

Industriefunkuhren



Technical Manual

MANAGEMENT BOARD

Model 7050RC

ENGLISH

Version: 06.00 – 03.09.2012

Valid for Devices 7050RC with **SET** Version: **06.xx**
IMAGE Version: **06.xx**
and FIRMWARE Version: **06.xx**

Version Numbers (SET / 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 7050RC (SEE **Chapter 7.3.4.1 Device Information** AND **Chapter 7.3.4.2 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.

Downloading Technical Manuals

All current manuals of our products are available free of charge via our homepage on the Internet.

Homepage: <http://www.hopf.com>

E-mail: info@hopf.com

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 89/336/EEG "Electromagnetic compatibility" and 73/23/EEG "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 General	9
2 Management Board 7050RC Basic Functions	10
3 Board 7050RC Construction	12
3.1 Board 7050RC Front Panel	12
3.1.1 Status LEDs	13
3.1.2 RJ45 Socket (ETH0)	14
3.1.3 Reset / Default Button	14
3.2 Overview of Board 7050RC (3U/4HP) Assembly	15
3.2.1 DIP Switch DS1	15
3.2.2 MAC Address Labels	16
3.2.3 Heat Sink	16
4 Board 7050RC System Performance	17
4.1 Delayed Readiness for Operation after Switch-on / Reset	17
4.2 Reset / Default Button	17
4.2.1 Board Reset	18
4.2.2 Place LAN Parameters in Default Status	19
5 Implementing Board 7050RC in a <i>hopf</i>Base System	20
5.1 Setting the System Board Number	20
5.1.1 Setting the Board Number for Base System 7001RC	21
5.2 Creating the Network Connection	22
6 Board 7050RC Network Configuration via the Base System	23
6.1 Input Functions of Base Systems 7001RC	25
6.1.1 Inputting the Static IPv4 Address / DHCP Mode	26
6.1.2 Inputting the Gateway Address	27
6.1.3 Inputting the Network Mask	27
6.1.4 Inputting the Control-Byte (no function at present)	27
6.1.5 Inputting the Parameterbyte 01 (no function at present)	28
6.1.6 Inputting the Parameterbyte 02 (no function at present)	28
7 HTTP/HTTPS WebGUI – Web Browser Configuration Interface	29
7.1 Quick Configuration	29
7.1.1 Requirements	29
7.1.2 Configuration Steps	29
7.2 General – Introduction	30

7.2.1	LOGIN and LOGOUT as a User	31
7.2.2	Navigation via the Web Interface	32
7.2.3	Inputting or Changing Data	33
7.2.4	Plausibility Check during Input.....	34
7.3	Description of the Tabs.....	35
7.3.1	GENERAL Tab.....	35
7.3.2	NETWORK Tab.....	36
7.3.2.1	Hostname/Nameservice.....	37
7.3.2.1.1	Hostname	37
7.3.2.1.2	Default Gateway	37
7.3.2.1.3	DNS Server 1 & 2	37
7.3.2.2	Network Interface ETH0.....	38
7.3.2.2.1	Link Status	38
7.3.2.2.2	Default Hardware Address (MAC Address)	38
7.3.2.2.3	Customer Hardware Address (MAC)	38
7.3.2.2.4	DHCP	39
7.3.2.2.5	IP Address	39
7.3.2.2.6	Network Mask	39
7.3.2.2.7	Operation Mode	39
7.3.2.3	Routing	40
7.3.2.4	Management- / HMC Management Port / SNMP	41
7.3.3	ALARM Tab.....	42
7.3.3.1	Syslog Configuration.....	42
7.3.3.2	E-mail Configuration	43
7.3.3.3	SNMP Configuration / TRAP Configuration	44
7.3.3.4	Alarm Messages	45
7.3.3.5	External Alarm Messages (optional)	46
7.3.4	DEVICE Tab.....	47
7.3.4.1	Device Information	47
7.3.4.2	Hardware Information	48
7.3.4.3	Restoring the Factory Settings - Factory Defaults	48
7.3.4.4	Restarting (Rebooting) the Board	49
7.3.4.5	Image Update & H8 Firmware Update	50
7.3.4.6	Customized Security Banner	52
7.3.4.7	Product Activation.....	53
7.3.4.8	Passwords	54
7.3.4.9	Downloading Configurations - Downloads	54
7.3.5	GPS.....	55
7.3.5.1	GPS Overview	55
7.3.6	System	57
7.3.6.1	System Overview	57
7.3.6.2	External Alarms	58
7.3.6.3	ERROR Overview.....	59
8	SSH and Telnet Basic Configuration	61
9	Technical Data	62
9.1	General	62
9.2	Ambient conditions	62
9.3	CE compliant to 89/336/EC and 73/23/EC	62
9.4	LAN	62
9.5	TCP/IP Network Protocols	63
9.6	Configuration	63

9.7 Management	63
9.8 Hardware.....	63
10 Factory Defaults.....	64
10.1 Network.....	64
10.2 ALARM.....	64
10.3 DEVICE	64
11 Glossary and Abbreviations	65
11.1 Time-specific expressions	65
11.2 Abbreviations.....	66
11.3 Definitions	67
11.3.1 DHCP (Dynamic Host Configuration Protocol)	67
11.3.2 TCP/IP (Transmission Control Protocol / Internet Protocol)	67
12 List of RFC's.....	68
13 List of Open Source Packages used	68

1 General

The Management Board (LAN) 7050RC is designed for the **hopf** 7001RC System in 19" (3U) racks.

Board 7050RC turns the **hopf** 7001RC System into a Remote Management System, particularly interesting for companies where the System needs to be administrated via a control centre. This saves costs for labour and time.

Thus the secured access to 7001RC System is guaranteed via each suitable TCP-IP workstation.

Management Board (LAN) 7050RC is equipped with 10/100 Base-T (auto-sensing) Ethernet interface. The Board can be installed at any desired point on the network.

The Remotesoftware HMC (**hopf** Management Console) enables the complete remote configuration and monitoring of 7001RC System via the network. The communication between HMC and board 7050RC is carried out only encoded.

Due to its **hot-plug capability**, the Board can be removed from and re-connected to the running 7001RC system at any time to its designated slot, without affecting the function of other system boards.

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

Up to eight (8) TTL compatible signals within the system can be connected to the Management Board 7050RC and monitored. A change in state (changing edge) of one of these signals can be sent as an alarm message included 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.

- The accessibility of the Management Board (LAN) 7050RC in the network can be established via the **hopf** Base System menu or remote software.
- The Board is configured over Ethernet by means of a web browser over:
 - HTTP/HTTPS WebGUI (**G**raphical **U**ser **I**nterface)
 - Or text-based menus over Telnet and SSH
- Various protocols (e.g. IPv4, http, https, Telnet etc.) are available for the Ethernet connection.

2 Management Board 7050RC Basic Functions

Network Protocols

- IPv4: Dynamic Host Configuration Protocol - DHCP (RFC 2131)
- HTTP/HTTPS
- DHCP
- Telnet
- SSH
- SNMP

Configuration Channel

- HTTP/HTTPS WebGUI (browser-based)
- Telnet
- SSH
- Hopf Management Console
- **hopf** 7001RC System and Keypad

Management

- HTTP/HTTPS (status, control)
- SNMPv2c, SNMP Traps (MIB-II, Private Enterprise MIB)
- Email Notification
- Syslog Messages to external Syslog Server
- Update over TCP/IP
- Status LEDs
- Fail-safe / Watchdog

Ethernet Interface 7050RC

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

Features

- HTTP/HTTPS (status, control)
- SNMPv2c, SNMP Traps (MIB-II, Private Enterprise MIB)
- E-mail notification
- Syslog Messages to External Syslog Server
- PPSKIT
- Update via TCP/IP
- Fail-safe
- Watchdog Circuit
- Power-Management
- System-Management
- Customized Security Banner
- External monitoring in- and outputs

Internal to the Board

An embedded Linux is responsible for the correct operation of the Board. The following Linux operating system version is in use:

Linux hopf727x 2.4.21-NANO (Linux Kernel 2.4.21 with Nano Kernel extension).

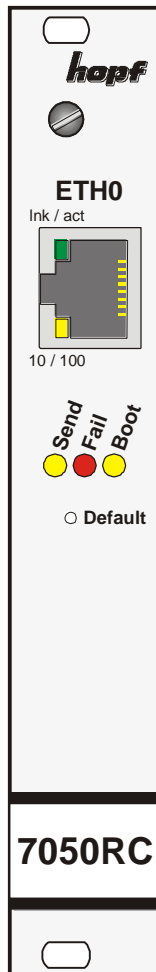
3 Board 7050RC Construction

This Chapter describes the hardware components of Board 7050RC.

3.1 Board 7050RC Front Panel

Board 7050RC has a 3U/4HP front panel for 19" systems. It is equipped with the following components:

3U/4HP Front Panel



ETH0-RJ45 socket - Ethernet LAN Interface

Ink/act LED - Activity with the Ethernet

10/100 LED - 10/100 MBit Ethernet

Send/system bus LED – Access to the Internal System Bus

Fail LED – Readiness for Operation

Boot LED – Boot Status

Default Button – Board Reset / Default Setting

3.1.1 Status LEDs

Board 7050RC has Status LEDs on the front panel. These facilitate detection of the operating status of installed boards.

The LEDs represent the following board conditions:

SEND LED (yellow)	Description
Flashing / flickering	Normal case – indicates access to the internal system bus. Board 7050RC is correctly integrated into System 7001RC.
Off	Board 7050RC is not ready for operation.
On	Fault on Board 7050RC.

Fail LED (red)	Description
Off	Normal case – Board 7050RC is not detecting any own operating failure.
On	Board 7050RC is not ready for operation or booting of the Board is delayed (see Chapter 4.1 Delayed Readiness for Operation after Switch-on / Reset).
Flashing (every sec.)	Default button activated for less than 5 seconds.

Boot LED (yellow)	Description
Off	Normal case – Board 7050RC is in operation.
On	Board 7050RC is booting its operating system (duration approx. 1 minute).

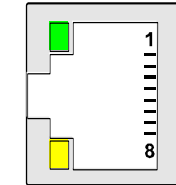
Ink/act LED (green)	Description
Off	There is no LAN connection to a network.
On	LAN connection available.
Flashing	Activity (send / receive) on network.

10/100 LED (yellow)	Description
Off	10 MBit Ethernet detected.
On	100 MBit Ethernet detected.

3.1.2 RJ45 Socket (ETH0)

ETH0

Ink / act



10 / 100

Pin No.	Assignment
1	Tx+
2	Tx-
3	Rx+
4	Not in use
5	Not in use
6	Rx-
7	Not in use
8	Not in use
9	Not in use

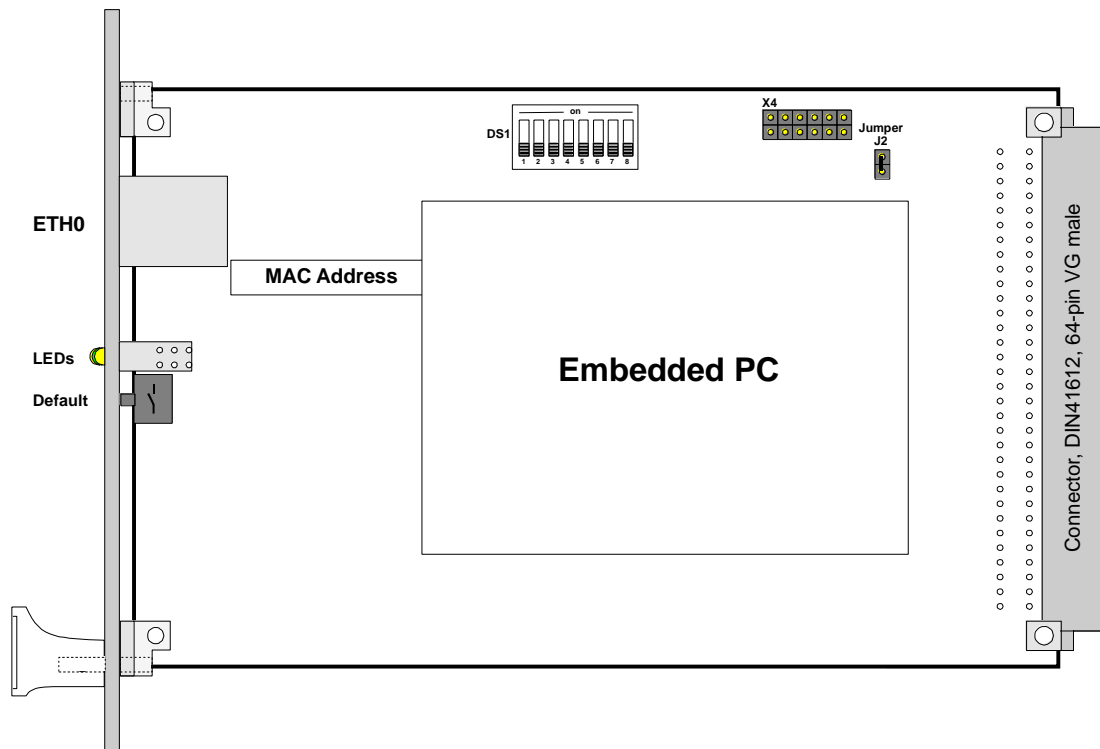


The meanings of the RJ45 socket LEDs are described in **Chapter 3.1.1 Status LEDs**.

3.1.3 Reset / Default Button

The default button is activated by means of a thin object through the hole in the front panel next to the "Default" inscription (see **Chapter 4.2 Reset / Default**).

3.2 Overview of Board 7050RC (3U/4HP) Assembly



3.2.1 DIP Switch DS1

The Board number in the Base System is set here.

DIP Switch DS1	Function
8	No function at present
7	
6	
5	Board number in System 7001RC (see Chapter 5.1 Setting the System Board Number)
4	
3	
2	
1	

3.2.2 MAC Address Labels

Each LAN interface is uniquely identifiable in the Ethernet by means of a MAC address (hardware address). The MAC address assigned to the respective LAN interface can be found on the label assigned to the interface. A unique MAC address is assigned by **hopf** Elektronik GmbH for each LAN interface.



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

3.2.3 Heat Sink

Due to the installation height, care should be taken to ensure that the heat sink does not make contact with surrounding system components when removing or inserting Board 7050RC.

4 Board 7050RC System Performance

Behaviour of Board 7050RC when switching on and resetting the Base System and when activating the default button on the front panel.

4.1 Delayed Readiness for Operation after Switch-on / Reset

Board 7050RC requires an increased supply current during the boot procedure (Board start-up). In order to guarantee the power management of the system, booting of the Board is delayed dependent on the set System Board number.

The red Fail LED on the front panel lights up during the delay phase.



Booting delay = Board number x 30 seconds

4.2 Reset / Default Button

Board 7050RC can be reset or placed in default status with the aid of the default button which is located behind the Board's front panel. The default button can be accessed by means of a thin object through the small hole in the front panel.

Default Button	Description
Press for approx. 1 second	Trigger Board reset (see Chapter 4.2.1 Board Reset)
Press for more than 5 seconds	Place Board in default status (see Chapter 4.2.2 Place LAN Parameters in Default Status)

4.2.1 Board Reset

A reset is triggered on Board 7050RC by briefly pressing the default button (approx. 1-2 seconds). This reset does not affect the Base System and its other functions.

Trigger Board reset with the default button:

1. Briefly press default button (approx. 1-2 seconds).
2. Board reset takes place maximum 5 seconds after releasing the default button.
3. Red Fail LED lights up \Rightarrow Board 7050RC is not yet ready for operation.
4. Yellow Send LED flickers \Rightarrow Board 7050RC is integrated into the Base System.
5. Red Fail LED goes out and yellow Boot LED lights up \Rightarrow the Board begins to boot depending on the set Board number (the boot process can take up to one minute).
6. Full operating status is obtained again when:
 - Send LED flickers
 - Fail LED is not lit
 - Boot LED is not lit



Board 7050RC is not immediately accessible following a reset (see **Chapter 4.1 Delayed Readiness for Operation after Switch-on / Reset**).



There run an embedded Linux-System and a μ -processor-system on board 7050RC for implementation of high-precision processes in real-time environment. These processes require an exact coordination of such two systems, monitored by a so-called alive-handling. Thus the detection of just a minimal deviation or rather recognizing of a problem in the network the board 7050RC automatically performs a reboot that resets the board into a defined and correct condition.

This process lasts approximately 60 seconds and can occur at different intervals depending on the diverse ambient conditions.

During this time the board 7050RC is not available in the net. In conjunction with NTP though this period is not critical and does not impact the time synchronisation through NTP. This is an intra-board process and does not impact the remaining clock system.

This behaviour of the board can not be influenced by the user.

4.2.2 Place LAN Parameters in Default Status

Board 7050RC can be placed in default status by means of the default button in the event that the Board is no longer reachable on the Ethernet following incorrect configuration (e.g. over the Ethernet).

If the default button is pressed for longer than 5 seconds, the following LAN parameters which are stored on the Board are set in the DHCP mode:

- IP 000.000.000.000
- Gateway 000.000.000.000
- Network mask 000.000.000.000



The LAN parameter like IP address, Netmask and Gateway are not changed in the system 7001RC. After a default they will be assumed from the board 7050RC.



All other configurations can only be set to default status via the Ethernet interface (see **Chapter 7.3.4.3 Restoring the Factory Settings - Factory Defaults**).

Set Board 7050RC to default status.

1. Press the default button
2. Red Fail LED flashes every second until "Trigger Default" is reached (after approx. 5 seconds)
3. Release the default button
4. Board 7050RC takes over the default settings
5. Board 7050RC triggers a Board reset
6. Create accessibility to the Ethernet via the Base System (reset the IP address, gateway and network mask via the Base System menu)
7. Check all configurations in the WebGUI and reset if necessary

5 Implementing Board 7050RC in a *hopf*Base System

All Function Boards are parameterised individually from within the Base System.



Each Function Board is uniquely identified in a *hopf*Base System 7001RC via the Board type and an assigned Board number

The following steps are required for the purpose of implementation:

- Fixed wired slot in the System 7001RC (see also system drawing)
- Not more than 30 LAN boards already implemented in the system
- Set a Board number that is not yet assigned in the Base System via the DIP switch on Board 7050RC
- Insert the LAN Board
- Select the LAN Board setting menu in the Base System (LAN x / x = set Board number)
- Set the desired LAN parameters (IP address, network mask and gateway) via the menu or remote software
- Configure LAN Board 7050RC over WebGUI and Ethernet

5.1 Setting the System Board Number

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 Boards 7050RC 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 takes place on Board 7050RC via DIP switch bank (**DS1**).

5.1.1 Setting the Board Number for Base System 7001RC

A maximum of 31 LAN Boards 7050RC can be configured in System 7001RC. The Board number is set via the DIP switch bank (**DS1-Dip1-5**) for unique identification in the Base System.

DIP 5	DIP 4	DIP 3	DIP 2	DIP 1	System Board No.:
off	off	off	off	off	-
off	off	off	off	on	Board Nr. 01
off	off	off	on	off	Board Nr. 02
off	off	off	on	on	Board Nr. 03
off	off	on	off	off	Board Nr. 04
off	off	on	off	on	Board Nr. 05
off	off	on	on	off	Board Nr. 06
off	off	on	on	on	Board Nr. 07
off	on	off	off	off	Board Nr. 08
off	on	off	off	on	Board Nr. 09
off	on	off	on	off	Board Nr. 10
off	on	off	on	on	Board Nr. 11
off	on	on	off	off	Board Nr. 12
off	on	on	off	on	Board Nr. 13
off	on	on	on	off	Board Nr. 14
off	on	on	on	on	Board Nr. 15
on	off	off	off	off	Board Nr. 16
on	off	off	off	on	Board Nr. 17
on	off	off	on	off	Board Nr. 18
on	off	off	on	on	Board Nr. 19
on	off	on	off	off	Board Nr. 20
on	off	on	off	on	Board Nr. 21
on	off	on	on	off	Board Nr. 22
on	off	on	on	on	Board Nr. 23
on	on	off	off	off	Board Nr. 24
on	on	off	off	on	Board Nr. 25
on	on	off	on	off	Board Nr. 26
on	on	off	on	on	Board Nr. 27
on	on	on	off	off	Board Nr. 28
on	on	on	off	on	Board Nr. 29
on	on	on	on	off	Board Nr. 30
on	on	on	on	on	Board Nr. 31



Only these Board numbers set with the DIP switch are allowable in System 7001RC.
System 7001RC is unable to configure Board numbers which are set outside the range of the system (1-31).

5.2 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 (see **Chapter 6 Board 7050RC Network Configuration via the Base System**).



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



Request the required network parameters from your network administrator if you do not know them.

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

6 Board 7050RC Network Configuration via the Base System

The only configuration that is carried out on Board 7050RC via the Base System is to enable it to be reachable on the network. All other configurations on the Board are carried out over the WebGUI.

LAN Board 7050RC is configured via the keyboard or remote software of the respective Base System. The necessary network parameters such as IP address, Gateway, Netmask and general control bytes are configured.

The Technical Description of the respective Base System 7001RC 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

6.1 Input Functions of Base Systems 7001RC



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 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:

```

SET SYSTEM-BOARDS PARAMETER Y/N

```

Select with key **Y**

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

Example:

```

PARAMETER BOARD 03 OF 25 7050 NO.: 01
STATUS: M / - BOARDNAME: "MANAGE__" SET>Y/N

```

- PARAMETER BOARD 03 OF 25** ⇒ board **03** of **25** implemented
- 7050RC NO.: 01** ⇒ board type **7050RC** with board number **01**
- STATUS: M (I) / - (E)** ⇒ **M or I** = monitoring **or** no monitoring
- ⇒ **E or -** = without error operating **or** board error
- BOARDNAME: "MANAGE__"** ⇒ **MANAGE__** board name freely selected by customer

6.1.1 Inputting the Static IPv4 Address / DHCP Mode

Static IPv4 Address

In the upper line the selected board appears with its board number and IPv4 address. 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	0	N	O	.	:	0	1	I	P	-	A	D	R	>	1	9	2	.	1	6	8	.	0	1	7	.	0	0	1	<	
						N	E	W		I	P	-	A	D	D	R	E	S	>	~	~	~	.	~	~	~	.	~	~	~	.	~	~	~	<

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.

6.1.2 Inputting the Gateway Address

The gateway address can be entered via the selection screen.

B.7050	NO. : 01	GW-ADR	> 255.000.000.000 <
	NEW	GW-ADDRESS	> ~ ~ ~ . ~ ~ ~ . ~ ~ ~ . ~ ~ ~ <

The Gateway address can now be entered in the same way as the IP address, as described in **Chapter 6.1.1 Inputting the Static IPv4 Address / DHCP Mode**.

A demarcation arrow follows the last group of figures "<".

6.1.3 Inputting the Network Mask

The network mask can be entered via the selection screen.

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

The network mask can now be entered in the same way as the IP address, as described in **Chapter 6.1.1 Inputting the Static IPv4 Address / DHCP Mode.**

A demarcation arrow follows the last group of figures "<".

6.1.4 Inputting the Control-Byte (no function at present)

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

B.7050	NR.:01	CONTROL-BYTE	00000000
	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:

CONTROL-BYTE >76543210<

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

6.1.5 Inputting the Parameterbyte 01 (no function at present)

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

```

B.7050 NO.:01 OLD: BYTE 01 >00000000<
BYTE = BIT 7..0 NEW: BYTE 01 >~~~~~<

```

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:

```

BYTE 01 >76543210<

```

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

6.1.6 Inputting the Parameterbyte 02 (no function at present)

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

```

B.7050 NO.:01 OLD: BYTE 02 >00000000<
BYTE = BIT 7..0 NEW: BYTE 02 >~~~~~<

```

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:

```

BYTE 02 >76543210<

```

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

7 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.



The WebGUI has been tested with the following browsers: MOZILLA 1.x, Netscape 7.x and IE 6.x – some functions do not run on older versions.

7.1 Quick Configuration

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

7.1.1 Requirements

- Ready-for-operation **hopf** Base System with implemented Board 7050RC
- Board made accessible to the network (see **Chapter 6 Board 7050RC Network Configuration via the Base System**)
- PC with installed web browser (e.g. Internet Explorer) in the sub-network of Board 7050RC

7.1.2 Configuration Steps

- Create the connection to the Board with a web browser
- Login as a '**master**' user (no password is set initially)
- Switch to Network tab and enter the DNS Server (required for the alarm)
- Save the configuration



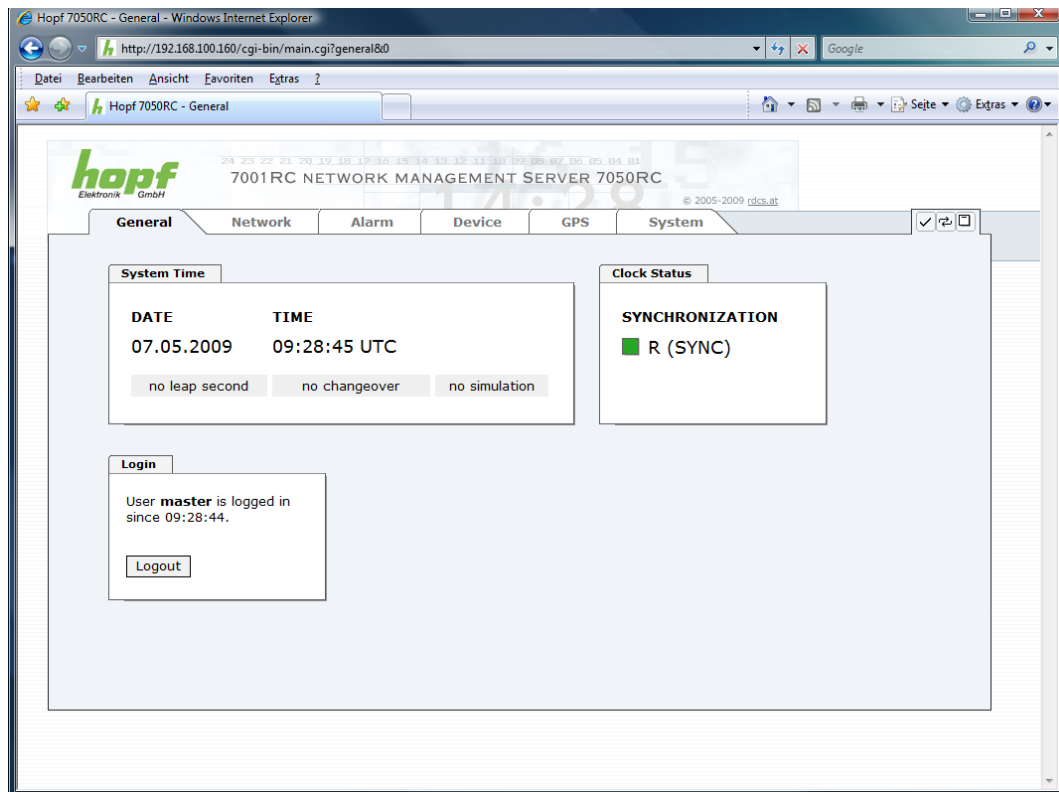
The following detailed explanatory information should be read if anything is unclear while executing the configuration steps.

7.2 General – Introduction

Board 7050RC 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 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.

7.2.1 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 (user name <master> no password is set on delivery)
- "device" user (user name <device> no password is set on delivery)

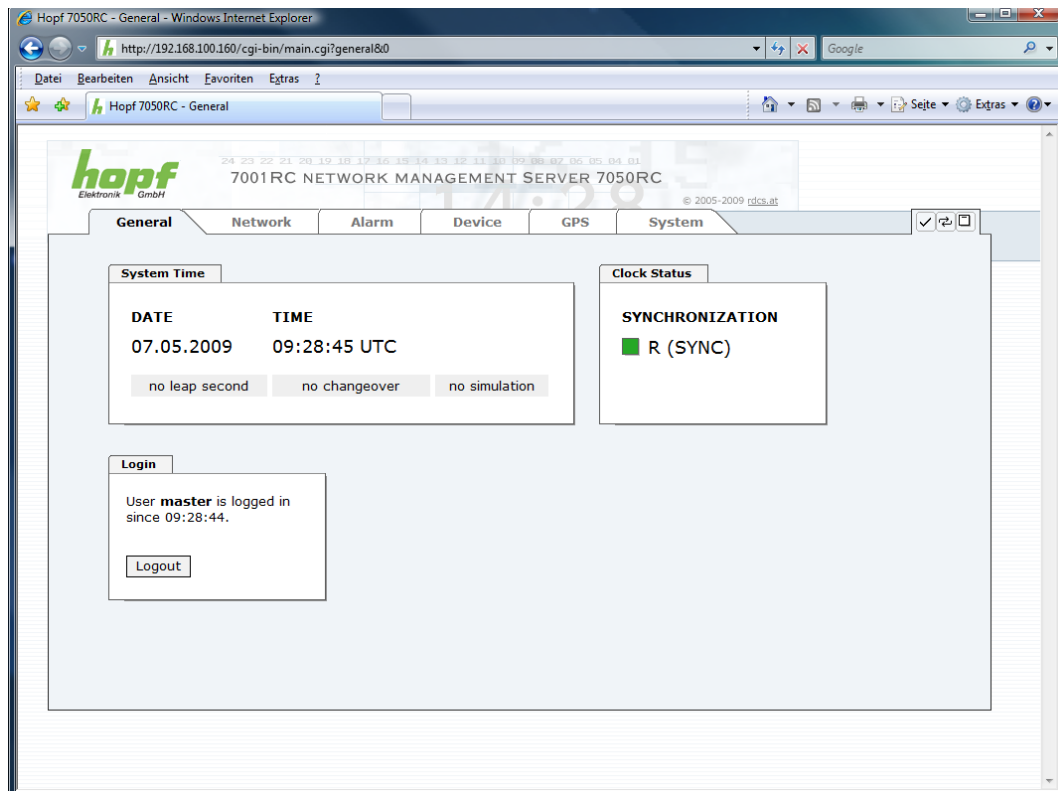


Differentiation is made between **upper and lower case** characters in the password. Alphanumeric characters and the following symbols can be used: **[] () * - _ ! \$ % & / = ?**



The password should be changed after the first login for security reasons (see **chapter 7.3.4.8 Passwords**).

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



Click on the **Logout** button to log out. 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 7050RC.

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 certification
- Change master password
- Download configuration files

7.2.2 Navigation via the Web Interface

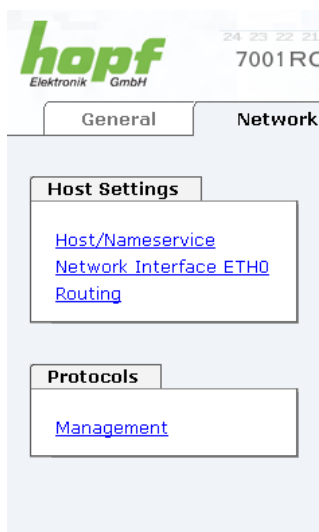
The WebGUI is divided into function tabs. Click on one of these tabs to navigate through the Board. The selected tab is identified by a darker background colour, see the following image (General in this case).



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



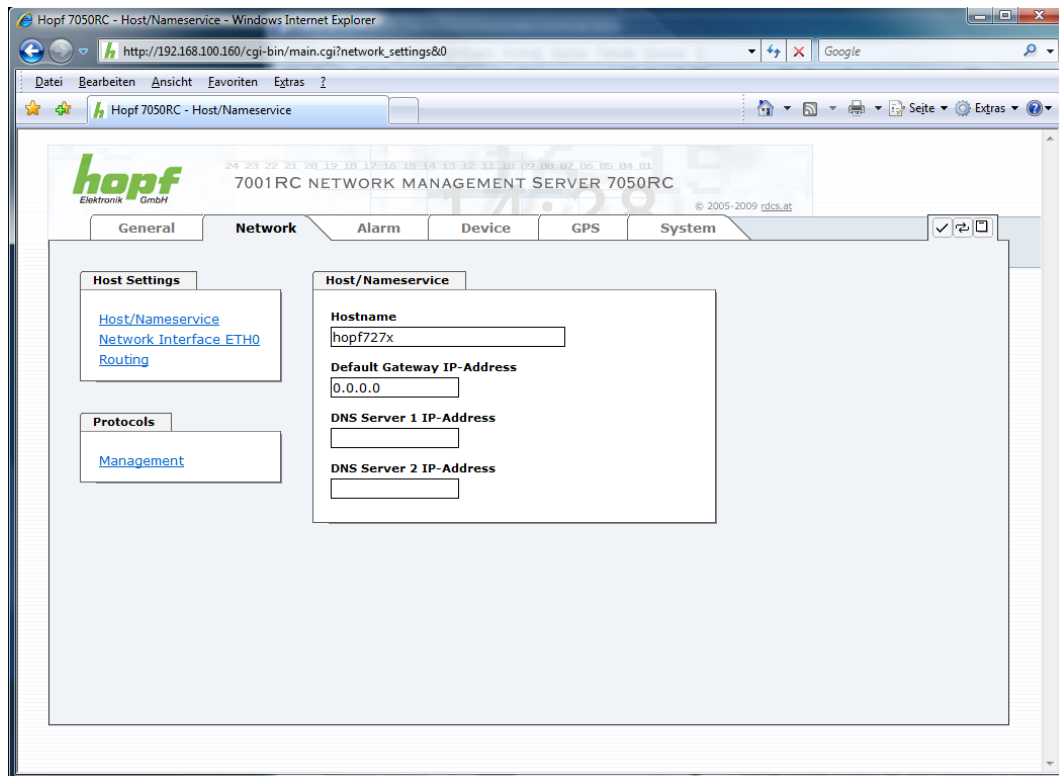
JavaScript should be enabled in the browser in order to guarantee the correct operation of the web interface.



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

7.2.3 Inputting 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:

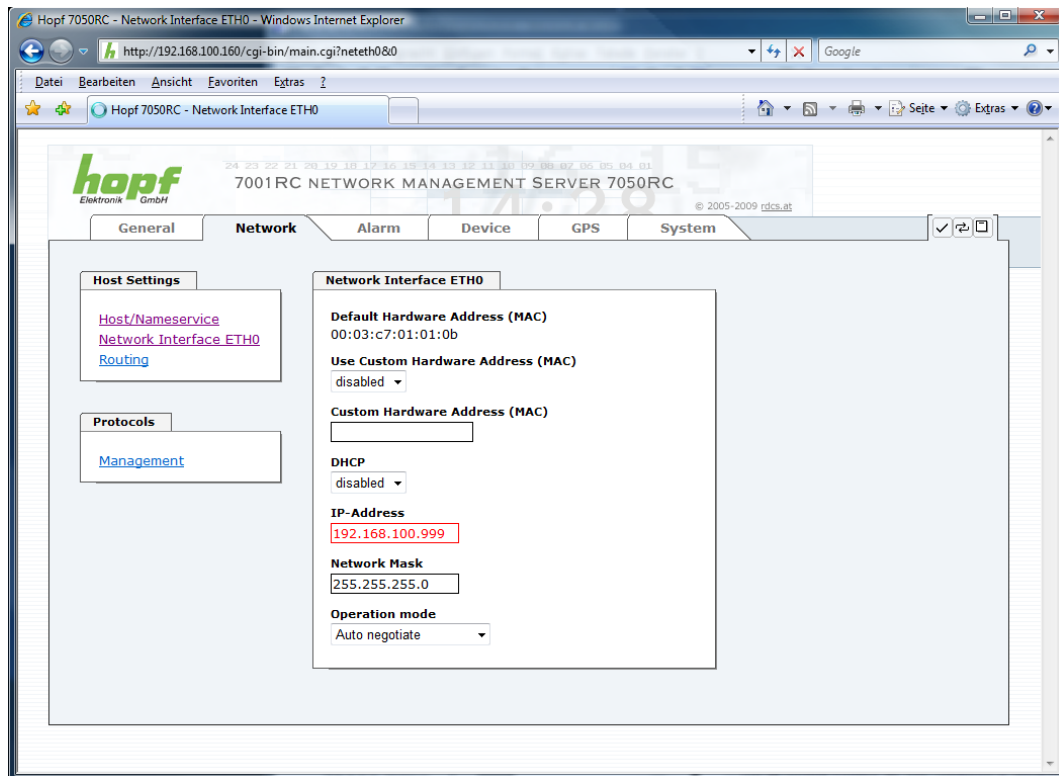
No.	Symbol	Description
1	Apply	Acceptance of changes and entered data
2	Reload	Restoring the saved data
3	Save	Permanent storage of the data in the flash configuration

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

If the data is only to be tested it is sufficient to accept the changes with **Apply**. However, this data is then lost when the **hopf** Base System is switched off or restarted.

7.2.4 Plausibility Check during Input

A plausibility check is generally carried out during input.



As can be seen in the above image (field "IP-Address"), an invalid value (e.g. text where a number should be entered, IP address out 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.

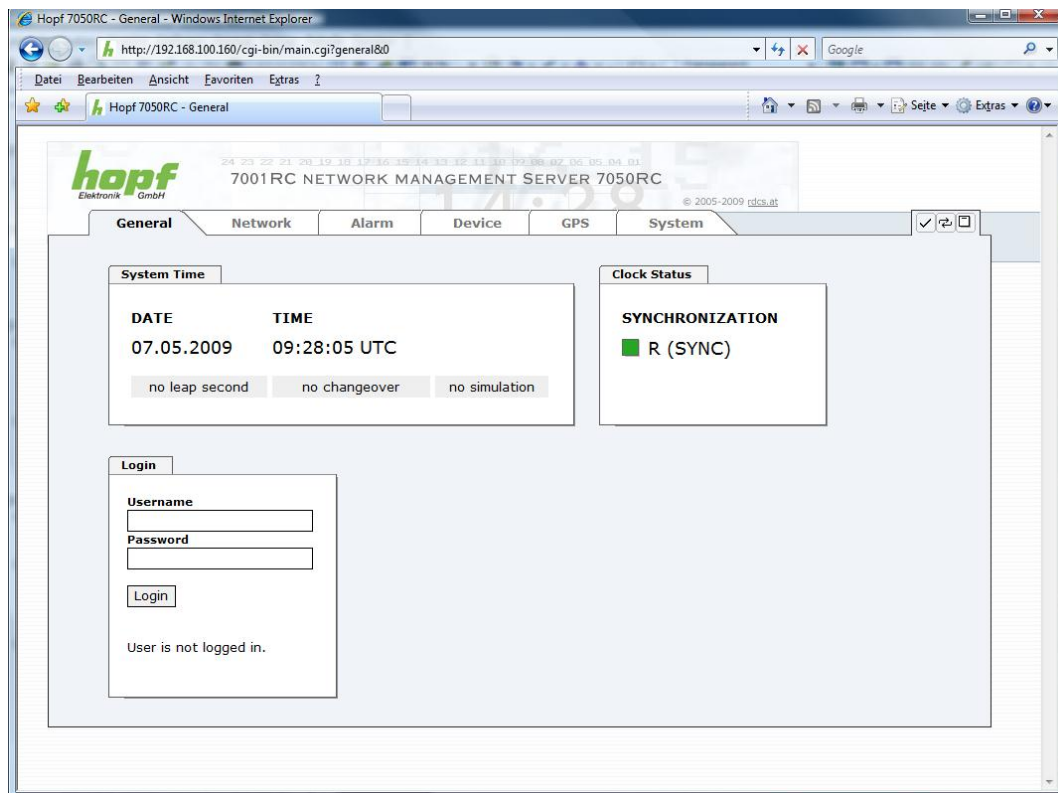
7.3 Description of the Tabs

The WebGUI is divided into the following tabs:

- General
- Network
- Alarm
- Device
- GPS
- System

7.3.1 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.

Clock Status

Display of the actual synchronization status from the **hopf** base system with the possible values:

invalid	invalid time
C	the clock system is in crystal operating (C = crystal)
r	the clock system is synchronous to the synchronisation source
R	the clock system is synchronous to the synchronisation source with control of the internal quartz basis.

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

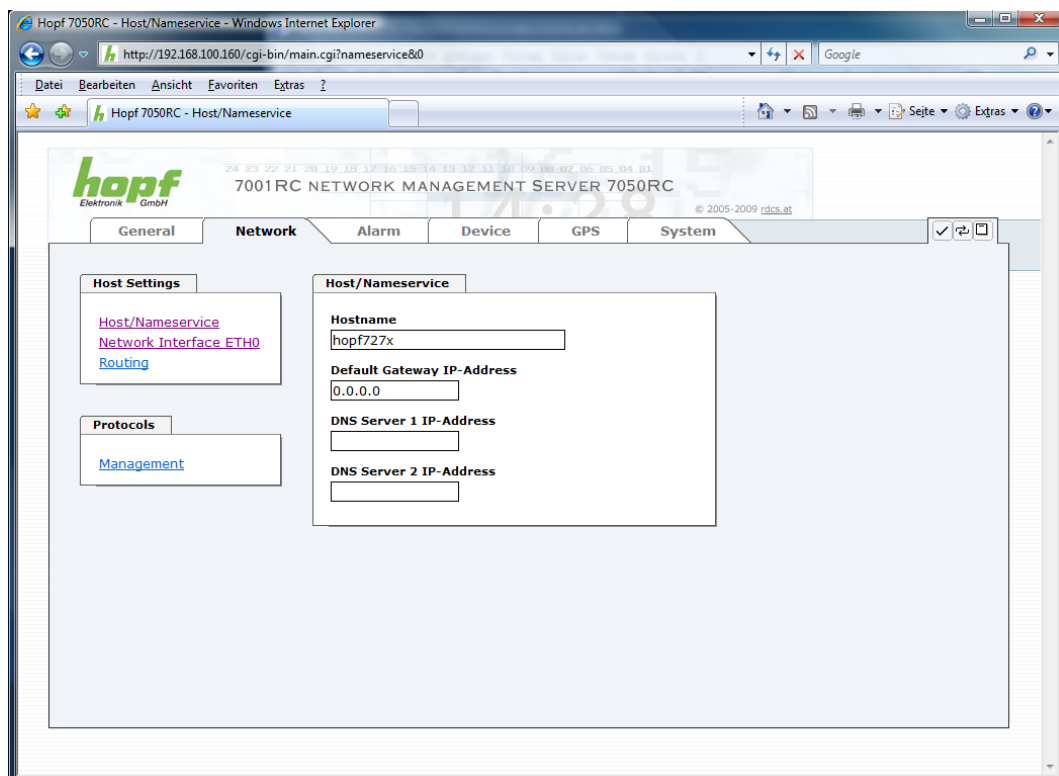
The **Simulation display** is used if the system time of the **hopf** Base System is marked as a simulated time (not currently available).

Login

The **Login** box is used in accordance with **Chapter 7.2.1 LOGIN and LOGOUT as a User**.

7.3.2 NETWORK Tab

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



7.3.2.1 Hostname/Nameservice

Setting for the unique network identification.

7.3.2.1.1 Hostname

The standard setting for the Hostname is "**hopf727x**". This name should also be adapted to the respective network infrastructure.

If in doubt, simply leave the standard value in place or ask your network administrator.



A BLANK Hostname is not a valid name and can cause the Board to malfunction.

7.3.2.1.2 Default Gateway

The standard gateway is generally configured via the Base System menu. However it can also be changed via the web interface.

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

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

7.3.2.1.3 DNS Server 1 & 2

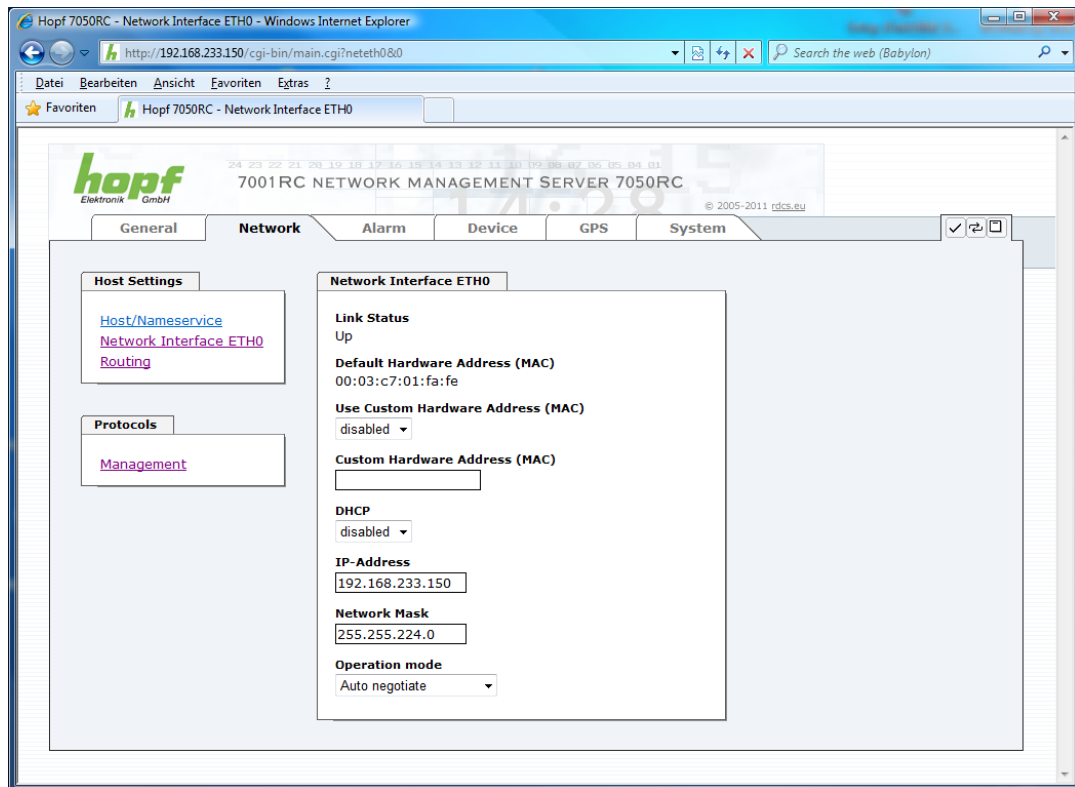
The IP address of the DNS server should be entered if you wish to use complete Hostnames (hostname.domainname) or work with reverse lookup.

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.

7.3.2.2 Network Interface ETH0

Configuration of the Ethernet interface.



7.3.2.2.1 Link Status

Display the link status of the Ethernet connection.

7.3.2.2.2 Default Hardware Address (MAC Address)

The 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.



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

7.3.2.2.3 Customer Hardware Address (MAC)

The MAC address assigned from **hopf** can be changed to a user-defined MAC address.



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

To use the 'customers MAC address function' you have to activate it by setting the function '**Use Custom Hardware Address (MAC)**' to **enable**.

You have to enter the customers MAC address is hexadecimal form with a colon to separate (e.g. **00:03:c7:55:55:02**).



The MAC address assigned by **hopf** can be activate consistently.

7.3.2.2.4 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.



Changes to the IP address or the enabling of DHCP take immediate effect when the settings are accepted. The connection to the web interface must be adapted and regenerated.

7.3.2.2.5 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.

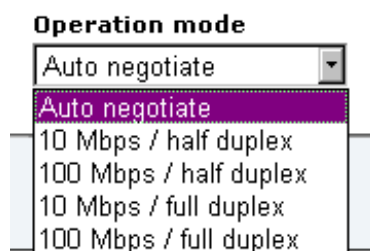
7.3.2.2.6 Network Mask

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.

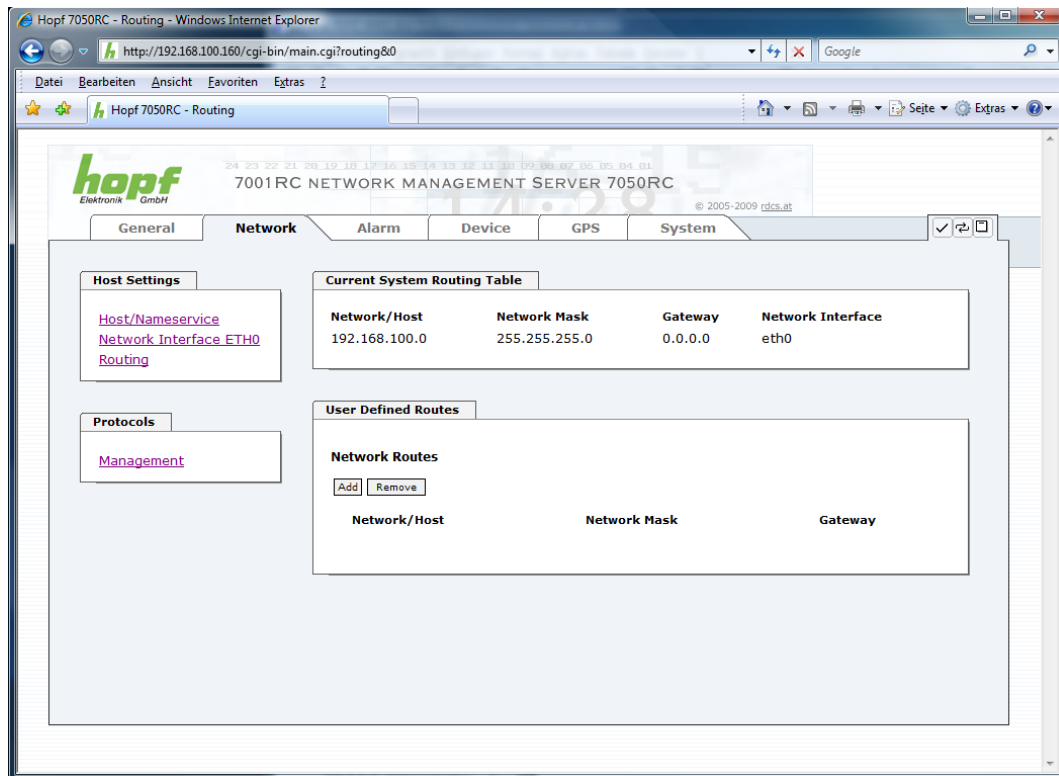
7.3.2.2.7 Operation Mode

The network device usually adjusts the speed 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.



7.3.2.3 Routing

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



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



This feature is an extended option and can cause problems in the network if it is not configured correctly!

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

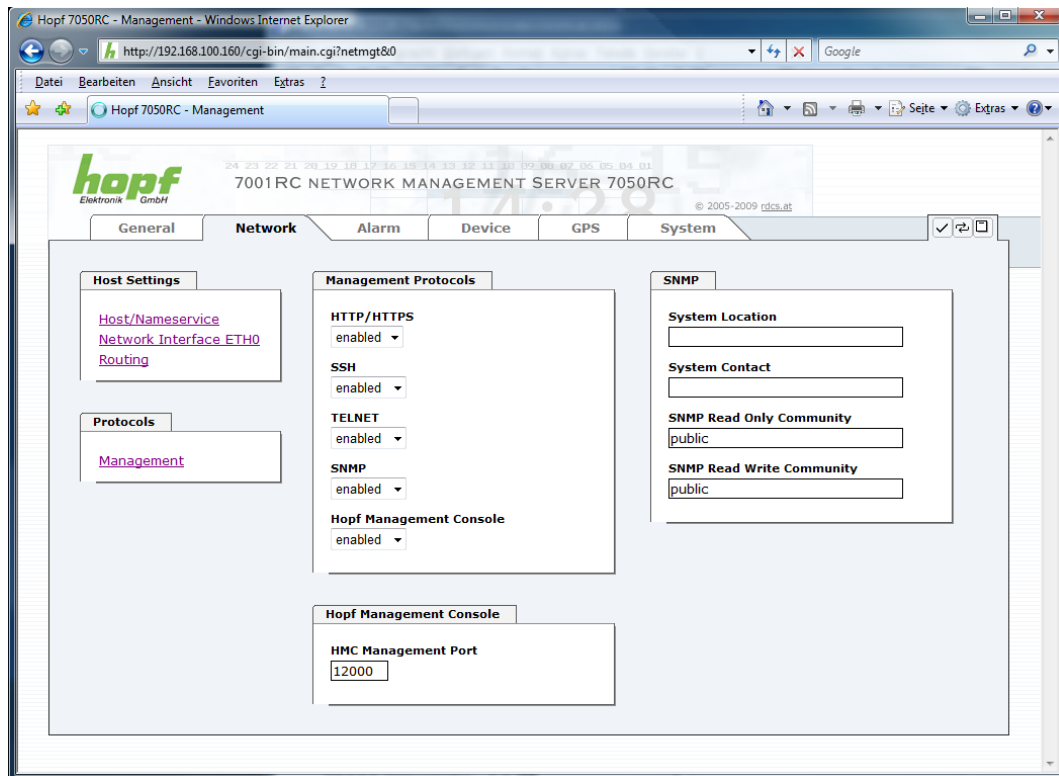


The Board cannot be used as a router!

7.3.2.4 Management- / HMC Management Port / SNMP

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 security for a protocol (enable/disable) take effect immediately.



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!!!

By standard the connection between management board (LAN) 7050RC 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.

7.3.3 ALARM Tab

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

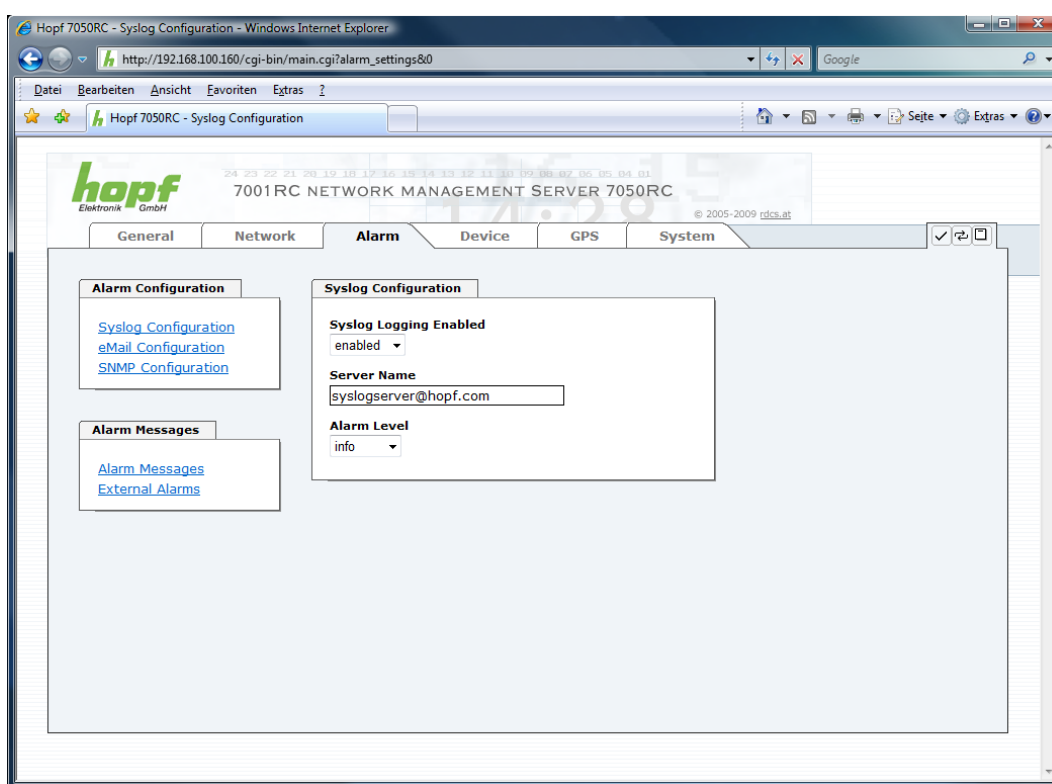
7.3.3.1 Syslog Configuration

It is necessary to enter the name or IP 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 flash memory is not of sufficient size.

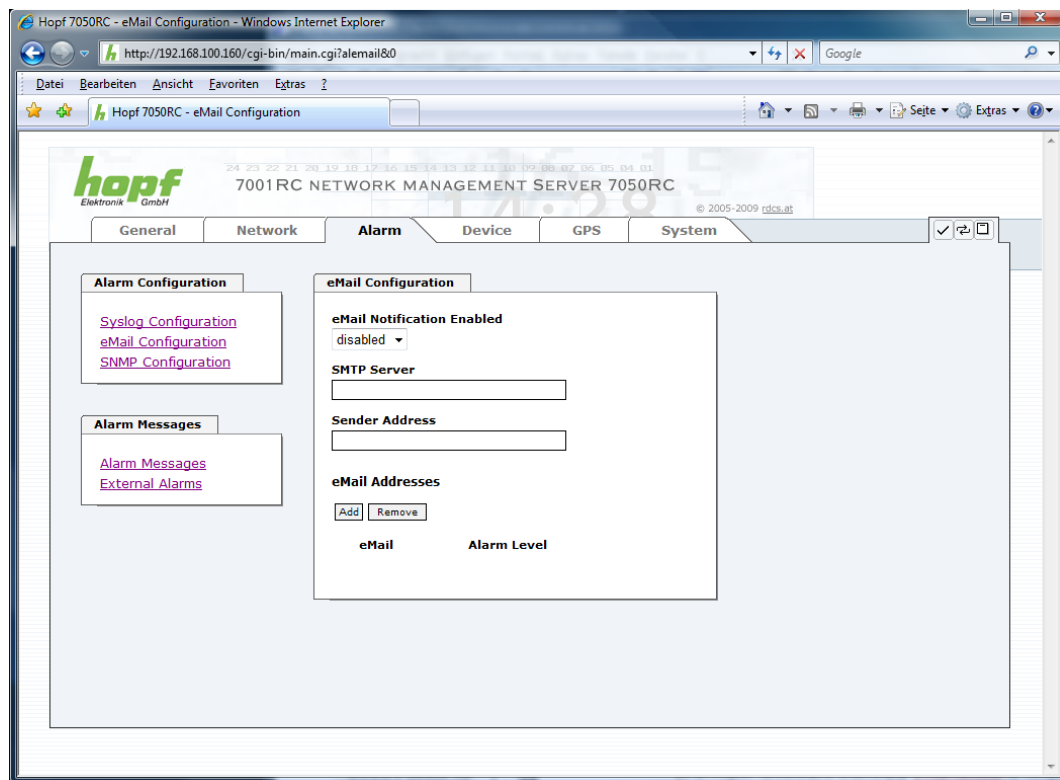
It should be noted that the standard Linux/Unix Syslog mechanism is used for this functionality. This is not the same as the Windows System Event mechanism!



The alarm level designates the priority level of the messages to be transmitted and the level from which transmission is to take place (see **Chapter 7.3.3.4 Alarm**).

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

7.3.3.2 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 email addresses which each have different alarm levels.

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

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

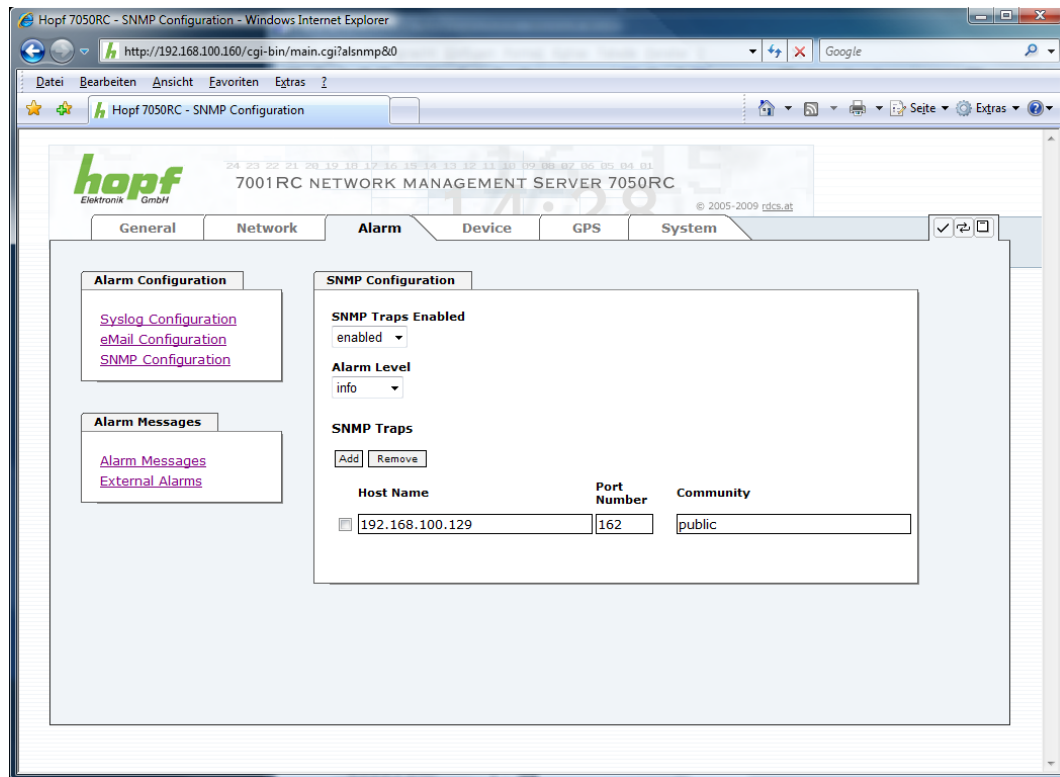
Some email servers only accept messages if the sender address entered is valid (spam protection). This can be inserted in the "Sender Address" field.

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 7.3.3.4 Alarm Messages**).

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

7.3.3.3 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 7.3.4.9 Downloading Configurations - Downloads**).

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 7.3.3.4 Alarm Messages**).

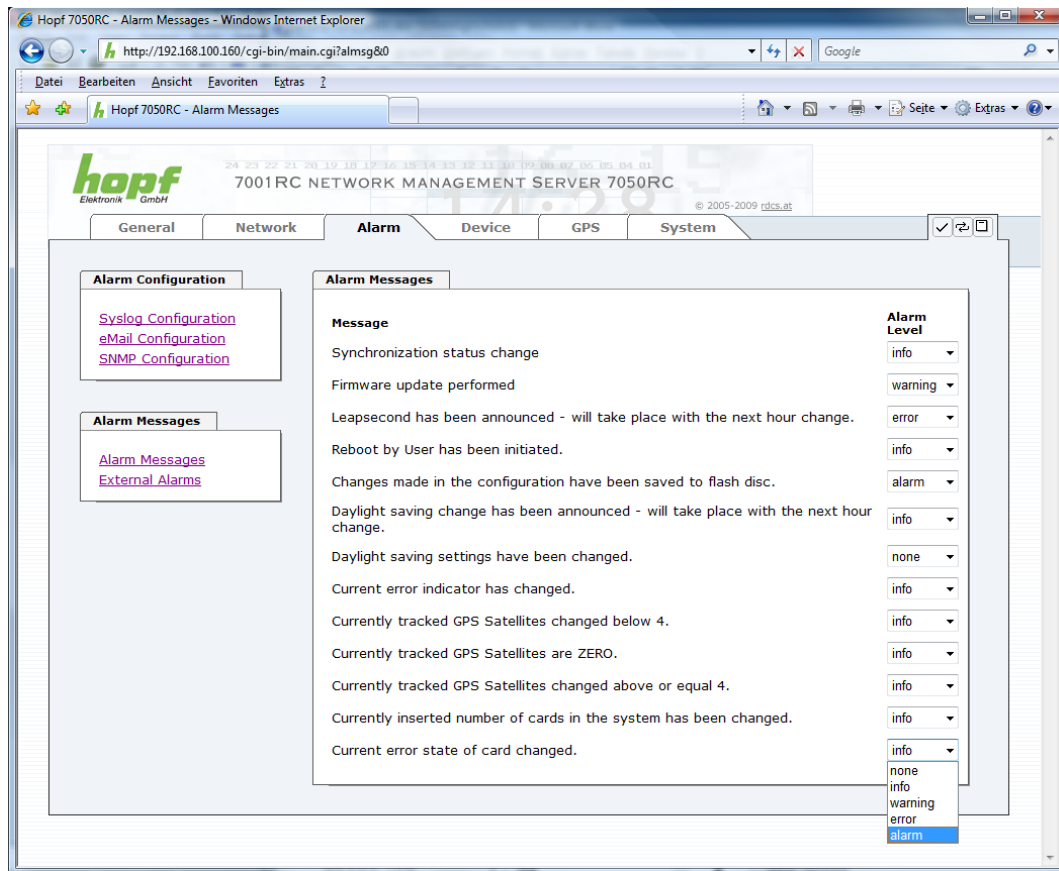
Alarm Level	Transmitted Messages
none	no messages
info	info / warning / error / alarm
warning	warning / error / alarm
error	error / alarm
alarm	alarm



SNMP protocol must be enabled in order to use SNMP (see **Chapter 7.3.2.4 Management- / HMC Management Port / SNMP**).

7.3.3.4 Alarm Messages

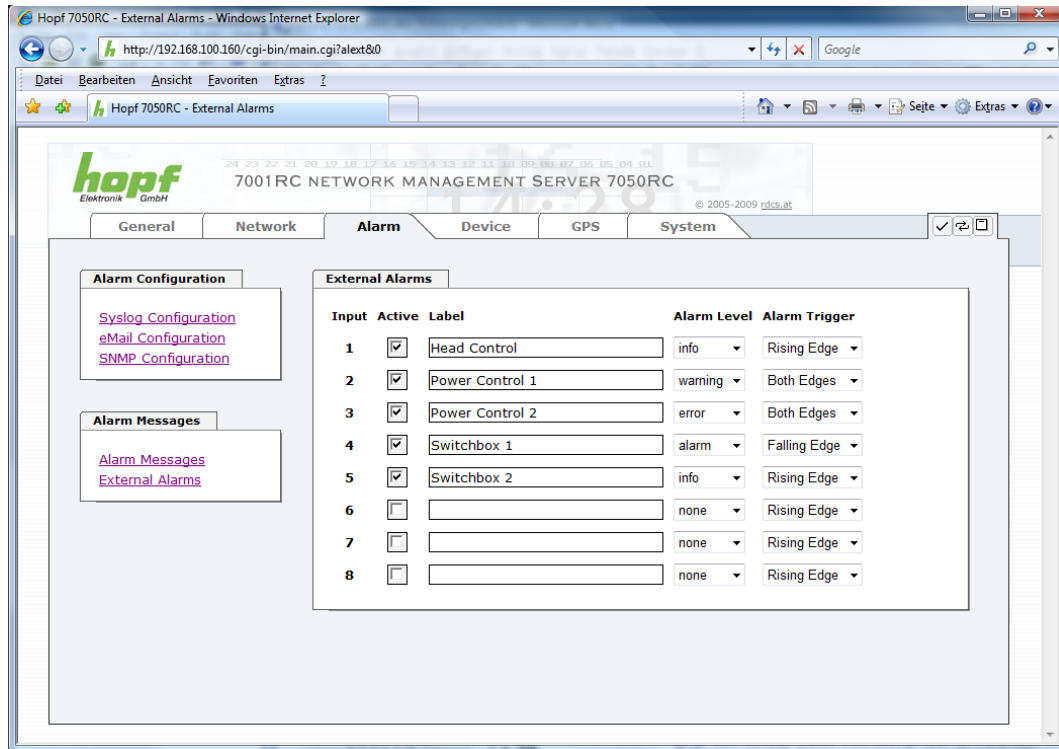
Every message shown in the image can be configured with the displayed alarm levels. If level NONE is selected this means that this message is completely ignored.



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

7.3.3.5 External Alarm Messages (optional)

The Management Board 7050RC 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.



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.

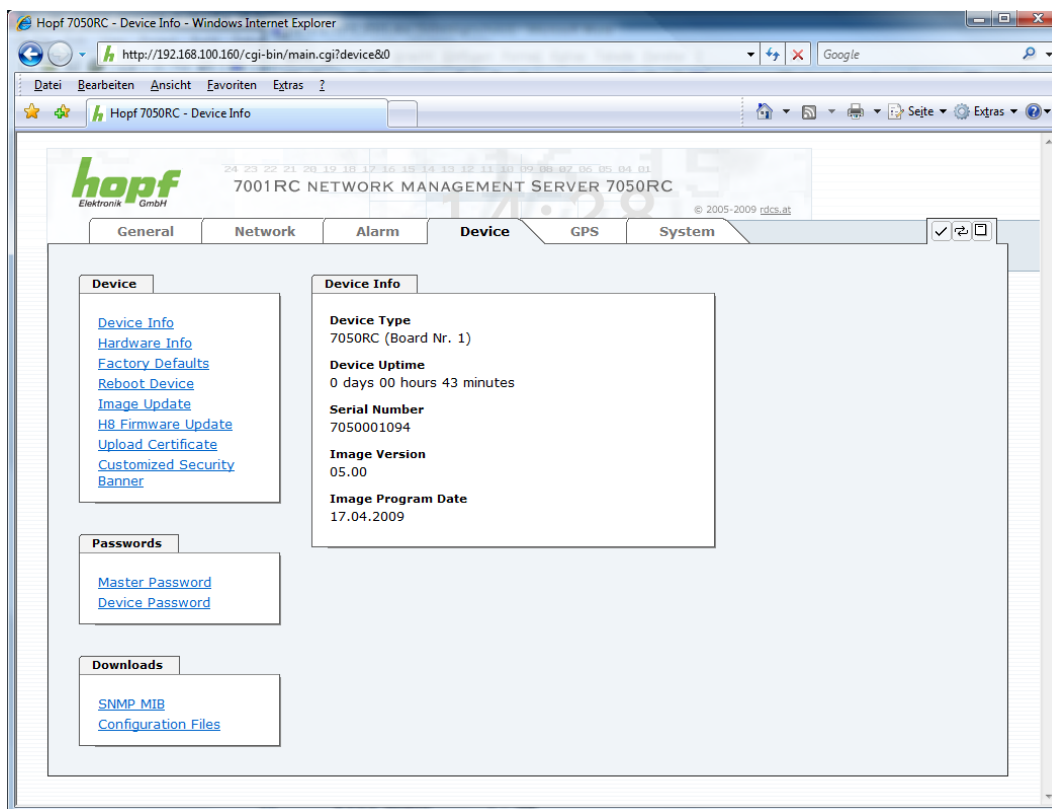
Alarm Trigger:

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

7.3.4 DEVICE Tab

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



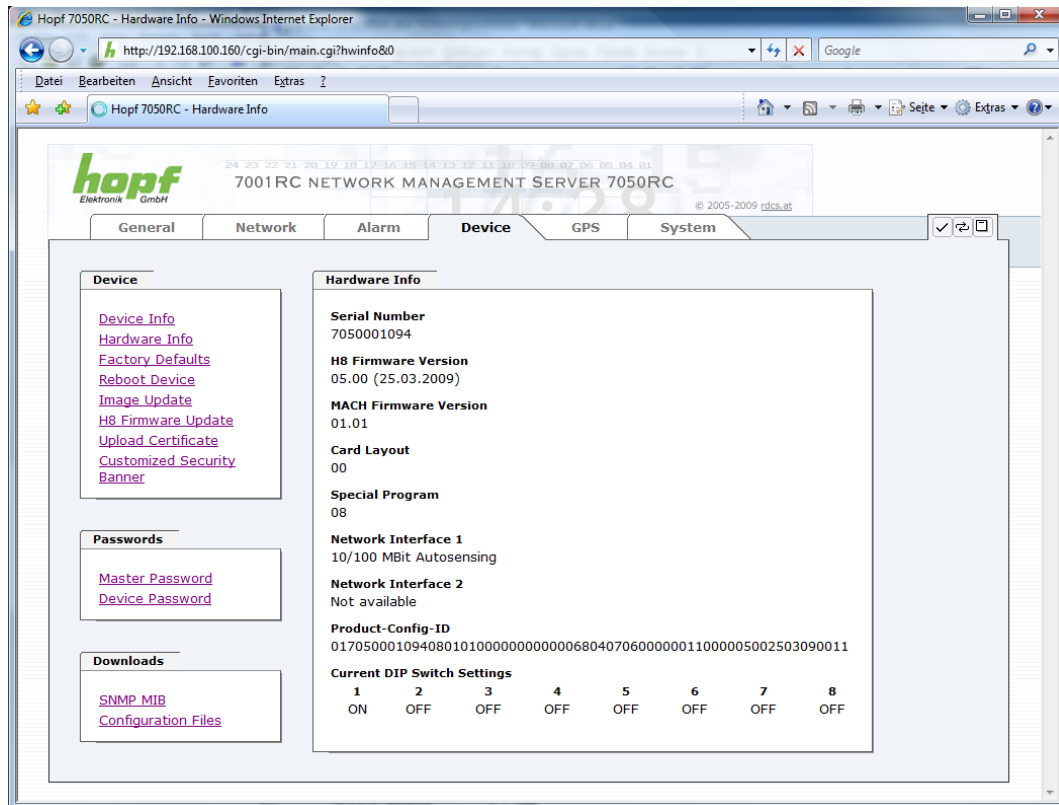
This tab provides the basic information about the Board hardware and software/firmware. Password administration and the update services for the Board are also made accessible via this website. The complete download zone is also a component of this site.

7.3.4.1 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.

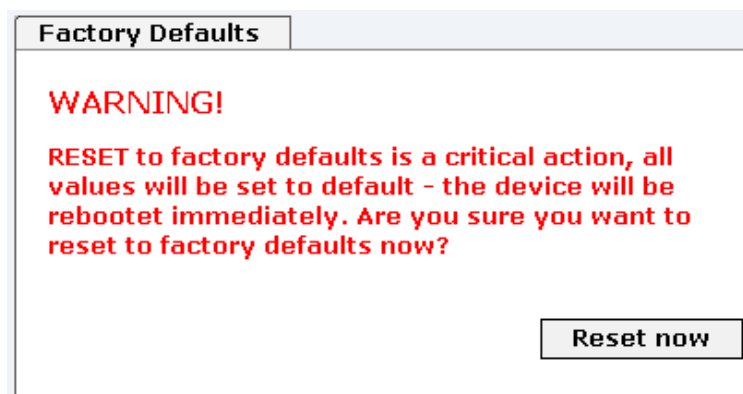
7.3.4.2 Hardware Information

Read-only access is provided here in the same way as for device information. The user requires this information in the case of service requests, e.g. MACH version hardware status etc.



7.3.4.3 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 10 Factory Default**).

Please log in as a "Master" user in accordance with the description in **Chapter 7.2.1 LOGIN and LOGOUT as a User**.

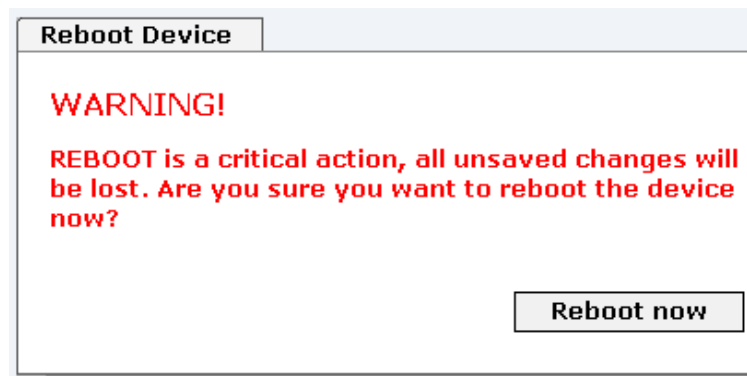
Press the "**Reset now**" button and wait until the restart has been completed.

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

**WARNING:**

A complete check (and reconfiguration of the Board where appropriate) is required after every **Factory Default** procedure. In particular, the MASTER and DEVICE passwords must be reset.

7.3.4.4 Restarting (Rebooting) the Board



All settings not saved with "**Save**" are lost on reset (see **Chapter 7.2.3 Inputting or Changing Data**).

Please log in as a "Master" user in accordance with the description in **Chapter 7.2.1 LOGIN and LOGOUT as a User**.

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

This procedure can take up to one minute. The website is not automatically updated.

7.3.4.5 Image Update & H8 Firmware Update

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

Both the embedded software and the H8 firmware can only be downloaded to the Board via the web interface (login as "Master" user required).



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 a **hopf** engineer.
- 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.
- A restart is absolutely essential prior to downloading an update (see **Chapter 7.3.4.4 Restarting (Rebooting) the Board**).
- During the update procedure, the device **must not be switched off** and **settings must not be saved to the flash memory!**
- Updates are usually executed as a 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.

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 image designations are:

upgrade7050_vXXxx.img	for the embedded image and	(update takes 3-5 minutes)
H8_7050_XXxx.bin	for the H8 firmware .	(update takes 3-5 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.

The Board must be restarted following the update.

H8 Firmware Update

WARNING!
H8 FIRMWARE UPDATE is a critical action. Please ensure not to switch off power during upload and reboot after upload! In 6xxx and 7001 Systems the rest of the System will go in AUTORESET MODE!

Update file:

Durchsuchen...

Upload now

Image Update

WARNING!
IMAGE UPDATE is a critical action. Please ensure not to switch off power during update!

Update file:

Durchsuchen...

Update now

The procedure for the **H8 update** differs only in that the Board 7050RC is restarted automatically.

7.3.4.6 Customized Security Banner

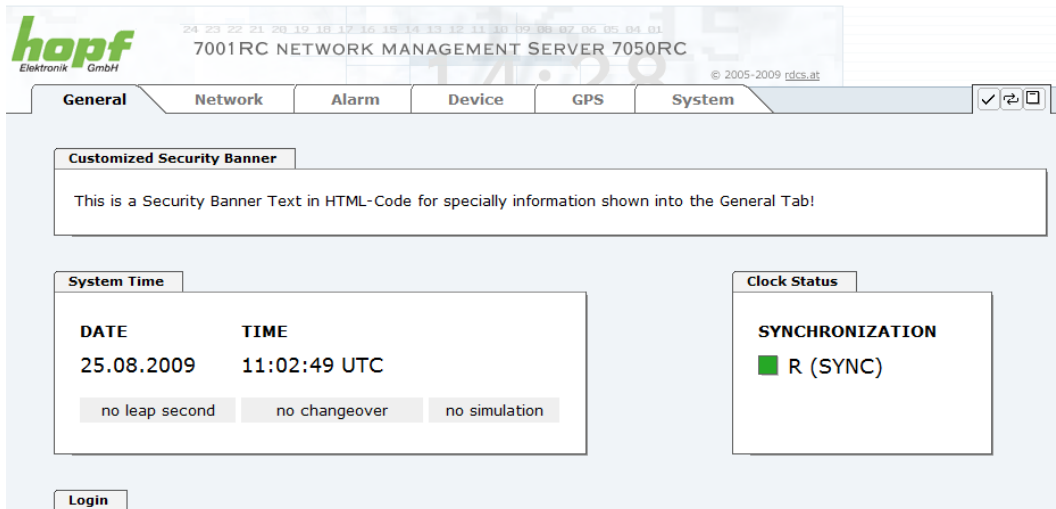
Special security information which are displayed in the General-Tab can be entered here by the user.

Customized Security Banner for General Tab

Security Banner Text (max. 2000 characters)

This is a Security Banner Text in HTML-code for specially custom information shown into the General Tab!

The security information can be written as 'unformatted' text as well as HTML formatted text. 2000 characters are available to write failsafe into the board 7050RC.



The screenshot shows the web interface for the 7001RC NETWORK MANAGEMENT SERVER 7050RC. The 'General' tab is selected, displaying the 'Customized Security Banner' with the text: 'This is a Security Banner Text in HTML-Code for specially information shown into the General Tab!'. Below this, the 'System Time' section shows the date '25.08.2009' and time '11:02:49 UTC', with options for 'no leap second', 'no changeover', and 'no simulation'. The 'Clock Status' section shows 'SYNCHRONIZATION' with a green square and 'R (SYNC)'. A 'Login' button is visible at the bottom left.

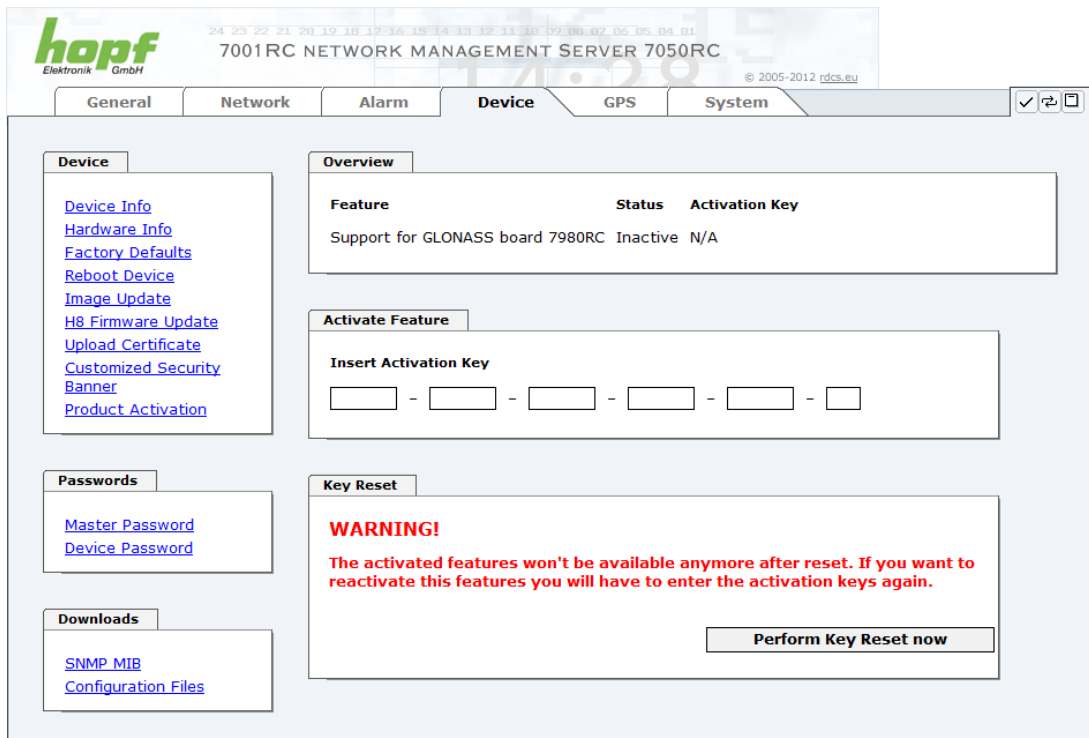
After a successful storage the "Customized Security Banner" with the saved security information is displayed in the General-Tab.

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

7.3.4.7 Product Activation

Optional features (e.g. Support for GLONASS board 7980RC) can be activated using a special activation key which can be requested from **hopf** Elektronik GmbH.

Each activation key is bound to a specific board and cannot be shared between several boards.



The screenshot shows the web interface for the 7050RC NETWORK MANAGEMENT SERVER. The top navigation bar includes tabs for General, Network, Alarm, Device (selected), GPS, and System. The left sidebar contains links for Device Info, Hardware Info, Factory Defaults, Reboot Device, Image Update, H8 Firmware Update, Upload Certificate, Customized Security Banner, and Product Activation. Below these are sections for Passwords (Master Password, Device Password) and Downloads (SNMP MIB, Configuration Files). The main content area is titled 'Device' and contains an 'Overview' table with columns for Feature, Status, and Activation Key. The table lists 'Support for GLONASS board 7980RC' with a status of 'Inactive' and 'N/A'. Below the overview is an 'Activate Feature' section with an 'Insert Activation Key' input field consisting of six boxes separated by hyphens. At the bottom is a 'Key Reset' section with a red 'WARNING!' message stating that activated features will be lost after a reset and that the activation key must be re-entered. A 'Perform Key Reset now' button is located at the bottom right of the Key Reset section.

Overview

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

Activate Feature

Input fields to enter a new activation key. The activation key has 26 characters and can be entered case insensitive without hyphens (-). After entering a key the feature can be activated by pressing the Apply button ☒ and Save to Flash button ☐. If activation was successful the new feature is listed in the overview with status "Active" and can be used immediately.

Key Reset

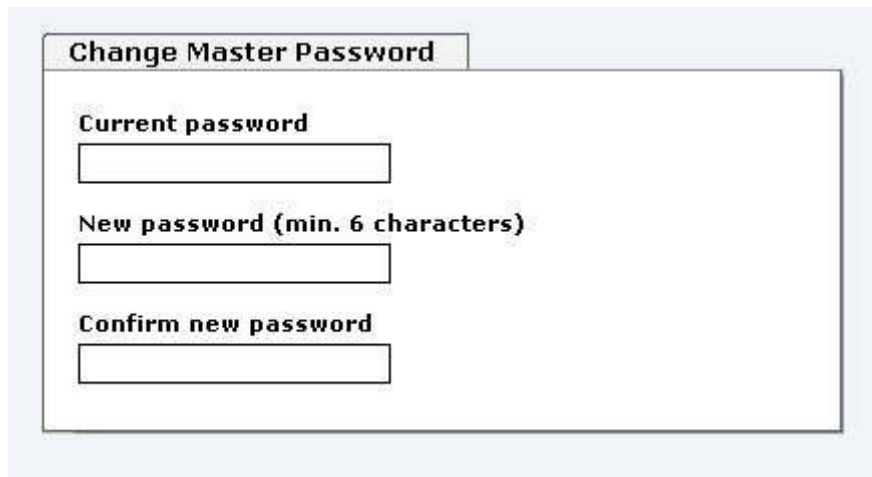
Clears all Activation Keys and sets all optional features to status "Inactive". All other non-optional functions are still available after a Key Reset. If the option is enabled again, the last configuration for the optional feature is restored.

7.3.4.8 Passwords

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 7.2.1 LOGIN and LOGOUT as a User**)



The screenshot shows a web form titled "Change Master Password". It contains three input fields: "Current password", "New password (min. 6 characters)", and "Confirm new password". Each field is represented by a rectangular text box.

7.3.4.9 Downloading Configurations - Downloads



The screenshot shows a web page titled "Configuration Files". It contains a section titled "Download System Configuration" with a document icon and a blue hyperlink that says "Click here to download".

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. Only the documentation can be downloaded without logging on.

The private **hopf** enterprise MIB is also available via the web.

7.3.5 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.

7.3.5.1 GPS Overview

Satellites Visible

Theoretical quantity of detected satellites by the GPS receiver.

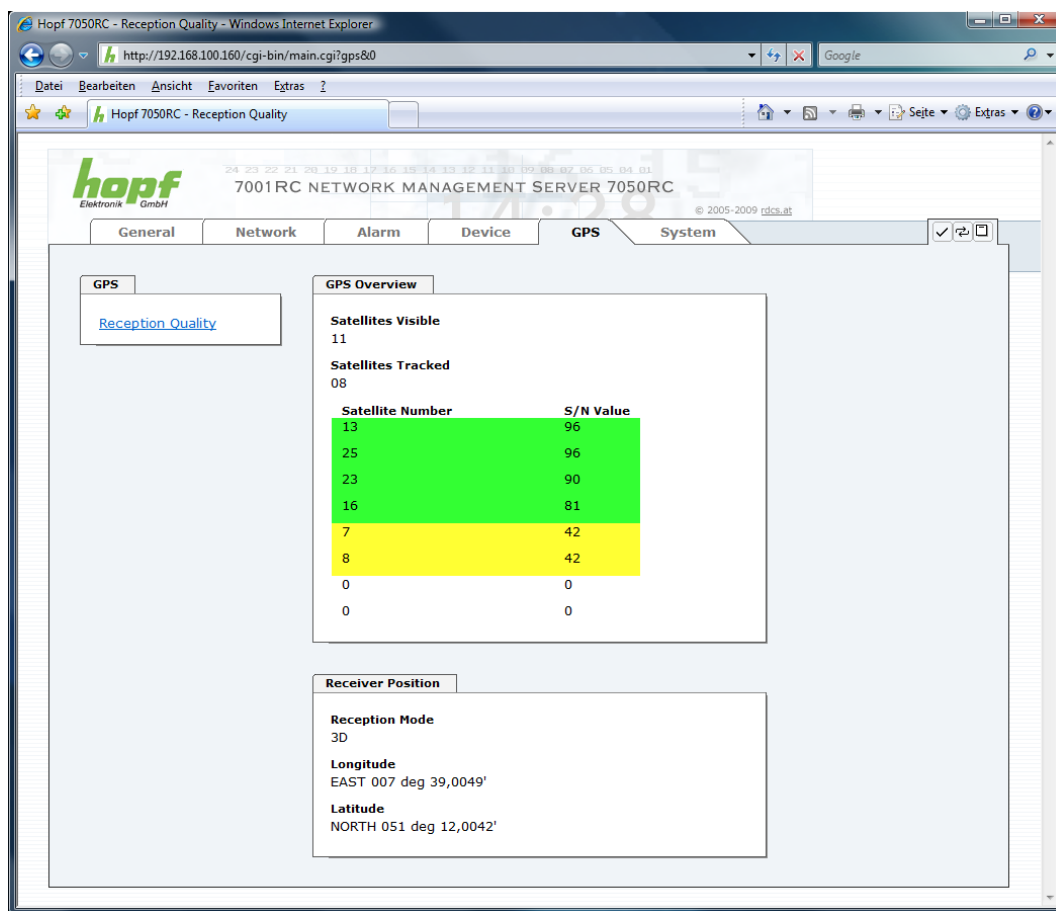
Satellites Tracked

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



The screenshot shows the 'GPS Overview' tab in the Hopf 7050RC Network Management Server web interface. The interface includes a navigation bar with tabs for General, Network, Alarm, Device, GPS, and System. The GPS tab is active, and the 'Reception Quality' link is highlighted. The 'GPS Overview' section displays the following data:

- Satellites Visible:** 11
- Satellites Tracked:** 08

Satellite Number	S/N Value
13	96
25	96
23	90
16	81
7	42
8	42
0	0
0	0

The 'Receiver Position' section shows:

- Reception Mode:** 3D
- Longitude:** EAST 007 deg 39,0049'
- Latitude:** NORTH 051 deg 12,0042'

Receiver Position

3D - Evaluation

The accuracy of the time evaluation is defined by the exact calculation of the installation position. In order to carry out this calculation (3D evaluation) it is necessary to receive information from at least 4 satellites. The signal runtime to several satellites is determined from the calculated position and the precise second mark is produced from their mean value.

Position-fix - Evaluation

In Position-fix mode the system can be synchronized using the data from only one received satellite. The second mark is calculated for the input position. If 4 satellites are available in this mode then the evaluation switches automatically into 3D mode and calculates the exact position. In this case, the accuracy with one satellite increases to the same accuracy as in 3D mode.

Current Position with Longitude and Latitude

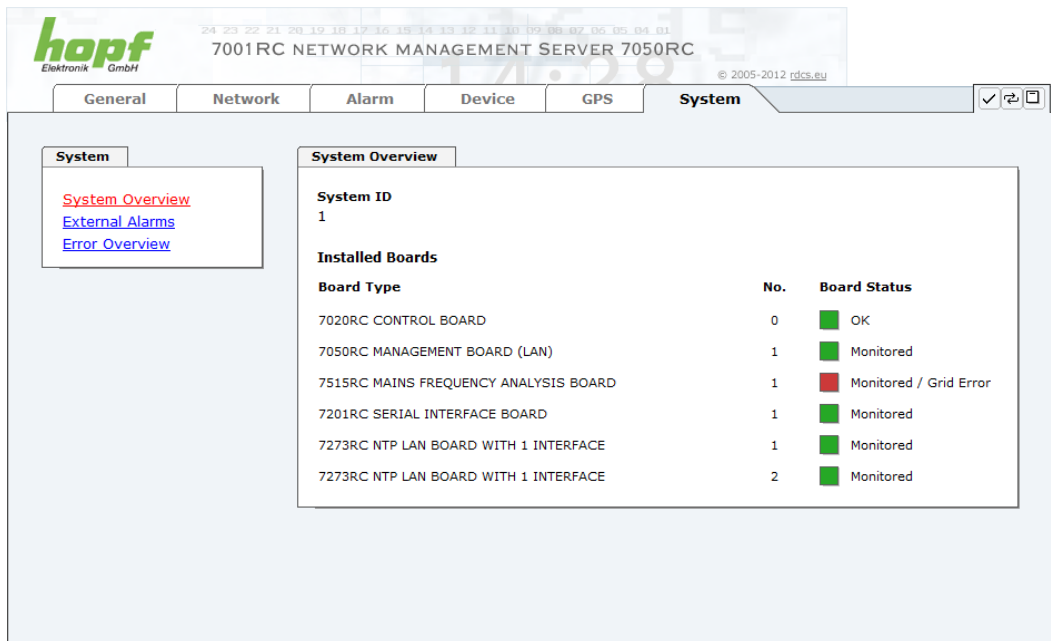
Hereby the geographical position of the system is entered. This is a helpful function referring to the initial commissioning of the system and reduces the first synchronization time of the GPS receiver.

7.3.6 System

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

7.3.6.1 System Overview

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



The screenshot shows the web interface for the 7001RC Network Management Server 7050RC. The 'System' tab is selected, and the 'System Overview' section is active. It displays the System ID as 1 and a table of installed boards.

Board Type	No.	Board Status
7020RC CONTROL BOARD	0	OK
7050RC MANAGEMENT BOARD (LAN)	1	Monitored
7515RC MAINS FREQUENCY ANALYSIS BOARD	1	Monitored / Grid Error
7201RC SERIAL INTERFACE BOARD	1	Monitored
7273RC NTP LAN BOARD WITH 1 INTERFACE	1	Monitored
7273RC NTP LAN BOARD WITH 1 INTERFACE	2	Monitored

System ID: 7001RC System code

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

Board Type: System board name

No.: adjusted associated system
board number

Board Status: actual control status

Monitored: high control status

Idle: low control status

OK status of the control board

7.3.6.2 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 7050RC. The top navigation bar includes tabs for General, Network, Alarm, Device, GPS, and System. The System tab is selected. On the left, a sidebar menu lists System Overview, External Alarms (highlighted), and Error Overview. The main content area displays the External Alarms section with a table of 8 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	N		OFF
8	N		OFF

External Alarms

Input:

Number of the monitoring input.

Active:

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

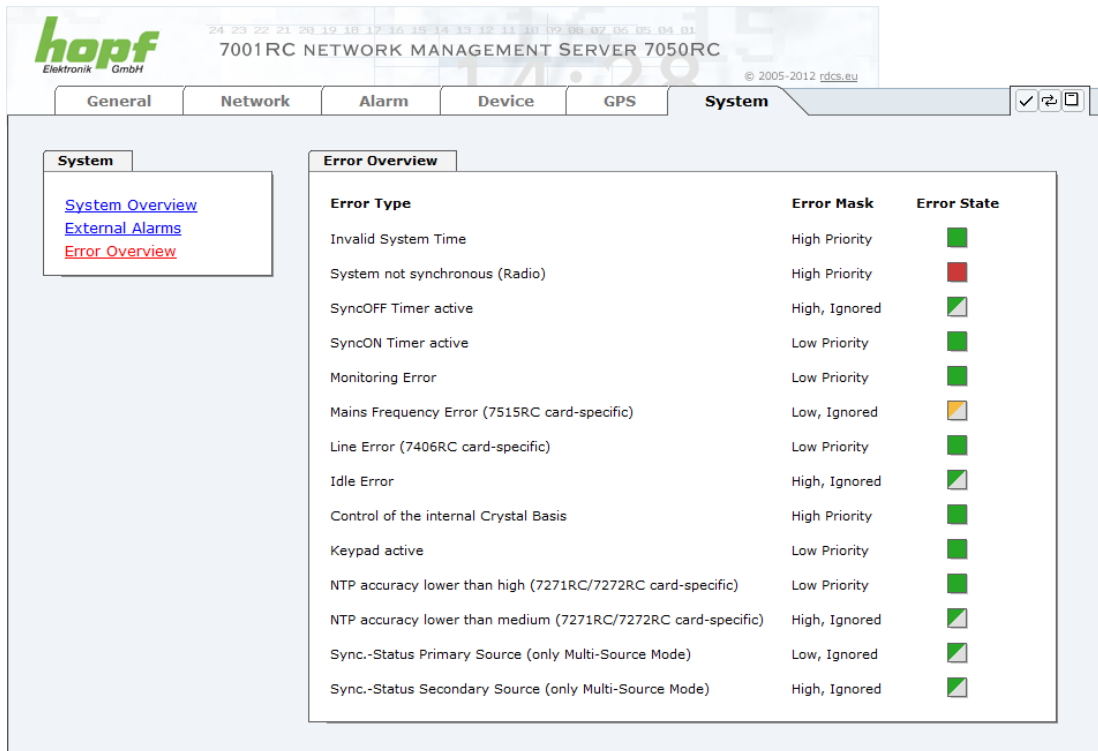
Label:

Name of the monitoring input.















Current Value:

Current state of the monitoring input ON / OFF.

7.3.6.3 ERROR Overview



The screenshot shows the web interface of the 7001RC NETWORK MANAGEMENT SERVER 7050RC. The top navigation bar includes tabs for General, Network, Alarm, Device, GPS, and System. The System tab is active, and the left sidebar contains 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	High Priority	
System not synchronous (Radio)	High Priority	
SyncOFF Timer active	High, Ignored	
SyncON Timer active	Low Priority	
Monitoring Error	Low Priority	
Mains Frequency Error (7515RC card-specific)	Low, Ignored	
Line Error (7406RC card-specific)	Low Priority	
Idle Error	High, Ignored	
Control of the internal Crystal Basis	High Priority	
Keypad active	Low Priority	
NTP accuracy lower than high (7271RC/7272RC card-specific)	Low Priority	
NTP accuracy lower than medium (7271RC/7272RC card-specific)	High, Ignored	
Sync.-Status Primary Source (only Multi-Source Mode)	Low, Ignored	
Sync.-Status Secondary Source (only Multi-Source Mode)	High, 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 t 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)!

8 SSH and Telnet Basic Configuration



Only basic configuration is possible via SSH or Telnet. The complete configuration of Board 7050RC 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.

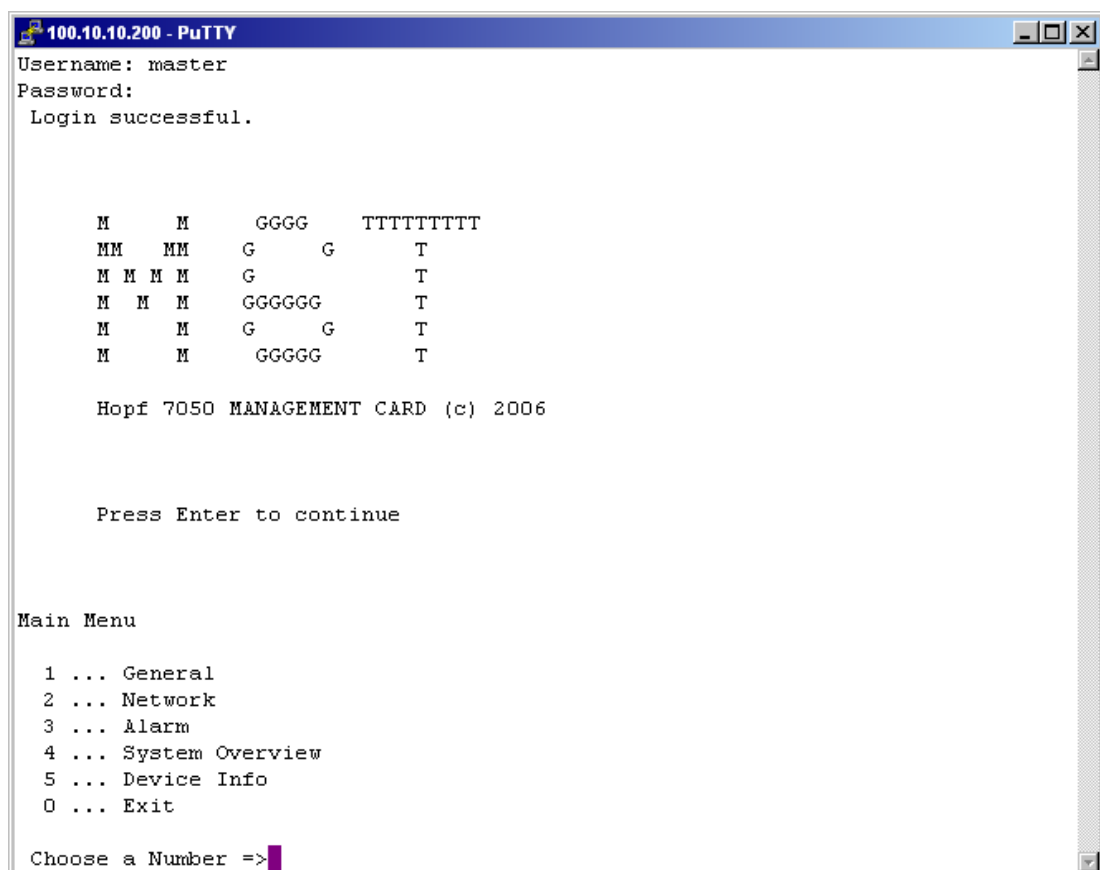
The user names and passwords are the same as on the web and are kept in alignment. (See **Chapter 7.2.1 LOGIN and LOGOUT as a User**)



SSH does not allow blank passwords for safety reasons (however this is the condition as delivered). Therefore, in order to use SSH, a password must have been pre-set via Telnet or the WebGUI.



The corresponding service is to be enabled for the use of Telnet or SSH (see **Chapter 7.3.2.4 Management- / HMC Management Port / SNMP**)



```

100.10.10.200 - PuTTY
Username: master
Password:
Login successful.

      M      M      GGGG      TTTTTTTTT
     MM     MM     G      G      T
    M M M M     G      T
   M  M  M     GGGGGG      T
  M      M     G      G      T
 M      M     GGGGG      T

Hopf 7050 MANAGEMENT CARD (c) 2006

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).

9 Technical Data

9.1 General

Model	Euro-board 160 x 100 mm
Racks	<ul style="list-style-type: none"> • 19" 3U racks with 3U/4HP front panel • Slim Line 1U racks with 1U front panel
Power supply internal system voltage Vcc	5V DC \pm 5% via system bus
Power consumption	
Normal operation	approx. 700 mA
Boot phase	approx. 1200 mA
MTBF	> 285,000 hours
Network interface	10/100 Base-T
Ethernet compatibility	Version 2.0 / IEEE 802.3
Isolation voltage (network to system side)	1500 Vrms
Internal TTL inputs	TTL compatible
Internal TTL outputs	TTL compatible with max. I _{out} =75mA

9.2 Ambient conditions

Temperature range	
Operating	0°C to +40°C
Storage	-20°C to +75°C
Humidity	max. 95%, not condensed
Cooling	passive cooling (heat sink) active cooling / ventilation are recommended

9.3 CE compliant to 89/336/EC and 73/23/EC

CE compliant to EMC Directive 89/336/EC and Low Voltage Directive 73/23/EC		
Safety / Low Voltage Directive	DIN EN 60950-1:2001 + A11 + Corrigendum	
EN 61000-6-4		
EMC (Electromagnetic Compatibility) / Interference Immunity	EN 610000-4-2 /-3/-4/-5/-6/-11	
EN 61000-6-2	EN 61000-3-2 /-3	
Radio Interference Voltage	EN 55022	EN 55022 Class B
Radio Interference Emission	EN 55022	EN 55022 Class B

9.4 LAN

Network Connection	Takes place via a LAN cable with RJ45 plug (recommended cable type CAT5 or better).
Requests per second	max. 1000 requests
Number of connectable clients	Theoretically unlimited

9.5 TCP/IP Network Protocols

- IPv4: Dynamic Host Configuration Protocol - DHCP (RFC 2131)
- HTTP/ HTTPS
- DHCP
- Telnet
- SSH
- SNMP

9.6 Configuration

- HTTP/HTTPS-WebGUI (Browser Based)
- Telnet
- SSH
- External LAN Configuration Tool
- **hopf** 7001RC system keypad and display / HMC
- Hopf Management Console (HMC)

9.7 Management

- HTTP/HTTPS (status, control)
- SNMPv2c, SNMP Traps (MIB-II, Private Enterprise MIB)
- Email Notification
- Syslog Messages to External Syslog Server
- Update over TCP/IP
- Fail-safe / Watchdog

9.8 Hardware

- Update
- Watchdog Circuit
- Power Management
- System Management

10 Factory Defaults

Board 7050RC is generally delivered in accordance with the factory defaults.

10.1 Network

Host/Name Service	Setting	WebGUI Presentation
Hostname	hopf727x	hopf727x
Default Gateway	No change	---
DNS 1	Blank	---
DNS 2	Blank	---
Network Interface ETH0	Setting	WebGUI
Use Custom Hardware Address (MAC)	Disabled	Disabled
Custom Hardware Address (MAC)	Blank	---
DHCP	Disabled	Disabled
IP	No change	No change
Netmask	No change	No change
Operation mode	Auto negotiate	Auto negotiate
Routing	Setting	WebGUI
User Defined Routes	Blank	---
Management	Setting	WebGUI
HTTP	Enabled	Enabled
HTTPS	Disabled	Disabled
SSH	Disabled	Disabled
TELNET	Disabled	Disabled
SNMP	Disabled	Disabled
Hopf Management Console	Disabled	Disabled
HMC Management Port	12000	12000
System Location	Blank	---
System Contact	Blank	---
Read Community	Blank	---
Read/Write Community	Blank	---

10.2 ALARM

Syslog Configuration	Setting	WebGUI
Syslog	Disabled	Disabled
Server Name	Blank	---
Alarm Level	Disabled	None
Email Configuration	Setting	WebGUI
Email Notifications	Disabled	Disabled
SMTP Server	Blank	---
Sender Address	Blank	---
Email 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
External Alarms	Setting	WebGUI
Alarms	All disabled	All none

10.3 DEVICE

User Passwords	Setting	WebGUI
Master Password	Blank	---
Device Password	Blank	---

11 Glossary and Abbreviations

11.1 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	Local Time = Standard Time, if exists with summer / winter time changeover
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>

11.2 Abbreviations

D, DST	Daylight Saving Time (Summer Time)
ETH0	Ethernet Interface 0
FW	Firmware
GPS	Global Positioning System
HW	Hardware
IF	Interface
IP	Internet Protocol
LAN	Local Area Network
LED	Light Emitting Diode (indicator lamp)
NTP	Network Time Protocol (version 3: RFC 1305)
NE	Network Element
OEM	Original Equipment Manufacturer
OS	Operating System
PC	Personal Computer
RFC	Recommendation for Comments
SNMP	Simple Network Management Protocol (handled by more than 60 RFC's)
SNTP	Simple Network Time Protocol (version 4: RFC 2030)
S, STD	Standard Time (Winter Time)
TCP	Transmission Control Protocol
ToD	Time of Day
UTC	Universal Time Coordinated
WAN	Wide Area Network
msec	Millisecond (10^{-3} Seconds)
µsec	Microsecond (10^{-6} Seconds)
ppm	Parts per Million / 10^{-6}
RFC	Remote Function Call

11.3 Definitions

An explanation of the terms used in this document.

11.3.1 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.

The Board is supplied from the factory with DHCP enabled.



See RFC 2131 Dynamic Host Configuration Protocol for further information

11.3.2 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.

12 List of RFC's

- IPv4:
Dynamic Host Configuration Protocol - DHCP (RFC 2131)
- Symmetric Key and Autokey Authentication
- Hypertext Transfer Protocol (HTTP):
HTTP/HTTPS (RFC 2616)
- Secure Shell (SSH):
SSH v1.3, SSH v1.5, SSH v2 (OpenSSH)
- Telnet:
(RFC 854-RFC 861)
- Simple Network Management Protocol (SNMP):
SNMPv1 (RFC 1157), SNMPv2c (RFC 1901-1908)
- Simple Mail Transfer Protocol (RFC 2821)

13 List of Open Source Packages used

- boa-0.94.13.tar.gz
- busybox-1.00-pre5.tar.bz2
- e100-2.3.43.tar.gz
- ethtool-3.tar.gz
- gmp-4.1.2.tar.bz2
- liboop-1.0.tar.gz
- linux-2.4.21.tar.bz2
- lsh-1.5.3.tar.gz
- mini_httpd-1.19.tar.gz
- mtd-snapshot-20040303.tar.bz2
- net-snmp-5.2.1.2.tar.gz
- ntp-4.2.0.tar.gz
- openssl-0.9.6l.tar.gz
- passwd.tar.gz
- PPSkit-2.1.2.tar.bz2
- smc91111.tar.bz2
- syslogd-1.4.1.tar.gz
- tinylogin-1.4.tar.bz2
- uClibc-0.9.26.tar.bz2
- udhcp-0.9.8.tar.gz
- zlib-1.2.1.tar.bz2