



Configuration and setup of FB-DP... and FB-HS... with ProfiTrace

User manual

User manual

Configuration and setup of FB-DP... and FB-HS... with ProfiTrace

2015-07-13

Revision: A

This user manual is valid for:

Designation	Version	Order No.
FB-HS...		2316370
FB-HSB		2316379
FB-HSC		2316371
FB-DP-RPTR		2316373
FB-DP-RPTR/SC		2316374
FB-PA/SC		2316375

Please observe the following notes

User group of this manual

The use of products described in this manual is oriented exclusively to:

- Qualified electricians or persons instructed by them, who are familiar with applicable standards and other regulations regarding electrical engineering and, in particular, the relevant safety concepts.
- Qualified application programmers and software engineers, who are familiar with the safety concepts of automation technology and applicable standards.

Explanation of symbols used and signal words



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety measures that follow this symbol to avoid possible injury or death.

There are three different categories of personal injury that are indicated with a signal word.

DANGER This indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING This indicates a hazardous situation which, if not avoided, could result in death or serious injury.

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



This symbol together with the signal word **NOTE** and the accompanying text alert the reader to a situation which may cause damage or malfunction to the device, hardware/software, or surrounding property.



This symbol and the accompanying text provide the reader with additional information or refer to detailed sources of information.

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1 FB-HS... system

1.1 Introduction

PROFIBUS coupler/link products transparently convert PROFIBUS DP to PROFIBUS PA while providing detailed network diagnostics. Advanced configuration and diagnostics of these products is accomplished through an onboard web server.



Basic configuration can be accomplished using DIP switches without the need to connect to the web server.

Different levels of monitoring capability are provided through the different head stations.

- The FB-HSA does not provide any monitoring capability.
- The FB-HSB provides diagnostic monitoring of one network.
- The FB-HSC provides diagnostic monitoring of up to four networks simultaneously.

Configuration of modules other than the FB-HS... can be accomplished through the FB-HS..., including other devices on the PROFIBUS network that use compatible FDT/DTM protocols.

1.2 Connecting a PROFIBUS/PA segment

The bottom of the FB-PA/SC module has two identical connections for the PROFIBUS/PA trunk. These are connected one-to-one. The integrated termination is activated when power is connected to the PA module, which means that the FB-PA/SC is always the start of a segment. The automatic termination cannot be disabled. Most installations will use only one connector. In that case it does not matter which connector is chosen.

1.2.1 Cable specifications

Use the correct cable for your project. The table below shows the cable specifications for PROFIBUS PA. If a cable is not compliant with these specifications, the reliability of the installation may become unstable.

Table 1-1 PROFIBUS cable specifications

Characteristic	Specification
Cable design	Twisted pair, shielded
Maximum conductor cross section (nominal)	0.8 mm ² (AWG 18)
Loop resistance (direct current)	44 Ω/km
Impedance (31,25 kHz)	100 Ω ±20%
Attenuation (39 kHz)	3 dB/km
Capacitive asymmetry	2 nF/km
Max. propagation delay change (7.9 to 39 kHz)	1.7 μs/km
Max. shield coverage	90%
Cable length	1900 m

Spur lines

The trunk line on the PA module can have up to 32 spur lines with the following lengths:

Table 1-2 Spur lines

Number of spur lines	Length of the spur (Non-Ex)
25 to 32	Max 1 meter
19 to 24	30 meter
15 to 18	60 meter
13 to 14	90 meter
1 to 12	120 meter

1.3 Connecting a PROFIBUS/DP segment

The PROFIBUS cable should be wired to the repeaters according to the PROFIBUS guidelines with suitable cable for the application.

Regular and SCOPE repeater modules are equipped with both a screw terminal connector and a D-SUB 9 connector for the bus connection. The connectors are linked with each other, but it is not recommended to use them both.

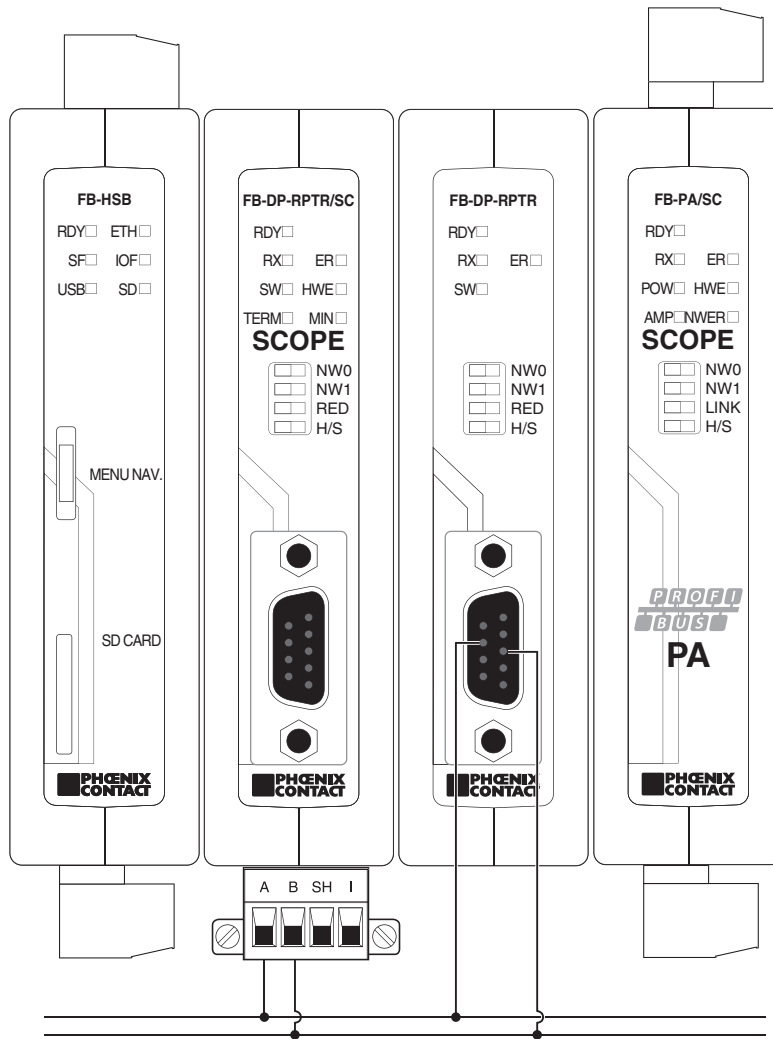


Figure 1-1 Repeater connection topologies

1.3.1 Screw terminals

Pin layout of the screw terminals:

A	Green wire
B	Red wire
SH	Cable shielding (direct) ¹
I	Cable shielding (capacitive) ²

¹ Direct shielding is recommended when connecting all shields

² Capacitive shielding connects the shields through a capacitor in cases where not all shields are connected to separate the different potential levels

1.3.2 D-SUB 9 connector

The D-SUB 9 connector offers an alternative connector for standard 9-pin PROFIBUS plugs (one-to-one with the screw terminals).

When the D-SUB 9 connector is utilized and located at the end of the segment, it is recommended to use the termination on the D-SUB 9 connector rather than on the repeater module.



Use a 2.5 mm (0.4 mm maximum) screwdriver to connect the PROFIBUS cable to the repeater modules.

1.3.3 Termination switch

A two-position switch, located on the bottom of the FB-DP-RPTR(/SC) modules, activates the built-in termination capability. Termination should be activated for modules located at the end of network segment.

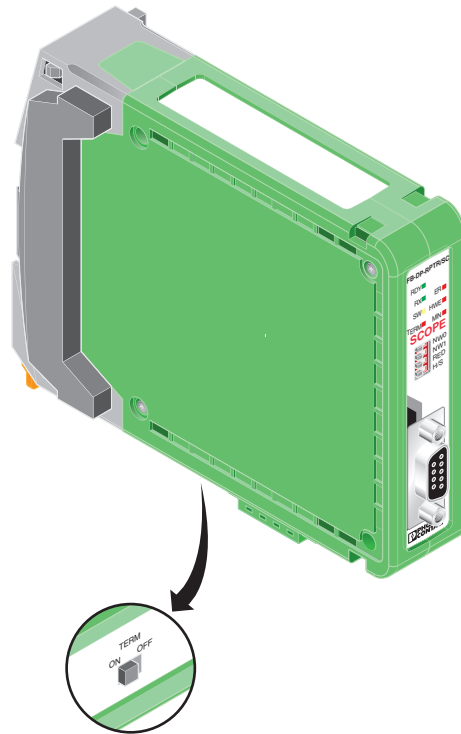


Figure 1-2 Termination switch

The built-in termination provides resistances of 390/220/390 Ω between the conductors.

1.4 Modes

The FB-PA/SC module allows two modes of operation. The mode selection is determined by the switch on the FB-PA/SC.

- Link mode (switch to the right) provides power to the PROFIBUS PA network.
- Coupler mode (switch to the left) allows the device to monitor a PROFIBUS PA network without controlling or powering it.

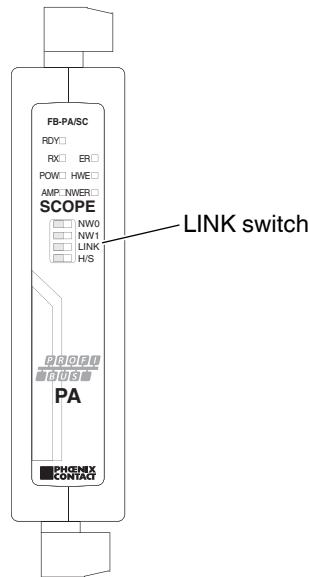


Figure 1-3 Mode switch

1.4.1 Link mode

Set the third switch to on (to the right). Connect a power source to the connector on top of the module. The DC voltage offered to the FB-PA/SC module is the same as the output on the PROFIBUS PA side. The minimum is 11 V DC, maximum is 28 V DC.

This module is now a fully functional PROFIBUS PA link/coupler combination. It is semi-transparent on all baud rates, and it also sends FDL status requests onto PROFIBUS PA. It supports connection of up to 32 devices that can take up to a total of 500 mA from the bus.

To receive telegrams from a PLC or DCS in Link mode, you need to install another module in the backplane. This module can be any PROFIBUS DP interface card. Set this DP card to the same network as the PA module.

1.4.2 Coupler mode

Set the LINK switch to off (to the left). Connect a power source to the connector on top of the module. The DC voltage offered to the FB-PA/SC module is the same as the output on the PROFIBUS PA side. The minimum is 11 V DC, maximum is 28 V DC.



NOTE:

When using an external PROFIBUS PA power supply, do not apply power to the top power connector. The FB-PA/SC module must be set to operate in Coupler mode.

The module is now a fully functional PROFIBUS PA coupler. It is totally transparent up to 1.5 Mbps, and it sends FDL status requests onto PROFIBUS PA networks. It supports connection of up to 32 devices that can take up a total of 500 mA from the bus.

1.5 Configuring repeater modules

The repeaters can be configured using the DIP switches located at the front of the module or by using the web server.

1.5.1 Customizing the PROFIBUS network (NW0/NW1)

Set these DIP switches to the following positions to customize a network number for a specific PROFIBUS network.

NW0	NW1	Network
LEFT	LEFT	1
RIGHT	LEFT	2
LEFT	RIGHT	3
RIGHT	RIGHT	4



When using software for configuration, the DIP switches do not have to be set.

1.5.2 Redundancy (RED)

Set this DIP switch to enable the redundancy group for the channel.

RED	Redundancy
LEFT	OFF
RIGHT	ON



When using software for configuration, the DIP switches do not have to be set.

1.5.3 Hardware or software settings (H/S)

Set this switch to enable hardware (DIP switches) or software settings.

H/S	Settings
LEFT	Hardware
RIGHT	Software



When software is enabled, all switch settings are overruled. The settings are saved in the internal memory of the FB-HS... module.

1.5.4 Testing and commissioning

If the channel recognizes valid PROFIBUS messages from one or more connected devices, the RX LED of this channel should flash and the ER LED should be off.

When the termination of a specific channel is set to on, the SWx LED should be on.

2 Web server

2.1 Login

A browser application running on a PC is required. The minimum versions of the following browser applications are:

Mozilla® Firefox®	2.0
Internet Explorer®	6.0
Google® Chrome™	1.0



A PC is required to access the web server. Using a smart phone or tablet-type product will not work.

To access the web server:

1. Open the browser application and enter the IP address in the “Address” field. The default IP address is **192.168.1.254**.
2. If the server is configured for a password, enter it at the prompt.



Initial login will not require a password. The password requirement can be configured using the web server (see “Password” on page 17).

The initial view of the web server shows the status screen with all system devices.

The web server page has three areas: the header, page list for navigation, and information/configuration screen.

The screenshot shows the Phoenix Contact web server interface. The browser address bar displays 192.168.1.254. The page is divided into three main sections:

- Header:** Contains system information such as IP address (192.168.1.254), MAC address (9C:B2:06:00:0A:36), System uptime (0 days, 0:37:06), Temperature (38°C), System time (1-Jan-2010 0:37:06), Company, and Country.
- Page list:** A vertical navigation menu on the left side with links for Status, System log, ProfiTrace, Live list, Statistics, Channel list, Message recording, Network event log, Event config, Tag-name config, Profibus Modules, Oscilloscope images, Oscilloscope errors, Barograph images, PA measurements, Oscilloscope config, Configuration (General config, Network config, IP config, Password config, E-mail account config, Device management, Output control config, User message), and a Login button.
- Information/Configuration:** The main content area showing a 'Status' table and a 'Connected clients' table.

Status Table:

Slot	Status	Module	Vendor	Serial #	Hw Rev
0	OK	Head Station Type 1B	Phoenix Contact	002614	V1.9
1	OK	1_Channel RG485 Repeater Type 1	Phoenix Contact	001958	V1.7
2	OK	1_Channel PA-coupler 500mA Type 1	Phoenix Contact	000761	V1.4

Connected clients Table:

Connected clients	Service
192.168.1.100	WEB (port 80)

Figure 2-1 Web server page construction

- Header: This provides general information about the device to which the web server is connected.
- Information/configuration: This section shows detailed information based on the page selected. Some fields are editable, and some are for informational purposes only. Editable fields can be boxes for text or numbers, check boxes to select or turn on an item, or drop-down menus to select from a predetermined list of options. Links to other sections of the web server are also available. These are typically indicated by underlined blue text. Clicking on an image of another device may also take you to that device.
- Page list: The list of available pages is determined by the capability of the connected device. Not all pages are available for all devices.

2.2 Status

2.2.1 System status

The “Status” page appears upon login. The page gives an overview of the attached modules, with descriptions, serial numbers, and version numbers. Modules can be installed and removed during operation. Any changes in the modules will be immediately visible on the “Status” page.

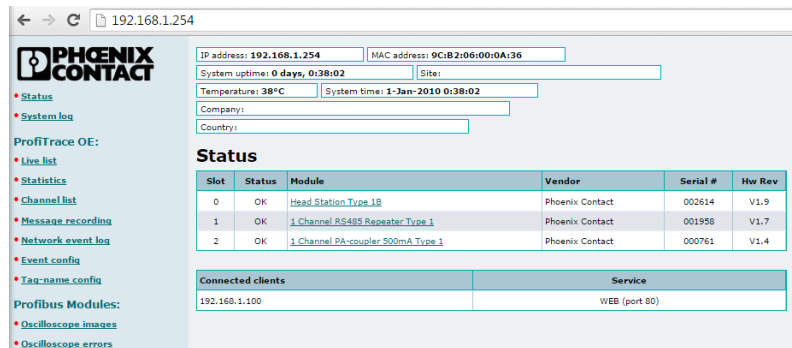


Figure 2-2 “Status” page

The top of the “Status” page displays network and site information in the header. A custom user message can be displayed (see “General configuration” on page 15).

2.2.2 Module status

Each name in the list of connected modules is a link that opens the status page for that particular module.

The screenshot shows the Phoenix Contact web interface. The browser address bar displays '192.168.1.254'. The page header includes the Phoenix Contact logo and navigation links such as 'Status', 'System log', 'ProfITrace OE:', 'Live list', 'Statistics', 'Channel list', 'Message recording', 'Network event log', 'Event config', 'Tag-name config', 'Profibus Modules:', 'Oscilloscope images', 'Oscilloscope errors', 'Barograph images', 'DA measurements', 'Oscilloscope config', 'Configuration:', 'General config', 'Network config', 'IP config', 'Password config', 'E-mail account config', 'Device management', 'Output control config', and 'User message'. A 'Not logged in. Login' link is also present.

The main content area is titled 'Head station status' and contains a table with the following data:

Head station info	
Vendor:	Phoenix Contact
Module type:	Head Station Type 1B
Serial number:	002614
Software revision:	V1.282
Hardware revision:	V1.9
MAC address:	9C:B2:06:00:0A:36
IP address:	192.168.1.254
Device name:	
Power supply 1:	● Connected
Power supply 2:	● Not connected
Micro SD-card present:	Yes
Micro SD-card capacity:	Total: 976.63 MB (free: 966.41 MB, used: 10.22 MB)
Current consumption (ref: 5.75V):	0.67A @ 5.74V
Temperature:	39°C
Uptime:	0 days, 0:39:04
Attached modules:	2
System status:	OK
I/O status:	OK

Figure 2-3 Module status showing “Head station status” page

2.3 System log

The “System log” page displays system-level events with a date and time stamp.

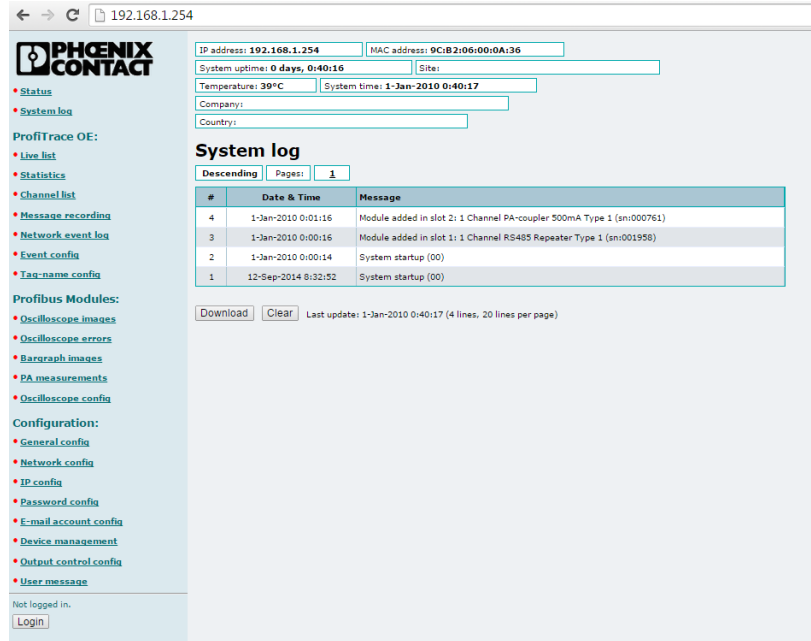


Figure 2-4 “System log” page

The “System log” page will update when the page is being viewed. If power is removed from the FB-HS..., the system log is saved. The system log is not editable.



A SecureDigital® (SD) card must be installed in the SD card slot for the system log to function.

Click the “Download” button to save the system log as a .txt file on the SecureDigital® (SD) card.

The system log will continue to save events until it runs out of memory, which is approximately 1000 events. At that point, the oldest events are overwritten. The system log can also be cleared. Click the “Clear” button to delete all currently saved events.

3 Configuration

3.1 General configuration

The basic settings are customized on the “General configuration” page. For optimal use of ProfiTrace OE, it is important that the time is synchronized and the site info is sufficiently filled in. If the system is connected to the Internet or a local NTP server, use the NTP server synchronization for automatic date and time update. If the system clock differs more than ten seconds from the NTP clock, a line is added to the system log.

The automatic time update occurs when the set interval has passed. The maximum interval that can be set is 1440 minutes, which corresponds to 24 hours.



Note that there is no option for Daylight Saving Time (DST) as this is typically not used in factory automation. When an NTP server is used, the time is always assumed to be standard time.

The screenshot shows the 'General configuration' page for a Phoenix Contact device. The browser address bar shows '192.168.1.254'. The page header includes the Phoenix Contact logo and system status information: IP address: 192.168.1.254, MAC address: 9C:B2:06:00:0A:36, System uptime: 0 days, 0:47:03, Site: [empty], Temperature: 39°C, System time: 1-Jan-2010 0:47:03, Company: [empty], and Country: [empty].

The main content area is titled 'General configuration' and contains several sections:

- Date & time synchronization:** Includes fields for PC time (17-Apr-2015 14:37:43) and Time (1-Jan-2010 0:47:03), a 'Sync now' button, and a 'Set time manually' section with date (1-1-2010) and time (0:46:59) fields, and a 'Set now' button. There is also a 'Use NTP Server' section with an 'Interval (min): 60' field and a 'Server: 0.europe.pool.ntp.org' dropdown.
- Date & time settings:** Includes 'Time zone: GMT +0' and 'Time display format: 24H' dropdowns.
- Site info:** Includes fields for Company, Country, Site name, Device name, and Contact.
- Display:** Includes 'Automatic refresh: [checked]', 'Update interval (seconds): 1', 'Website start page: Main status', and 'Website preferred network: 1 (Network 1)'.
- Language:** Includes 'Preferred language: English' and 'Language status: Current language is English'.

The left sidebar contains a navigation menu with categories like Profibus Modules, Configuration, and User message.

Figure 3-1 “General configuration” page

Set the “Update interval (seconds)” field to match the bandwidth of the network. The default is 1 second. If the bandwidth is limited, it is recommended to increase this time or uncheck the “Automatic refresh” box.

Click the “Website start page” drop-down menu to select the initial page displayed when browsing to the Head Station IP address. The options are:

- Main Status

- System Log
- Live List
- Statistics
- Channel list
- Message Recording
- Network Event log

Click the “Website preferred network” drop-down menu to select the initial network viewed when first opening the web browser.

The interface language can be changed in the “Preferred language” drop-down menu.

3.2 Network

The “Network configuration” page configures the network names and the assignment of the repeater. For optimal use of ProfiTrace OE, it is important that correct and understandable network names are defined. The network names are used in multiple components: ProfiTrace Live List, event e-mails, message recording, etc.

Each of the four available Live Lists (using the FB-HSC module) can be individually set up to a different time-out. The default is five seconds. The time indicates how long a slave is displayed as green when communication to the master is lost. After the time expires it the device LED will turn yellow if it has no communication anymore.

The network assignment of the repeater modules is also displayed and can be adjusted if software settings are enabled. It is possible to assign a module to Network 1 to 4, or to disconnect it from the backplanes. This makes it possible to create a multiplexed system, or temporarily remove certain slaves from the PROFIBUS network.

DIP switch settings are always primary to software settings.

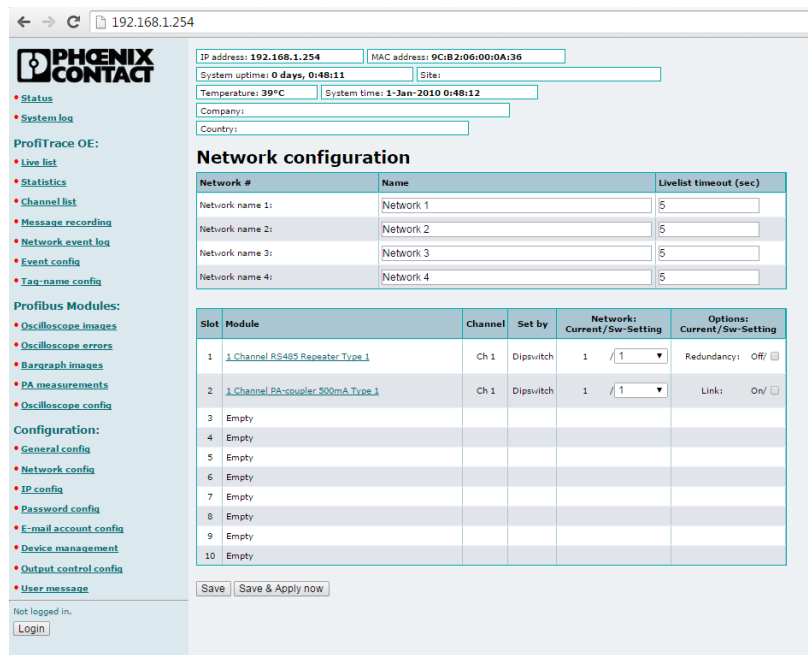


Figure 3-2 “Network configuration” page

3.3 IP address

The “IP configuration” page configures the IP address and network configuration for the Ethernet network.

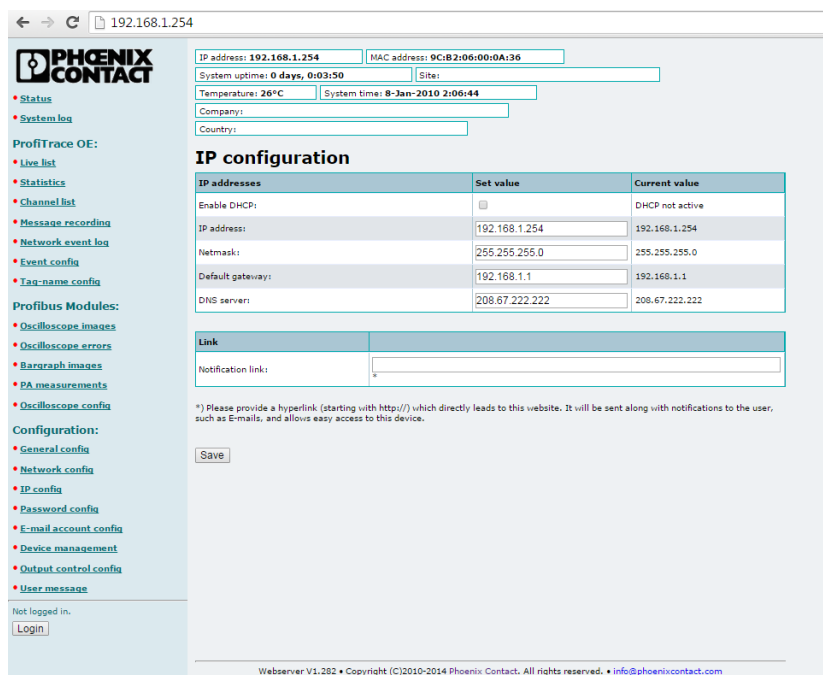


Figure 3-3 “IP configuration” page

In addition to the IP address, the netmask, default gateway, and DNS server may be manually entered.

A hyperlink may be entered to allow easy access to the device from any other device on the network.

3.4 Password



Passwords are not activated by default or when reset, ensuring that all menu options are accessible and configurable.

The FB-HS... supports two password levels:

- Admin password: Provides full access to the web server. This must be set before the user password can be set.
- User password: Limited to read-only information.

Table 3-1 Password-based access rights

Access to	Factory default administrative password only	User-configured administrative password	User-configured user password
Login required for web server access	No	No	Yes
Visit web pages	Yes	Yes	Yes
Clear system log	Yes	Yes	Yes
Restart the device using web server	Yes	Yes	Yes
Output control	Yes	Yes	Yes
Change password	Yes	Yes	No
Adjust any other configuration settings	Yes	Yes	No

Passwords must be between one and 16 characters.

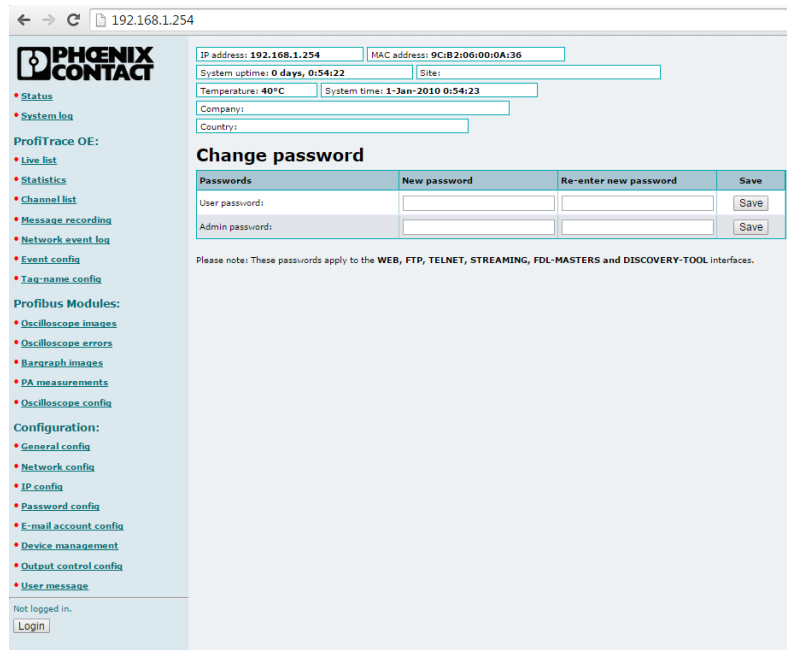


Figure 3-4 “Change password” page

Enter the desired password in the “New password” field and then again in the “Re-enter new password” field. Click the “Save” button. If they do not match, you will be prompted to enter them again.

If more than one person has access to the network, configure the Admin password. Follow recommended password best practices:

- Activate the passwords immediately after installation.
- Use different passwords at the administrator and user levels.

- Never share passwords with anyone.
- Always use strong passwords.
- Change passwords immediately if they may have been compromised.
- If a password must be written down, store it in a secure location and destroy it when it is no longer needed.
- Be careful when entering passwords. Some dialog boxes and browsers may offer to remember passwords. This is not recommended as it poses a potential security risk.

External protocols

For some external protocols, login information may be required. If prompted, you must enter a login name (User or Admin) and password. If no password has been configured, the FB-HS... will accept any password.

Clearing passwords

There are three ways to restore the system to the default passwords (none):

- On the “Password config” page, delete all characters from both password fields and then click the “Save” button. The Admin login is required.
- Click the “Restore factory defaults” button on the “Device management” page. The Admin login is required.
- Press the factory reset button on the FB-HS... module.

3.5 E-mail account

E-mail account information must be entered to receive notice of signal events by e-mail.



The “Event config” page (see “Events” on page 30) must also be configured to send event notifications by e-mail. Simply entering an e-mail address will not result in e-mail notifications.



The SMTP server must support unencrypted connections as the FB-HS... does not support encrypted connections, such as SSL/TLS. The DNS address must be modified according to the DNS addresses of your Internet provider.

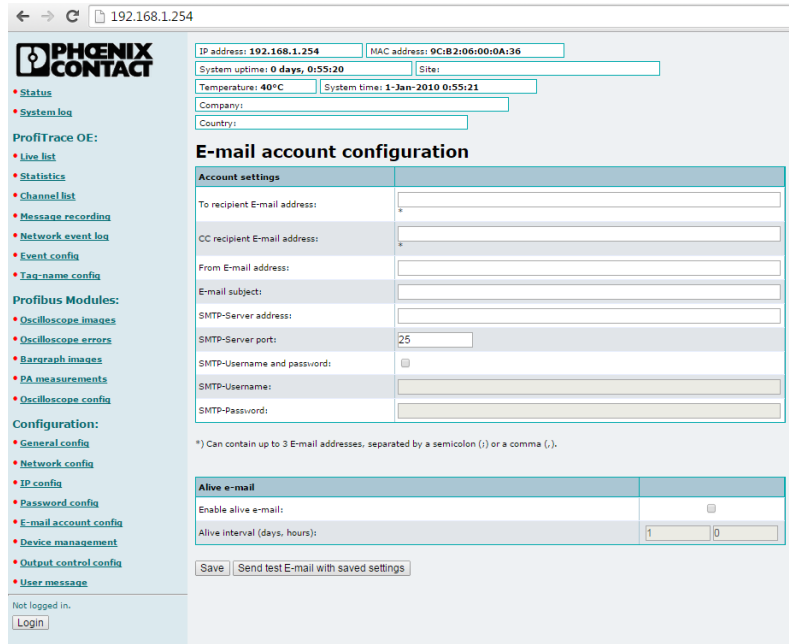


Figure 3-5 “E-mail account configuration” page

Enter the information in the appropriate fields. When finished, click the “Save” button. To verify correct setup, click the “Send test E-mail with saved settings” button.



Always click the “Save” button before sending a test e-mail.
 E-mail is not instantaneous. It may take a few minutes before you receive the e-mail. If you do not receive the e-mail, check to ensure that it was not blocked by a spam filter.

Alive e-mail

The FB-HS... can send a periodic e-mail to the configured e-mail address to verify that the system is still functioning when no events have been triggered.

The Alive e-mail can be configured to send an e-mail at any interval from one hour to one day.

E-mail troubleshooting

- Verify that the FB-HS... has access to the Internet.
- Compare the DNS settings with the requirements of the e-mail server being used.
- Make sure the e-mail server supports unsecured connections.
- Check the e-mail settings and generate a test e-mail. Enter only one e-mail address in the “To” field when troubleshooting.
- If the test e-mail works, verify that the “Event configuration” page is correctly enabled and an event has been triggered.

3.6 Device management

The “Device management” page allows a user to manage the location and transfer of the configuration.

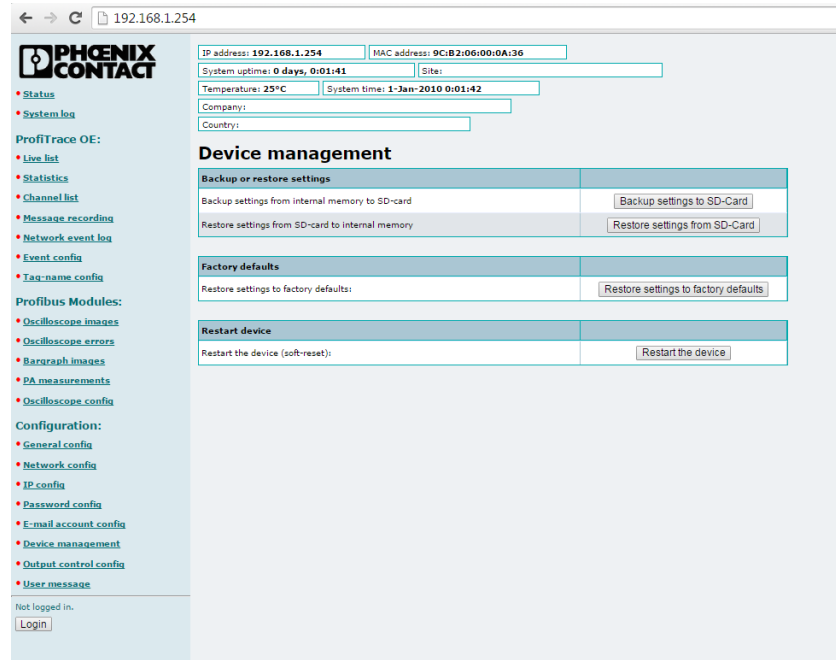


Figure 3-6 “Device management” page

The configuration can be transferred from the internal memory of the FB-HS... to a SecureDigital® (SD) card or transferred from the SD card to internal memory. Note that any existing configuration will be overwritten.

Click the “Restore settings to factory defaults” button to reset the FB-HS... to the factory defaults.

Click the “Restart the device” button to perform a soft restart, which does not require the need to physically reapply power.

3.7 Output control

The “Output control” page configures the alarm contacts.

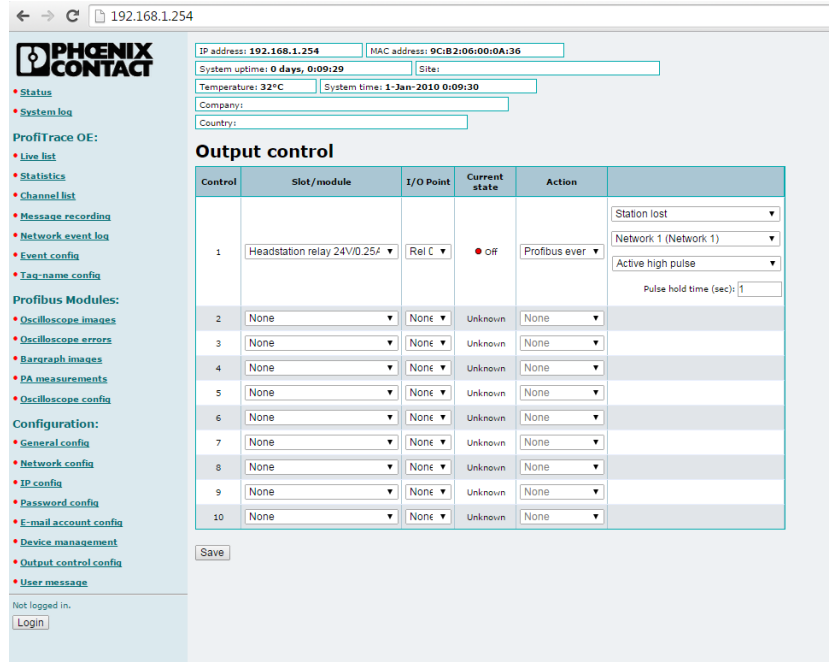


Figure 3-7 “Output control” page

The ten outputs are displayed in a table format, with each output having its own settings. Each column/field uses a drop-down menu for configuration of the specified output.

In the output number row, click the “Slot/module” drop-down arrow to select the desired head station module. The next column allows selection of the I/O point. The status of the specific I/O point is displayed as either On or Off.

In the “Action” column, select “Profibus event”, and then select the criteria required to trigger the event.

3.8 User message

A custom user message can be entered and viewed when logged into the FB-HS... "Status" page.

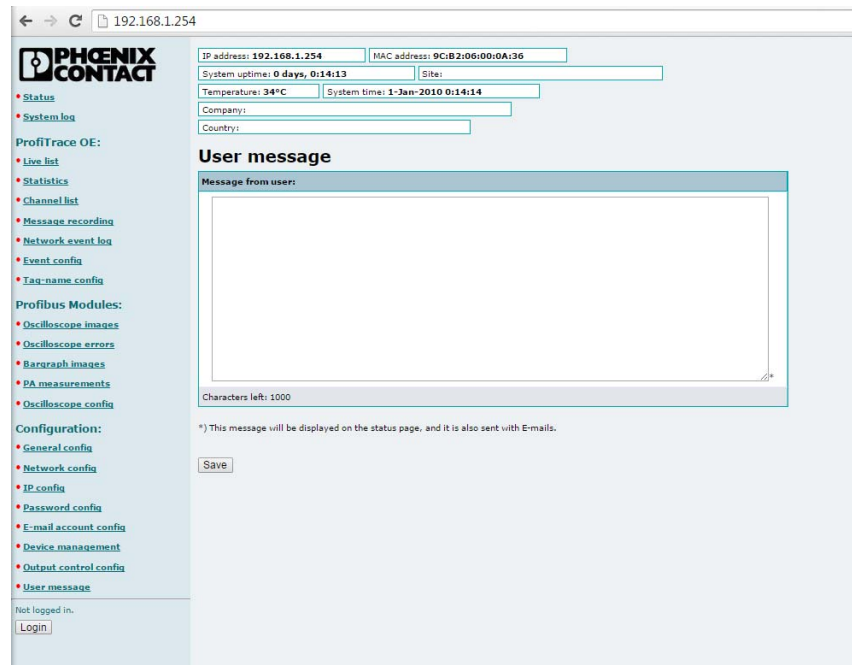


Figure 3-8 "User message" page

4 ProfiTrace OE

ProfiTrace OE is a web-based version of ProfiTrace 2 embedded within the FB-HS.... It offers the basic functionality of regular ProfiTrace 2, including; Live list, statistics, and message recording.

4.1 Live list

The “Live list” page displays a matrix that continuously lists all the available devices. A color code provides a quick, visible status of each device’s condition. The color codes are:

- Green: Device is in data exchange
- Yellow: Device is lost
- Red: Parameter fault
- Purple: Configuration fault
- No color: On the bus but not in data exchange

The “Live list” page can generate the product name of a device when a diagnostic message is captured (synchronized with the GSD library).



GSD files describes the capabilities of a device, and is shipped with each device. They can also be downloaded from the www.profibus.com website or from the device manufacturer’s website.

The “Display Legend” dialog box appears explaining the meaning of the colors in more detail.

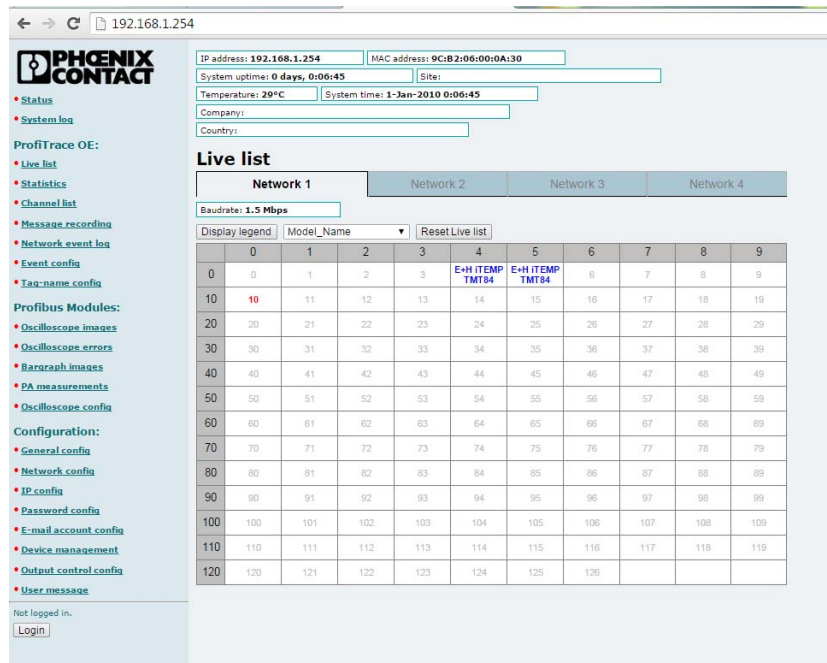


Figure 4-1 “Live list” page

4.1.1 GSD library

The GSD library provides information about each device. It is provided by a device manufacturer and is available from the vendor’s website.

Updating the GSD file library

As devices are developed and updated, the GSD file library may require updates for new devices. To update the GSD file library in the FB-HS... :



The transfer of GSD files to the FB-HS... is accomplished through the use of the SD card slot. Any PC used to download a GSD file must have the ability to read/write an SD card.

Transfer any new GSD files by copying them onto an SD card and inserting the SD card into the FB-HS... head station. When the head station is rebooted, the new GSD files will be recognized and replace any existing files.

4.2 Statistics

The “Statistics” page displays various data from the device that can be used to analyze the condition of a device. This page is typically used by a maintenance technician to look at things such as the number of retries, communication drops, diagnostic messages, etc.

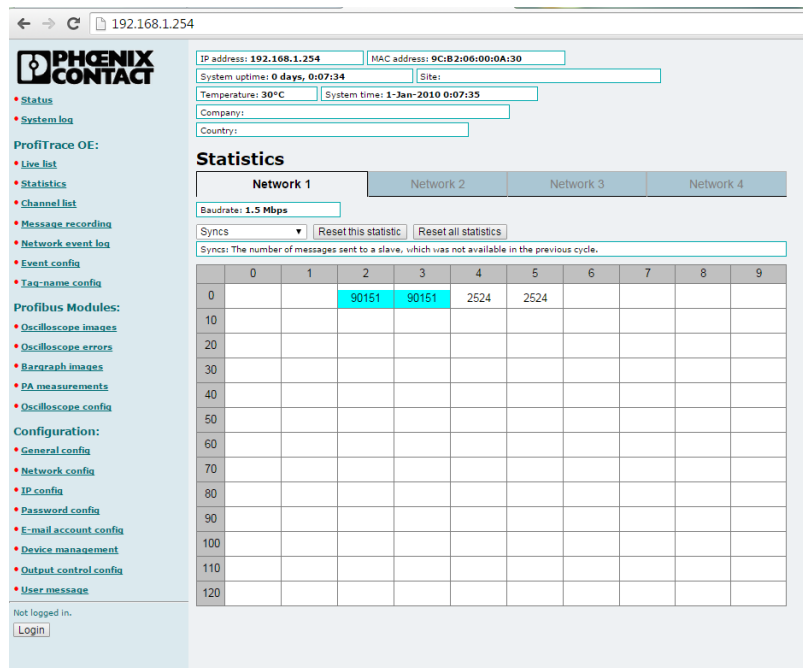


Figure 4-2 “Statistics” page

The “Statistics” page provides a quick view into the data without the need for a detailed examination of messages or difficult operations to ensure the quality of the installation.

4.3 Channel list

The “Device channel list” page provides a graphical view of all stations in the network. Similar to a logical topology scan, the page also shows the network connected to each station.

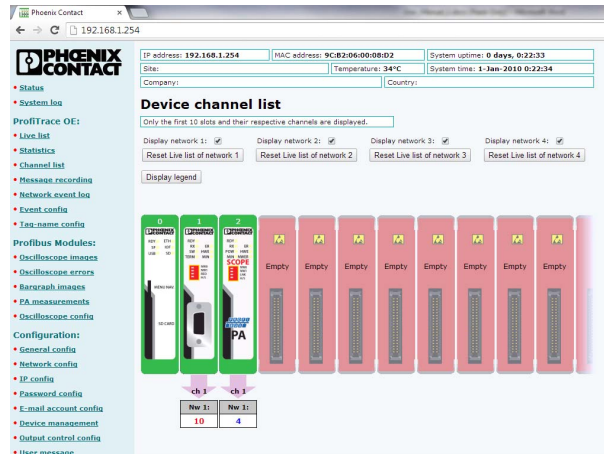


Figure 4-3 “Device channel list” page

4.4 Message recording

Messages can be triggered based on status changes and any diagnostic data that exceeds the user-set limits.

Because the FB-HS... is intended for permanent monitoring applications, it automatically starts recording a message when an event is detected. The following event automatically starts a message recording again.

When the unit is first purchased or reset to the defaults, it automatically triggers the “Lost” statistic. The user can change the settings during operation.

The recorded files can be opened with an offline ProfiTrace 2 (no license required).

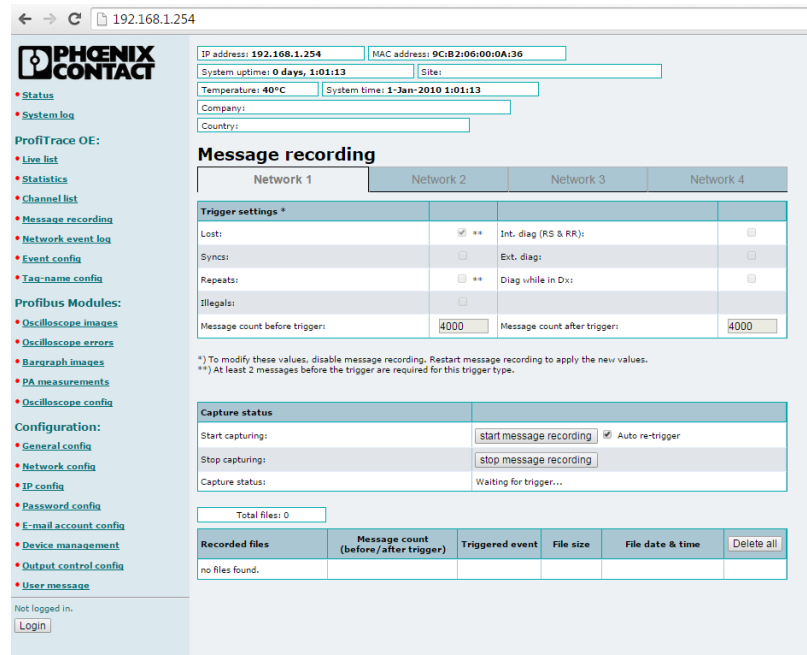


Figure 4-4 “Message recording” page

The file name is created using the MAC address of the FB-HS..., the network number, and a sequential number between 1 and 999.



The automatic triggering can generate 1000 Profitrace (.ptc) files per network. After 1000 files are generated, the next event deletes the oldest file, replacing it with the most recent event. The .ptc files are stored on the SD card.



The .ptc files can be opened with ProfiTrace 2.5.3 and higher.

4.5 Network events

The network event log shows all the processor activity of the head station and network and records any status changes. The event log can be viewed using a web browser.

The screenshot shows the Phoenix Contact ProfiTrace OE web interface. The browser address bar displays 192.168.1.254. The main content area is titled "Network event log" and is divided into four tabs: Network 1, Network 2, Network 3, and Network 4. The "Network 1" tab is active, showing a table of event logs. The table has three columns: #, Date & Time, and Message. The data rows are as follows:

#	Date & Time	Message
3	8-Jan-2010 2:03:06	System startup (00)
2	1-Jan-2010 0:00:14	System startup (00)
1	12-Sep-2014 0:32:52	System startup (00)

Below the table, there are "Download" and "Clear" buttons, and a status message: "Last update: 8-Jan-2010 2:14:14 (3 lines, 20 lines per page)". The left sidebar contains various navigation links under "ProfiTrace OE:" and "Profibus Modules:". The footer of the page reads: "Webserver V1.282 • Copyright (C)2010-2014 Phoenix Contact. All rights reserved. • info@phoenixcontact.com".

Figure 4-5 “Network event log” page

4.6 Events

The “Event configuration” page sets the events which are monitored and determines how the event information is distributed, for example, e-mail or log tracking.

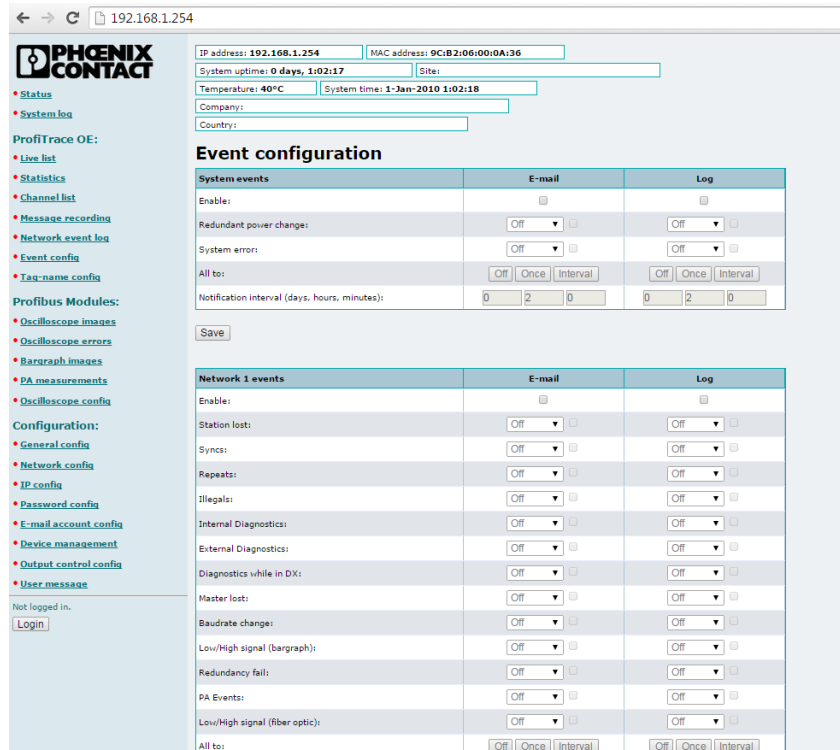


Figure 4-6 “Event configuration” page

To control the number of events monitored, each event can be individually set to **Off**, **Once**, or **Interval**. When set to **Interval**, the event is recorded once during the specified time. When the time is expired, the next occurrence of that event is recorded.

A check box allows each event to be independently configured to be either sent to an e-mail account or listed in the log file.

The Interval time can be set from one minute to 365 days.

Check boxes allow all events to be selected or deselected.

4.7 Tagging devices

To organize the devices in a network, every module and every station in every network can be tagged with a name on the “Tag-name configuration” page.

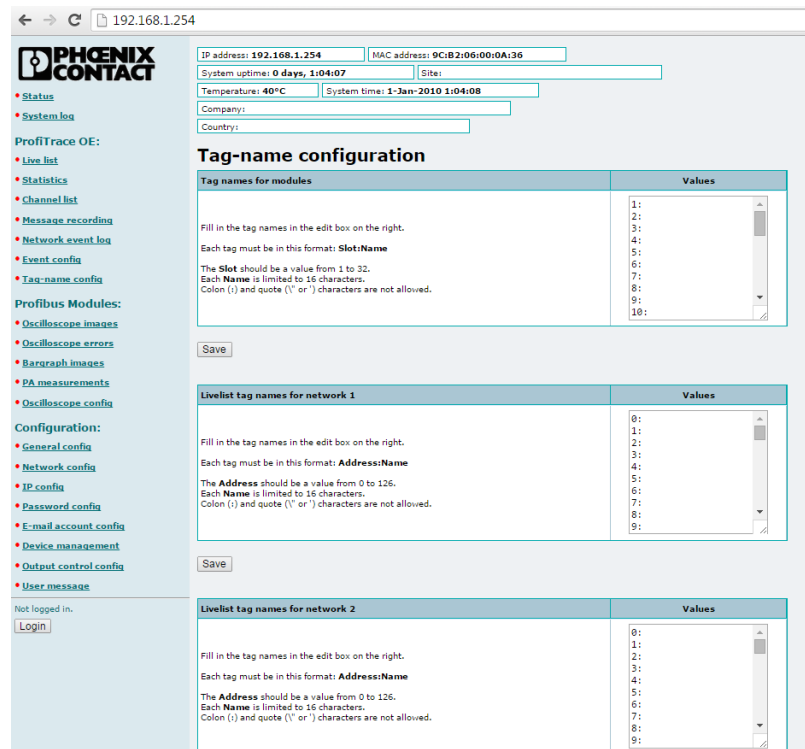


Figure 4-7 “Tag-name configuration” page

The first block of tag names is used to assign tags to the FB-HS... modules. Each tag must have the format **slot:name**, where slot is the slot number. The tag names are limited to 16 characters. The colon (:) and quote (' or ") characters cannot be used.

The second to the fifth block of tag names are used to assign tags to individual stations in each network. The tag names are visible in the “Channel list” page, if hovering over a module or station address. It is also possible to display the tag names on the “Live list” page.

Module tag names are also displayed in drop-down menus to modules and in tables on the following pages:

- Oscilloscope images
- Oscilloscope error images
- Oscilloscope configuration
- Bar graphs
- PA measurements
- Network configuration
- Output control configuration

5 PROFIBUS modules

The transparent FB-PA/SC coupler enables seamless high-speed integration to PROFIBUS PA. It powers the attached PROFIBUS PA devices and fully emulates them as PROFIBUS DP devices on the backplane. Adjusted bus parameters are not required and, therefore, suitable for all DCS and PLC systems, even when running on 12 Mbps networks.

The combined internal ProfiTrace and oscilloscope make this product extremely useful for remote maintenance over Ethernet. Jitter, noise, DC current, DC voltage, bar graph, and oscilloscope, it is all there and easy to access. The free CommDTM (available at phoenixcontact.com) allows access for asset management tools over Ethernet.

The FB-DP-RPTR coupler is able to carry nine PROFIBUS PA links and an RS-485 module. It can also be a customized mix of PROFIBUS PA modules with other communication modules. The FB-PA/SC coupler provides 500 mA current on a customizable bus voltage. The integrated PROFIBUS PA termination is automatically activated when the module works as a link or coupler. It is switched off in the monitoring mode.

It does not require configuration and operates the same way as regular PROFIBUS repeaters. In the web server, the behavior of the PROFIBUS PA side can be set, like retries (default 5) and the watchdog (default three seconds). This product can directly replace third-party non-Ex PA coupler/links and can be used as a monitor behind existing third-party non-Ex PA couplers.



The FB-HS..., FB-DP-RPTR, FB-DP-RPTR/SC, and FB-PA/SC modules are not suitable for use in Ex environments unless a barrier is used between the PA module and the Ex zone. An approved external fieldbus power supply must also be used to power a PROFIBUS PA segment in an Ex zone.

5.1 Oscilloscope images

The FB-HSB and FB-HSC head stations and FB.../SC modules have an integrated oscilloscope to measure the signal quality of the telegrams. The oscilloscope has an interface with the web server to display the signals from the devices connected to its channel. After opening the web page, all oscilloscope signals are displayed and updated live.

The benefits of the Phoenix Contact devices with a built-in oscilloscope are:

- You do not have to touch the installation.
- Works automatically.
- Oscilloscope data is never mistaken with the wrong segment.
- No probe wiring.
- No spur lines.

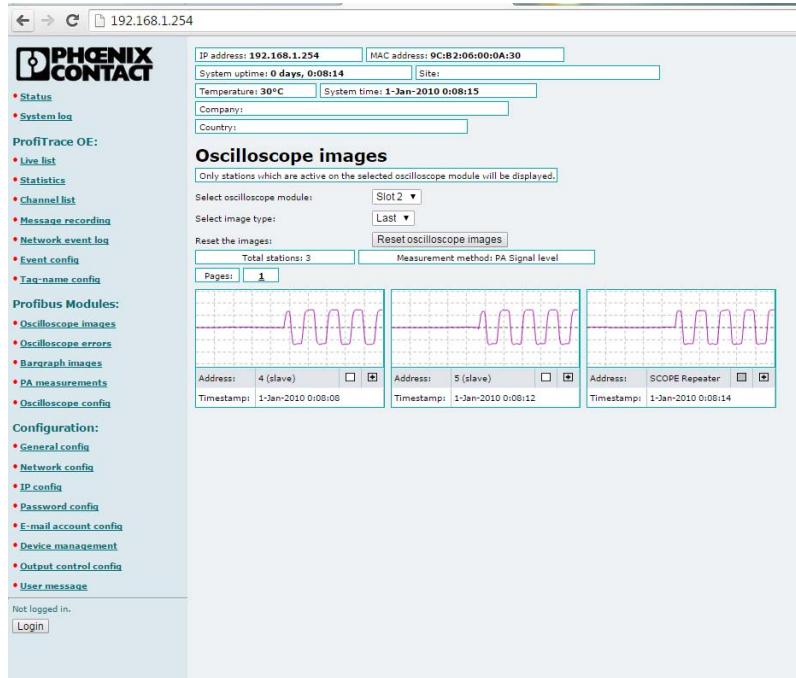


Figure 5-1 "Oscilloscope images" page

Click on the oscilloscope waveform image of a device to display the device's signals in a new page. This opens/creates a new web page.



The FB-HSB and FB-HSC head stations and FB.../SC modules are limited to differential measurements.

5.2 Oscilloscope errors

Whenever an illegal message is seen on the PROFIBUS network, and if the message occurred on a module with an integrated scope, an image of the signal error will be displayed. It captures the exact moment of a communication failure when troubleshooting is necessary. This makes it easy to prove out EMC issues and also issues with cabling.

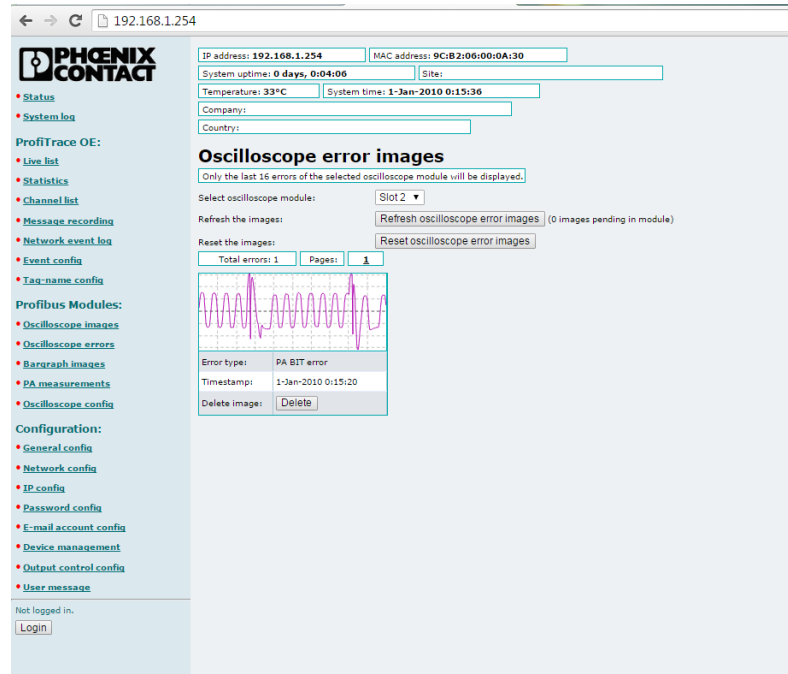


Figure 5-2 “Oscilloscope error images” page

Up to 16 error messages can be stored in the head station memory. If there are more than 16 error images, click the “Refresh error images” button to update the view.

5.3 Bar graphs

The “Bargraph images” page illustrates the average signal strength from all available connected devices behind a specific SCOPE repeater. It is a helpful utility to get an impression of the overall signal quality of the network.

The average amplitude should be around 5 V for PROFIBUS DP networks and between 0.25 and 1 V for PROFIBUS PA networks. When there are bus problems, the graph displays different voltage levels and the colors of the bars change. The bar graph feature is also helpful for detecting issues with segment termination.

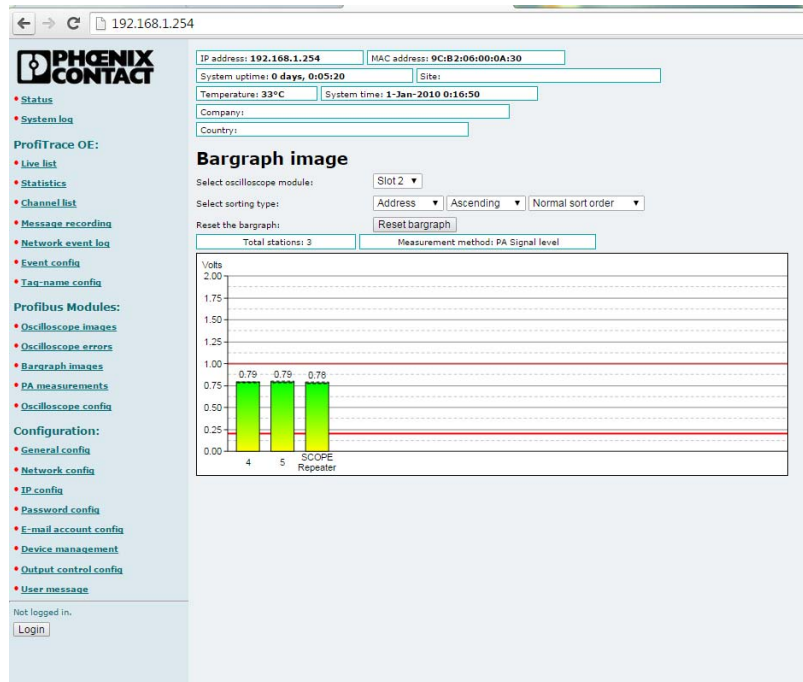


Figure 5-3 “Bargraph image” page

5.4 PA measurements

The PA measurements page shows a static scope image; it is not an actual scope measurement. The blue arrow illustrates the measured value of the amplitude and the jitter. The values are displayed in the corresponding boxes.

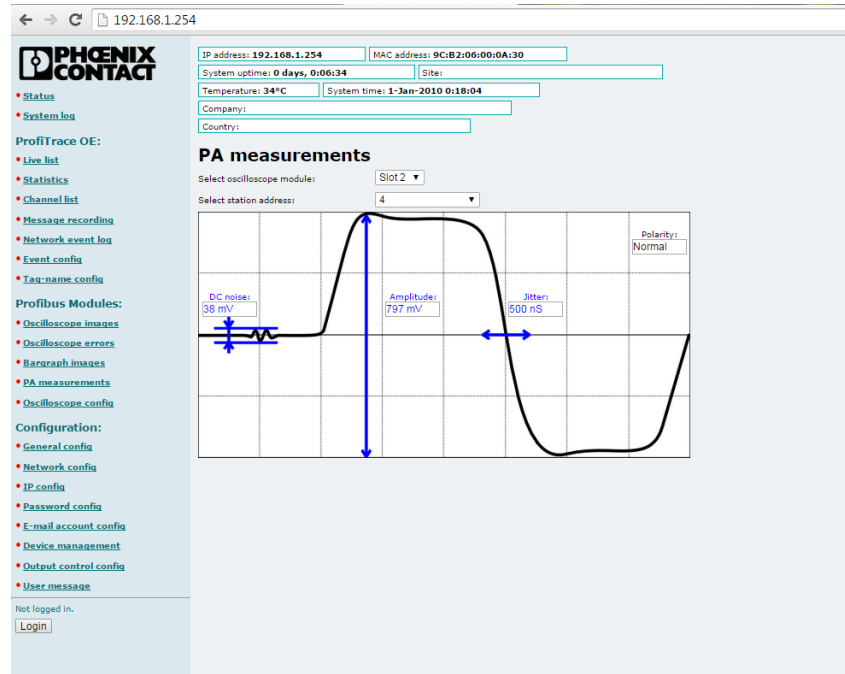


Figure 5-4 “Bargraph image” page

Amplitude

The amplitude is the difference between the highest and the lowest measured value of the AC signal (the actual data). The displayed result is measured by taking samples from all the bits in a telegram. Not the entire bit is measured, but only a small part to filter out irregularities such as overshoots.

Jitter

Jitter is described as “zero-crossing point deviation,” which means that the changing of a bit does not occur at the intended time. This is acceptable within the limit of 3200 ns, positive or negative. Causes for high jitter times can be wiring mistakes, EMI, cable cross talk, or device problems.

Polarity

This is not the polarity of the bus wiring, but the internal communication signal. In some products it is possible that the polarity is switched. This does not affect the communication.

DC noise

The DC noise indicates how much the voltage of the signal varies. If the noise is too high, it can influence the communication; it should not exceed 100 mV.

5.5 Oscilloscope configuration

The “Oscilloscope” page allows customizing of the oscilloscope functions.

The screenshot shows the 'Oscilloscope configuration' page in a web browser. The address bar shows '192.168.1.254'. The page header includes the Phoenix Contact logo and system status: IP address: 192.168.1.254, MAC address: 9C:B2:06:00:0A:30, System uptime: 1 days, 20:31:57, Site: [blank], Temperature: 39°C, System time: 2-Jan-2010 20:43:28, Company: [blank], Country: [blank].

The left sidebar contains navigation menus for Status, ProfitTrace OE, Profibus Modules, and Configuration.

The main content area is titled 'Oscilloscope configuration' and contains several sections:

- General oscilloscope settings:**
 - Maximum number of images per page: 9
 - Line color: Purple
 - Error images buffer type: Ring buffer
- 1 Channel RS485 SCOPE Repeater Type 1:**
 - Termination min level (mV): 700
 - Termination max level (mV): 1300
 - Bargraph OK limit (mV): 2500
- Other SCOPE Repeater settings (these settings will be saved in the modules themselves):**

Slot	Module	Ch.	Variable	Current value	Lower limit	Upper limit
			Bargraph level	min: 782 mV max: 804 mV	200	1000
			Jitter level	875 nS		3200
2	1 Channel PA-coupler 500mA Type 1	Ch1	DC voltage	23490 mV	9000	32000
			DC noise	38 mV		100
			DC current	35 mA		475

At the bottom of the configuration area is a 'Save' button. The footer of the page reads: 'Webserver V1.282 • Copyright (C)2010-2014 Phoenix Contact. All rights reserved. • info@phoenixcontact.com'.

Figure 5-5 “Oscilloscope configuration” page

The termination voltage limits can be adjusted, as well as the limits for PA segment alarming.

5.6 ProfiTrace statistics summary

Table 5-1 contains a description of the items listed in the statistics and events.

Table 5-1 Summary of statistics and events monitored by ProfiTrace OE

Statistics	Description	Critical
Lost	How many times a device in data exchange fails to respond after the maximum retries have been reached. Lost is retrIGGERED when the device recovers back to data exchange and fails to respond again. <ul style="list-style-type: none"> – The “Live list” page could indicate a yellow-colored address (after time-out). 	Yes
Syncs	Attempts of the master to contact a device for the first time or establish a communication relationship. This occurs in most cases after station lost, device unavailability or startup of the master. In the statistics view, these values add up relatively quick. <ul style="list-style-type: none"> – Some DCS systems read diagnostics all the time with Syncs ON. – The “Live list” page could indicate a yellow colored address. 	Yes, in most cases
Repeats Total	Attempt of the master to get a response from an unanswered telegram. The response did not come or has content errors. The maximum amount of repeats a master attempts can be customized in the master. <ul style="list-style-type: none"> – When the retries have reached the limit, the master goes to the Syncs state. 	Yes
Repeats Max (worst sequence)	This value represents the highest amount of retries that were attempted on this specific device in one cycle. <ul style="list-style-type: none"> – This value will never get higher than the retry value that has been set up in the master. 	Yes
Illegal Responses	The response to a master request telegram contains framing errors (parity error, wrong FCS, SD error, etc.). This mostly happens with EMC and cabling problems. <ul style="list-style-type: none"> – When this statistic adds up relatively quick, it could also be a double device address. 	Yes
Internal Diag	Negative responses at the lowest telegram level (Layer 2: FDL) are rare. In the telegram recording you will see SD1 telegrams with, for example, an RS (Reject Service) or RR (Reject Resources). Examples of situations where this occurs: <ul style="list-style-type: none"> – DP-V1 connections to DP-V0 devices. – Watchdog has run out on a DP device and the master sends a Data Exchange output telegram. – Non-certified DP devices that do not support a specific service/command or cannot handle a command in time. 	No
External Diag	All responses from Get Diagnostics requests from all masters.	No

Table 5-1 Summary of statistics and events monitored by ProfiTrace OE

Statistics	Description	Critical
Diag while in DX	<p>Only responses to Get Diagnostics requests from the master that controls this slave (primary class 1 master).</p> <ul style="list-style-type: none"> - When the first two bytes of the diagnostic content contain 08 0C or 08 04, a red indicator blinks in the left corner of the device on the "Live list" page (critical content). 	Yes, in most cases
Master lost	One of the masters is not active after getting the token; it is not responding anymore. Note that this also happens when a Class 2 DP-V1 master is disabled.	Yes, in most cases
Baud rate change	The detected baud rate of the PROFIBUS network has been changed.	Yes (in most cases)
Low/High signal (Bar graph)	The amplitude of at least one station is too low (in PROFIBUS DP and PA networks) or too high (in PROFIBUS PA networks only).	Yes
Redundancy Failure	One of the redundant cables has failed.	No
PA signal and levels	PROFIBUS PA values, such as jitter, DC voltage, or DC noise out of range.	Yes

6 CommDTM

The FB-HS... head station provides a fully functional gateway between any Windows platform and field devices via a CommDTM. This enables the FB-HS... head station and attached modules to function as a real asset management tool. Currently, FDT 1.2 frame applications are supported, such as PACTware and E+H FieldCare. During interaction with the CommDTM, all FB-HS... head station functions can be used simultaneously (web-based monitoring, oscilloscope, OPC, and alarms via e-mail).

6.1 Setting up the PCD server

1. Download the PCD server application (available at PhoenixContact.com). Unzip the file or navigate to and double-click the file to start the executable.
2. Right-click the “PCD” icon in the notification area and click the “Show” option.

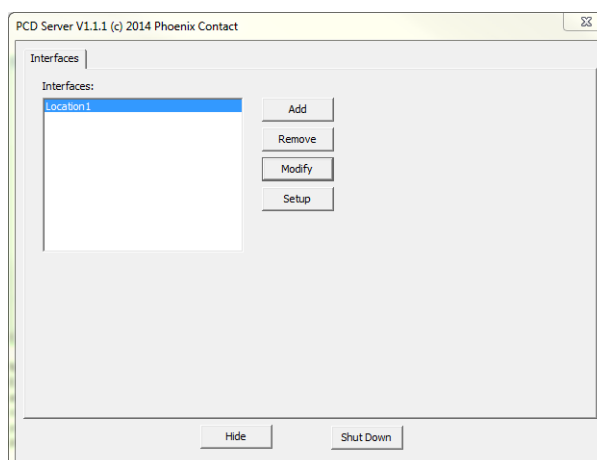


Figure 6-1 “PCD/Interfaces” page

3. Click the “Modify” button to open the “Interface Settings” dialog box.
 - Type a name for the device in the “Interface Name” field.
 - Click the “Driver” drop-down menu and select a driver.



It is recommended that the most recent driver be selected.

- The “Serial Nr.” field can remain empty.
- Click the “OK” button to close the dialog box.

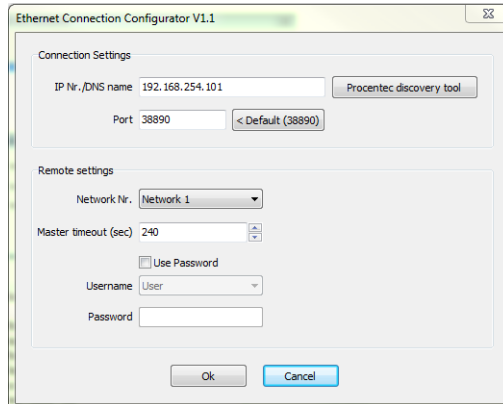


Figure 6-2 “Ethernet Connection Configurator” dialog box

4. Click the “Setup” button to open the “Ethernet Connection Configurator” dialog box.
 - Enter the IP address of the FB-HS... module in the “IP Nr./DNS name” field.
 - Enter the port number in the “Port” field.
 - Click the “Network Nr.” drop-down menu and click the name of the desired network.
 - Populate the “Username” and “Password” fields, if your network requires it.
- Click the “OK” button to close the dialog box

6.2 Creating a project using FdtCONTAINER

Adding devices

Start the FDT manager and create or load a project. The vendor-independent application FdtCONTAINER (available at <http://mm-software.com/en/oem-fdtcontainer-application>) is used in the example below. Refer to the manual of your FDT manager for details.

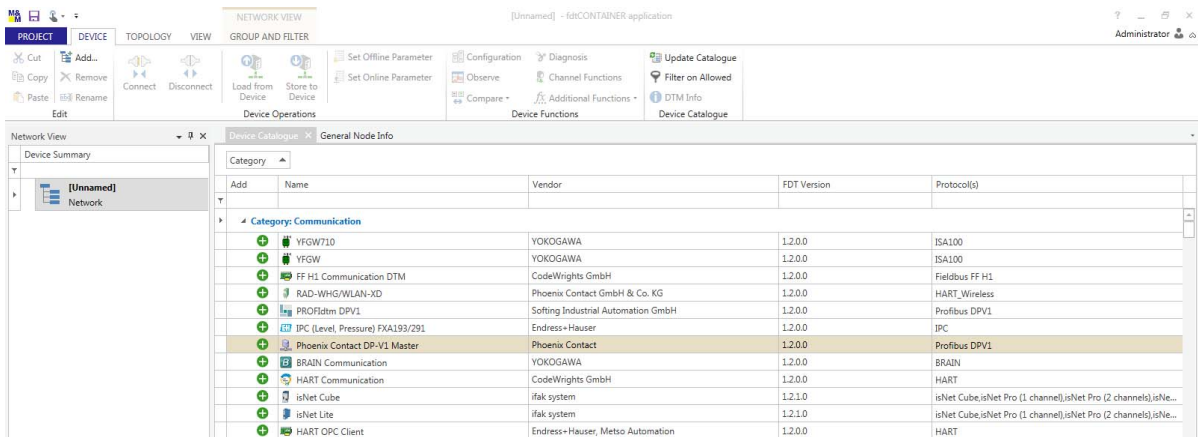


Figure 6-3 “CommDTM/Device” dialog box

1. Click the “Device” tab.
2. Click the “Add...” button. Select **Phoenix Contact DP-V1 Master** in the device list.

- Click the “OK” button, and then double-click **Phoenix Contact DP-V1 Master** to open the “Bus Parameter” page.

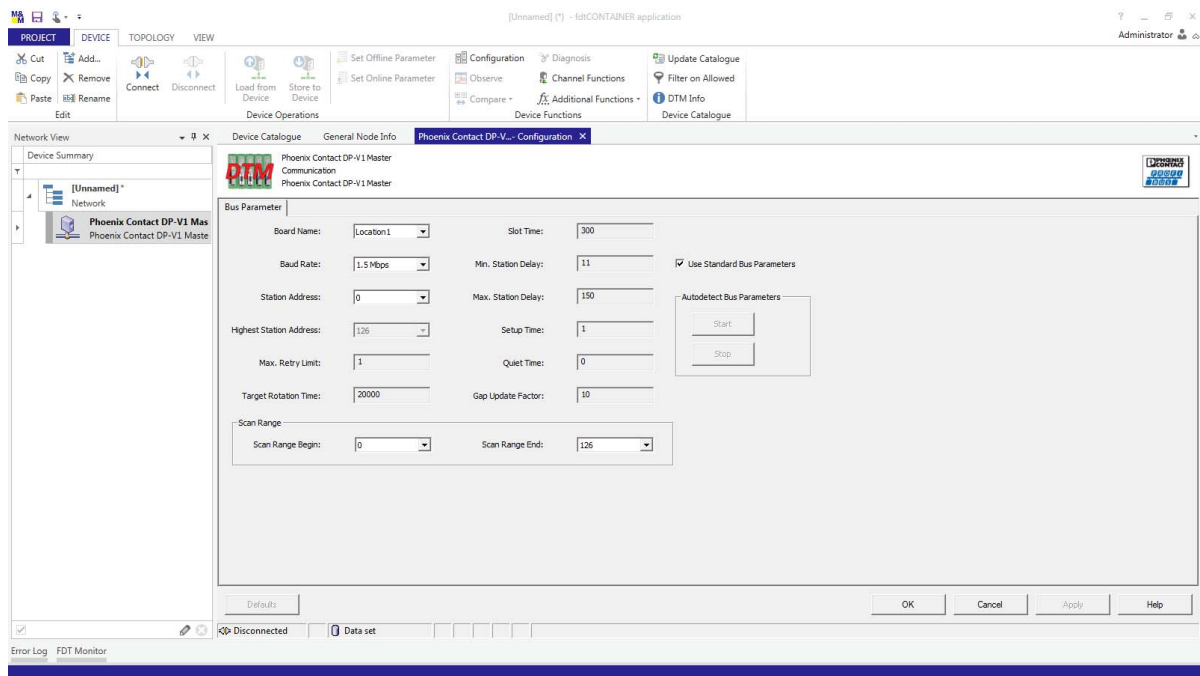


Figure 6-4 FdtCONTAINER “Parameters” dialog box

- In the “Device Summary” list, right-click the Phoenix Contact DP-V1 master and click “Parameters” from the context menu.
- Enter the correct parameters or select the “Start” button to initiate the “Autodetect Bus Parameters” process.
- Click the “OK” button.

The FB-HS... is now set up as a DP-V1 master. To activate the connection to field devices, right-click the Phoenix Contact DP-V1 master, and click the “Connect” option.

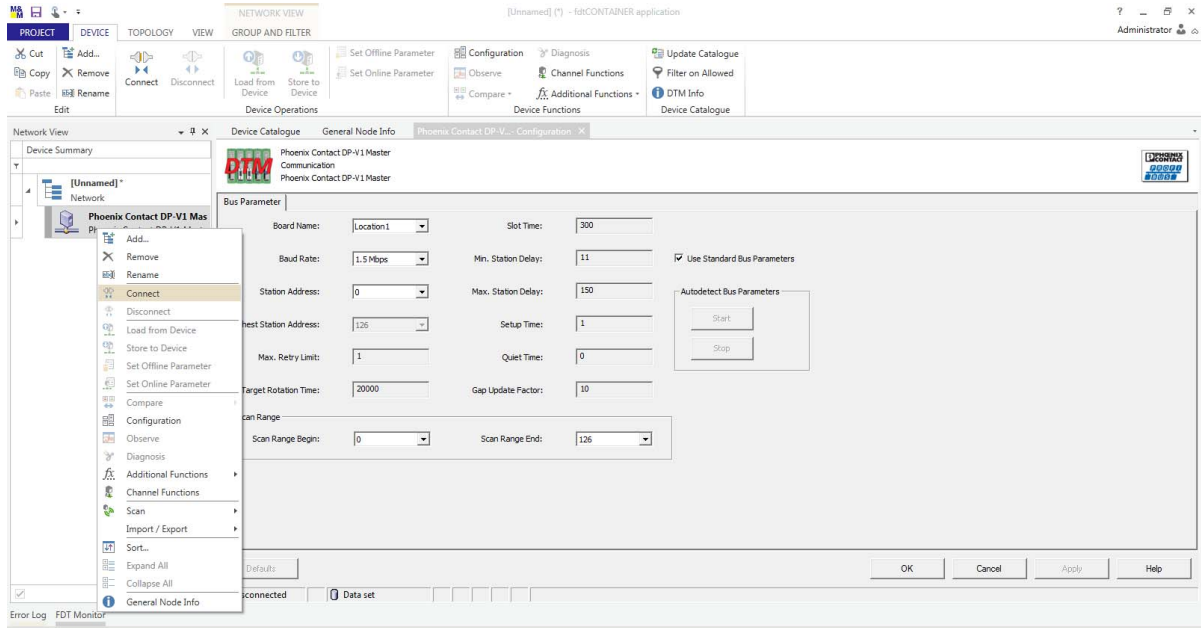


Figure 6-5 Connecting to devices

A communication session is now active between the software to the device connected on the network.

Network scan

Once communication is established with the FB-HS... head station, the network will now be able to scan for all the connected field devices on the network. To initiate the scan, right-click the Phoenix Contact DP-V1 master and click the “Scan/Create” option. The head station will scan the entire PROFIBUS network for active PROFIBUS DP and PROFIBUS PA devices.

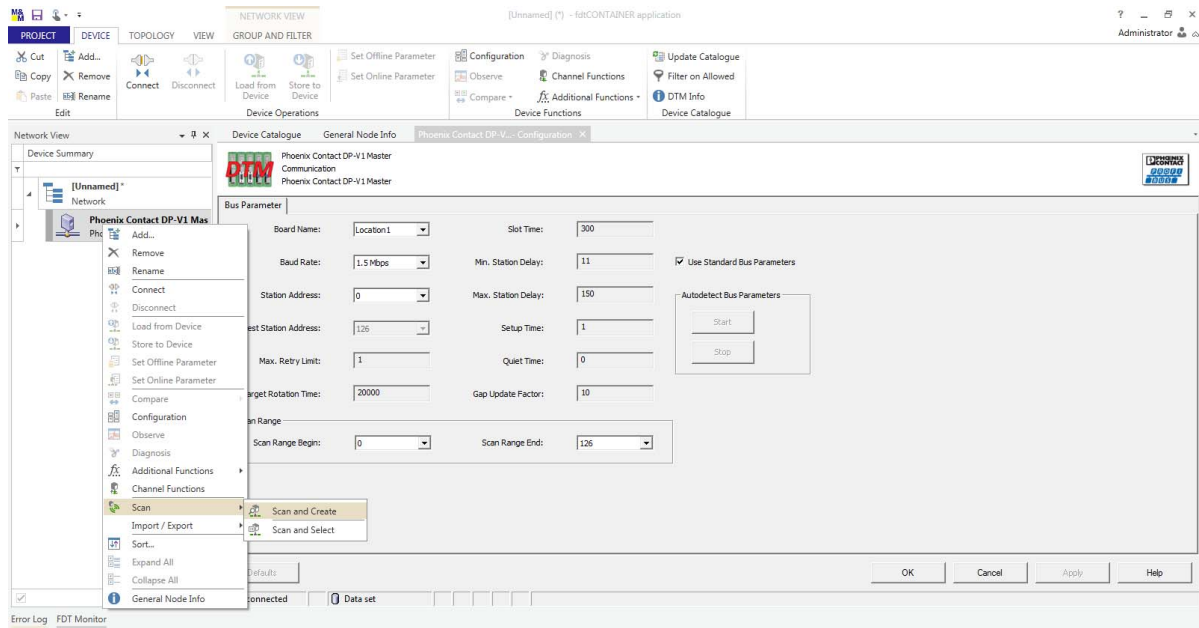


Figure 6-6 Network scan

A Technical appendix

A 1 Bus parameters

Some adjustments to the bus parameters in the PLC or DCS need to be made. Follow the table below for your master project:

Table A-1 Bus parameters for PROFIBUS/PA (in bit times)

Baud rate	Tslot (only DX)	Max TSDR (only DX)	Tslot (with DP-V1)	Max TSDR (with DP-V1)
9.6 - 19.2 kbps	330	145	1500	150
45.45 kbps	640	480	640	480
93.75 kbps	2500	1000	2500	1000
187.5 kbps	3200	1500	14000	1400
500 kbps	8500	4000	38000	3700
1.5 Mbps	25500	11500	110000	11000

These are worst-case values. It is recommended to examine the timing of your installation and decrease the bus parameters to a suitable value for your network.

In small applications it is required to set a value for the Tset parameter. Usually a value of 95 is sufficient.

Because of the longer Slot Time and MaxTSDR, it is also recommended to set the Watchdog to at least 2 seconds. This is normal in PA networks.

In coupler mode, the module has no bus address on either side. When configuring the PA network there is no restriction in the use of addresses for field devices, although most configuration tools do not allow addresses 0, 1, and 2.

A 2 Current consumption calculations

The FB-PA/SC module provides a maximum of 500 mA to the PROFIBUS/PA trunk. The total current consumption of all slaves on this trunk cannot exceed 500 mA. The PROFIBUS/PA module consumes 10 mA. At least one FDE (Fault Disconnection Electronics, stated in the manual of the PA device) should also be calculated. The calculation for the current consumption is as follows:

$$I_{SEG} = I_{B0} + I_{B1} + \dots + I_{BN} + I_{FDE}$$

where

I_{SEG} = Total current in a segment

I_{BN} = Basic current of devices

I_{FDE} = Current of the Fault Disconnection Electronics

A 3 Voltage at the end of the segment

The resistance of the cable causes a lower voltage at the end of the cable. At least 9 V should be available for the last device at the end of the cable. The following calculation is a worst-case scenario where all devices are connected at the end of the cable:

$$U_B = U_S - (I_{SEG} \times R_{CABLE} \times L_{SEG})$$

where

- U_B = Bus voltage at the last device (V)
- U_S = Voltage of the segment coupler (V)
- I_{SEG} = Total current in a segment (A)
- R_{CABLE} = Resistance per unit length of the cable (Ω/km)
- L_{SEG} = Length of all cables in the segment, including stubs (km)
- $U_B >$ minimal specified operating voltage of the last device

A 4 Directories and files

The following directories are standardized for the FB-HS... modules and are, in most cases, located on the SD card:

Table A-2 SD card directory

Directories	Description
/Busmon	ProfiTrace message-recoding files
/Log	Log files
/Doc	Contains the web server download page

Table A-3 File extensions

Files and extensions	Description
Journal.dat	System file (Do not delete or remove)
gsd.bin	File with GSD information for the Live list
settings.ini	Head station settings (IP address, name, location, etc.)
.ptc	ProfiTrace OE message-recoding files located in the "Busmon" directory
.pkg	Firmware files
.csv	Log files located in the "Log" directory

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