

# Softing Linking Device

## Manual for Configuration, Installation and Maintenance

V1.31

Date: July 24<sup>th</sup>, 2013

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## 1 General Notes

Please read this document thoroughly from beginning to end before starting installation to protect users from injury and to prevent misuse or damage to the Linking Device.

### 1.1 Scope of Delivery

The scope of delivery for FIM-110 FF comprises the following parts:

- FG-110 FF Linking Device
- Up to 4 FF-H1 power supplies
- Up to 1 RS-232 / RS485 converter
- FF-Configuration Software
- Installation and operating guidelines (this document)

Please check whether the delivery is complete and free of defects before starting installation.

### 1.2 Safety Notes

Do not open the housing of the Linking Device FG-110 FF. It does not contain any parts that need to be maintained or repaired by the user. In the event of a fault or defect, return the unit to the vendor.

**Opening the unit will void the warranty!**

### 1.3 Intended Use

The Linking Device has been designed for use mainly in process control applications. For use in hazardous areas, see appropriate chapter. The permissible ambient conditions given in the Technical Data must be complied with.

The faultless and safe operation of the product requires proper transport, proper storage and installation, and expert operation and maintenance in accordance with the manual.

### 1.4 System Requirements

#### 1.4.1 Operating Systems

- Windows XP (Home or Professional)
- WIN 7 32 and 64 bit version

If the operating system requirement is not met, the setup will display a message and stop.

Software (not included in delivery):

- Mozilla Firefox 3.6
- Internet Explorer 8.0
- Google Chrome 10.0

## 2 Hardware Installation

### 2.1 Overview Hardware – FG-110 FF

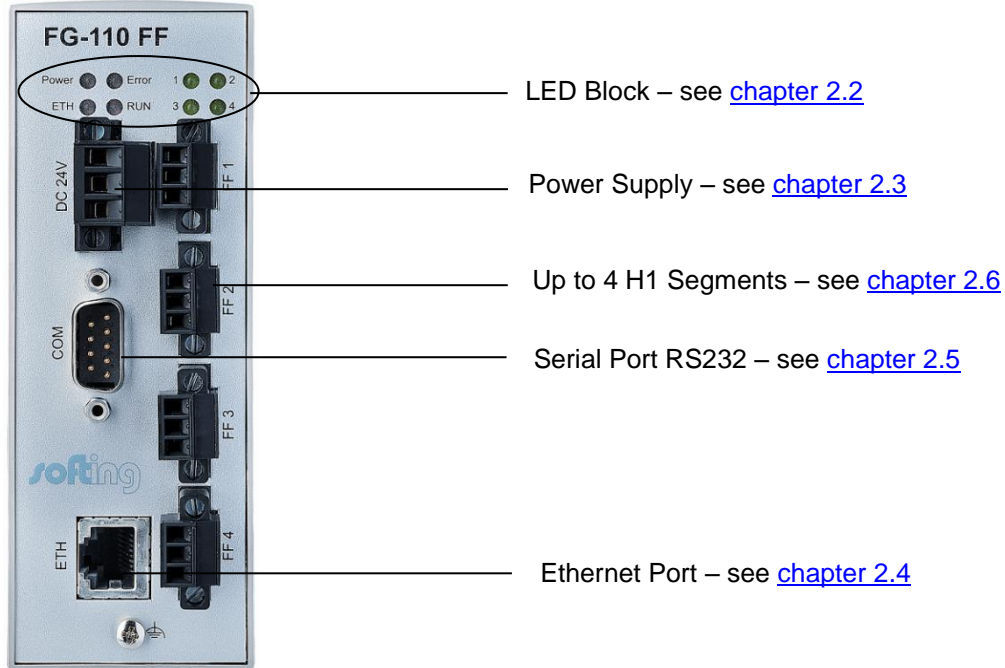


Fig 2.1-1 Overview Hardware – FG-110 FF power and data connections

### 2.2 LED Block – Meaning

#### PWR

The "PWR" LED indicates the power supply status:

This green LED is on when the internal power supply is ensured. If this LED is off, the supply voltage (24 V) is missing or the internal voltage generation is defective. In this case, the unit needs to be returned to the manufacturer for repair.

#### LAN

The green "LAN" (Local Area Network) LED is on when proper communication (link connection to a hub/switch/NIC) with the Ethernet is possible. It goes off temporarily during transmission.

#### RUN

The "RUN" LED is available for application-specific purposes and is off by default.

#### ERROR

The "ERROR" LED is available for application-specific purposes and is off by default.

#### BUS

This green LED shows the bus activity of the FF H1 channel. The LED indicates the status data exchange.



The LED may also light up if the bus has not been connected or is defective.



### 2.3 Power Supply

The Linking Device is powered by 24 V DC. The power supply plug connector is included in the delivery. The power supply socket connector on the front panel is labeled DC 24V-.

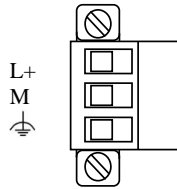


Fig 2.3-1 Linking Device Power Supply

The two power supply terminals are labeled L+ and M. L+ must be connected to 24V and M to 0V. The two terminals are provided with an internal reverse-polarity protection. The functional ground terminal is labeled with the  $\oplus$  symbol and must be connected to the protective ground. For use in an environment that is highly subject to electromagnetic interference, an additional ground connection can be provided at the grounding screw below the "LAN" connector.

Proper grounding is a prerequisite for compliance with the EMC directives and for ensuring proper operation.

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.

The Linking Device has an internal safety fuse which blows if an over voltage (of approx. 30V or higher) occurs in the power supply or if a fault occurs in the device. The safety fuse can only be replaced by the device manufacturer.

**i** The starting current of the Linking Device may be up to 3A. The power supply must provide this starting current in compliance with the voltage range to ensure a safe start-up. Replacement Part for this connector is Phoenix Contact MSTB2,5/3-STF-5,08 BK AU.

### 2.4 Ethernet Port

The Linking Device is equipped with one 10/100 Base-T Ethernet interface receptacle. Connect the Linking Device to the PC that will be used for configuration, if it is possible using an existing Ethernet Hub, Switch or Router. If you want to connect your PC to the Linking Device directly do it with a crossover cable.

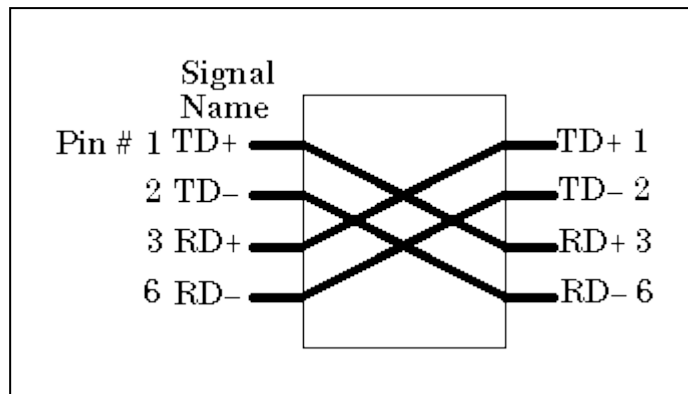


Fig 2.4-1 Crossover cable pinout

The Ethernet port corresponds to the standards IEEE 802.3 100BASE-TX/10BASE-T and supports auto negotiation.

The pin assignment corresponds to MDI (Medium Dependent Interface).

Pin	MDI Signal Pinout (Standard Ethernet Cable)
1	TD+
2	TD-
3	RD+
4	Not used
5	Not used
6	RD-
7	Not used
8	Not used

*Table 2.4-1 Ethernet Pins*

## 2.5 Modbus

### 2.5.1 MODBUS TCP

The FG-110 FF is able to communicate with the HSE (High Speed Ethernet protocol of Fieldbus Foundation) and Modbus TCP over the same Ethernet port.

### 2.5.2 MODBUS serial (RS232 / RS485)

The FG-110 FF provides a serial interface based on RS232.

The connection is made using a 9-pin male D-sub connector with the following pin layout:

Pin # Connector 1	Pin # Connector 2	Signal	Description
1	1	Reserved	Do not connect
2	3	RXD	Receive Data
3	2	TXD	Transmit Data
4	4	Reserved	Do not connect
5	5	GND	Signal Ground
6	6	Reserved	Do not connect
7	7	Reserved	Do not connect
8	8	Reserved	Do not connect
9	9	Reserved	Do not connect

*Table 2.5-1 COM PIN Allocation*

But mostly the units are connected to the Linking Device by the Interface RS485.

The FIM-110 FF offers a solution with a serial converter RS232 to RS485 (9185 see “Stahl Manual”) of the company Stahl. For detailed information please follow the user guide of

Stahl. You will find this manual on the CD-ROM or on the internet web page <http://www.r-stahl.com>

## 2.6 FF H1 fieldbus connection

The fieldbus terminals are mounted in 4 sets of three terminals for the positive and negative conductors and a shield (FF1 – FF4). Although the Linking Device is not polarity sensitive, other components in the segment such as junction blocks may require correct polarity.

With 3-pole terminal blocks, up to 4 separate fieldbus segments can be connected. The FF-H1 interfaces comply with type 114 of the FF physical layer profile, which is characterized by

- standard power signalling and voltage mode
- separately powered operation (galvanically isolated) no intrinsic safety
- the fieldbus cables +/- can be interchanged.
- wire diameter: 0.14 - 1.5 mm<sup>2</sup>, AWG 28-16
- replacement parts for the terminal block can be obtained from Phoenix-Contact (<http://www.phoenixcontact.com/>) as part type MC 1,5/3-STF-3,81 BK AU.

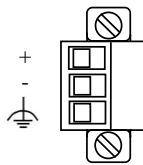


Fig 2.6-1 Pin assignment 3-pole terminal block for FF H1 Connections

## 2.7 FIM-110 FF - The pre-wired Installation of the FG-110 FF

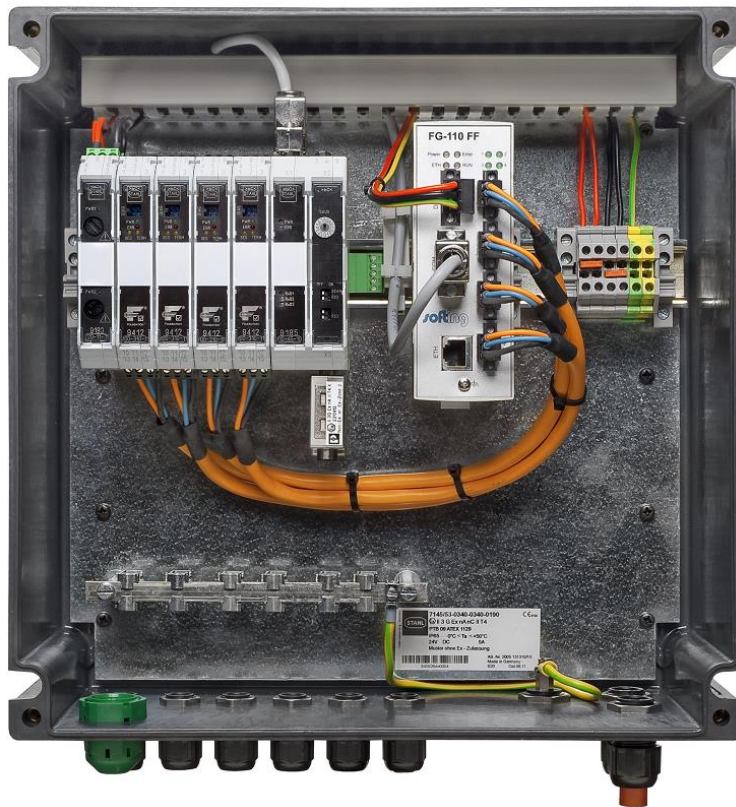
The FIM-110 FF has an IP-65 housing.

The upper cover provides access to single parts like

- the Linking Device FG-110 FF,
- the RS-232 / RS-485 converter,
- the fieldbus power conditioners/terminators,
- the power supply board and ground terminals.

The enclosure cover provides access to the terminal blocks. To open either cover of the enclosure, use a ¼ inch blade screwdriver to remove the appropriate screw on the unhinged side of the enclosure

The Linking Device is intended for mounting in a control cabinet. One of the favorite possibilities is the FIM (SOFTING Foundation Fieldbus Interface Module FIM 110)



*Fig 2.7-1 Mounting the Linking Device ready for use: the SOFTING Foundation Fieldbus Interface Module FIM 110*

The Linking Device is convection-cooled. It therefore needs to be installed in such a way that the ventilating ducts are at the top and bottom of the unit.



Please ensure against the direct contact with the sunlight.

## 2.8 Installation Overview

The whole installation is wired as shown in the picture.

The network connectivity of the PC is part of the private Ethernet. The connectivity between H1 Links and H1 Devices is realized by shielded twisted pair. The maximum distance depends on the numbers of H1 Devices and other surrounding conditions, normally 1900 m.

### 3 Ethernet Network Configuration

#### 3.1 Linking Device IP address Configuration

The Linking Device is delivered with a pre-configured IP address 192.168.177.177. It must be assigned an IP address from your LAN address range. Furthermore, subnet mask and gateway IP address must be set.

To configure the Linking Device a private network between a PC and the Linking Device must first be established. This can be done with a PC dedicated to the Linking Device or a PC used for another purpose can be temporarily configured for the task. If a PC from another network is used, carefully record the current IP address and other settings so the PC can be returned to its original network when configuration of the Linking Device is finished. If using a PC attached to another network, shut down the PC and remove it from the network before proceeding to set up the Linking Device private network.

Please see the chapter [<Configuration><Internet Protocol>](#) and follow the instruction for the IP configuration in the Linking Device.

#### 3.2 PC IP address Configuration

To install a private network on your PC please press the Microsoft Windows <Start> button and choose <Control Panel><Network and Dial-up Connections>. The following screen appears.

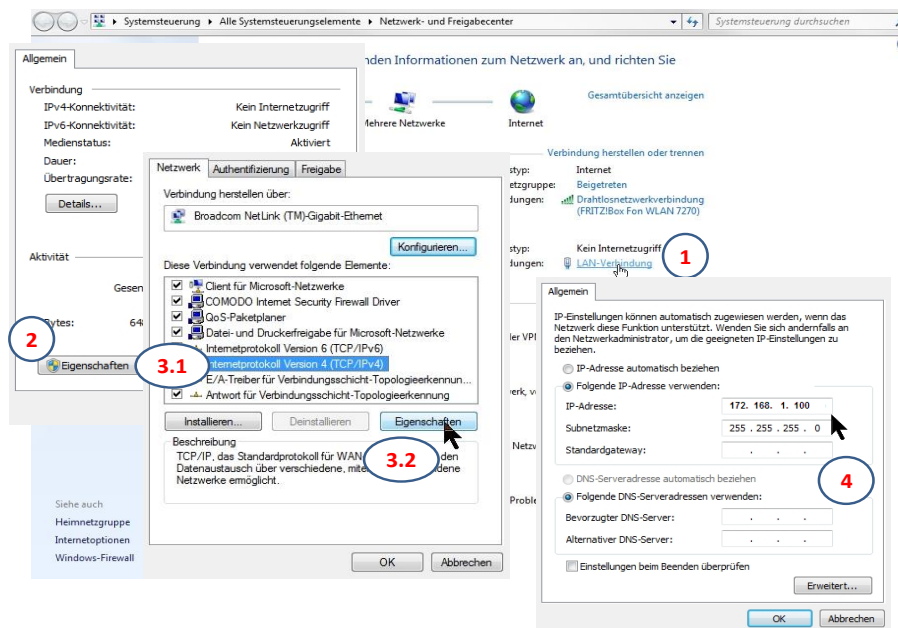


Fig 3.2-1: Configure IP address on PC

Follow the red numbered buttons. In the field IP address (4) fill in the IP address of the subnet you have chosen. In this example we have chosen the address 192.168.1.10 as the IP address for the PC.

Store the inputs with OK and close the window.

## 4 Linking Device FG-110 FF - Internal Web Server

The internal web server of the Linking Device FG-110 FF offers the possibilities to configure the Linking Device (like 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.

### 4.1 Homepage of the Linking Device FG-110 FF

The FG-110 FF web server application is optimized for Mozilla Firefox browser but it is also possible to use Microsoft Internet Explorer.

When you start the web server the first time then please use the following default IP address, login and password.

IP address: 192.168.1.10

Password: fgadmin

Login: administrator

After login was successful, the homepage screen of the Linking Device Web Site appears.

The screen is divided into three partitions. At the top of the screen you see the headline with the input line for the http:// addresses (browser standard).

At the bottom left you see the headers of the main menu of the Linking Device Web Site which will be described in detail in the following text. Next to the content menu listing you see a free partition where the content of the single main menu items will be shown.

The headers of the main menu of the Linking Device Web Site are:

- Information
- Diagnostics
- Monitor
- Configuration

The submenu associated with each active menu opens automatically.

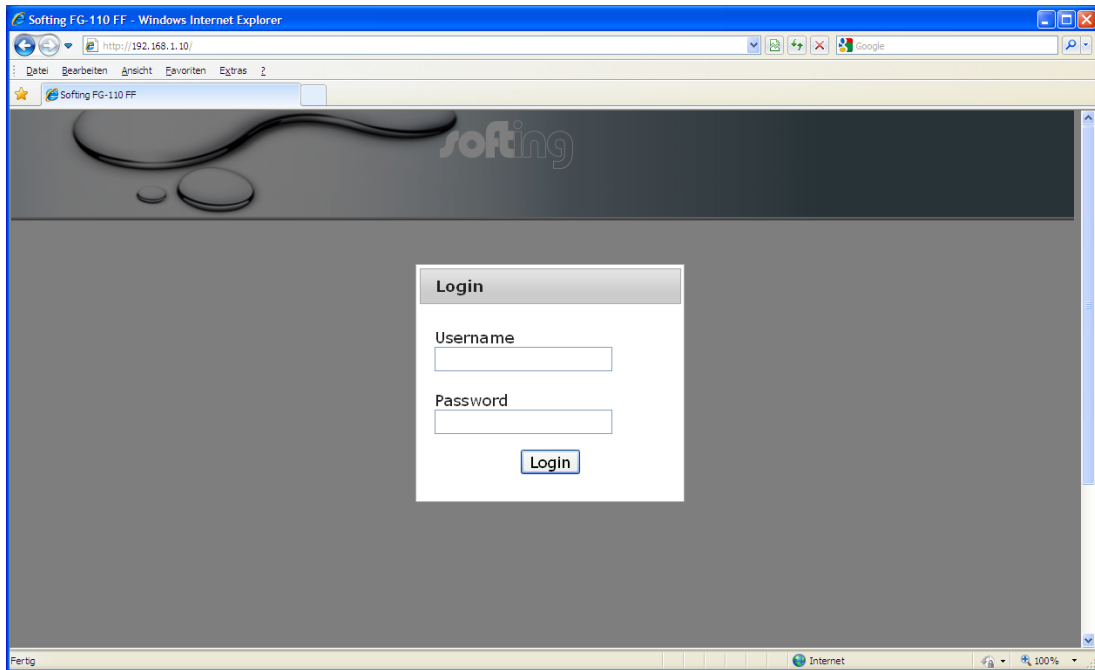


Fig 4.1-1 Starting Screen

## 4.2 Information

### 4.2.1 <Information><Contact>

When you click on <Information><Contact> you will see the contact address of Softing Industrial Automation GmbH on the free partition on the right of the screen. This view is the default Homepage.



Fig 4.2-1 Contact

### 4.2.2 <Information><Version>

When you click on <Information><Version> you will see a large number of version numbers, serial numbers and ID numbers of the connected devices in the in-house LAN on the free

right partition on the right of the screen. Here you can find the numbers of the several Linking Device modules which are important for questions relating to the support of Softing Industrial Automation GmbH.

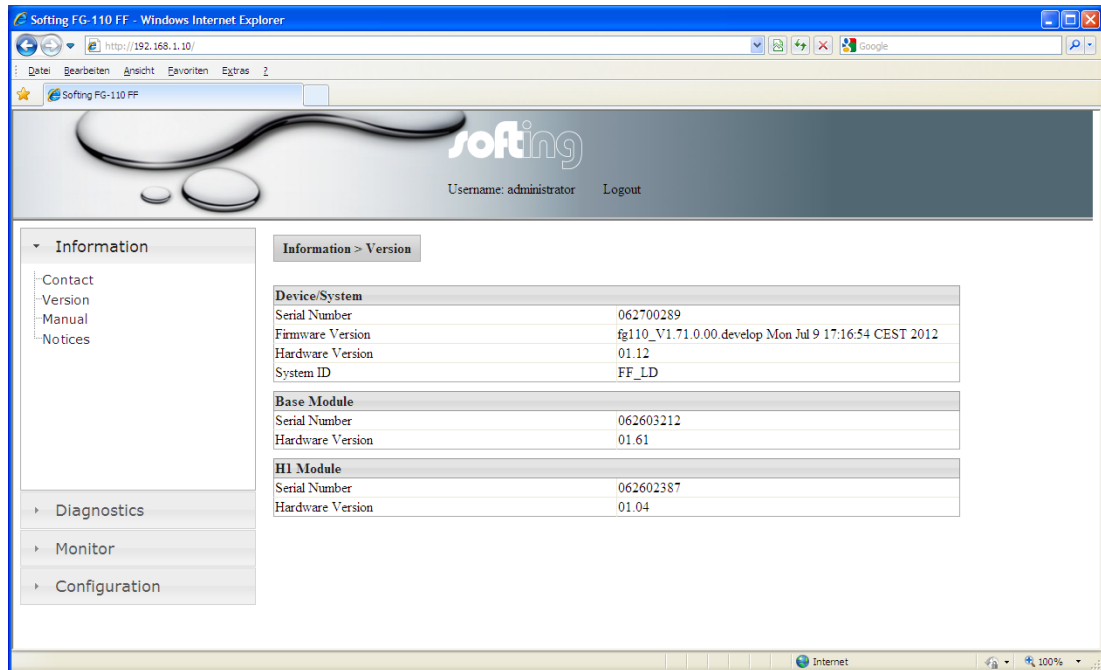


Fig 4.2-2 Version

### 4.2.3 <Information><Manual>

Click on <Information><Manual> and you find a link to download the manual from the Softing webpage



Fig 4.2-3 User Manual



#### 4.2.4 <Information><Notices>

Click on <Information><Notices> to obtain topical information about licenses which are used in the Linking Device.

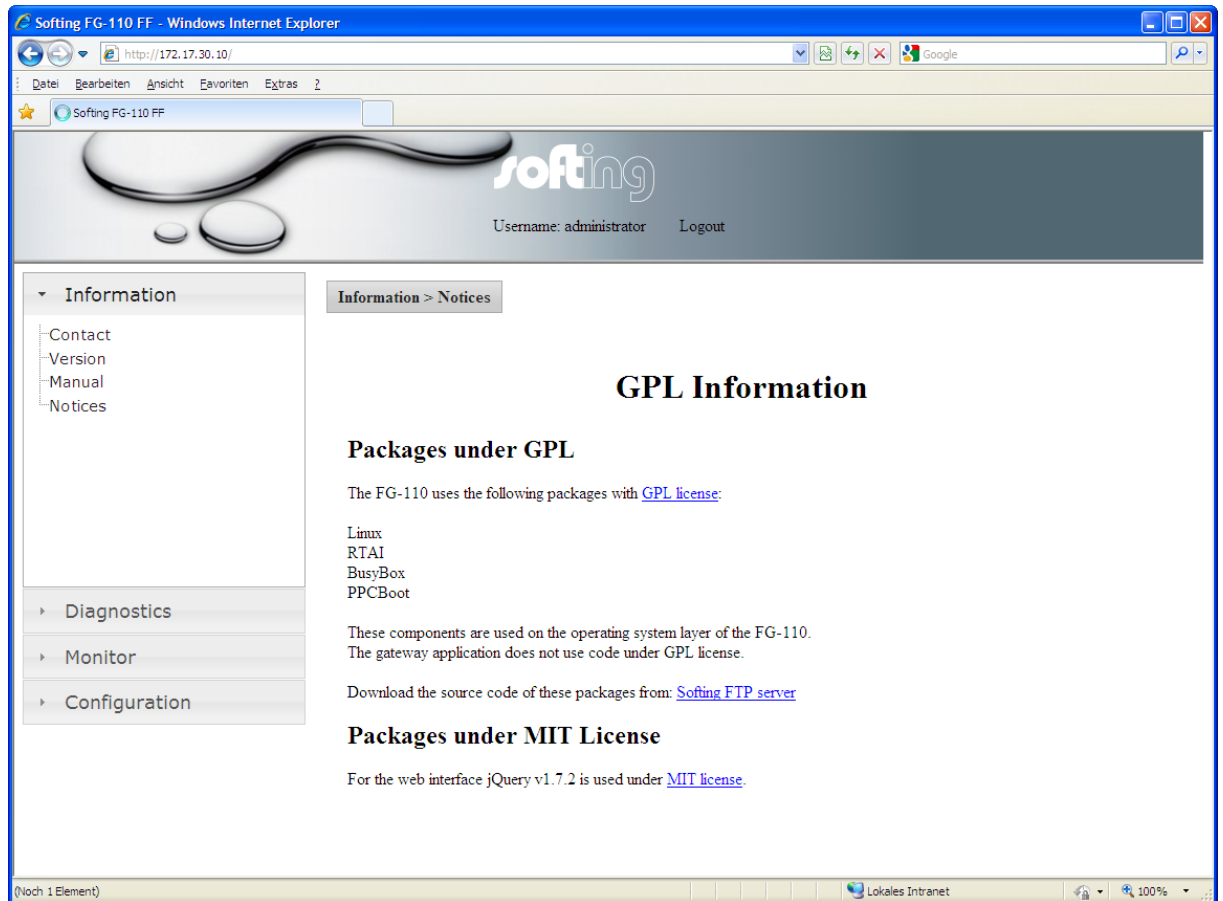


Fig 4.2-4 Actual information for the customer

#### 4.3 <Diagnostics>

Under the menu item <Diagnostics> the headers <System>, <Internet Protocol>, <Fieldbus> and <Advanced> are listed.

The tables listed under the menu item <Diagnostics> show the values in display mode.

##### 4.3.1 <Diagnostics><System>

The operating system and the application layer can be diagnosed.

The first table lists

- the Operating State,
- the System Uptime of the configured Linking Device Operating System.

The second table lists (in percent (%))

- the states of CPU Load,
- the Memory Load,
- the Flash Load of the configured Hardware.

The displayed data shows the usage rate of the system in %.

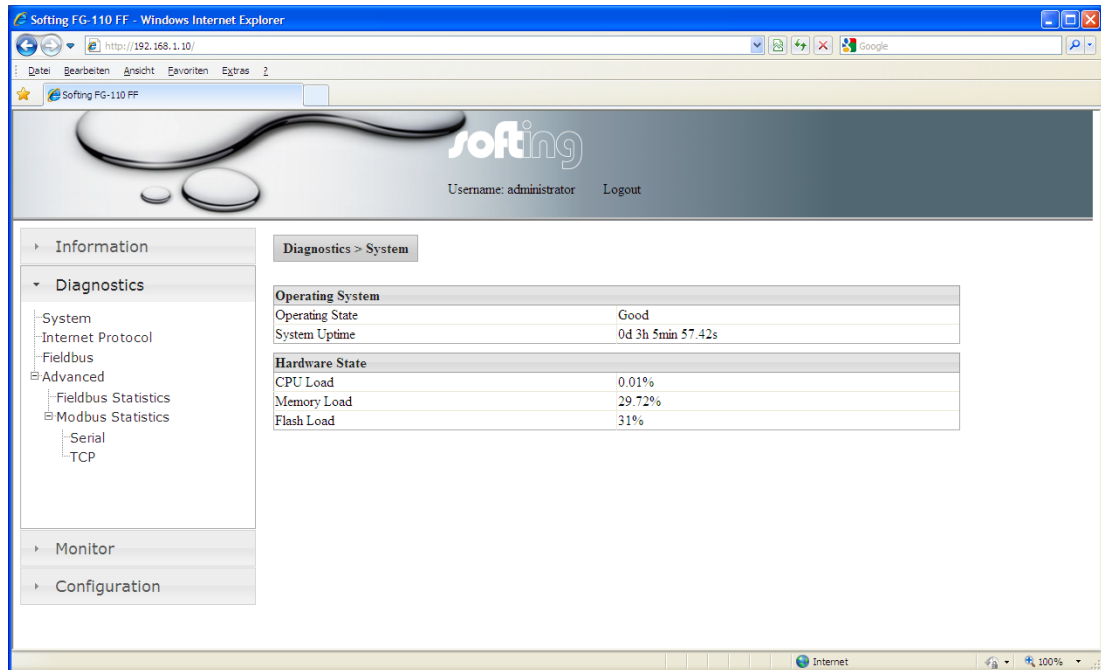


Fig 4.3-1 System - actual Information of the Linking Device state

### 4.3.2 <Diagnostics><Internet Protocol>

The table <Internet Protocol> lists the main information the system has got about the connected subnet.

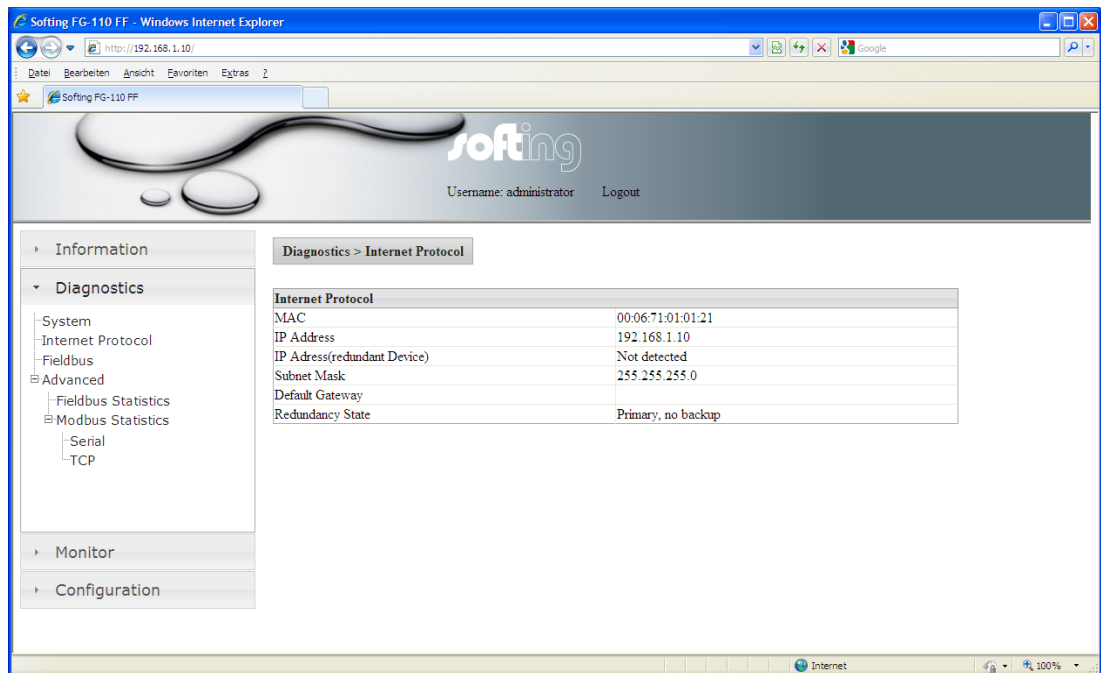


Fig 4.3-2 Data of the Internet protocol

### 4.3.3 <Diagnostics><Fieldbus>

Fieldbus segment diagnostics are provided to give you a quick view of what is attached to the Linking Device. It shows how many segments are active.

On the screen two tables are shown.

The first table shows the information about the Linking Device, the PD Tag as well as the Device ID. The PD Tag can be modified in the Configuration page "LD Settings".

Underneath it another table shows which segment (H1 Link) of the Linking Device (FG-110 FF) is occupied and how many FF-H1 devices are connected under each segment.

Additional, for each available FF-H1 device the tag name is shown. So, the this table provide a simple live list of the FF-H1 network. Please note that this list will be updated just be clicking on “Fieldbus” again.

For each Linking Device up to 4 H1 Links (segments) are available. And under each segment H1 Link up to 16 devices H1 are possible.

(In this example: Segment 1 (H1 Link) from Linking Device HSE\_ DEVICE\_1 is occupied by two connected devices (H1 Device), flagged with a green check mark. The segments 2-4 (H1 Links) are free, flagged with red buttons.

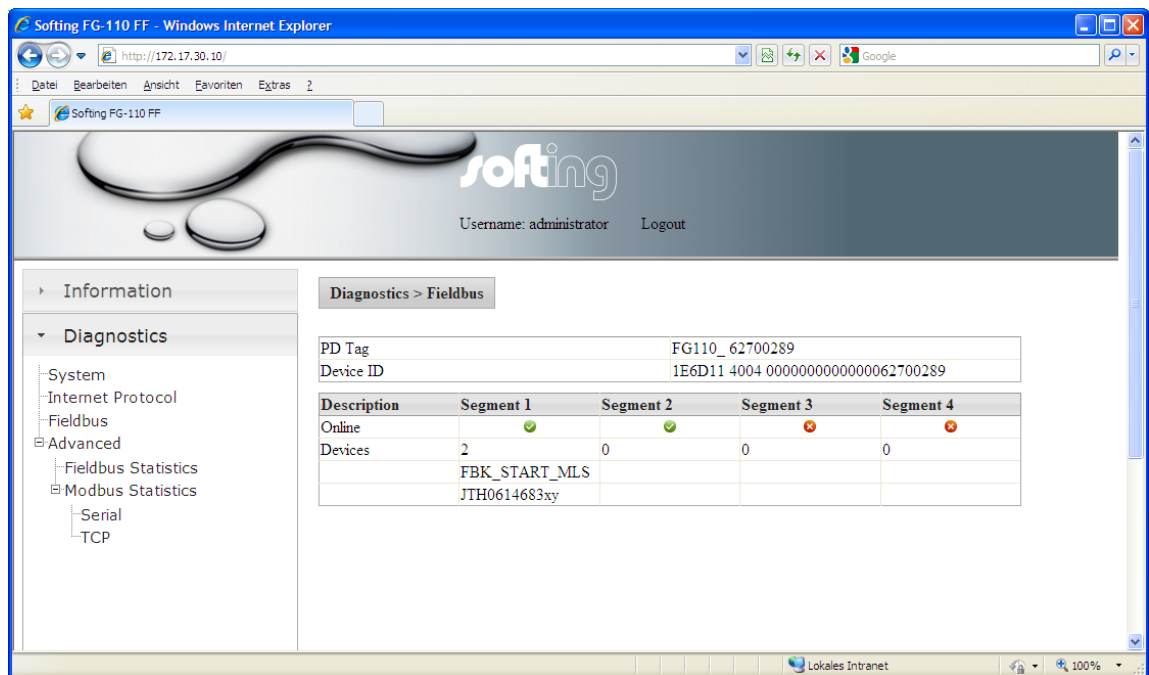


Fig 4.3-3 Shows the actual configuration – Linking Device and occupancy of the 4 H1 Links (Segments)

#### 4.3.4 <Diagnostics><Advanced>

The menu item <Diagnostics><Advanced> therefore shows two different menu items.

- Fieldbus Statistics
- Modbus Statistics.

##### 4.3.4.1 <Diagnostics><Advanced><Fieldbus Statistics>

The menu item <Fieldbus Statistics> shows two different tables. The values specified apply to the time since the program has been started or the latest <Reset count>.

The first table shows statistical data for each single occupied segment of the H1 Device.

- Messages Transmitted: Assumption of all the transmitted messages for each occupied segment
- Good Messages received: Assumption of the good messages received at each occupied segment.
- Total: Number of total retries.
- 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”

- Framing Errors: Number of framing errors
- Checksum Errors: Number of checksum errors

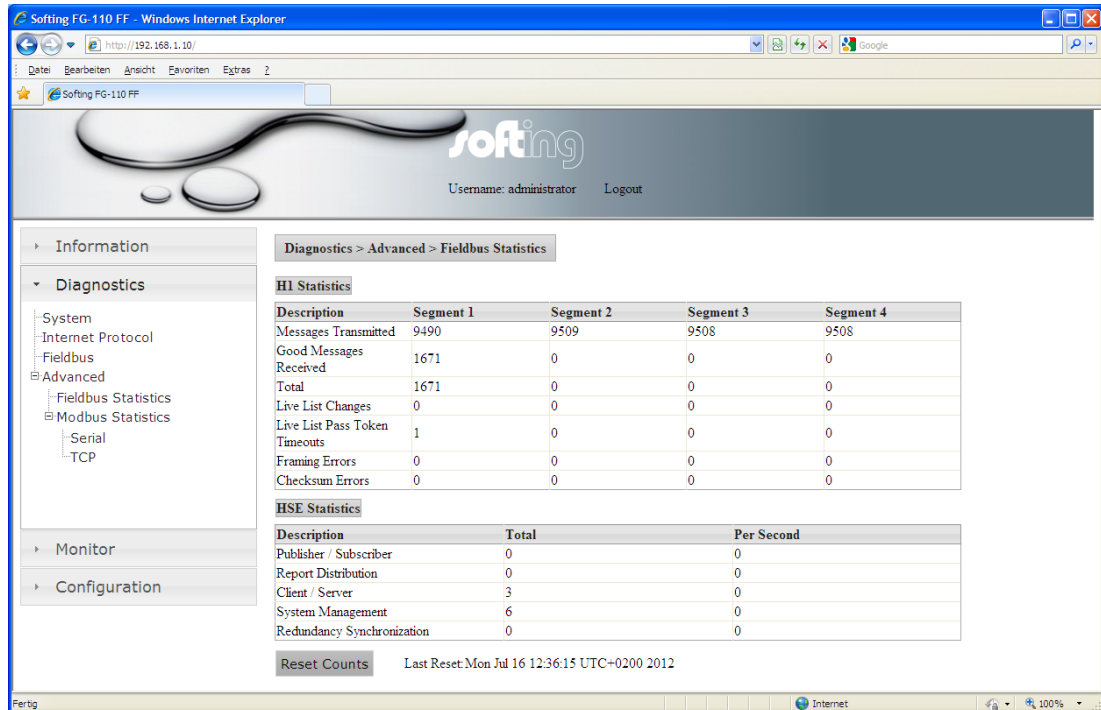


Fig 4.3-4 Fieldbus Statistics (H1 and HSE)

The second table shows statistical data for each of the HSE Links.

- Publisher/Subscriber: Number of messages per second (average value)
- Report Distribution: Number of messages per second (average value)
- Client/Server: Number of messages per second (average value)
- System Management: Number of messages per second (average value)
- Redundancy Synchronization: Number of messages per second (average value)

Pressing the button <Reset count> sets the counter to zero. Recording of the statistical data starts at the beginning.

You have to click<Fieldbus><Statistics> once again to see the new results.

#### 4.3.4.2 <Diagnostics><Advanced><Modbus Statistics>

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.

Therefore the Modbus may work with two different protocols. Menu item <Diagnostics><Advanced> <Modbus Statistics> shows two different menu items.

- Serial
- TCP

### <Diagnostics><Advanced><Modbus Statistics><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. RS232 needs a converting unit RS232/RS485 and a separate data connection between Linking Device and Modbus.

The values specified apply to the time since the program has been started or the latest <Reset count>.

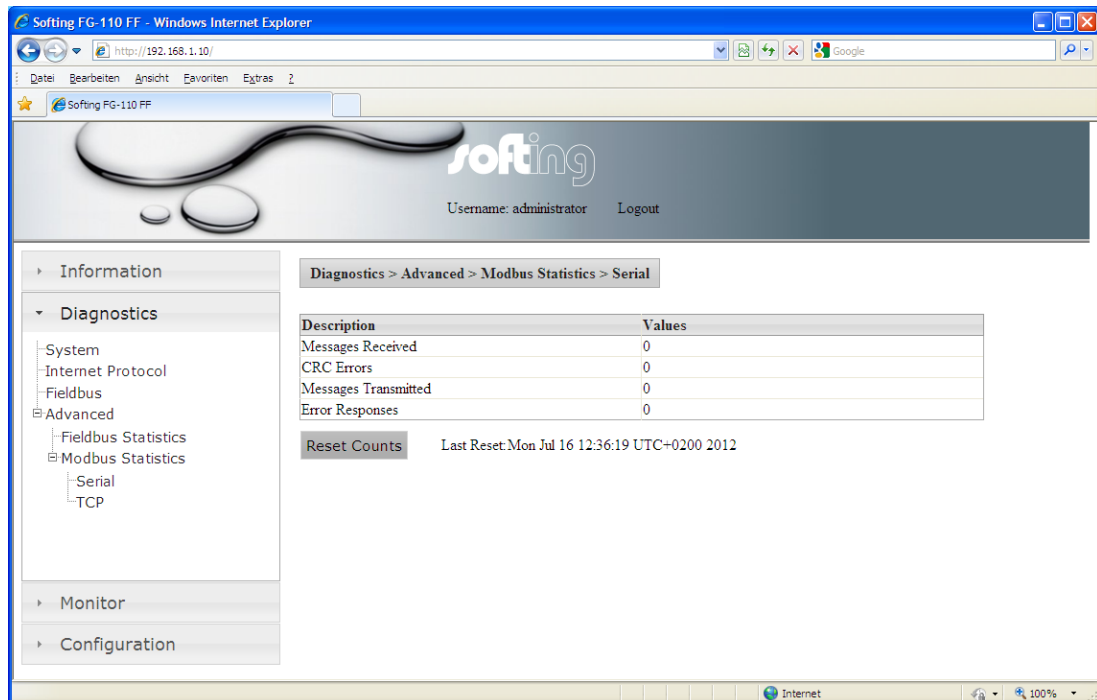


Fig 4.3-5 Modbus Serial Statistics

Pressing the button <Reset count> sets all counters to zero. Recording of the statistical data starts at the beginning.

You have to click<Modbus Statistics> <Serial> once again to see an update of the results.

### <Diagnostics><Advanced><Modbus Statistics><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.

Pressing the button <Reset count> sets all counters to zero. Recording of the statistical data starts at the beginning.

You have to click<Modbus Statistics> <TCP> once again to see an update of the results.

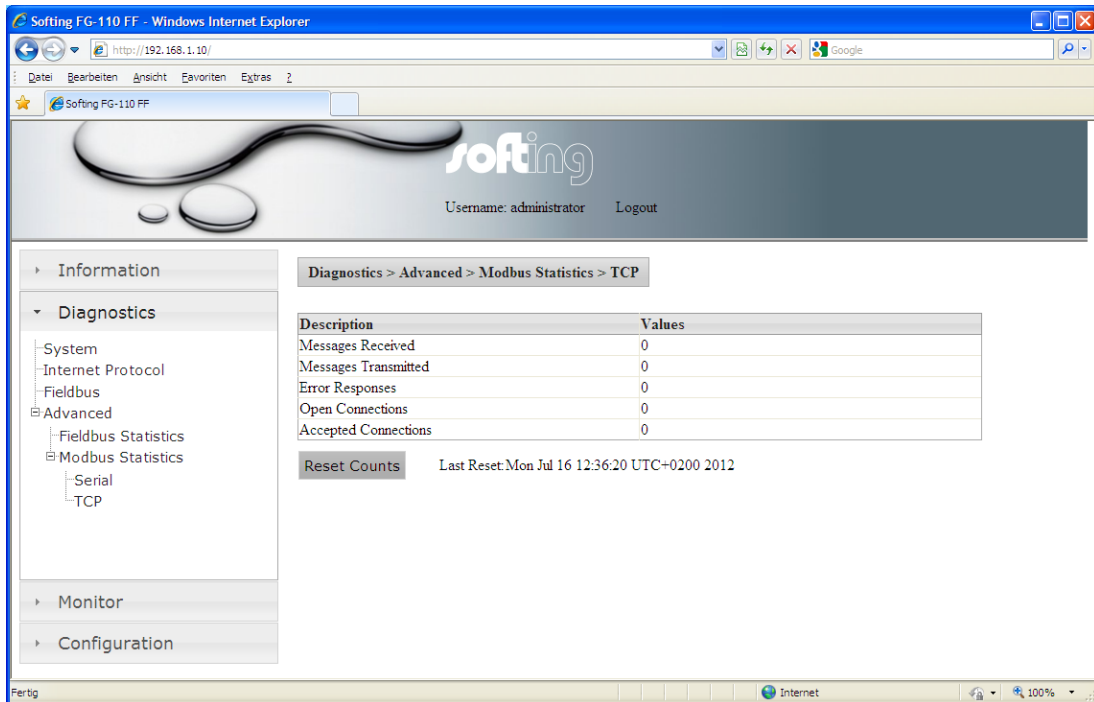


Fig 4.3-6 Modbus TCP Statistics

## 4.4 <Monitor>

Click <Monitor> Options to display the point pages and point data.

### 4.4.1 <Monitor> <Point Pages>

Point Pages provide a means to view the Process Value (PV) or Output of a Function Block and its 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.

First click <Point Pages> to select the desired part of data. It may be one or more rows or sites.

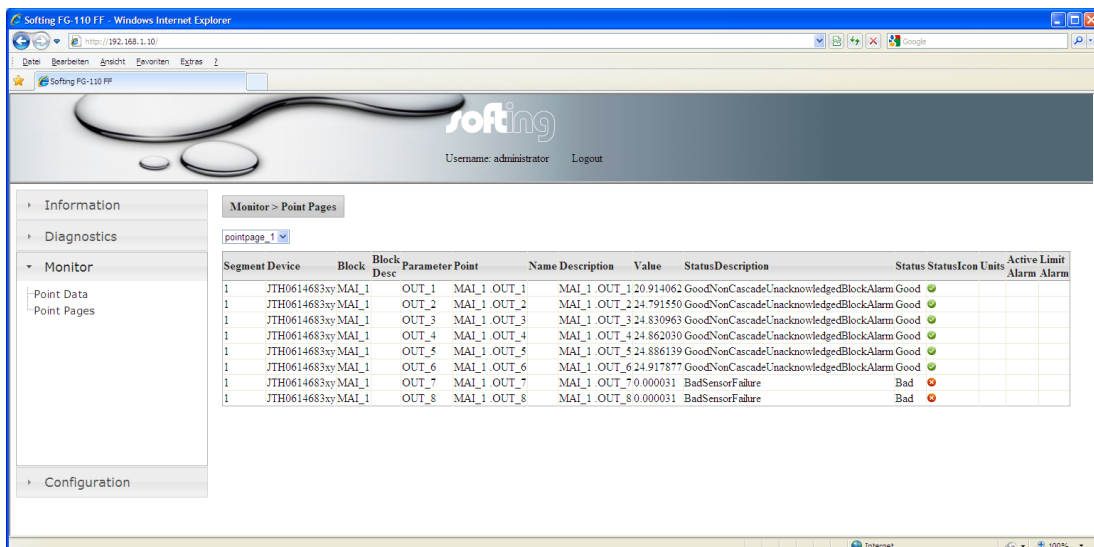


Fig 4.4-1 Statistics of the H1 Devices for the selected page

#### 4.4.2 <Monitor><Point Data>

Next click <Point Data> to see the details of all available point pages displayed for the selected page.

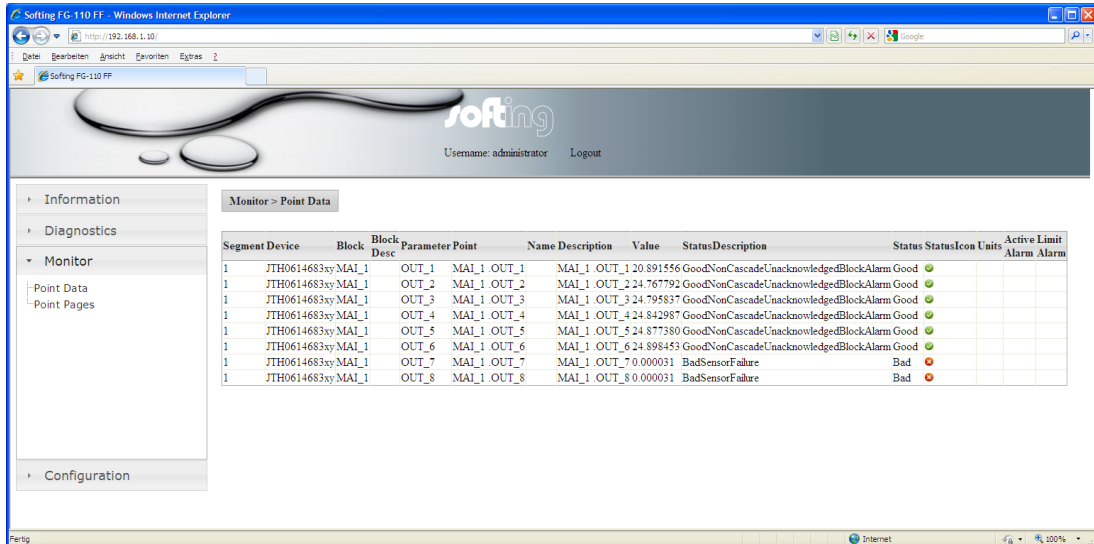


Fig 4.4-2 Monitor Point Data – all Data of your plant will be shown

### 4.5 <Configuration>

The menu item <Configuration> is a very important item of the Linking Device web site. Here the user with administrator rights has the possibility to change network parameters, configure the point pages and perform Modbus mapping.

#### 4.5.1 <Configuration><Settings>

##### 4.5.1.1 <Configuration><Settings><General Settings>

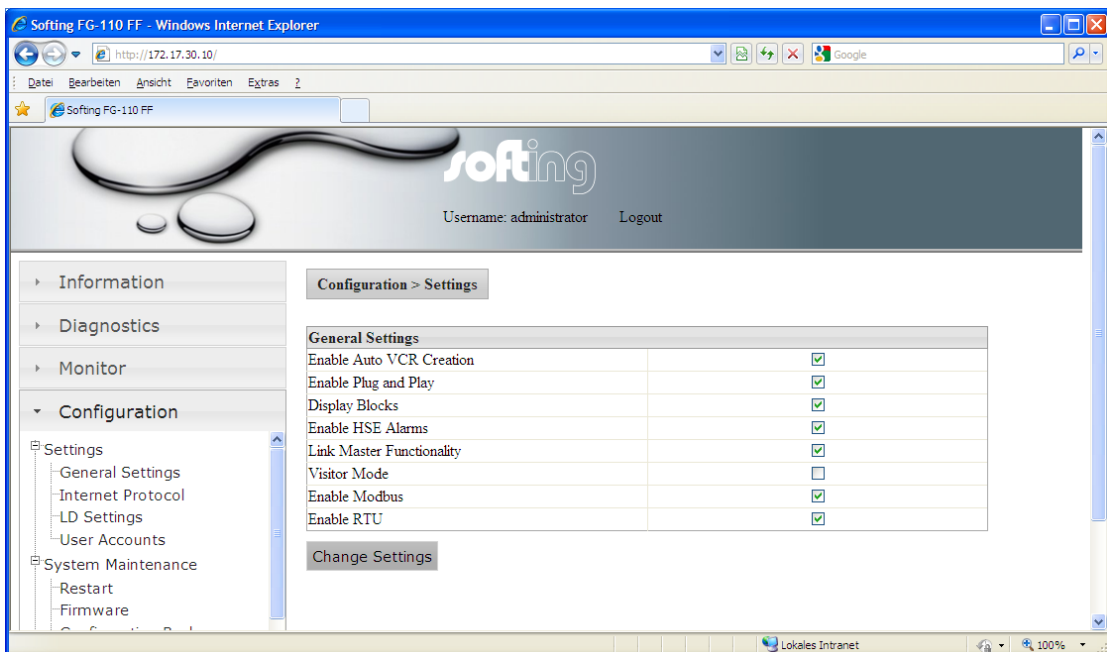


Fig 4.5-1 General Settings of the Linking Device

#### 1.) Enable VCR Creation

If this feature is “on” then the Linking Device establishes the VCR connection by them self. Please read in the software manual if it is necessary or not.

Some examples

Softing Configuration Tool (FF-CONF)	--> On
Emerson AMS™ Software	--> On
NI-FBUS Configuration Tool	--> Off



Please note that the feature “Automatic VCR creation has to be enabled when the tool FF\_CONF is to be used for the Foundation fieldbus configuration

#### 2.) Enable Plug&Play

This feature makes sure that pre-configured device can be used without a configuration tool.

#### 3.) Display Blocks

This feature enables or disables the point page functionality. The use of the point page creates a lot of traffic of the FF-H1 network. If you don't use this Monitor feature then you can save more H1 bandwidth and faster reaction time over Modbus.

#### 4.) Enable HSE Alarms

The Linking Device is able to use the already configured alarm VCR's in the FF-H1 devices or can established new one.

#### 5.) Link Master Functionality

In case of visitor mode it can make sense to disable the Link Master functionality. If no Link Master is available then a time-out will follow after 6 sec.

#### 6.) Visitor Mode

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

#### 7.) Enable Modbus

This button enables or disables Modbus TCP and RTU.

#### 8.) Enable 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.



#### 4.5.1.2 <Configuration><Settings><Internet Protocol>

The Linking Device is delivered in a default configuration. To change the default internet protocol settings into assigned values of the chosen subnet in which the installation is running you click <Configuration><Internet Protocol>.

A table which enables you to change settings appears.

First you can click a button to <obtain an IP address from a DHCP server>. When you click this button the IP address is a random address chosen from the DHCP server. To find out the IP address of the Linking Device you can use the tool “Search and Configure” (SAG.exe) or the live list of the FF-CONF tool. Both tools are available on the CD-ROM or on the Softing homepage.

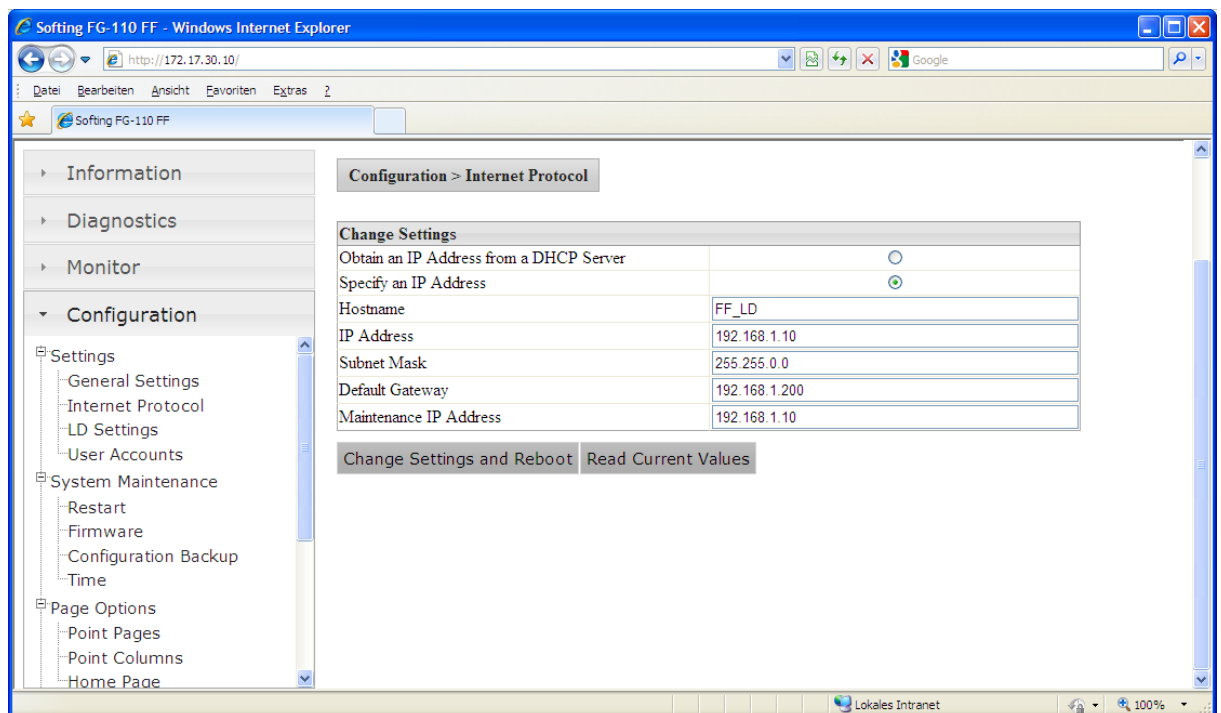


Fig 4.5-1 Configure the Internet Protocol

To keep the systems under your control click the button <Specify an IP address>. Underneath this button input fields become active to insert:

- **Domain name:** configurable name for the domain
- **IP address:** must be compatible with the subnet you choose for the PC setting, must be present in any case.
- **Net mask:** default with 255.255.0.0, no change needed, must be present in any case.
- **Gateway:** It is not necessary to configure a Default Gateway if the host and Linking Device share the same network.
- **Maintenance IP address:** IP address of the connected PC in the same subnet. The Maintenance IP Address is required to download the Linking Device firmware from a maintenance server. The maintenance server is a TFTP server (Tiny File Transfer Protocol) that contains an image of the flash memory content of the Linking Device (it is also possible to download a file via the website). In that case it is not necessary to install a maintenance server and to specify its address.

**<Change Settings and Reboot>**

When you click the button <Change Settings and Reboot> the web site shuts down and the system reboots.

The input values will be checked for consistency. If the input values are not consistent, the Linking Device will propose consistent values. You can use the proposed values by clicking <yes> or keep the values you entered by selecting <no>.

The Linking Device will be rebooted after a few seconds and the new values will be accepted.

If you change the IP address of the Linking Device, the IP connection between PC and Linking Device will be lost. You have to use the new IP address to re-establish web access to the Linking Device.

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.



Do not access the web server of the Linking Device before the NEW NETWORK SETTINGS or ERROR OCCURED 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 Linking Device.

**4.5.1.3 <Configuration><Settings><LD Settings>**

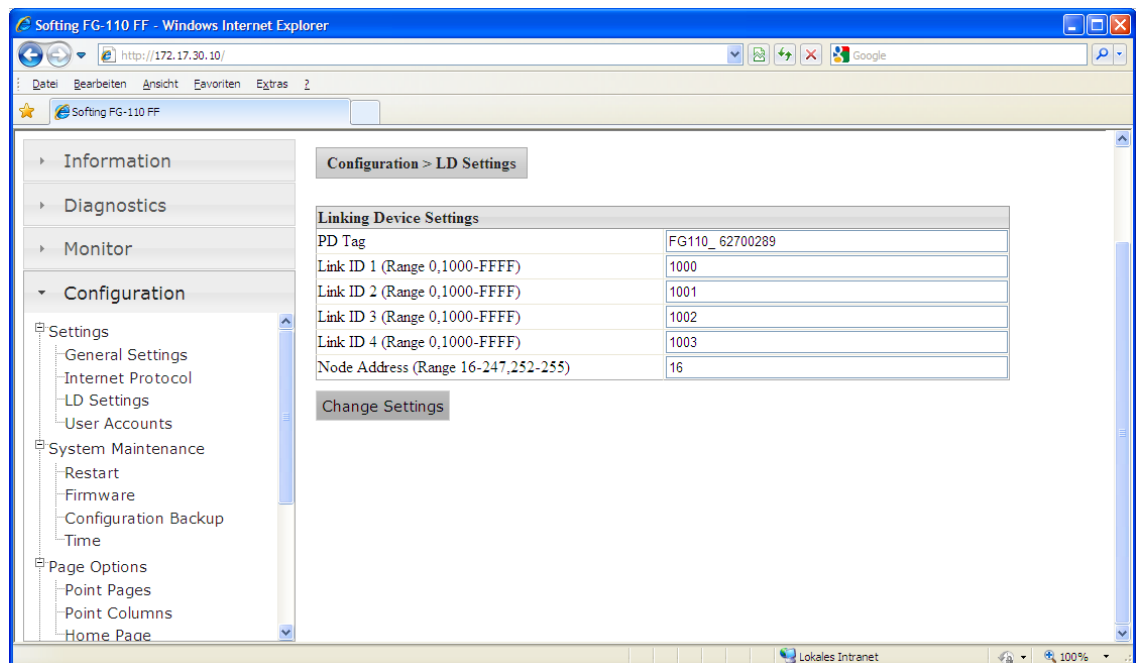


Fig 4.5-2 Configuration of Linking Device Settings

Each Linking device gets a unique PD-Tag which includes the serial number.

The Webpage “LD-Settings” can be used to change the PD-Tag of the Linking device, the Link ID as well as the Node Address of the H1 links.

#### 4.5.1.4 <Configuration><Settings><User Account>

The Linking Device is shipped with default user password. Under this menu item you can change the settings of the user passwords. Due to the jobs the user executes in this web site there are several graduations for admission control.

The following standard logins and password are available.

Login: administrator Password: fgadmin  
Login: maintenance Password: keepitgoing  
Login: operator Password: runit  
Login: executive Password: showme

These passwords can be configured with administrator rights.

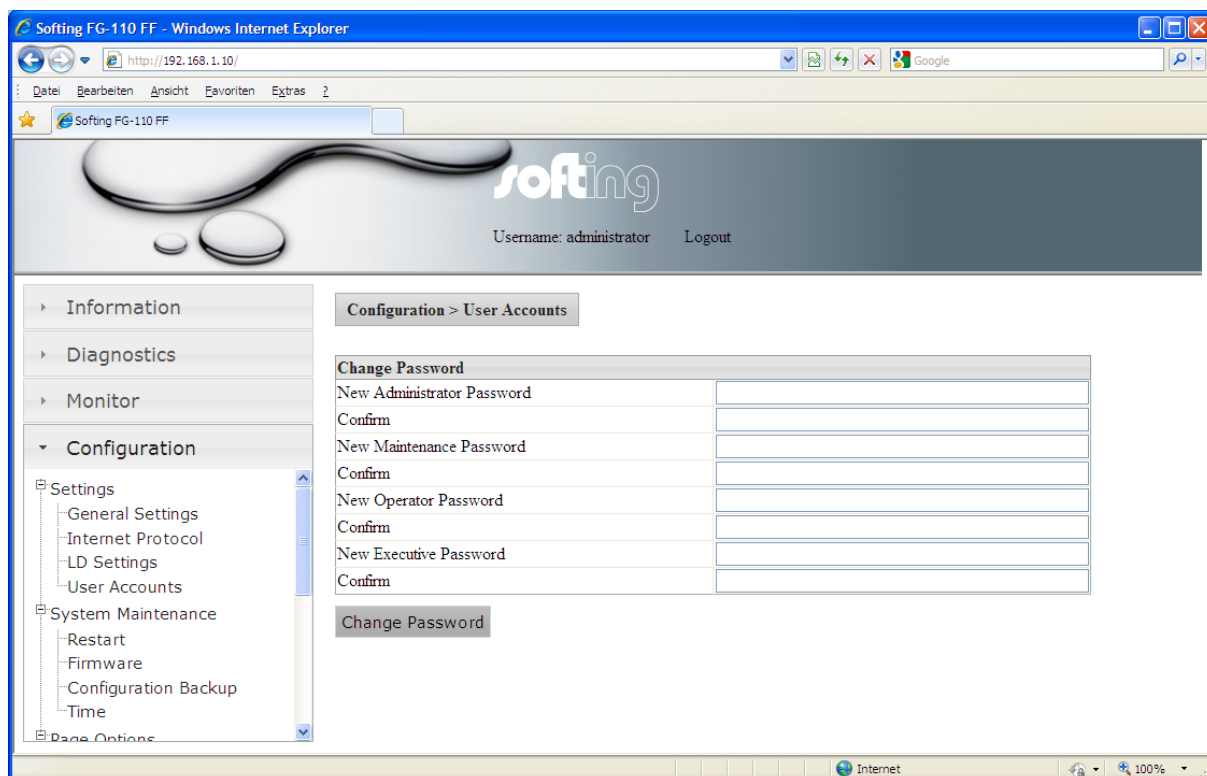


Fig 4.5-3 Change user accounts – new Passwords

The following rights are connected to the pointed out roles:

The administrator can

- configure network settings (address, default)
- set passwords
- set time settings
- set home page options
- restart applications

in addition to all the functions of the other roles listed below.

The **maintenance**, **executive** and **operator** can just monitor the process values (point pages) and the diagnostic. They have not access to all configuration sides.

You can install user passwords for four user groups. Fill in the new password and confirm your input with a second input. The input mode is always the same for all user groups.

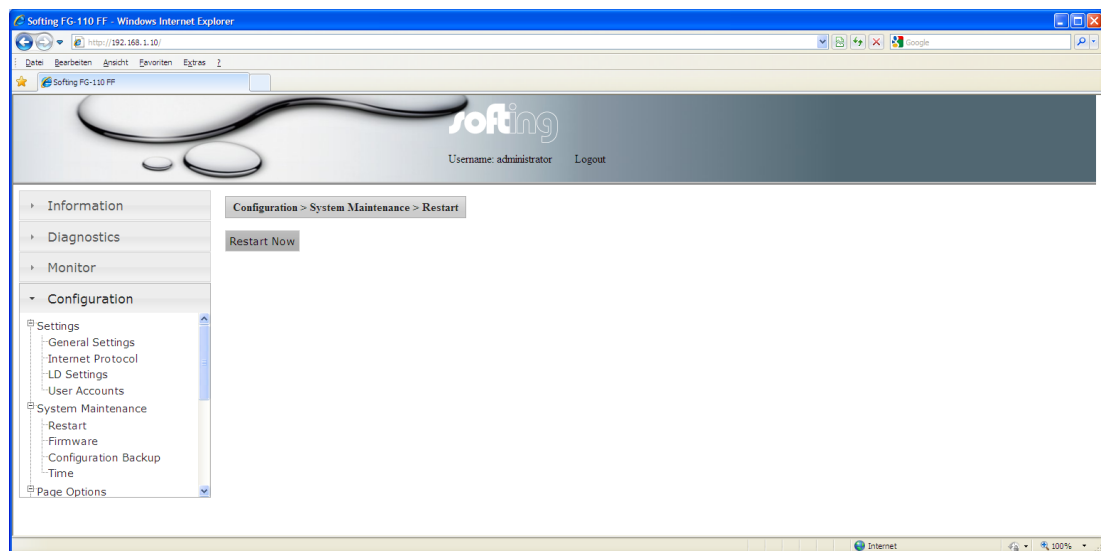
When you click the button <Change Password> the passwords will be changed and activated the next time you enter the web site.

The administrator can modify any system or field device setting. Thus use caution when changing the administrator password. If the administrator password is lost, you will not be able to set up the Linking Device und and it is necessary for a staff member of Softing to reset the password.

## 4.5.2 <Configuration><System Maintenance>

### 4.5.2.1 <Configuration><System Maintenance><Restart>

Restart causes the start of the program from the beginning with all settings stored last.



*Fig 4.5-4 Restart of the HSE Device*

Pressing the button <Restart now> causes another window to appear with the question whether the restart of the device is desired. Seek the required file and

- Click <OK> to start the restart of the device.

Click <Cancel> to return the program to the beginning. Each setting is persistent.

### 4.5.2.2 <Configuration><System Maintenance><Firmware>

Clicking the button <seek> the Firmware Update page opens a file selector box to select the firmware file to be downloaded. Click <Download Firmware and Reboot> to start the download process. Firmware download and flash memory update take between one and two minutes. You can observe the progress of the update process in the browser window.

During Reboot, the IP connection between PC and Linking Device will be lost.

Do not access the web server of the Linking Device 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 Linking Device.

The end of the boot process is indicated by a reboot of the Linking Device.

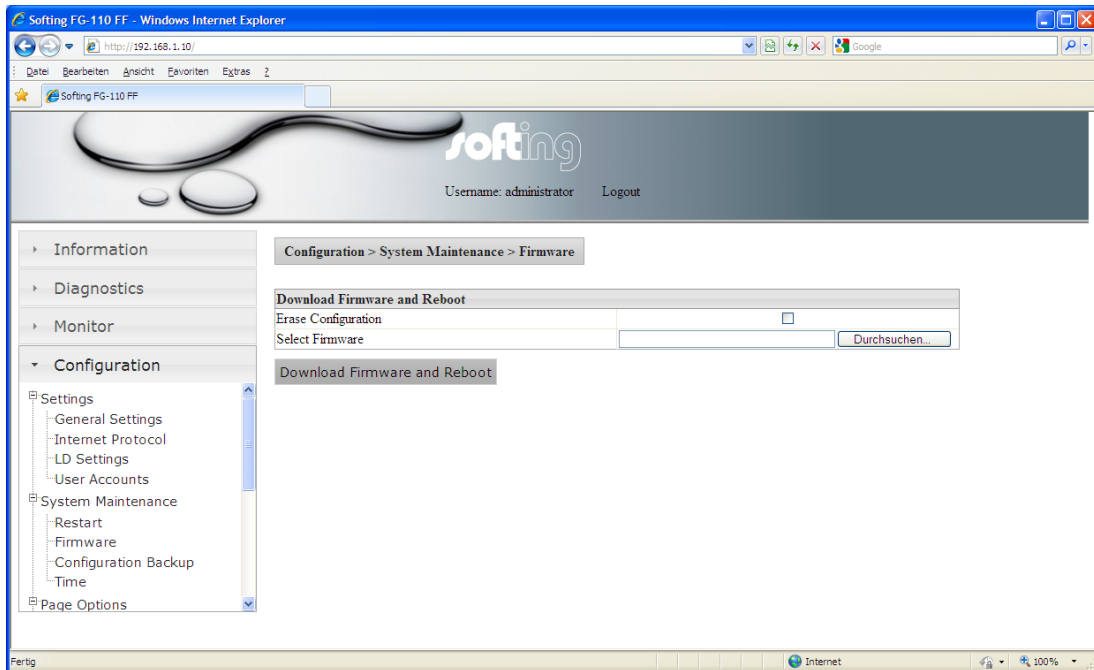


Fig 4.5-5 Download Firmware and Reboot

After a new start the firmware stored in the chosen file is now valid for this configuration.

**i** Please note that while the software download is running the connection between the PC and the Linking Device will not be closed or the power supply of the Linking Device disconnected. This can destroy the Linking Device.

#### 4.5.2.3 <Configuration><System Maintenance><System Backup>

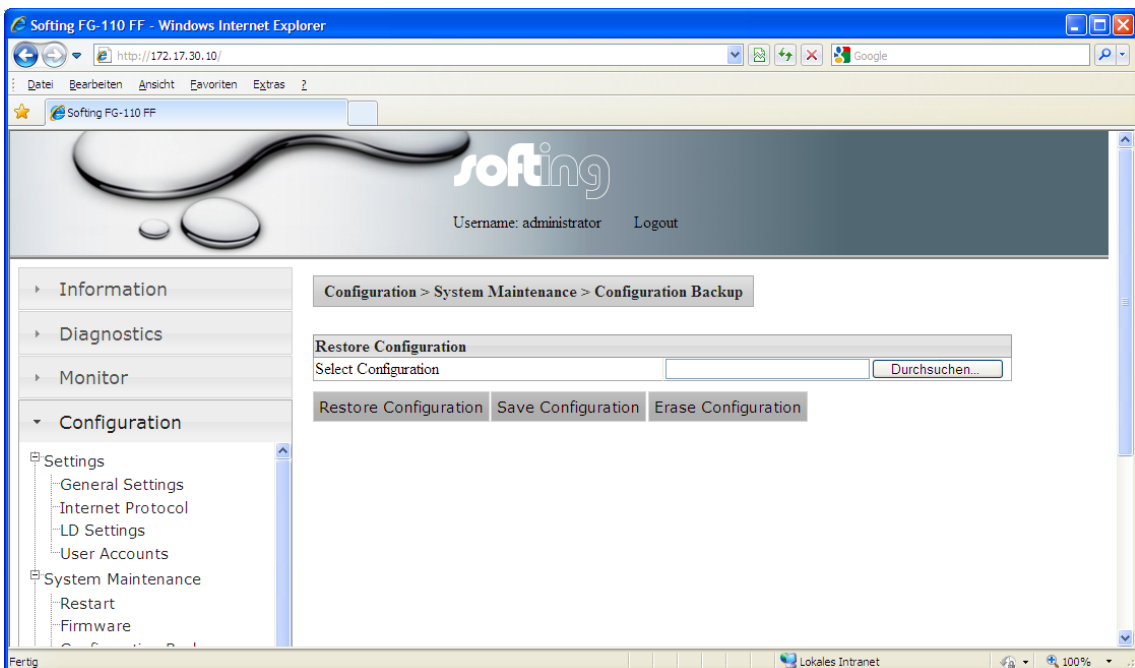


Fig 4.5-6 Save your current system

Press the button <Save Configuration> another window appears on the screen which enables you to search for a folder in your directory on your PC or external store media to store the configuration you have created for the installation for future use.

With the button “Erase Configuration” the Linking device can be switched back to factory default settings.

Erase causes the deletion of the valid configuration.

It is recommended that you erase the configuration part of the flash memory by checking <Erase Configuration>. This will clear the FF configuration information (plant configuration), but the IP configuration will not be changed.

Pressing the button <Erase Configuration> causes another window to appear with the question whether the deletion of the configuration is desired.

- Click <OK> to start deletion of the configuration.
- Click <Cancel> returns the program to the beginning. Each setting is persistent.

If you erase the Linking Device configuration, the password will be reset to its default value.

#### 4.5.2.4 <Configuration><System Maintenance><Time>

Click <Configuration><Time> to configure the system time.

The first table, *Current Time*, shows the current time on your PC, the time on the Softing Linking Device. The difference between the current PC time and the time in the Linking Device is shown in the field under it.

In the second table, *Set Time*, you can check a box *Set with PC*. After clicking the button <Set Time> the current PC time and the time in the Linking Device will be synchronized and shown in the table Current Time.

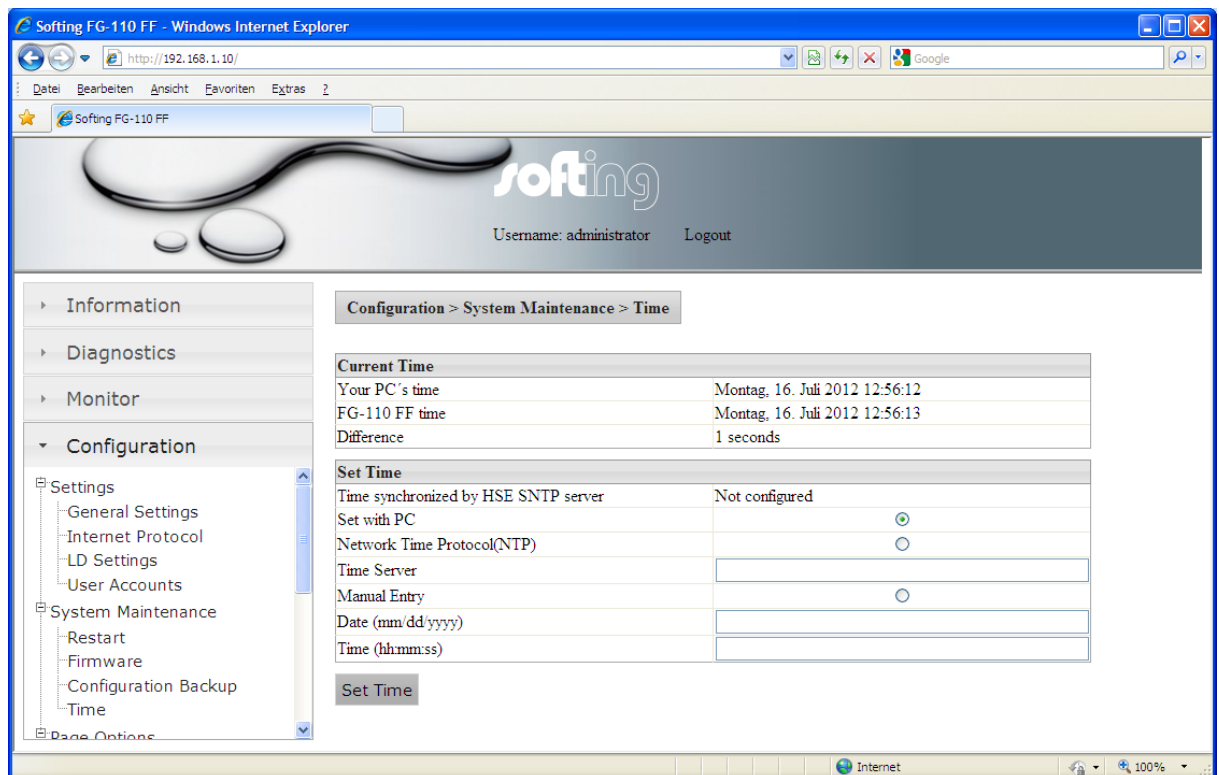


Fig 4.5-7 The possible opportunities to set time

If the Linking Device 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 will be less accurate and time updates must be entered for each Linking Device. To use a network time server, check the box <Network Time Protocol> (NTP), enter the IP address of the time server and select the appropriate NTP packet version.

If a HSE SNTP server is configured then all other fields are greed out.

Alternately you can set the time manually. This is accomplished by checking the box <Manual Entry>. This will enable you to enter information in the <Date> and <Time> fields. In both cases you must confirm the input by clicking the button <Set Time>. Until then your input will be activated.

### 4.5.3 <Configuration><Page Options>

Click <Configuration> <Page Options> to configure the Point Pages, the Point Columns and the Home Page.

#### 4.5.3.1 <Configuration><Page Options><Point Pages>

Point Pages provide a means to view the PV or Output of a Function Block and its status on one or more web pages. Multiple pages can be configured to fit the application. Click <Configuration> <Page Options> <Point Pages> to display the current list of Point Pages.

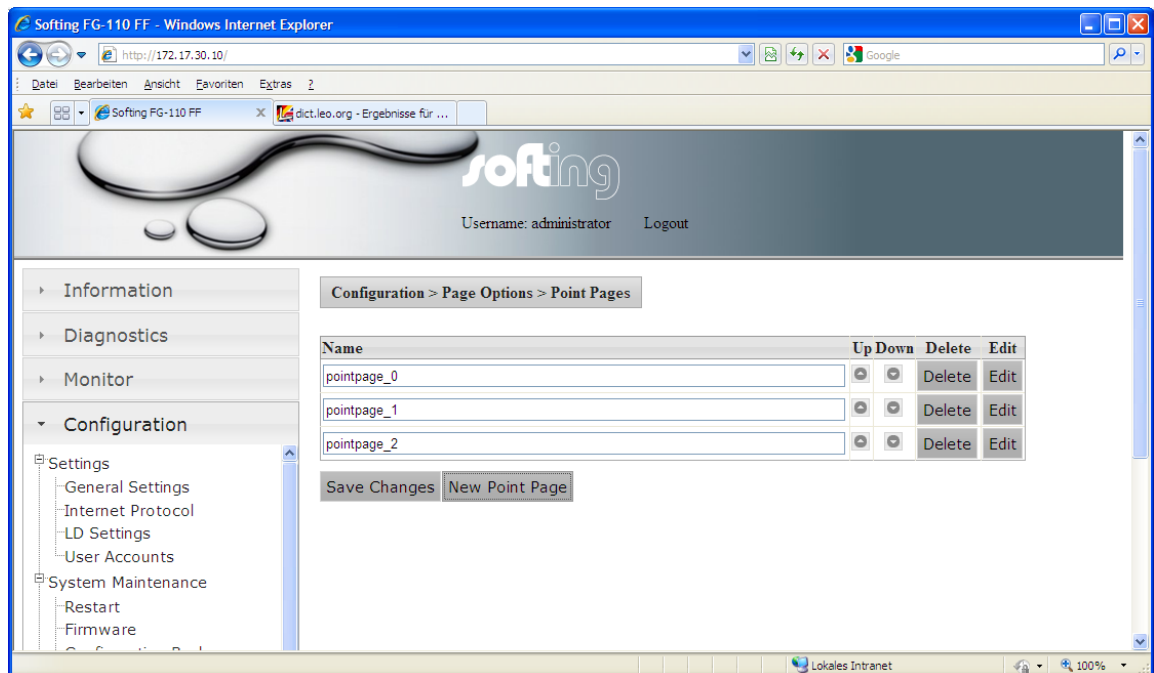


Fig 4.5-8 Create Pages to select information of your whole plant

With the button <◀▶> you can move the chosen point page so that the pages are sorted in the order you desire.

To delete a point page which already exists, press the button <Delete> in the line of the point page you want to erase.

To change the content of a listed point page, press the button <Edit> in the line where the desired point page is listed.

Another window appears with a table where the valid Points for this point page are listed. Over the table there is an input box with the name of the point page.

If you change this name you get a new point page with all the attributes of the chosen point page.

The table below the page name has five columns. The first column is named "Point". Under this column, the possible Out-Blocks (AI Function Blocks) are listed. Beside the file name you find a search field <...> for choosing another .out file from a file list.

The second column of the edit table is named "Name". It can contain a name of the Function Block.

The third column is named "Description". In this field it is possible to type the description of the Function Block.

In the next column "Up/Down" you can scroll the list. The last column "Delete" contains a <Delete> button for each .out file in the table.

Under the table the buttons <Save Changes> and <New Point> are arranged. When you press one of the buttons you can either save the changes of the point page or create a new point.

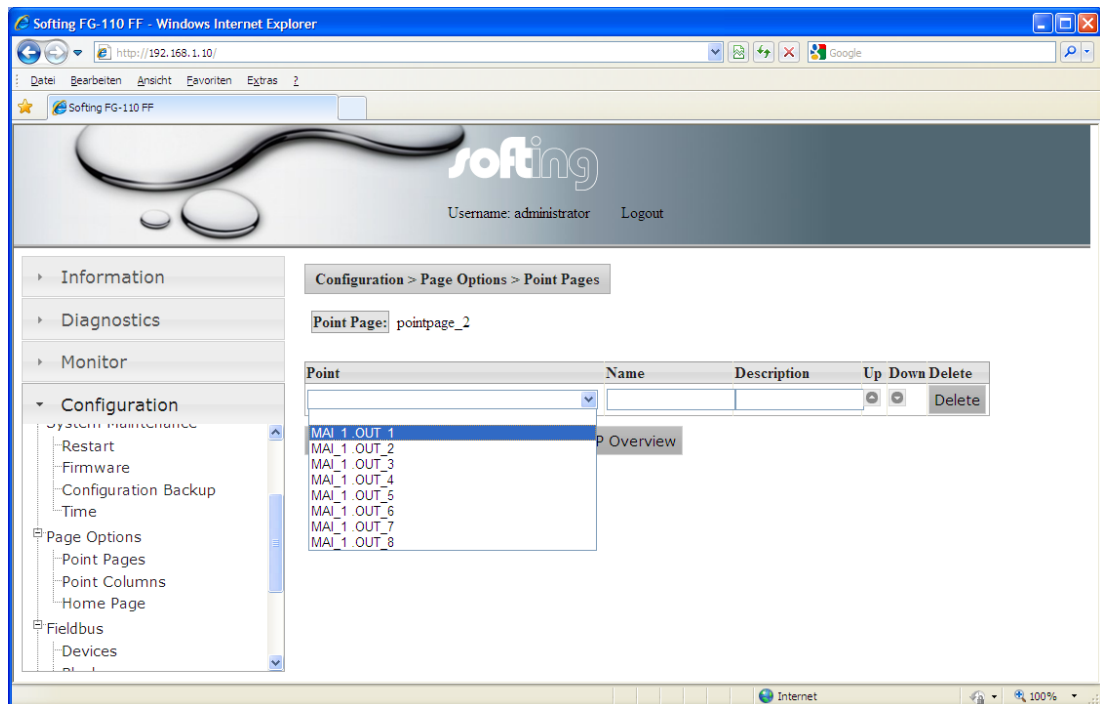


Fig 4.5-9 Create a new Point or change pages

To save the changes click <Save Changes>.

To create a new Page click <New Point Page>. The input data of a new Point Page must be treated in the same way as when existing Point Pages are changed.

After <Save Changes> and clicking <Point Pages> you see the data of all your pages again, possibly including a new page. Without <Save Changes> the existing data remains unmodified.

#### 4.5.3.2 <Configuration><Page Options><Point Columns>

When you click <Configuration> <Page Options> <Point Columns> a table with various point columns appears on the screen. A check mark in the check box right beside the point columns enables the point columns. If the check box is empty the column is disabled and does not appear in the point page. In this way you can build the format you need.



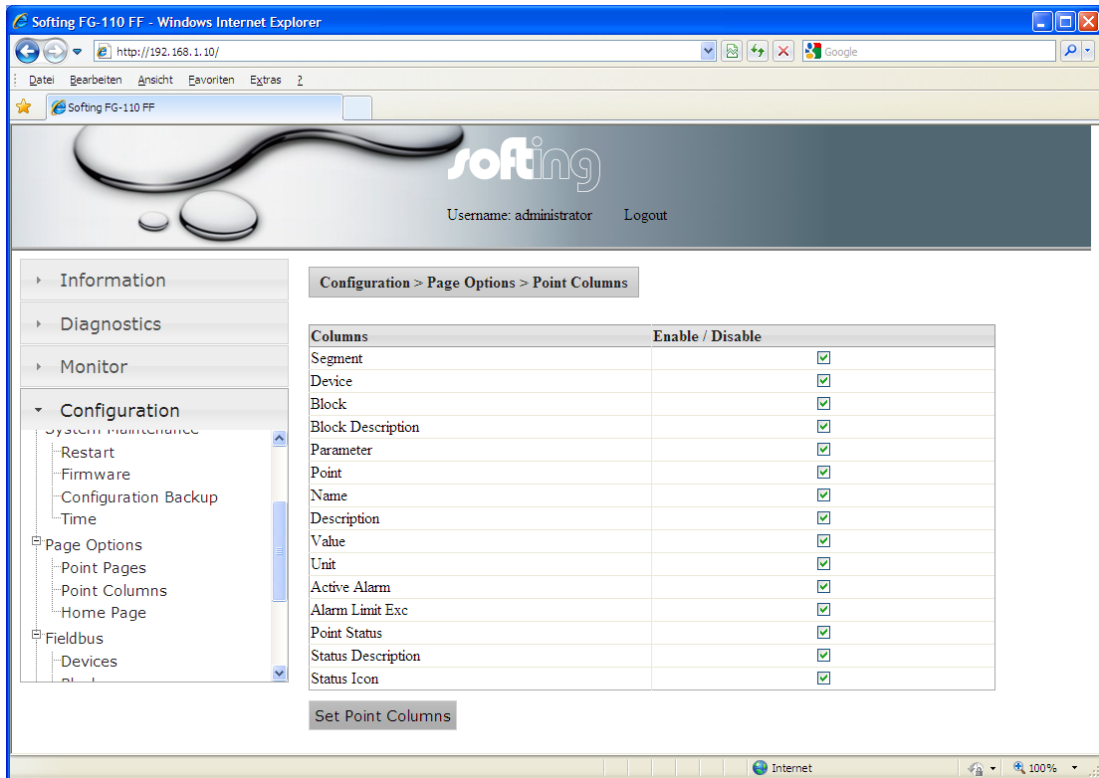


Fig 4.5-10 Select columns and save your selection

#### 4.5.3.3 <Configuration><Page Options><Home Page>

When you click <Configuration><Page Options><Home Page> a table with four possibilities for the first side of the homepage appears on the screen. You can choose between the chapters “Information | Contact”, “Diagnostics | Fieldbus”, “Monitor | Point Monitor” or “Monitor | Point Pages”.

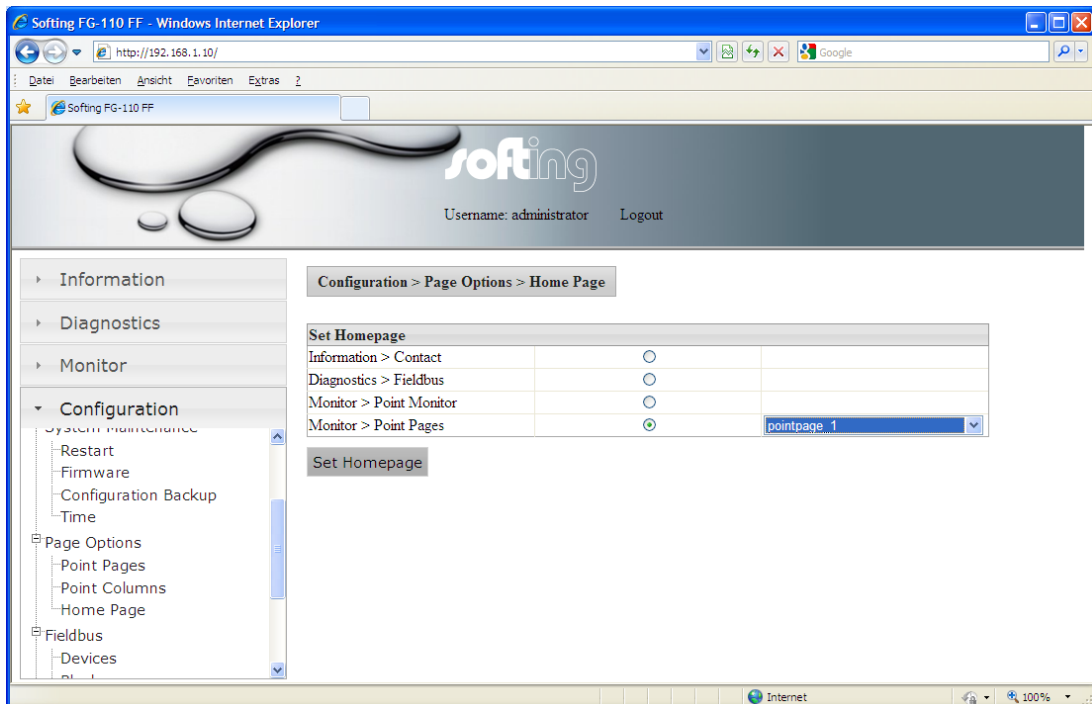


Fig 4.5-11 Elect your homepage

You choose the chapter for the start web side of the FG-110 FF with a click on the check box beside the desired chapter.

When you press the button <Set Homepage> the input will be activated. The next start of the web application will show you the selected page as your homepage. If you choose the <Monitor><Point Monitor> you have to select the desired page. <Monitor><Point Pages> shows you the desired page at once.

#### 4.5.4 <Configuration><Fieldbus>

##### 4.5.4.1 <Configuration><Fieldbus><Devices>

When you click <Configuration><Fieldbus><Devices> the table with the connected devices to the Linking Device appears on the screen.

The table shows which segment from the Linking Device is occupied with how many devices. The devices are indicated with their Node, their Device ID and their PD Tag.

Additionally there is information about the alarm VCR (VCR address) and the status of the alarm (Alarm configured). When the alarm is configured (✓) then it can be used otherwise there is a red dot (✗).

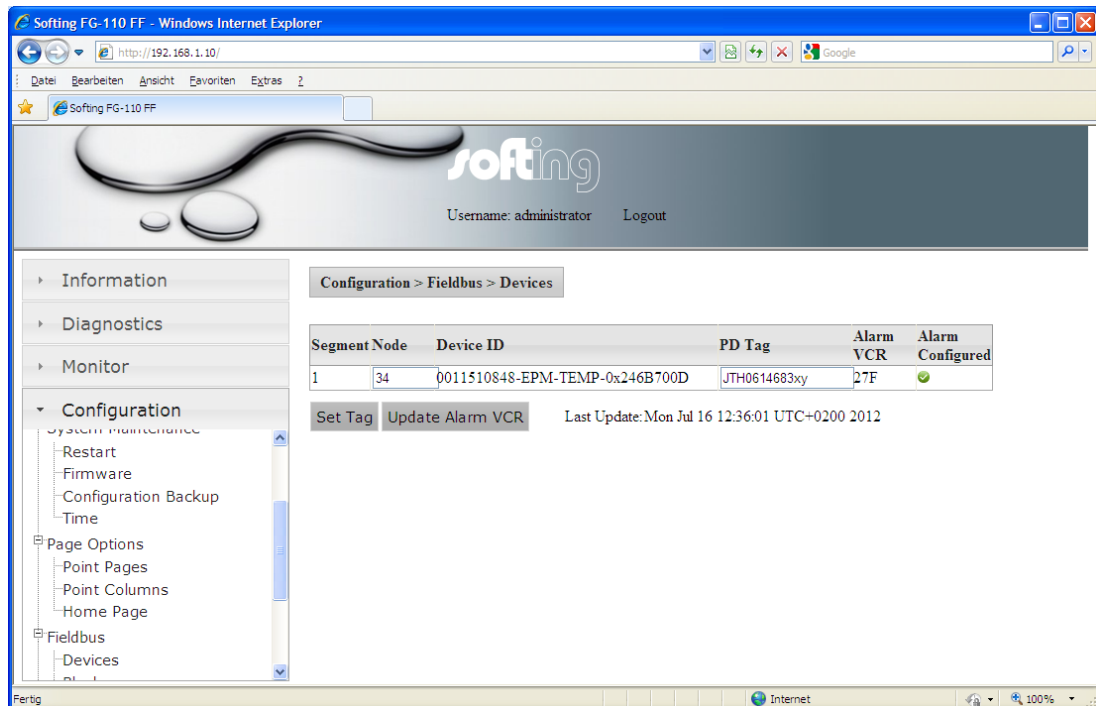


Fig 4.5-12 Change Node or PD Tag of your fieldbus devices

**i** The fields “Node” and “PD Tag” are input fields. In a connected system, the inputs from here have an influence on the values in the FF-CONF Program. Press the button <Set Tag> and the changed data appears as well in the FF-CONF Program.

The fields “Segment” and “Device ID” are only display fields. No input is possible.

##### 4.5.4.2 <Configuration><Fieldbus><Blocks>

In this site you see the blocks of all FF-H1 field devices which are connected to the Linking Device.

Based on a possible large number of function block there are two filters:

- Segment: 1...4

- Device: Devices (PD Tags) on segment

In the table below is shown the function block type (Block Type), function block name (Block Name) and the description.

With the “Enable” button can be selected if the block will be displayed in Point Page Monitor or not. By default only block with a block name are enabled.

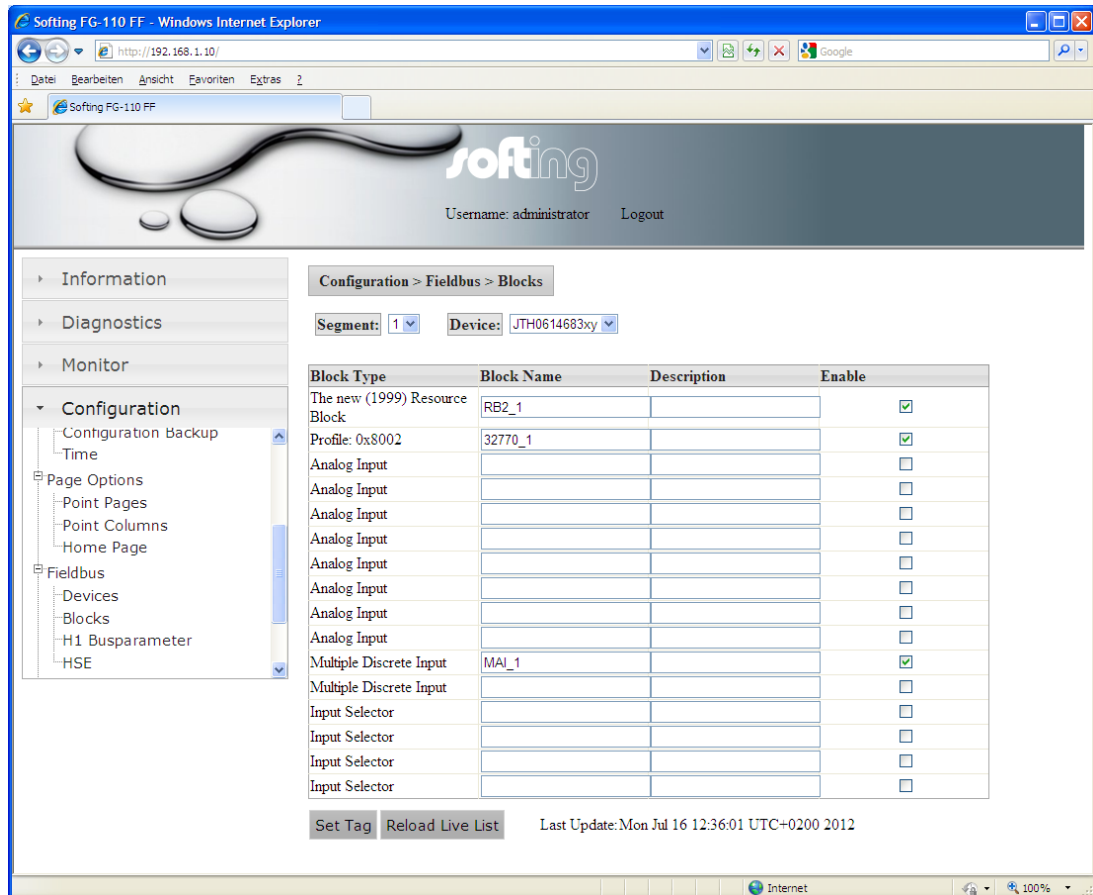


Fig 4.5-13 Process the Block names or the Description of your Fieldbus Devices

If you designate the blocks (up to 32 ASCII-characters) it is useful – especially in large plants – to assign self-explanatory names which say something about the location and define its information (e.g. analog output, digital input). This facilitates control and assignment of the displayed alerts or alarms.

#### 4.5.4.3 <Configuration><Fieldbus><H1 Parameter>

Click <Configuration><Fieldbus><H1 Parameter> to define your parameters for the chosen segment (H1 Link). With <Change Settings> you activate your inputs.

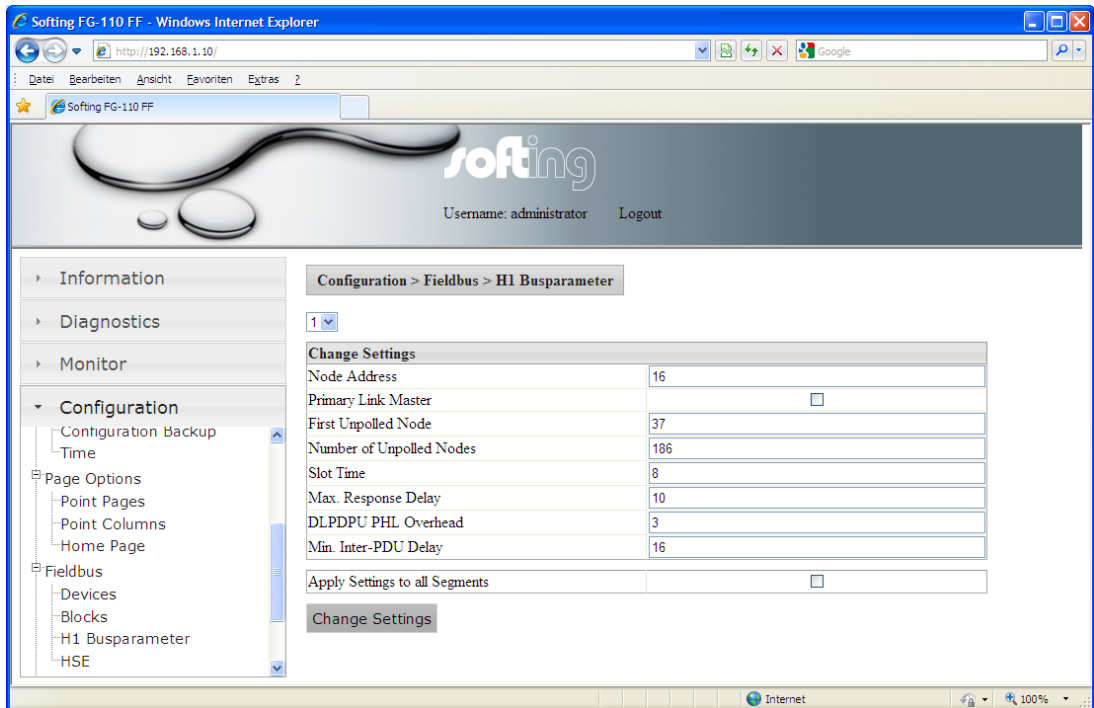


Fig 4.5-14 Change settings of the H1-Links



Please change these parameters only if you are absolutely sure it is necessary and correct. Otherwise you will lose the Foundation fieldbus communication.

#### 4.5.4.4 <Configuration><Fieldbus><HSE>

Click <Configuration><Fieldbus><HSE> to define your parameters for the Linking Device. With <Change Settings> you activate your inputs.

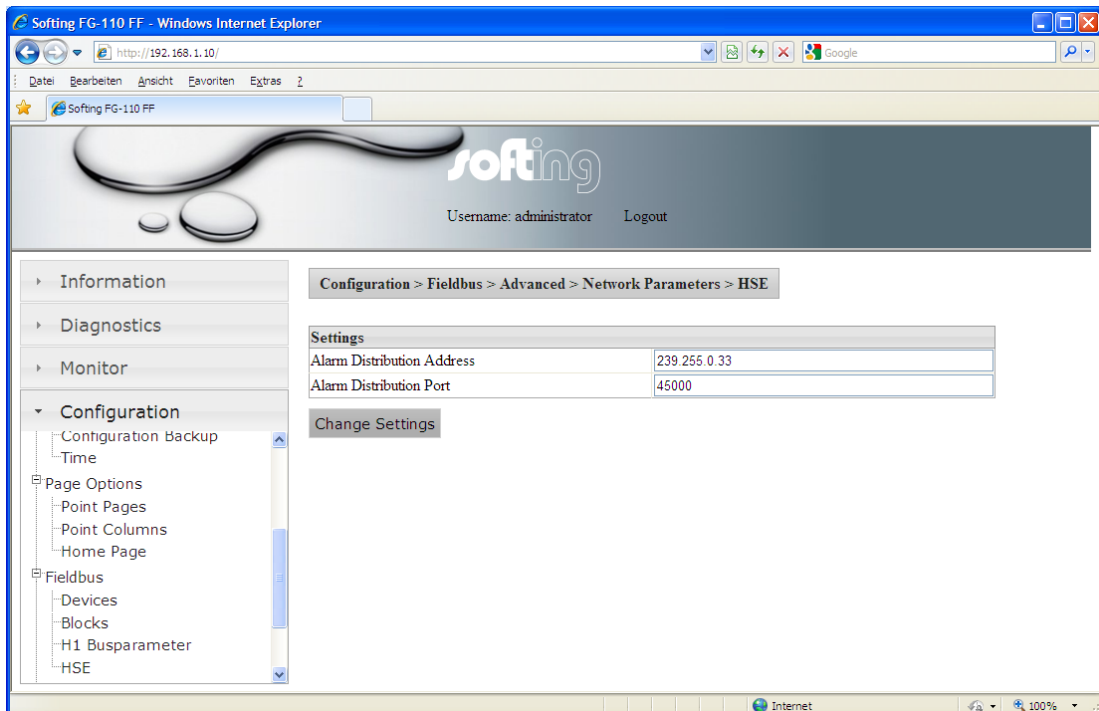


Fig 4.5-15 Change settings of the Linking Device

#### 4.5.5 <Configuration><Modbus>

The Linking Device allows traditional control systems access to modern 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.

##### 4.5.5.1 <Configuration><Modbus><Communication>

Click <Configuration><Modbus><Communication> to configure the Modbus Communication settings. First check if 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 these 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.

To apply the changes click <Change Settings>.

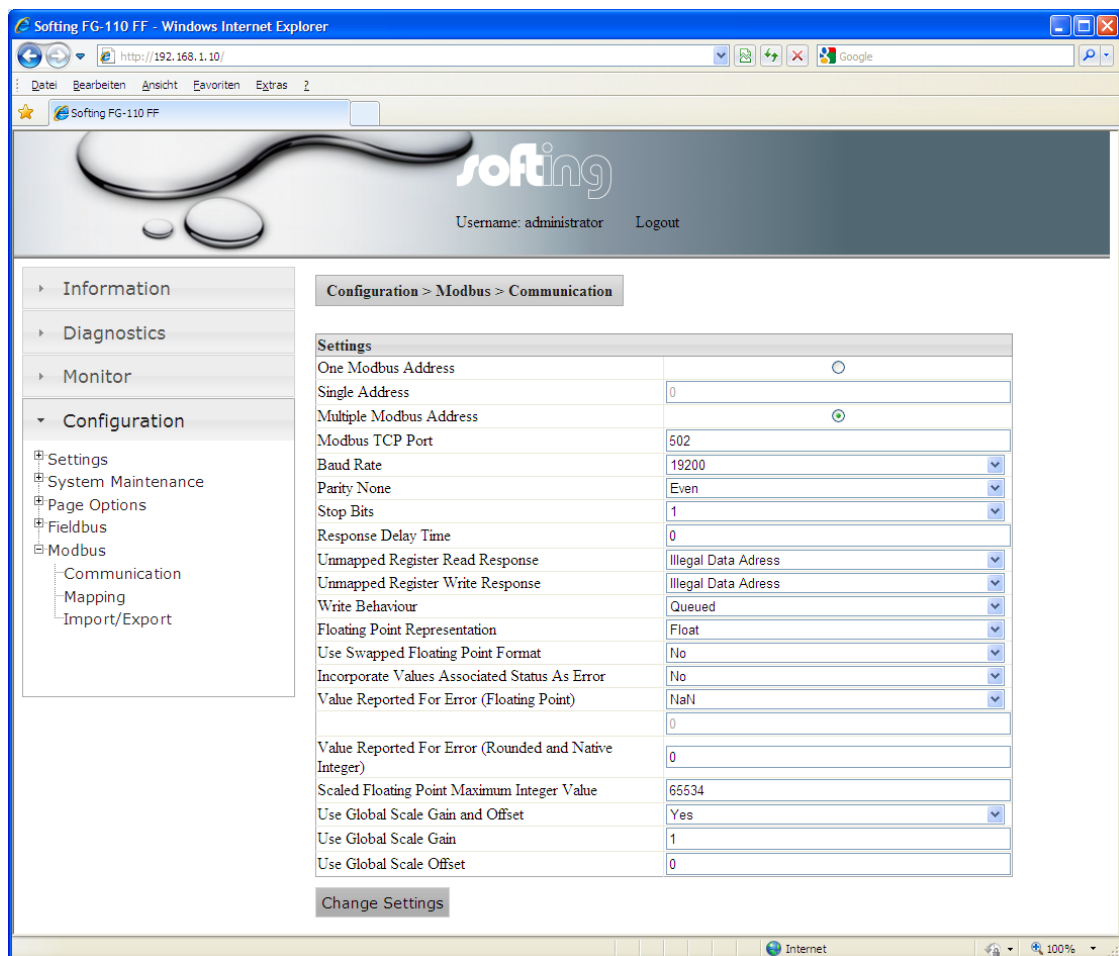


Fig 4.5-16 Change settings of the Modbus Communication

### 4.5.5.2 <Configuration><Modbus><Mapping>

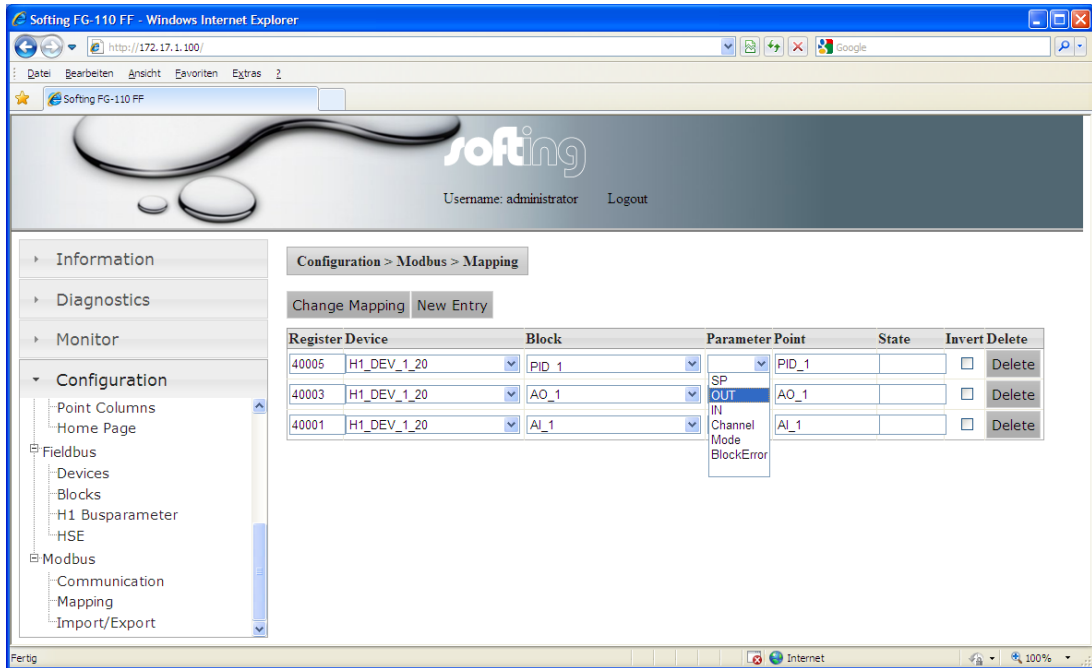


Fig 4.5-17 Change settings of the Modbus Mapping

The functions of the Modbus mapping in the Linking Device are flexible enough to accommodate most traditional control systems. The Modbus mapping table allows a user to associate the output or input value of an AI or an AO Function Block with any traditional or extended Modbus register. To add new entries click the button <New Entry>. Next type the required Modbus register and assign the relevant process value (the **out** or **in** value of the function block). When you have entered your entire data click the button <Change Mapping> to apply the configuration. After a reload of the page you will see the new mapping entry.

On the FF H1 side 1 bit data length doesn't exist. Therefore on the Modbus side the Gateway doesn't support Discrete Inputs and Coils.

### 4.5.5.3 <Configuration><Modbus><Import/Export>

To save the properties you have specified in Modbus Mapping use the function <Export>, if you want to utilize an existing set of Modbus Mapping data use the function <Import>.

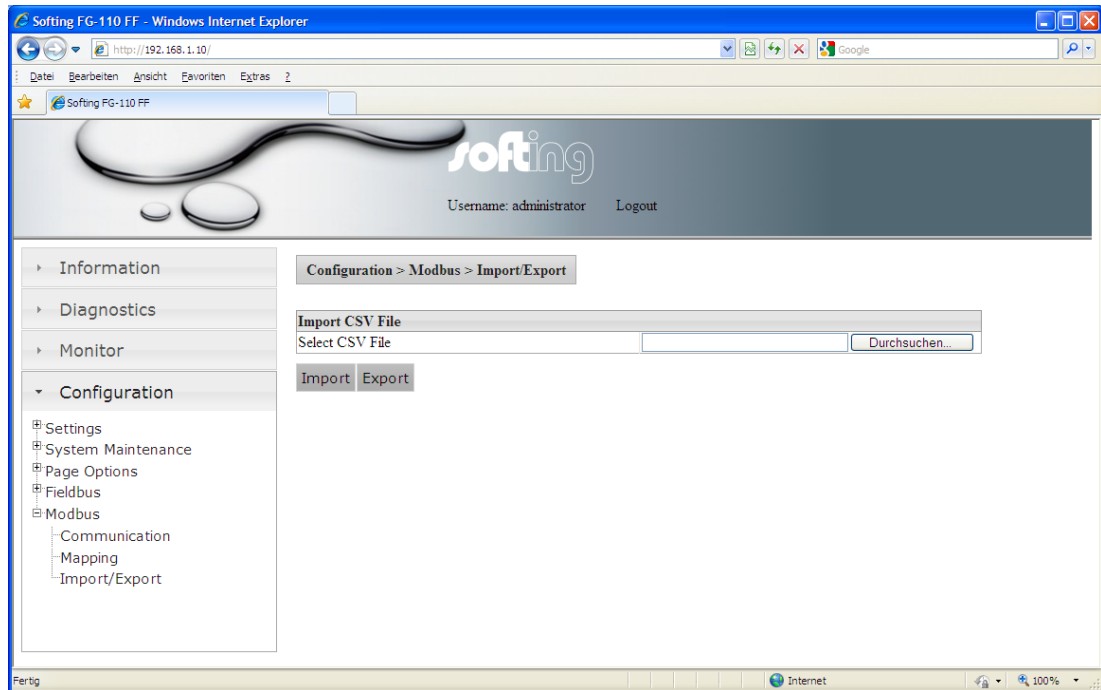


Fig 4.5-18 Import/Export of the Modbus Configuration

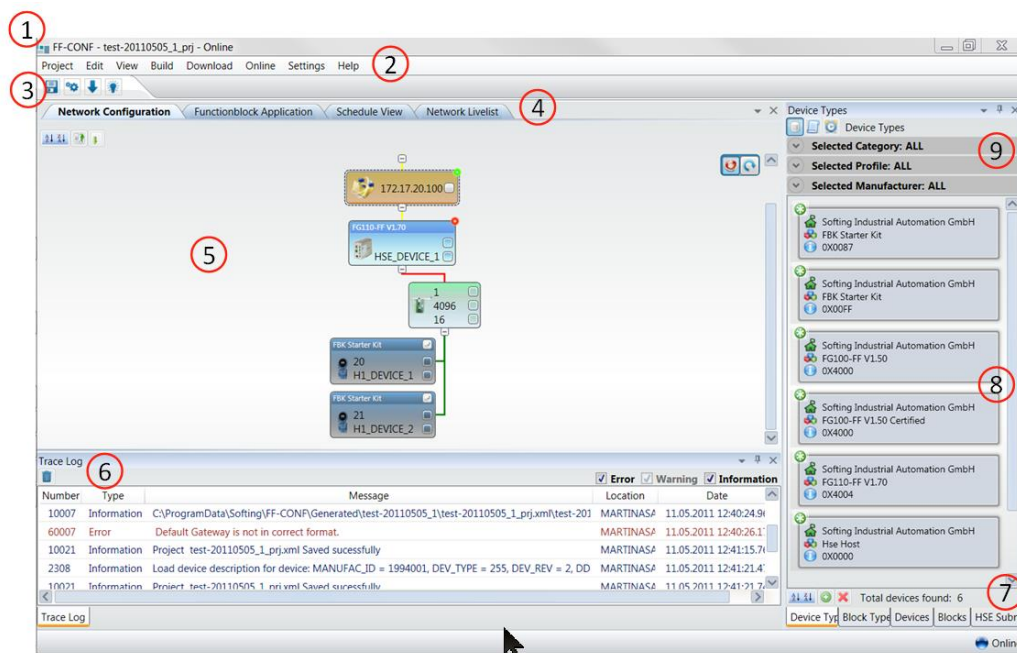
## 5 FF-CONF Configure your plant

By choosing the FF-CONFsetup.exe you will start the installation routine of the FF-CONF program. To start FF-CONF it is not necessary to activate any network access, but without network access online configuration is not necessary.

It is possible to create various configurations and store them in external files. FF-CONF is an offline configuration tool and to build the Network Configuration it is not necessary to install any fieldbus devices.

### 5.1 The screen FF-CONF and general descriptions

Below you see a screenshot of FF-CONF with most of the parts you will encounter while you are working with FF-CONF. The numbers reference short explanations of the meaning and will help you to find the particular description of the different specialist contents quickly.



5.1-1 An overview of the FF-CONF screen

The numbers on the screen will be described in the chapters 5.1.1 to 5.1.10

- (1) **Caption** - FF-CONF, the active project, the status
- (2) **Main Menu** – for details see chapter Main Menu
- (3) **Tool-Bar** - Icons you can use while working. You save time using the offered functions with one click.
- (4) **Main view tabs** – the most important functions to build a configuration and to activate the messaging between the blocks of the different devices.
- (5) **Main view**, where you normally work after choosing a tab.
- (6) The **Trace Log** shows error messages, warnings and information provided by FF-CONF.
- (7) **List and properties view** (items and icons) – List view icons provide a means for handling device and block types and instances.
- (8) **List and properties view** (contents) – show you the contents of the selected items (7) .
- (9) **Filtering the contents** - Here you can set filters and select the contents shown in the list view.



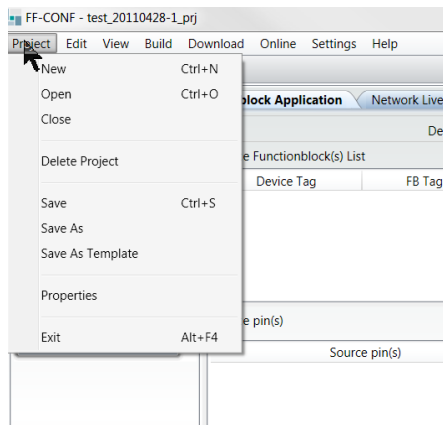
### 5.1.1 Caption

The caption shows the name FF-CONF, the file name of the active project and the program status offline/online.

### 5.1.2 Main menu

In the main menu you find the following items specially to administrate and to organize your project. When you click on the right mouse button each of the items of the main menu allows you to activate or deactivate the toolbar.

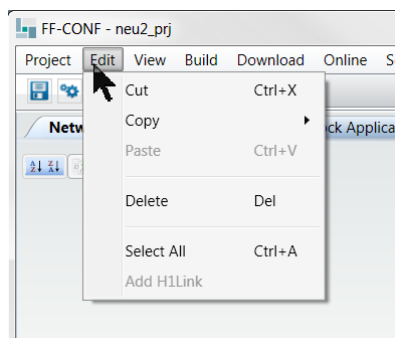
#### 5.1.2.1 Project



5.1-2 Menu item Project

Here you can create a new project, open an available project, close, delete and save the active project, rename the project (save as), save it as a template or view the properties of the project in the right-hand part of your screen.

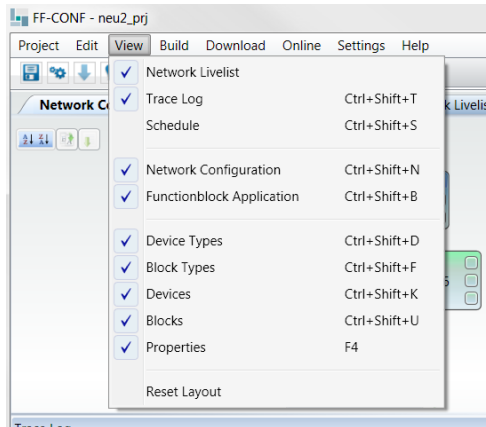
#### 5.1.2.2 Edit



5.1-3 Edit

The functions of the item Edit are reserved for system-related functions.

### 5.1.2.3 View



5.1-4 View – shows you the displayed contents of the project

With <View> you can activate the desired contents like the Network Livelist, Schedule View or intentionally hidden parts of the screen like Trace Log or previously activated views.

The tabs for the Network Configuration and the Function Block Application cannot be closed, but can be brought to the foreground.

### 5.1.2.4 Build

The item Build consists of the two functions <Check All> und <Build All>. Both of the functions can be done in the offline or online mode.

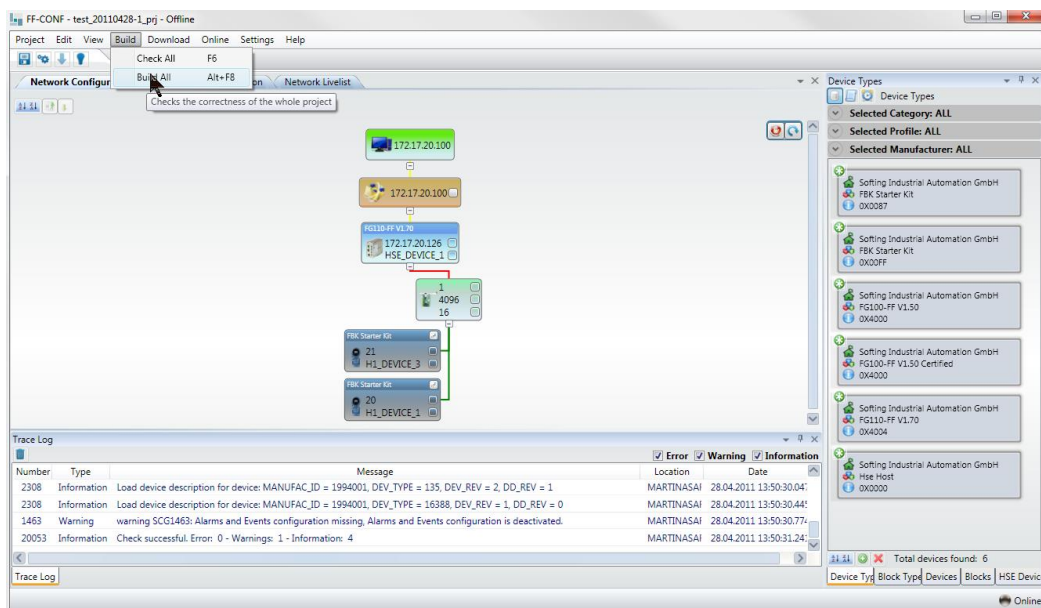


Fig 5.1-5 Build function

#### Check All

With the function <check all> the whole project is checked – network configuration as well as function block application. This functionality can be used if you know that no download domain can be built, for example due to missing device assignments. You see warnings and errors in the Trace log.

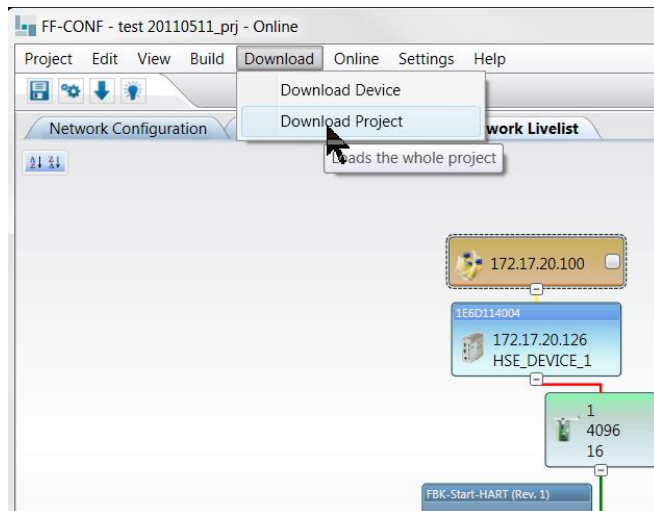
## Build All

<Build All> Build all first checks the configuration and then builds a download domain if there are no error messages which prevent generation of the download domain.

A lot of information, warning and error codes are given in the Trace log. If the build all function is done successfully you can download a device or the whole project.

### 5.1.2.5 Download

<Download> needs the online mode. You can download a device or the whole project.



5.1-6 Download device or project

#### Download Device

A single marked device can be downloaded after all the input and updates are checked for correctness.



Please use the download device functionality only if you are sure that the changes will not affect other devices. Otherwise your system might not work correctly.

#### Download Project

All data of the project can be downloaded after all the input and updates are checked for correctness. The download of the project transfers the download domain created by a build from the PC to the Linking Device and the H1 Devices.



Inexperienced users of Foundation Fieldbus® are recommended to use <download project>. Error messages are shown in the trace log view and will help you to debug your control application.

The trace log provides a lot of information. You can filter it by choosing only errors and warnings (disable information).

After a successful download the units are fully operable.

### 5.1.2.6 Online

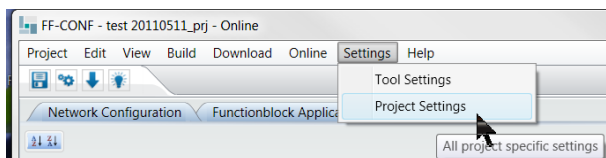


When FF-CONF is started with a new or an existent project FF-CONF is in mode offline. You can configure devices or build your Function Block application in this mode. If you want to see the real installation – the Network Livelist – you must change to the online mode. When you open the livelist with <View> <Network Livelist> the program automatically changes to online. The idea of this functionality is to change back to offline if the user does not need online functionality. Online might need lots of performance.

### 5.1.2.7 Settings

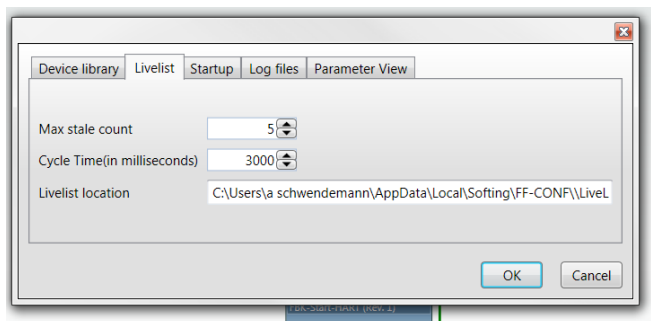
The <tool settings> define the several conditions for the process which follows later, especially storage location and data, as well as startup conditions and time cycles.

The <project settings> define information about the project like the time cycle for autosave or the project description.



5.1-7 Tool and Project Settings

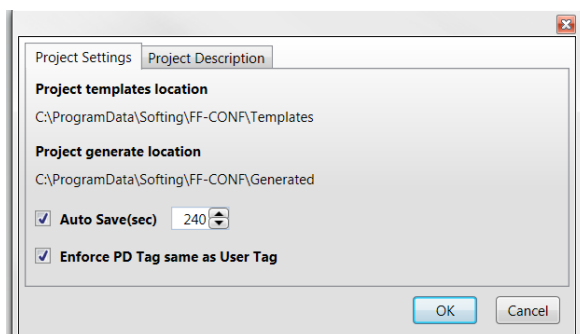
#### Tool Settings



5.1-8 Tool Settings – you can define a lot of properties

You define library and file locations, time cycles and enable/disable some functions.

#### <Project Settings>



5.1-9 Project Settings

Here you define the cycles of the auto save and the handling with Tag names. If you want to add or to change the project description you can do it here even so the project exists.

### 5.1.2.8 Help

The Help function gives you information in different ways. You can call it by pressing the F1 button and you get the Help-Information for the current function you are working with. You also can reach the Help function with the menu item Help.

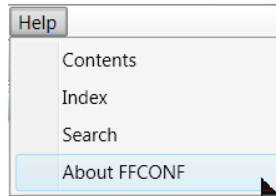


Fig 5.1-10 The options of the Help function

### 5.1.3 ToolBar - Icons you can use while working

In this line 4 buttons are shown which can be used while FF-CONF is running.



You can <Save Project>, start <Build All>, start <Download Project> and with the icon <Online> you change offline/online. If you want to activate or deactivate the toolbar click the right mouse button on any item of the main menu.

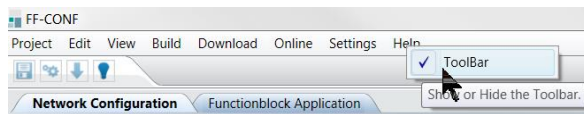


Fig 5.1-11 Activate or deactivate the ToolBar in any item of the main menu

### 5.1.4 Main view

Main view tabs (4) are the most important functions to build a configuration, to assign configured devices of the <Network Configuration> with the <Network Livelist>, to configure the <Function Block Application> and activate the messaging between the blocks of the different devices.

Below you find a free space (5) where you normally work after you have chosen a tab.

#### 5.1.4.1 <Network Configuration>

The tab <Network Configuration> is always unhidden. In the Network Configuration you configure your network offline. The description of the devices must be allocated in the device type library. Therefore see chapter [Managing the Device Type Library](#).

To work faster you can use the offered icons:



to sort the devices, to assign and to download the project.

In the upper right corner of your working space you find two icons <Toggle drag> and <Reset>. They allow you to relocate the devices shown in the working space and to reset to the standard notification. First click <Toggle drag> and then to an object of the configuration. Your mouse pointer changes to a cross and you can move the whole configuration picture across your working space.

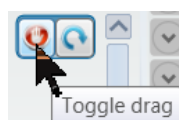


Fig 5.1-12 The icons <Toggle drag> and <Reset>

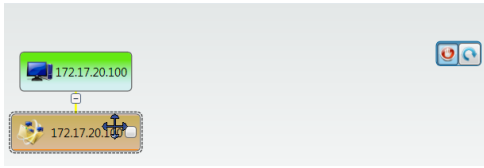



Fig 5.1-13 The changed mouse pointer allows you to move the whole configuration picture

#### 5.1.4.2 <Function Block Application>

The tab <Function Block Application> is always active. Here you configure the communication between the blocks of the H1 devices or the HSE Host. In Function Block Application you can create different groups and applications to structure the whole plant and its various areas.

#### 5.1.4.3 Network Livelist

The Network Livelist shows you the currently active devices. To run your system it's necessary to assign configured and active devices of Network Configuration and Network Livelist. How this is done is explained in detail in chapter [Network Livelist](#).

In the Network Livelist you may sort the devices on PD Tags with the icon .

#### 5.1.4.4 Parameter View

Parameter View shows you all parameters of each block as well as of the selected device as of a block which is not associated with a device. You can change parameters if they are in read/write mode.

#### 5.1.4.5 Schedule View

Schedule View shows information about the cyclic behaviour of an H1 link. It lists all VCRs of the LAS and the start time of the function blocks and their duration.

#### 5.1.5 The Trace Log

Under the main view you see the partition for the Trace log. In the Trace log all information, warnings and errors are listed while running the program. It shows the success of your action. You can filter for each message type by activating the check box.

Here you see a screenshot with trace log after using the build function.

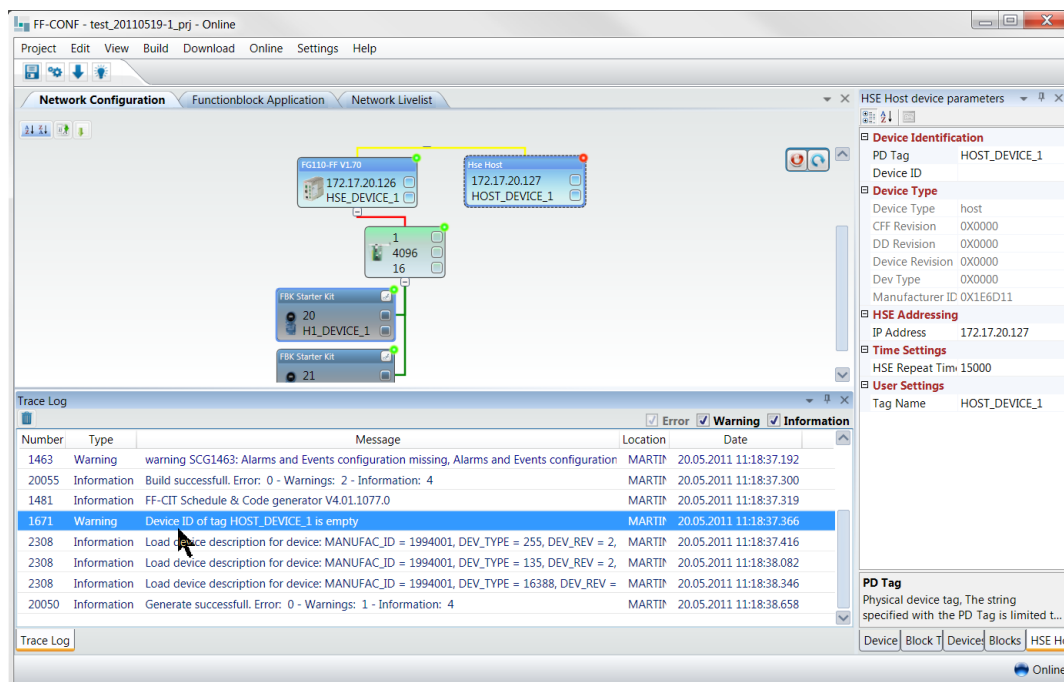


Fig 5.1-14 Example for Information and Warning in the Trace log

The source object of specific messages can be located by double clicking. In this example the HSE Host device parameters are shown.

## 5.1.6 List and properties view

You choose the view to the contents of the available types of devices or blocks, the devices or blocks or the properties of a selected field in the work space of an application (8). Under the contents you find several icons which are different for each item to process a marked content (7). Above you see the possibilities for filtering (9). The possibility of filtering is different from item to item and is based on the contents.

### 5.1.6.1 Device Types

The device type view lists all devices in the device type library. Default device types are:

- FG 110 FF
- FG 100 FF
- FG 100 FF (Certified)
- HSE Host

The H1 Device Types have to be imported by the user.

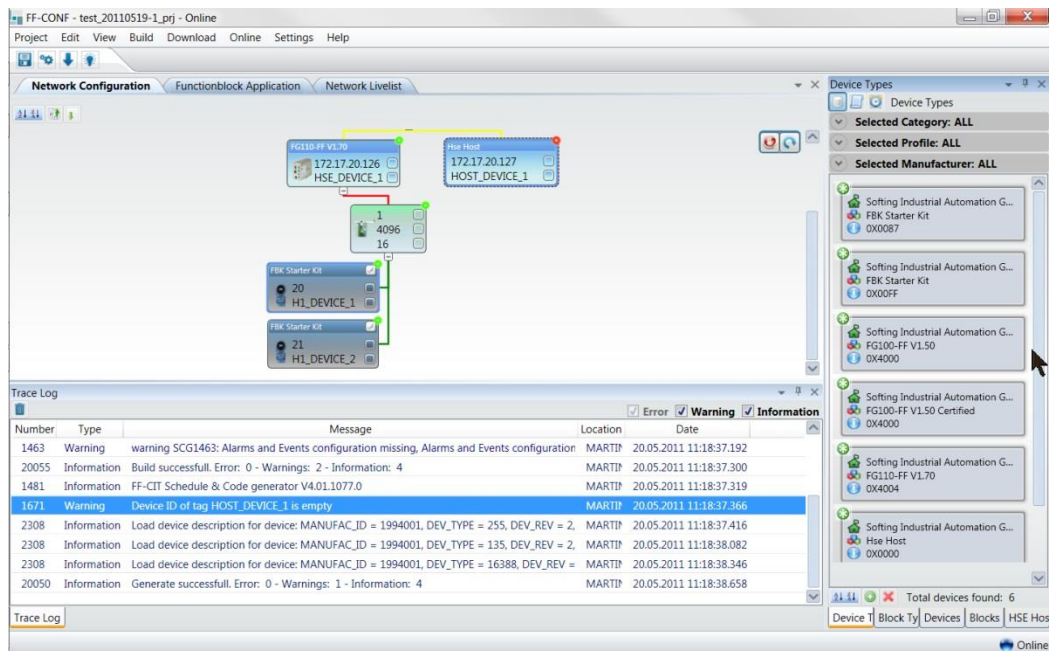


Fig 5.1-15 Content of Device Types, the icons to process them and filters to select Device Types

Meaning of the icons below the contents:

- - to sort by Device Name
- - to import a new device,
- - to remove a marked device,
- and the count of total devices found.

### 5.1.6.2 Block Types

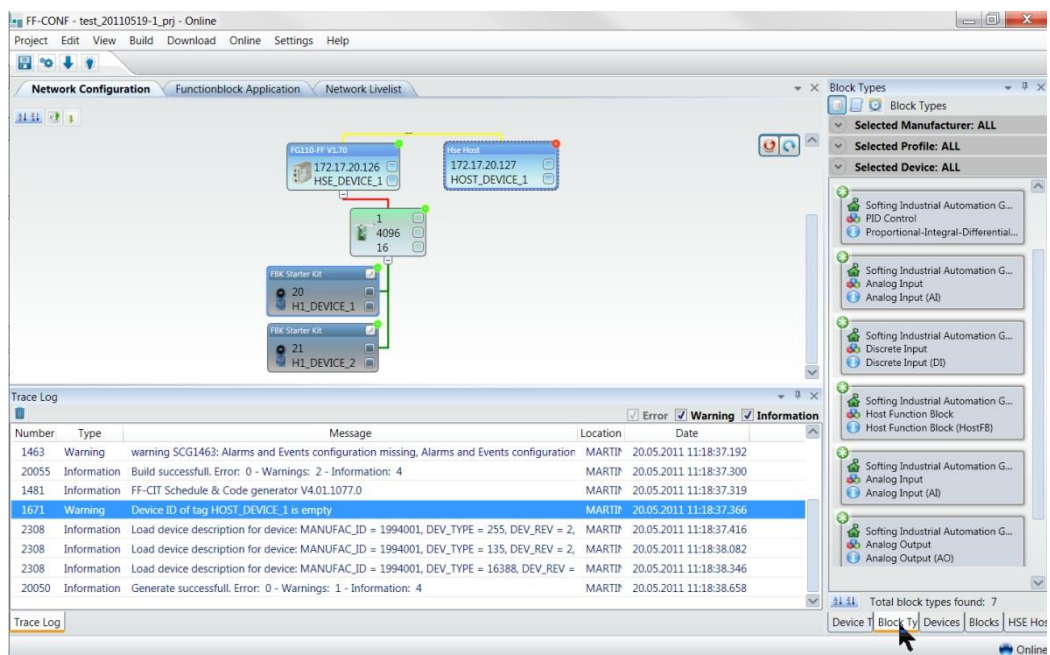


Fig 5.1-16 Content of Block Types, the icons to process them and filters to select Block Types



Meaning of the icons below the contents:

- - to sort by Manufacturer Name,
- and the count of total block types found.

### 5.1.6.3 Devices

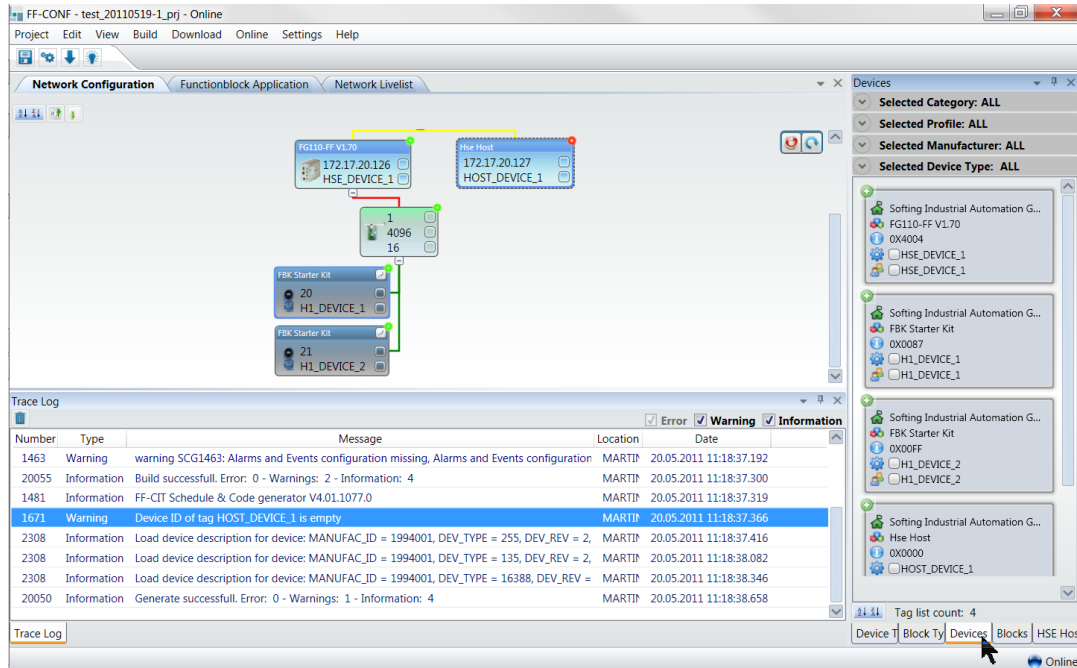
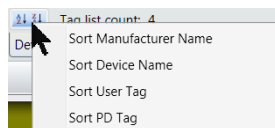


Fig 5.1-17 Content of Devices, the icons to process them and filters to select Devices

Meaning of the icons below the contents:



- to sort by Manufacturer Name, Device Name, User Tag, PD Tag
- and tag list count.

### 5.1.6.4 Blocks

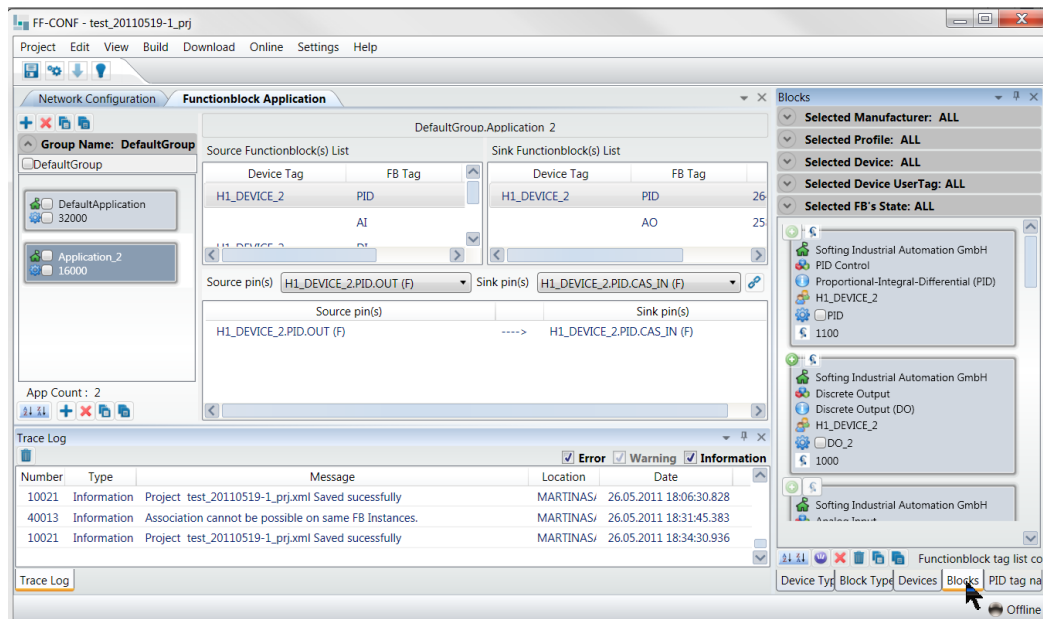


Fig 5.1-18 Content of Blocks, the icons to process them and filters to select Blocks

Meaning of the icons below the contents:

- to sort by Manufacturer Name,
- to look at FB Parameter View
- - to remove Function Block
- - to remove all unused Function Blocks
- - to copy and paste Function Blocks

The block view lists all explicitly and implicitly configured function blocks. The resource and transducer blocks belong to the device and are not listed within the block list view.

### 5.1.6.5 Properties

If you choose the item properties you see the properties of any device or block that is activated in any part of application. The properties of a selected object are displayed.

Properties View list of object types:

- Network configuration / livelist
  - PC
  - HSE subnet
  - HSE devices (Linking Devices)
  - H1 Links (Segments)
  - H1 devices
- Function block application
  - Group
  - Application
  - Block

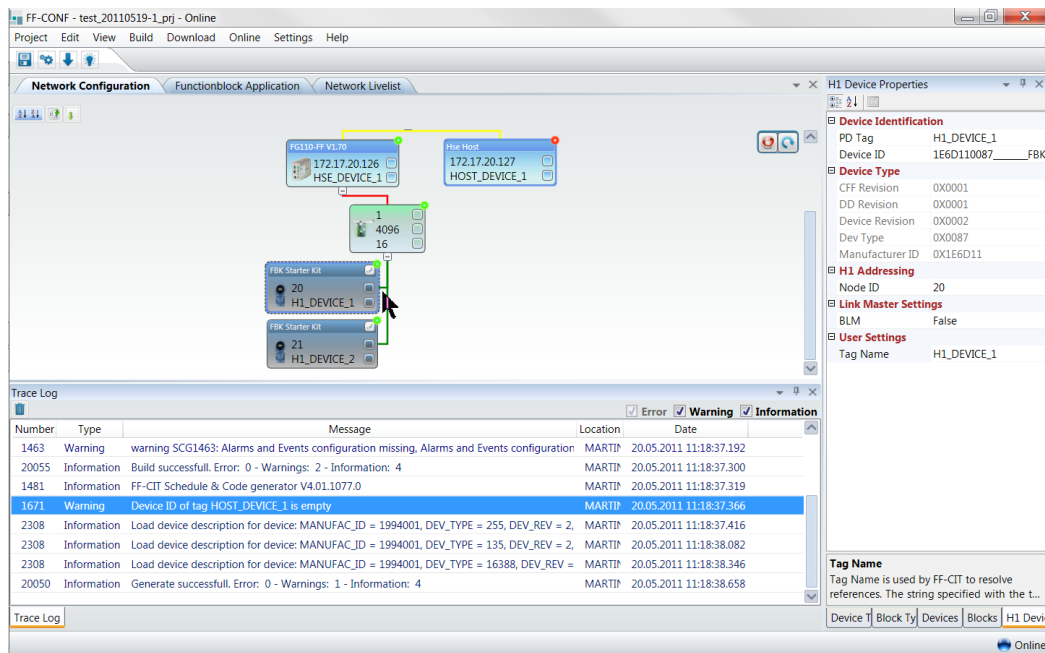


Fig 5.1-19 The H1\_Device\_1 properties of the marked device are shown

### 5.1.7 Filtering the contents

Here you find the possibility to set filters and so you may select the contents shown in the list view. The possibility of filtering is different from item to item and is based on the contents.

## 5.2 General Information

### 5.2.1 Floating windows

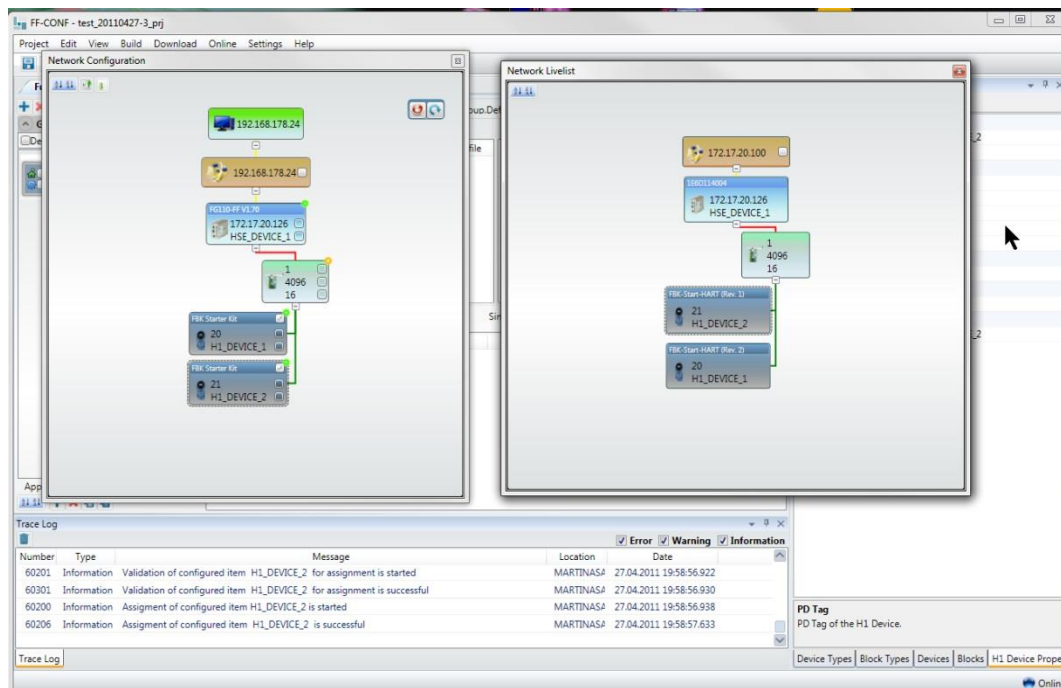


Fig 5.2-1 A special view to synchronize Network Configuration and Network Livelist in a very efficient method with floating windows

Under the main menu item <View> <Reset Layout> the floating windows return to the default view.

## 5.2.2 Objects within the Network Configuration

### PC

Here you are working online or offline to build your Network Configuration and commission your installation.

### HSE Subnet

Ethernet component which corresponds with the Linking Device.

### HSE Device

HSE Device or Linking Device. Field gateway to the H1 Links and the H1 devices.

### H1 Link

The connective link between the HSE Device and the H1 Devices. It includes most of the integrative functions of the field bus network. So the H1 Link object represents the port of the linking device with the H1 VFD and the bus parameters common for every device on this link.

### H1 Device

Terminal with type information, network address, PD Tag and user tag. Details are provided for each device in the properties view.

## 5.2.3 Tag Names

You find different tag names in FF-CONF. Nothing is prescribed for the User Tag. The string specified with these tag names is unlimited.

If you see different tag names, please take into consideration that there is a difference between user tags and FF PD tags. While user tags strings are not restricted in length and character sets, FF PD tags are subject to the restrictions of the VisibleString data type within FF-specs (32 ASCII characters).

As this might be inconvenient and if you don't have any problems with the FF-restrictions, you can enforce similarity between these tag names by selecting <Settings><Project settings>and activate <Enforce PD tag same as User Tag>.

## 5.2.4 Using the buttons of the objects

Most of the objects offer the possibility to capture or to change the important data by clicking the enclosed buttons. In the List View they allow you to build parts of the Network Configuration. The current details are provided in the different chapters.

A double-click on the symbol of the objects of the Network Configuration or the Network Livelist hides the units below or shows hidden units again. So you can select the units to work with and get a better overview of this part of the installation.

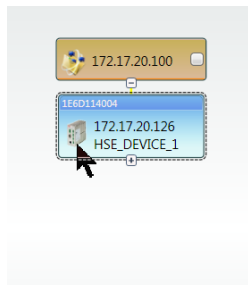


Fig 5.2-2 Hide the units below with a double-click

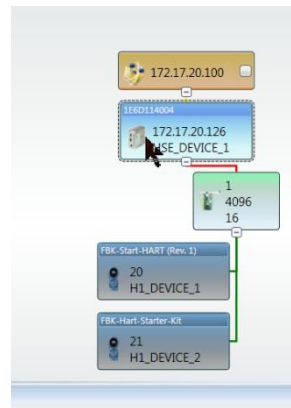


Fig 5.2-3 Another double-click shows the hidden units again

### 5.2.5 Using the context menu

Nearly all objects contain a context menu that allows you to do some of the steps to pattern your Network Configuration or your Function Block Application. Examples are copy objects, add and delete objects, the assign in the commissioning or set special parameters like in the H1 Link.

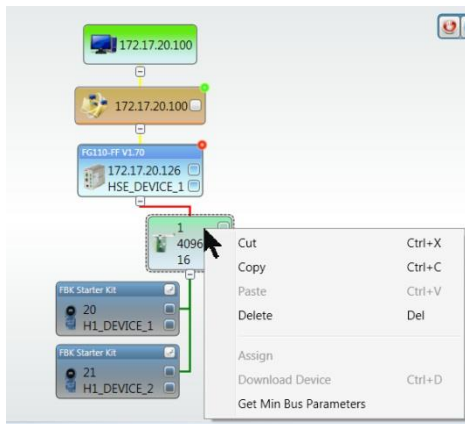


Fig 5.2-4 For example the context menu of the H1 Link

### 5.3 Start FF-CONF

After correct installation you can start the program by clicking on Start/Program...e.c..\Softing\FF-CONF\bin\FF-CONF.exe on your PC.



Fig 5.3-1 Start FF-CONF – Start Screen

After a short time you see the screen to work with.

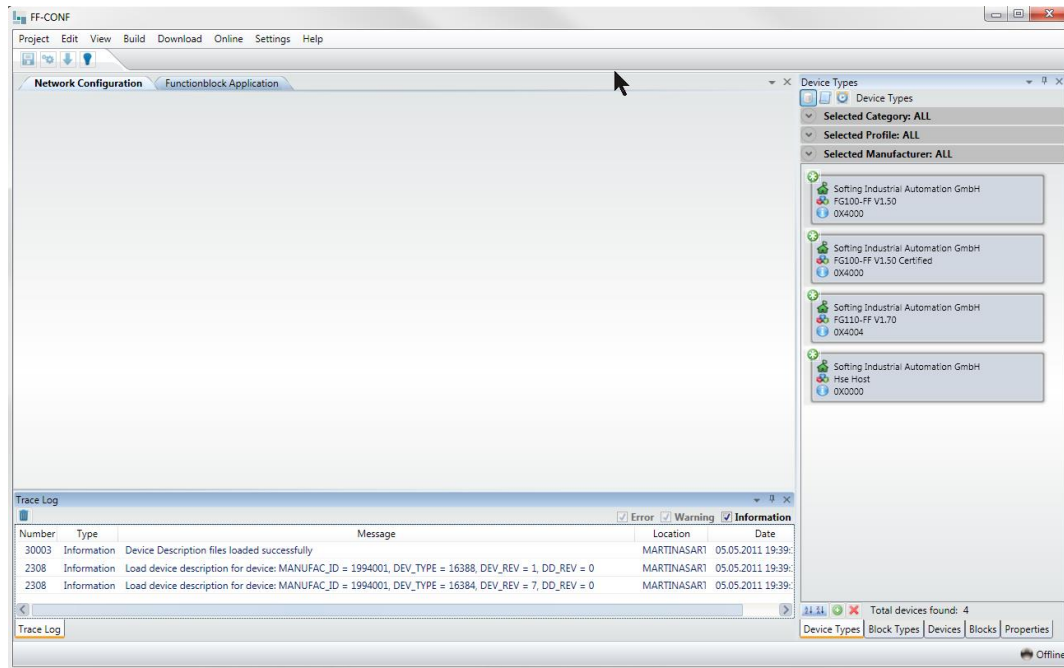



Fig 5.3-2 Basic screen to load an existent or a new project

The above screenshot shows the start screen of FF-CONF if you have never downloaded device descriptions into the device library.

## 5.4 Managing the Device type library

### HSE and H1 device types.

HSE device descriptions are preconfigured and cannot be changed. H1 device descriptions can be added and removed. Each H1 device needs its special entry within the device type library which must be notified before the Network Configuration can work successfully. A device description has to be imported to the PC. You can add and delete single devices to and from the device type library.

Before adding a device to the network configuration it has to be imported via the green  button. In the screen below you see the File selection dialog for importing a device description.

While the .cff file is imported into the device type library possible error messages are shown in the trace log. If there are any error messages, please contact the manufacturer of the device for an update.

By selecting the cff-file, the information from associated .ffo and .sym files are imported as well.

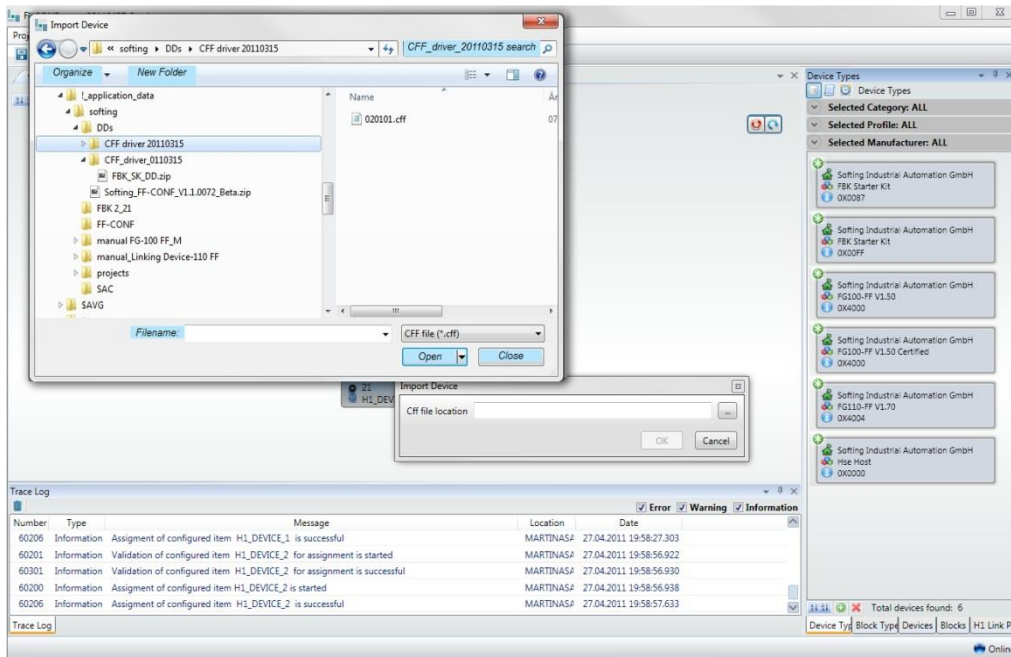


Fig 5.4-1 Select a .cff file for adding an H1 device to the list of Device Types.

The device library contains the description of H1 device types. The description of a device (.cff-file, .ffo-file, .sym-file) is either part of the delivery of the H1 device or can be loaded from fieldbus.org: [http://www.fieldbus.org/index.php?option=com\\_mtree&Itemid=324](http://www.fieldbus.org/index.php?option=com_mtree&Itemid=324)

### Remove a Device Type

To remove a device type from FF-CONF, select a device type within the list in the right-hand partition of the screen (1). Click the button of the device type view (2). Acknowledge the pop up window with <yes> (3) and the selected device type is deleted from the device type list.

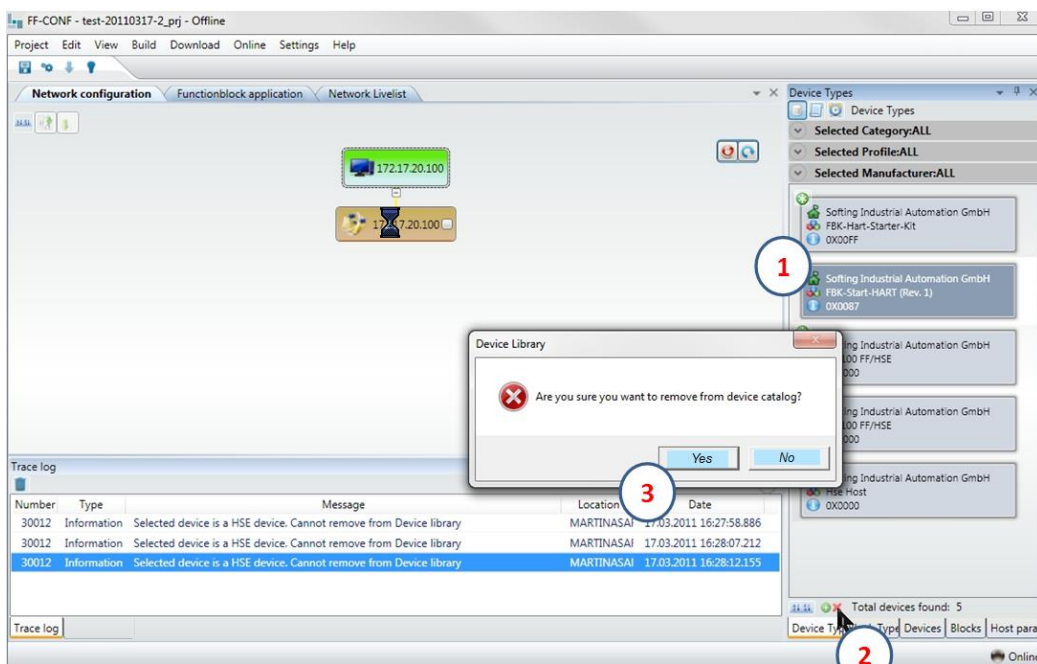


Fig 5.4-2 Remove a device type



Exception: HSE Devices cannot be removed. You get the notification:



Selected device is a HSE device. Cannot remove from Device library

OK

## 5.5 Project handling

In the menu item <Network Configuration> you start the main configuration work of your project.

### 5.5.1 Create a New Project

After the preliminaries you can start a new project.

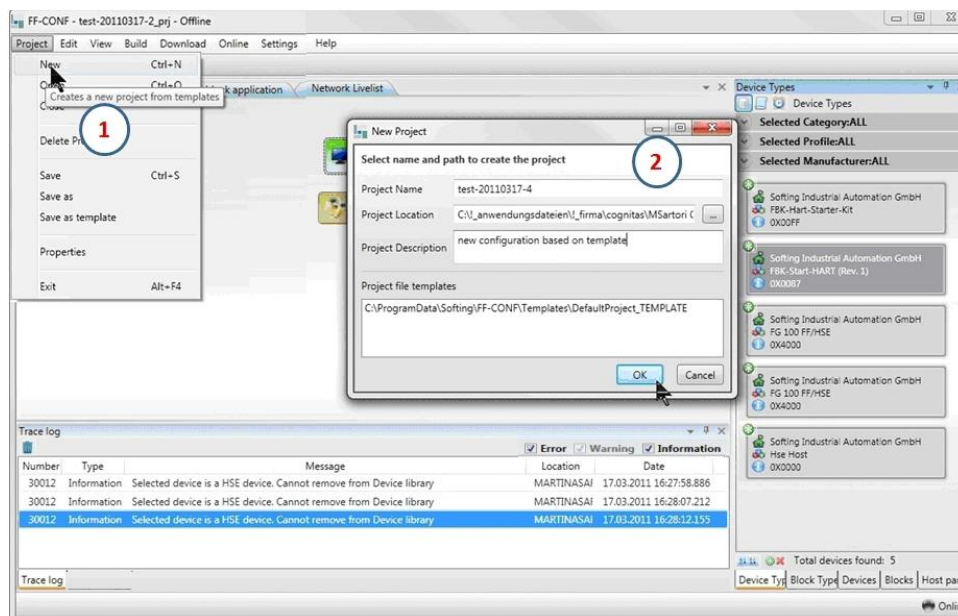


Fig 5.5-1 Starting a new project

You choose <New> or <Open>.

**New:** The window (2) with the New Projects Dialog appears. Edit the project name and, if desired, add a comment. Leave the window by pressing the <OK> button.

**Open:** You choose one of the shown projects to work with.

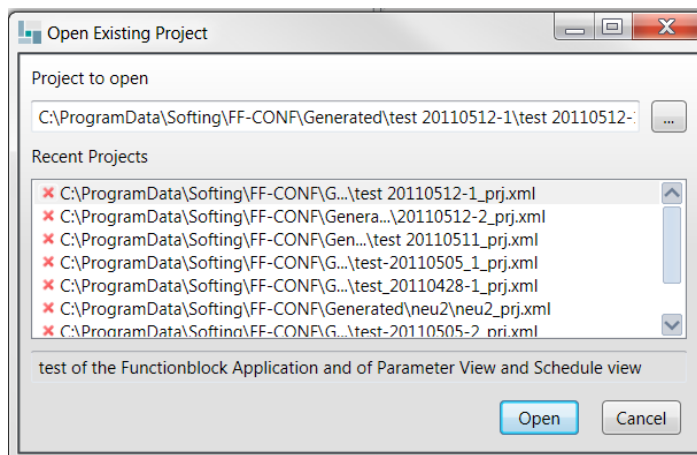


Fig 5.5-2 Open an existing project



### 5.5.2 Save project

You can save the project manually whenever you want. You have two options to do this:

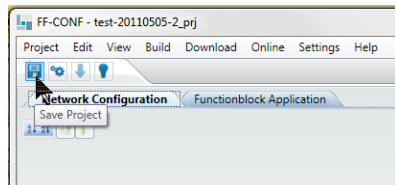


Fig 5.5-3 Save your project manually

If you save your project at object time click the icon <save project> in the ToolBar.

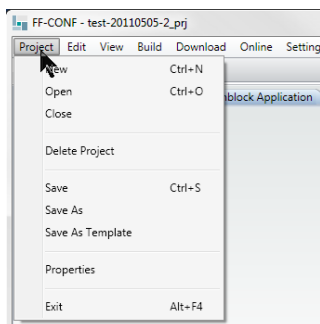


Fig 5.5-4 Save your project with <save> or with <save as>

If you want to copy the project with a new name or to another folder use the function <save as>.

In the <project settings> “autosave” you can define the auto save in any number of seconds so that you save your project automatically after a short time of working.

Beside the autosave the project is saved on any “check”, “build” or “download”.

### 5.5.3 Delete Project

If you want to delete the current project you click the buttons <project> and <delete project> in the upper left-hand corner of your screen.

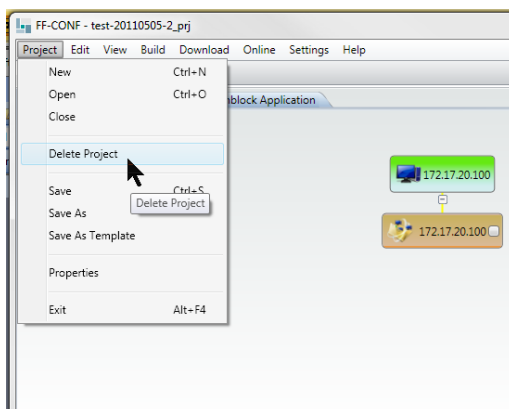


Fig 5.5-5 Delete the current project

Of course you also can delete a non-current project with the functions of the operating system.

## 5.6 Network configuration

The most important part of the project handling is the Network Configuration. You can configure a network in two ways:

- You adapt the network configuration to the real existing installation,
- You configure a planned network without an existing installation and adapt it later. You need only the offline status to do this.

Both ways have their advantages. The chosen way is to decide on your individual situation. Of course it is possible to mix the procedure, e.g. you have some installed devices and you configure other devices that will be installed at a later time.

### 5.6.1 Objects within the network configuration

The objects within the network configuration are PC, HSE subnet, HSE device, H1 Link and the H1 Device.

### 5.6.2 Configure PC and Subnet

A new project already contains two preconfigured objects: a Host object representing the PC you are working on and an HSE subnet object representing your Ethernet connection to the HSE subnet. The configured PC and subnet with their IP addresses are shown on the screen after starting a new project. Here you must select the valid IP addresses of the HSE subnet in the context menu. Press the button on the HSE subnet object. A selection dialog appears and shows the IP addresses the PC supports. The PC and the HSE device must be configured in the same subnet area. Please ensure that you select the correct IP addresses.

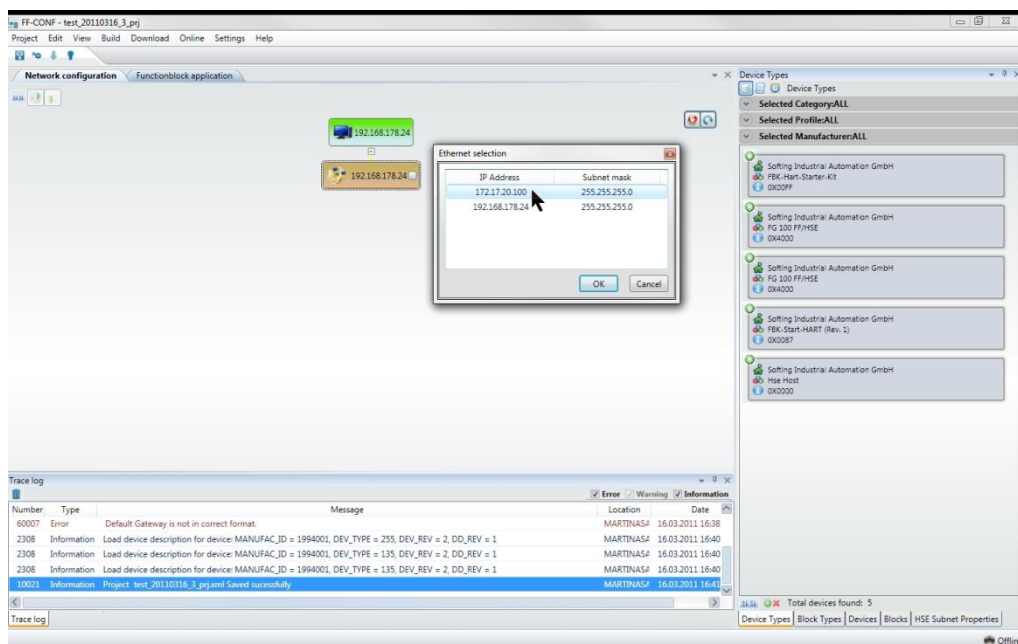


Fig 5.6-1 Select an IP Address

### 5.6.3 Add a Linking Device (HSE)

To add a Linking Device to the configuration press the green button to the left of the selected Linking Device in the list Device Types.

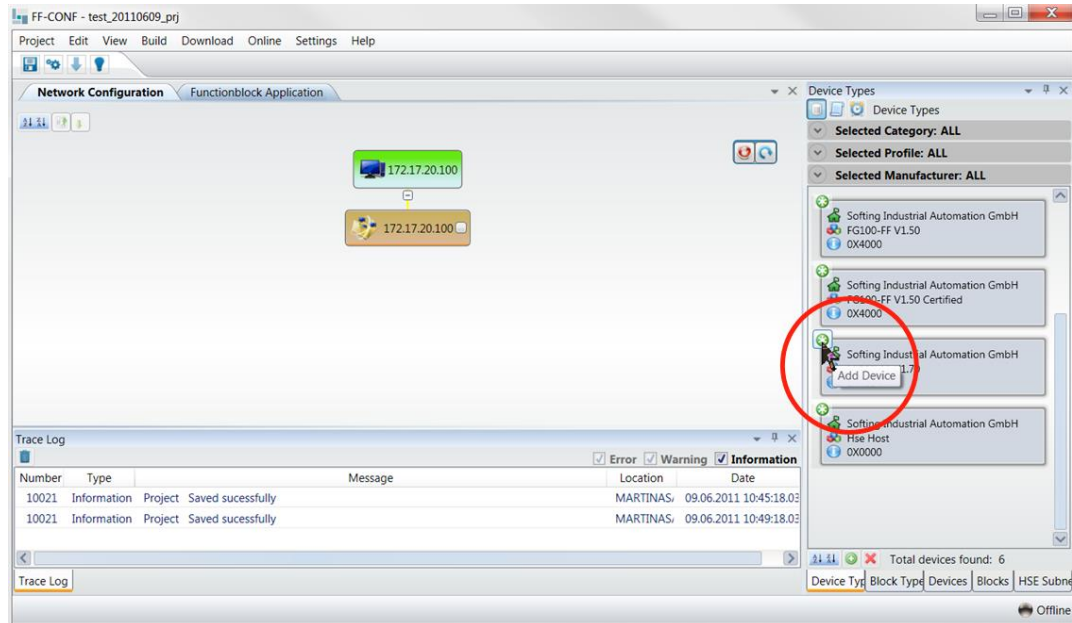


Fig 5.6-2 Add an HSE Device

Below the subnet field an instance of the selected device type appears on the screen.

In the field of the Linking Device you must enter the IP address which matches the real IP Address of the Linking Device. It also can be the IP address you want to use in your planned configuration.

After pressing the top right-hand button in the Linking Device field you can change the IP address. Press the button on the bottom right in the Linking Device field to change the User Tag.

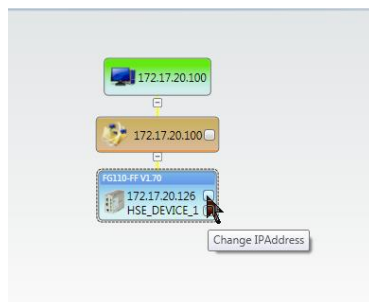


Fig 5.6-3 Change IP Address

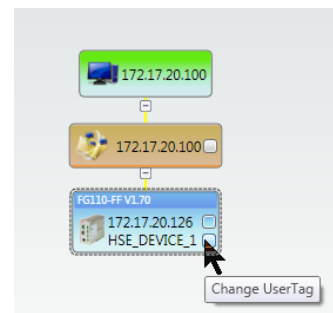


Fig 5.6-4 Change User Tag

### 5.6.4 Add an H1 Link to a Linking Device

Next you add an H1 Link. You use the context menu to do this, using the right mouse button to click on the HSE\_Device object.

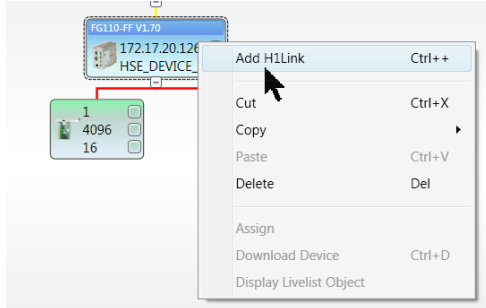


Fig 5.6-5 Add an H1 Link to the HSE Device

The H1 Link will be configured, the Port Number and the LinkID are set automatically, but in any case you have to enter a new NodeID. If it is necessary you also can change the Port Number and the LinkID. The port numbers are the physical ports of your linking device.

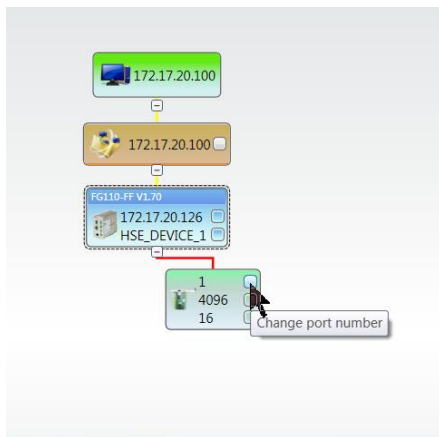


Fig 5.6-6 Change port number, LinkID or NodeID of the H1 Link

You will find an important function in the context menu of the H1 link object: <Get Min Bus Parameters>. It optimizes the bus parameters in such a way that all the configured H1 devices on the link will be able to communicate.

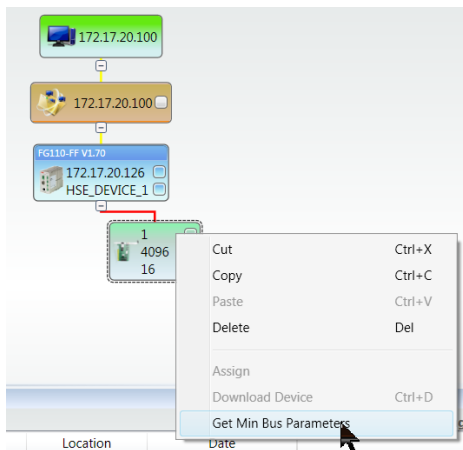


Fig 5.6-7 Optimizing the bus parameters with <Get Min Bus Parameters>



The H1 link object represents the port of the linking device with the H1 VFD and the bus parameters common for every device on this link.

### 5.6.5 Add H1 Device (Field Device) to an H1 Link

First you mark the H1 Link to which you want to add an H1 device. Next you select an H1 Device from your list of Device Types and add it to your configuration with a click on the green star in the upper left-hand corner of the device type object. The chosen H1 Device is added to your configuration.

If no H1 link exists, it is automatically created by adding an H1 Device.

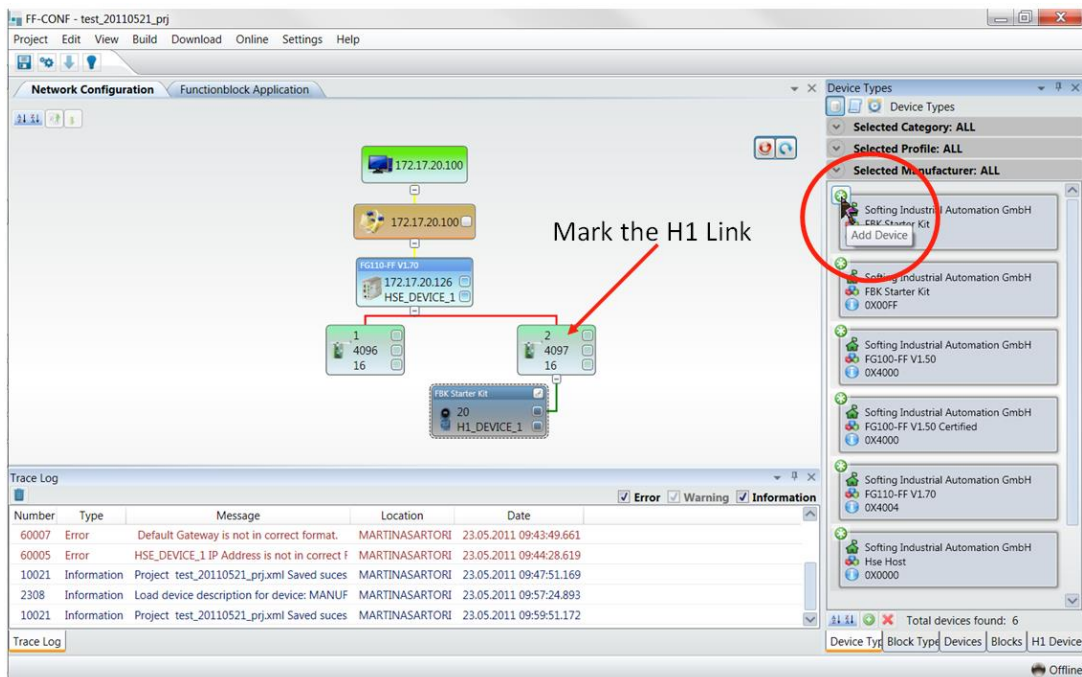


Fig 5.6-8 Add an H1 device

If you want to see the parameter view of the device, click the button on the upper right-hand corner of the H1 device object and the menu item “Device H1 Device X (device number) Parameter” appears and shows you the parameters of the first block of the device.

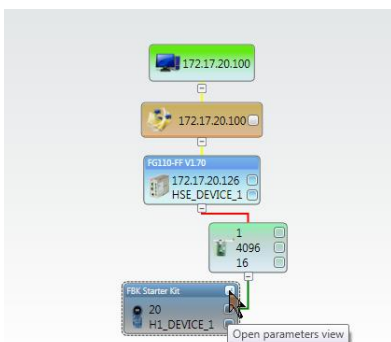


Fig 5.6-9 Open parameter view

Now you can see it and if necessary you can change the configured values and write actual values, but only if they are read/write parameters. You can do it block by block.



You need no installed instances to configure the devices or to define block parameters in your network configuration

## 5.7 Network Livelist

The commissioning of your plant needs to adapt the data of your Network Configuration to the installation which really exists (Network Livelist). You must perform the next steps to do this.

### 5.7.1 Set the online status

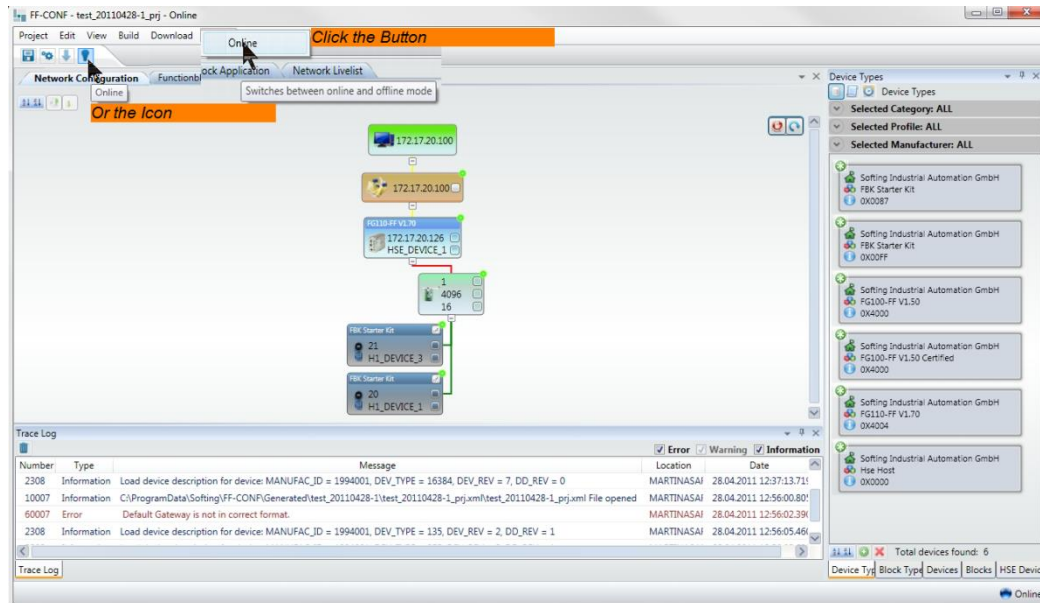


Fig 5.7-1 The two options to go online

When you start the program FF-CONF the function <online> is not active. The Network Livelist is not shown. The condition to show the Network Livelist is being in the online status. In the options displayed above you can switch to the online status. Opening the network livelist via menu <View><Network Livelist> automatically activates the online status.

### 5.7.2 Display the Network Livelist

The menu item <Network Livelist> shows active devices of your Foundation Fieldbus network. You can compare the planned project and the physical devices by comparing <Network Configuration> view and <Network Livelist> view.

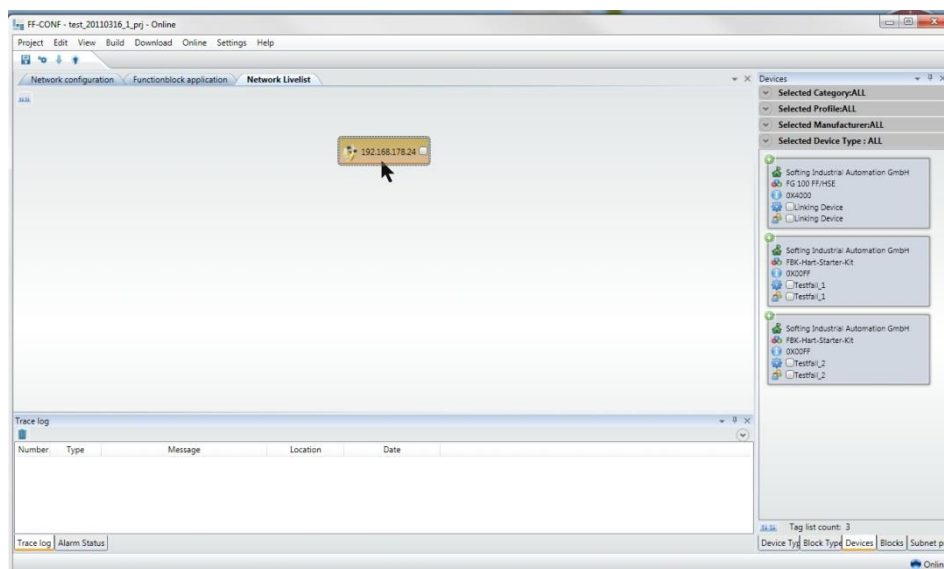
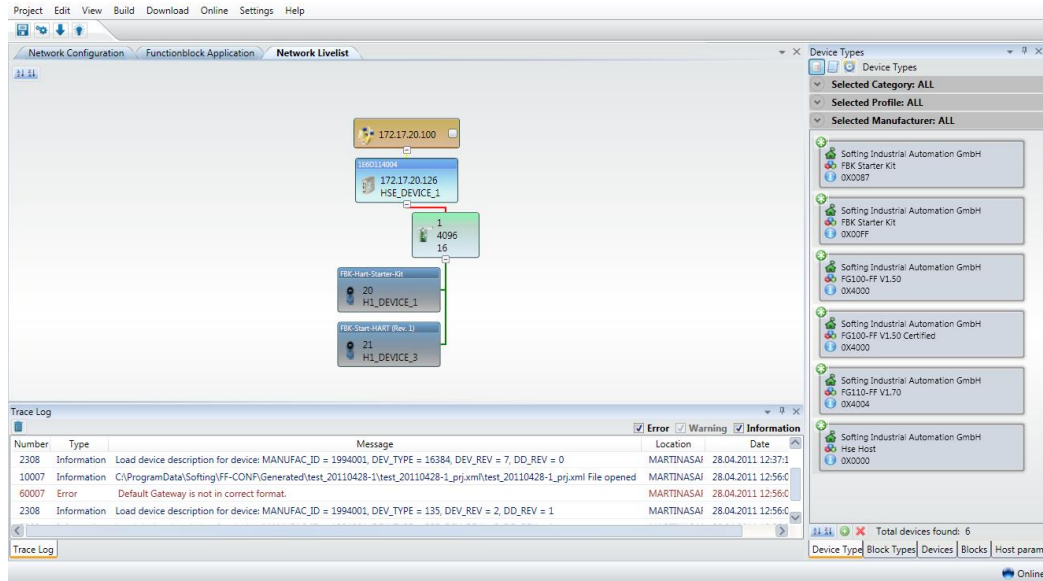


Fig 5.7-2 Your first look at the Network Livelist

When you first change from <Network Configuration> to the <Network Livelist> you click on the menu item <View> <Network Livelist>. Beside the menu items <Network Configuration> and <Function Block application> the new menu item <Network Livelist> appears and is active. Dependent on the size of the network, FF-CONF needs some time to update the livelist. If you change the view to work with another part of FF-CONF the livelist works in the background.

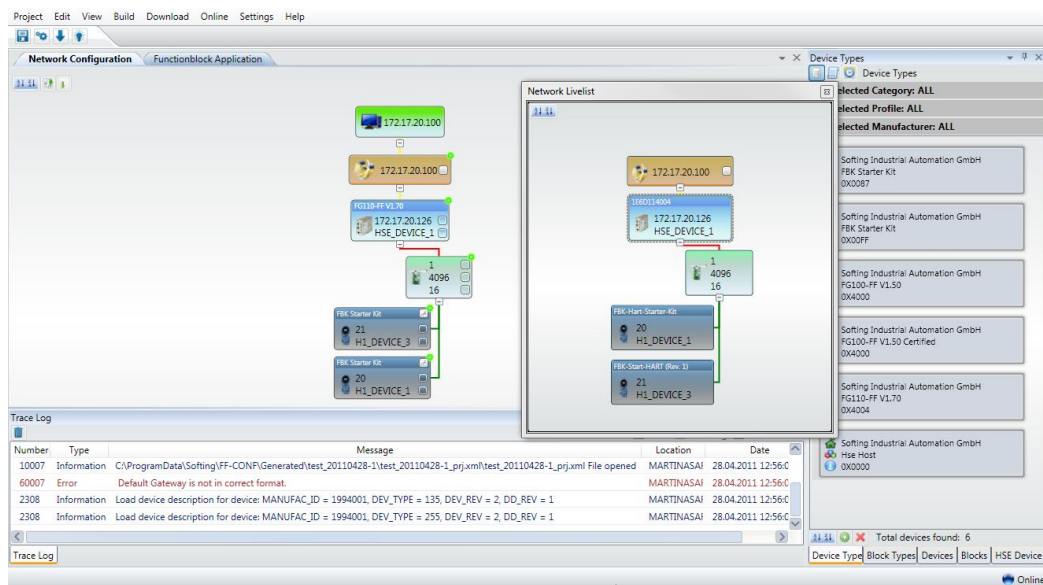
If you don't see any devices which are physically available, please check

- physical connection and
- IP address range



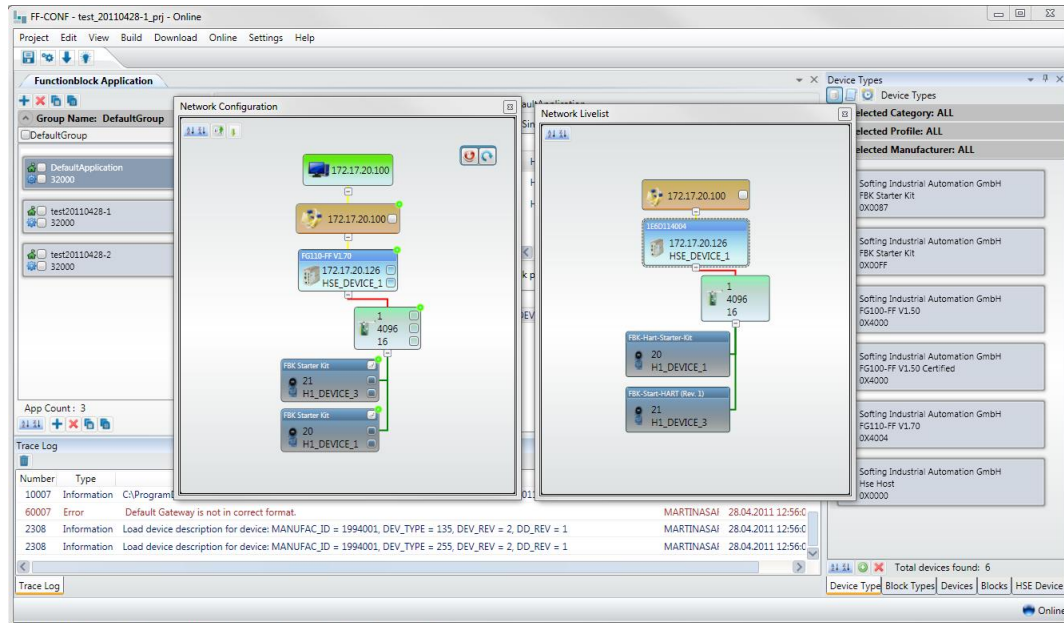
*Fig 5.7-3 The complete View “Network Livelist” – it shows you the devices which are really installed.*

In the basic state of FF-CONF you can see either the Network Configuration view or the Network Livelist view. If you want to see both pictures together use the function of floating/docking windows. It is convenient to use a floating network livelist view to compare configured and physical devices.

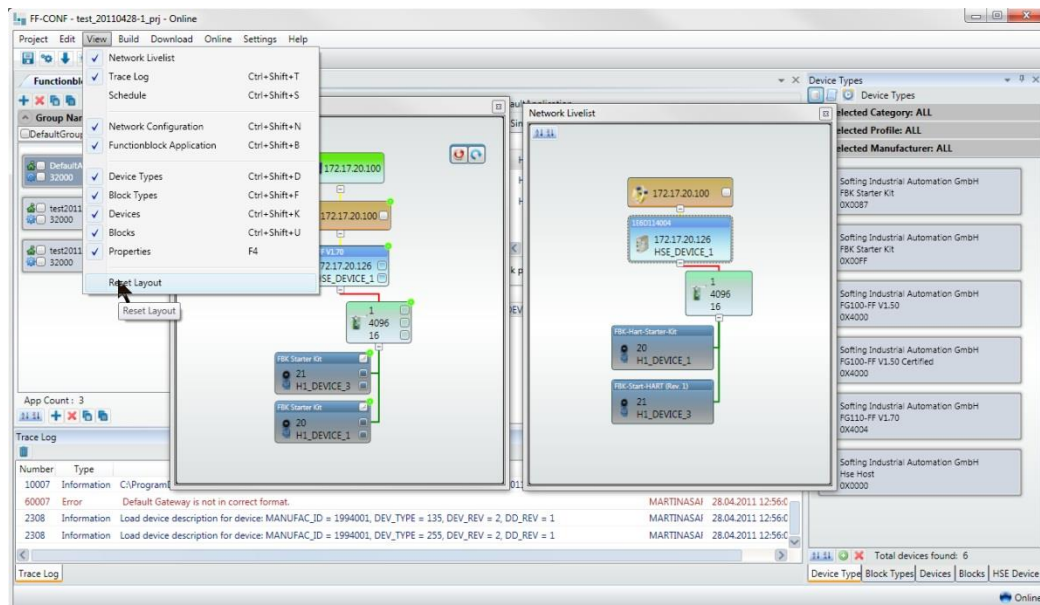


*Fig 5.7-4 Pull down the Network Livelist*

In the same way you can pull down the tab *Network configuration*. So you get two windows in variable size and positions. This way you have the best possibilities to compare and commission your project. You'll see it below in the screenshot.



*Fig 5.7-5 Two variable windows to compare and adapt the Network Configuration and the Network Livelist*



*Fig 5.7-6 Reset of the Layout*

To establish the connection between a configured device and one which exists physically, select the physical device within the live list. You have to assign the Linking Device and H1 Link first, then the H1 devices. To establish the connection between a configured device and one which exists physically, select the physical device within the live list.

You have to assign the Linking Device and H1 Link first, then the H1 devices.

If you see different tag names, please take into consideration that there is a difference between user tags and FF PD tags. Therefore refer to chapter [Tag Names](#).



Device assignment is a time consuming action. During assignment, the device within the network configuration view gets a yellow bullet. The physical device within Network Livelist disappears if the PD tag and/or the node address have changed. As soon as the assignment is accomplished, the physical device is displayed again and the bullet on the configured device turns green.

A prerequisite for building and downloading code is that the configured device matches the physical device displayed in the livelist. Necessary adaptations to the configuration can be done both in <Network Configuration> and in <Network Livelist>, depending on your individual requirements.

If you change the user tag or the NodeID of an H1 device in the Livelist, the H1 device uses for a short time one of the reserved numbers 248 to 251 and also vanishes and reappears. After about a minute the H1 device appears with its new user tag and/or its new NodeID. If your attempt is not successful try it again.

## 5.8 Function Block Application

The Function Block Application defines the communication between input and output parameters of function blocks. Depending on the installation's topology direct communication between the H1 Devices will be configured. If necessary the signal is republished by the linking device(s). The blocks are defined by the imported .cff files.



The communication does not take place when configured, but after loading the project to the device.

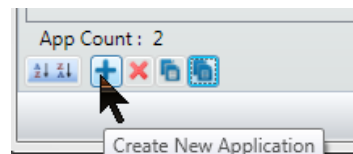
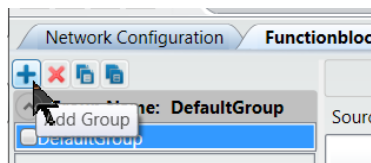
Function block applications can be organized in groups and applications. A project contains one or more groups. A group contains one or more applications. By default a DefaultGroup and a DefaultApplication are created. The data can be shown by selecting the block in the block view as well as clicking on the desired block in the Function Block application.

There are two ways to connect blocks in the Function Block application:

- To use a block instance of a configured device,
- to instantiate a block type.

### 5.8.1 New groups and applications (beside the Default Group and Application)

To simplify the overview in big installations or in the case of different requirements it is useful to create more than one group or application.



With the icons above you can create new groups and applications, delete or copy and paste applications. The applications names can be given individually and different cycle times can be defined.



The cycle time has to fit the macro cycle time defined on the H1 link

### Copy and paste groups and applications

To realize big installation without any problem, and to record all the blocks and connections repeatedly use the possibility to copy and paste groups and applications.

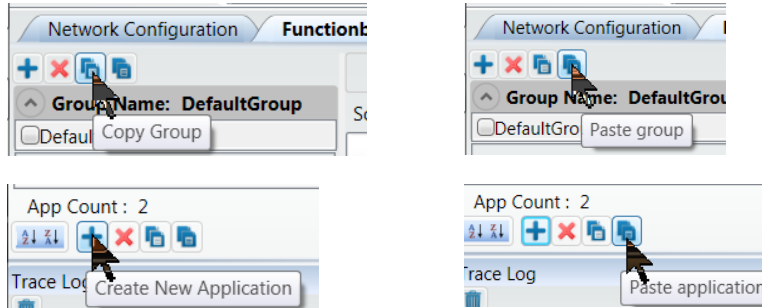


Table 5.8-1 Copy and paste groups and applications

If you copy and paste a group or an application you copy all blocks and all the connections but there is no association of the blocks to a device. The association to destined devices might be established during commissioning.



Each block can be used in only one application

### 5.8.2 Configure the Function Block application

There are 2 ways to configure a function block application:

- Use the devices first approach, i.e. use the function blocks of configured devices.
- Use the function block application first approach and later associate to a device. First choose the blocks.

#### 5.8.2.1 Devices first approach

- Configure network configuration view
- Change to Function Block application

You first configure the devices and use the Function Blocks on the devices for your Function Block application.

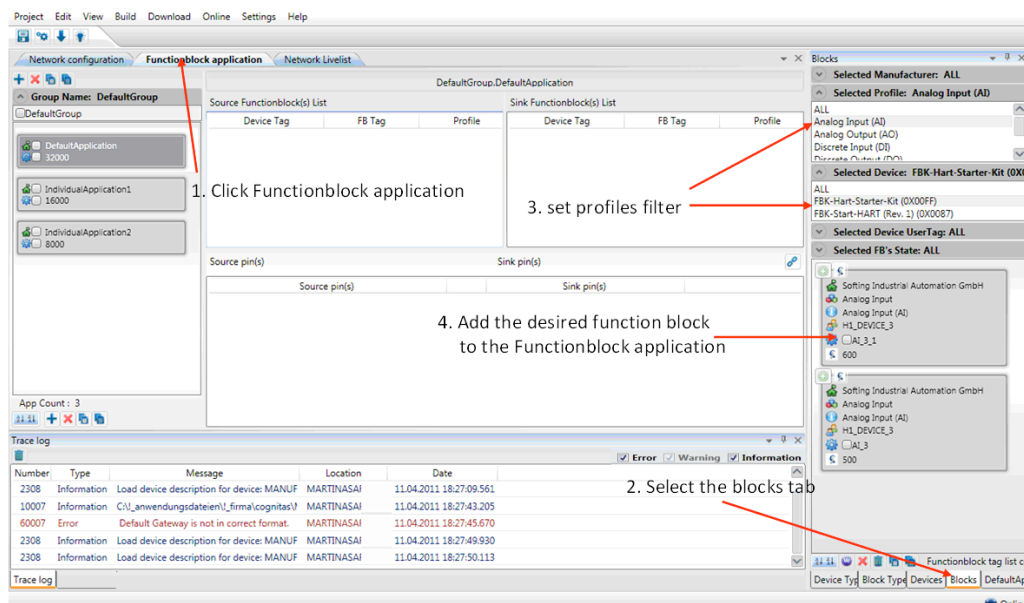


Fig 5.8-1 The steps to choose the desired blocks

- Select the Function Block application tab.
- Select the blocks tab. The blocks tab contains all configured blocks. These can be filtered.
- Set the profiles filter, for example to AI. All AI blocks are displayed in the list
- Set the selected devices filter to see the AI for a specific device.
- Add the Function Block, for example AI\_5 to the Function Block application.
- Add all other blocks you need.

The screenshot shows you an example of chosen blocks and the data flow between the blocks.

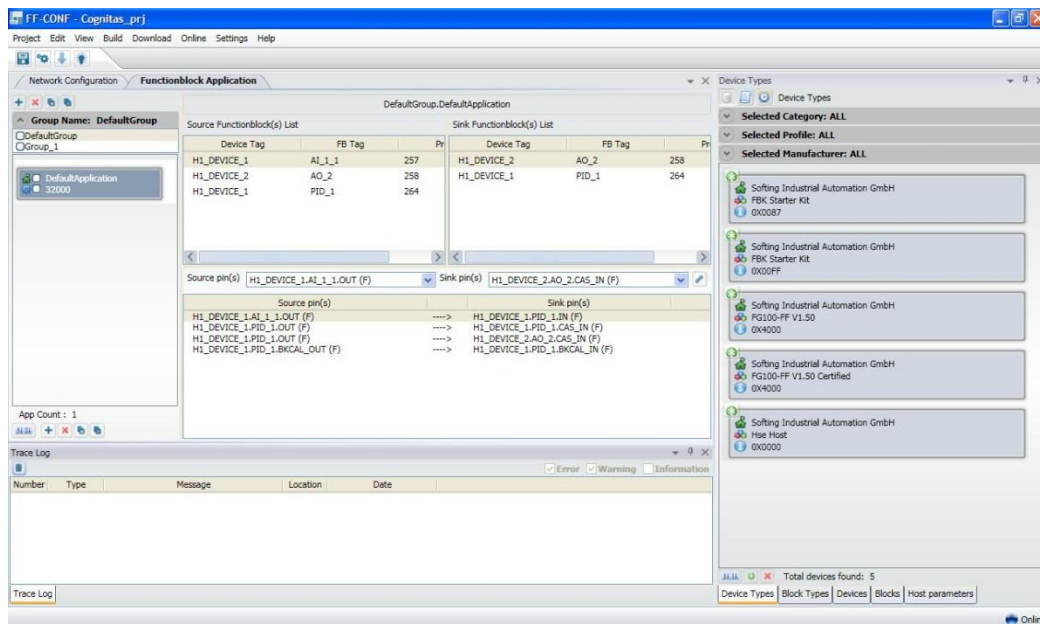


Fig 5.8-2 Chosen blocks and the flow of data between blocks and devices

### 5.8.2.2 Change tag names

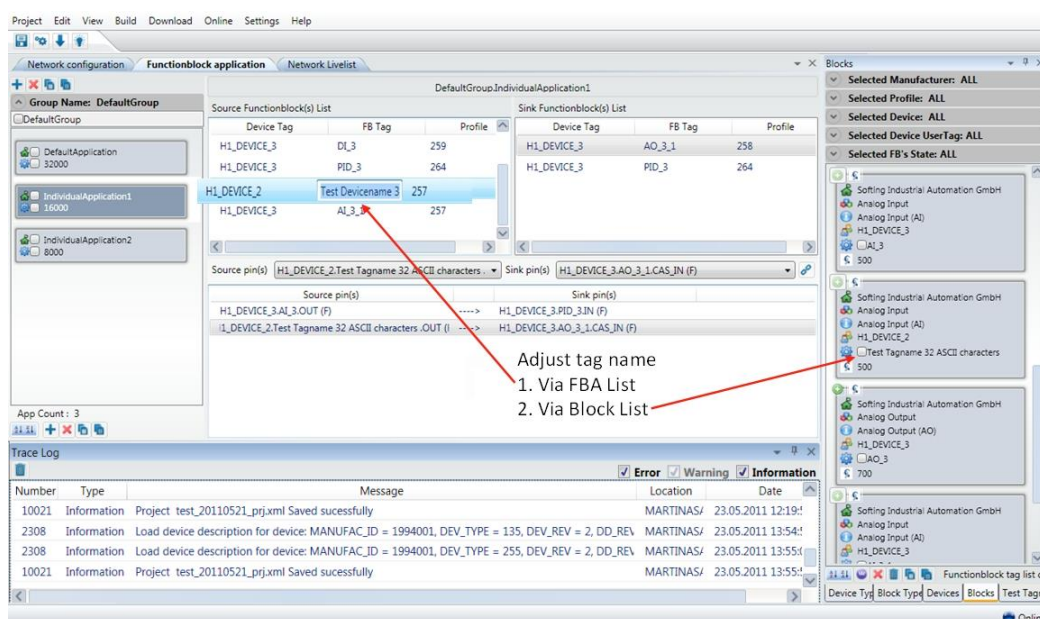


Fig 5.8-3 Adjust tag names - you can adjust the tag names by selecting a list of function blocks within one function block application or by selecting within the block list.

### 5.8.2.3 Configure connections

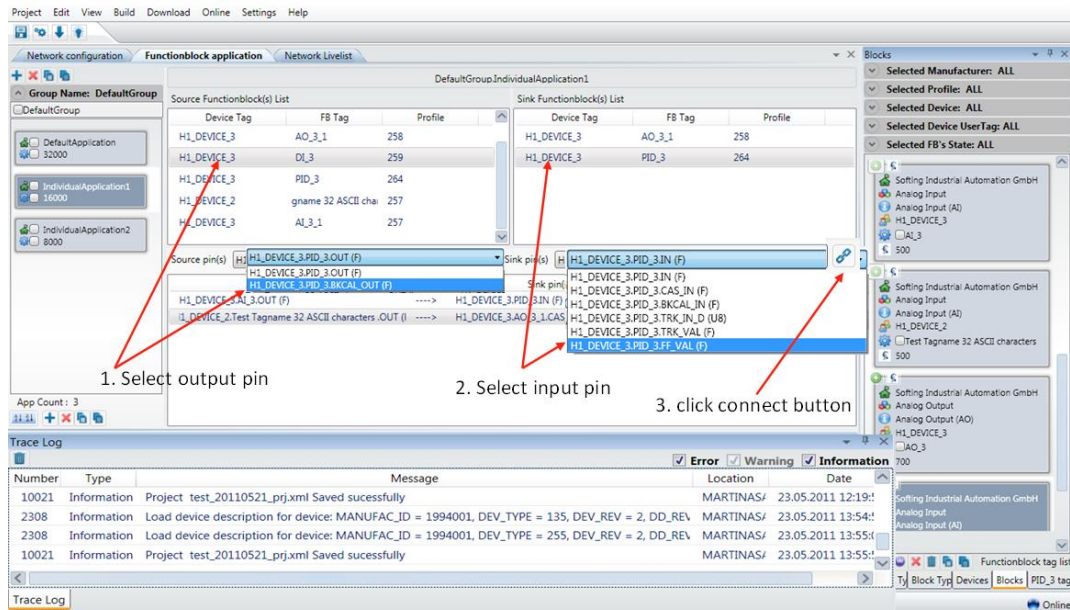


Fig 5.8-4 Configure connections

Configure a connection by pressing the link buttons:

1. select output pin (H1\_Device\_3\_PID\_3.BKCAL\_OUT)
2. select input pin (H1\_Device\_3\_PID\_3.FF\_VAL)
3. click <connect> button

Configure your application block by block. You cannot reuse a block which has already been used.

In each application the flow of information between the blocks will be defined (e. g. Discrete Input, Analog Output). It is not possible to control the plausibility of the joined blocks automatically because of the high number of individual applications. Only connections which are technologically impossible in the system will be rejected by an error message in the trace log or marked with a red arrow (e. g. type mismatch).

### 5.8.2.4 Configure parameters

To switch to the parameter view, select a block and pick the parameter view using the right mouse button.

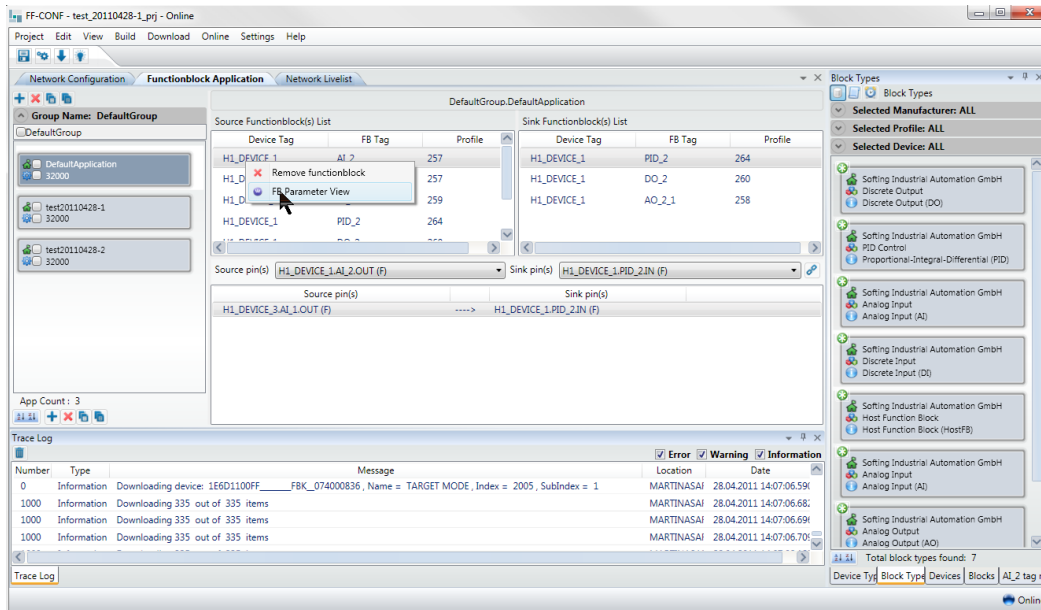


Fig 5.8-5 Click FB Parameter View

Next you see the block parameters and can change the values.

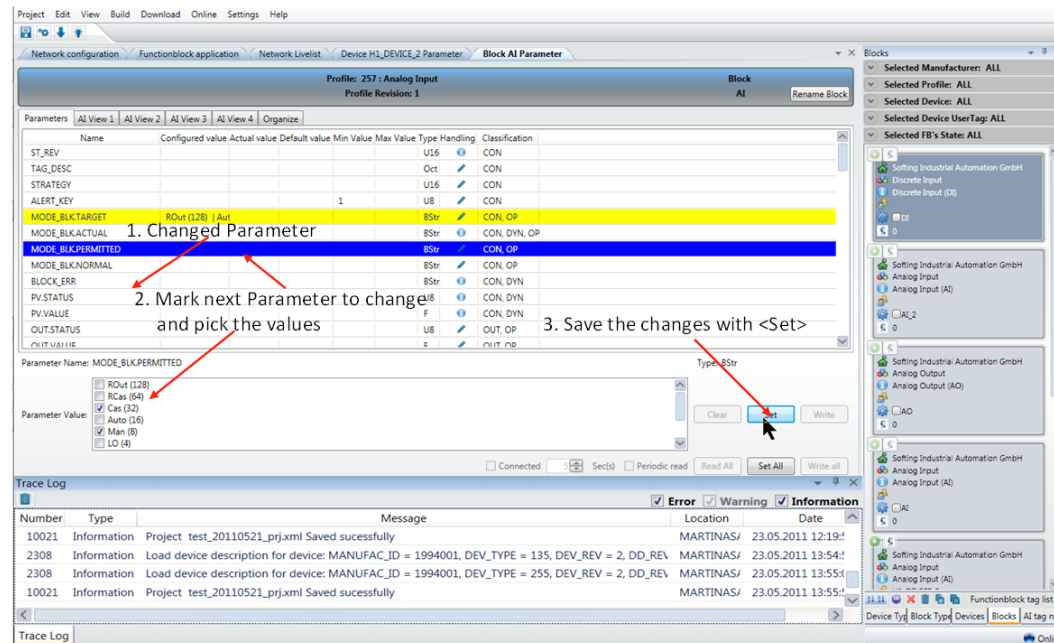


Fig 5.8-6 Change values of the block parameters

First select the parameter to change within the grid. Please look at the column “Handling” for the information on whether the parameter is read/write or read only. Read only parameters cannot be changed and therefore no edit field is displayed.

Then edit the value within the edit field “parameter value” at the bottom of the view or select from the combo box. The parameters marked yellow are different to the default values.

To finish the configuration, press set and save the project.

### 5.8.2.5 Change Block Tags

You can change the block tags to get a better overview of where the block is situated, what its special function is and so on. For the valid character set please see the chapter on

[general information](#). Independently from the block tag the type of the block is shown in brackets.

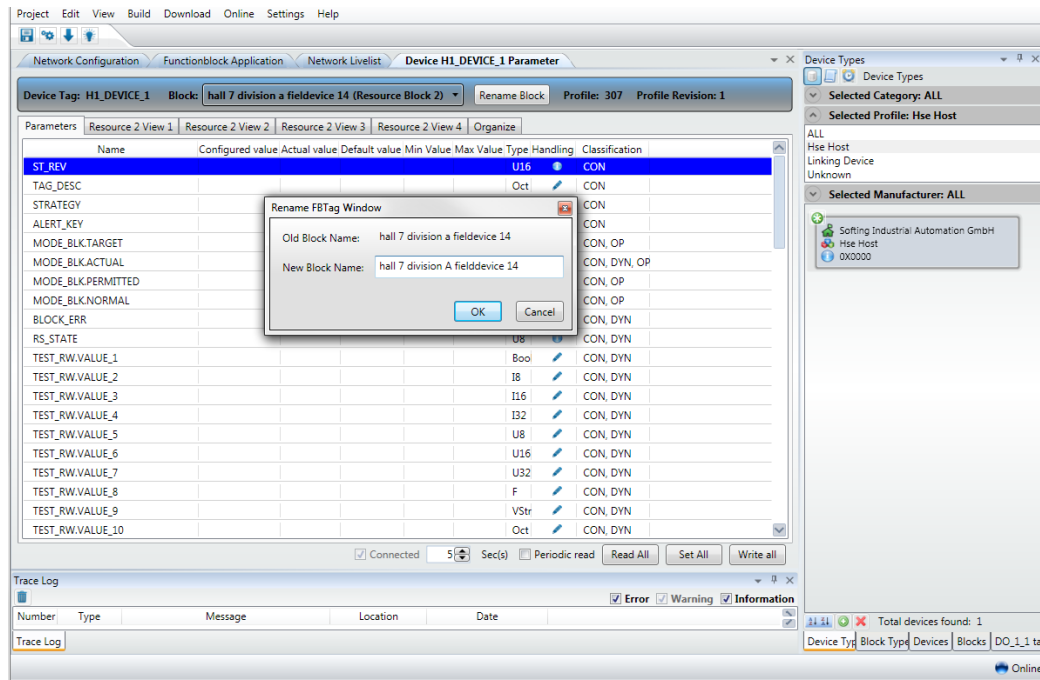


Fig 5.8-7 Rename blocks

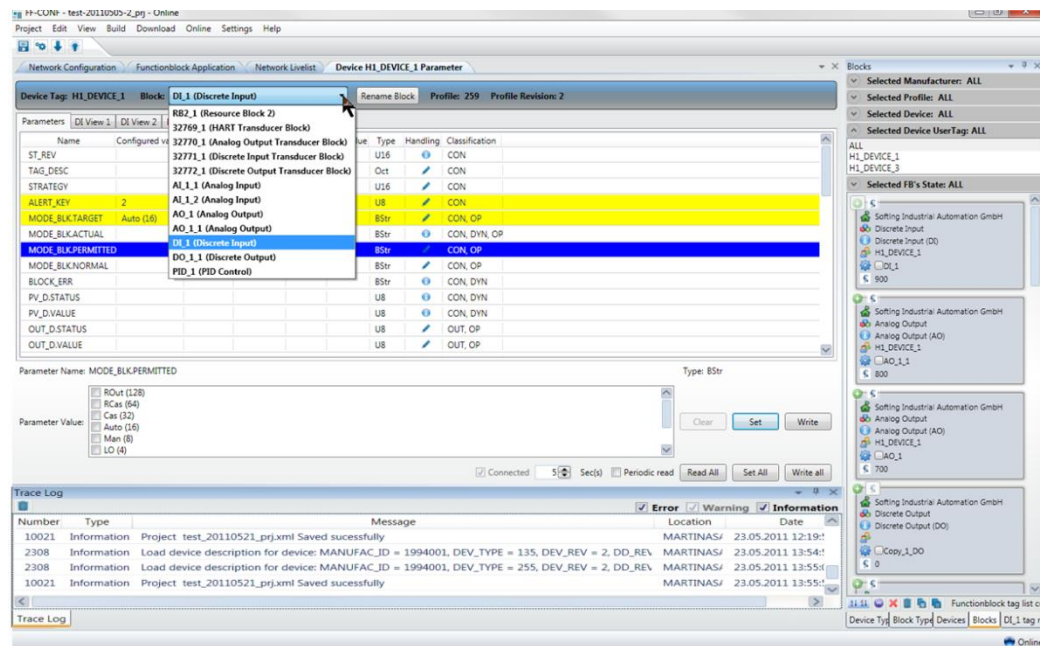


Fig 5.8-8 Choose a block to see or edit parameters

### 5.8.2.6 Changing parameters online

It is also possible to call the parameter view of all blocks of a device by selecting the device and pressing the icon <Open parameters view> in the upper right-hand corner of the device.

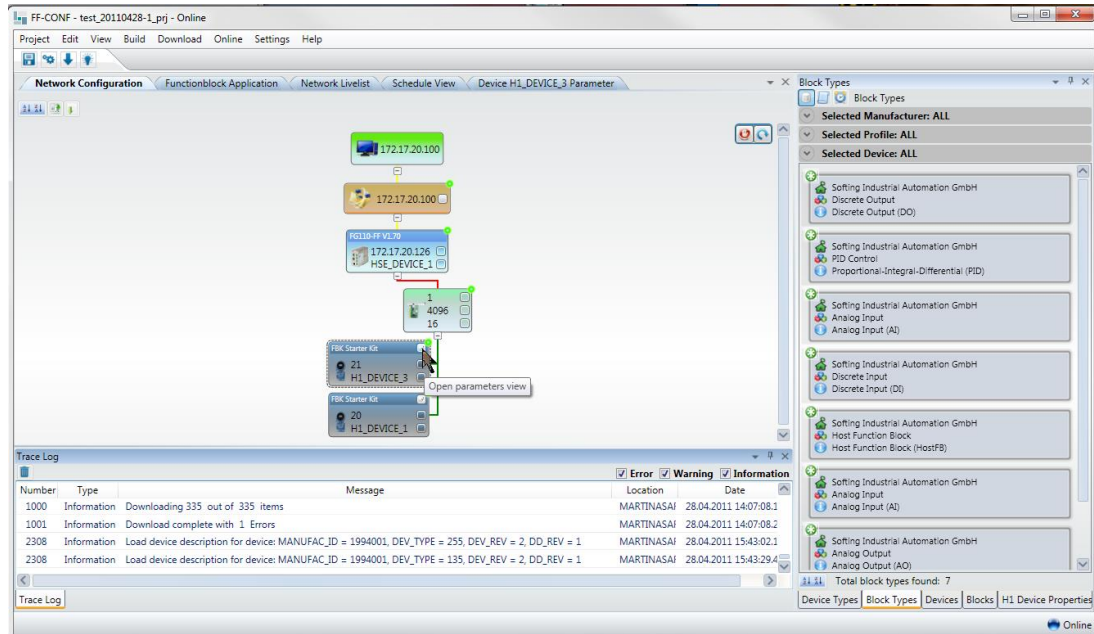


Fig 5.8-9 Changing parameters online by pressing the block icon in the upper right-hand corner of the device

Now you see all the parameters of the first block (it's the same view and processing as explained in Function Block application). If you need to see the parameters of another block, click the button <Block> near the top center of the displayed window. Now click the desired parameter and you see the window Parameter Value. Choose one or more of the required values and click the button <Set> to activate your selection.



If there is an error message displayed in the trace log view, this might be due to the fact that the device is in AUTO mode and some of the parameters can only be written in MANUAL or OOS (out of service). If this is the case, first set the block to the desired mode by writing MODE\_BLK.TARGET.

### 5.8.2.7 Block types first approach

You can also enter the instance of a block type without device association to a function block application by clicking the \*button of a selected block type.

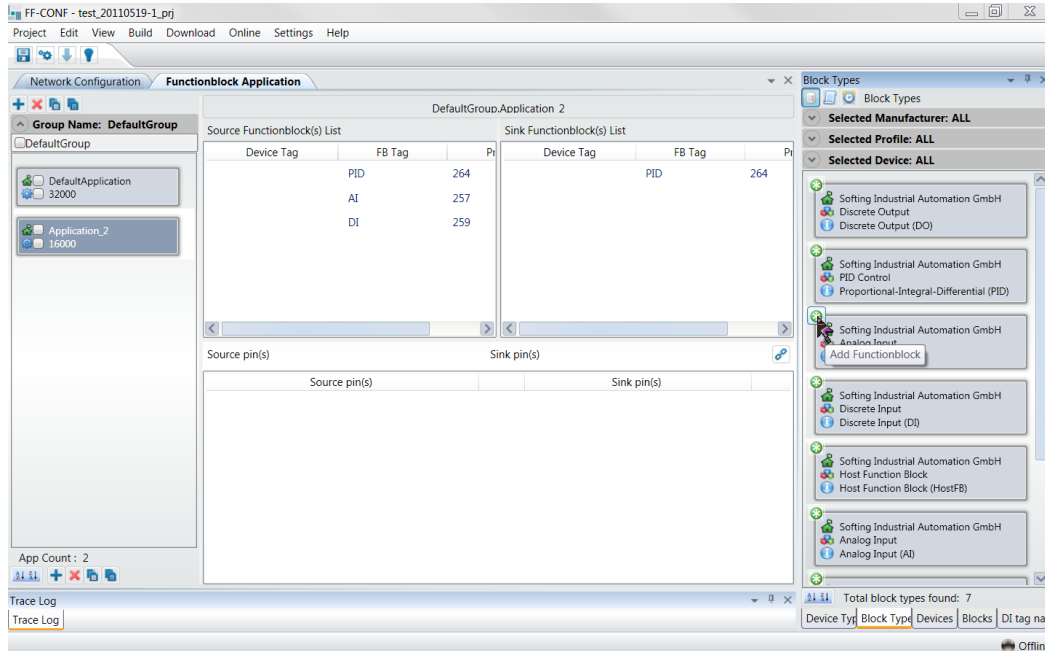


Fig 5.8-10 Add a block type

Now you can configure your function block application as described above and then associate the blocks to the blocks of the device via the associate button. When you associate a block, both the block tag and the configured parameters from the function block application are used to configure the specific block on the configured device. The device tag of the device is then listed within the function block application.

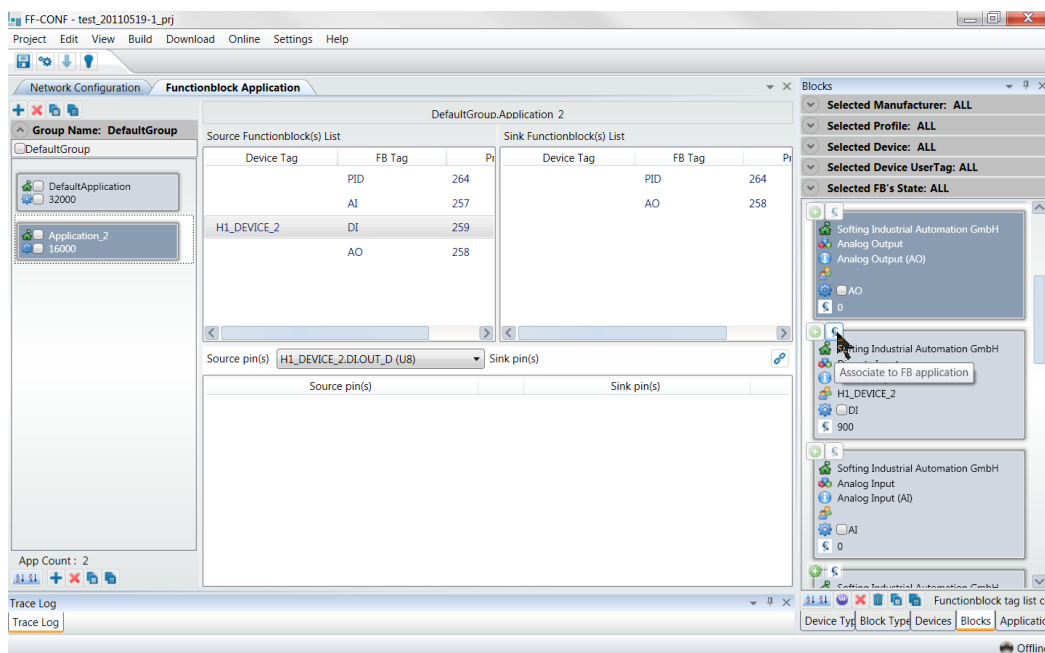


Fig 5.8-11 Associate a Function Block



The same situation appears after copying a function block application or a whole group of function block applications because this copy action removes the device association.

### **5.8.3 Schedule View**

The schedule view gives you an overview of the start time and duration of function blocks and VCRs within the macro cycle for one H1 Link.

## **5.9 Handling Host devices**

Part of an installation may be a Host device. The Host device is a customer specific system (controller) and is a participant on the HSE subnet. It needs its own valid IP address.

Communication between the Host device and H1 devices can be configured via Host function blocks. For details please contact Softing.

## 6 Error handling and troubleshooting

It's not possible to describe all the different options for critical handling. Consequently the most problems which occur most frequently in your process are described here.

If you can't find the answer you seek please contact our service centre. The staff there will be pleased to help you and have most experience in handling FF-CONF and the installations around it.

Symptom	Cause	Recommended Actions
PC does not communicate with the Linking Device		<ul style="list-style-type: none"> <li>• Check to see if you are using a cross-over cable</li> <li>• Use the PING command described in configuration to verify the IP address and the FIM name</li> <li>• Check that the browser has the proxy server turned off</li> <li>• Check that the IP address of the PC is set as indicated in Chapter 5</li> </ul>
Fieldbus device is not detected		<ul style="list-style-type: none"> <li>• Check your installation for correct wiring and grounding and that a field terminator is installed at each end of the segment.</li> </ul>
Device does not show up on segment	Unknown No power to device	Recycle power to device 1. Ensure the device is connected to the segment. 2. Check voltage at terminals. There should be 9–32Vdc. 3. Check to ensure the device is drawing current. There should be approximately 17 mA.
Device does not stay on segment	Incorrect signal levels. Refer to host documentation for procedure. Excess noise on segment. Refer to host documentation for procedure. Electronics failing  Other	Check for two terminators. Excess cable length. Bad Power supply or conditioner Check for incorrect grounding. Check for correct shielded wire. Tighten wire connections. Check for corrosion or moisture on terminals. Check for Bad power supply. Tighten electronics board. Replace electronics. Check for water in the terminal housing.
Can't log in to Linking Device Web Site	Forgot username or password	Softing must reset passwords. Contact Softing Support.
Can't find a specific page or functionality	Using an older version of Firmware	Purchase and install updated Firmware

Symptom	Cause	Recommended Actions
Can see fieldbus device, but can't see the fieldbus blocks	Device not commissioned	Wait for device to auto commission or enable commissioning and cycle power on device
Can't expand any function blocks	DD not installed	Install DD
Can't expand any function blocks	Block not enabled	Enable block from block list
Can see some fieldbus blocks, but not all fieldbus blocks	User does not have sufficient privileges	Use higher level login and password

Returned Value	Action
OUT.STATUS is Bad:: OutOfService	Verify that the MODE.TARGET of the block in question is in Auto. <ul style="list-style-type: none"> <li>Verify that the MODE.TARGET of the transducer block or function block that is connected to the block in question is in Auto.</li> <li>Verify that the MODE.TARGET of the resource block of the device containing the block is set to Auto.</li> <li>Go to Setup&gt;Fieldbus&gt;Blocks to schedule the Block</li> </ul>
MODE.ACTUAL=OOS, MODE.TARGET=AUTO, and BLOCK_ERR=Power_up	The block is not scheduled. <ul style="list-style-type: none"> <li>The FF-CONF will schedule AI and MAI blocks automatically but will not schedule other blocks.</li> <li>Go to Setup&gt;Fieldbus&gt;Blocks to schedule the Block</li> </ul>
Error Dialog on Parameter Write	Most parameters require the block to be placed in OOS for the write to be accepted: <ul style="list-style-type: none"> <li>Edit the MODE.TARGET to OOS</li> <li>Wait for the MODE.ACTUAL to transition to OOS</li> </ul> Make desired parameter change: <ul style="list-style-type: none"> <li>Edit the MODE.TARGET to Auto</li> <li>Wait for the MODE.ACTUAL to transition to Auto</li> </ul> Parameter change is complete.
OUT.STATUS=Bad::ConfigurationError	For AI/MAI blocks: <ul style="list-style-type: none"> <li>LTYPE must be set correctly for the application</li> <li>CHANNEL must be set to a valid transducer channel</li> <li>XD_SCALE and OUT_SCALE must have valid UNITS and EU_0 and EU_100 values for the application</li> </ul> For transducer blocks: <ul style="list-style-type: none"> <li>Sensor configuration must be valid</li> </ul>

## 7 Appendix A - Bus Parameter Configuration

This section will help you configure the bus parameters of an H1 device or H1 link of a linking device correctly. It gives hints and ranges for the individual parameters.

### 7.1 Bus parameters relevant for H1 devices

Parameter	Description	Range/ Restriction	Default value
T1	This is the preset value for the SM service timeout timer in 1/32 of a millisecond ticks. It defines the time which the SM kernel of the host will wait for a response to an SM request to the field device. If the timer expires the service will be aborted with a negative response. Its purpose is to ensure that devices responding to system management requests have sufficient time to carry out necessary actions and transmit a response. For a description of the relationship between the three timers refer to <a href="#">T3</a> .	-	480000 (15s)
T2	This is the preset value for the SM set address sequence timer in 1/32 of a millisecond ticks. The timer T2 is a sequence duration timer. Its purpose is to guarantee that incorrectly executed or incomplete sequences are aborted in the System Management Kernel of the device. For a description of the relationship between the three timers refer to <a href="#">T3</a> .	$T2 \geq T3 + 3 \cdot T1$ (host)	2880000 (90s)
T3	This is the preset value for the set address wait timer in 1/32 of a millisecond ticks. This time is used by the SM kernel of the host after a new address was assigned to a field device to wait before checking for the field device at the new node address. The relationship between the three timers T1, T2 and T3 is important for the host and the device to set the address of a field device correctly. T1 and T3 will be used on the host side, T2 within the field device. If the value for T2 is too small a new address cannot be assigned to the field device because the timeout is too small. T2 should always be $\geq T3 + 3 \cdot T1$ of the host.	-	1440000 (45s)
SlotTime V(ST)	Device capability for how fast the device can reply upon receipt of a PDU. This capability is measured in MaxResponseDelay SlotTimes, $V(MRD) \times V(ST)$ . Both parameters are specified in octet durations. The attributes SlotTime and MaxResponseDelay should be set such that the device represents the maximum response delay in octets of the device. The capability can be obtained from the devices CFF file. When configuring an H1 Link the maximum value of the product SlotTime $\times$ MaxResponseDelay of all devices residing on that link should be the minimum value for the Link configuration. This is to assure that all devices participate on the bus.	1 - 4095	8. Support for a value less than the default is recommended.
MaxResponseDelay	Device capability for how fast the device can reply upon receipt of a PDU. This capability is measured in	1 - 11	10. Support for a value less

V(MRD)	MaxResponseDelay SlotTimes, V(MRD) × V(ST). Both parameters are specified in octet durations. The attributes MaxResponseDelay and SlotTime should be set such that the device represents the maximum response delay in octets of the device. The capability can be obtained from the device's CFF file. When configuring an H1 Link the maximum value of the product SlotTime × MaxResponseDelay of all devices residing on that link should be the minimum value for the Link configuration. This is to assure that all devices participate on the bus.			than the default is recommended.
MinInterPDUDelay	This parameter specifies the minimum interval between two frames on the H1 link. The minimum value of MinInterPDUDelay which a device is able to support is described in the CFF file of a device. When configuring the H1 link the minimum value that can be used for MinInterPDUDelay is the maximum of the values from the CFF files of the used devices.			Max. value of the capabilities of the H1 link and all H1 devices on the link shall be configured.
MaxSchedulingOverhead V(MSO)	This parameter specifies the maximum scheduling overhead permitted an LAS DLE by the existing link schedule. The parameters unit is the transmission duration of one octet. This overhead is included in the time allocated for each scheduled activity, and so is used only during schedule construction and determination of whether a DLE can serve as LAS for an existing schedule. An H1 device capable value of V(MSO) will be checked with the configured value in the LAS domain during download of the domain.	0 - 63		63. Max. value of the capabilities of the H1 link and all <a href="#">BLM</a> capable H1 devices on the link shall be configured.
PreambleExtension	Each frame on the H1 link starts with a preamble octet which is used by the receiving nodes (Devices) to synchronize to the signal clock. The number of preamble(s) can be extended when setting this parameter. The default value is 0. Networks including digital repeaters may require larger values.	0 - 7		0
PerDlpduPhysicalOverhead	The parameter defines the physical layer induced delay between the end of the last octet of one data link frame as it appears on the link, and the beginning of the first octet of any other data link frame as it appears on the link.	2 - 63		2

## 7.2 Bus parameters relevant for H1 Links

The following bus parameters are additionally relevant for configuration of H1 Links or a Link master device.

Parameter	Description	Range/ Restriction	Default value
DefTokenHoldTime	Determines how long a device can hold a token, i.e. how much time the device can use for acyclic bus traffic (Client/Server connections, SM services and alarms/events).	276 - 65000	276
DefMinTokenDelegationTime	As the accuracy of the LAS schedule has the highest priority, the remaining time for granting the token might be less than DefTokenHoldTime. In this case the token	2 - 32767	80

	can be granted only when the remaining time is higher than DefMinTokenDelegTime. The parameter is specified in octet durations.		
TargetTokenRotTime	This parameter specifies the target time in which all devices have been given the token for acyclic data transfer. If the actual token rotation time is higher than the configured value for TargetTokenRotTime the LAS will increase the token priority. So a value of TargetTokenRotTime that is too small could mean that no client/server or SM service can be transmitted as these are using the lowest priority.	1 - 60000	60000
LinkMaintToLinkHoldTime	This parameter specifies the time that the LAS uses within a token rotation for link maintenance which is probing for new node addresses and sending LAS status frames.	292 - 65000	336
TimeDistributionPeriod	Time Distribution PDU's will be sent on the bus in 95% or less of that time period. The parameter is specified in milliseconds.	10 - 55000	5000
MaximumInactivityToClaimLasDelay	This parameter specifies the internal delay time a Link Master device needs from the detection of the failure of a LAS to the time the Link Master sends a ClaimLAS request. When configuring the link the minimum value for this parameter is determined by the highest value of all Link Master devices in the link.	1 - 4095	100
LasDatabaseStatusSpdu-DistributionPeriod	The LAS Live list database of the link will be distributed in that time period to other LAS or link master devices on the link. The parameter is specified in milliseconds. A value of 1000 - 5000 is recommendable.	100 - 55000	5000
TimeSyncClass	This parameter defines the quality of the clock accuracy of a device. Thus it also defines the periods for time synchronization because a device with a more inaccurate clock should be synchronized more often. The maximum value a device is capable of supporting is described in the device's CFF file. When configuring a link, the maximum value should be set according to the minimum value of the used devices.		5
FirstUnpolledNodeId (FUN)	The node address of the first node that will not be polled by the LAS of the link.	FUN >= 20 AND FUN + NUN - 1 <= 247.	248
NumConsecutiveUnpolledNodeIds (NUN)	Range of consecutive node addresses that are not polled by the LAS of the link.	FUN >= 20 AND FUN + NUN - 1 <= 247.	0

**i** Ranges and/or restrictions denoted with the column **Range/Restriction** above will be checked by the FF-CONF and an appropriate error message will be issued if the range/restriction is violated.

## 8 Glossary

Explains specialist terms of the organisation, configuration, device types and the handling of FF-CONF.

### 8.1 General remarks of the user manual

Term	Definitions	Comment, other term
softing Linking Device	Gateway between PC/LAN, Modbus/LAN, Modbus serial and H1 Devices	HSE, Linking Device
Linking Device	Gateway between PC/LAN, Modbus/LAN, Modbus serial and H1 Devices	(softing) Linking Device, HSE
HSE	Gateway and communication controller between PC/LAN, Modbus/LAN, Modbus serial and over the H1 Links with the H1 Devices	(softing) Linking Device
H1 Device	Terminal to record and communicate measurements complying with the fieldbus standards	
H1 Link	Connected to the linking device. Supplies up to 16 H1 devices with power and data.	sometimes also called "segment"
Network Configuration	The part of FF-CONF that allows you to configure your plant offline.	
Function Block application	The part of FF-CONF where you build your communication network between the different blocks of your H1 Devices.	
Network Livelist	Image of the existing installation: PC, Network Card, Linking Devices, H1 Links, H1 Devices and Host devices	
Modbus	<p>A unit to communicate with the Linking Device and to control the activities of the H1 Devices. It is always a special system and it has to prove whether it works in combination with the Linking Device.</p> <p>The Modbus may exist as an Ethernet version, then it is participant in the LAN. Application In most cases works with the serial interface RS485 and has to be connected with the Linking Device over an interface converter RS232 – RS485.</p>	

## 8.2 Networking definitions

Term	Definitions	
DHCP	Dynamic Host Configuration Protocol: Used to configure the network parameters automatically. This device contains a DHCP Client to retrieve the network configuration parameters from a DHCP server on the network.	
NTP/SNTP	Network or Simple Network Time Protocol: Used to set the system time. This device contains an NTP client for keeping the system time synchronized with a network time server.	
Domain Name	A unique designator on the internet composed of symbols separated by dots such as: this.domain.com	
FTP	File Transfer Protocol: A method for transferring files to and from remote computers on the network.	
Host Name	A unique designator in a domain associated with the IP address of a device such as: device.this.domain.com. In that example the hostname is device.	
HTML	Hyper Text Markup Language: The file format used to define pages viewed with a web browser.	
HTTP	Hyper Text Transfer Protocol: The protocol that defines how a web server sends and receives data to and from a web browser.	
IP	Internet Protocol: The protocol that specifies how data is transmitted over the internet.	
Netmask	A string of 1's and 0's that mask out or hide the network portion of an IP address leaving only the host component.	
Network	The portion of the network that the device resides on.	
Broadcast	The address that a station can send to that will be received by all devices on the network.	
Gateway	The address of the node on the network that serves as an entrance to other networks.	

## 8.3 Fieldbus definitions

Term	Definitions	
Terminator	A device attached to the end of a communications bus or network to absorb signals so they do not reflect back.	
Resource Block	The resource block defines device specific characteristics such as software revisions, hardware revisions and materials of construction.	
Transducer Block	The transducer block defines device specific input/output characteristics for function block application purposes. It contains universal parameters and device specific parameters such as trim limits, sensor type, sensor serial number and sensor diagnostic information.	



Function Block	Function blocks define the capabilities of the high level measurement and control available in the device. There are many possible function block capabilities contained in a device such as analog input, discrete input, discrete output, signal characterizer, arithmetic, integrator, PD or PID control, input selector or analog output.	
Analog Input (AI) Function Block	Scanned by the Linking Device.	
Multiple Analog Input (MAI) Function Block	Provides up to 8 variables in one function block, reducing scan times.	
Mode	Target - The mode requested by the operator Actual - The current mode of the block which may differ from the target based on the current operating conditions. The actual mode is calculated during block execution. Permitted - The modes allowed by target during operation Normal - The desired operating mode of the block.	
Mode: Out of Service	In this mode the algorithm of the block is no longer being executed and any outstanding alarms will be cleared. This is the highest priority mode.	
Mode: Auto	In this mode the block algorithm is being executed with new value and status as well as mode being computed each Macrocycle or execution of the block	
Mode: Manual	In this mode the block output is not being calculated although it may be limited. It is set directly by the operator through an interface device.	
Macrocycle	The period of execution in which the function block schedule is defined.	
Schedule	The rate and relative time which function blocks process their inputs and generate their outputs. The schedule defines when a function block is triggered to start execution	
Link Master	A link master device is a device that is capable of becoming the LAS. There is a bid procedure that is followed that selects the link master device with the lowest node address.	
Link Active Schedule Device	The LAS performs five functions: Maintains the schedule to send compel data (CD) messages (DLPDU's) to devices on the network. This is the highest priority function.	

## 9 ATEX and IECEx Certifications - Excerpt from the Instruction Manual

### 9.1 Preface

This excerpt from the instruction manual does only refer to those aspects relevant for explosion protection. In its given or similar wording, the excerpt is a part of the original manual; modification of the wording may be allowed as long as the statements relevant for explosion protection are not impaired.

In order to ensure both the functionality of the device and your own safety you are requested to carefully study the instruction manual enclosed before you start installing the device. If you have further questions, please contact Softing as the manufacturer.

### 9.2 General Information on Explosion Protection

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 parameterization and the recording of production data. The data circuits are galvanically isolated (not ex-relevant).

The device can be used within Zone 2 (gas-Ex category 3G); it is suitable for explosion group IIC and temperature class T4 if accommodated in an accordingly tested enclosure.

The linking device shall only be used in compliance with the details given in the technical documentation of Softing Services GmbH and those stated on the type label. The equipment complies with the applicable standards and regulations and meets the requirements of Directive 94/4EC. The requirements for erecting the device as part of systems in potentially explosive atmospheres (e.g. EN 60079-14) have to be adhered to strictly.

The linking device is intended for use in gas-Ex atmospheres of Zone 2 (category 3G) in the explosion groups IIA, IIB and IIC in temperature class T4.

- The permitted ambient temperature range is  $-40^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$

### 9.3 Marking of equipment (type label)



## 9.4 General requirements

- a) If the notes stated in this excerpt are not observed or in case of inappropriate handling of the device, our liability is waived. In addition, the warranty on devices and spare parts does no longer apply.
- b) The details of this instruction manual have to be observed as have to be the conditions for use and the applicable details stated on the marking and type labels of each equipment.
- c) Any selection and operation of the device has to be done observing the acknowledged technical rules.
- d) Suitable precautions have to be taken to prevent unintended actuation or not permitted impairment of the device.
- e) Be aware that energised conductors are not to be disconnected! This can lead to danger of life if potentially explosive atmosphere is present there at that time.
- f) The equipment is only approved for intended and appropriate use. In case of non-compliance, the warranty and manufacturer's liability do no longer apply!
- g) It has to be ensured that only such equipment is installed which complies with the types of protection applicable to the relevant zones!
- h) All connected electrical equipment has to be suitable for the respective intended use.
- i) The operator has to ensure protection against lightning in compliance with the locally applicable regulations.
- j) Electrostatic aspects have to be considered when mounting the bus-modules.
- k) The hazard of any objects falling onto the bus-module has to be prevented.
- l) The equipment does not meet the requirements of impact protection. Thus, protection against impact energy and IP protection have to be provided at the place of use according to the requirements stated in section 26.4 of EN 60079-0
- m) The equipment is defined as "instruments and apparatus of low energy" according to clause 23 of 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.

## 9.5 Commissioning, installation

The linking device is to be mounted in a major system. Depending on the degree of IP-protection, an interval for cleaning the apparatus (dust settlement) has to be defined. Strict care has to be taken that only equipment is installed that complies with the types of protection relevant to the applicable zones and categories.

Other important facts to be observed:

- a) The equipment has to be installed in a protective enclosure which meets the requirements for resistance to impact defined in EN 60079-0, cl. 26.4.2. This enclosure has to pass the environmental tests according to EN 60079-0 for the preferred ambient range, i.e. it has to be submitted to these tests (thermal endurance, impact and IP; this test sequence must be observed).
- b) The equipment shall only be used as intended.
- c) The FE connection of the apparatus has to be connected with the PE of the system.
- d) The linking device is only to be operated in a fully mounted and intact enclosure; if the enclosure is damaged, the operation is not permitted.
- e) If ambient temperatures exceed 58°C at the place of installation, it may occur that the temperatures of connecting cables strongly rise if those cables have been put in place in an unfavourable condition. In such cases, either measurements have to be performed to confirm that the service temperature of the cables are not exceeded (i.e. 80°C), or such variants have to be used that withstand temperatures of minimum 90°C.
- f) When removing the packaging ensure that no dirt can enter the enclosure or the plugs.
- g) The equipment has to be protected against accidental opening; a warning sign saying "WARNING – DO NOT SEPARATE WHEN ENERGIZED" has to be installed near the plugs.
- h) The connecting plugs have to be fastened using a torque of min. 0.3 Nm.
- i) 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.
- j) Open or not securely closed sockets shall not be energised in the Ex-atmosphere!

- k) To circuits of Zone 2 only such equipment may be connected that is suitable for operation in this zone and has been certified accordingly (suitable documents have been provided).
- l) The devices have to be protected from UV light exposure.
- m) The device has to be connected at low inductance with the PE of the system.
- n) Spare parts are ordered as complete units giving the material number stated on the device (marking, type label).
- o) Do not put stress on the system by bending or torsion.
- p) Inside the potentially explosive atmospheres assembly shall only be performed taking the locally applicable rules of erection into account. The following hints have to be observed (incomplete):
  - (1) Assembly and maintenance to be done only if atmosphere is Ex-free and a hot work permit is in place;
  - (2) Additional precautions have to be taken if the presence of hydrosulphide, ethylene oxide and/or carbon monoxide is to be expected: those substances are of a very low ignition energy;
  - (3) Where these substances are present and where any substance of explosion group IIC is present, and where yet a potentially explosive atmosphere is expected to be present, only non-sparking tools shall be used!

## 9.6 Use

The linking device is only approved for intended and appropriate use. In case of non-compliance, the warranty and manufacturer's liability do no longer apply!

- a) Only such auxiliary components may be used in potentially explosive atmospheres which meet all requirements of European and national directives and legislation.
- b) The environmental conditions specified in the manual have to be followed strictly.
- c) The linking device is not to be used in systems where cathodic systems for corrosion protection are in place. Although special precautions may make that possible (additional earthing bridges), the manufacturer has to be consulted in each case.
- d) The operator has to provide measures for protection against lightning.
- e) The maximum surface temperatures depend on the circumstances of installing the equipment, and the customer or operator is responsible for those. During intended operation no temperature increases of > 20 K are to be reached at the outside parts of the enclosure. Thus temperature T4 is maintained.
- f) All outside parts are made from suitable low-sparking materials. Nevertheless, the operator has to inspect any ignition hazards that may be caused by sparks when operating the entire machine. Parts containing light metal alloys have to be installed in a way that they are protected against external impact.
- g) In explosion group IIC and Zone 1 no projected plastic surfaces > 20 cm<sup>3</sup> are allowed; in IIB or dust-Ex, 100 cm<sup>2</sup> may be reached.
- h) Dust settlements have to be removed regularly.
- i) The company installing the device has to ensure that the transient characteristic is limited to 40% above the service voltage.
- j) Icing is not permitted!

## 9.7 Maintenance and repair

Definition of terms according to IEC 60079-17:

**Maintenance:** defines a combination of any actions carried out to retain an item in, or restore it to, conditions in which it is able to meet the requirements of the relevant specification and perform its required functions.

**Inspection:** defines any action comprising careful scrutiny of an item carried out either without dismantling, or with the addition of partial dismantling as required, supplemented by means such as measurement, in order to arrive at reliable conclusion as to the condition of an item.

**Visual inspection:** defines an inspection which identifies, without the use of access equipment and tools, those defects, such as missing bolts, which will be apparent to the eye.

**Close inspection:** defines an inspection which encompasses those aspects covered by a visual inspection and, in addition, identifies those defects, such as loose bolts, which will be apparent only by the use of access equipment, for example steps, where necessary, and tools.

**Detailed inspection:** defines an inspection which encompasses those aspects covered by a close inspection and, in addition, identifies those defects, such as loose terminations, which will only be apparent by opening the enclosure, and/or using, where necessary, tools and test equipment.

- a. Maintenance works are to be carried out by qualified personnel only, i.e. personnel qualified according to TRBS 1203 or similar.
- b. Only such auxiliary components may be used in potentially explosive atmospheres which meet all requirements of European and national directives and legislation.
- c. Components may only be replaced by original spare parts which are also approved for the use in Ex-atmospheres.
- d. Inside the Ex-atmosphere the equipment has to be serviced and cleaned regularly. The intervals are to be defined by the operator in compliance with the environmental rules valid at the place of operation.
- e. After maintenance and repair works have been performed, all barriers and notes removed for that purpose have to be put back in their original place.
- f. In case faults of the equipment are noticed, remove the equipment. The inner parts cannot be maintained by the customer. Instead, send the equipment to the manufacturer for inspection.

	Activity	Visual inspection monthly	Close inspection every 6 months	Detailed inspection every 12 months
1	Visual inspection of lining device for intactness, removal of dust settlements		● <sup>1</sup>	
2	Check of entire system	Operator's responsibility		

## 9.8 Disposal

Packaging material and worn components shall be disposed of according to the regulations applicable in the country of installation.

<sup>1</sup> Can be shortened or extended taking local conditions into account.