

Industriefunkuhren



Technical Manual

Network Management Server

Model 7052RC

ENGLISH

Version: 01.00 – 29.01.2018

SET

Valid for Version: **01.xx**

IMAGE

Version: **01.xx**

FIRMWARE

Version: **01.xx**

Version Numbers (Firmware / Description)

THE TERM **SET** DEFINES THE FIXED RELATIONSHIP BETWEEN THE IMAGE VERSION AND THE ASSOCIATED H8 FIRMWARE VERSION.

THE FIRST TWO DIGITS OF THE TECHNICAL DESCRIPTION VERSION NUMBER, THE **SET** VERSION AND THE IMAGE VERSION **MUST BE THE SAME!** THEY DESIGNATE THE SHARED FUNCTIONAL IDENTITY BETWEEN DEVICE, SOFTWARE AND TECHNICAL DESCRIPTION.

THE VERSION NUMBER OF THE IMAGE AND THE H8 SOFTWARE CAN BE READ IN THE WEBGUI OF BOARD 7274/7274RC (SEE **CHAPTER 6.3.4.1 Device Information** AND **CHAPTER 6.3.4.2 HARDWARE INFORMATION**).

THE TWO DIGITS AFTER THE DOT IN THE VERSION NUMBER DESIGNATE CORRECTIONS TO THE FIRMWARE AND/OR DESCRIPTION WHICH HAVE NO EFFECT ON FUNCTIONALITY.

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Symbols and Characters



Operational Reliability

Disregard may cause damages to persons or material.



Functionality

Disregard may impact function of system/device.



Information

Notes and Information.



Safety regulations

The safety regulations and observance of the technical data serve to ensure trouble-free operation of the device and protection of persons and material. It is therefore of utmost importance to observe and compliance with these regulations.

If these are not complied with, then no claims may be made under the terms of the warranty. No liability will be assumed for any ensuing damage.



Safety of the device

This device has been manufactured in accordance with the latest technological standards and approved safety regulations

The device should only be put into operation by trained and qualified staff. Care must be taken that all cable connections are laid and fixed in position correctly. The device should only be operated with the voltage supply indicated on the identification label.

The device should only be operated by qualified staff or employees who have received specific instruction.

If a device must be opened for repair, this should only be carried out by employees with appropriate qualifications or by **hopf** Elektronik GmbH.

Before a device is opened or a fuse is changed all power supplies must be disconnected.

If there are reasons to believe that the operational safety can no longer be guaranteed the device must be taken out of service and labelled accordingly.

The safety may be impaired when the device does not operate properly or if it is obviously damaged.

CE-Conformity



This device fulfils the requirements of the EU directive 2014/30/EU "Electromagnetic compatibility" and 2014/35/EU "Low voltage equipment".

Therefore the device bears the CE identification marking
(CE = Communautés Européennes = European communities)

The CE indicates to the controlling bodies that the product complies with the requirements of the EU directive - especially with regard to protection of health and safety for the operator and the user - and may be released for sale within the common markets.

Contents	Page
1 Description Network Management Server 7052RC.....	9
1.1 Overview of Assembly of Board 7052RC.....	12
1.1.1 DIP Switch DS1.....	13
1.1.2 MAC Address for ETH0 and ETH1	13
1.2 Front Panels of Board 7052RC.....	14
1.2.1 Overview of Functions of the Front Panel Elements.....	15
1.2.1.1 SEND LED.....	15
1.2.1.2 Reset Button (and Default Button)	15
1.2.1.3 Status LEDs.....	15
1.2.1.4 USB Female Connector (Host)	16
1.2.1.5 LAN Interface ETH0/ETH1.....	16
2 System Behaviour of Network Management Server 7052RC.....	17
2.1 Boot Process.....	17
2.2 Reset- (Default) Button.....	17
2.3 Firmware Update.....	18
2.3.1 Firmware Update Board 7052RC (WebGUI: Device)	18
2.4 Activation of Functions (Activation Key).....	20
3 Implementing Board 7052RC in a modular <i>hopf</i> 19" Base System.....	21
3.1 Handling of Board / ESD Protection.....	22
3.2 General - Setting the Board Number for the Use in Base System.....	22
3.2.1 Setting the Board Number for Base 7001RC.....	23
3.3 Creating the Network Connection.....	24
4 Network Configuration for ETH0 via LAN Connection through <i>hmc</i>.....	25
5 Network Configuration for ETH0 via the Base System.....	28
5.2 Input Functions of Base Systems 7001RC	30
5.2.1 Entry the Static IPv4 Address / DHCP Mode.....	31
5.2.2 Entry the Gateway Address	31
5.2.3 Entry the Network Mask.....	31
5.2.4 Entry the Control Byte.....	31
5.2.5 Entry the Parameterbyte 01 (no function at present).....	32
5.2.6 Entry the Parameterbyte 02 (no function at present).....	32
5.3 Configuration via <i>hmc</i> (<i>hopf</i> Management Console) Remote Access.....	32
6 HTTP/HTTPS WebGUI – Web Browser Configuration Interface.....	33
6.1 Quick Configuration.....	33
6.1.1 Requirements.....	33
6.1.2 Configuration Steps.....	33
6.2 General – Introduction	34
6.2.1 LOGIN and LOGOUT as a User	35
6.2.2 Navigation via the Web Interface.....	36
6.2.3 Entry or Changing Data	37

6.2.4 Plausibility Check during Input.....	38
6.3 Description of the Tabs.....	38
6.3.1 GENERAL Tab.....	39
6.3.2 NETWORK Tab.....	40
6.3.2.1 Host/Nameservice	41
6.3.2.1.1 Hostname	41
6.3.2.1.2 Use Manual DNS Entries	41
6.3.2.1.3 DNS Server 1 to 3.....	41
6.3.2.1.4 Use Manual Gateway Entries	42
6.3.2.1.5 Default Gateway IPv4	42
6.3.2.1.6 Default Gateway IPv6	42
6.3.2.2 Network Interface ETH0/ETH1	43
6.3.2.2.1 Default Hardware Address (MAC)	43
6.3.2.2.2 Customer Hardware Address (MAC)	44
6.3.2.2.3 DHCP	44
6.3.2.2.4 IP Address	44
6.3.2.2.5 Network Mask	44
6.3.2.2.6 Operation Mode	45
6.3.2.2.7 Maximum Transmission Unit (MTU)	45
6.3.2.2.8 IPv6	46
6.3.2.2.9 DHCP-IPv6	46
6.3.2.2.10 IPv6 Address	46
6.3.2.2.11 IPv6 Subnet Prefix Length	46
6.3.2.2.12 VLAN (Activation Key necessary)	47
6.3.2.3 Network Interface Bonding/Teaming (Activation Key necessary)	48
6.3.2.3.1 Basic Configuration.....	49
6.3.2.3.2 IPv6-Network Configuration	50
6.3.2.3.3 Advanced Settings	51
6.3.2.4 Network Interface PRP (Activation Key necessary)	53
6.3.2.4.1 IPv6-Netzwerkkonfiguration	55
6.3.2.5 Routing	56
6.3.2.6 Routing File.....	57
6.3.2.7 Management-Protocols – HTTP, SNMP etc.	58
6.3.2.7.1 SNMPv2c / SNMPv3.....	59
6.3.2.7.2 HMC Management Port	59
6.3.3 ALARM Tab.....	60
6.3.3.1 Syslog Configuration.....	60
6.3.3.2 E-mail Configuration	61
6.3.3.3 SNMP Configuration / TRAP Configuration	62
6.3.3.4 Alarm Messages	63
6.3.3.5 External Alarm Messages (optional)	64
6.3.4 DEVICE Tab.....	65
6.3.4.1 Device Information.....	65
6.3.4.2 Hardware Information	66
6.3.4.3 Restoring the Factory Settings - Factory Defaults	67
6.3.4.4 Restarting the Board (Reboot Device / Hardware Reset)	68
6.3.4.5 Image Update & H8 Firmware Update	69
6.3.4.6 Upload SSL-Server-Certificate.....	71
6.3.4.7 Customized Security Banner	71
6.3.4.8 Product Activation.....	72
6.3.4.9 Diagnostics Function	73
6.3.4.10 Passwords (Master/Device)	74
6.3.4.11 Downloading Configurations / SNMP MIB	75
6.3.5 GPS.....	76
6.3.5.1 GPS Overview	76
6.3.5.2 GPS Receiver Position	77
6.3.6 System	78
6.3.6.1 System Overview.....	78
6.3.6.2 External Alarms	79
6.3.6.3 ERROR Overview.....	80

7	SSH and Telnet Basic Configuration	82
8	Technical Data	83
9	Factory Defaults of Board 7052RC	84
9.1	ALARM.....	85
9.2	DEVICE.....	85
10	Glossary and Abbreviations	86
10.1.1	Time-specific expressions.....	86
10.2	Abbreviations.....	87
10.3	Definitions	88
10.3.1	DHCP (Dynamic Host Configuration Protocol)	88
10.3.2	SNMP (Simple Network Management Protocol).....	88
10.3.3	TCP/IP (Transmission Control Protocol / Internet Protocol)	88
10.4	Syslog Messages	89
11	List of RFC.....	90
12	List of Open Source Packages used	91

1 Description Network Management Server 7052RC

The Board 7052RC is designed for use in the modular **hopf** systems 7001RC in 19" rack.

With the Board 7052RC, the **hopf** 7001RC system becomes a remote management system, which is particularly suitable for companies in which the system must be managed from a central office. This saves staff and time costs.

Secure access to the 7001RC system is thus ensured across every TCP / IP-enabled workstation



Generally, the Board 7052RC provide functions and fields of applications completely backward compatible to the Board 7050RC.

The Board 7052RC can be used as direct replacements for already supplied Boards 7050RC. The successor boards provide all functions, adjustment options and protocols as offered by the Board 7050RC.



The Board 7020RC placed in this **hopf** system 7001RC must have at least the firmware version 07.06 if the Board 7052RC is to be used as a replacement for the Board 7050RC

The Board 7052RC is equipped with two Ethernet interfaces (ETH0 and ETH1) 10/100/1000 Base-T (autosensing).

The Network Management Server 7052RC are used to configure and control 7001RC Systems.

The network connection of the Network Management Server 7052RC can be installed at any desired point on the network.

Depending on the respective **hopf** system, these Boards can be implemented (even subsequently) in the Base System.

A variety of management and monitoring functions are available (e.g. SNMP traps, E-mail notification, Syslog messages).

Up to 8 TTL-compatible signals can be connected system-internally and monitored on the Network Management Server 7052RC. A state change (edge change) of each of these signals can be issued as an alarm message in the above-mentioned protocols via LAN.

Extensive parameters are provided to suit the conditions of individual applications by means of a variety of access / configuration channels.

- Depending on the clock system the accessibility of the Board 7052RC can be adjusted in the network via the keyboard of the **hopf** base system or via a **hmc** remote connection.
- The boards are configured over Ethernet by means of a web browser:
 - HTTP/HTTPS WebGUI (**G**raphical **U**ser **I**nterface)
 - or text-based menus over Telnet and SSH
- Various protocols (e.g. IPv4, IPv6, http, https, Telnet etc.) are available for the Ethernet connection.

The Network Management Server 7052RC currently has unlockable features that are described in **Chapter 2.4 Activation of Functions (Activation Key)**:

- Network Interface Bonding / Teaming
- PRP (Parallel Redundancy Protocol) according to IEC62439-3
- Virtual LAN (VLAN) according to IEEE 802.1q

Overview of the functions of the Network Management Server 7052RC:

Two Ethernet Interfaces

- Auto negotiate
- 10 Mbps half-/full duplex
- 100 Mbps half-/full duplex
- 1 Gbps full duplex

Network Configuration

- DHCP
- Routing
- Bonding (NIC Teaming) Link aggregation according to IEEE 802.1ad (Activation Key necessary)
- VLAN support according to IEEE 802.1q (Activation Key necessary)
- PRP (Parallel Redundancy Protocol) according to IEC62439-3 (Activation Key necessary)

System Management (Activation Key necessary)

- E-mail notification
- Syslog messages to external syslog server
- SNMPv2c / SNMPv3, SNMP Traps (MIB-II, Private Enterprise MIB)

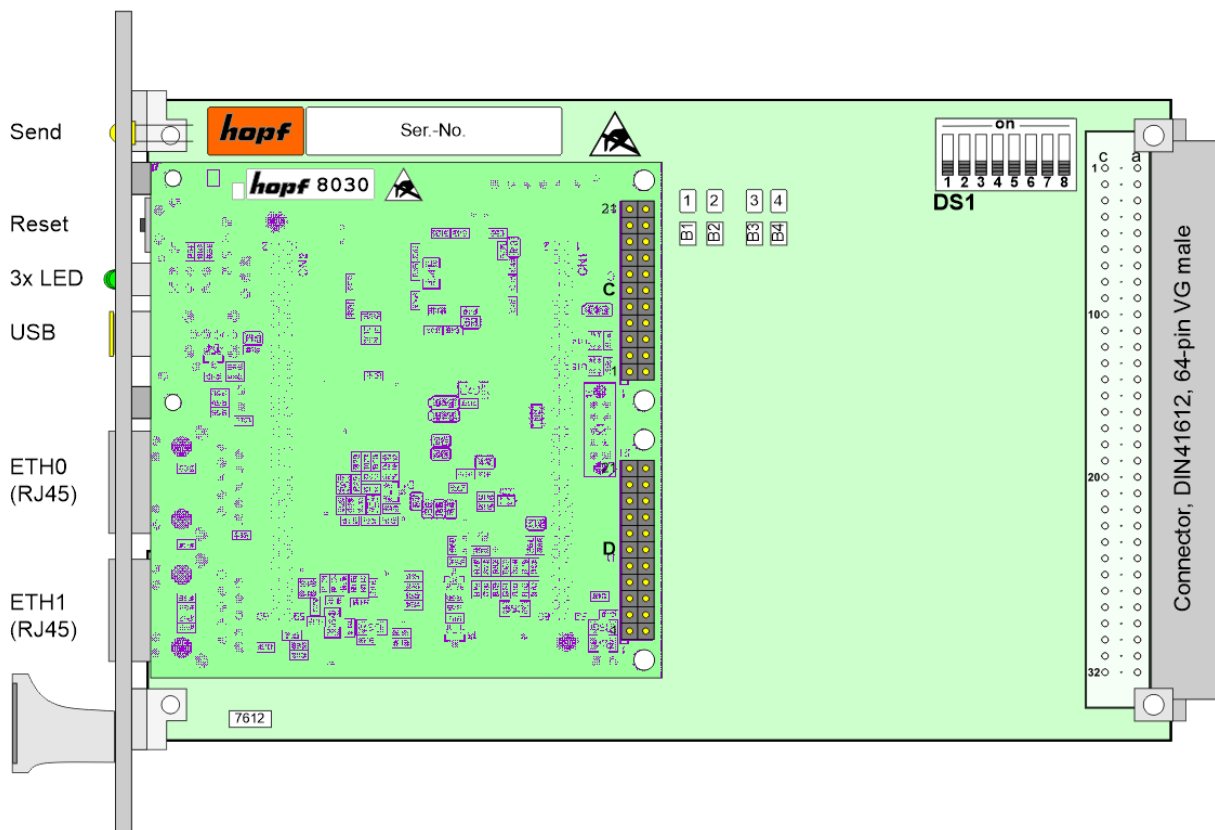
Configuration Channel

- HTTP/HTTPS WebGUI (browser-based)
- Telnet
- SSH
- External LAN configuration tool (**hmc** - Network-Configuration-Assistant)
- **hopf** 7001RC system **hmc**, keypad and display – Board 7274RC only
- Hot-plug functionality

Additional Features

- Firmware Update via TCP/IP
- Fail-safe
- Watchdog circuit
- Power management
- System management
- Customized security banner
- External monitoring in- and outputs

1.1 Overview of Assembly of Board 7052RC



1.1.1 DIP Switch DS1

The board number in the Base System is set via DIP Switch DS1.

DIP Switch DS1	Function
8	No function at present
7	No function at present
6	No function at present
5	Board number in System 7001RC (see Chapter 3.2.1 Setting the Board Number for Base 7001RC)
4	
3	
2	
1	

1.1.2 MAC Address for ETH0 and ETH1

Each LAN interface is clearly identifiable on the Ethernet via a unique MAC Address (hardware address).

The MAC addresses given for the LAN interfaces can be read in WebGUI of the appropriate board or be evaluated via the **hmc Network Configuration Assistant**.

The MAC address for ETH1 is incremented hexadecimal by 1 to the MAC address of ETH0.

Example:

- MAC address ETH0 = 00:03:C7:12:34:59
- MAC address ETH1 = 00:03:C7:12:34:5A

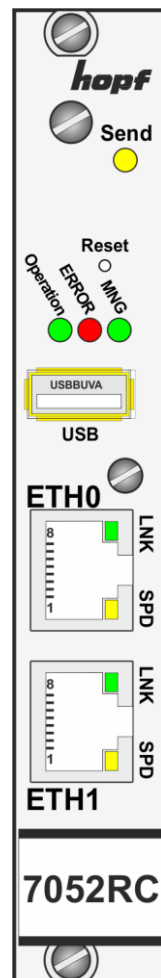
The MAC address is uniquely assigned for each LAN interface by the company **hopf** Elektronik GmbH.



hopf Elektronik GmbH MAC addresses begin with **00:03:C7:xx:xx:xx**.

1.2 Front Panels of Board 7052RC

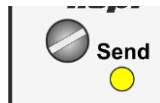
Board 7052RC 3U/4HP



1.2.1 Overview of Functions of the Front Panel Elements

This chapter describes the individual front panel elements and their functions.

1.2.1.1 SEND LED



SEND LED (yellow)	Description
Flashing / flickering	Normal case – indicates access to the internal system bus. Board 7052RC is correctly integrated into the respective System.
Off	Board 7052RC is not ready for operation.
On	Fault on Board 7052RC.

1.2.1.2 Reset Button (and Default Button)



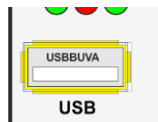
The reset button is activated by means of a thin object through the hole in the front panel next to the "Reset" inscription (see **Chapter 2.2 Reset- (Default) Button**).

1.2.1.3 Status LEDs



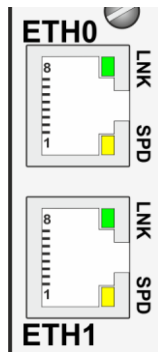
MNG-LED (Green)	System Management for Systems 7001RC
On	Standard , running
Off	Not running
ERROR-LED (Red)	Description
Off	Standard case , Board 7052RC is working.
3Hz flashing	Fail-safe basic parameterization is not available (emergency operation mode)
On	Primary CPU of Board 7052RC does not show any activity.
Operation-LED (Green)	Description
On	Standard case , Board 7052RC is working
1Hz flashing	Board 7052RC is booting the operating system.
3Hz flashing	A firmware update (image) of Board 7052RC is going to be implemented.
Off	Board 7052RC is not ready for operation.

1.2.1.4 USB Female Connector (Host)



The USB connection can be used for certain problems and after consulting the **hopf** support for a System recovery.

1.2.1.5 LAN Interface ETH0/ETH1



LNK LED (Green)	Description
Off	10 MBit Ethernet detected
On	100 MBit / 1 GBit Ethernet detected

SPD LED (Yellow)	Description
Off	No LAN connection to a network
On	LAN connection available
Flashes	Network activity at ETH0 (transmission / reception)

Pin No.	Assignment
1	TX_DA+
2	TX_DA-
3	RX_DB+
4	BI_DC+
5	BI_DC-
6	RX_DB-
7	BI_DD+
8	BI_DD-

2 System Behaviour of Network Management Server 7052RC

In this chapter the behaviour of the boards in special operation phases is described.

2.1 Boot Process

The boot process of the board starts after turning on the Clock System the board is operated in or rather after a reset of the board.

During the boot process the board booting its operation system and is therefore not available via LAN.

2.2 Reset- (Default) Button

The Board 7052RC can be reset by the Reset-(Default) Button behind the front panel of the board. The Reset-(Default) Button is accessible with a thin object through the small drilling in the front panel.

The button triggers different functions depending on how long it is pressed:

Duration	Function
< 1 sec.	No action
1 - 9 sec.	After releasing a hardware reset is triggered
>= 10 sec.	After releasing a FACTORY DEFAULT of Board 7052RC followed by a REBOOT is triggered after approx. 10 seconds

2.3 Firmware Update

The Board 7052RC is a multi processor system. For this reason a firmware update always consists of a so called Software SET including two (2) programs versions for the image and H8 programs defined by the Set-Version which both needed to be loaded into the board.

Board 7052RC (WebGUI: Device):

1x Image Update	upgrade_8030gen_rel_vXXXX.img
1x H8 Update	H8_8030_vXXXX_128.mot



An update is a critical process.
The device should not be turned off during the update and the network connection to the device should not be interrupted.



All programs of a SET needed to be loaded to ensure a defined operation condition.



The assignment of program versions of a SET-Version may be taken from the Release-Notes of the software sets of Board 7052RC in cases of doubt.

2.3.1 Firmware Update Board 7052RC (WebGUI: Device)

The general process of a software update of Board 7052RC is described below:



For selection of the correct update set the identifier of Board 7052RC has to be observed obligatory.

Board 7052RC can be recognized:

- By the label on the front panel
- In WebGUI at the Web-banner "**7052RC**"

The firmware update 7052RC has to be performed as a SET.

The software package contained in the file package hopf7052_SET_vXXXX.zip has to be unpacked. The following steps have to be executed in the following sequence:

1. **Image Update 8030 (7052RC)**
2. **H8 Firmware Update 8030 (7052RC)**

Image Update 7052RC

1. Log in as Master in WebGUI of the board.
2. Select in **Device** tab the menu item **Image Update**.
3. Select the file with the file **.img** via the selection window (Exapmle: **upgrade_8030gen_rel_vXXXX.img**).
4. The selected file is shown in the selection window.
5. The update process is started with the button **Upload now**.
6. In WebGUI the successful file transfer and writing to the Module is indicated.
7. In WebGUI the successful update is indicated after 2-3 minutes with the request to release a reboot of the board.
8. After activation and successful reboot of the board the image update process is finished.

H8 Firmware Update 7052RC

1. Log in as Master in WebGUI of the board.
2. Select in the **Device** tab the menu item **H8 Firmware Update**.
3. Select the file with the file extension **.mot for Board 7052RC** via the selection window (Example: **H8_8030_vXXXX_128.mot**).
4. The selected file is shown in the selection window.
5. The update process is started with the button **Upload now**.
6. In WebGUI the successful file transfer to the Module is indicated.
7. Now the update of the board automatically starts after a few seconds.
8. After successful update the board automatically reboots.
9. After approx. 2 minutes the H8 update process is finished and the board is again accessible via WebGUI.

2.4 Activation of Functions (Activation Key)

Currently the Board 7052RC offers two functions that require an "Activation Key".

These functions are only available after entering a valid activation key depending on the serial number of the particular Board 7052RC, (not depending on the serial number of the entire clock system). The serial number can be found in the WebGUI via Device / Serial Number: 8030xxxxxx.

The required function(s) can be activated at time of delivery as well as subsequently on site by the user.

Please find an overview of the above mentioned functions here:

- **Network Interface Bonding/Teaming**
By activating this function the LAN interfaces ETH0 and ETH1 can be bundled to a logical network interface. This feature plays a key role in redundantly structured networks to increase fail-safety of the NTP time service.
- **PRP (Parallel Redundancy Protocol)**
The PRP functionality enables to bundle the physical network interfaces ETH0 and ETH1 to a logical network interface using the Parallel Redundancy Protocol (PRP).
- **Virtual LAN (VLAN)**
By activating this function network interfaces can be configured with additional VLANs (Virtual Bridged Local Area Networks) according to IEEE 802.1q.



The settings for activation keys (e.g. an entered activation key) are neither modified nor influenced by the function FACTORY DEFAULTS.

3 Implementing Board 7052RC in a modular **hopf** 19" Base System

Operation



An ESD conform handling and operation of the board has to be ensured!

Otherwise there is the danger that the board might get damaged through ESD (electrostatic discharge). Damages to the board caused by improper handling are not covered by factory guaranty.

System Requirments



The board 7052RC is a **function boards for the system bus**. Thus the systems in which these board should be operated needed to provide an appropriate slot.

Board Number



Each LAN Board is assigned a definite board number via DIP switch in order to be uniquely identified in a **hopf** Base System.

Configuration



The basic LAN parameters (IP address etc.) to access the Board 7052RC in the network are set via the Base System or via the **Network Configuration Assistant** integrated in the **hmc**.

Afterwards the complete parameterization of the board is made by means of a web browser via WebGUI of the board.

Power Supply



The function board 7052RC is exclusive supported with operating voltage via the internal system bus.

3.1 Handling of Board / ESD Protection



An ESD conform handling and operation of the board has to be ensured!

Otherwise there is the danger that the board might get damaged through ESD (electrostatic discharge). Damages to the board caused by improper handling are not covered by the factory guaranty.

3.2 General - Setting the Board Number for the Use in Base System

The boards must be coded to a System Board number in order to enable the various LAN Boards to be administered and configured in the Base System.



Under no circumstances may two LAN with the same board number be integrated into one Base System. This leads to unspecified faults on these two boards!

The coding of the board number is effected on Board 7052RC via DIP switch bank (**DS1**).

3.2.1 Setting the Board Number for Base 7001RC

A maximum number of 31 LAN boards (also different types – e.g. board 7052RC and board 7274RC) can be configured in a System 7001RC. The board number is set via the DIP switch bank (**DS1 / SW1-5**) for unique identification in the Base System.

SW5	SW4	SW3	SW2	SW1	System Board No.:
off	off	off	off	off	-
off	off	off	off	on	Board No. 01
off	off	off	on	off	Board No. 02
off	off	off	on	on	Board No. 03
off	off	on	off	off	Board No. 04
off	off	on	off	on	Board No. 05
off	off	on	on	off	Board No. 06
off	off	on	on	on	Board No. 07
off	on	off	off	off	Board No. 08
off	on	off	off	on	Board No. 09
off	on	off	on	off	Board No. 10
off	on	off	on	on	Board No. 11
off	on	on	off	off	Board No. 12
off	on	on	off	on	Board No. 13
off	on	on	on	off	Board No. 14
off	on	on	on	on	Board No. 15
on	off	off	off	off	Board No. 16
on	off	off	off	on	Board No. 17
on	off	off	on	off	Board No. 18
on	off	off	on	on	Board No. 19
on	off	on	off	off	Board No. 20
on	off	on	off	on	Board No. 21
on	off	on	on	off	Board No. 22
on	off	on	on	on	Board No. 23
on	on	off	off	off	Board No. 24
on	on	off	off	on	Board No. 25
on	on	off	on	off	Board No. 26
on	on	off	on	on	Board No. 27
on	on	on	off	off	Board No. 28
on	on	on	off	on	Board No. 29
on	on	on	on	off	Board No. 30
on	on	on	on	on	Board No. 31



In System 7001RC only board numbers 1 - 31 are allowed.

System 7001RC is unable to configure board numbers which are set outside this range.

3.3 Creating the Network Connection



Ensure that the network parameters of the LAN board are configured in accordance with the local network before connecting the LAN board to the network.



Connecting a network to an incorrectly configured LAN Board (e.g. duplicated IP address) may cause interference in the network.



The Board 7052RC is supplied with:

ETH0 with static IP address

IP address: 192.168.0.1
Netmask: 255.255.255.0
Gateway: not set

ETH1 with DHCP

Please note:

Integrating the Board 7052RC into the **hopf** system 7001RC overwrites the configuration of ETH0. DHCP for ETH0 is now activated. For this reason, the board should be register into the **hopf** system 7001RC before the final configuration of ETH0 is done.



Request the required network parameters from your network administrator if those are unknown.

The network connection is made via a LAN cable and RJ45 plug (recommended cable type: CAT5 or better).

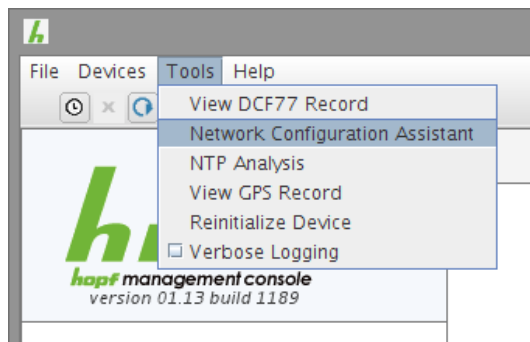
4 Network Configuration for ETH0 via LAN Connection through *hmc*

After connecting the system to the power supply and creating the physical network connection to the LAN interface of the Board 7052RC, the device can be searched for on the network via the *hmc* Software. Then the base LAN parameters (IP address, netmask and gateway or DHCP) may be adjusted in order to allow accessibility of the board for other systems in the network.



The SEARCH Function of the *hmc* - **Network Configuration Assistant** requires for location and recognition of the wished LAN board(s) the *hmc*-computer is in the same LAN.

The basis LAN parameters can be set via the *hmc* integrated **Network Configuration Assistant**.



After a successful start of the *hmc* **Network Configuration Assistant** and completed search of the *hopf* LAN Modules, the configuration of the base LAN parameters can be done.

The Network Management Server 7052RC are listed in the **Device List** as:

7052RC

The determination of different **hopf** LAN boards of the same type is made via **Hardware Address** (MAC Address).

For an extended configuration (**WebGUI**) of the LAN Board 7052RC via a browser the following base parameters are mandatory:

- **Host Name** ⇒ e.g. hopf7052RC
- **Network Configuration Type** ⇒ **Static IP Address**
- **IP Address** ⇒ e.g. 192.168.0.1
- **Netmask** ⇒ e.g. 255.255.255.0
- **Gateway** ⇒ e.g. 0.0.0.0



The **hostname must** meet the following conditions:

- The hostname may only contain the characters 'A'-'Z', '0'-'9', '-' and '.'. There should be no distinction between upper-and lower-case letters.
- The character '.' may only appear as a separator between labels in domain names.
- The sign '-' must not appear as first or last character of a label.



The network parameters being assigned should be pre-determined with the network administrator.

After entering the above mentioned LAN parameters they needed to be transferred to the LAN Board 7052RC via Button **Apply**. Afterwards the entry of the **Device Password** is requested:



Device Password **<device>** is set for LAN boards 7052RC on delivery. So no further entry is required here – click on the button **OK** to confirm.

The LAN parameters thus set are directly adopted by the LAN board (without reboot) and are immediately active.

5 Network Configuration for ETH0 via the Base System

The only configuration that is carried out on Board 7052RC via the Base System is to enable it to be reachable on the network via **ETH0**. All other configurations on the Board are carried out over the WebGUI.

LAN Board 7052RC is configured via the keyboard of the respective Base System. The necessary network parameters are configured such as IP address, gateway address, network mask and a general control byte.

The Technical Description of the respective Base System is the basis for configuration.



After they have been entered fully, the LAN parameters configured through the system menu are transferred to the control board by pressing the **ENT** key. From here the parameters are transferred to the LAN board.



The Base System accept LAN parameters which are subsequently changed via the WebGUI.

IP Address (IPv4)

An IP address is a 32 bit value divided into four 8 bit numbers. The standard presentation is 4 decimal numbers (in the range 0...255) separated from each other by dots (dotted quad notation).

Example: 192.002.001.123

The IP address consists of a leading network ID followed by the host ID. Four common network classes were defined in order to cover different requirements. Depending on the network class, the last one, two or three bytes define the host while the rest define the network (network ID) in each case.

In the following text the "x" stands for the host part of the IP address.

Class A Networks

IP addresses 001.xxx.xxx.xxx to 127.xxx.xxx.xxx

There is a maximum of 127 different networks in this class. This allows the possibility to connect a very high number of devices (max. 16.777.216)

Example: 100.000.000.001, (Network 100, Host 000.000.001)

Class B Networks

IP addresses 128.000.xxx.xxx to 191.255.xxx.xxx

Each of these networks can consist of up to 65534 devices.

Example: 172.001.003.002 (Network 172.001, Host 003.002)

Class C Networks

IP addresses 192.000.000.xx to 223.255.255.xxx

These network addresses are the most commonly used. Up to 254 devices can be connected.

Class D Networks

The addresses from 224.xxx.xxx.xxx - 239.xxx.xxx.xxx are used as multicast addresses.

Class E Networks

The addresses from 240.xxx.xxx.xxx - 254.xxx.xxx.xxx are designated as "Class E" and are reserved.

Gateway Address

The gateway or router address is required in order to be able to communicate with other network segments. The standard gateway must be set to the router address which connects these segments. This address must be within the local network.

Network Mask

The network mask is used to partition IP addresses outside of network classes A, B and C. When entering the network mask it is possible to designate the number of bits of the IP-address to be used as the network part and the number to be used as the host part, e.g.:

Network Class	Network Part	Host Part	Network Mask Binary	Network Mask Decimal
A	8 Bit	24 Bit	11111111.00000000.00000000.00000000	255.0.0.0
B	16 Bit	16 Bit	11111111.11111111.00000000.00000000	255.255.0.0
C	24 Bit	8 Bit	11111111.11111111.11111111.00000000	255.255.255.0

The number of bits for the host part is entered in order to calculate the network mask:

Network Mask	Host Bits
255.255.255.252	2
255.255.255.248	3
255.255.255.240	4
255.255.255.224	5
255.255.255.192	6
255.255.255.128	7
255.255.255.000	8
255.255.254.000	9
255.255.252.000	10
255.255.248.000	11
.	.
.	.
255.128.000.000	23
255.000.000.000	24

Example:

Desired network mask:

255.255.255.128

Value to be entered:

7

5.2 Input Functions of Base Systems 7001RC



Any modification of parameters requires checking of **all** menu points of the LAN menu. Menu points which do not require any change of value or just checked with the key **ENT**. Only the complete check of **all single** menu points allow the adoption of all changes and their transfer to the board 7052RC.

The input and display functions of the board parameters are polled in the menu heading **BOARD-SETUP : 4**

with **ENT** key ⇒ Main menu

with **4** key ⇒ Board setup

with **N** key ⇒ Scroll to menu heading:

[illegible]

Select with key **Y**

Search for board to be parameterized with key **N** and select with key **Y**.

Example:

PARAMETER	BOARD 03 OF 25	7052	NO. : 01
STATUS: M/ -	BOARDNAME: "MANAGE _"	SET > Y/N	

PARAMETER BOARD 03 OF 25	⇒ board 03 of 25 implemented
7052RC NO.: 01	⇒ board type 7052RC with board number 01
STATUS: M (I)/- (E)	⇒ M = monitoring, I = no monitoring
	⇒ - = without error operating, E = board error
BOARDNAME:"MANAGE__"	⇒ MANAGE__ board name freely selected by customer

5.2.1 Entry the Static IPv4 Address / DHCP Mode

Static IPv4 Address

In the upper line the selected board appears with its board number and IPv4 address of the LAN interface ETH0. For configuration of a new IPv4 address the complete entry of the 4 groups of digits is necessary.

The IPv4 address is entered in 4 groups of digits configurable from 000 to 255. They are separated by a dot (.). Input must be in the form of 3 digits (e.g.: 2 ⇒ 002).

An example of a complete entry would be as follows:

B	.	7	0	5	2	NO	:	0	1	IP-ADR	>	1	9	2	.	1	6	8	.	0	1	7	.	0	1	0	<
						NEW				IP-ADDRESS	>	~	~	~	.	~	~	~	.	~	~	~	.	~	~	~	<

In the case of an implausible entry (such as 265), an INPUT ERROR is sent and the complete entry is rejected.

DHCP / Static IP Address Assignment

For the use of DHCP, the IP address, gateway address and network mask are all to be fully set to **>000.000.000.000<** (invalid IP address).

All other addresses are interpreted as static IP addresses.

5.2.2 Entry the Gateway Address

The gateway address can be entered via the selection screen:

B	.	7	0	5	2	NO	:	0	1	GW-ADR	>	1	9	2	.	1	6	8	.	0	1	7	.	0	0	1	<
						NEW				GW-ADDRESS	>	~	~	~	.	~	~	~	.	~	~	~	.	~	~	~	<

The Gateway address can now be entered in the same way as the IP address, as described in **Chapter 5.2.2 Entry the Gateway Address**.

5.2.3 Entry the Network Mask

The network mask can be entered via the selection screen:

B	.	7	0	5	2	NO	:	0	1	NETMASK	>	2	5	5	.	2	5	5	.	0	0	0	.	0	0	0	<
						NEW				NETMASK	>	~	~	~	.	~	~	~	.	~	~	~	.	~	~	~	<

The network mask for LAN interface ETH0 can now be entered in the same way as the IP address, as described in **Chapter 5.2.3 Entry the Network Mask**.

5.2.4 Entry the Control Byte

The Control-Byte is shown on the top line with the currently set values.

B	.	7	0	5	2	NR	:	0	1	CONTROL-BYTE		0	0	0	0	0	1	0								
						NEW				CONTROL-BYTE	>	~	~	~	~	~	~	~	<							

For the purposes of manipulation, the individual bits of the new byte are to be entered on the second line using "0" and "1". The complete Control Byte must always be recorded and confirmed with the **ENT** key.

The bits of the Control Byte are numbered in descending order:

C O N T R O L - B Y T E > 7 6 5 4 3 2 1 0 <

Bit 7-0	No function at present
0	These bits should always be set to "0" for reasons of compatibility.

5.2.5 Entry the Parameterbyte 01 (no function at present)

Parameter of Parameter-Byte 01 is shown on the top line with the currently set values.

B . 7 0 5 2 N O . : 0 1 O L D : B Y T E 0 1 > 0 0 0 0 0 0 0 0 <
B Y T E = B I T 7 . . 0 N E W : B Y T E 0 1 > ~ ~ ~ ~ ~ ~ ~ ~ <

For the purposes of manipulation, the individual bits of the new byte are to be entered on the second line using "0" and "1". The complete Parameter Byte must always be recorded and confirmed with the **ENT** key.

The bits of the Parameter Byte are numbered in descending order:

B Y T E 0 1 > 7 6 5 4 3 2 1 0 <

Bit 7-0	No function at present
0	These bits should always be set to "0" for reasons of compatibility.

5.2.6 Entry the Parameterbyte 02 (no function at present)

Parameter of Parameterbyte 02 is shown on the top line with the currently set values.

B . 7 0 5 2 N O . : 0 1 O L D : B Y T E 0 2 > 0 0 0 0 0 0 0 0 <
B Y T E = B I T 7 . . 0 N E W : B Y T E 0 2 > ~ ~ ~ ~ ~ ~ ~ ~ <

For the purposes of manipulation, the individual bits of the new byte are to be entered on the second line using "0" and "1". The complete Parameter Byte must always be recorded and confirmed with the **ENT** key.

The bits of the Parameter Byte are numbered in descending order:

B Y T E 0 2 > 7 6 5 4 3 2 1 0 <

Bit 7-0	No function at present
0	These bits should always be set to "0" for reasons of compatibility.

5.3 Configuration via **hmc** (**hopf** Management Console) Remote Access

The parameters can also be set via the **hmc**, insofar the Base System provides remote communication.

6 HTTP/HTTPS WebGUI – Web Browser Configuration Interface



JavaScript and Cookies must be enabled in the browser in order for the WebGUI to display and function correctly.

6.1 Quick Configuration

This Chapter briefly describes the basic operation of the WebGUI installed on the Board.

6.1.1 Requirements

- Ready-for-operation **hopf** Base System with implemented Board 7052RC
- Board configured for network operation (see **Chapter 4 Network Configuration for ETH0 via LAN Connection through hmc** and **5 Network Configuration for ETH0 via the Base System**)
- PC with installed web browser (e.g. Internet Explorer) in the sub-network of Board 7052RC

6.1.2 Configuration Steps

- Create the connection to the Board with a web browser
- Login as a '**master**' user (default password <master> is set by delivery)
- Switch to "Network" tab and if available enter the DNS Server (required for NTP and the alarm messages depending on the network)
- Save the configuration
- Switch to "Device" tab and restart Network Time Server via "Reboot Device"
- NTP Service is now available with the standard settings
- NTP specified settings can be done in the "NTP" tab
- Alarm messages via Syslog/SNMP/Email can be configured in "Alarm" tab



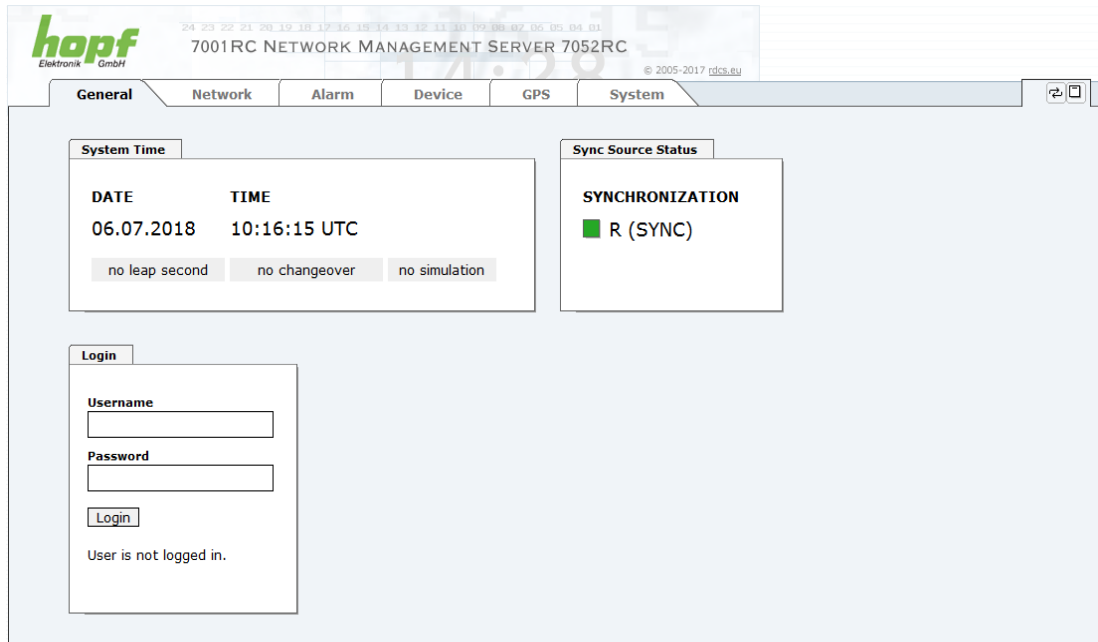
The following detailed explanatory information should be read if anything is unclear while executing the configuration steps.

6.2 General – Introduction

Board 7052RC should be accessible to a web browser if it has been set up correctly. Enter the IP address - as set up on the Board earlier - or the DNS name on the address line <<http://xxx.xxx.xxx.xxx>> and the following screen should appear.



Configuration can only be completed via the Board's WebGUI!



The screenshot shows the WebGUI interface for the 7001RC Network Management Server 7052RC. The interface has a header with the hopf logo and navigation tabs: General, Network, Alarm, Device, GPS, and System. The 'General' tab is active, showing two main sections: 'System Time' and 'Sync Source Status'. The 'System Time' section displays the date '06.07.2018' and time '10:16:15 UTC', with options for 'no leap second', 'no changeover', and 'no simulation'. The 'Sync Source Status' section shows 'SYNCHRONIZATION' with a green square and 'R (SYNC)'. Below these sections is a 'Login' form with fields for 'Username' and 'Password', a 'Login' button, and a message 'User is not logged in.'.



The WebGUI was developed for multi-user read access but not multi-user write access. It is the responsibility of the user to pay attention to this issue.

6.2.1 LOGIN and LOGOUT as a User

All of the Board's data can be read without being logged on as a special user. However, the Board data can only be configured or modified by an authorised user! Two types of user are defined:

- "master" user (default password on delivery: <master>)
- "device" user (default password on delivery: <device>)



The password should be changed after the first login for security reasons.

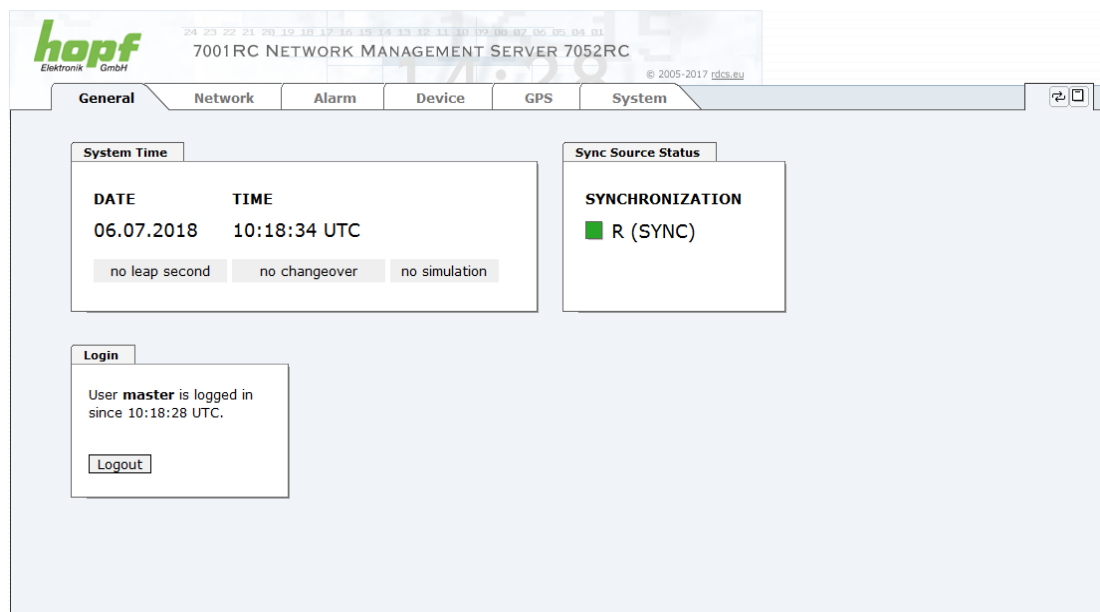


The password must be between 6 and 20 characters long, contain at least one uppercase letter, one lowercase letter and one digit!



Differentiation is made between **upper and lower case** characters in the password. Alphanumeric characters and the following symbols can be used: [] () * - _ ! \$ % & / = ?

The following screen should be visible after logging in as a "master" user:



Click on the **Logout** button to log out.

The WebGUI is equipped with session management. If a user does not log out, he or she is automatically logged off after 10 minutes of inactivity (idle time).

After successful login, depending on the access level (device or master user), changes can be made to the configuration and saved.

Users logged in as "**master**" have all access rights to Board 7052RC.

Users logged in as "**device**" do **not** have access to:

- Trigger reboot
- Trigger factory defaults
- Carry out image update
- Carry out H8 firmware update
- Upload Certificate
- Diagnostic
- Change master password
- Download configuration files

6.2.2 Navigation via the Web Interface

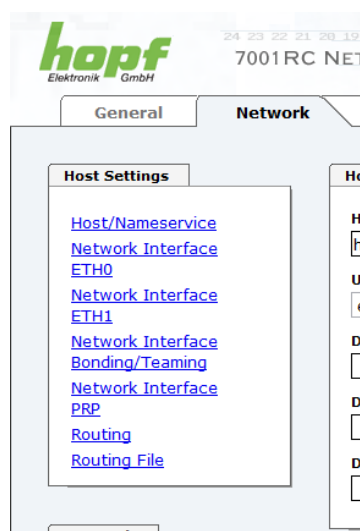
The WebGUI is divided into function tabs. Click on one of these tabs to navigate through the Board. The selected tab is identified by a darker background colour, see the following image (General in this case).



User login is not required in order to navigate through the Board configuration options.



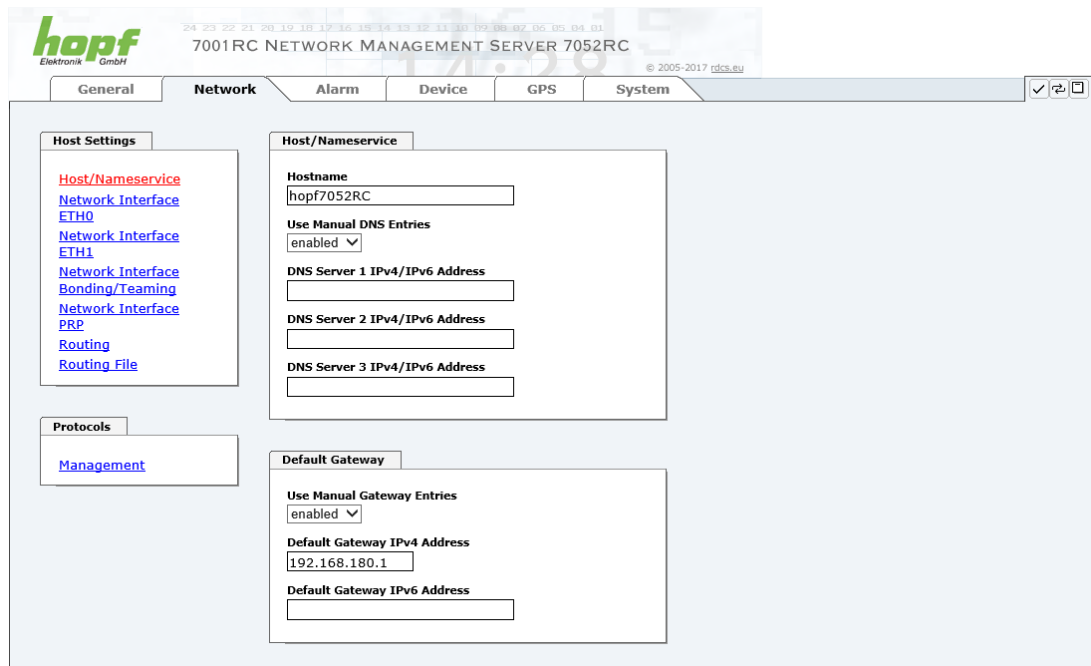
JavaScript should be enabled in the browser in order to guarantee the correct operation of the web interface.



All the links within the tabs on the left hand side lead to corresponding detailed display or setting options.

6.2.3 Entry or Changing Data

It is necessary to be logged on as one of the users described above in order input or change data.



After an entry has been made the configured field is marked with a star ' * '. This means that a value has been entered or changed but is not yet stored in the flash memory. It is necessary to be acquainted with the symbols shown below in order to be able to save the configuration or the changed value.



Meaning of the symbols from left to right:

No.	Symbol	Description
1	Apply	Acceptance of changes and entered data
2	Reload	Restoring the saved data
3	Save	Fail-save storage of the data in the flash configuration

For permanent storage the value **MUST** be accepted by the Board with **Apply** and then saved with **Save**.

However, this data is then lost when the **hopf** Base System is switched off or restarted.

If the data is only to be tested it is sufficient to accept the changes with **Apply**.



Changing Network Parameters

Modifications of the network parameters (e.g. IP address) are immediately effective clicking on **Apply** to confirm.

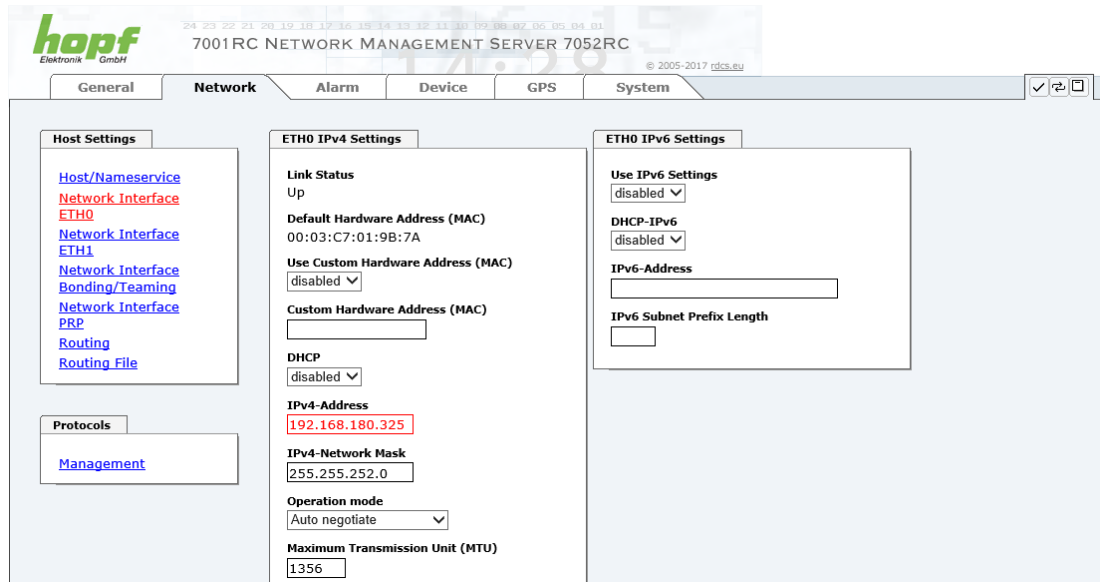
However, the modifications are not permanently saved yet. This requires to access the WebGUI with the new network parameters again and to save the data with **Save** permanently.



For adopting changes and entering values only the respective buttons in the WebGUI can be used.

6.2.4 Plausibility Check during Input

A plausibility check is generally carried out during input.



As it can be seen in the above image, an invalid value (e.g. text where a number should be entered, IP address instead of a range etc.) is identified by a red border when an attempt is made to accept these settings. It should be noted here that this is only a semantic check and not to test whether an entered IP address can be used on the network or in the configuration! If an error message is displayed it is not possible to save the configuration in the Board's flash memory.



The error check only verifies semantics and the validity of ranges. It is **NOT** a logic or network check for entered data.

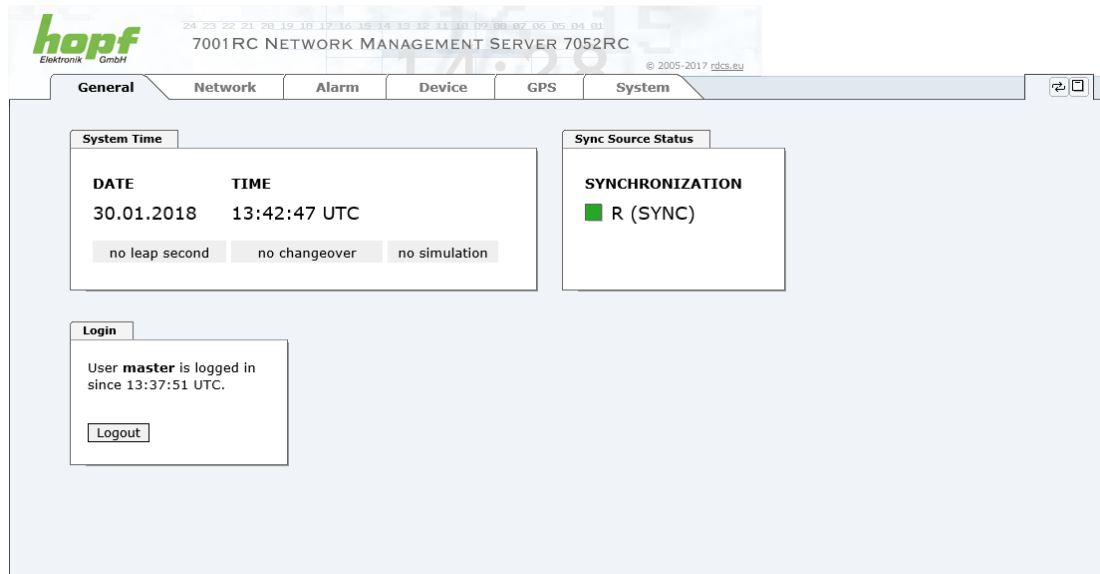
6.3 Description of the Tabs

The WebGUI is divided into the following tabs:

- General
- Network
- NTP
- Alarm
- Device

6.3.1 GENERAL Tab

This is the first tab which is displayed when using the web interface.



System Time

This area shows basic information about the current time and date of the Board. The time ALWAYS corresponds to UTC time. The values are updated every minute automatically. An immediate update of values can be released point and click on tab GENERAL.

SYNC Status

Display of the actual status of synchronization of the base system with these possible values:

R (SYNC)	Time synchronized + Quartz regulation started/running
R (SYOF)	Time synchronized + SyncOFF running
Q (QUSE)	Quartz/Crystal time after reset or manual setting
- (INVA)	Invalid time

The **Leapsecond** and **Changeover** display fields announce that such an event is to take place on the next hour change.

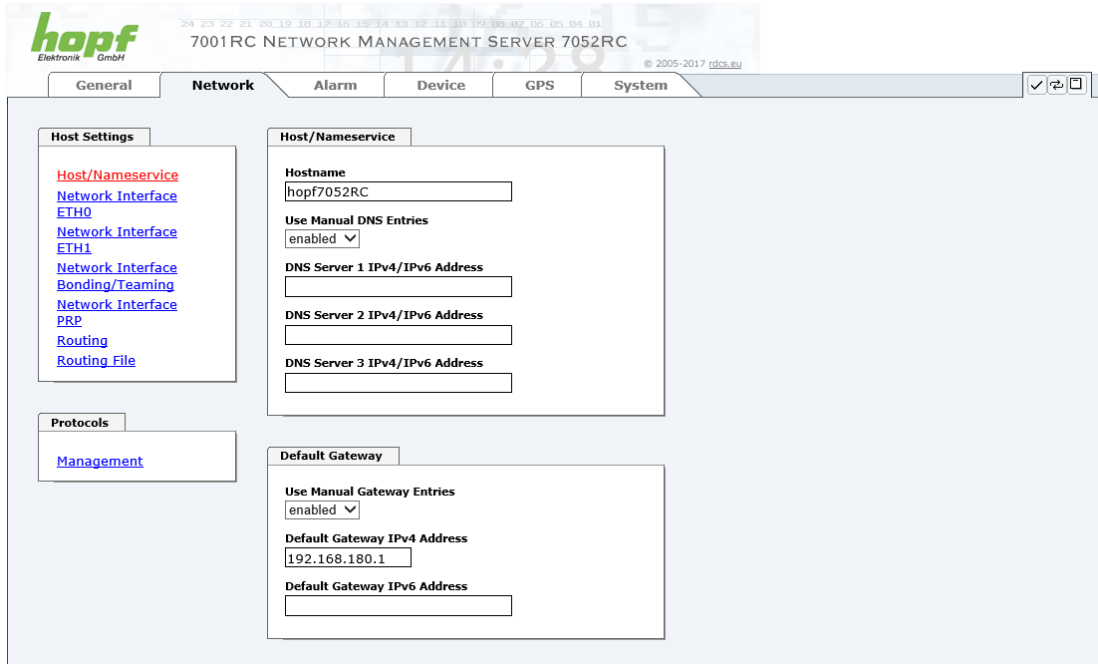
The **Simulation display** is used if the system time of the **hopf** Base System is marked as a simulated time (not currently available).

Login

The **Login** box is used how described in **Chapter 6.2.1 LOGIN and LOGOUT as a User**.

6.3.2 NETWORK Tab

All the links within the tabs on the left hand side lead to corresponding detailed setting options.



The screenshot shows the 'Network' tab of the hopf 7001RC NETWORK MANAGEMENT SERVER 7052RC web interface. The interface has a top navigation bar with tabs: General, Network (selected), Alarm, Device, GPS, and System. Below the tabs, there are two main sections: 'Host Settings' and 'Host/Nameservice'. The 'Host Settings' section contains links to 'Host/Nameservice', 'Network Interface ETH0', 'Network Interface ETH1', 'Network Interface Bonding/Teaming', 'Network Interface PRP', 'Routing', and 'Routing File'. The 'Host/Nameservice' section contains fields for 'Hostname' (hopf7052RC), 'Use Manual DNS Entries' (enabled), 'DNS Server 1 IPv4/IPv6 Address', 'DNS Server 2 IPv4/IPv6 Address', and 'DNS Server 3 IPv4/IPv6 Address'. The 'Default Gateway' section contains fields for 'Use Manual Gateway Entries' (enabled), 'Default Gateway IPv4 Address' (192.168.180.1), and 'Default Gateway IPv6 Address'.



Changing Network Parameters

Modifications of the network parameters (e.g. IP address) are immediately effective clicking on **Apply** to confirm.

However, the modifications are not permanently saved yet. This requires to access the WebGUI with the new network parameters again and to save the data with **Save** permanently.

6.3.2.1 Host/Nameservice

Setting for the unique network identification.

6.3.2.1.1 Hostname

The standard setting for the Hostname is "**hopf7052RC**". This name should also be adapted to the respective network infrastructure.

In case of doubt, just leave the standard setting as it is or ask your network administrator.



The **hostname** **must** meet the following conditions:

- The hostname may only contain the characters 'A'-'Z', '0'-'9', '-' and '.'. There should be no distinction between upper-and lower-case letters.
- The character '.' may only appear as a separator between labels in domain names.
- The sign '-' must not appear as first or last character of a label.



For a correct operation a hostname is required. The field for the hostname **must not** be left blank.

6.3.2.1.2 Use Manual DNS Entries

With this setting you can select whether the manually entered DNS servers (DNS servers 1 to 3) should be used.

If "enabled" is selected here, the entries in DNS Server 1 to 3 are used.

If "disabled" is selected, the entries in DNS Server 1 to 3 are ignored.



If a DHCP server is used to distribute the network configuration and if this also distributes the DNS servers used in the network, then **Use Manual DNS Entries** should be set to disabled.

6.3.2.1.3 DNS Server 1 to 3

The IP address (IPv4 or IPv6) of the DNS server should be entered if you wish to use complete Hostnames (hostname.domainname) or work with reverse lookup.

Contact your network administrator for details of the DNS server if not known.

If no DNS server is available (special case), enter 0.0.0.0 in the input field or leave the field blank.

6.3.2.1.4 Use Manual Gateway Entries

With this setting, you can select whether the manually entered gateways (Default Gateway IPv4 and Default Gateway IPv6) should be used.

If "enabled" is selected here, the entries in Default Gateway IPv4 and Default Gateway IPv6 are used.

If "disabled" is selected, the entries in Default Gateway IPv4 and Default Gateway IPv6 are ignored.



If a DHCP server is used to distribute the network configuration and if this also distributes the address of the default gateway used in the network, then Use Manual Gateway Entries should be set to disabled.

6.3.2.1.5 Default Gateway IPv4

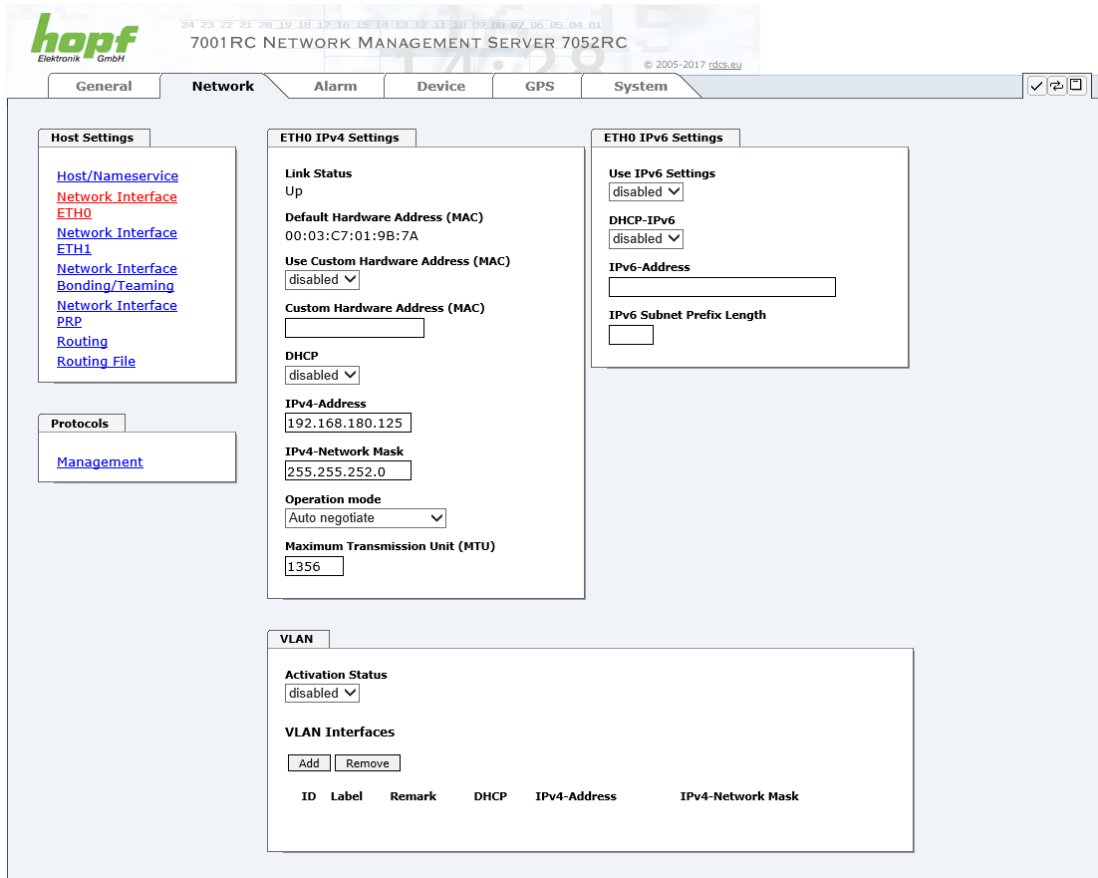
If the IPv4 default gateway is not known, it must be requested by the network administrator. If no standard gateway is available (special case), enter 0.0.0.0 in the input field or leave the field blank.

6.3.2.1.6 Default Gateway IPv6

If the Ipv6 default gateway is not known, it must be requested by the network administrator. If no standard gateway is available (special case), enter :: in the input field or leave the field blank.

6.3.2.2 Network Interface ETH0/ETH1

Configuration of the Ethernet interface ETH0/ETH1 of the Board 7052RC



7001RC NETWORK MANAGEMENT SERVER 7052RC

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General Network Alarm Device GPS System

Host Settings

- [Host/Nameservice](#)
- [Network Interface ETH0](#)
- [Network Interface ETH1](#)
- [Network Interface Bonding/Teaming](#)
- [Network Interface PRP](#)
- [Routing](#)
- [Routing File](#)

Protocols

- [Management](#)

ETH0 IPv4 Settings

Link Status: Up

Default Hardware Address (MAC): 00:03:C7:01:9B:7A

Use Custom Hardware Address (MAC): disabled

Custom Hardware Address (MAC):

DHCP: disabled

IPv4-Address: 192.168.180.125

IPv4-Network Mask: 255.255.252.0

Operation mode: Auto negotiate

Maximum Transmission Unit (MTU): 1356

ETH0 IPv6 Settings

Use IPv6 Settings: disabled

DHCP-IPv6: disabled

IPv6-Address:

IPv6 Subnet Prefix Length:

VLAN

Activation Status: disabled

VLAN Interfaces

Add Remove

ID	Label	Remark	DHCP	IPv4-Address	IPv4-Network Mask
----	-------	--------	------	--------------	-------------------

6.3.2.2.1 Default Hardware Address (MAC)

The factory assigned MAC address can only be read and cannot be changed by the user. It is assigned once-only by **hopf** Elektronik GmbH for each Ethernet interface.

For further information about the MAC address refer to **Chapter 1.1.2 MAC Address for ETH0 and ETH1** for Board 7052RC.



hopf Elektronik GmbH MAC addresses begin with **00:03:C7:xx:xx:xx**.

6.3.2.2.2 Customer Hardware Address (MAC)

The MAC address assigned from **hopf** can be changed to any user-defined MAC address. The board identifies itself with the user-defined MAC address to the network. The default hardware address shown in WebGUI remains unchanged.



Please avoid a double of customer MAC address in the Ethernet.
If the MAC address is not known please contact your network administrator.

The use of customers MAC address needs to be activated by the function **Use Custom Hardware Address (MAC)** with **enable** and subsequently save it with **Apply** and **Save**.

Afterwards the customers MAC address has to be entered in hexadecimal form with a colon to separate as described in the below example, e.g. **00:03:c7:55:55:02**



The MAC address assigned by **hopf** can be activated at any time by disabling this function.



There are no MAC multicast addresses allowed!

Finally, the Board 7052RC has to be restarted via "Device" □ "Reboot Device" (see **Chapter 6.3.4.4 Restarting the Board (Reboot Device / Hardware Reset)**)

6.3.2.2.3 DHCP

If DHCP is to be used, 0.0.0.0 should be entered as the IP address via the **hopf** Base System menu (likewise for gateway and network mask). This change can also be made via the web interface by enabling the DHCP mode.

6.3.2.2.4 IP Address

The IP address is generally configured via the **hopf** Base System menu. However it can also be changed via the web interface.

Contact your network administrator for details of the IP address if not known.

6.3.2.2.5 Network Mask

The network mask is generally configured via the **hopf** Base System menu. However it can also be changed via the web interface.

Contact your network administrator for details of the network mask if not known.

6.3.2.2.6 Operation Mode

The network device usually adjusts the data stream and duplex mode to the device to which it is connected (e.g. HUB, SWITCH) automatically. If the network device requires a certain speed or duplex mode, this can be configured via the web interface. The value should only be changed in special cases. The automatic setting is normally used.

Operation mode

Auto negotiate
10 Mbps / half duplex
100 Mbps / half duplex
10 Mbps / full duplex
100 Mbps / full duplex
1000 Mbps / full duplex



In individual cases an enabled "Auto negotiate" might lead to problems between the network components and the adjustment process fails.

In such cases it is recommended to set the network speed of the Board 7052RC **and** the connected network components manually to the same value.

6.3.2.2.7 Maximum Transmission Unit (MTU)

The Maximum Transmission Unit describes the maximum size of a data packet of a protocol of the network layer (layer 3 of OSI model), measured in octets which can be transferred into the frame of a net of the security layer (layer 2 of OSI model) without fragmentation.

Board 7052RC is going to be delivered with default setting 1356.

6.3.2.2.8 IPv6

The board 7052RC can also be operated in an IPv6 network.

To enable IPv6, **Use IPv6 Settings** must be set to **enable**.

IPv6 addresses are 128 bits long and they are recorded in eight 4-character hexadecimal blocks. For example: **2001:0db8:0000:08d3:1319:8a2e:0370:7344**

Leading zeroes in a 4-character hexadecimal block can be omitted. For the above example, this results in the notation: **2001:db8:0:8d3:1319:8a2e:370:7344**

In addition, **once** per IPv6 address a consecutive sequence of blocks containing all zeros may be omitted. But this must be recorded with two consecutive colons. For the above example, this gives the notation: **2001:db8::8d3:1319:8a2e:370:7344**

Another example: **2001:0:0:0:1319:8a2e:0:7344** may be represented

as **2001::1319:8a2e:0:7344**

or **2001:0:0:0:1319:8a2e::7344**

6.3.2.2.9 DHCP-IPv6

If DHCP is to be used, this function is activated with **enabled**.

6.3.2.2.10 IPv6 Address

If DHCP is not used, enter the IPv6 address here. If the IPv6 address to be used is unknown, it must be requested by the network administrator.

6.3.2.2.11 IPv6 Subnet Prefix Length

If no DHCP is used, the length of the network address must be entered here. If the length of the network address is not known, it must be requested by the network administrator.

6.3.2.2.12 VLAN (Activation Key necessary)

A VLAN (Virtual Local Area Network) is a logical sub-network within a network switch or a whole physical network. VLANs are used to separate the logical network infrastructure from the physical wiring, thus to virtualize the Local Area Network. The technology of VLAN is standardized by IEEE Standard 802.1q. Network applications like Board 7052RC, implementing the standard IEEE 802.1q, are able to allocate individual network interfaces to specific VLANs. To transfer data packets of several VLANs via a single network interface the data packets are marked with a related VLAN ID. This method is called VLAN-Tagging. The network application at the other end of the line (e.g. network switch, router etc.) can allocate the data packet to the correct VLAN by checking the marking / tag.

VLAN

Activation Status

disabled ▼

VLAN Interfaces

Add

Remove

ID	Label	Remark	DHCP	IP-Address	Network Mask
----	-------	--------	------	------------	--------------

WebGUI with activated VLAN

To be able to configure VLANs the activation status must be set to "enabled" first. Afterwards up to 32 different VLANs per network interface can be configured by clicking the button "Add".

An explicit VLAN ID must be configured for each VLAN interface.

The boxes "Label" and "Remark" can be filled out with a designation or a comment to easily keep the configured VLANs apart.

Determination of the IP-address for the configured VLAN interface can either be done automatically via DHCP or by filling out the boxes "IP-Address" and "Network Mask".

VLAN

Activation Status

enabled ▼

VLAN Interfaces

Add

Remove

ID	Label	Remark	DHCP	IP-Address	Network Mask
<input type="checkbox"/> 10	DEV	Development	disabled ▼	192.168.180.30	255.255.255.0



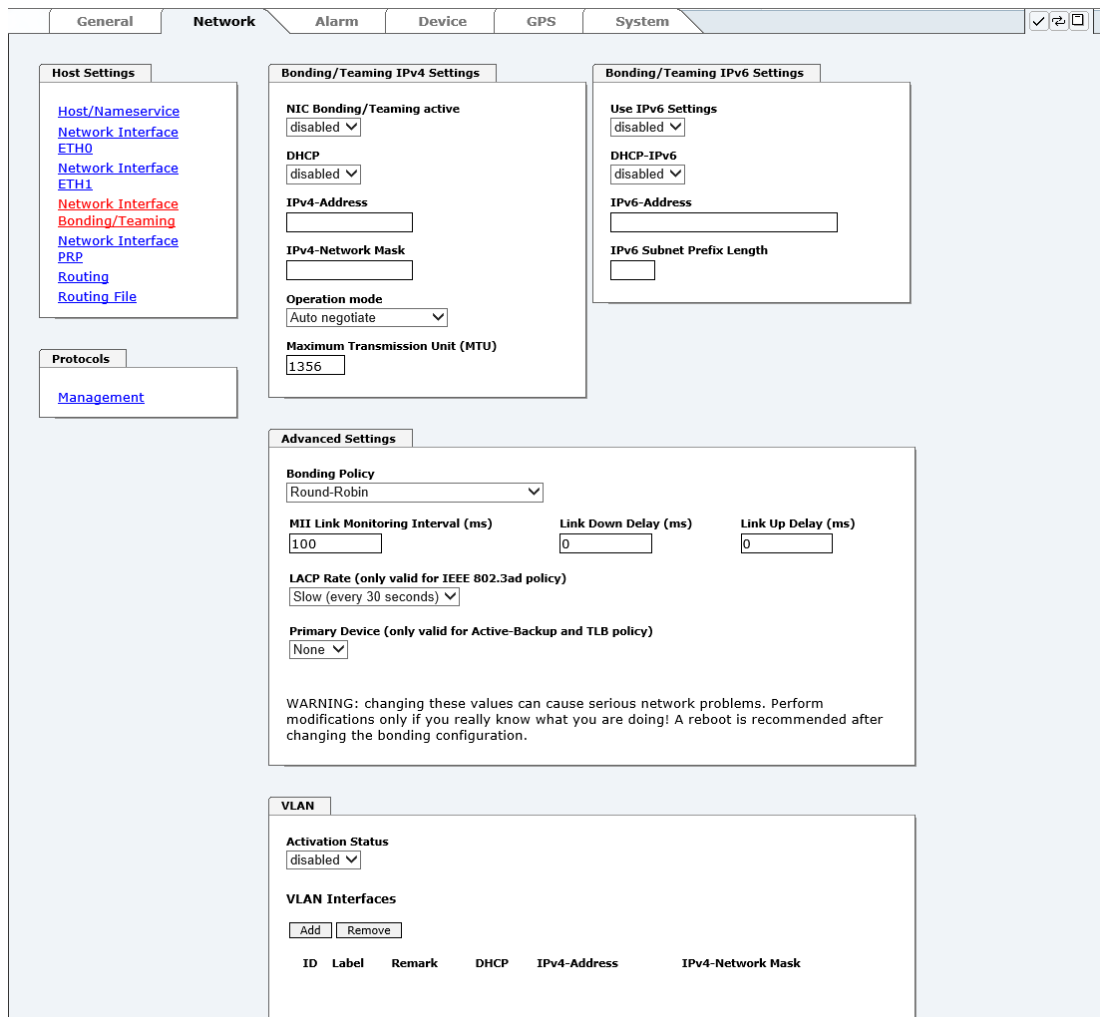
To ensure the correct function the network appliance must be connected with Board 7052RC via the network interface. Furthermore it must be ensured that the network appliance is accurately configured with the same VLANs.



VLAN ID one (1) and two (2) are reserved and are therefore not permitted!

6.3.2.3 Network Interface Bonding/Teaming (Activation Key necessary)

The function Network Interface Bonding/Teaming (also known as NIC Bonding, NIC Teaming, Link Bundling, EtherChannel) enables to bundle the physical network interfaces ETH0 and ETH1 to a logical network interface.



The screenshot shows the 'Network' tab of the web interface. On the left, a sidebar contains links for 'Host Settings' (Host/Nameservice, Network Interface ETH0, Network Interface ETH1, Network Interface Bonding/Teaming, Network Interface PRP, Routing, Routing File) and 'Protocols' (Management). The main area is divided into three sections: 'Bonding/Teaming IPv4 Settings', 'Bonding/Teaming IPv6 Settings', and 'Advanced Settings'. The 'Bonding/Teaming IPv4 Settings' section includes fields for 'NIC Bonding/Teaming active' (disabled), 'DHCP' (disabled), 'IPv4-Address', 'IPv4-Network Mask', 'Operation mode' (Auto negotiate), and 'Maximum Transmission Unit (MTU)' (1356). The 'Bonding/Teaming IPv6 Settings' section includes fields for 'Use IPv6 Settings' (disabled), 'DHCP-IPv6' (disabled), 'IPv6-Address', and 'IPv6 Subnet Prefix Length'. The 'Advanced Settings' section includes a 'Bonding Policy' dropdown (Round-Robin), 'MII Link Monitoring Interval (ms)' (100), 'Link Down Delay (ms)' (0), 'Link Up Delay (ms)' (0), 'LACP Rate (only valid for IEEE 802.3ad policy)' (Slow (every 30 seconds)), and 'Primary Device (only valid for Active-Backup and TLB policy)' (None). A warning message states: 'WARNING: changing these values can cause serious network problems. Perform modifications only if you really know what you are doing! A reboot is recommended after changing the bonding configuration.' Below these sections is a 'VLAN' section with 'Activation Status' (disabled) and a table for 'VLAN Interfaces' with columns for ID, Label, Remark, DHCP, IPv4-Address, and IPv4-Network Mask.

This function is used for the distribution of load as well as to increase fail-safety in computer networks.



Making settings without profound knowledge of Bonding/Teaming can lead to serious network problems!

An incorrect configuration can lead to a loss of the network connection so that the Ethernet access to Board 7052RC is going to be refused.

In this case settings of Board 7052RC must be set back to default settings!



If function Bonding has been activated, parameters for ETH0 and ETH1 cannot be changed any more. The parameters are not displayed in the host setting menu as long as Bonding will be deactivated.

6.3.2.3.1 Basic Configuration

Determination of the basic network configuration with activated function Bonding/Teaming.

Basic Configuration

NIC Bonding/Teaming active

DHCP

IP-Address

Network Mask

Maximum Transmission Unit (MTU)

NIC Bonding/Teaming active

Activation of function NIC Bonding/Teaming

DHCP

Activation of DHCP of the "Bonding interface".



A change of the IP-address or activating of DHCP do have an immediate effect after confirming the settings – the connection to the web interface must be adapted and renewed.

IP address

Input of IP address of the "Bonding interface".

If you do not know the IP address, please contact your network administrator.



A change of the IP-address or activating of DHCP do have an immediate effect after confirming the settings – the connection to the web interface must be adapted and renewed.

Network Mask

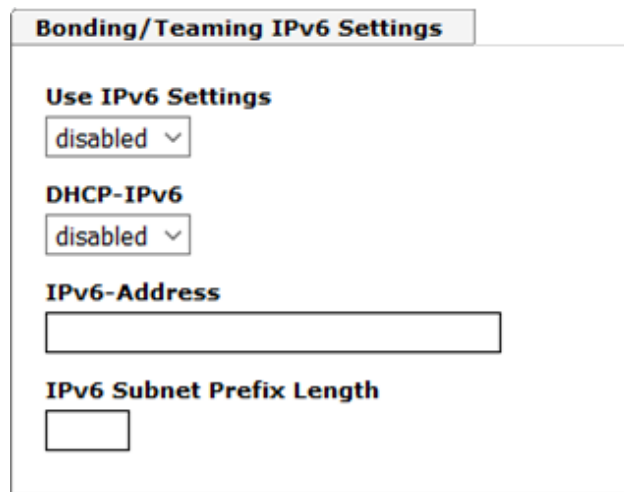
Input of the network mask of the "Bonding interface".



A change of the IP-address or activating of DHCP do have an immediate effect after confirming the settings – the connection to the web interface must be adapted and renewed.

6.3.2.3.2 IPv6-Network Configuration

Defining the IPv6 network configuration with the Bonding / Teaming function activated.



Bonding/Teaming IPv6 Settings

Use IPv6 Settings
disabled ▾

DHCP-IPv6
disabled ▾

IPv6-Address

IPv6 Subnet Prefix Length

Use IPv6 Settings

Activation of IPv6 function

DHCP IPv6

Activation of IPv6 DHCP for the "bonding interface".

IPv6 address

Input of the IPv6 address for the "bonding interface". If the IPv6 address is not known, it must be requested by the network administrator.

IPv6 Subnet Prefix Length

Input of the IPv6 network length for the "bonding interface".

6.3.2.3.3 Advanced Settings

Advanced Settings

Bonding Policy

Active-Backup

MII Link Monitoring Interval (ms)

100

Link Down Delay (ms)

0

Link Up Delay (ms)

0

LACP Rate (only valid for IEEE 802.3ad policy)

Slow (every 30 seconds)

Primary Device (only valid for Active-Backup and TLB policy)

None

WARNING: changing these values can cause serious network problems. Perform modifications only if you really know what you are doing! A reboot is recommended after changing the bonding configuration.

Bonding Policy

- Round-Robin:**
 In this case the network interfaces, starting with ETH0, are transmitting sequentially whereby a distribution of load and a higher tolerance for errors are achieved. In that mode the network interfaces must be connected to the same network switch.
- Active Backup:**
 Only one of two network interfaces is sending and receiving. If an error occurs, the other network interface assumes responsibility for the process. The network interfaces do not have to be connected to the same network switch. From the outside the MAC address of the association is only visible on one network interface to avoid a mix-up. This mode supports tolerance for errors.
- Balance XOR:**
 Source and target are permanently assigned with one another via the MAC address of the network interfaces ETH0 and ETH1. The network interfaces must be connected to the same network switch. This mode supports distribution of load and tolerance for errors.
- Broadcast:**
 In this mode the computer sends its data via all available network interfaces which enables the use of several network switches. This fact leads to a high tolerance for errors, but this mode does not enable distribution of load.
- IEEE 802.3ad Dynamic Link Aggregation:**
 The network interfaces ETH0 and ETH1 are going to be bundled (Trunking) in this mode. It is mandatory that the network interfaces are configured with the same transmission rate and duplex setting. Bundling is made dynamically via the Link Aggregation Control Protocol (LACP). This mode supports distribution of load as well as tolerance for errors.



The network switch on which the network interfaces ETH0 and ETH1 of Board 7052RC are connected also needs to be configured correctly! A wrong configuration can lead to a loss of availability of Board 7052RC!

- **Adaptive Transmit Load Balancing (TLB):**
Outbound data traffic is split on both network interfaces ETH0 and ETH1 in accordance with the current load, depending on the interface speed adjusted.
The network interfaces do not have to be connected on the same network switch.
This mode supports distribution of load and tolerance for errors.

MII link monitoring interval (ms)

Indicates the interval in milliseconds for observing the MII-connection. A value of zero deactivates monitoring. The default value is 100ms.

link down delay (ms)

Determines the delay time in milliseconds to deactivate a connection after a link error is detected. This value needs to be a multiple of the MII link monitoring interval.

link up delay (ms)

Determines the delay time in milliseconds to enable a conjunction after a connection is detected. This value needs to be a multiple of the MII link monitoring interval.

LACP rate (only available for IEEE 802.3ad directive)

Indicates the link partner's request frequency to transfer LACP packets in IEEE 802.3ad mode.

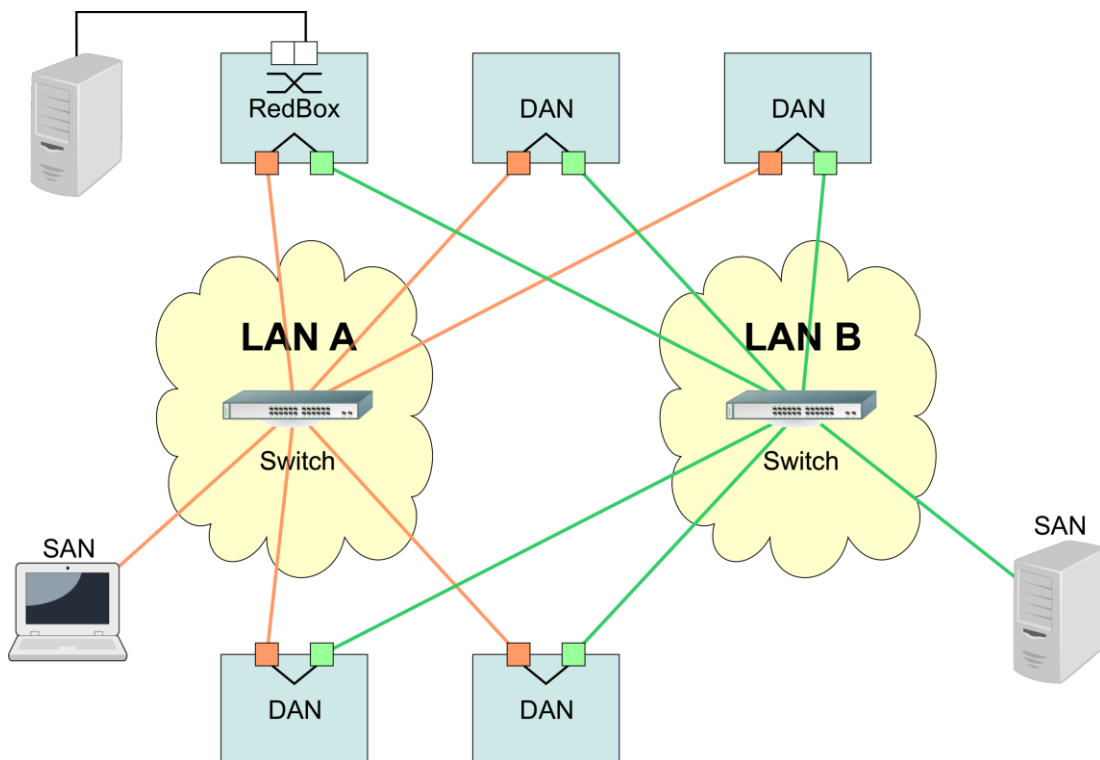
Primary Device (only valid for active backup and TLB directive)

If this asset is configured and the network interface is active, the adjusted network interface is going to be used. Only if the network interface is inactive, mode is changed to the second network interface.

6.3.2.4 Network Interface PRP (Activation Key necessary)

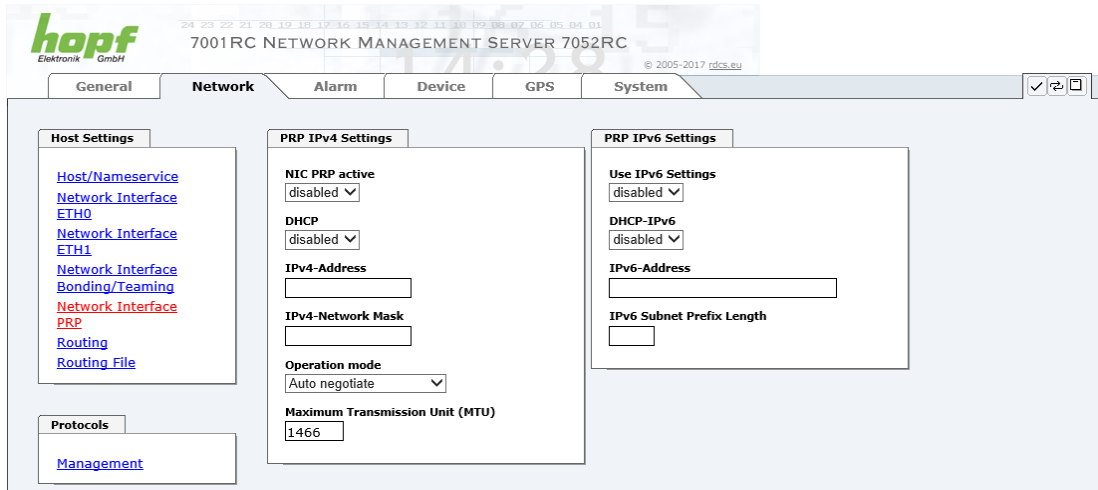
The PRP (Parallel Redundancy Protocol) functionality is specified in standard IEC 62439-3:2011 and enables to bundle the physical network interfaces ETH0 and ETH1 to a logical network interface. Each network interface is connected to an independent LAN (Local Area Network). If one of the two LANs has got a failure, usage of PRP ensures that the network connection between the PRP terminal devices is going to be maintained via the second, independent LAN. PRP standard was developed for very high demanding and critical applications in the field of automation of substations.

The following illustration shows an example of a PRP network:



PRP-suitable applications are known as DAN (Dual Attached Node) and are going to be connected to the independent networks "LAN A" and "LAN B". The advantage of PRP is that cost-efficient and common network switches can be used which do not have to support the PRP standard. Applications which do not need to be redundantly available and which do not have to support PRP can be connected without problems in one of the two LANs - they are then called SAN (Single Attached Node). If it is necessary to redundantly connect non-PRP-supporting applications to the PRP network, a so-called RedBox (Redundancy Box) can be used.

Time Server 7052RC supports PRP as DAN and can therefore directly be integrated into a PRP network without using a RedBox.



To use PRP the following settings must be carried out:

NIC PRP active

Activation of the PRP functionality

DHCP

Activation of DHCP for the "PRP interface".



A change of the IP address or activation of DHCP will have an immediate effect after applying the settings - the connection to the web interface must be adapted and renewed.

IP address

Input of the IP address for the "PRP interface". If unknown the IP address needs to be obtained by the network administrator.



A change of the IP address or activation of DHCP will have an immediate effect after applying the settings - the connection to the web interface must be adapted and renewed.

Network Mask

Input of the network mask for the "PRP interface".



A change of the IP address or activation of DHCP will have an immediate effect after applying the settings - the connection to the web interface must be adapted and renewed.

Maximum Transmission Unit (MTU)

Input of the MTU to be used for the "PRP interface".



The MTU default setting with value 1466 should not be necessary by default.

An incorrect configuration can lead to a loss of the network connection which refuses the Ethernet access to Time Server 7052RC.

In that case the settings of Time Server 7052RC need to be set to "factory default"!

The network interface ETH0 of Time Server 7052RC need to be connected to PRP network "LAN A", network interface ETH1 need to be connected to PRP network "LAN B"!



If settings are done without profound knowledge of PRP, severe network problems can occur.

An incorrect configuration can lead to a loss of the network connection which refuses the Ethernet access to Time Server 7052RC.

In that case the settings of Time Server 7052RC need to be set to "factory default"!



If the functionality PRP was activated, parameters for ETH0 and ETH1 can no longer be adapted. The parameters will not be displayed in the host settings menu as long as PRP is going to be deactivated.

6.3.2.4.1 IPv6-Netzwerkkonfiguration

Defining the IPv6 network configuration for the PRP interface.

Use IPv6 Settings

Activation of IPv6 function

DHCP IPv6

Activation of IPv6 DHCP for the "PRP interface".

IPv6 address

Input of the IPv6 address for the "PRP interface".

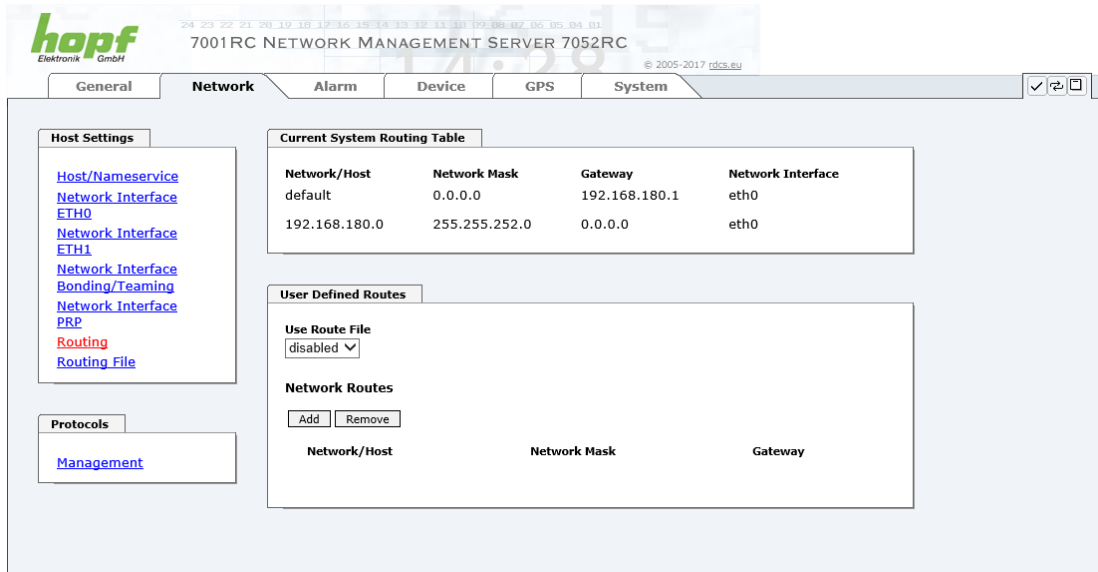
If the IPv6 address is not known, it must be requested by the network administrator.

IPv6 Subnet Prefix Length

Input of the IPv6 network length for the "PRP interface".

6.3.2.5 Routing

A route must be configured if the Board is to be used in more than the local sub-network.



The screenshot shows the web interface for the 7001RC Network Management Server 7052RC. The 'Network' tab is selected. On the left, under 'Host Settings', there are links for 'Host/Nameservice', 'Network Interface', 'ETH0', 'Network Interface', 'ETH1', 'Network Interface', 'Bonding/Teaming', 'Network Interface', 'PRP', 'Routing', and 'Routing File'. Below this is a 'Protocols' section with a link for 'Management'. The main area displays the 'Current System Routing Table' with the following data:

Network/Host	Network Mask	Gateway	Network Interface
default	0.0.0.0	192.168.180.1	eth0
192.168.180.0	255.255.252.0	0.0.0.0	eth0

Below the routing table is the 'User Defined Routes' section. It has a 'Use Route File' dropdown set to 'disabled'. There is a 'Network Routes' section with 'Add' and 'Remove' buttons. Below this is a table with columns for 'Network/Host', 'Network Mask', and 'Gateway'.

Routes cannot be used where the gateway / gateway host is not in the local sub-network range of the Board.



The parameterization of this feature is a critical process as an incorrect configuration may lead to considerable problems on the network!

The image above shows every configured route of the Base System Routing Table as well as the User Defined Routes.



The Board cannot be used as a router!

Select **Use Route File** to set whether the routing configuration set under **User Defined Routes** should be used, or routing configuration using a routing file.




If IPv6 routes are required, the routes must be made using the settings in **Chapter 6.3.2.6 Routing File**.

6.3.2.6 Routing File

In order to activate this function, **Use Route File** must be set to **enabled** on the Routing Page (see **Chapter 6.3.2.5 Routing**).

The routing file also makes it possible to configure IPv6 routes.



24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 09 08 07 06 05 04 03

7001RC NETWORK MANAGEMENT SERVER 7052RC

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General

Network

Alarm

Device

GPS

System

Host Settings

[Host/Nameservice](#)
[Network Interface](#)
[ETH0](#)
[Network Interface](#)
[ETH1](#)
[Network Interface](#)
[Bonding/Teaming](#)
[Network Interface](#)
[PRP](#)
[Routing](#)
[Routing File](#)


Protocols

Management

Routing File

Update file:

Download Routing File


[Click here to download](#)

Current System Routing Table

Network/Host	Network Mask	Gateway	Network Interface
default	0.0.0.0	192.168.180.1	eth0
192.168.180.0	255.255.252.0	0.0.0.0	eth0
00000000000000000000000000000001 80		00000000000000000000000000000000 10	
fe800000000000000000000000000000 80		00000000000000000000000000000000 10	
fe800000000000000000000000000000 40		00000000000000000000000000000000 eth0	
ff000000000000000000000000000000 08		00000000000000000000000000000000 eth0	
00000000000000000000000000000000 00		00000000000000000000000000000000 10	

Via the selection window under Update file and the button Upload now a new routing file can be uploaded. When uploading the file is checked whether the file is error-free and only then it is used.

If a routing file has already been uploaded, the uploaded routing file can be downloaded under Download Routing File.

Routing File Syntax

Each line of the routing file must be either a valid routing line or a comment line.

A comment line starts with a hash sign (#) and can contain any text behind it.

A routing line has the format [destination address] [tab] [length of the destination mask in bits] [tab] [gateway address for the specified destination].

If the host 192.168.20.11 is to be reached using the gateway 192.168.0.2, then the routing file must look like this:

```
192.168.20.11    32    192.168.0.2
```

Example of a Routing File:

```
# Host 192.168.20.11 via Gateway 192.168.0.2
192.168.20.11 32 192.168.0.2
#Net 192.168.180.0 Netmask 255.255.255.0 via Gateway 192.168.0.2
192.168.180.0 24 192.168.0.2
#Net 2001:0db8:0:f102:: Subnet Prefix Length 64 via Gateway 2001:0db8:0:f101::1
2001:0db8:0:f102:: 64 2000::1
```

Current **System** Routing Table

This table shows all active IPv4 and IPv6 routes.

For IPv6 routes, the colons of the destination and gateway addresses are not displayed, and the **Network Mask** column displays the length in hexadecimal

6.3.2.7 Management-Protocols – HTTP, SNMP etc.

Protocols that are not required should be disabled for security reasons. A correctly configured Board is always accessible via the web interface.

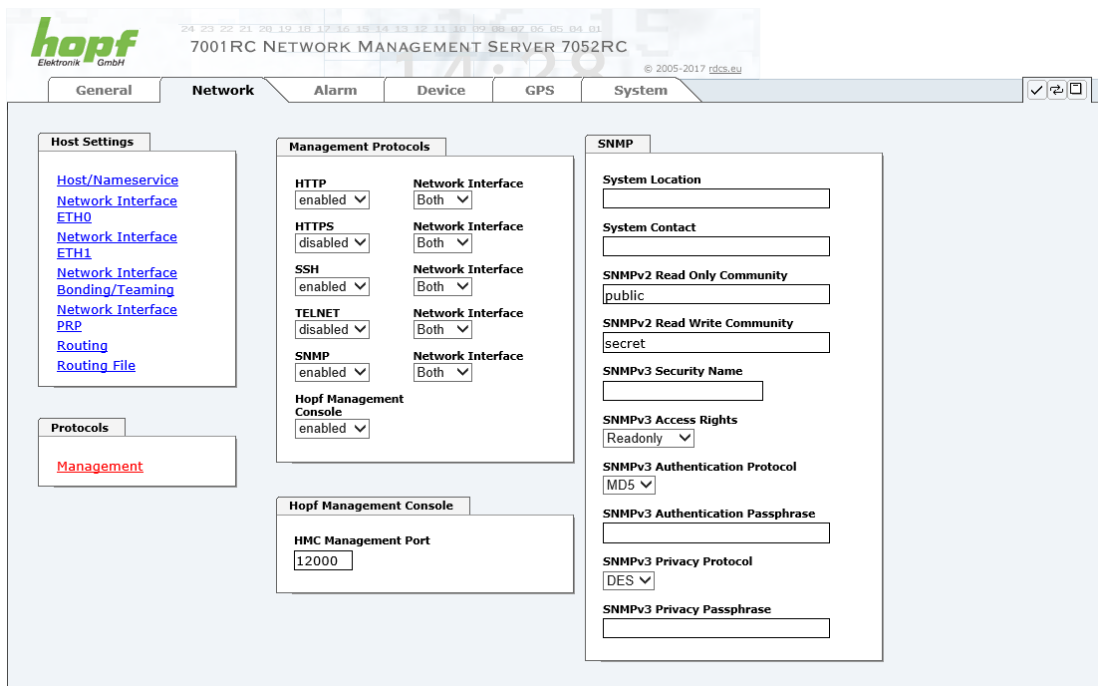
Changes to the availability for a protocol (enable/disable) take effect immediately.



If by mistake all protocol channels become "disabled" the SSH channel automatically get "enabled" after the attempt to save.



After a factory default the HTTP channel is "enabled".



All fields must be completed for the SNMP to operate correctly. Contact your network administrator if you do not have all the data.

The SNMP protocol should be enabled when using SNMP Traps.



These service settings are applicable across the board! Services with "disabled" status are not externally accessible and are not made externally available by the Board!

6.3.2.7.1 SNMPv2c / SNMPv3

Both protocols SNMPv2c and SNMPv3 are supported and can be configured and enabled independently from each other.

System Location and System Contact are global settings and are valid for both protocols (SNMPv2c / SNMPv3).

In order to disable SNMPv2c both fields **SNMP Read Only Community** and **SNMP Read Write Community** must remain empty.

SNMPv2c	SNMPv2c enabled	SNMPv2c disabled
Read Only Community:	set (e.g. public)	empty
Read/Write Community:	set (e.g. secret)	empty

In order to enable SNMPv3 the following fields must be set:

SNMPv3	Description
Security Name:	SNMPv3 is enabled (identical to the username)
Access Rights:	Equivalent to the Read/Write Communities in SNMPv2c
Authentication Protocol:	Authentication (MD5 or SHA Hash)
Privacy Protocol:	Encryption (DES or AES Algorithm)

There are three security levels in SNMPv3 that can be adjusted by the removal of the pass-phrases:

SNMPv3	noAuthNoPriv	authNoPriv	authPriv
Authentication Passphrase:	empty	set	set
Privacy Passphrase:	empty	empty	set



Right now only one user is supported.

6.3.2.7.2 HMC Management Port

By standard the connection between management board (LAN) 7052RC and the remote software HMC is made via TCP Port 12000. If this value is changed all HMC-connections are interrupted. They must be re-connected by specification of the new configured ports.



If there is a firewall between HMC and the board the adjusted port (default 12000) must be unlocked to use TCP.

6.3.3 ALARM Tab

All the links within the tabs on the left hand side lead to corresponding detailed setting options.

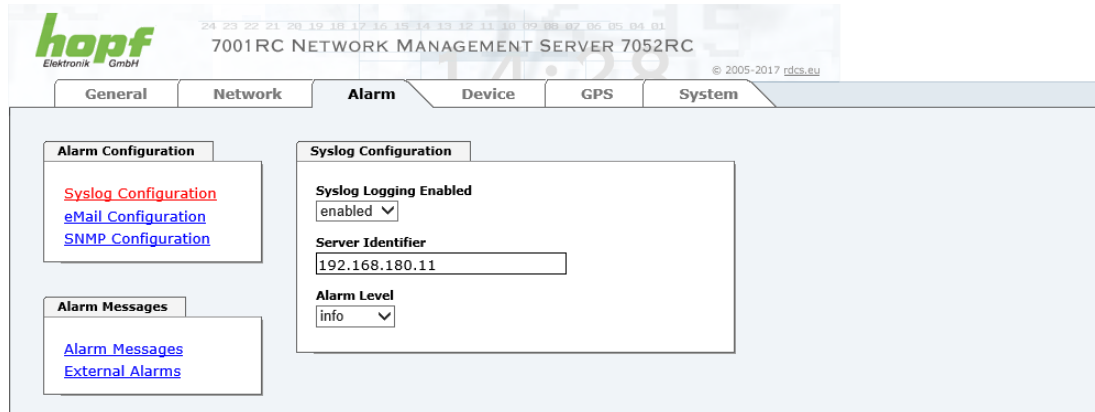
6.3.3.1 Syslog Configuration

It is necessary to enter the name or IPv4 or IPv6 address of a Syslog server in order to store every configured alarm situation which occurs on the Board in a Linux/Unix Syslog. If everything is configured correctly and enabled (dependent on the Syslog level), every message is transmitted to the Syslog server and stored in the Syslog file there.

Syslog uses Port 514.

Co-logging on the Board itself is not possible as the internal memory is not of sufficient size.

It should be noted that the standard Linux/Unix Syslog mechanism is used for this functionality. This is not the same as the Windows System Event mechanism!

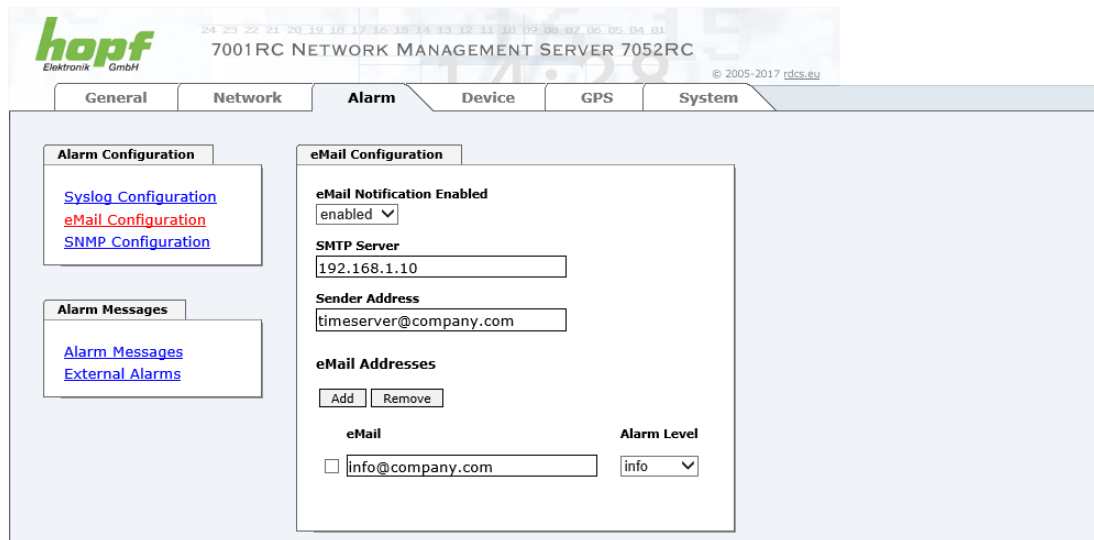


The screenshot shows the web interface of the Hopf 7001RC Network Management Server 7052RC. The 'Alarm' tab is selected. On the left, there are links for 'Syslog Configuration', 'eMail Configuration', and 'SNMP Configuration' under 'Alarm Configuration', and 'Alarm Messages' and 'External Alarms' under 'Alarm Messages'. The 'Syslog Configuration' section on the right shows 'Syslog Logging Enabled' set to 'enabled', 'Server Identifier' set to '192.168.180.11', and 'Alarm Level' set to 'info'.

The alarm level designates the priority level of the messages to be transmitted and the level from which transmission is to take place (see **Chapter 6.3.3.4 Alarm Messages**).

Alarm Level	Transmitted Messages
none	no messages
info	info / warning / error / alarm
warning	warning / error / alarm
error	error / alarm
alarm	alarm

6.3.3.2 E-mail Configuration



E-mail notification is one of the important features of this device which offer technical personnel the opportunity to monitor and/or control the IT environment.

It is possible to configure various, independent E-mail addresses which each have different alarm levels.

Dependent on the configured level, an E-mail is sent after an error has occurred on the respective receiver.

A valid E-mail server (SMTP server) must be entered for the purpose of correct configuration.

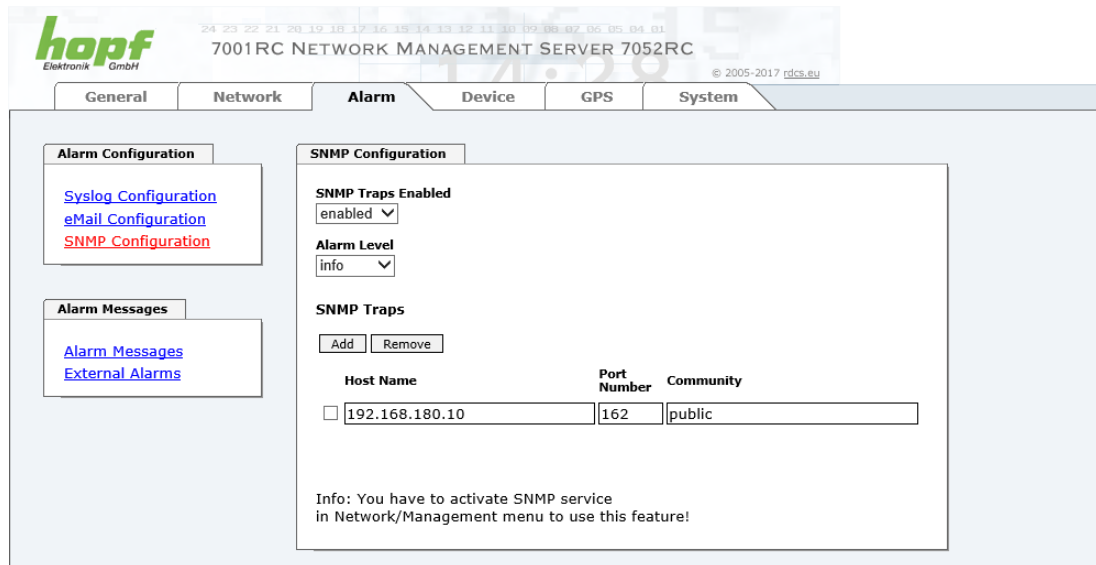
Some E-mail servers only accept messages if the sender address entered is valid (spam protection). This can be inserted in the "Sender Address" field.

The Alarm Level designates the priority level of the messages to be sent and the level from which they are to be sent (see **Chapter 6.3.3.4 Alarm Messages**).

Alarm Level	Transmitted Messages
none	no messages
info	info / warning / error / alarm
warning	warning / error / alarm
error	error / alarm
alarm	alarm

6.3.3.3 SNMP Configuration / TRAP Configuration

It is possible to use an SNMP agent (with MIB) or to configure SNMP traps in order to monitor the Board over SNMP.



SNMP traps are sent to the configured hosts over the network. It should be noted that these are based on UDP and therefore it is not certain that they will reach the configured host!

Several hosts can be configured. However, all have the same alarm level.

The private **hopf** enterprise MIB is also available over the web (see **Chapter 6.3.4.11 Downloading Configurations / SNMP MIB**).

The “Alarm Level” designates the priority level of the messages to be sent and the level from which they are to be sent (see **Chapter 6.3.3.4 Alarm Messages**).

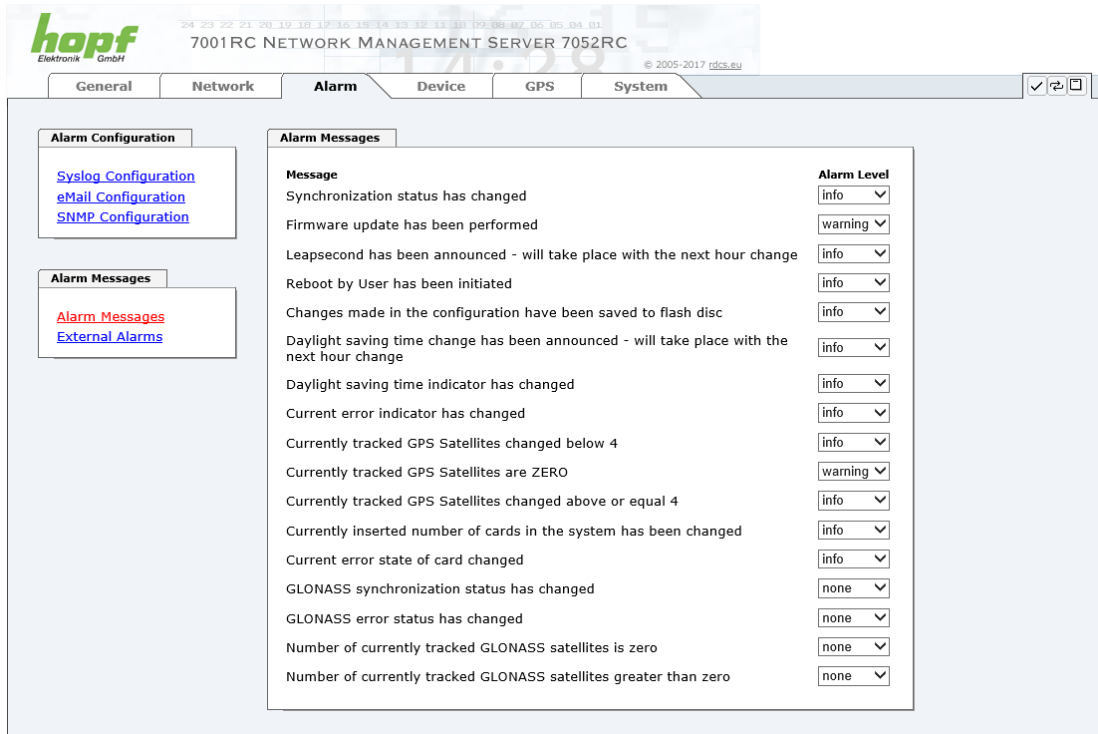
Alarm Level	Transmitted Messages
none	no messages
info	info / warning / error / alarm
warning	warning / error / alarm
error	error / alarm
alarm	alarm



SNMP protocol must be enabled in order to use SNMP (see **Chapter 6.3.2.7 Management-Protocols – HTTP, SNMP etc.**).

6.3.3.4 Alarm Messages

Every message shown in the image can be configured with the displayed alarm levels. If level NONE is selected this means that this message is completely ignored.



Message	Alarm Level
Synchronization status has changed	info
Firmware update has been performed	warning
Leapsecond has been announced - will take place with the next hour change	info
Reboot by User has been initiated	info
Changes made in the configuration have been saved to flash disc	info
Daylight saving time change has been announced - will take place with the next hour change	info
Daylight saving time indicator has changed	info
Current error indicator has changed	info
Currently tracked GPS Satellites changed below 4	info
Currently tracked GPS Satellites are ZERO	warning
Currently tracked GPS Satellites changed above or equal 4	info
Currently inserted number of cards in the system has been changed	info
Current error state of card changed	info
GLONASS synchronization status has changed	none
GLONASS error status has changed	none
Number of currently tracked GLONASS satellites is zero	none
Number of currently tracked GLONASS satellites greater than zero	none

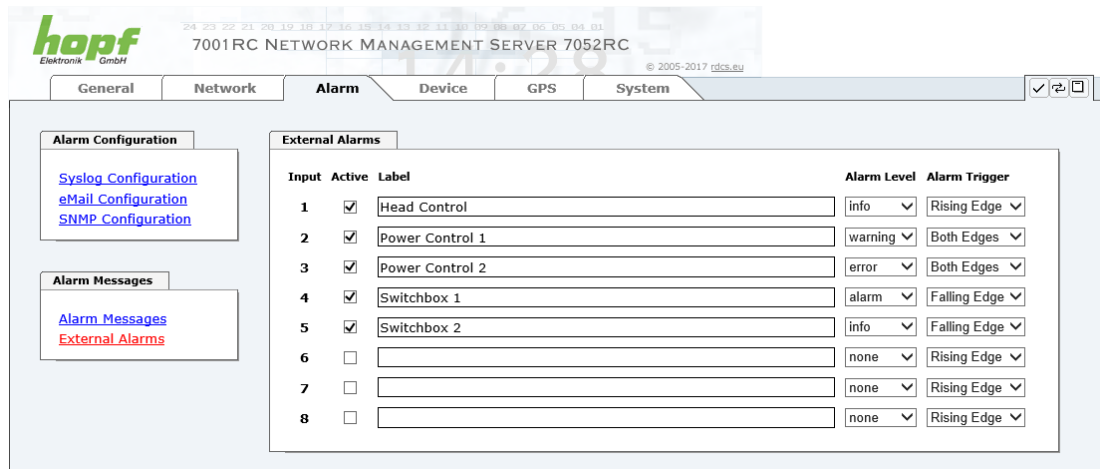
A corresponding action is carried out if an event occurs, depending on the messages, their configured levels and the configured notification levels of the E-mails.



Modified settings are failsafe stored after **Apply** and **Save** only.

6.3.3.5 External Alarm Messages (optional)

The Management Board 7052RC optionally provides eight (8) TTL compatible monitoring inputs within the system that are available for sending alarm messages released by the change of the input signal.



The screenshot shows the web interface for the 7001RC Network Management Server 7052RC. The 'Alarm' tab is selected, and the 'External Alarms' sub-tab is active. On the left, there are links for 'Syslog Configuration', 'eMail Configuration', 'SNMP Configuration', 'Alarm Messages', and 'External Alarms'. The main area displays a table for configuring 8 monitoring inputs.

Input	Active	Label	Alarm Level	Alarm Trigger
1	<input checked="" type="checkbox"/>	Head Control	info	Rising Edge
2	<input checked="" type="checkbox"/>	Power Control 1	warning	Both Edges
3	<input checked="" type="checkbox"/>	Power Control 2	error	Both Edges
4	<input checked="" type="checkbox"/>	Switchbox 1	alarm	Falling Edge
5	<input checked="" type="checkbox"/>	Switchbox 2	info	Falling Edge
6	<input type="checkbox"/>		none	Rising Edge
7	<input type="checkbox"/>		none	Rising Edge
8	<input type="checkbox"/>		none	Rising Edge

Each monitoring input is separately configured:

Active:

Activation / Deactivation of the monitoring input for release of alarm messages.

Label:

Naming of the monitoring input for a better identification of the alarm message, maximal 65 ASCII characters possible.

Alarm Level:

The alarm level indicates the priority level of the alarm message to be sent.

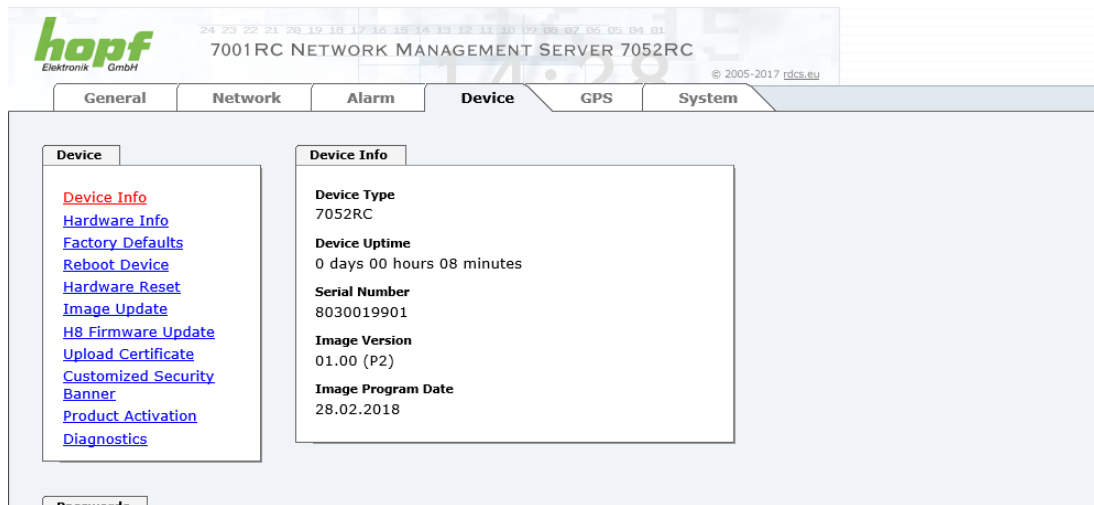
Alarm Trigger:

The Alarm Trigger indicates the change of signal input causing sending of the alarm message.

Alarm Trigger	Change of Signal	Display	TTL Input Signal
Rising Edge	Rising	Off ⇒ On	5V ⇒ 0V
Falling Edge	Falling	On ⇒ Off	0V ⇒ 5V
Both Edges	Rising and Falling	Off ⇒ On On ⇒ Off	5V ⇒ 0V 0V ⇒ 5V

6.3.4 DEVICE Tab

All the links within the tabs on the left hand side lead to corresponding detailed setting options.



This tab provides the basic information about the Board hardware and software/firmware. Password administration and the update services for the Board are also made accessible via this website. The complete download zone is also a component of this site.

6.3.4.1 Device Information

All information is available exclusively in write-protected and read-only form. Information about the Board type, serial number and current software versions is provided to the user for service and enquiry purposes.

6.3.4.3 Restoring the Factory Settings - Factory Defaults

In some cases it may be necessary or desirable to restore all of the Board's settings to their delivered condition (factory defaults).



This function serves to restore all values in the flash memory to their default values. This also includes passwords (see **Chapter 9 Factory Defaults of Board 7052RC**).

Please log in as a "Master" user in accordance with the description in **Chapter 6.2.1 LOGIN and LOGOUT as a User**

Press the "Reset now" button and wait until the restart has been completed.

Once this procedure has been triggered there is NO possibility of restoring the deleted configuration.



After a factory default a complete check (and reconfiguration of the Board where appropriate) is required. In particular, the default MASTER and DEVICE passwords must be reset.

6.3.4.4 Restarting the Board (Reboot Device / Hardware Reset)



The restart concerns Board 7052RC only.

Reboot Device: Restart of the internal Operating System



Hardware Reset: Board Reset including all Hardware components




All settings not saved with "**Save**" are lost on Reboot / Hardware Reset (see **Chapter 6.2.3 Entry or Changing Data**).

In broad terms, the **NTP service** implemented on the Board is restarted. This leads to a renewed alignment phase with the loss of the stability and accuracy reached up to this point.

Please log in as a "Master" user in accordance with the description in **Chapter 6.2.1 LOGIN and LOGOUT as a User**.

Pressing the "**Reset now**" or "**Perform Reset now**" button releases a restart.

6.3.4.5 Image Update & H8 Firmware Update

Patches and error recovery are provided for the individual Boards by means of updates.

Both the embedded image and the H8 firmware can only be downloaded to the Board via the web interface (login as "Master" user required). See also **Chapter 2.3 Firmware Update**.



The following points should be noted regarding updates:

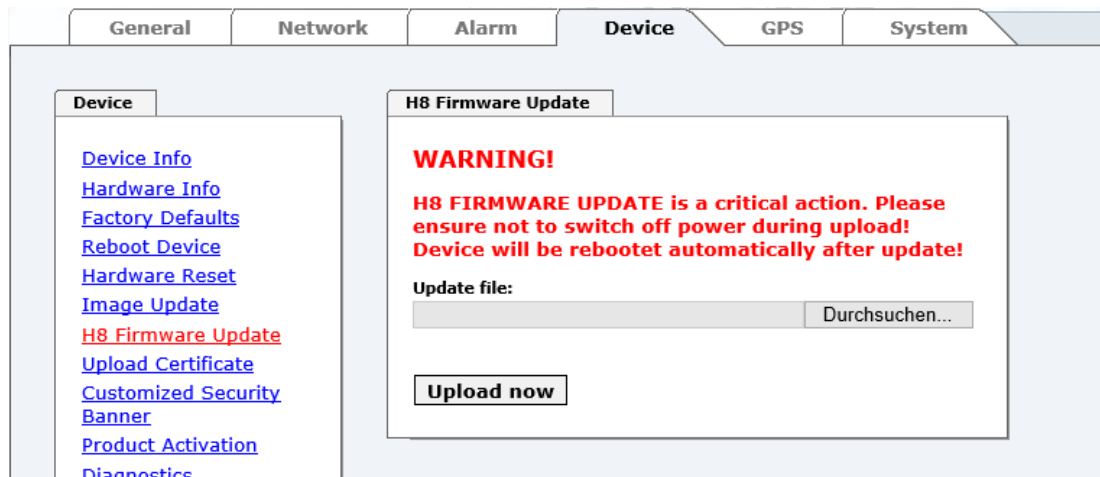
- Only experienced users or trained technical personnel should carry out an update after checking all necessary preconditions.
- Important: **Faulty updates** or **update attempts** may under certain circumstances require the Board to be returned to the factory for rectification at the owner's expense.
- Check that the update on hand is suitable for your Board. If in doubt please consult the support of the **hopf** company.
- In order to guarantee a correct update, the "**New version of saved site**" function must be set to "**On each access to the site**" in the Internet browser used.
- During the update procedure, the device **must not be switched off** and **settings must not be saved to the flash memory!**
- Updates are always executed as software set. I.e. H8 firmware update + image update. Unless specifically defined otherwise in the SET, it is absolutely essential to complete the H8 firmware update first, followed by the image update.
- For the Update please pay attention to the points in **Chapter 2.3 Firmware Update**.

In order to carry out an update, enter the name and the folder in which the update / firmware image is located in the text field or open the file selection dialogue by pressing the "Browse" button.

Correct firmware and image designations are (e.g.):

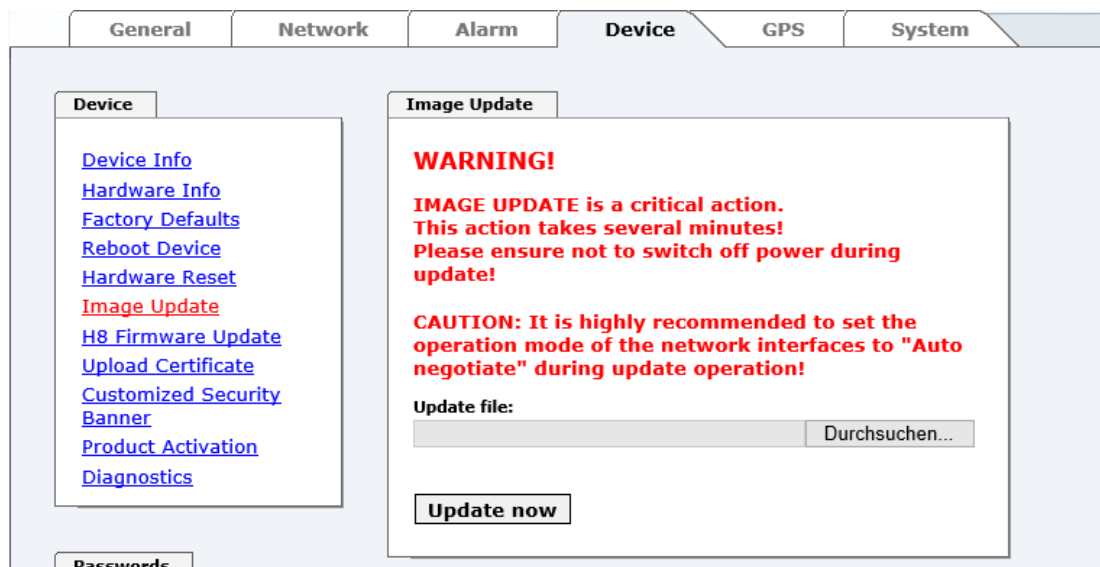
H8_8030_v0114_128.mot	for the H8 firmware (update takes approx. 1-1.5 minutes)
upgrade_8030gen_v0120.img	for the embedded image (update takes approx. 2-3 minutes)

The update process is started by pressing the "**Update now**" button. The update is installed if the transfer and checksum test are successful. A success page is displayed and shows the number of bytes that have been transferred and installed.



A restart of the Board with the new Firmware is done automatically after the H8-Firmware update.

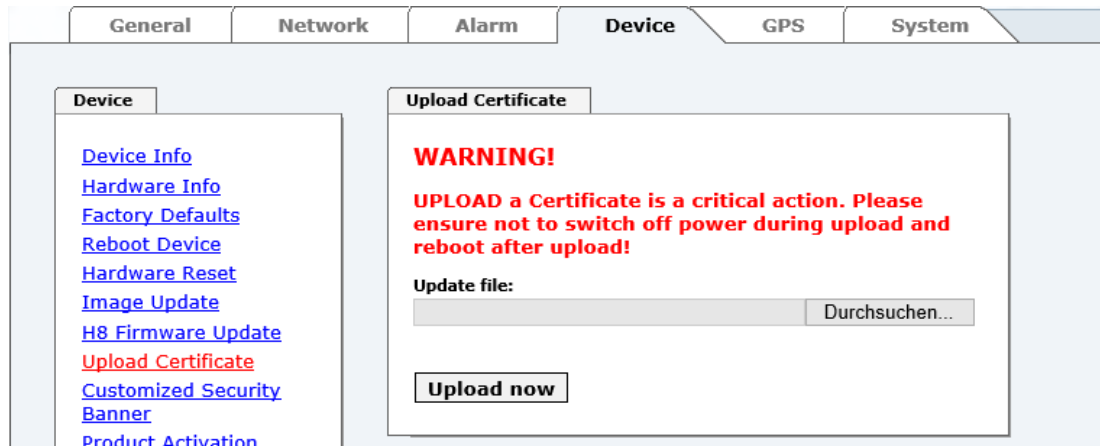
The procedure for the **Image update** differs only in how the Board is restarted.



After the image-update the WebGUI displays a window to confirm the restart (reboot) of the board.

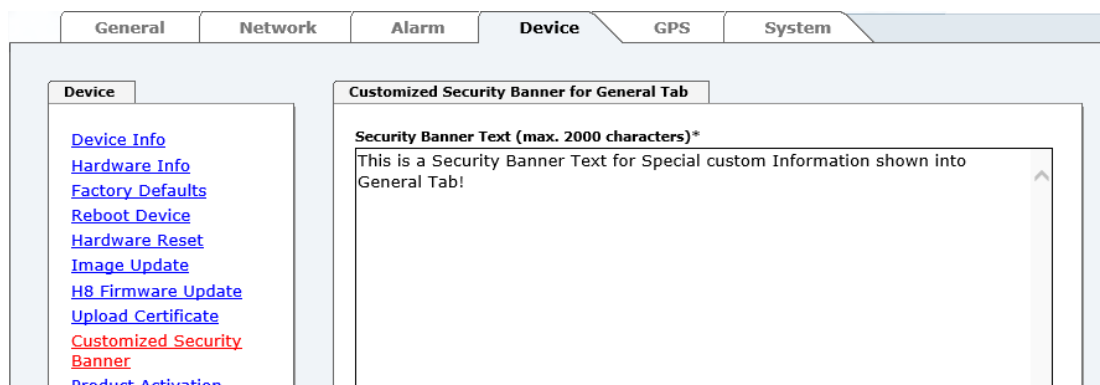
6.3.4.6 Upload SSL-Server-Certificate

This offers the possibility to encrypt the https connections to the board 7274 (RC) with a user-provided SSL server certificate.



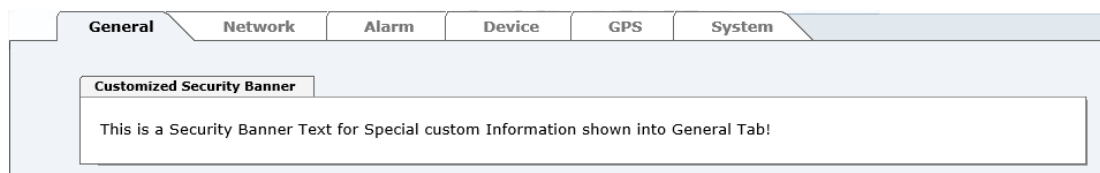
6.3.4.7 Customized Security Banner

Special security information which are displayed in the General-Tab can be entered here by the user.



The security information can be written as 'unformatted' text as well as in HTML format. There are 2000 characters available to write failsafe into the Time Server.

The text may only contain the characters A to Z, a to z, 0 to 9 and ! , . : ? and Space included, all other characters are removed!



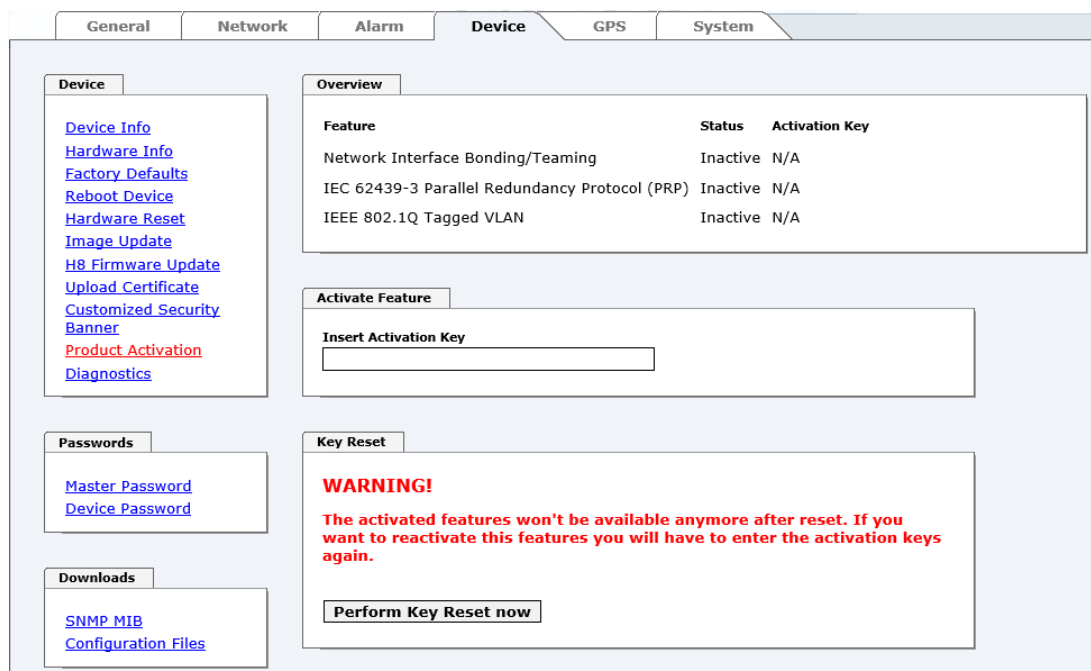
After a successful storage the "Customized Security Banner" with the saved security information is displayed in the General-Tab.

To delete the "Customized Security Banner" the inserted text must be deleted and saved again.

6.3.4.8 Product Activation

Optional features (e.g. Network Interface Bonding/Teaming) can be activated using a special activation key which can be requested from **hopf** Elektronik GmbH.

An activation key is bound to a specific board and cannot be shared between different boards.



The screenshot shows the 'Device' tab in the web configuration interface. The left sidebar contains links for Device Info, Hardware Info, Factory Defaults, Reboot Device, Hardware Reset, Image Update, H8 Firmware Update, Upload Certificate, Customized Security Banner, Product Activation (highlighted), and Diagnostics. Below these are sections for Passwords (Master Password, Device Password) and Downloads (SNMP MIB, Configuration Files). The main content area has three sections: 'Overview' showing a table of features and their activation status, 'Activate Feature' with an input field for the activation key, and 'Key Reset' with a warning message and a 'Perform Key Reset now' button.

Feature	Status	Activation Key
Network Interface Bonding/Teaming	Inactive	N/A
IEC 62439-3 Parallel Redundancy Protocol (PRP)	Inactive	N/A
IEEE 802.1Q Tagged VLAN	Inactive	N/A

Activate Feature

Insert Activation Key

Key Reset

WARNING!

The activated features won't be available anymore after reset. If you want to reactivate this features you will have to enter the activation keys again.

Overview

List of all options with its current activation status and the stored activation key.

Activate Feature


Input field to enter a new activation key. The activation key has 26 characters and can be entered case insensitive. After entering a key the feature can be activated by pressing the ☒ Apply button. If activation was successful the new feature is listed in the overview with status "Active" and can be used immediately.

Key Reset

Clears all Activation Keys and sets all optional features to status "Inactive". No optional feature is available anymore after performing the Key Reset. If the feature is enabled again, the last configuration for the optional feature is restored.

6.3.4.9 Diagnostics Function

It "status messages" is activated the output is processed as SYSLOG message. This function should only be used/activated in case a problem arises and after consulting the **hopf** support.

General	Network	Alarm	Device	GPS	System
<div><div>Device</div><div>Device Info Hardware Info Factory Defaults Reboot Device Hardware Reset Image Update H8 Firmware Update Upload Certificate Customized Security Banner Product Activation Diagnostics</div></div> <div><div>Real Time Diagnostics</div><div>Status Messages disabled ▼</div><div><div>Hardware Log</div><div>Download Hardware Log  Click here to download <div>Refresh Hardware Log</div></div></div></div>					

6.3.4.10 Passwords (Master/Device)

Differentiation is made between upper and lower case characters in passwords. In principle, all alphanumeric characters and the following symbols are allowed in passwords:

[] () * - _ ! \$ % & / = ?

(See also **Chapter 6.2.1 LOGIN and LOGOUT as a User**)

Change Device Password

Current password

New password (min. 6 characters)

Confirm new password

A new password must contain at least one uppercase and lowercase letter, one number, and between 6 and 20 characters.

6.3.4.11 Downloading Configurations / SNMP MIB

In order to be able to download certain configuration files via the web interface it is necessary to be logged on as a "**master**" user.



The screenshot shows the 'Device' tab selected in the top navigation bar. On the left, there are sections for 'Device' (with a text input), 'Passwords' (with a text input), and 'Downloads' (containing links for 'SNMP MIB' and 'Configuration Files'). On the right, the 'SNMP MIB' section is active, displaying 'Download hopf7001RC MIB' and a button labeled 'Click here to download'.



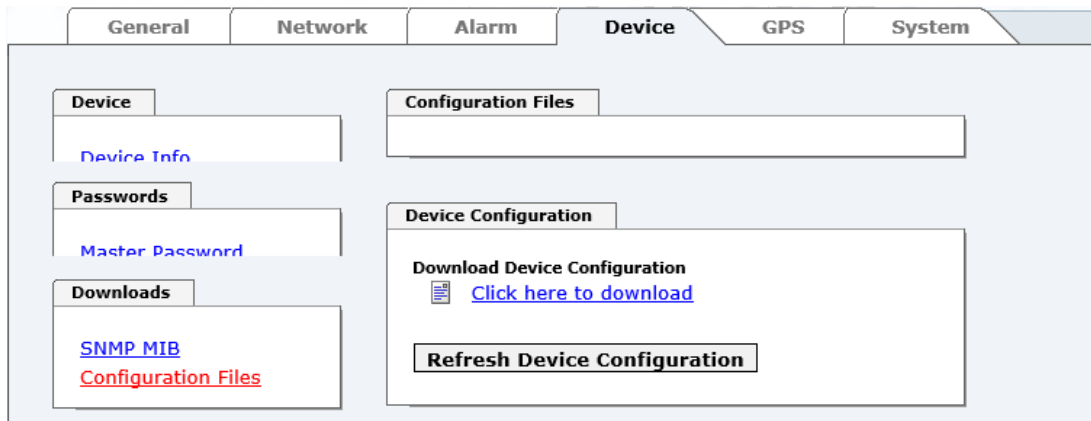
The loaded file **System Configuration** from the board is only used for support purposes and cannot be reloaded for adjusting the settings.



Before a file **System Configuration** download it is imperative to press the button **Refresh System Configuration**.

The "private **hopf** enterprise MIB" is also available via the WebGUI in this area.

In order to be able to download certain configuration files via the web interface, it is necessary to have logged in as a 'master' user.



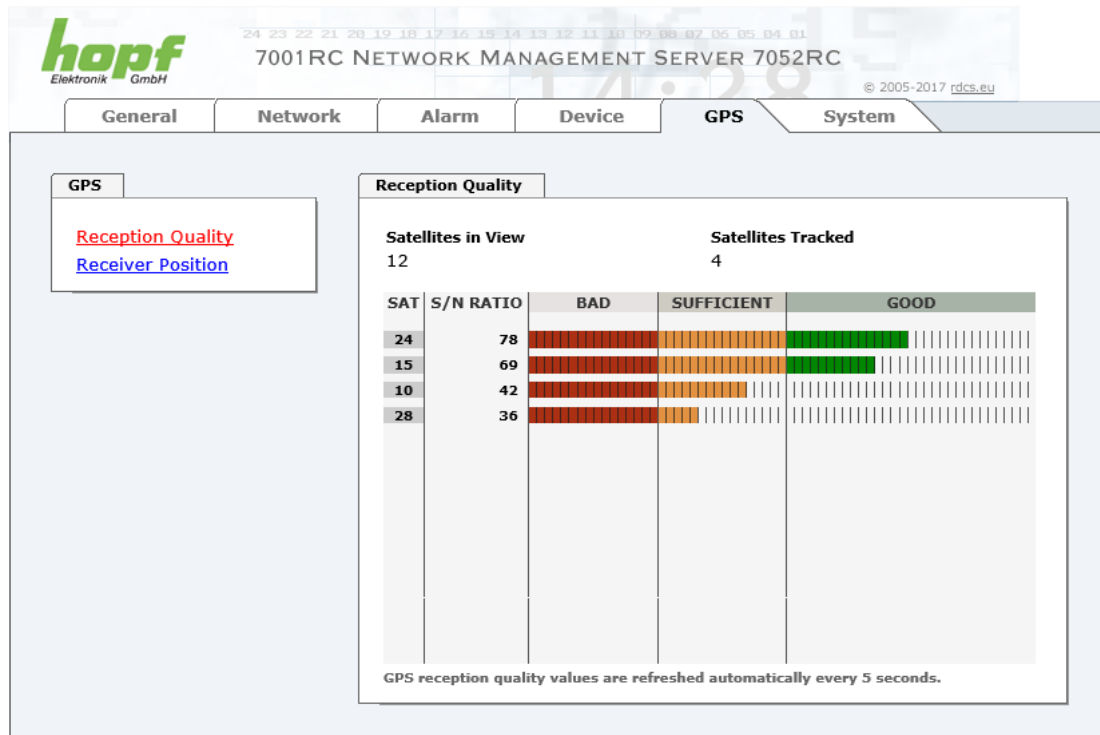
The screenshot shows the 'Device' tab selected. On the left, the 'Downloads' section now includes a link for 'SNMP MIB Configuration Files'. On the right, the 'Configuration Files' section is active, showing 'Download Device Configuration' with a 'Click here to download' button and a 'Refresh Device Configuration' button.

6.3.5 GPS

This tab represents the following GPS information.

Further information about "GPS Reception and Display of Satellites" are represented in the technical manual of the system.

6.3.5.1 GPS Overview



Satellites Visible

Theoretical quantity of detected satellites by the GPS receiver.

Satellites Tracked

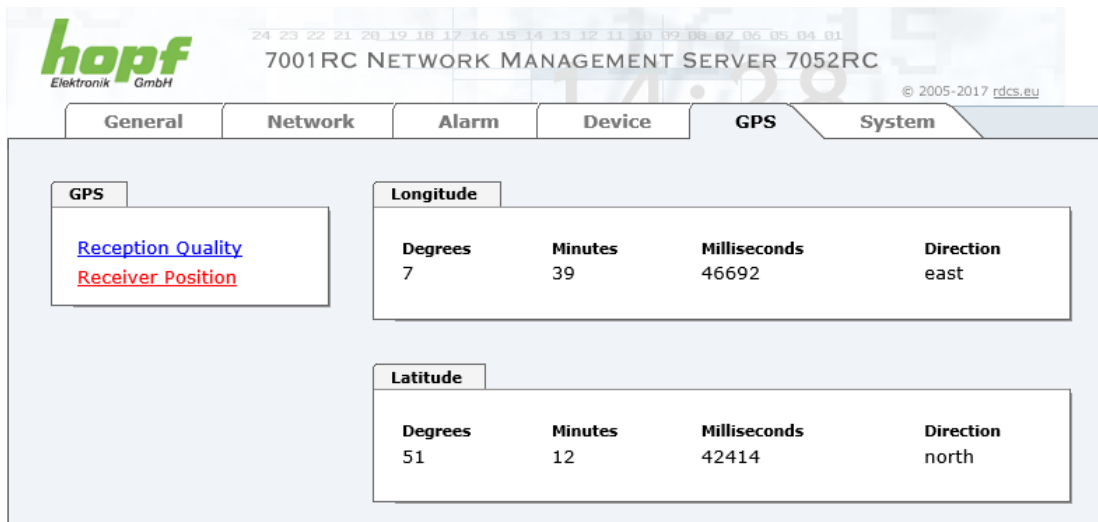
Effective quantity of received satellites used for the synchronization of the base system.

Number of Satellites – S/N Value

Overview of effectively received GPS satellites with their reception quality and the pertinent interpretation.

green	48-108	good reception quality
yellow	33-45	sufficient reception quality
red	0-30	poor reception quality

6.3.5.2 GPS Receiver Position



The screenshot shows the 'GPS' tab selected in the configuration interface. The header includes the hopf logo, the title '7001RC NETWORK MANAGEMENT SERVER 7052RC', and a copyright notice '© 2005-2017 rdc.eu'. The main content area is divided into two sections: 'GPS' and 'Longitude'. The 'GPS' section contains links for 'Reception Quality' and 'Receiver Position'. The 'Longitude' section displays the following data:

Degrees	Minutes	Milliseconds	Direction
7	39	46692	east

Below the Longitude section is a 'Latitude' section with the following data:

Degrees	Minutes	Milliseconds	Direction
51	12	42414	north

Current Position with Longitude and Latitude

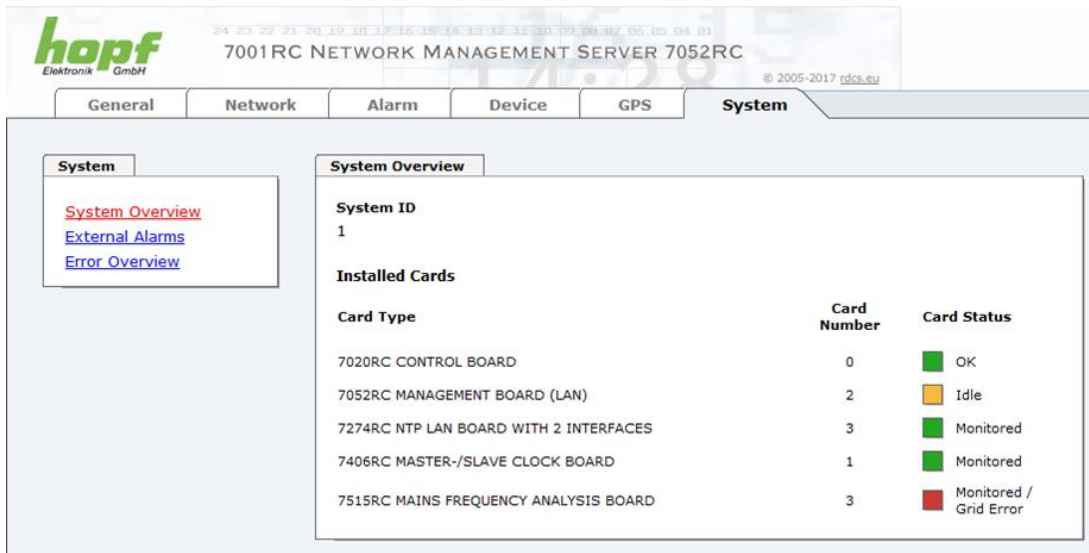
Hereby the geographical position of the system is shown. At the first use this function is helpful because you can see if the receiver has already determined the current position.

6.3.6 System

On the left side every link of the navigation is leading to the appropriate system overview.

6.3.6.1 System Overview

The System tab gives an overview over all connected system boards in the System 7001RC.



The screenshot shows the 'System Overview' section of the web interface. It displays the 'System ID' as 1 and lists the 'Installed Cards' with their types, card numbers, and statuses.

Card Type	Card Number	Card Status
7020RC CONTROL BOARD	0	OK
7052RC MANAGEMENT BOARD (LAN)	2	Idle
7274RC NTP LAN BOARD WITH 2 INTERFACES	3	Monitored
7406RC MASTER-/SLAVE CLOCK BOARD	1	Monitored
7515RC MAINS FREQUENCY ANALYSIS BOARD	3	Monitored / Grid Error

System ID: 7001RC System code

Installed Cards: Overview of the boards connected to the system 7001RC

Card Type: System board name

Card Number: adjusted associated system board number

Card Status: actual control status

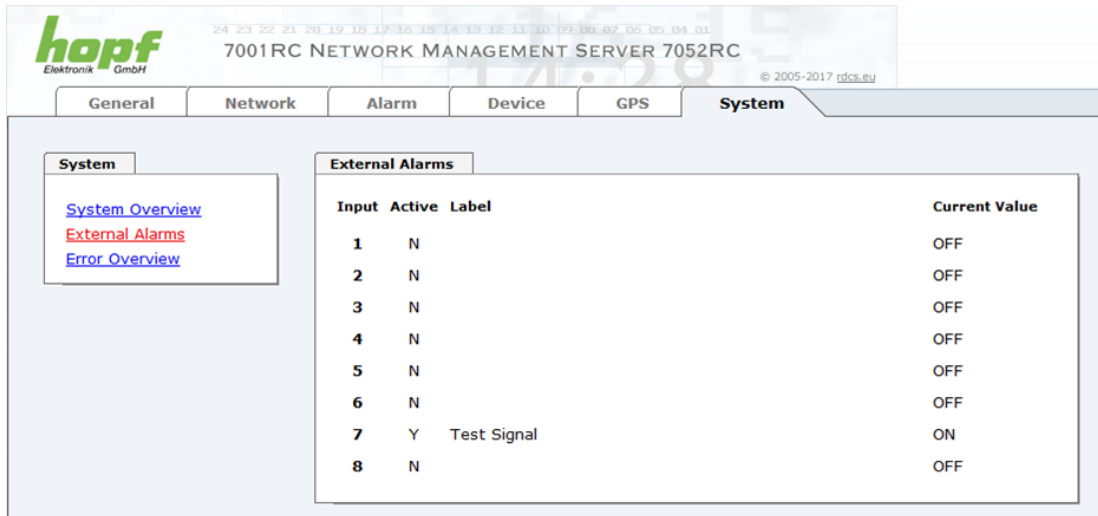
Monitored: high control status

Idle: low control status

OK status of the control board

6.3.6.2 External Alarms

Overview of the current state of the optionally external monitoring inputs.



The screenshot shows the web interface of the hopf 7001RC Network Management Server 7052RC. The top navigation bar includes tabs for General, Network, Alarm, Device, GPS, and System. The System tab is selected, and within it, the External Alarms section is active. On the left, there are links for System Overview, External Alarms (highlighted in red), and Error Overview. The main area displays a table of external monitoring inputs.

Input	Active	Label	Current Value
1	N		OFF
2	N		OFF
3	N		OFF
4	N		OFF
5	N		OFF
6	N		OFF
7	Y	Test Signal	ON
8	N		OFF

External Alarms

Input:

Number of the monitoring input.

Active:

Activation status of the monitoring input, Y = activated and N = deactivated.

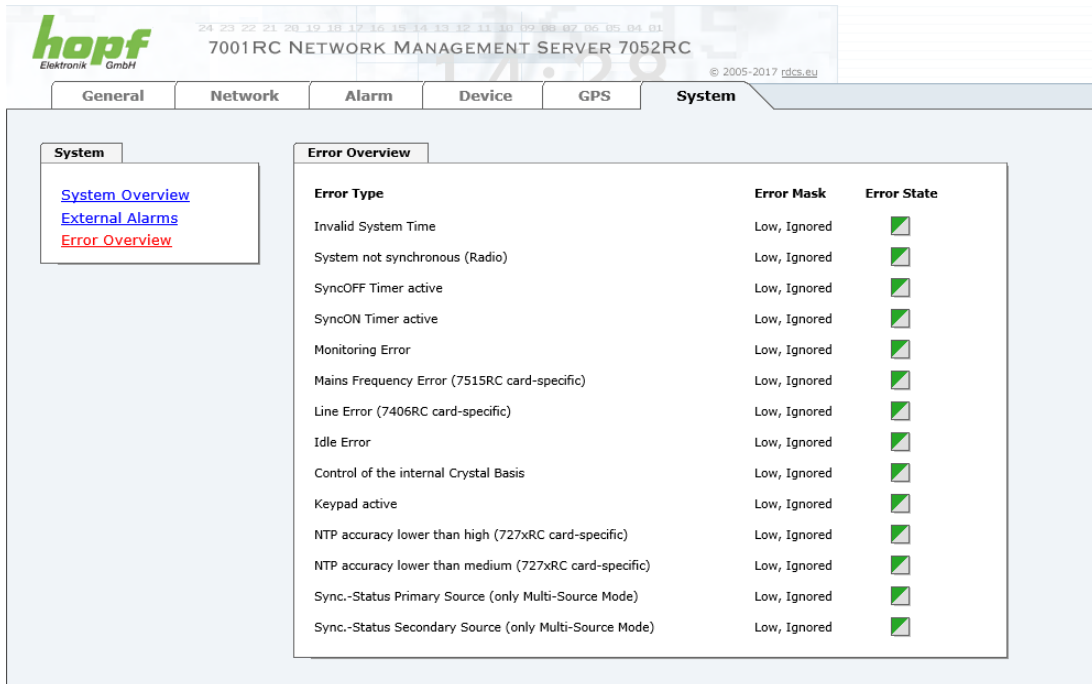
Label:

Name of the monitoring input.















Current Value:

Current state of the monitoring input ON / OFF.

6.3.6.3 ERROR Overview



The screenshot shows the web interface of the 7001RC Network Management Server 7052RC. The top navigation bar includes tabs for General, Network, Alarm, Device, GPS, and System. The System tab is active, and the left sidebar shows links for System Overview, External Alarms, and Error Overview. The main content area displays the Error Overview table.

Error Type	Error Mask	Error State
Invalid System Time	Low, Ignored	
System not synchronous (Radio)	Low, Ignored	
SyncOFF Timer active	Low, Ignored	
SyncON Timer active	Low, Ignored	
Monitoring Error	Low, Ignored	
Mains Frequency Error (7515RC card-specific)	Low, Ignored	
Line Error (7406RC card-specific)	Low, Ignored	
Idle Error	Low, Ignored	
Control of the internal Crystal Basis	Low, Ignored	
Keypad active	Low, Ignored	
NTP accuracy lower than high (727xRC card-specific)	Low, Ignored	
NTP accuracy lower than medium (727xRC card-specific)	Low, Ignored	
Sync.-Status Primary Source (only Multi-Source Mode)	Low, Ignored	
Sync.-Status Secondary Source (only Multi-Source Mode)	Low, Ignored	

The current status of the individual error messages can be consulted in the system 7001RC at any time. The listing does not take into account whether errors are static or dynamic.

Display of error status messages in the system:

- **High** – high priority level (major error)
- **Low** – low priority level (minor error)
- **Ignored** – the error is removed from the common message

The following errors are displayed:

Error No. System 7001RC	Error Type	Meaning
ERROR-01	Invalid System Time	System time valid / invalid
ERROR-02	System not synchronous	System status is synchronous / not synchronous
ERROR-03	SyncOFF Timer active	SyncOFF Timer running / not running
ERROR-04	SyncON Timer active	SyncON Timer running / not running
ERROR-05	Monitoring Error	RC function board operated in "Monitoring Mode" reports an error message
ERROR-06	Mains Frequency Error	RC function board 7515RC operated in "Monitoring Mode" reports a Mains Frequency error
ERROR-07	Line Error	RC function board 74065RC operated in "Monitoring Mode" reports Line error
ERROR-08	Idle Error	RC function board operated in "Idle Mode" reports error message. Possible reasons: Failure of the appropriate boards or card-specific errors (line error, mains frequency error or NTP accuracy < high / medium message).
ERROR-09	Control of the internal Crystal Basis	Error / no error in the control of the internal crystal basis
ERROR-10	Keypad active	Access via remote interface possible / not possible
ERROR-11	NTP accuracy lower than high	RC function board, operated in "Monitoring Mode", reports "NTP accuracy < high"
ERROR-12	NTP accuracy lower than medium	RC function board, operated in "Monitoring Mode", reports "NTP accuracy < medium"
ERROR-13	Sync-Status Primary Source	Primary synchronisation source for synchronisation is available / not available
ERROR-14	Sync-Status Secondary Source	Secondary synchronisation source for synchronisation is available / not available

Card-specific Errors:

1. Card-specific errors are reported by the relevant boards. If there is a board failure, not the card-specific errors are reported but the error of the appropriate board!
2. Card-specific errors are only reported separately if the relevant board runs in "Monitoring Mode". Otherwise the Idle error is activated.

Example: If a board 7406RC fails which runs in "Monitoring Mode" the Monitoring Error (ERROR-05) will be reported but no Line Error (ERROR-07)!

7 SSH and Telnet Basic Configuration



Only basic configuration is possible via SSH or Telnet. The complete configuration of Board 7052RC takes place exclusively via the WebGUI.

It is just as easy to use SSH (Port 22) or Telnet (Port 23) as the WebGUI. Both protocols use the same user interface and menu structure.

The user names and passwords are the same as on the WebGUI and are kept in alignment (see **Chapter 6.3.4.10 Passwords (Master/Device)**).



SSH does not allow blank passwords for safety reasons.



The corresponding service is to be enabled for the use of Telnet or SSH (see **Chapter 6.3.2.7 Management-Protocols – HTTP, SNMP etc.**)

```

192.168.180.125 - PuTTY
login as: master
master@192.168.180.125's password:

  M      M      GGGG  TTTTTTTT
 MM    MM    G    G    T
M M M M    G      T
M M M    G  GGGG  T
M      M    G    G    T
M      M      GGGGG  T

Hopf 7052 MANAGEMENT CARD (c) 2006 - 2018

This is a Security Banner Text for Special custom Information shown into General
Tab!

Press Enter to continue

Main Menu

1 ... General
2 ... Network
3 ... Alarm
4 ... System Overview
5 ... Device Info
0 ... Exit

Choose a Number =>

```

Navigation through the menu takes place by entering the respective number associated with the menu option (as can be seen in the above image).

8 Technical Data

General technical Data of the Board 7052RC.

Assembly	
Model	Euro-board 160 x 100 mm
Power supply	
internal system voltage Vpp	5V DC \pm 5% via system bus

Environmental Conditions		
Temperature range:	operation:	0°C to +40°C
	storage:	-20°C to +75°C
Humidity:	max. 95%, not condensed	

TCP/IP Network Protocols

- HTTP/ HTTPS
- DHCP
- Telnet
- SSH
- SNMPv2c / SNMPv3

Configuration

- HTTP/HTTPS-WebGUI (Browser Based)
- Telnet
- SSH
- **hopf** Base System via keypad and display resp. **hmc** remote access
- **hmc** network configuration assistant

Power consumption – internal	
Normal operation	Typical: 550 mA (max. 850 mA)
Boot phase	Typical: 550 mA (max. 850 mA)
LAN - ETH0/ETH1	
Network connection	Via a LAN cable with RJ45 connector, male (recommended cable type CAT5 or better)
Request per second	Max. 6,250 requests (during operation in GigaBit networks under optimum network conditions)
Number of connectable Clients	Theoretically unlimited
Network interface ETH0	10/100/1000 Base-T
Ethernet compatibility	Version 2.0 / IEEE 802.3
Isolation voltage (Network- to system side)	1500 Vrms
Boot time:	typ.: 35 seconds - When using static IP addresses for ETH0 and ETH1. Depending on the network configuration in use (e.g. DHCP) an extension of the boot phase can occur.
MTBF	
MTBF	> 740,000 hours

Ambient Conditions		
Temperature range:	Operation:	0°C to +55°C
	Storage:	-20°C to +75°C
Humidity:	max. 95%, non condensing	

9 Factory Defaults of Board 7052RC

The default delivery status of the Board 7052RC meets the factory default values when using GPS synchronization sources.

Host/Name Service	Setting	WebGUI
Hostname	Hopf7052RC	Hopf7052RC
Use Manual DNS Entries	Enabled	Enabled
DNS Server 1 IPv4/IPv6 Address	Blank	---
DNS Server 2 IPv4/IPv6 Address	Blank	---
DNS Server 3 IPv4/IPv6 Address	Blank	---
Use Manual Gateway Entries	Enabled	Enabled
Default Gateway IPv4 Address	Blank	---
Default Gateway IPv6 Address	Blank	---
Network Interface ETH0	Setting	WebGUI
Use Custom Hardware Address (MAC)	Disabled	Disabled
Custom Hardware Address (MAC)	Blank	---
DHCP	Disabled	Disabled
IP	192.168.0.1	192.168.0.1
Netmask	255.255.255.0	255.255.255.0
Operation mode	Auto negotiate	Auto negotiate
VLAN Interfaces	Disabled	Disabled
IPv6 Settings	Disabled	Disabled
Network Interface ETH1	Setting	WebGUI
Use Custom Hardware Address (MAC)	Disabled	Disabled
Custom Hardware Address (MAC)	Blank	---
DHCP	Enabled	Enabled
IP	Blank	---
Netmask	Blank	---
Operation mode	Auto negotiate	Auto negotiate
VLAN Interfaces	Disabled	Disabled
IPv6 Settings	Disabled	Disabled
Bonding	Setting	WebGUI
Network Interface Bonding/Teaming	Disabled	Disabled
PRP	Setting	WebGUI
Network Interface PRP	Disabled	Disabled
Routing	Setting	WebGUI
Use Route File	Disabled	Disabled
User Defined Routes	Blank	---

Management	Setting	WebGUI
HTTP	Enabled	Enabled
HTTPS	Disabled	Disabled
SSH	Enabled	Enabled
TELNET	Disabled	Disabled
SNMP	Disabled	Disabled
Hopf Management Console	Disabled	Disabled
HMC Management Port	12000	12000
System Location	Blank	---
System Contact	Blank	---
Read Only Community	public	public
Read/Write Community	secret	secret
Security Name	Blank	---
Access Rights	Readonly	Readonly
Authentication Protocol	MD5	MD5
Authentication Passphrase	Blank	---
Privacy Protocol	DES	DES
Privacy Passphrase	Blank	---
Destination MAC Address	09:00:06:03:FF:EF	09:00:06:03:FF:EF

9.1 ALARM

Syslog Configuration	Setting	WebGUI
Syslog	Disabled	Disabled
Server Name	Blank	---
Alarm Level	Disabled	None
E-mail Configuration	Setting	WebGUI
E-mail Notifications	Disabled	Disabled
SMTP Server	Blank	---
Sender Address	Blank	---
E-mail Addresses	Blank	---
SNMP Traps Configuration	Setting	WebGUI
SNMP Traps	Disabled	Disabled
Alarm Level	Disabled	None
SNMP Trap Receivers	Blank	---
Alarm Messages	Setting	WebGUI
Alarms	All disabled	All none

9.2 DEVICE

User Passwords	Settings	WebGUI
Master Password	master	---
Device Password	device	---
Diagnostic	Einstellung	WebGUI
Real Time Diagnostics	Disabled	disabled

10 Glossary and Abbreviations

10.1.1 Time-specific expressions

UTC	UTC Time (Universal Time Coordinated) was dependent on the Greenwich Mean Time (GMT) definition of the zero meridian. While GMT follows astrological calculations, UTC is based on the stability and accuracy of the Caesium standard. The leap second was defined in order to cover this deviation.
Time Zone	<p>The globe was originally divided into 24 longitudinal segments or time zones. Today, however, there are a number of time zones which in part apply specifically to certain individual countries only.</p> <p>In relation to the time zones, consideration was given to the fact that local daylight and sunlight coincide at different times in the individual time zones.</p> <p>The zero meridian runs through the British city of Greenwich.</p>
Time Offset	<p>This is the difference between UTC and the valid standard time of the current time zone.</p> <p>The Time Offset will be commit from the local time zone.</p>
Local Standard Time (winter time)	<p>Standard Time = UTC + Time Offset</p> <p>The time offset is defined by the local time zone and the local political regulations.</p>
Daylight Saving Time (summer time)	<p>Offset of Daylight Saving Time = + 1h</p> <p>Daylight Saving Time was introduced to reduce the energy requirement in some countries. In this case one hour is added to the standard time during the summer months.</p>
Local Time	<p>Local Time = Standard Time if exists with summer / winter time changeover</p>
Leap Second	<p>A leap second is a second which is added to the official time (UTC) in order to synchronise this with Greenwich Mean Time when required.</p> <p>Leap seconds are defined internationally by the International Earth Rotation and Reference Systems Service (IERS).</p>

10.2 Abbreviations

D, DST	Daylight Saving Time
ETH0	Ethernet Interface 0
ETH1	Ethernet Interface 1
FW	Firmware
GPS	Global Positioning System
HW	Hardware
IF	Interface
IP	Internet Protocol
LAN	Local Area Network
LED	Light Emitting Diode
NTP	Network Time Protocol
NE	Network Element
OEM	Original Equipment Manufacturer
OS	Operating System
PTP	Precision Time Protocol
PRP	Parallel Redundancy Protocol
RFC	Request for Comments
SNMP	Simple Network Management Protocol (handled by more than 60 RFCs)
SNTP	Simple Network Time Protocol
S, STD	Standard Time
TCP	Transmission Control Protocol http://de.wikipedia.org/wiki/User_Datagram_Protocol
ToD	Time of Day
UDP	User Datagram Protocol http://de.wikipedia.org/wiki/User_Datagram_Protocol
UTC	Universal Time Coordinated
VLAN	Virtual Local Area Network
WAN	Wide Area Network
msec	millisecond (10^{-3} seconds)
µsec	microsecond (10^{-6} seconds)
ppm	parts per million (10^{-6})

10.3 Definitions

An explanation of the terms used in this document.

10.3.1 DHCP (Dynamic Host Configuration Protocol)

DHCP makes it possible to integrate a new computer into an existing network with no additional configuration. It is necessary only to set the automatic reference of the IP address on the client. Without DHCP, relatively complex settings need to be made. In addition to setting the IP address, other parameters such as network mask, gateway and DNS server would need to be entered. A DHCP server can assign these parameters automatically by DHCP when starting up a new computer (DHCP client).

DHCP is an extension of the BOOTP protocol. A valid IP address is allocated automatically if a DHCP server is available on the network and DHCP is enabled.



See RFC 2131 Dynamic Host Configuration Protocol for further information

10.3.2 SNMP (Simple Network Management Protocol)

Simple Network Management Protocol (SNMP) is a network protocol which was developed by the IETF in order to be able to monitor and control network elements from a central station. This protocol regulates the communication between the monitored devices and the monitoring station. SNMP describes the composition of the data packets which can be transmitted and the communication procedure. SNMP was designed in such a way that every network-compatible device can be monitored. The network management tasks which are possible with SNMP include:

- Monitoring of network components
- Remote control and configuration of network components.
- Fault detection and notification

Due to its simplicity, SNMP has become the standard which is supported by most management programmes. SNMP Versions 1 and 2c offer hardly any safety mechanisms. The safety mechanisms have been significantly expanded in the current Version 3.

With the aid of description files known as MIB's (Management Information Base), the management programmes are in a position to represent the hierarchical structure of the data of any desired SNMP agent and to request data from them. In addition to the MIB's defined in the RFC's, every software and hardware manufacturer can define his own so-called private MIB's, which reflect the special characteristics of his product.

10.3.3 TCP/IP (Transmission Control Protocol / Internet Protocol)

TCP and IP are generally used concurrently and thus the term TCP/IP has become established as the standard for both protocols.

IP is based on network layer 3 (layer 3) in the OSI Layer Model while TCP is based on layer 4, the transport layer. In other words, the expression TCP/IP signifies network communication in which the TCP transport mechanism is used to distribute or deliver data over IP networks. As a simple example: Web browsers use TCP/IP to communicate with web servers.

10.4 Syslog Messages

Description of the Syslog messages of the Board 7052RC configured by the alarm messages. Further Syslog messages generated by the operating system (e.g. NTP, Syslog-Deamon, ...) are not described here.

Typ	Meldung	Wert %1, %2
G	Synchstatus changed from %1 to %2	I, C, r, R
E	Firmware update performed	-
E	Leap second has been announced - will take place with the next hour change	-
E	Reboot by user has been initiated	-
E	Changes made in the configuration have been saved to flash disc	-
E	Daylight saving time change has been announced - will take place with the next hour change	
G	Current error indicator has changed	
E	Currently tracked GPS Satellites changed below 4	
E	Currently tracked GPS Satellites are ZERO	
E	Currently tracked GPS Satellites changed above or equal 4	
E	Currently inserted number of boards in system has been changed	
E	Current error state of board has changed	
E	GLONASS synchronization status has changed	
E	GLONASS error status has changed	
E	Number of currently tracked GLONASS satellites is zero	
E	Number of currently tracked GLONASS satellites is greater than zero	

Type of message (E : single-point information ; G : group information)

11 List of RFC

- DHCP (RFC 2131)
- HTTP (RFC 2616)
- HTTPS (RFC 2818)
- SSH-2 (RFC 4250-4256, 4335, 4344, 4345, 4419, 4432, 4716, 5656)
- TELNET (RFC 854)
- SNMPv2c (RFC 1213, RFC1901-1908)
- SNMPv3 (RFC 3410)
- SYSLOG (RFC 5424)
- SMTP (RFC 5321)

12 List of Open Source Packages used

Third Party Software

The **hopf** network TimeServer 7052RC includes a numerous of software packages subject to other license conditions. In case the use of such a software package might violate the licence conditions immediately after written notice it is ensured that the underlying licence conditions are met again.

If the underlying licence conditions relating to a specific software package require availability of the source code the package is provided electronically (email, download etc.) on requested.

The following table includes all uses software packages with the applicable underlying software license conditions:

Package name	Version	Licence	Licence details	Patches
boost	1.60.0		http://www.boost.org/LICENSE_1_0.txt	no
busybox	1.24.1	GPL	v2	no
bzip2	1.0.6	BSD		no
can-utils	f0abaaacb0 a3f620f73dd 6fd716d7da a3c36a8e3	GPL	v2	no
cifs-utils	6.4	GPL	v3	no
dhcpcd	6.10.1	BSD		no
dhcpcdump	1.8		<p>Copyright 2001, 2002 by Edwin Groothuis, edwin@ma- vetju.org All rights reserved.</p> <p>Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:</p> <ol style="list-style-type: none"> 1. Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer. 2. Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution. <p>THIS SOFTWARE IS PROVIDED BY THE AUTHOR AND CONTRIBUTORS ``AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE AUTHOR OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.</p>	no
dosfstools	3.0.28	GPL	v3	no
eeprog	0.7.6	GPL	v2+	no

Package name	Version	Licence	Licence details	Patches
ethntool	4.2	GPL	v2	no
exfat	1.2.3	GPL	v2+	no
exfat-utils	1.2.3	GPL	v2+	no
freetype	2.6.2	GPL	v2	no
gd	2.1.1	BSD		no
genext2fs	1.4.1	-		no
gzip	1.6	GPL	v2	no
host-autoconf	2.69	GPL	v3	no
host-automake	1.15	GPL	v2	no
host-bison	3.0.4	GPL	v3	no
host-dos2unix	7.3.1	BSD		no
host-e2fsprogs	1.42.13	GPL	v2	no
host-flex	2.5.37		<p>Flex carries the copyright used for BSD software, slightly modified because it originated at the Lawrence Berkeley (not Livermore!) Laboratory, which operates under a contract with the Department of Energy:</p> <p>Copyright (c) 2001, 2002, 2003, 2004, 2005, 2006, 2007 The Flex Project.</p> <p>Copyright (c) 1990, 1997 The Regents of the University of California.</p> <p>All rights reserved.</p> <p>This code is derived from software contributed to Berkeley by Vern Paxson.</p> <p>The United States Government has rights in this work pursuant to contract no. DE-AC03-76SF00098 between the United States Department of Energy and the University of California.</p> <p>Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:</p> <ol style="list-style-type: none"> 1. Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer. 2. Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution. <p>Neither the name of the University nor the names of its contributors may be used to endorse or promote products derived from this software without specific prior written permission.</p> <p>THIS SOFTWARE IS PROVIDED "AS IS" AND WITHOUT ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, WITHOUT LIMITATION, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.</p> <p>This basically says "do whatever you please with this software except remove this notice or take advantage of the University's (or the flex authors') name".</p> <p>Note that the "flex.skl" scanner skeleton carries no copyright notice. You are free to do whatever you please with scanners generated using flex; for them, you are not even bound by the above copyright.</p>	

Package name	Version	Licence	Licence details	Patches
host-gen-ext2fs	1.4.1	GPL	v2	no
host-gettext	0.19.7	GPL	v3	no
host-kmod	22	LGPL	v2.1	no
host-libffi	3.2.1		<p>libffi - Copyright (c) 1996-2014 Anthony Green, Red Hat, Inc and others. See source files for details.</p> <p>Permission is hereby granted, free of charge, to any person obtaining a copy of this software and associated documentation files (the "Software"), to deal in the Software without restriction, including without limitation the rights to use, copy, modify, merge, publish, distribute, sublicense, and/or sell copies of the Software, and to permit persons to whom the Software is furnished to do so, subject to the following conditions:</p> <p>The above copyright notice and this permission notice shall be included in all copies or substantial portions of the Software.</p> <p>THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT. IN NO EVENT SHALL THE AUTHORS OR COPYRIGHT HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.</p>	no
host-libglib2	2.46.2	LGPL	v2	no
host-libtool	2.46	GPL	v2	no
host-libxml2	2.9.3		<p>Copyright (C) 1998-2012 Daniel Veillard All Rights Reserved.</p> <p>Permission is hereby granted, free of charge, to any person obtaining a copy of this software and associated documentation files (the "Software"), to deal in the Software without restriction, including without limitation the rights to use, copy, modify, merge, publish, distribute, sublicense, and/or sell copies of the Software, and to permit persons to whom the Software is furnished to do so, subject to the following conditions:</p> <p>The above copyright notice and this permission notice shall be included in all copies or substantial portions of the Software.</p> <p>THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT. IN NO EVENT SHALL THE AUTHORS OR COPYRIGHT HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.</p>	no
host-lzo	2.09	GPL	v2	no
host-m4	1.4.17	GPL	v3	no
host-mtd	1.5.2	GPL	v2	no
host-ncurses	5.9		Copyright (c) 1998-2010,2011 Free Software Foundation, Inc.	no

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host-omap-u-boot-utils	0.2.1	GPL	v2	no
host-pkgconf	0.9.12		<p>Copyright (c) 2011, 2012, 2013, 2014, 2015 pkgconf authors (see AUTHORS).</p> <p>Permission to use, copy, modify, and/or distribute this software for any purpose with or without fee is hereby granted, provided that the above copyright notice and this permission notice appear in all copies.</p> <p>This software is provided 'as is' and without any warranty, express or implied. In no event shall the authors be liable for any damages arising from the use of this software.</p>	
host-uboot-tools	2016.01	GPL	v2+	no
host-zlib	1.2.8		<p>Copyright (C) 1995-2017 Jean-loup Gailly and Mark Adler</p> <p>This software is provided 'as-is', without any express or implied warranty. In no event will the authors be held liable for any damages arising from the use of this software.</p> <p>Permission is granted to anyone to use this software for any purpose, including commercial applications, and to alter it and redistribute it freely, subject to the following restrictions:</p> <ol style="list-style-type: none"> 1. The origin of this software must not be misrepresented; you must not claim that you wrote the original software. If you use this software in a product, an acknowledgment in the product documentation would be appreciated but is not required. 2. Altered source versions must be plainly marked as such, and must not be misrepresented as being the original software. 3. This notice may not be removed or altered from any source distribution. 	no
hwdata	0.267	GPL	v2	no
i2c-tools	3.1.2	GPL	v2	no
igmpproxy	0.1	GPL	v2	no

Package name	Version	Licence	Licence details	Patches
ipkg	0.99.163	GPL	v2	no
iproute2	4.4.0	GPL	v2	no
iptables	1.6.0	GPL		no
iputils	2.4.10	GPL	v2	no
latencytop	0.5	GPL	v2	no
libarchive	3.1.2	BSD		no
libevent	2.0.22	3-clause BSD	http://libevent.org/LICENSE.txt	no
libffi	3.2.1	MIT License		no
libfuse	2.9.5	GPL		no
libglib2	2.46.2	LGPL	v2+	no
libnl	3.2.27	GPL		no
linux	4.1.13- g8dc6617	GPL	v2	yes
linuxptp	1.8	GPL	v2	yes
libpcap	1.7.4	2-clause BSD		no
libpng	1.6.21		http://www.libpng.org/pub/png/src/libpng-LICENSE.txt	no
libselinux	2.1.13			
libsepol	2.1.9	LGPL	v2.1	
libserial	0.6.0rc2	GPL	v3	no
libserialport	0.1.1	GPL	v3	no
libsocketcan	0.0.10	LGPL	v2.1	no
libsysfs	2.1.0	LGPL	v2.1	no
libusb	1.0.19	LGPL	v2	no
libxml2	2.9.3	MIT License		no
libzip	0.11.2	BSD		no
lighttpd	1.4.39	3-clause BSD		no
lm-sensors	3.4.0	LGPL	v2.1	no
lshw	B.02.17	GPL	v2	no
lua	5.3.2	MIT License		no
lzo	2.09	GPL	v2	no
lzop	1.03	GPL	v2	no
memstat	1.0	MIT License		no
mii-diag	2.11	GPL		no
minicom	2.7	GPL	v2	no
mmc-utils		GPL	v2	no
mtd	1.5.2	GPL	v2	no
nano	2.5.1	GPL		no
nanocom	1.0	GPL		no
ncftp	3.2.5		http://www.ncftp.com/ncftp/doc/LICENSE.txt	no
ncurses	5.9	Permissive free soft- ware licence	Copyright (c) 1998-2004,2006 Free Software Foundation, Inc. Permission is hereby granted, free of charge, to any person obtaining a copy of this software and associated documentation files (the "Software"), to deal in the Software without restriction, including without limitation the rights to	no

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net-snmp	5.7.3	BSD (mehrere)	http://net-snmp.sourceforge.net/about/license.html	no
netstat-nat	1.4.10	GPL		no
ntp	4.2.8p10	NTP	<p>Copyright (c) University of Delaware 1992-2011</p> <p>Permission to use, copy, modify, and distribute this software and its documentation for any purpose with or without fee is hereby granted, provided that the above copyright notice appears in all copies and that both the copyright notice and this permission notice appear in supporting documentation, and that the name University of Delaware not be used in advertising or Publicity pertaining to distribution of the software without specific, written prior permission. The University of Delaware makes no representations about the suitability this software for any purpose. It is provided "as is" without express or implied warranty.</p>	yes (6)
openssh	7.1p2	BSD		no
openssl	1.0.2g	Dual	http://www.openssl.org/source/license.html	no
opkg	0.3.1	GPL	v2	no
pcr	8.38	BSD		no
popt	1.16	GNU Free Documentation License	V1.3	no
pps-tools	0deb9c7e135e9380a6d09e9d2e938a146bb698c8	GPL	v2	no
prp	1.4	Permissive free software licence	<p>Copyright (c) 2007, Institute of Embedded Systems at Zurich University of Applied Sciences (http://ines.zhaw.ch)</p> <p>Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:</p> <ul style="list-style-type: none"> - Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer. - Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution. 	yes

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rsync	3.1.2	GPL		no
setools	3.3.8	GPLv2, LGPLv2.1		no
setserial	2.17	GPL		no
spidev_test	V3.0	GPL	v2	no
sqlite	3100200	Public domain		no
sshpas	1.05	GPL		no
start-stop-daemon	1.18.4	GPL	v2	no
statserial	1.1	GPL		no
sudo	1.8.15	ISC-style	http://www.sudo.ws/sudo/license.html	no
sysstat	11.2.0	GPL	v2	no
ti-tools	06dbdb2727354b5f3ad7c723897f40051fddee49		<p>Copyright(c) 1998 - 2010 Texas Instruments. All rights reserved. All rights reserved.</p> <p>Base on code from</p> <p>Copyright (c) 2007, 2008, Johannes Berg johannes@sipsolutions.net Copyright (c) 2007, Andy Lutomirski Copyright (c) 2007, Mike Kershaw Copyright (c) 2008-2009, Luis R. Rodriguez mccgrof@gmail.com</p> <p>Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:</p> <ul style="list-style-type: none"> * Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer. * Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution. * Neither the name Texas Instruments nor the names of its contributors may be used to endorse or promote products derived from this software without specific prior written permission. <p>THIS SOFTWARE IS PROVIDED BY THE COPYRIGHT HOLDERS AND CONTRIBUTORS "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE COPYRIGHT OWNER OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF</p>	no

Package name	Version	Licence	Licence details	Patches
THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.				
uboot	2010.06	GPL	v2	no
uboot-tools	2016.01	GPL	v2	no
usb_modeswitch	2.2.6	GPL	v2	no
usb_modeswitch_data	20151101	GPL	v2	no
util-linux	2.27.1	GPL	v2	no
zlib	1.2.8	Permissive free software licence	http://www.gzip.org/zlib/zlib_license.html	no