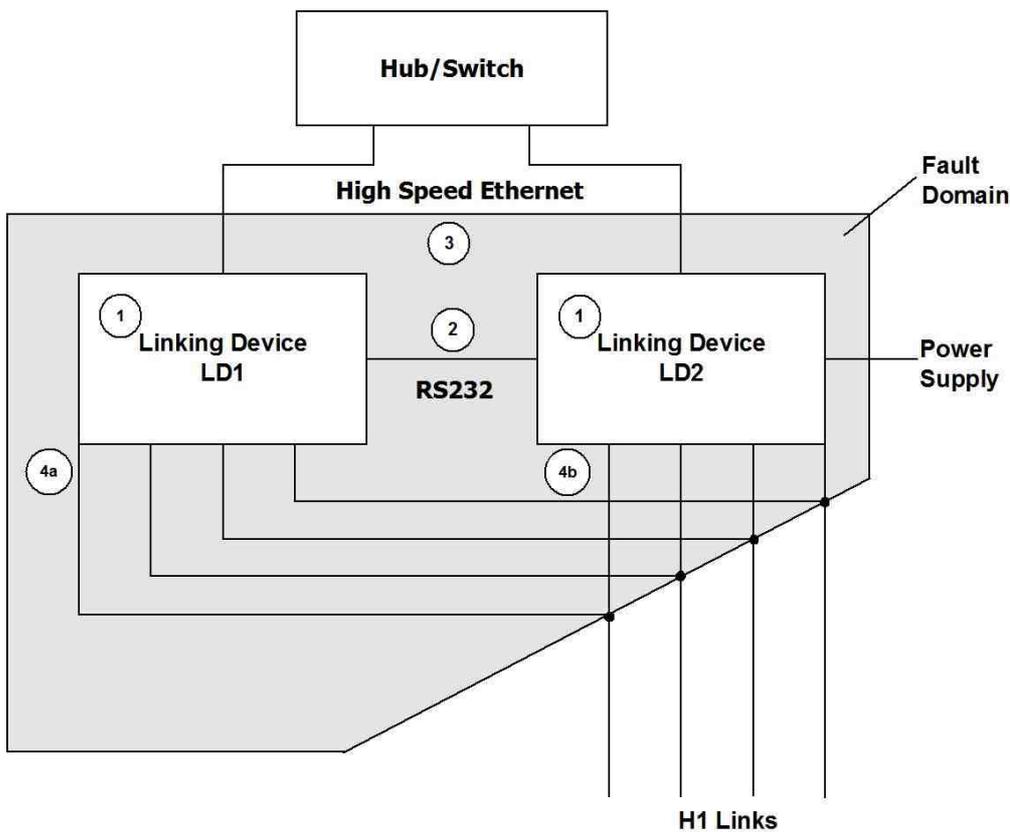
The secondary device is able to take over the function of the primary device if the primary device fails. In that case the Linking Device is reduced to a non-redundant system that is not able to tolerate any further failure. Therefore it is necessary to replace the defective device as soon as possible to recover redundancy.

The secondary device acts as Backup Link Master on each H1 link attempting to take over the LAS role if required. Additional Link Master Devices may be configured to act as Backup Link Master on the H1 links.

The two devices forming a redundant set communicate via a redundancy link interface and via Ethernet. The serial line is used to establish a redundant set of devices, to exchange signs of life, and to control redundancy switch-over, while the Ethernet is used to transfer configuration information from the primary device to the secondary device. Therefore an operational serial communication path and an operational Ethernet path between both devices are required for proper operation.

The two physical Linking Devices forming a redundant set of devices are determined by the serial link between them. Without that serial link, both devices operate like independent, non-redundant Primary Devices.

## 7.2 Fault domain



The shaded area in the figure above shows the fault domain. Faults within the fault domain can be detected and covered by the redundancy features. Those are:

- permanent faults within the Linking Device - (1)
- transient faults within a Linking Device that lead to loss of functions - (1)
- a loss of the serial connection between the two Linking Devices - (2)
- a failure in the Ethernet communication between the two Linking Devices - (3)
- a loss of an H1 connection between the primary device and the entire H1 link; this may be caused by disconnecting an H1 cable from the primary device - (4a) if LD1 acts as primary device; (4b) if LD2 acts as primary device).

Detecting a loss of an H1 connection between the primary device and the entire H1 link requires that at least two H1 devices have been connected to that H1 channel of the Linking Device and have appeared in the H1 Live List before the loss of the connection occurs.

Only one of the listed faults may be present at a time. Another fault cannot be tolerated until the redundant set has been repaired and a fully operational secondary device is available.

The following fault conditions cannot be detected and covered:

- A loss of an H1 connection between the primary device and a subset of devices on an H1 link
- A loss of an H1 connection between the secondary device and the entire H1 link or a subset of devices on an H1 link.

The conditions for a switch-over from the primary device to the secondary device are listed below.

### **Transfer from primary device to secondary device**

The primary device transfers its role to the secondary device

- if** Host system or configuration tool request to transfer the role
- or** the primary device detects a failure of its own Ethernet port
- or** the primary device detects a failure on at least one H1 interface
- or** the primary device detects a loss of the connection to all devices on an H1 link.<sup>1</sup>

<sup>1</sup> This requires that at least two devices have been connected to that H1 channel of the Linking Device and have appeared in the H1 Live List before the loss of the connection occurs.

The secondary device accepts the transfer

- if** its H1 interfaces are operational and faultless
- and** its Ethernet port is operational
- and** it has a valid configuration.

### **Take over of primary role**

The secondary device takes over the primary role

- if** the serial connection to the primary device is lost
- and** it acts as Link Active Scheduler on all configured H1 links
- and** its Ethernet port is operational.

**Restoring redundancy**

Only one of the listed faults may be present at a time. Another fault cannot be tolerated until the redundant set has been repaired and a fully operational secondary device is available.

The required measures for repairing the redundant set of devices depend on the present fault. For an overview refer to Table 15.

| Fault   | Measure of repair                                |
|---|--|
| Permanent fault within the FG-200   | Replacement of the defective FG-200.             |
| Transient fault within the FG-200   | Restart of the FG-200 (performed automatically). |
| Loss of the serial connection between the two FG-200s                       | Re-establishment of the serial connection.       |
| Loss of the Ethernet connection between the two FG-200s.                    | Re-establishment of the Ethernet connection.     |
| Loss of an H1 connection between the Primary Devices and the entire H1 link | Re-establishment of the H1 connection.           |

## 7.3 Configuration of a redundant pair of FG-200

### Webserver interface

Make sure that both FG-200s have a different IP address. Refer to Configure IP address and Modbus parameters for a detailed description.

To realize a redundant pair of FG-200s a serial link between both devices is necessary. Deactivate **Enable RTU**. To do so, go to **Configuration** → **Settings** → **General Settings** in the webserver interface and deselect the option **Enable RTU**.

Configuration > Settings > General Settings

| General Settings              |                                     |
|-------------------------------|-------------------------------------|
| Enable automatic VCR Creation | <input checked="" type="checkbox"/> |
| Display Blocks                | <input type="checkbox"/>            |
| Enable HSE Alarms             | <input type="checkbox"/>            |
| Link Master Functionality     | <input checked="" type="checkbox"/> |
| Visitor Mode                  | <input type="checkbox"/>            |
| Enable Modbus                 | <input checked="" type="checkbox"/> |
| Enable RTU                    | <input type="checkbox"/>            |

Change Settings

After modifying the configuration settings click [**Change Settings**] to apply the new settings and to reboot the FG-200. Make sure to apply these configuration settings on **both** FG-200s.

### Detect primary and secondary FG-200

To detect primary and secondary FG-200 go to **Diagnostics** → [Internet Protocol](#)<sup>33</sup>. In the respective entry in line **Redundancy State** you will see **Primary, no backup** for the primary device and **Secondary** for the secondary device.

Then go to **Diagnostics** → [Fieldbus](#)<sup>34</sup> and note down the **Device ID** for the respective FG-200.

### comConf

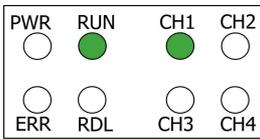
1. To configure a redundant FG-200 with the comConf select the FG-200 within the project manager or topology and open the Properties View.
2. Enter the IP address in the corresponding fields of the secondary FG-200.
3. Save the values with Ctrl+S.
4. From the **Build** menu select the command **Build All** (or press **Alt+F8**).
5. Generate Code for the current segment.
6. Select **Download** → **Download Project**.

### Synchronize Modbus mapping tables

To synchronize Modbus mapping tables of primary and secondary device, import the mapping tables generated with comConf in both the primary and secondary FG-200.

## 8 LED status indicators

The FG-200 is equipped with eight LEDs on its front side:



- PWR** stands for power supply - refer to [PWR - power supply](#)<sup>(56)</sup>
- RUN** stands for running - refer to [Device LED statuses \(PWR, RUN, ERR and RDL\) in stand-alone mode](#)<sup>(57)</sup>
- ERR** stands for error- refer to [Device LED statuses \(PWR, RUN, ERR and RDL\) in stand-alone mode](#)<sup>(57)</sup>
- RDL** stands for redundancy link - refer to [RUN / ERR / RDL - LED statuses in redundant mode](#)<sup>(58)</sup>
- CH1 to CH4** stands for H1 channel 1 to H1 channel 4 - refer to [Status indications of the four H1 channels](#)<sup>(59)</sup>

The LEDs may be on permanently or flash in different colors and frequencies. We use the following symbols:

| Symbol | Color | Lighting                 |
|--------|-------|--------------------------|
|        | none  | off                      |
|        | red   | permanent                |
|        | green | permanent                |
|        | red   | flashing                 |
|        | green | flashing                 |
|        | green | flashing slowly (0.5 Hz) |
|        | green | flashing quickly (5 Hz)  |

### 8.1 PWR - power supply

|  |                 |                           |
|--|-----------------|---------------------------|
|  | permanent green | 24V DC power supply is ok |
|  | off             | no power supply           |

## 8.2 Device LED statuses (PWR, RUN, ERR and RDL) in stand-alone mode

The following table shows possible LED combinations in stand-alone mode:

| LEDs   |  | Meaning  |  |
|--|--|--|--|
| <b>PWR</b><br> green<br> | <b>RUN</b><br><br> | <b>Start-up phase (approximately 7 seconds)</b><br>During this phase redundancy role is determined.  |  |
| <b>ERR</b><br>  | <b>RDL</b><br>  | <b>Non redundant device, ready.</b><br>The device is operational; it is not part of a redundant set. |  |
| <b>PWR</b><br><br>       | <b>RUN</b><br>green<br>   | <b>Permanent hardware fault detection during startup.</b><br>A fatal error has been detected.        |  |
| <b>ERR</b>   | <b>RDL</b>   |  |  |

### 8.3 RUN / ERR / RDL - LED statuses in redundant mode

The redundancy link LED is used to indicate if traffic via the serial line is performed. It will flash green if a valid message is received. It will switch to red if serial communication is lost and it will be off if no serial response has been received after startup.

|   |                |  |
|---|----------------|--|
|  | flashing green | redundancy link communication is ok (triggered by redundancy link packets) |
|  | red            | link communication interrupted or aborted (broken down)                    |
|  | off            | no link communication at all   |

| LEDs   | Meaning    |   |            |  |   |       |   |       |   |     |   |  |            |  |            |  |  |
|--|------------|---|------------|--|---|-------|---|-------|---|-----|---|--|------------|--|------------|--|--|
| <table border="1"> <tr> <td><b>PWR</b></td> <td></td> <td><b>RUN</b></td> <td></td> </tr> <tr> <td></td> <td>green</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td><b>ERR</b></td> <td></td> <td><b>RDL</b></td> <td></td> </tr> </table>                 | <b>PWR</b> |   | <b>RUN</b> |  |    | green |    |       |    |     |    |  | <b>ERR</b> |  | <b>RDL</b> |  | <p>Start-up phase (approx. 7 seconds)<br/>During this phase redundancy role is determined.</p>   |
| <b>PWR</b>   |            | <b>RUN</b>  |            |  |   |       |   |       |   |     |   |  |            |  |            |  |  |
|   | green      |    |            |  |   |       |   |       |   |     |   |  |            |  |            |  |  |
|   |            |    |            |  |   |       |   |       |   |     |   |  |            |  |            |  |  |
| <b>ERR</b>   |            | <b>RDL</b>  |            |  |   |       |   |       |   |     |   |  |            |  |            |  |  |
| <table border="1"> <tr> <td><b>PWR</b></td> <td></td> <td><b>RUN</b></td> <td></td> </tr> <tr> <td></td> <td>green</td> <td></td> <td>green</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td><b>ERR</b></td> <td></td> <td><b>RDL</b></td> <td></td> </tr> </table>          | <b>PWR</b> |   | <b>RUN</b> |  |    | green |    | green |   |     |   |  | <b>ERR</b> |  | <b>RDL</b> |  | <p>Non redundant device, ready.<br/>The device is operational; it is not part of a redundant set.<br/>Primary Device is redundant set.<br/>The device is operational, acting as Primary Device in a redundant set. The secondary device is ready</p>   |
| <b>PWR</b>   |            | <b>RUN</b>  |            |  |   |       |   |       |   |     |   |  |            |  |            |  |  |
|   | green      |    | green      |  |   |       |   |       |   |     |   |  |            |  |            |  |  |
|    |            |   |            |  |   |       |   |       |   |     |   |  |            |  |            |  |  |
| <b>ERR</b>   |            | <b>RDL</b>  |            |  |   |       |   |       |   |     |   |  |            |  |            |  |  |
| <table border="1"> <tr> <td><b>PWR</b></td> <td></td> <td><b>RUN</b></td> <td></td> </tr> <tr> <td></td> <td>green</td> <td></td> <td>green</td> </tr> <tr> <td></td> <td>red</td> <td></td> <td></td> </tr> <tr> <td><b>ERR</b></td> <td></td> <td><b>RDL</b></td> <td></td> </tr> </table> | <b>PWR</b> |   | <b>RUN</b> |  |  | green |  | green |  | red |  |  | <b>ERR</b> |  | <b>RDL</b> |  | <p>Permanent hardware fault detection during startup.<br/>A fatal error has been detected. Possible failure could be a missing Ethernet connection.</p>  |
| <b>PWR</b>   |            | <b>RUN</b>  |            |  |   |       |   |       |   |     |   |  |            |  |            |  |  |
|   | green      |  | green      |  |   |       |   |       |   |     |   |  |            |  |            |  |  |
|   | red        |  |            |  |   |       |   |       |   |     |   |  |            |  |            |  |  |
| <b>ERR</b>   |            | <b>RDL</b>  |            |  |   |       |   |       |   |     |   |  |            |  |            |  |  |
| <table border="1"> <tr> <td><b>PWR</b></td> <td></td> <td><b>RUN</b></td> <td></td> </tr> <tr> <td></td> <td>green</td> <td></td> <td>green</td> </tr> <tr> <td></td> <td>red</td> <td></td> <td></td> </tr> <tr> <td><b>ERR</b></td> <td></td> <td><b>RDL</b></td> <td></td> </tr> </table> | <b>PWR</b> |   | <b>RUN</b> |  |  | green |  | green |  | red |  |  | <b>ERR</b> |  | <b>RDL</b> |  | <p>Primary device or non-redundant device, hardware failure.<br/>The device is acting as non-redundant device, but a minor hardware failure has been detected during start-up.<br/>In the case of a Primary Device on a redundant set, the secondary device is not ready</p>   |
| <b>PWR</b>   |            | <b>RUN</b>  |            |  |   |       |   |       |   |     |   |  |            |  |            |  |  |
|   | green      |  | green      |  |   |       |   |       |   |     |   |  |            |  |            |  |  |
|   | red        |  |            |  |   |       |   |       |   |     |   |  |            |  |            |  |  |
| <b>ERR</b>   |            | <b>RDL</b>  |            |  |   |       |   |       |   |     |   |  |            |  |            |  |  |
| <table border="1"> <tr> <td><b>PWR</b></td> <td></td> <td><b>RUN</b></td> <td></td> </tr> <tr> <td></td> <td>green</td> <td></td> <td>green</td> </tr> <tr> <td></td> <td>red</td> <td></td> <td></td> </tr> <tr> <td><b>ERR</b></td> <td></td> <td><b>RDL</b></td> <td></td> </tr> </table> | <b>PWR</b> |   | <b>RUN</b> |  |  | green |  | green |  | red |  |  | <b>ERR</b> |  | <b>RDL</b> |  | <p>Primary device or non-redundant device, failure.<br/>The device is acting as non-redundant device, but a failure has been detected.<br/>or<br/>Secondary device, not ready.<br/>The device is acting as secondary device in a redundant set, but it is not ready to take over the primary role due to e.g. not synchronized configuration information or a non-operational redundancy link.<br/>or<br/>Primary Device or non-redundant device, failure.<br/>The device is acting as Primary Device in a redundant set or as non-redundant device, but a failure has been detected.<br/>In the case of a Primary Device in a redundant set or as non redundant set, the secondary device is not ready.</p> |
| <b>PWR</b>   |            | <b>RUN</b>  |            |  |   |       |   |       |   |     |   |  |            |  |            |  |  |
|   | green      |  | green      |  |   |       |   |       |   |     |   |  |            |  |            |  |  |
|   | red        |  |            |  |   |       |   |       |   |     |   |  |            |  |            |  |  |
| <b>ERR</b>   |            | <b>RDL</b>  |            |  |   |       |   |       |   |     |   |  |            |  |            |  |  |

| LEDs  | Meaning   |   |   |   |   |     |   |       |            |   |            |   |  |
|---|---|---|---|---|---|-----|---|-------|------------|---|------------|---|--|
| <table border="1"> <tr> <td><b>PWR</b></td> <td> green</td> <td><b>RUN</b></td> <td> green</td> </tr> <tr> <td></td> <td></td> <td></td> <td>green</td> </tr> <tr> <td><b>ERR</b></td> <td></td> <td><b>RDL</b></td> <td></td> </tr> </table>           | <b>PWR</b>  |  green   | <b>RUN</b>  |  green   |    |     |    | green | <b>ERR</b> |    | <b>RDL</b> |    | <p>Secondary device, operational.</p> <p>The device is operational as secondary device in a redundant set. The configuration information has been successfully transferred from the Primary Device and the redundancy link is operational.</p>           |
| <b>PWR</b>  |  green   | <b>RUN</b>  |  green   |   |   |     |   |       |            |   |            |   |  |
|    |   |          | green   |   |   |     |   |       |            |   |            |   |  |
| <b>ERR</b>  |          | <b>RDL</b>  |          |   |   |     |   |       |            |   |            |   |  |
| <table border="1"> <tr> <td><b>PWR</b></td> <td> green</td> <td><b>RUN</b></td> <td></td> </tr> <tr> <td></td> <td>red</td> <td></td> <td></td> </tr> <tr> <td><b>ERR</b></td> <td></td> <td><b>RDL</b></td> <td></td> </tr> </table>                   | <b>PWR</b>  |  green   | <b>RUN</b>  |          |    | red |    |       | <b>ERR</b> |    | <b>RDL</b> |    | <p>Secondary device, hardware failure.</p> <p>The device is acting as secondary device in a redundant set, but a hardware failure has been detected. Details are available on the web page <a href="#">Diagnostics</a><sup>(33)</sup> of the device.</p> |
| <b>PWR</b>  |  green   | <b>RUN</b>  |          |   |   |     |   |       |            |   |            |   |  |
|    | red   |          |   |   |   |     |   |       |            |   |            |   |  |
| <b>ERR</b>  |          | <b>RDL</b>  |          |   |   |     |   |       |            |   |            |   |  |
| <table border="1"> <tr> <td><b>PWR</b></td> <td> green</td> <td><b>RUN</b></td> <td> green</td> </tr> <tr> <td></td> <td>red</td> <td></td> <td></td> </tr> <tr> <td><b>ERR</b></td> <td></td> <td><b>RDL</b></td> <td></td> </tr> </table>             | <b>PWR</b>  |  green   | <b>RUN</b>  |  green   |    | red |    |       | <b>ERR</b> |    | <b>RDL</b> |    | <p>Primary with H1 error state</p>   |
| <b>PWR</b>  |  green   | <b>RUN</b>  |  green   |   |   |     |   |       |            |   |            |   |  |
|    | red   |          |   |   |   |     |   |       |            |   |            |   |  |
| <b>ERR</b>  |          | <b>RDL</b>  |          |   |   |     |   |       |            |   |            |   |  |
| <table border="1"> <tr> <td><b>PWR</b></td> <td> green</td> <td><b>RUN</b></td> <td> green</td> </tr> <tr> <td></td> <td>red</td> <td></td> <td></td> </tr> <tr> <td><b>ERR</b></td> <td></td> <td><b>RDL</b></td> <td></td> </tr> </table>           | <b>PWR</b>  |  green   | <b>RUN</b>  |  green   |    | red |    |       | <b>ERR</b> |   | <b>RDL</b> |   | <p>Primary not ready</p>   |
| <b>PWR</b>  |  green   | <b>RUN</b>  |  green   |   |   |     |   |       |            |   |            |   |  |
|    | red   |          |   |   |   |     |   |       |            |   |            |   |  |
| <b>ERR</b>  |         | <b>RDL</b>  |         |   |   |     |   |       |            |   |            |   |  |
| <table border="1"> <tr> <td><b>PWR</b></td> <td> green</td> <td><b>RUN</b></td> <td> green</td> </tr> <tr> <td></td> <td>red</td> <td></td> <td></td> </tr> <tr> <td><b>ERR</b></td> <td></td> <td><b>RDL</b></td> <td></td> </tr> </table> | <b>PWR</b>  |  green | <b>RUN</b>  |  green |  | red |  |       | <b>ERR</b> |  | <b>RDL</b> |  | <p>Secondary with H1 error</p>   |
| <b>PWR</b>  |  green | <b>RUN</b>  |  green |   |   |     |   |       |            |   |            |   |  |
|    | red   |        |   |   |   |     |   |       |            |   |            |   |  |
| <b>ERR</b>  |        | <b>RDL</b>  |        |   |   |     |   |       |            |   |            |   |  |
| <table border="1"> <tr> <td><b>PWR</b></td> <td> green</td> <td><b>RUN</b></td> <td></td> </tr> <tr> <td></td> <td>red</td> <td></td> <td></td> </tr> <tr> <td><b>ERR</b></td> <td></td> <td><b>RDL</b></td> <td></td> </tr> </table>       | <b>PWR</b>  |  green | <b>RUN</b>  |        |  | red |  |       | <b>ERR</b> |  | <b>RDL</b> |  | <p>Primary, configuration error</p>  |
| <b>PWR</b>  |  green | <b>RUN</b>  |        |   |   |     |   |       |            |   |            |   |  |
|    | red   |        |   |   |   |     |   |       |            |   |            |   |  |
| <b>ERR</b>  |        | <b>RDL</b>  |        |   |   |     |   |       |            |   |            |   |  |

## 8.4 Status indications of the four H1 channels

The following table shows the channel LEDs and their meaning for all four channels (CH1 - CH4):

| Symbol  | Color / frequency        | Meaning                               |
|---|--------------------------|---------------------------------------|
|  | green                    | Visitor address                       |
|  | flashing slowly (0.5 Hz) | not in LAS role                       |
|  | flashing quickly (5 Hz)  | LAS role                              |
|  | red                      | no carrier or H1 link is disconnected |
|  | flashing red             | no token received                     |
|  | off                      | H1 link unused                        |

## 9 Appendix

### 9.1 FOUNDATION Fieldbus basics

#### 9.1.1 Link active scheduler

The link active scheduler (LAS) is a deterministic, centralized bus scheduler that controls the communication in the H1 segment. It is responsible to maintain the live list.

#### 9.1.2 Visitor host

A visitor host is a secondary on-process host typically used for asset management and device maintenance. The visitor host uses CLT/SRV connections only. It usually should be assigned to node addresses in the range from 252 to 255.

#### 9.1.3 Live list

The Live list is a list of all currently active devices.

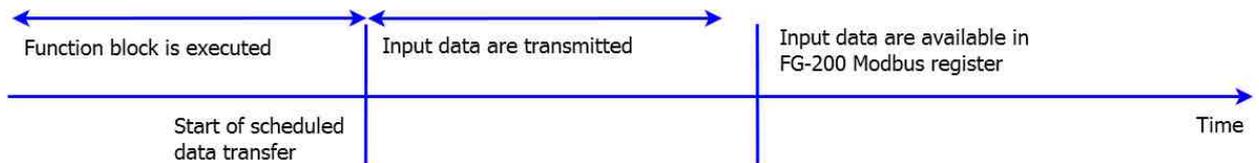
#### 9.1.4 Publisher/subscriber links (PUB/SUB links)

Publisher/subscriber links is used for cyclic transfer of process values (input data and output data). The process value is send by a publisher. Multiple subscribers linked to the publisher are able to receive the process value.

The LAS coordinates the cyclic data transfer on base of a synchronized system time. The cyclic data transfer is synchronized with the execution of the function blocks in the field devices. The schedules for cyclic data transfer as well as for the execution of the function blocks are generated by the comConf tool.

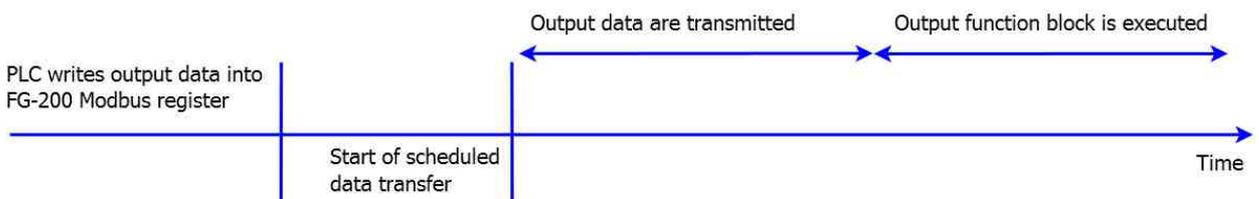
#### Input data

In case of input data the input function block executed and immediately after the function block execution the new data are transmitted over the line.



#### Output data

In case of output data the output function block is executed immediately after the transmission of the output data.



Output function blocks detect the absence of fresh PLC output data. If the PLC does not provide fresh output data then output function blocks will switch into a fault state mode. As the PLC write accesses to the FG-200 Modbus registers are not synchronized with the cyclic data transfer in the H1 segment it is necessary that the PLC writes "oversample" the H1 macrocycle. If, for example, the macrocycle time in the H1 link is one second then it is assumed that the PLC writes fresh output data every 500 milliseconds.

### 9.1.5 Client/server connections (CTL/SRV connections)

Client/server connections are used for acyclic transfer between FG-200 and field devices. Acyclic data transfer is performed in the gaps between cyclic data transfer.

For client/server connections the client (FG-200) establishes and server (H1 field device) is established. Once the connection is established the FG-200 can send read and write requests to the field device. After processing the request the field device sends a read or write response to the FG-200.

In case of client/server communication the FG-200 build internal read lists with all parameters configured in the Modbus mapping table or in the point pages. The FG-200 executes this read lists periodically. The time for executing the read lists depends on various factors. As a rule of thumb you can assume that a read request and the corresponding read response will take about 100 millisecond. Thus, if you have, for example, 25 parameters in your Modbus mapping and/or in your point pages each Modbus register and point page parameter will be updated every two and a half second.

The main time consuming factors in read request handling are the low baud rate in an H1 segment (31.25 kbit/sec) and the processing time of the read request in the H1 field device. The processing time within the FG-200 is negligible.

The FG-200 supports four H1 segments. If, enhancing the example above, 25 parameters are configured in each segment the update time of the  $4 * 25$  parameters will still be two and a half second.

Please consider that the execution of the FG-200 read lists is not synchronized with the periodic execution of the function blocks. Assuming the function blocks are executed one time per second and the execution of the read list takes two and a half seconds then you will get only each second or third value produced by the function block.

### 9.1.6 Macrocycle

Macrocycle is the period of the function block schedule and the cyclic data transfer schedule. Typical macrocycle times are 500 milliseconds, one second, two seconds and four seconds.

### 9.1.7 Input/output parameters (I/O parameters)

Input and output parameters are used for accessing process values (input data and output data). They are structured parameters composed of a status and a value.

IO parameters are typically transmitted via publisher/subscriber links. If no publisher/subscriber links are configured IO parameter can be read and written via client/server connection.

### 9.1.8 Contained parameters

Contained parameters are used for data that are not process values. Contained parameters contain status information and configuration data.

Contained parameters are read or written via client/server connections. It is not possible to transmit contained parameters via publisher/subscriber links.

## 9.2 Redundancy

### 9.2.1 Redundancy behavior

The following table provides detailed information on the redundancy behavior. This may be useful to get a correct understanding of what fault conditions can be covered and how the system recovers from those fault conditions.

In any case, the fully redundant state is obtained again when the secondary device indicates "operational" (RUN-LED flashing) and its H1 live lists are complete. In highly populated, tightly configured H1 links it may take several minutes to acquire the live lists. Before the live lists are completed, redundancy switching is possible but client server connections can only be established to H1 devices which are in the live list.

Any further error that occurs before the fully redundant state is reached may cause the system to fail.

|                        |   |
|------------------------|---|
| <b>Fault detection</b> | Device fails completely or software watchdog expires or hardware watchdog expires or exception occurs or failure in H1 interface detected.                |
| <b>Fault treatment</b> | Primary role actively transferred to or taken by redundant system   |
| <b>Effect</b>          | Redundancy switch-over. System degrades to non-redundant system.  |
| <b>Repair measure</b>  | Transient fault: Automatic reboot<br>Permanent fault: replace device<br>Secondary service will reboot and receive configuration data from primary device. |

|                        |   |
|------------------------|---|
| <b>Fault detection</b> | Bad link status of Ethernet port detected. Detection time less than 500 ms.   |
| <b>Fault treatment</b> | Primary role actively transferred to redundant device.  |
| <b>Effect</b>          | Redundancy switch-over. System degrades to non-redundant system.  |
| <b>Repair measure</b>  | Repair or reconnect Ethernet cable.<br>Secondary device will reboot and receive configuration data from primary device. |

|                        |   |
|------------------------|---|
| <b>Fault detection</b> | Empty live list detected on one H1 port or primary device while secondary device still has non-empty live list. Due to the H1 protocol it may take some seconds. Until the live list becomes empty. Detection occurs only if in primary device and secondary device the number of active H1 devices in the live list has exceeded the threshold of one. |
| <b>Fault treatment</b> | Primary role actively transferred to redundant device, so that access to H1 is possible again.  |
| <b>Effect</b>          | Redundancy switch-over. No redundancy concerning the affected H1 link.  |
| <b>Repair measure</b>  | Repair or reconnect H1 cable.   |

|                        |  |
|------------------------|--|
| <b>Fault detection</b> | Device fails completely or software watchdog expires or hardware watchdog expires or exception occurs or failure in H1 interface detected.               |
| <b>Fault treatment</b> | Secondary device assumes and indicates non-operational state.  |
| <b>Effect</b>          | System degrades to non-redundant system.   |
| <b>Repair measure</b>  | Transient fault: Automatic reboot<br>Permanent fault: replace device<br>Secondary device will reboot and receive configuration data from primary device. |

|                        |   |
|------------------------|---|
| <b>Fault detection</b> | Bad link status of Ethernet port detected. Detection time less than 500 ms.   |
| <b>Fault treatment</b> | Secondary device assumes and indicates non-operational state.   |
| <b>Effect</b>          | System degrades to non-redundant system.  |
| <b>Repair measure</b>  | Repair or reconnect Ethernet cable.<br>Secondary device will reboot and receive configuration data from primary device. |

|                        |  |
|------------------------|--|
| <b>Fault detection</b> | No fault detection in secondary device.<br>Empty live list has to be detected by any HSE client (e. g. asset monitor). |
| <b>Fault treatment</b> | None.  |
| <b>Effect</b>          | No redundancy concerning the affected H1 link.   |
| <b>Repair measure</b>  | Repair or reconnect H1 cable.  |

|                        |  |
|------------------------|--|
| <b>Fault detection</b> | Time-out on TCP connection.<br>Detection time less than 2 sec during activity and less than 7 sec during idle times.                                       |
| <b>Fault treatment</b> | Secondary device assumes and indicates non operational state <sup>1)</sup> .   |
| <b>Effect</b>          | System degrades to non-redundant system.<br>Secondary device clears configuration.   |
| <b>Repair measure</b>  | Repair Ethernet connection.<br>Secondary device may reboot in some cases depending on prior state and will receive configuration data from primary device. |

<sup>1)</sup> If the secondary device reboots cyclically in this state, set the TCP acknowledge timeout (object 22223) to a smaller value.

|                        |  |
|------------------------|--|
| <b>Fault detection</b> | Loss of serial communication. Detection time less than 800 ms.   |
| <b>Fault treatment</b> | Secondary device assumes and indicates non operational state.  |
| <b>Effect</b>          | System degrades to non-redundant system.   |
| <b>Repair measure</b>  | Repair or reconnect redundancy link.<br>Secondary device will reboot and receive configuration data from primary device. |

The following table shows the state indications associated with the fault states described above. The numbers in the first column refer to the previous table. Line 0 describes the faultless state. "primary device" and "secondary device" denote the role after redundancy switching.

|   | Primary device |                          |               | Secondary device |                          |                 |
|---|----------------|--------------------------|---------------|------------------|--------------------------|-----------------|
|   | R-LED          | H1-LED                   | Web-Info      | R-LED            | H1-LEDs                  | Web-Info        |
| 0 | On             | fast on configured links | Ok<br>Primary | Flashing         | Slow on configured links | Ok<br>Secondary |

|   | Primary device |   |  | Secondary device |  |  |
|---|----------------|---|--|------------------|--|--|
|   | R-LED          | H1-LED  | Web-Info   | R-LED            | H1-LEDs  | Web-Info   |
|   |                | Off on unconfigured links.                              |  |                  | Off on not configured links  |  |
| 1 | On             | fast on configured links<br>Off on not configured links | Failure no serial communication<br>Primary, no backup              | off              | off  | (no connection to web server)                                      |
| 2 | On             | fast on configured links<br>Off on non configured links | Failure TCP link to redundant device is lost<br>Primary, no backup | Flashing         | Slow on configured links<br>Off on non configured links                          | (no connection to web server)                                      |
| 3 | On             | fast on configured links<br>Off on not configured links | Ok<br>Primary  | Flashing         | fast on missing links<br>Slow on configured links<br>Off on not configured links | Ok<br>Secondary  |
| 4 | On             | fast on configured links<br>Off on not configured links | Failure no serial communication<br>Primary, no backup              | off              | off  | (no connection to web server)                                      |
| 5 | On             | fast on configured links<br>Off on not configured links | Failure TCP link to redundant device is lost<br>Primary, no backup | Flashing         | Slow on configured links<br>Off on not configured links                          | (no connection to web server)                                      |
| 6 | On             | fast on configured links<br>Off on not configured links | Ok<br>Primary  | Flashing         | fast on missing links<br>Slow on configured links<br>Off on not configured links | Ok<br>Secondary  |
| 7 | On             | fast on configured links<br>Off on not configured links | Failure TCP link to redundant device is lost                       | off              | off  | Failure TCP link to redundant device is lost<br>Primary, no backup |

|   | Primary device |   |  | Secondary device |   |   |
|---|----------------|---|--|------------------|---|---|
|   | R-LED          | H1-LED  | Web-Info   | R-LED            | H1-LEDs   | Web-Info  |
|   |                |   | Primary, no backup<br>(if connection to web server possible) |                  |   | (if connection to web server possible)                |
| 8 | On             | fast on configured links<br>Off on not configured links | Failure no serial communication<br>Primary, no backup        | off              | Slow on configured links<br>Off on not configured links | Failure no serial communication<br>Primary, no backup |

## 9.2.2 Duration of redundancy switch-over

### Switch-over duration PUB/SUB links

During redundancy switch-over, the activity on H1 links is interrupted. From the perspective of a single H1 device, [PUB/SUB links](#)<sup>60</sup> are interrupted for a period of time that is composed of the following times:

- fault detection time  $t_{fd}$
- redundancy switching time  $t_{rs}$
- macro cycle duration  $t_{mc}$

The time of inactivity due to redundancy switch-over for a single process value is therefore:

- time of inactivity =  $t_{fd} + t_{rs} + t_{mc}$
- compared to  $t_{mc}$  during regular operation.

The fault detection time is:

- $t_{fd} = 800$  ms if the primary device fails.
- $t_{fd} = 1500$  ms if the Ethernet connection on the primary device is removed.

The redundancy switching time is:

- $t_{rs} = 500$  ms.

The macrocycle duration depends on the configuration and is usually in the range of 500 ms to 2 seconds.

### Switch-over duration for CLT/SRV connections

In case of [CLT/SRV connections](#)<sup>61</sup> the switch will take about one minute.

If [contained parameters](#)<sup>61</sup> such as BLOCK\_ERR or channel are accessed, it will take about one minute until the registers in the secondary FG-200 show the current parameter values.

### 9.2.3 Replace a defective FG-200 in a redundant set

For replacing a defective FG-200 in a redundant set of FG-200s, perform the following steps:

1. Identify the defective FG-200. Refer to [Status indicators - LEDs](#)<sup>(56)</sup>.
2. Remove the power terminal block from the FG-200.
3. Remove the redundancy link interface cable and the Ethernet cable.
4. If not indicated on the cable, make a note to which channel each H1 link is connected. Then remove the H1 terminal blocks.
5. Make sure that the new FG-200 has the same IP configuration (IP address and subnet mask) as the replaced defective device. See [Internet Protocol submenu](#)<sup>(38)</sup> for more information.
6. Replace the defective FG-200.
7. Plug in the H1 terminal blocks. Make sure to use the same allocation as before.
8. Connect the Ethernet cable and the redundancy link interface cable.
9. Make sure that the redundancy link interface cable is connected before plugging in the power terminal block.

If the replaced FG-200 is powered while the serial link is missing, it will behave like an independent, non-redundant primary device. If in this case the FG-200 has a valid (possibly unknown) configuration, it might use H1 node addresses which are already in use on the H1 links. This will disturb or interrupt communication and application processing on the H1 links.

10. Plug in the power terminal block. The boot process and the download of the configuration information take about 1 minute. For indication of proper operation as a secondary device refer to [Status indicators - LEDs](#)<sup>(56)</sup>.

## 9.3 Diagnostics - Advanced submenus

Click **Advanced** to open the following submenus:

- [Fieldbus Statistics submenu](#) <sup>67</sup>
- [HSE Statistics submenu](#) <sup>68</sup>
- [FPGA Error Statistics submenu](#) <sup>68</sup>
- [FPGA Register Contents submenu](#) <sup>69</sup>
- [Device Temperature submenu](#) <sup>69</sup>
- [Modbus Statistics submenu](#) <sup>69</sup>

### 9.3.1 Fieldbus Statistics submenu

This table shows you information about all four segments concerning

- Live List Changes - number of total live list changes
- Live List Pass Token Timeouts - number of pass token timeouts; under good conditions it should be "0"
- Total Retries - number of total retries for acyclic H1 requests. This could be an indication of noise on the H! segment or a H1 device problem.
- Messages Transmitted - number of messages transmitted by the FG-200.
- Good Messages Received - number of messages received from FG-200.

The button **[Reset Statistic Counter]** allows you to reset all segment values to zero and to restart counting. To see the new results, click **Fieldbus Statistics** again.

Diagnosics > Advanced > Fieldbus Statistics

| Description                   | Segment 1 | Segment 2 | Segment 3 | Segment 4 |
|-------------------------------|-----------|-----------|-----------|-----------|
| Live List Changes             | 0         | 0         | 0         | 4         |
| Live List Pass Token Timeouts | 0         | 0         | 0         | 0         |
| Total Retries                 | 0         | 0         | 0         | 0         |
| Messages Transmitted          | 0         | 0         | 0         | 999566    |
| Good Messages Received        | 0         | 0         | 0         | 395088    |

Reset Statistic Counter

Last Reset: Fri Sep 18 2015 10:12:01 GMT+0200

### 9.3.2 HSE Statistics submenu

This table shows you the total number and number per second of HSE frames grouped into:

- Publisher / Subscriber
- Report Distribution
- Client / Server
- System Management
- Redundancy Synchronization

(This functionality is not supported by AssetMonitor Linking Devices.)

The button **[Reset Statistic Counter]** allows you to reset all segment values to zero and to restart counting. To see the new results, click **[Fieldbus Statistics]** again.

**Diagnostics > Advanced > HSE Statistics**

| Description                | Total  | Per Second |
|----------------------------|--------|------------|
| Publisher / Subscriber     | 186837 | 3          |
| Report Distribution        | 0      | 0          |
| Client / Server            | 295    | 0          |
| System Management          | 215    | 0          |
| Redundancy Synchronization | 0      | 0          |

**Reset Statistic Counter**

Last Reset: Thu Sep 17 2015 15:38:49 GMT+0200

### 9.3.3 FPGA Error Statistics submenu

This table shows the values of the framing error counters per channel and checksum errors in received packets. High counter values may indicate a bad signal quality in the H1 channel and/or a device that is not operating properly.

In addition, the following information is displayed:

- Framing Errors (i.e. incomplete frames, might be an indication of noise on the H1 segment)
- Checksum Errors (might be an indication of noise on the H1 segment)
- Carrier Not Seen Errors
- Buffer Not Empty (might indicate that the H1 network is not connected or not powered)
- Receive Overrun
- Transmit Overrun
- Transmit Readback Error
- Collision Timeout Errors (might indicate that the H1 network is not connected or not powered).

## Diagnostics &gt; Advanced &gt; FPGA Error Statistics

| Description              | Segment 1 | Segment 2 | Segment 3 | Segment 4 |
|--------------------------|-----------|-----------|-----------|-----------|
| Framing Errors           | 0         | 0         | 0         | 0         |
| Checksum Errors          | 0         | 0         | 0         | 0         |
| Carrier Not Seen Errors  | 0         | 0         | 0         | 0         |
| Buffer Not Empty         | 0         | 0         | 0         | 0         |
| Receive Overrun          | 0         | 0         | 0         | 0         |
| Transmit Overrun         | 0         | 0         | 0         | 0         |
| Transmit Readback Error  | 0         | 0         | 0         | 0         |
| Collision Timeout Errors | 0         | 0         | 0         | 0         |

### 9.3.4 FPGA Register Contents submenu

The content of the FPGA register contains data which is only relevant if you contact Softing's customer support for error analysis and troubleshooting.

If requested by Softing's support, take a screen shot and send your problem description together with the screen shot to [support.automation@softing.com](mailto:support.automation@softing.com).

### 9.3.5 Device Temperature submenu

This table shows you information about current temperature values in degrees Celsius and Fahrenheit.

The button **[Reset Temperature Values]** allows you to reset all values to zero and to restart measuring. To see the new results, click **[Device Temperature]** again.

## Diagnostics &gt; Advanced &gt; Device Temperature

| Description                 | Celsius | Fahrenheit | Time                |
|-----------------------------|---------|------------|---------------------|
| Current Temperature         | 47.500  | 117.500    | 2015/08/27 16:08:08 |
| Min. Temperature (Lifetime) | 21.500  | 70.700     | 1972/01/01 01:00:00 |
| Max. Temperature (Lifetime) | 54.500  | 130.100    | 1972/01/01 01:00:00 |
| Min. Temperature            | 47.500  | 117.500    | 2015/08/27 16:08:05 |
| Max. Temperature            | 47.500  | 117.500    | 2015/08/27 16:08:05 |

Reset Temperature Values

### 9.3.6 Modbus Statistics submenu

The Modbus communications statistics provide information on the data and packets received and transmitted by the Modbus slave interface. Select

- **[Serial]** if you want to monitor the Modbus RTU link or
- **[TCP]** if you are monitoring the Modbus TCP/IP communications.

#### Serial

The menu item **Serial** shows statistical data of a Modbus connected on a serial interface. First messages and CRC errors from received data are listed. Then messages and error responses from the transmitted data are listed.

The values specified apply to the time since the program has been started or the latest **[Reset Statistic Counter]**.

Diagnostics > Advanced > Modbus Statistics > Serial

| Description          | Values |
|----------------------|--------|
| Messages Received    | 0      |
| CRC Errors           | 0      |
| Messages Transmitted | 0      |
| Error Responses      | 0      |

Reset Statistic Counter      Last Reset: Thu Sep 10 2015 12:57:02 GMT+0200

The button **[Reset Statistic Counter]** allows you to reset all values to zero and to restart counting. To see the new results, click **[Serial]** again.

### TCP

The menu item **TCP** shows statistical data of a Modbus connected using TCP. First received and transmitted messages are listed. Then the error responses are counted. Finally open and accepted connections are listed.

The button **[Reset Counts]** allows you to reset all values to zero and to restart counting. To see the new results, click **[TCP]** again.

Diagnostics > Advanced > Modbus Statistics > TCP

| Description          | Values |
|----------------------|--------|
| Messages Received    | 1666   |
| Messages Transmitted | 1666   |
| Error Responses      | 0      |
| Open Connections     | 0      |
| Accepted Connections | 3      |

Reset Statistic Counter      Last Reset: Thu Sep 10 2015 12:57:04 GMT+0200

## 9.4 Coding of bit fields

### Parameter BLOCK\_ERR

|                          |        |
|--------------------------|--------|
| No error                 | 0x0000 |
| Out Of Service           | 0x0001 |
| Power up                 | 0x0002 |
| Device needs maintenance | 0x0004 |
| Readback check failed    | 0x0008 |
| Lost nv data             | 0x0010 |
| Lost static data         | 0x0020 |
| Memory failure           | 0x0040 |
| Output failure           | 0x0080 |
| Input failure            | 0x0100 |
| Dev needs maint soon     | 0x0200 |

|                     |        |
|---------------------|--------|
| Dev fault state set | 0x0400 |
| Local override      | 0x0800 |
| Simulate active     | 0x1000 |
| Link config err     | 0x2000 |
| Block config err    | 0x4000 |
| Other               | 0x8000 |

#### **Parameter MODE\_BLK:**

|                       |      |
|-----------------------|------|
| Out Of Service        | 0x01 |
| Initialization Manual | 0x02 |
| Local Override        | 0x04 |
| Manual                | 0x08 |
| Auto                  | 0x10 |
| Cascade               | 0x20 |
| Remote-Cascade        | 0x40 |
| Remote-Output         | 0x80 |

Modbus Register 16 Bit register contains target mode in High Byte, actual mode in low byte.

Example: Modbus value 0x1001 means: target mode = Auto, actual mode = Out Of Service

#### **Field Diagnostics (Parameter FD\_FAIL, FD\_OFFSPEC, FD\_CHECK, FD\_MAINT)**

The bit fields are vendor specific and not specified by FIELDBUS Foundation except the least significant bit (LSB). The LSB indicates the check function to be active. The check function is typically mapped to the FD\_CHECK parameter but may also be mapped to any of the other FD\_xxx parameters.

The value for LSB is 0x80000000, the value for the most significant bit (MSB) is 0x00000001

## **9.5 Modbus exception responses**

### **ExceptionCode = 02**

The FG-200 will send an exception response with [ExceptionCode = 02] if [start address] or [start address + quantity of registers] is not OK.

### **ExceptionCode = 04**

The FG-200 will send an exception response with [ExceptionCode = 04] if one of the requested registers does not contain valid data. Please note that after power-on the FG-200 responds with [ExceptionCode = 04] until all requested data are read from the connected H1 field devices.

## 9.6 Assign a second (local) IP address under Windows 8.1

1. Open the **Desktop**
2. Press the **Windows start key** and select **Control Panel**.
3. Select **Network and Internet**.
4. Open **Network and Sharing Center**.
5. Click **Connections**.
6. In the Connection Status window click **Properties**.
7. In the item connection list select **Internet Protocol Version 4 (TCP/IPv4)**.
8. Click **Properties**. In the **General** dialog, the regular (first) IP address, the subnet mask and the standard gateway are shown.
9. Click **Advanced** to add a second IP address. Then click **[Add]** in the IP Addresses dialog.
10. Enter the IP address and the subnet mask.
11. Click **[Add]**.
12. Then confirm all open dialogs with **[OK]**.

# 10 ATEX Type Examination Certificate



## Translation

# Type Examination Certificate

- (1) Equipment and protective systems intended for use in potentially explosive atmospheres - Directive 94/9/EC
- (2) No. of Type Examination Certificate: **BVS 15 ATEX E 063 X**
- (3) Equipment: **Linking Device type FG-200 HSE/FF**
- (4) Manufacturer: **Softing Industrial Automation GmbH**
- (5) Address: **Richard-Reitzner-Allee 6, 85540 Haar, Germany**
- (6) The design and construction of this equipment and any acceptable variation thereto are specified in the appendix to this type examination certificate.
- (7) The certification body of DEKRA EXAM GmbH certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design of Category 3 equipment intended for use in potentially explosive atmospheres, given in Annex II to the Directive. The examination and test results are recorded in the Test and Assessment Report BVS PP 15.2105 EG.
- (8) The Essential Health and Safety Requirements are assured by compliance with:
  - EN 60079-0:2012 + A11:2013 General requirements**
  - EN 60079-11:2012 Intrinsic Safety "i"**
  - EN 60079-15:2010 Equipment protection by type of protection „n“**
- (9) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the appendix to this certificate.
- (10) This Type Examination Certificate relates only to the design, examination and tests of the specified equipment in accordance to Directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.
- (11) The marking of the equipment shall include the following:


**II 3G Ex nA IIC T4 Gc** or  
**II 3G Ex nA [ic] IIC T4 Gc**

DEKRA EXAM GmbH  
Bochum, dated 2015-06-09

Signed: Simanski

\_\_\_\_\_  
Certification body

Signed: Dr. Eickhoff

\_\_\_\_\_  
Special services unit

Page 1 of 3 of BVS 15 ATEX E 063 X  
This certificate may only be reproduced in its entirety and without any change.

DEKRA EXAM GmbH, Dinnendahlstrasse 9, 44809 Bochum, Germany,  
telephone +49.234.3696-105, Fax +49.234.3696-110, zs-exam@deka.com



- (13) Appendix to
- (14) **Type Examination Certificate**  
**BVS 15 ATEX E 063 X**
- (15) 15.1 Subject and type

Linking Device type FG-200 HSE/FF

15.2 Description

The linking device acts as a gateway between Ethernet-based host systems with foundation field-bus HSE and the foundation field-bus H1 bus system. It is suited for network configuration, device parametrization and the recording of production data. The data circuits are galvanically isolated. The Fieldbus circuits may operate as intrinsically safe circuits (level of protection Ex ic) or as non-intrinsically safe circuits; details see manual.

15.3 Parameters

15.3.1 Electrical parameters

15.3.1.1 Power supply circuit (terminals 1 – 3 or Rail Power Supply L+ and GND)

|                   |       |    |         |   |
|-------------------|-------|----|---------|---|
| Nominal voltage   |       | DC | 18...32 | V |
| Power consumption |       |    | < 5,6   | W |
| Max. voltage      | $U_m$ | DC | 40      | V |

15.3.1.2 Redundancy Link circuit (terminals 4,5,6)

|                 |       |    |          |   |
|-----------------|-------|----|----------|---|
| Nominal voltage |       | DC | up to 32 | V |
| Max. voltage    | $U_m$ | DC | 40       | V |

15.3.1.3 Ethernet Ports (connectors ETH1, ETH2)

|                 |       |    |          |   |
|-----------------|-------|----|----------|---|
| Nominal voltage |       | DC | up to 32 | V |
| Max. voltage    | $U_m$ | DC | 40       | V |

15.3.1.4 Fieldbus circuits (terminals 7,8,9 and 10,11,12 and 13,14,15 and 16,17,18)  
(if operated as non-intrinsically safe circuits)

|                 |  |    |       |   |
|-----------------|--|----|-------|---|
| Nominal voltage |  | DC | 24/32 | V |
|-----------------|--|----|-------|---|

(if operated as intrinsically safe circuits, each channel)

|         |       |    |     |    |
|---------|-------|----|-----|----|
| Voltage | $U_i$ | DC | 32  | V  |
| Current | $I_i$ |    | 570 | mA |

15.3.2 Ambient temperature range

-40 °C ≤ T<sub>a</sub> ≤ see Manufacturer's instructions

15.3.2.1 Horizontal installation position

| Minimum distance | Maximum number of fieldbus channels used per device | Maximum voltage of fieldbus circuits | Maximum permissible ambient temperature T <sub>a</sub> |
|------------------|---|--------------------------------------|--|
| 0 mm             | 4   | 32 VDC                               | 55 °C  |
| 0 mm             | 2   | 24 VDC                               | 60 °C  |
| 17.5 mm          | 4   | 32 VDC                               | 65 °C  |
| 17.5 mm          | 2   | 24 VDC                               | 70 °C  |

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telephone +49.234.3696-105, Fax +49.234.3696-110, zs-exam@dekra.com



15.3.2.2 Vertical installation position

| Minimum distance | Maximum number of fieldbus channels used per device | Maximum voltage of fieldbus circuits | Maximum permissible ambient temperature T <sub>a</sub> |
|------------------|---|--------------------------------------|--|
| 0 mm             | 4   | 32 VDC                               | 40 °C  |
| 0 mm             | 2   | 24 VDC                               | 50 °C  |
| 17.5 mm          | 4   | 32 VDC                               | 55 °C  |
| 17.5 mm          | 2   | 24 VDC                               | 60 °C  |

(16) Test and Assessment Report

BVS PP 15.2105 EG as of 09.06.2015

(17) Special conditions for safe use

- 17.1 The equipment is defined as "instruments and apparatus of low energy" according to clause 13 of EN 60079-15; thus the requirement stated in sub-clause c) (limiting the transient characteristic to 40% of the rated voltage) has to be adhered to when erecting the equipment.
- 17.2 The equipment has to be installed in a protective enclosure which meets the requirements for resistance to impact and IP54 defined in EN 60079-0 clause 26.4
- 17.3 Before the first use of the device one marking field (Ex nA IIC T4 Gc or Ex nA [ic] IIC T4 Gc) has to be selected and marked; once the device has operated at non-intrinsically safe fieldbus circuits it may not operate at intrinsically safe fieldbus circuits without reconsideration by the manufacturer.
- 17.4 The ambient temperature range depends on various installation conditions of the devices; see manufacturer's instructions.

We confirm the correctness of the translation from the German original.  
In the case of arbitration only the German wording shall be valid and binding.

DEKRA EXAM GmbH  
44809 Bochum, 2015-07-16  
BVS-Pe/Wit/Ma A 20150664

  
\_\_\_\_\_  
Certification body

  
\_\_\_\_\_  
Special services unit

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## 11 UL Certificate of Compliance

### CERTIFICATE OF COMPLIANCE

**Certificate Number** 20151215-E356500  
**Report Reference** E356500-20151214  
**Issue Date** 2015-DECEMBER-15

**Issued to:** SOFTING AG  
RICHARD-REITZNER-ALLEE 6  
85540 HAAR GERMANY

**This is to certify that  
representative samples of**

PROGRAMMABLE CONTROLLERS FOR USE IN  
HAZARDOUS LOCATIONS  
Class I, Division 2 Groups A,B,C and D.

Enclosed Type Fieldbus Gateways Model – FG-200  
HSE/FF

Have been investigated by UL in accordance with the  
Standard(s) indicated on this Certificate.

**Standard(s) for Safety:**

ANSI/ISA 12.12.01, Nonincendive Electrical Equipment for  
Use in Class I and II, Division 2 and Class III, Divisions 1  
and 2 Hazardous (Classified) Locations  
CAN/CSA C22.2 No. 213-15, Non-Incendive Electrical  
Equipment for Use in Class I, Division 2 Hazardous  
Locations

**Additional Information:**

See the UL Online Certifications Directory at  
[www.ul.com/database](http://www.ul.com/database) for additional information

Only those products bearing the UL Certification Mark should be considered as being covered by UL's  
Certification and Follow-Up Service.

Look for the UL Certification Mark on the product.



Bruce Mährenholz, Director North American Certification Program  
UL LLC

Any information and documentation involving UL Mark services are provided on behalf of UL LLC (UL) or any authorized licensee of UL. For questions, please  
contact a local UL Customer Service Representative at <http://ul.com/aboutul/locations>.



## 12 Declarations of conformity

This device is compliant with EC directive 2014/30/EG, "Electromagnetic Compatibility" (EMC directive) and meets the following requirements:

- EN 55011 Industrial, scientific and medical (ISM) devices - radio disturbance - limits and methods of measurement
- EN 55032 Electromagnetic compatibility of multimedia equipment (MME) and interference emission
- EN 61000-6-4 Electromagnetic compatibility (EMC); Part 6-4: generic standard – emission for industrial environments
- EN 61000-6-2 Electromagnetic compatibility (EMC); Part 6-2: generic standard - immunity for industrial environments



### Note

To fulfill the EMC requirements, the other components of your installation (DC adapter, Industrial Ethernet devices, etc.) also have to meet the EMC requirements. A shielded cable must be used. In addition, the cable shield must be grounded properly.



### CAUTION

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures!



### CE

A Declaration of Conformity in compliance with the above standards has been made and can be requested from Softing Industrial Automation.



### ROHS

This product is ROHS compliant.



### FCC

This equipment has been tested and found to comply with the limits for a Class A digital device, under part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.



### VCCI

This Class A product conforms to the regulations of Voluntary Control Council for Interference (VCCI) by Information Technology Equipment.



### WEEE

Electrical and electronic equipment must be disposed of separately from normal waste at the end of its operational lifetime. Packaging material and worn components shall be disposed of according to the regulations applicable in the country of installation.

**Softing Industrial Automation GmbH**

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