Güralp NAM MkII

Quick-start Guide

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1 Introduction

The Güralp NAM MkII is a rack-mounted data acquisition, processing, storage and communications unit for data-centre applications. The unit can be configured and controlled using a web-based interface. Security and fire-wall features support direct connection to the internet for remote data concentration and system operation.

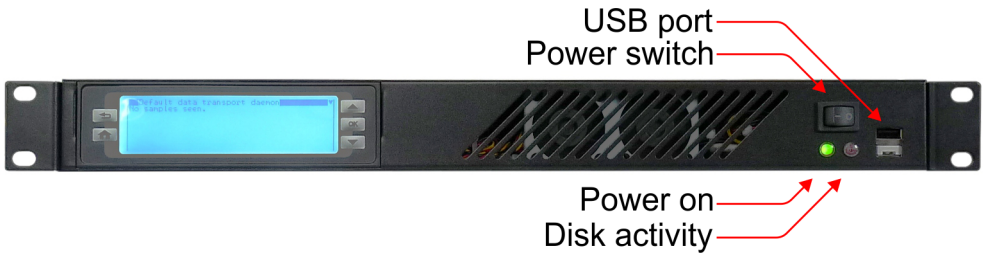
The Güralp NAM runs the open-source Linux operating system and Güralp Systems' Platinum firmware, providing:

- Data acquisition:
  - Data can be acquired in various formats via USB, Ethernet or serial ports;
- Recording:
  - Data can be recorded to a network-attached storage device (NAS) in a variety of standard formats;
- Data forwarding:
  - GCF output via serial port or Scream Server (TCP/UDP);
  - SEEDlink output over TCP/IP;
  - CD1.1 output;
  - Güralp Data Interconnect (GDI) can be used for interchanging data between NAMs, EAMs, DCMs and Güralp *n*TDE instruments.
- Processing:
  - The NAM has sophisticated data-processing capabilities, including triggering.



2 Connections

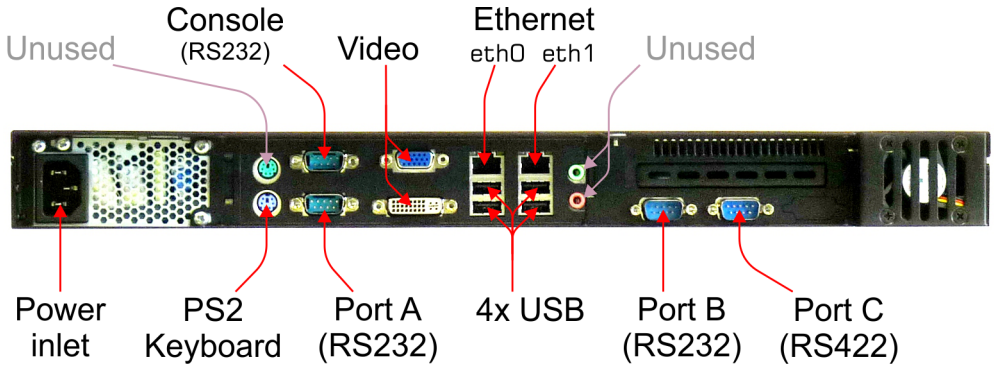
2.1 Front panel



The front panel provides:

- A large, back-lit LCD display which cycles through a number of screens of status information;
- The main power control, which is a momentary (non-latching) rocker switch;
- Indicators for “Power on” (green) and “Disk activity” (red); and
- A USB port which can be used for a wide variety of functions.

2.2 Rear Panel



The rear panel provides:

- The AC power inlet, which accepts 100 to 240 V AC at 50 or 60 Hz;
- Sockets for a PS2-style keyboard and mouse. The keyboard socket (purple) can be used to connect a console keyboard, although any available USB socket can also be used for this purpose. The mouse connector (green) is not used;
- An RS232 serial port which is dedicated to the Platinum console;
- An RS232 serial port, Port A, which can be used for a wide variety of functions;

- Video connectors, both VGA and DVI, which are dedicated to the system's console;
- Two 1000BASE-T Ethernet ports, referred to in the user interface as `eth0` and `eth1`;
- Four USB ports, which can be used for a wide variety of functions; and
- An RS232 serial port, Port B, which can be used for a wide variety of functions;
- An RS422 serial port, Port C, which can be used for a wide variety of functions;



3 Getting started

These steps enable you to connect to and start using your Güralp NAM.

3.1 The console

The NAM can be controlled using either the web interface, the console command-line or a terminal command-line.

3.1.1 Video console

Connect a suitable display to either:

- the VGA video connector on the rear panel; or
- the DVI connector on the rear panel.

Connect either:

- a PS2-style keyboard to the lower, purple PS2 connector on the rear panel; or
- a USB keyboard to any USB connector on the front or rear panel



Note: The console displays system messages while the unit is booting and operating. This is essential for some diagnostic purposes but may be inconvenient when performing routine monitoring or configuration.

4 Serial terminal

Connect a PC/laptop running terminal emulation software (such as minicom under Linux or PuTTY under Windows) to the upper RS232 terminal connector on the rear panel, next to the VGA socket.

Configure the emulator for 115,200 Baud, 8 data bits, no parity bits and one stop bit (commonly referred to as “8-N-1”). Disable both hardware (XON/XOFF) and software (RTS/CTS) flow control.

4.0.1 SSH terminal

Switch on the NAM, as described in section 4.2 on page 8, configure a network interface, as described in section 4.3 on page 9, and then use an ssh client (such as the `ssh` command on Linux or PuTTY on Windows) to connect to the IP address of the NAM using TCP port 22.

4.1 Logging in

The default login name is `root` and the default password is `guralp3`. (Older units had a default password of `rootme`.) Note that the password is not displayed while you type it.

Note: The password must be changed if the unit is to be connected to the Internet. Refer to the Platinum manual, MAN-EAM-0003, for instructions regarding changing the password.

4.2 Switching on and off

4.2.1 Switching on

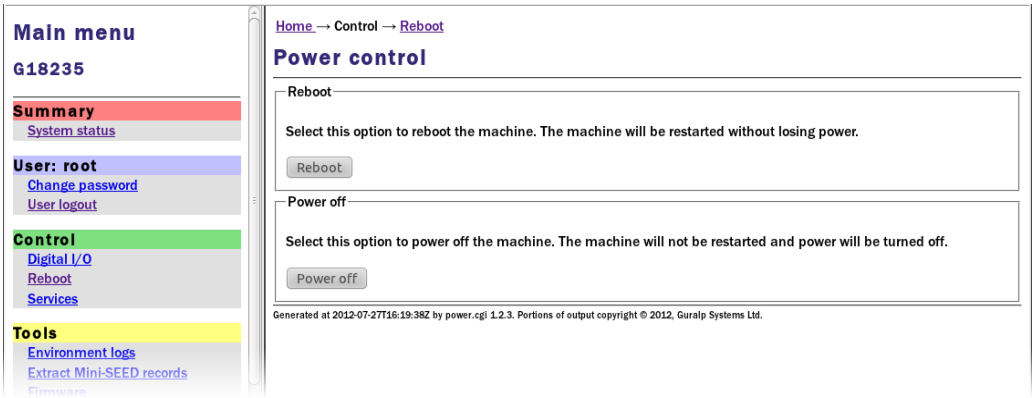
To switch on the NAM, connect a mains (line) power cable to the power inlet on the rear panel. The unit will start immediately.

4.2.2 Switching off

The NAM should be shut down before removing power. This can be done using the web interface, from the console or from the command line.

4.2.2.1 Switching off using the web interface

To safely shut down the NAM from the web interface, select “Reboot” from the “Control” menu. Click Power off on the resulting screen. Wait until the green front panel power indicator has extinguished before removing power.



4.2.2.2 Switching off using the console or command line

To safely shut down the NAM from the console or command line, enter the command

```
poweroff
```

Wait until the green front panel power indicator has extinguished before removing power.

4.2.3 Restarting

If the NAM has been shut down without removing power, it can be restarted by briefly holding the front-panel power control in the '1' position.

4.2.4 Emergency shut-down

If it is not possible to shut down the NAM using the web interface or command line, it is possible to stop the system by holding the front-panel power control in the '1' position for a few seconds, until the green front panel power indicator extinguishes. Note that the system will not have had a chance to write any outstanding data to the storage media so some data may be lost.

4.3 Configuring networking

There are three ways in which your NAM can acquire a network address, DHCP, APIPA or static configuration.

4.3.1 DHCP

If the NAM is connected to a network which includes a DHCP (Dynamic Host Configuration Protocol) server, the NAM will automatically obtain an IP address from the server. The resulting address will be displayed in the LCD display on the front panel.

4.3.2 APIPA

Many modern systems support Automatic Private IP Address (APIPA) allocation (also known as “link-local addressing”). On networks without a DHCP server, computers can negotiate addresses in the range 169.254.0.0 to 169.254.254.255 (or in the block fe80::/64 for IPv6 systems). This scheme will, for example, allocate addresses to both systems if the NAM is connected directly to a laptop running Windows. The resulting address will be displayed in the LCD display on the front panel.

4.3.3 Static addressing

You can configure your NAM to use a static IP address from the command line: either from the console or over an SSH connection.

Log in and issue the following command:

```
nam999 ~ # ip addr add 192.168.0.1/24 dev eth0
```

replacing ***192.168.0.1/24*** with the desired IP address. It must be specified in CIDR format where the actual address is followed by the number of bits of the network mask. The above example uses 192.168.0.1 with a netmask of

255.255.255.0 (24 bits of network address). A PC connected to this network could communicate with the acquisition module if it was configured to use an IP address of (for example) 192.168.0.2 with a matching netmask of 255.255.255.0.



Note: IP addresses assigned using this method will be lost if the unit is rebooted. To permanently assign an IP address, use the `net-setup` command or refer to the Platinum manual, MAN-EAM-0003, available from www.guralp.com.

If you wish to connect to the NAM from a PC, they must either both be on the same subnet (usually the first three numbers of the IP address) or be able to connect to each other via routers.

In the latter case, you will need to tell the acquisition module the address of its default router. Please refer to the Platinum manual, MAN-EAM-0003, for more details.

4.3.4 Discovering dynamically allocated addresses

There are three ways to discover a dynamically allocated address. You can read it from the unit's LCD display, you can query it from the command line or you can use a broadcast address in Scream.

4.3.4.1 Using the command line

To use the command line, log in via the Platinum console or an SSH connection and issue the command:

```
ip addr show dev eth0
```

You will see output like

```
nam999 ~ # ip addr show dev eth0
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc
pfifo_fast qlen 1000
   link/ether 00:50:c2:40:54:75 brd ff:ff:ff:ff:ff:ff
   inet 192.168.0.101/24 brd 192.168.1.255 scope global eth0
   inet6 fe80:250:c2ff:fe40:5475/64 scope link
   valid_lft forever preferred_lft forever
nam999 ~ #
```

The first line of the output should contain the word `UP`, confirming that the adaptor has been enabled. The IP address that has been assigned is shown on the line beginning `inet` - in this case, it is `192.168.0.101` (with a netmask of 24-bits indicated by `/24`).

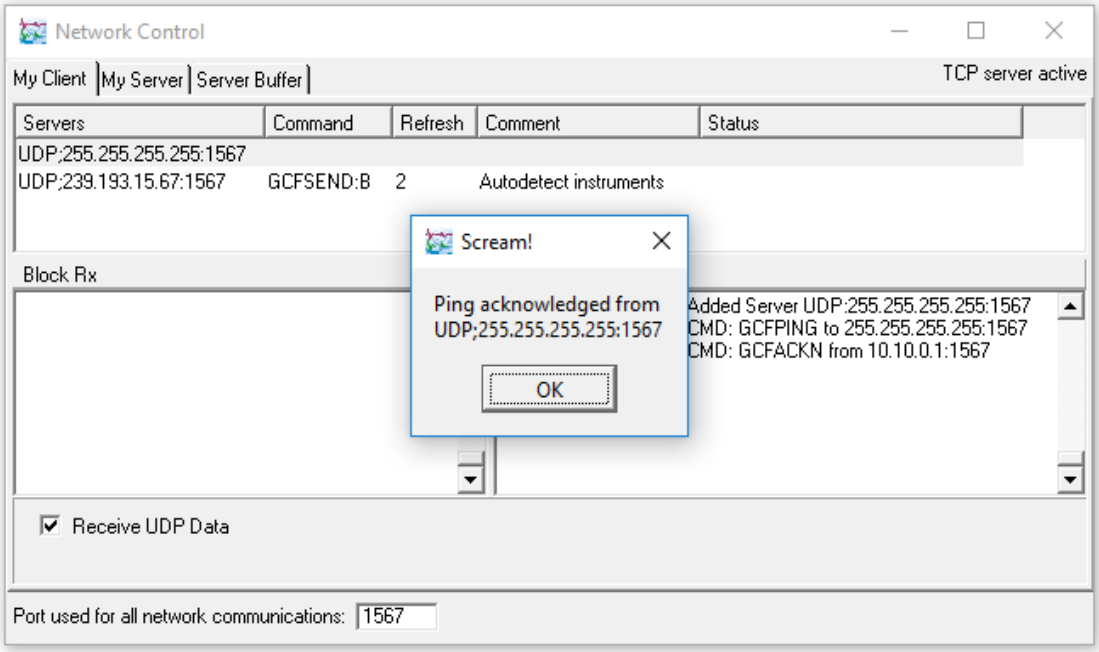
Substitute `eth1` in place of `eth0` to see the address of the second port.

4.3.4.2 Using Scream

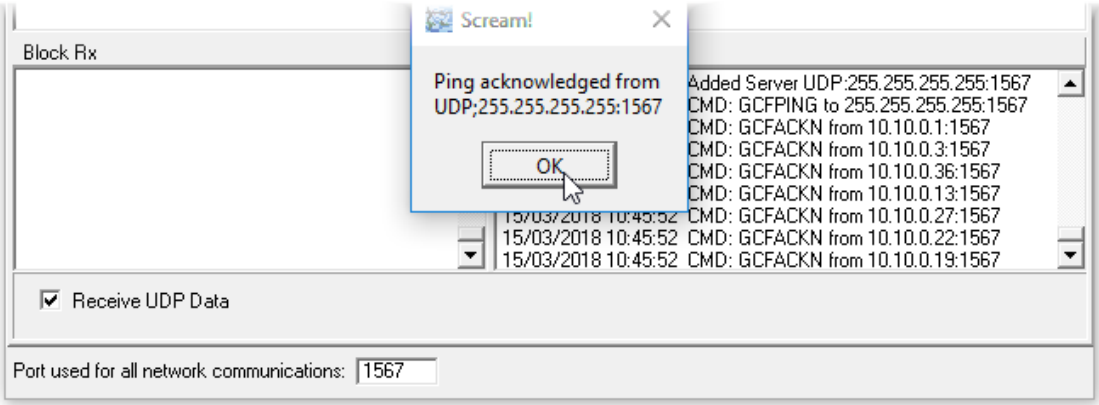
Scream is a software package for ***S***eismometer ***C***onfiguration, ***Re***al-time ***A***cquisition and ***M***onitoring, developed by Güralp Systems. To obtain a free copy of Scream, please send an email to scream@guralp.com, describing

briefly your equipment and the organisation for whom you are working. For more information , please visit www.guralp.com/scream.

To determine the IP address of your NAM(s), start Scream and open the network control window (Ctrl + N). A multicast address - 239.193.15.67 - should be listed. If it is not, key Ins to add a new UDP server and enter the address 239.193.15.67. – this is a broadcast address that will be recognised by all hosts on the network. The new server will appear in the Servers list: click on it once to highlight it and then key Ctrl + P. This sends a "GCFPING" packet to which all GCF servers will reply. The address of your NAM will appear in the control pane as shown below, along with the addresses of any other GCF servers.



In this case, a single acknowledgement response (GCFACKN) was received and it came from the address 10.10.0.1 so this is the address of the NAM. If there are more than one NAM (or other GCF servers) on the network, multiple GCFACKN packets will be reported, as shown here:



4.4 Using the web interface

Once the NAM is powered up and you have configured or determined its IP address, you can access the web interface by entering the IP address of the unit in the address bar of your web browser. You can use either HTTP or HTTPS: HTTPS provides encrypted connections which are desirable if you are accessing the NAM via an insecure network and essential if is connected to the public Internet.

For example, if your NAM has an IP address of 192.168.0.101, you can access its web interface by entering either

http://192.168.0.101

or

https://192.168.0.101

4.5 Operation

The NAM runs Platinum firmware which has been developed specifically for the Güralp Systems range of data acquisition products, including the EAM and *n*TDE instruments. Platinum includes features for data collection, processing, storage, forwarding and protocol conversion and well as digitiser and instrument configuration and control facilities.

There are many features of Platinum firmware on the NAM which you may wish to explore and enable. Full details are provided in the Platinum manual, MAN-EAM-0003, which should be read in conjunction with this document and is available for download from www.guralp.com/documents/MAN-EAM-0003.pdf.

The rest of this section discusses features of the NAM which differ from or are not mentioned in the Platinum manual.

4.5.1 The LCD display

The front-panel LCD display is not mentioned in the Platinum manual: it scrolls through several pages of status information, showing the same content as the "System status" page of the web interface, including the current IP address.

4.5.2 Connectors

4.5.2.1 Platinum console - serial terminal

The upper serial terminal connector beside the VGA connector is not configurable via Platinum: it is permanently configured as a terminal running at 115,200 Baud. You can access the command line of the NAM by connecting a terminal emulator to this port. Set your emulator to 8 data bits, 1 stop bit and no parity bits (8-N-1) and disable both hardware (XON/XOFF) and software (RTS/CTS) flow control.

4.5.2.2 Ports A, B and C

Ports A, B and C are general purpose serial connections that can be configured for a wide variety of purposes. They are identified within the user interface as `PortA`, `PortB` and `PortC`. See the Platinum manual, MAN-EAM-0003, for more details.

Note that Port C presents an RS422 interface, allowing cable runs of up to 1,500 metres.

4.5.2.3 USB

Each USB connector can be used for multiple purposes, including:

- a USB console keyboard
- a CD24-R8 digitiser (or up to seven such devices via a USB hub).

  CD24-R8 digitisers connected to these ports are automatically configured as GCF input sources. Entries will appear for each on the System Status page of the web interface and appropriate entries will appear in the instrument control and digitiser configuration menus. If the digitisers are connected and powered-up after the NAM has been started, you will have to refresh the web page in order to see these entries.

  Note: In order for this feature to work correctly, the DATA OUT ports of the CD24-R8 digitisers must be configured to operate with a line speed of 115,200.

- a USB-to-serial converter (see section 5.1 on page 14). The resulting serial ports are dynamically named within the user interface and each can be used for a wide variety of purposes. See the Platinum manual, MAN-EAM-0003, for details of serial port configuration.
- at most one external storage device, such as a USB thumb-drive.

  A USB storage device connected to any of the USB ports becomes available to Platinum as “External USB storage”. It can be selected as the recording device using the “Configuration” → “Storage and recording” page of the web interface. Please see the “Recording and Retrieving Data” chapter of the Platinum manual for more details.

5 Accessories

5.1 Serial Port expanders

GSL supply a range of serial port expanders which provide additional serial ports via a USB connection to the NAM. They are single-height (1U), nineteen-inch rack-mounting units with part numbers CMG-NSP-RM08, CMG-NSP-RM16 and CMG-NSP-RM24. The final two digits of the part number indicate the number of ports.



These systems have a single USB type B connector on the front panel and eight, sixteen or twenty-four nine-pin serial ports on the rear panel. Because the serial ports require more power than is available from a single USB connection, a 5 V DC power input is required.

To deploy these systems, connect a suitable 5 V DC power supply and then connect the unit to the NAM using a USB Type A to USB Type B cable. The NAM will automatically detect the new serial ports and provide automatically-generated names for them, depending on any previously-connected units.

5.2 Network accessible storage

GSL supply NAS (network-accessible storage) units, part number CMG-NAS-RMExxx (where xxx indicates the capacity) which provide additional storage capacity for the NAM and extra resiliance, through the use of RAID technology. They are single-height (1U), nineteen-inch rack mounting systems suitable for data-centre use and each unit holds four drives, providing up to 12 TB of storage (less if mirroring is enabled). The total power consumption is around 30 W.



The CMG-NAS-RME*xxx* works with 2.5-inch or 3.5-inch SATA hard drives mounted in hot-swappable drive carriers and includes two Gigabit LAN ports for multi-IP settings and port trunking (7 bonding modes).

The CMG-NAS-RME*xxx* supports RAID 0, 1, 5, 6, 10, 5+hot spare, single and JBOD disk configurations. Online RAID capacity expansion and online RAID level migration allows expansion of storage capacity and upgrading of the RAID level without disrupting services. The RAID recovery feature secures the data against accidental removal of the hard drives.

To configure a NAM to use a CMG-NAS-RME*xxx*, open the web interface and navigate to

Configuration → Data handling → Storage and recording

In the "Storage device" drop-down menu, select "Remote NFS mount". Go to the NFS tab and enter the hostname or IP address of the NAS and the path of the directory that you with to use. Please see the "Recording and Retrieving Data" chapter of the Platinum manual for further details.

6 Connector pin-outs

6.1 Front panel

6.1.1 USB

The front-panel USB connector is a standard USB type A socket with conventional wiring. Suitable mating connectors are widely available.





USB connections are very sensitive to wiring details so it is recommended that ready-made cables are used where possible. When used with a CD24-R8 or GSL serial port expander, Type A to Type B cables are required.

6.2 Rear Panel

6.2.1 USB

The USB connectors are standard USB type A sockets with conventional wiring. Suitable mating connectors are widely available.





USB connections are very sensitive to wiring details so it is recommended that ready-made cables are used where possible. When used with a CD24-R8, Type A to Type B cables are required.

6.2.2 Ethernet

The ETHERNET connectors are standard 8P8C modular sockets, conforming to TIA/EIA-568-B. They are compatible with 10Base-T, 100Base-TX and 1000BASE-T twisted-pair connectors.



Pin	Function
1	BI_DA+
2	BI_DA-
3	BI_DB+
4	BI_DC+
5	BI_DC-
6	BI_DB-
7	BI_DD+
8	BI_DD-

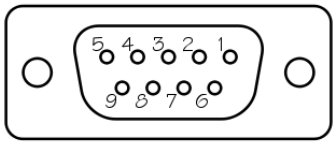
6.2.3 Console

This is a standard DE9F (TIA-574) sub-miniature (D-sub) socket, conforming to DIN 41652 and MIL-DTL-24308. They are very widely available, as are suitable mating connectors.



The console port operates at 115,200 Baud with 8 data bits, no parity bit and one stop bit. Hardware and software flow-control are not used. These settings can not be changed in the firmware, so that access to the configuration system can be gained via this port if all other routes are unavailable.

Pin	Function
1	*not connected*
2	RS232 TxD
3	RS232 RxD
4	*not connected*
5	Ground
6	*not connected*
7	*not connected*
8	*not connected*
9	*not connected*



Wiring details for the compatible plug, DE9M, as seen from the cable end (i.e. during assembly).

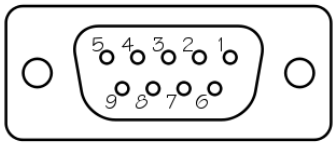
Note: This provides access to the Platinum console but not the system console. If the Platinum system will not boot, a VGA screen and USB keyboard should be connected to the back panel in order to see the system's console boot messages.

6.2.4 Ports A and B - RS232

These are standard DE9F (TIA-574) sub-miniature (D-sub) sockets, conforming to DIN 41652 and MIL-DTL-24308. They are very widely available, as are suitable mating connectors.



Pin	Function
1	*not connected*
2	RS232 TxD
3	RS232 RxD
4	*not connected*
5	Ground
6	*not connected*
7	*not connected*
8	*not connected*
9	*not connected*



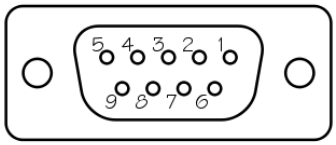
Wiring details for the compatible plug, DE9M, as seen from the cable end (i.e. during assembly).

6.2.5 Port C - RS422

These are standard DE9F (TIA-574) sub-miniature (D-sub) sockets, conforming to DIN 41652 and MIL-DTL-24308. They are very widely available, as are suitable mating connectors.



Pin	Function
1	RS422 TxD - (inverting)
2	RS422 TxD + (non-inverting)
3	*Not connected*
4	*Not connected*
5	*Not connected*
6	RS422 RxD - (inverting)
7	RS422 RxD + (non-inverting)
8	*Not connected*
9	*Not connected*



Wiring details for the compatible plug, DE9M, as seen from the cable end (i.e. during assembly).

Notes:

- The idle voltage between pins 2 and 1 is greater than 0.2 V.
- Maximum common-mode voltage is -7 V to +7 V

7 Specifications

Physical	
Case	Single-height (1U), nineteen-inch rack-mounting
Case depth	230 mm (allow extra depth for connected cables)
Case material	Mild steel
Weight	3.65 kg
Electrical	
Supply voltage	100 – 240 V AC, 50 – 60 Hz
Power	20 W

8 Revision history

2014-03-24	A	New document
2015-07-08	B	Minor layout changes and updated root password.
2016-04-14		Face-lift for new branding
2018-03-15	C	Distinguish between Platinum console and system console. Update Scream screen-shots.