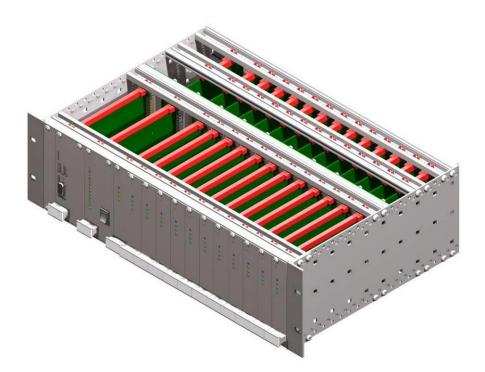


CR-6plus[®] User Manual



GeoSIG Ltd, Wiesenstrasse 39, 8952 Schlieren, Switzerland Phone: + 41 44 810 2150, Fax: + 41 44 810 2350 info@geosig.com, www.geosig.com

Document Revision

Version	Date	Modification	Prepared	Checked	Released
1	22.11.2013	First release	FAR	MAE	MAE
2	02.12.2013	Minor changes	MAE	TAB	MAE
3	13.11.2015	Addition of alarm card	JON		
4	06.01.2015	Addition of GPS standard cable colors	WES		
5	12.09.2016	Addition of "GeoSIG Cybersecurity	KES	VAG	VAG
		Recommendations" section.			
6	12.09.2017	Addition to section 5.2.3.1	PAT	VAG	VAG

Disclaimer

GeoSIG Ltd reserves the right to change the information contained in this document without notice. While the information contained herein is assumed to be accurate, GeoSIG Ltd assumes no responsibility for any errors or omissions.

Copyright Notice

No part of this document may be reproduced without the prior written consent of GeoSIG Ltd. Software described in this document is furnished under a license and may only be used or copied in accordance with the terms of such a license.

Trademark

All brand and product names mentioned are trademarks or registered trademarks of their respective holders.

All rights reserved.

GeoSIG Ltd

Switzerland

Table of Contents

Applicability of This Manual	7
Warnings and Safety	7
GeoSIG Cybersecurity Recommendations	8
Symbols and Abbreviations	9
Foreword	10
1. Introduction	11
2. Incoming Inspection	12
2.1. Damage during shipment	12
2.2. Warranty	12
2.2.1. Limitation of Warranty	12
3. Storage (Instrument Shelf Life)	13
3.1. Main battery	13
3.2. Backup battery	13
4. System Description	14
4.1. CR-6plus	16
4.1.1. Front Side	16
4.1.2. Back Side	17
4.2. Backup battery	17
4.3. Supplied and Optional Accessories	18
4.3.1. Optional Accessories	18
5. Slot-In Modules	19
5.1. Front Side	19
5.1.1. CR-6-SBC Single Board Computer Slot-In-Module	19
5.1.2. CR-6-WDB Watchdog Slot-In-Modules	20
5.1.3. CR-6-DS Digitiser Slot-In Module	21
5.2. Back Side	23
5.2.1. CR-6-OVPSx Sensor OVP Slot-In Module	23
5.2.2. CR-6-OVPB OVP Slot-In Module	25
5.2.3. CR-6-Relay Alarm card slot-in module	27
6. Installation	28
6.1. Site Selection	28
6.1.1. Environmental Considerations	28
6.1.2. Power Supply Considerations	28
6.2. Cabling of a CR-6plus	29
6.2.1. Communication Considerations	
6.3. Sensors	29
7. Principle of Operation of the Instrument	

7.1. Normal Operation	
7.2. Behaviour on a Seismic Event	
7.3. Firmware and Configuration Upgrade	32
7.4. Backup Server	32
8. Quick Start Up	33
8.1. Preparation	
8.2. Set IP Address of the Instrument	
8.3. No Stations Configured at first Start Up	35
8.4. Adding New Stations	36
8.5. Configuration of Data Server	37
8.6. Basic Configuration of the Instrument	
9. Network Settings	40
9.1. Network Settings through the Web Interface or Instrument Setup	40
9.2. Network Settings through GeoDAS	41
9.3. Wired Ethernet settings through the local Console	
9.4. Get IP from Instrument	42
10. The Web Interface	43
10.1. Accessing the Web Interface	43
10.2. The Home Panel and the General Navigation	
10.3. Device Configuration	45
10.3.1. armdas Configuration	46
10.3.2. Manage armdas Configurations	
10.3.3. Network Configuration	49
10.3.4. Web Interface Configuration	
10.4. State of Health	50
10.4.1. Error Status	
10.4.2. Recording Status	
10.4.3. Hard- and Software Status	
10.4.4. Requests	
10.5. Data Explorer	53
10.6. Help	
10.6.1. Online Help	54
10.6.2. Contact GeoSIG Service	54
11. Detailed Configuration of the Instrument	
11.1. Switch ON and OFF the instrument	
11.2. General Comments to the Configuration	
11.2.1. Change Configuration by the Web Interface	55
11.2.2. Change Configuration by GeoDAS	55
11.2.3. Changing Configuration by the Console	56
11.2.4. Explanation of the Structure in the Manual	57
11.3. Configuration of the Channels	
11.3.1. In the Web Interface or by GeoDAS	
11.3.2. Via Local Serial Console	59

11.3.3. Calculation of the LSB factor	61
11.3.4. Channel Naming	62
11.4. Configuration of Data Streams	63
11.4.1. In the Web Interface or by GeoDAS	63
11.4.2. Via Local Serial Console	64
11.4.3. Set up of Data Streams	65
11.5. Trigger Settings	
11.5.1. In the Web Interface or by GeoDAS	67
11.5.2. Via Local Serial Console	68
11.5.3. STA/LTA trigger	
11.5.4. Trigger Weight	71
11.5.5. Trigger Time Frame	
11.5.6. Trigger Interconnection over LAN	
11.6. Preset Trigger Settings	
11.6.1. In the Web Interface or by GeoDAS	
11.6.2. Via Local Serial Console	
11.7. File Storage and Policy	
11.7.1. In the Web Interface or by GeoDAS	
11.7.2. Via Local Serial Console	
11.8. Communication Parameters	
11.8.1. In the Web Interface or by GeoDAS	
11.8.2. Via Local Serial Console	
11.9. Miscellaneous Parameters	
11.9.1. In the Web Interface or by GeoDAS	
11.9.2. Via Local Serial Console	
11.9.3. Time synchronization	
11.10. Other Options in the Instrument Main Menu	
11.10.1. User requests	91
12. Test and Configuration Menu	
12.1. Flash Images and Boot Options	
12.2. Hardware Setup and Monitor	
12.3. Test Functions	
12.4. Security	
12.5. Comparison of User Permissions	95
13. Firmware Upgrades	96
14. Remote Access to the Instrument over SSH	
14.1. SSH Clients for Linux OS	
14.2. SSH Clients for Windows OS	
14.3. SFTP access for Windows OS	
14.4. File Structure on the Instrument	
15. GeoDAS Settings	
15.1. Configuration of Stations	
15.1.1. Add a new Instrument	104

15.1.2. Remove an Instrument	104
15.2. Configuration of Server Parameters	105
15.3. Instrument Control in GeoDAS	106
15.3.1. More Information (State of Health of the instrument)	106
15.3.2. Instrument Setup	107
15.3.3. Cancel Pending Request	107
15.3.4. CR-6plus Communication Interface	107
15.4. Open recorded miniSEED files in GeoDAS	
15.4.1. Save predefined Scaling Factors	109
15.4.2. Calculation of the Scaling Factors	110
16. Maintenance	111
Index	112

Table of Tables

Table 1, Storage instruction	. 13
Table 2. Main battery specification	. 17
Table 3. Backup battery models	. 17
Table 4. The over all error states shown in the Web Interface	. 45
Table 5. The over all error states shown in the Web Interface	. 51
Table 6. Explanation table structure	. 57
Table 7. Channel configuration menu structure	. 60
Table 8. LSB of all GeoSIG sensors	. 61
Table 9. Data streaming configuration menu structure	. 65
Table 10. Trigger configuration menu structure	. 70
Table 11. Preset trigger configuration menu structure	. 78
Table 12. File Storage and Policies menu structure	. 80
Table 13. Communication Parameters menu structure	. 83
Table 14. Server Parameters menu structure	. 84
Table 15. Miscellaneous Parameters menu structure	. 89
Table 16. Comparison of test and configuration menu users	. 95
Table 17. Scaling factors of different sensors	111

Applicability of This Manual

CR-6plus Instruments are constantly being improved. Although the manual you receive along with your instrument corresponds to the actual software versions, you are advised to check the GeoSIG web page periodically for the most recent version of this document, and especially after performing any software upgrades. This manual is based on the following software and firmware versions:

Component	Description	Required version or higher
GeoDAS	Data acquisition and analysis software on the computer	2.25
armdas	Data acquisition software of the instrument	26.05.00
RTC	Real time clock	80.02.02
Bootloader	Barebox	2011.06.0
Web Interface	Web Interface	1.6
Linux OS	Root file system	rootfs-gms-77
	Kernel Version	3.8.2-rt2

Warnings and Safety

STATIC ELECTRICITY

The Instrument contains CMOS devices and when serviced, care must be taken to prevent damage due to static electricity. This is very important to ensure long term reliability of the unit.

I BATTERY LIFE

Although supplied through an AC/DC adapter from the mains, the instrument is optionally shipped with the batteries to provide the backup power supply. If the system is not in use, the batteries should be disconnected. If connected, the batteries are attached using the clamps; the red cable on "+", the black cable on "-" poles of the battery.

Note: The battery lifetime can drastically change depending on operating conditions. Strong discharge of the main battery must be avoided.

IFFERENT OF SLOT-IN-MODULES

The slot-in-modules are not hot swappable. When changing any slot-in-modules, the instrument must be switched off first to avoid any damage on the instrument.

GeoSIG Cybersecurity Recommendations

GeoSIG instruments, as described in their documentation, have built-in security and safety features against unauthorised access or use. However, ultimately it is the user's responsibility to ensure the safe and secure usage of our instruments based on their actual implementation. No factory delivered solution can fit each and every possible scenario. The user is advised herein that once you connect a device to a network, you are also connecting that network to that device. It is the responsibility of the user to take appropriate precautions so that all devices should be adequately hardened, such as with individual strong passwords, and should have their traffic monitored and managed via appropriate security features, such as firewalls. Also, noncritical devices should be segmented away from networks that contain sensitive information.

Compliance with a well-defined security procedure helps protect not only an individual device, but also other devices connected through the network. Such procedure would be intended to prevent exploitation of an individual device's resources by unauthorized individuals, including the use of such device to attack other systems on the network or the Internet.

The following recommendations can be considered in establishing such a security procedure:

1. Physical access restriction

All devices must be restricted from unauthorised physical access and a well-defined physical access procedure shall be utilised.

2. No Unattended Console Sessions

Except for the devices which are physically secured, no unattended console sessions shall be left running.

3. No Unattended Network Sessions

No unattended user interface sessions shall be left running towards any device accessed through its network interface.

4. Use of a Firewall

For a network that has any connection to the outside world, a hardware firewall must be running and configured to block all inbound traffic that is not explicitly required for the intended use of the network and the connected devices. The user can also consider limiting outbound traffic.



If any communication ports that are required for the operation must be protected.

5. No Unnecessary Services or Ports

If a service or port is not necessary for the intended purpose or operation of the device, that service must not be running and the port must be closed. (e.g. if seedlink server is running, but not used, turn it off)

6. Use of authentication

Network and console device access must require authentication by means of strong and individualised passwords per device (no passe-partout passwords).

Wireless access must require strong encryption to associate (such as WPA2), or some other strong mechanism to keep casual users near the access point from using it to get full access to the network. WEP or MAC address restrictions do not meet this requirement.

7. Password complexity and security

When passwords are used, they must meet the specifications similar to below:



All default passwords must be changed at time of initial access or latest at deployment into service.

Passwords MUST:

contain eight characters or more

contain characters from AT LEAST two of the following three character classes:

```
Alphabetic (e.g., a-z, A-Z)
Numeric (i.e. 0-9)
Punctuation and other characters (e.g., !@#$%^&*() +|~-=\`{}[]:";'<>?,./)
```

8. Privileged Accounts

Privileged and super-user accounts (Administrator, root, etc.) must not be used for non-administrator activities. A secure mechanism to escalate privileges with a standard account is acceptable to meet this requirement. Network services must run under accounts assigned the minimum necessary privileges.

9. No Unencrypted Authentication

All network-based authentication must be strongly encrypted. In particular, insecure services such as Telnet, FTP, SNMP, POP, and IMAP must not be used or must be replaced by their encrypted equivalents.

10. Software / Firmware updates

Networked devices must only run software/firmware that are updated according to supplier's guidelines. A periodical check of any available updates from the supplier must be sought.

Please contact GeoSIG Ltd if you require any further advice or clarification.

Symbols and Abbreviations

ADC	Analog to Digital Converter
ARM	Main processor
Bootloader	First program executed when unit starts
CR-6-SBC	Single Board Computer Slot-In Module
CR-6-COMB	Base Communication Slot-In Module
CR-6-OVPB	Base Over Voltage Protection Slot-In Module
CR-6-OVPS	Sensor Over Voltage Protection Slot-In Module
CR-6-WDB	Base Watchdog Slot-In Module
RTC	Real Time Clock
SSH	Secure Shell
SSID	Service Set IDentifier, This is the identifier name of a wireless network.
STP	Shielded Twisted Pair
UTP	Unshielded Twisted Pair
VPN	Virtual Private Network
WAN	Wide Area Network, it is a network connection established between 2 LAN or a LAN and a server over the internet (usual case) or through a rented link.

Foreword

Dear Valued GeoSIG Customer, thank you for purchasing this product.

These Instruments have been optimised to meet the requirements of the majority of customers out of the box and may have even be delivered tailored to your needs. In any case, to be able to get the most out of our product, please carefully study this manual, its appendices and referenced manuals, as well as any other documents delivered with it.

This is a reliable and easy to use device, and at the same time a sophisticated product, which requires care, attention and know-how in configuring, installing, operating and maintenance.

GeoSIG continuously improves and enhances capabilities of all products. There may be several other connectivity, hardware or software options for the instrument, which are not covered in this manual. Refer to separate documentation from GeoSIG about available options or ask GeoSIG directly.

1. Introduction

The Central Recording System CR-6plus (in further text CR-6plus or instrument) is a 24 bit seismic system suitable for centralised data acquisition and recording. The CR-6plus is designed for both, temporary and permanent setups such as bridges, tunnels, and tall buildings. It is easy to use and provides user with a possibility to easily reinstall the system and acquire the seismic data from numerous measurement points.

Several types of externally mounted sensors can be used with the instrument, like seismometers, geophones, accelerometers, anemometers or other sensors with single-ended or differential outputs.

The CR-6plus collects and records the data on the microSD card in the slot in front of the housing. This data can be uploaded and analysed to a remote PC running the dedicated software package GeoDAS. Optionally the data can be downloaded by accessing the web interface of the instrument from remote or on site. Given the system is configured to store the data permanently; the data can alternatively be accessed by turning the instrument off and copying the data stored on the microSD card.

Frequency response (bandwidth) depends on the chosen low-pass filter and the sampling rate. Typical attenuation at 99% of the Nyquist frequency is >120 dB.

During normal operation the instrument continuously amplifies, filters and converts sensor inputs to 24 bit digital form and passes these to the embedded computer. The recording parameters can be set by the computer. The recorded data can then be downloaded over the network and analysed with the GeoDAS software package.

Trigger algorithms include STA/LTA ratio triggering and level triggering. The STA/LTA ratio trigger computes the short term and long term signal averages.

GeoSIG 12/112

2. Incoming Inspection

All instruments are carefully inspected both electrically and mechanically before they leave the factory. Please check if all received items correspond with the packing list and your order confirmation. In case of discrepancy please contact GeoSIG or your local representative immediately.

2.1. Damage during shipment

If requested at the time of order, all instruments can be insured prior to shipment. If you receive a damaged shipment and shipping insurance was previously arranged you should:

- Report the damage to your shipper immediately
- Inform GeoSIG or your local representative immediately
- Keep all packaging and shipping documents

Insurance claims may be void if the above procedure is not followed.

2.2. Warranty

GeoSIG Ltd (hereafter GeoSIG) warrants hardware and software products against defects in materials, workmanship and design for the defined period in the relevant contract or offer, starting from date of shipment and 5 years parts and maintenance support commitment. If GeoSIG receives notice of such defects during the warranty period, GeoSIG shall at its option either repair (at factory) or replace free of charge hardware and software products that prove to be defective. If GeoSIG is unable, within a reasonable time to repair or replace any cabinet to a condition as warranted, buyer shall be entitled to a refund of the purchase price upon return of the cabinet to GeoSIG. 50% of freight charges on shipments of warranty repairs or replacements will be borne by GeoSIG (normally one way freight).

2.2.1. Limitation of Warranty

The foregoing guarantee shall not apply to defects resulting from:

- Improper or inadequate maintenance by buyer
- Buyer supplied software or interfacing
- Unauthorised modification or misuse
- Operation and storage outside of the environmental specifications of the instrument
- Related to consumables or batteries
- Improper preparation and installation at site.

3. Storage (Instrument Shelf Life)

Period of time	External power supply	Instrument is operating	Main battery	Real Time Clock backup battery
	ON	YES	Connected	Connected
< 1 month	ON	NO	Connected	Connected
	OFF	NO	Connected	Connected
4 0	ON	YES	Connected	Connected
1 – 3 months	ON	NO	Connected	Disconnected
	OFF	NO	Disconnected	Disconnected
2 0	ON	YES	Connected	Connected
3 – 6 months	ON	NO	Connected	Disconnected
	OFF	NO	Disconnected	Disconnected
	ON	YES	Connected	Connected
Mara than G	ON	NO	Connected	Disconnected
More than 6 months	OFF	NO	Disconnected, must be recharged every 6 months for at least 24 hours.	Disconnected

In case the instrument is stored, the batteries have to be maintained according to the storage duration.

Table 1, Storage instruction



Removing or replacing the backup battery must be done by a trained person only. Therefore it the instrument is stored for more than 1 month, always have it connected to power and let it running.

3.1. Main battery

The instrument is normally connected to a 100 Ah battery, which is charged through a separate power supply module.

3.2. Backup battery

The jumper JMP_BBATT on the SBC Slot-in module has to be put in position 2-3 to disconnect the backup battery if the instrument is turned off for more than one month. In this mode the RTC (Real Time Clock) will continue to operate from the battery in order to keep the time information. The RTC is able to store the time for approximately 1.5 years at ambient temperature when the system is turned off, before the battery runs low.

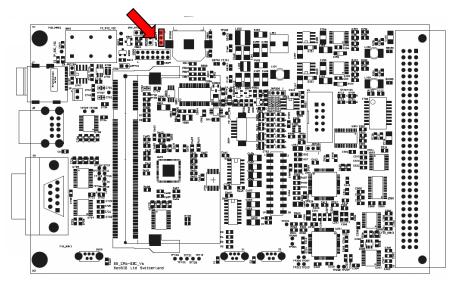


Figure 1. Jumper location to disconnect Backup Battery of the RTC

4. System Description

The CR-6plus is a multi-channel central recording system mounted in a 19" rack and containing an industrial single-board-computer (SBC) with up to 12 digitisers. As each of the digitisers provides 3 data channels, the CR-6plus can provide a maximum number of 36 channels.

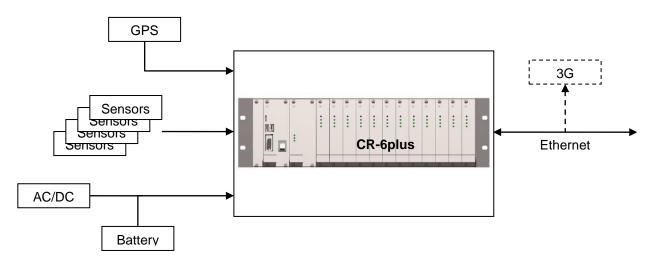


Figure 2. System Overview

The GPS module provides an accurate time source to the CR-6plus Recording System. The CR-6plus system locks the internal RTC with the GPS time source. If GPS is lost, the internal RTC signal will reproduce the 1PPS signal and run for itself keeping all the channels synchronised. Alternatively, time synchronisation can be achieved over NTP, in which case a reliable NTP server must be accessible over Ethernet from the CR-6plus.

The CR-6plus system can manage up to 36 channels and contains an OVP protection on all in- and outputs. A wide variety of sensors can be used: acceleration, velocity, displacement, temperature, current, wind speed, wind direction, stress and pressure.

The CR-6plus system is powered from an external 12 VDC source (24 VDC on request). The internal watchdog permanently checks the supplied voltage and shuts the system down in case of a voltage drop to protect the battery from deep discharge.

An over voltage protected RJ45 Ethernet input allows the CR-6plus to be connected to the local network.

The block diagram below shows the design of the CR-6 system, including all internal and external connections.

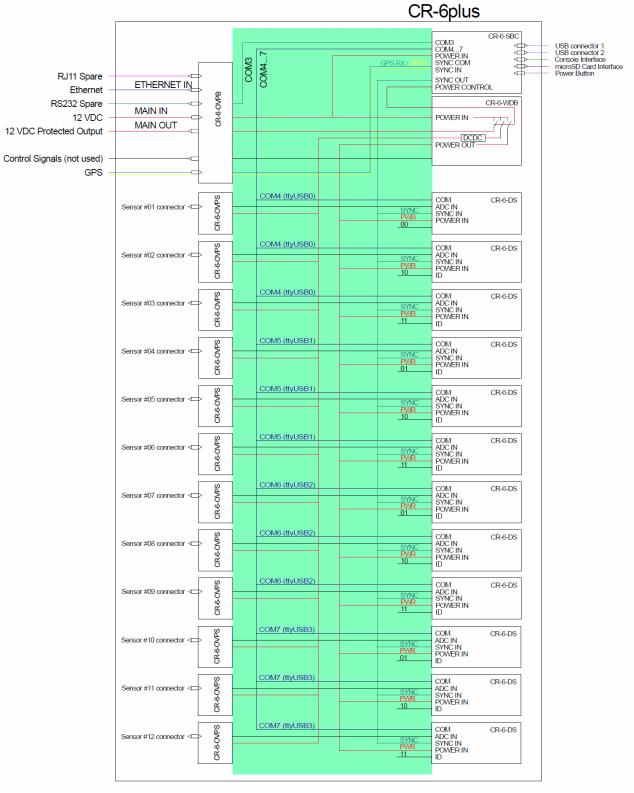


Figure 3. Internal Block Diagram

4.1. CR-6plus

The CR-6plus consists of slot-in modules, independent if accessible from the front or from the back, which are plugged into a backplane that is fixed to the middle of the housing and is responsible for exchanging all signals within the system between the slot-in modules. The racks are designed, that there are no active components on the backplane, which allows the user to easily replace every part of the system by simply exchanging the related plug-in module.

4.1.1. Front Side

The SBC (Single-Board-Computer) is the slot-in module on the most left side accessible from the front is responsible for the data processing, storage and communication. The next module right of the SBC is the CR-6-WDB. It controls the voltages that are applied to all the other modules and sensors. The button on it allows to turn the system on and off. The remaining 12 slots on the right of the CR-6-WDB module slot can contain a digitiser of the type CR-6-DS.

The front of the rack is therefore containing:

CRplus Rack

Task

- 1x CR-6-SBC
- 1x CR-6-WDB Base Watchdog
- 12x CR-6-DS Slave Digitiser

Data storage, processing and communication Voltage control Data acquisition

Each of the 12 CR-6-DS Digitiser Slot-In Module contains three channels. Always three CR-6-DS Digitiser Modules are connected to the same serial port, sending their data time multiplexed over the same line to the SBC. The CR-6-DS Slave Slot-In Modules can be plugged at any slot.

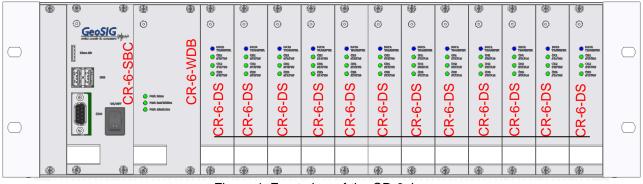


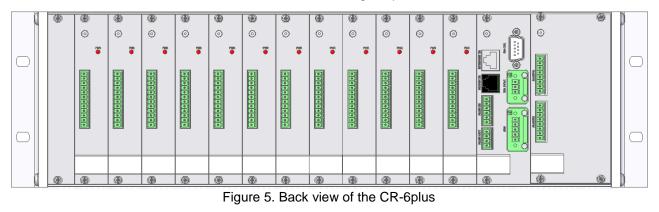
Figure 4. Front view of the CR-6plus

4.1.2. Back Side

On the backside the rack contains:

CR-6plus Component		Task
12x	CR-6-OVPS -Sensor OVP	Interface to the sensor. Protects the CR-6plus from over- voltages from the sensor.
1x	CR-6-OVPB Base OVP	Interface of the SBC to peripherals. Protects the SBC from over-voltages from the GPS, batteries and power supplies.

All sensors are connected to the over voltage protection Slot-In Modules CR-6-OVPS. All other external signals (power, GPS, Ethernet, ...) are connected to the CR-6-OVPB or CR-6-OVPS Slot-In Module. All the Slot-In Modules are described in more details in the following chapters



4.2. Backup battery

The backup battery on the SBC is used to maintain time in the instrument when it is powered off. It requires the following specifications:

Description	Specification
Nominal Voltage	3 V
Capacity	48 mAh
Cell diameter	12.5 mm
Cell height	2.5 mm
Weight	<1 g

Table 2. Main battery specification

The following models have been checked to be compatible with the instrument:

Supplier	Model
VARTA	CR1225

Table 3. Backup battery models

4.3. Supplied and Optional Accessories

4.3.1. Optional Accessories

The following parts can be ordered additionally and will be added if specified at order time:

- External power supply module, 100 to 230 VAC / 50-60 Hz
- AC Power cable, depending on the shipping address with European, US or Swiss power plug
- Console cable for use on the internal RS-232 connector
- **GPS** time code receiver with 20 meters cable, other cable length on request. GPS is an option as the time can also be synchronised through the network using NTP.
- microSD card reader for USB for reading the memory card on a computer or laptop.
- Any spare connectors
- External battery

5. Slot-In Modules

The slot-in-modules are not hot swappable. When changing any slot-in-modules, the instrument must be switched off first to avoid any damage on the instrument.

5.1. Front Side

5.1.1. CR-6-SBC Single Board Computer Slot-In-Module

The CR-6-SBC (Single Board Computer Slot-In Module) is mounted into the CR-6plus in the first position on the left side of the device. The CR-6-SBC is the data processing and storing unit of the CR-6plus Recording System and will acquire the data from the digitisers.

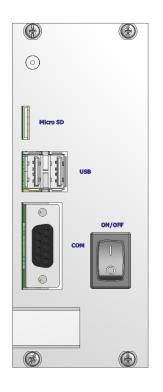


Figure 6 CR-6-SBC Slot-In module

5.1.1.1. ON/OFF Switch

In default position of the ON/OFF button is 'O'. To turn the system on, one has to press the button into postion "I" for about 2 seconds. Likewise to turn the system off if it is already running, the button has to be pressed into the "I" position for about 2 seconds. The status of the system can observed on the LED's of the watchdog bord as described in Section 5.1.2.1

5.1.1.2. COM Interface

The COM interface allows to access the control and configuration menu of the CR-6plus. By connecting a PC to it with a serial cable (terminal settings: 8N1, 115200 baud) it is possible to access this menu with a terminal emulator. More information on how to do this can be found in Chapter 11.

5.1.1.3. USB Interfaces

The USB interfaces in the front of the SBC are reserved for later use and are not supported at the moment.



5.1.1.4. microSD Interface

The microSD slot of the SBC is the default data storage of the CR-6plus. The microSD in this slot will contain, depending on the configuration, the recorded Ringbuffer, Trigger and calibration files as well as SOH- and Log files.

5.1.1.5. Real Time Clock

The CR-6-SBC has a complete, self-contained time-keeping system (RTC). This clock keeps track of days, hours, minutes, seconds down to milliseconds. The instrument synchronise the clock automatically with an encoded external time signal coming from a GPS or any NTP server. The clock operates from the internal battery and runs regardless whether the main switch is at ON or OFF position. If the CR-6plus Recording System is stored in shelf, please see chapter 3 to avoid that the backup battery for the RTC is discharged.

5.1.2. CR-6-WDB Watchdog Slot-In-Modules

The CR-6-WDB (Base Watchdog Slot-In Module) is mounted into the CR-6plus next to the SBC and the watchdog of the whole CR-6 Recording System. This Slot-In Module supervises the status of the data acquisition software and power supplies.



Figure 7. CR-6-WDB Watchdog Slot-In Module

5.1.2.1. LED's

Function	LED		Description
PWR OUT	ON	OFF	Supply voltage of the SBC and external devices is on (Green LED on) or off (Green LED off)
PWR DIGITIZERS	ON	OFF	Supply voltage of the digitizers and the GPS is on (Green LED on) or off (Green LED off)
PWR SENSORS	ON	OFF	Supply voltage of the sensors is on (Green LED on) or off (Green LED off)

5.1.3. CR-6-DS Digitiser Slot-In Module

The CR-6-DS Digitiser Slot-In Module measures the value of the sensor with an ADC. The filtered value will be transferred to the SBC to be recorded and analyzed.



Figure 8 CR-6-DS Digitiser Slot-In Module

Function	LED		Description
DATA TRANSFER	ON	OFF	In case the blue LED is blinking, the Digitiser Module transfers data to the SBC
CH1 STATUS	ON	OFF	Channel 1 is enabled (Green LED on) or disabled (Green LED off)
CH2 STATUS	ON	OFF	Channel 2 is enabled (Green LED on) or disabled (Green LED off)
CH3 STATUS	ON	OFF	Channel 3 is enabled (Green LED on) or disabled (Green LED off)

5.1.3.2. Full Scale Settings

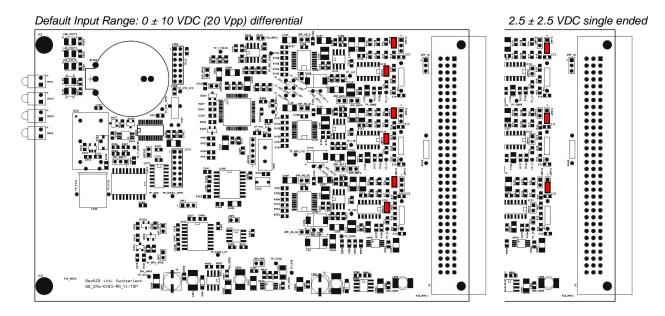
On the CR-6-DS the electrical signals from seismic sensors are range-adjusted in preparation for conversion to digital form and are filtered to prevent aliasing effects. The signals are next sampled and digitised, and then digitally filtered under software control to further reduce noise.



Depending on the jumper configuration, the instrument accepts signals from sensors within the sensor voltage output ranges as follows:

		Jumpers on	CR-6-Dx Digitis	er Slot-In Modules
Range		JMPX1	JMPX2	JMPX3
		JMPY1	JMPY2	JMPY3
		JMPZ1	JMPZ2	JMPZ3
0 ± 10 VDC (20 Vpp)	Differential	open	1-2	1-2
0 ± 2.5 VDC (5 Vpp)	Differential	open	open	open
0 ± 10 VDC (20 Vpp)	Single Ended	1-2	1-2	1-2
0 ± 2.5 VDC (5 Vpp)	Single Ended	1-2	open	open
2.5 VDC ± 2.5 VDC	Single Ended	2-3	open	open

Examples:



Each channel of the CR-6plus has a low-pass 500 Hz 4th-order Butterworth analogue filter prior to being sampled and converted to digital form. This filter removes signal energy at frequencies above one-half the input sampling rate (1000 Hz), so that higher frequencies are not aliased by the sampling process. For different sampling rates, further anti-aliasing is achieved by digital filters in the DSP (equi-ripple FIR filter structures with the linear phase) with a -3dB point above 80% of the Nyquist rate. Any delay from the digital filter is directly compensated inside the DSP.

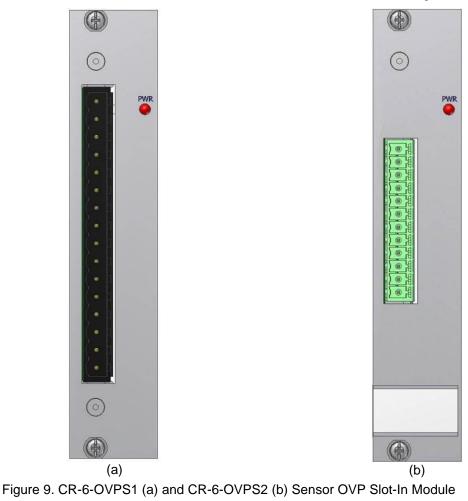


The sampling rate is common to all three channels digitised by one CR-6-DS Digitiser Slot-In Module, i.e. the sampling rate cannot be individually set for a specific channel.

5.2. Back Side

5.2.1. CR-6-OVPSx Sensor OVP Slot-In Module

Each triaxial sensor is connected to a separate CR-6-OVP-S Sensor OVP Slot-In Module. This Module protects the CR-6 Recording System from over voltage, injected on the sensor cable. Two versions are available. The CR-6-OVPS1 is backwards compatible option to the CR-4 and can be ordered on request. The new standard version is however the CR-6-OVPS2. Both of them can be seen in Figure 9.



Function	LED		Description
PWR	ON	OFF	In case the LED is on, the sensor is powered.

5.2.1.2. Connector Pinout

The sensor connector is a CR-4 compatible 16 pin connector, which is used to connect an external sensor to the CR-6 Recording System. The sensor connector provides a stabilised +12 VDC power to the sensor. Optionally also -12 VDC can be provided.

Pin	CR-6-OVPS1 (CR-4 Compatible)	CR-6-OVPS2 (Standard)
1	X+	X+
2	X-	X-
3	GND	Y+
4	Y+	Y-
5	Y-	Z+
6	GND	Z-
7	Z+	S_TEST
8	Z-	GND
9	GND	Power +12 VDC
10	S_TEST	GND
11	GND	S_MODE
12	Positive Power +12 VDC	AGND
13	Power GND	
14	Earth	
15	S_MODE or negative Power -12 VDC	
16	AGND	

5.2.2. CR-6-OVPB OVP Slot-In Module

The CR-6-OVPB protects the rack from over voltage on any incoming cables (e.g. power, Ethernet, GPS, ...)

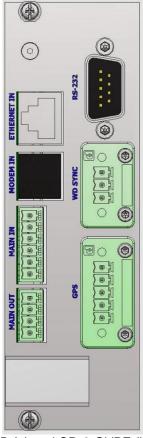


Figure 10. CR-6-OVPB (a) and CR-6-OVPE (b) OVP Slot-In Module

5.2.2.1. Connectors

ETHERNET IN	Connection of the	e CR-6p	lus to the local LAN with a standard RJ45 Et	hernet plug."
		1	TX+	
	1	2	TX-	
		3	RX+	
		4	NC	
	8	5	NC	
	Ű	6	RX-	
		7	NC	
		8	NC	
MODEM IN	This connector is	s not use	d	
	1	1	NC	
		2	Phone line A	
		3	Phone line B	
	4	4	NC	

MAIN IN			ed to supply the CR-6pl	us. 12 VDC from a batt	ery or a power
	supply shall be p	rovid	ed.		
		1	12 VDC (optionally	24 VDC)	
		2	12 VDC (optionally		
		3	GND	- /	
	WAIN	4	GND		
				o AC, max. 30 VDC	
	6	5	from relay contact)	-,	
		6	GND		
MAIN OUT	This connector is	suse	d to supply any external	devices like modems.	
	1	1	Same voltage as for		
			output controlled by max.	watchdog. 500 mA	
	18	2	IIIdX.		
	MADT and and and and and and and and and and	3	GND		
	4	4	GND		
RS-232	This connector is	suse	d for any external device	s (DTE) with RS-232 inte	erface.
	5 ~ 9	1	CD		
		2	RXD		
		3	TXD		
		4	DTR		
	1 🕑 6	5	GND		
		6	DSR		
		7	RTS		
		8	CTS		
		9	RI		
WD SYNC	This connector is	s not	used.		
		1	SW3		
		2	SW4		
	3	3	GND		
GPS	This connector is	use:	d to connect the GPS rec	ceiver.	
			RS-485	RS232 (default)	
			JMP1: 1-2	JMP1: 2-3	
			JMP500: 2-3	JMP500: 1-2	
			JMP501: 2-3	JMP501: 1-2	
		1	RX+ (White)	RX (Brown)	
		2	RX- (Brown)	TX (White)	
		3	1PPS from GPS received	er (Green)	
	5	4	Power (12VDC) for GP	S receiver (Yellow)	
		5	GND (Grey)		

5.2.3. CR-6-Relay Alarm card slot-in module

The CR-6-Relay is the "alarm card" or "relay card" of the CR-6plus. This card gives access to four relays. Relay ratings: 250 VAC [220 VDC] max continuous current 3 A.

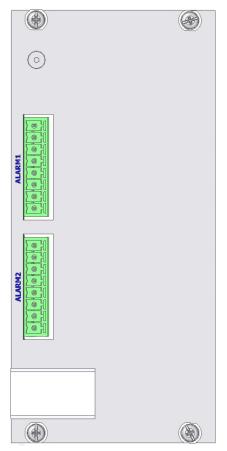


Figure 11. CR-6-Relay Slot-In Module

5.2.3.1. Connectors

		o connect external devices to the relays of the	e CR-6-Relay.
500 1	1	K1 Normally Closed (NC) *	
	2	K1 Normally Open (NO) *	-
	3	K1 Common	-
	4	GND	-
	5	VRELAY	
8	6	K2 Common	
	7	K2 Normally Open (NO) *	-
	8	K2 Normally Closed (NC) *	
This connector is	s used to	connect external devices to the relays of the	e CR-6-Relay.
V m H 1	1	K3 Normally Closed (NC) *	
	2	K3 Normally Open (NO) *	
	3	K3 Common	
	4	GND	
	5	VRELAY	
8	6	K4 Common	
<u></u> "	7	K4 Normally Open (NO) *	
	8	K4 Normally Closed (NC) *	
	илим2	3 4 5 6 7 8 7 8 7 8 7 8 7 8 7 8 6 7 8 6 7 8 6 7 8	3 K1 Common 4 GND 5 VRELAY 6 K2 Common 7 K2 Normally Open (NO) * 8 K2 Normally Open (NO) * 8 K2 Normally Closed (NC) * This connector is used to connect external devices to the relays of th 1 K3 Normally Closed (NC) * 2 K3 Normally Open (NO) * 3 K3 Common 4 GND 5 VRELAY 6 K4 Common 7 K4 Normally Open (NO) *

* Each relay can be normally energized or de-energized. Please look the remarks of CR-6-Relay option at the test record of the instrument.

6. Installation

This section lists the procedures involved in installation, configuration and operation of the instrument. The procedures will be outlined as steps to be performed in the field or in house prior to deploying the instrument in the field.

6.1. Site Selection

6.1.1. Environmental Considerations

The choice of an installation site is similar in most respects to that of a regular continuous recording seismic station.

Although the Instrument is in a solid case, a location shall be arranged that is free from direct sunlight, dangers of falling materials in the event of an earthquake and the risk of tampering or vandalism. Furthermore, the installation site must not be affected by weather conditions such as ice, snow or rain.

The user must ensure that the location is provided with either 115 / 230 VAC or 12 VDC (e.g. from a solar panel or battery).

In case of the setup of the event triggered recordings, any local environmental source of noise, disturbance or vibration such as vibration from machinery, highway traffic, aircraft, waves, etc. around the site must be taken into account. This will cause false triggering of the recording system in case the threshold is set too low. These influencing factors must be taken in account when configuring the trigger settings in armdas. It is recommended to check the instrument frequently during the first several days of operation after each set-up, to see if there are previously unsuspected sources of noise which are triggering the instrument and using up the storage.

6.1.2. Power Supply Considerations

The CR-6plus is powered by battery and/or an external power supply, connected to 230/115 VAC. The power supply works as a battery charger at the same time and therefore guarantees maximum of autonomy in case of a power loss. A solar panel can be used as well instead of a power supply, ask GeoSIG for more detailed specifications.

- With 115/230 VAC power, a cable has to be connected to the external power supply. The cable must consist of Phase, Neutral and Earth Protection.
- If the system is powered only by battery, the battery must be fully charged at least 24 hours uninterrupted before connecting to the system. The configuration of the instrument may be performed while the charger is connected to the instrument.



Please ensure that the right voltage (115 VAC / 60 Hz or 230 VAC / 50 Hz) is selected on the external power supply.

The best solution for the system is to use the battery with the external power supply at the remote installation site. The instrument can be checked and configured locally in the work shop before going on site (e.g. correct time, trigger and all relevant settings). It can be transported then to the installation site (Ensure that the system is "OFF"). When in place and powered again, the system will run with the preconfigured parameters. After turning the Instrument *ON* (see chapter 11.1), the instrument runs with the pre-configured parameters. This reduces the amount of time needed to configure in the field; an important consideration in the case of an adverse condition.

Many times the locations of seismic equipment are highly exposed to electrical disturbances caused by lightning or by the industrial environment. It may sometimes be necessary to use additional surge protectors for the equipment. Contact GeoSIG or your local representative for more information.

6.2. Cabling of a CR-6plus

In the figure below the external cabling of the CR-6plus is shown.

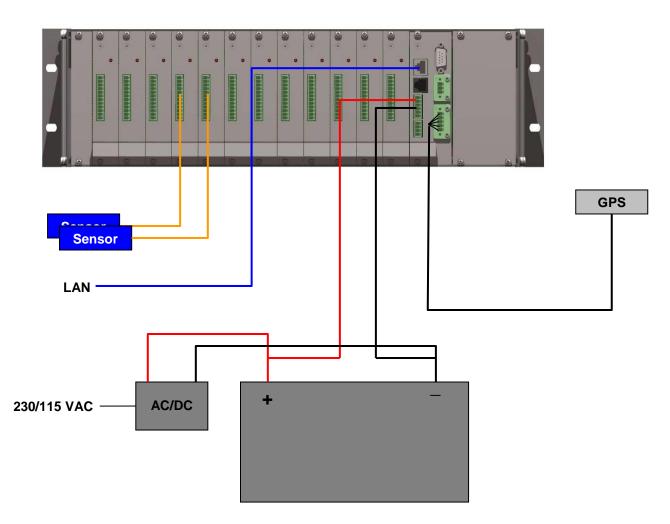


Figure 12. External cabling of a CRplus

6.2.1. Communication Considerations

An Ethernet connection must be present to have a data communication. If the Instrument uses an *NTP Server* as time source, please make sure that an internet connection is available and the network settings are properly set in the instrument. Optionally an external cellular modem can be used for the connection to the internet. Use of NTP is not recommended when using a cellular modem; a GPS should be used instead if possible.

If the Instrument is used as a standalone recording station, a notebook with an Ethernet connector can be used for downloading the data on a regularly basis. In a network the stations will upload the data to the configured server.

6.3. Sensors

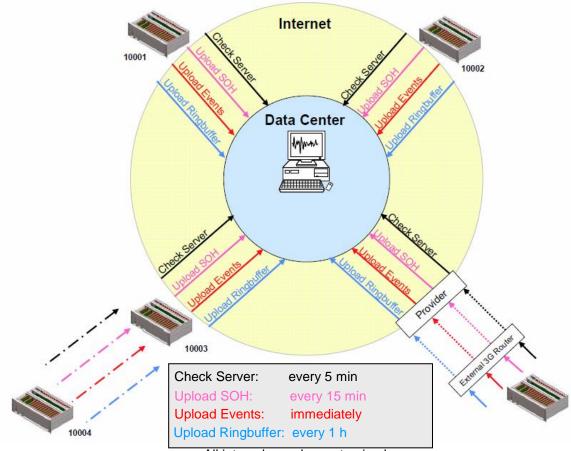
For information on how to mount the sensors and connect them to the CR-6plus, please refer to the manual of the sensor and section 5.2.1.2 of this document.

7. Principle of Operation of the Instrument

This chapter gives an overview about the normal operation the instrument in a network or as a standalone unit.

7.1. Normal Operation

During normal operation the instruments are installed on sites and connected to a data server over Ethernet or Internet. The instrument check in a defined interval, if there are any requests or firmware updates ready for pick up on the server. Additionally – and if configured – the instruments uploads the ringbuffer files (from continuous recording) and the state of health files to the data server.



All intervals can be customized

Figure 13. Normal operation in a network

7.2. Behaviour on a Seismic Event

In case there is an earthquake and the vibrations are above the trigger threshold, the instrument is recording the event and immediately uploading it to the data server (see Figure 14)

In case some of the stations are too far away from the epicentre to trigger, the data can still be collected from all instruments:

- A data request will be placed on the server
- All instruments will download the request during the next time checking the server (see Figure 15).

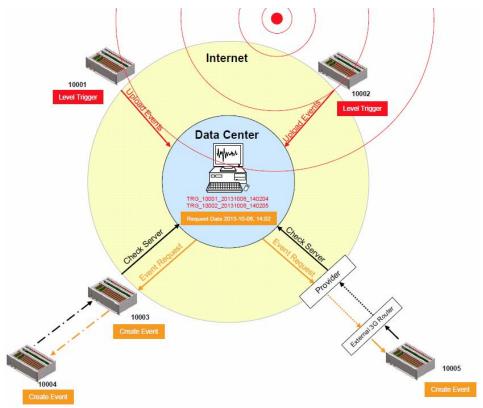


Figure 14. Upload of seismic events and download of requests from the server

- All instruments will create an event at the time listed inside the data request and extract these data out of the ringbuffer data
- The extracted event file will be uploaded to the data server (see Figure 15)

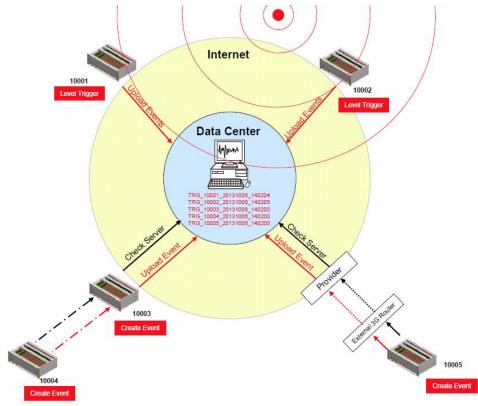


Figure 15. Behaviour on Events: Upload of extracted events

7.3. Firmware and Configuration Upgrade

In case of a firmware upgrade, the new firmwares can be easily put on the server. All instruments will recognise the new firmware during the next server checkup, download and install it. See chapter 13 for details about the firmware upgrade.

The same happens also with new configurations. In case under *Server Parameters* the option *Keep connection to the server is* enabled (see chapter 11.8 for details), then the instrument will keep the channel open, so that it is possible to configure the instrument via the web interface without knowing the IP of the instrument. See chapter 10 for details.

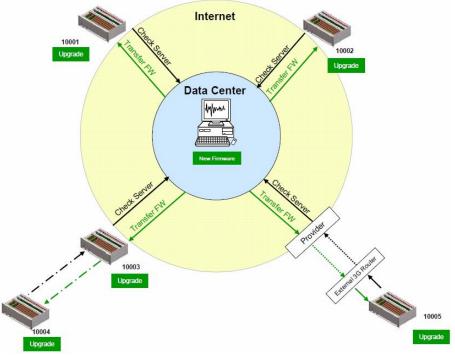


Figure 16. Firmware upgrade

7.4. Backup Server

It might be that the instrument is not able to contact the main data server anymore: Either because it is down or a wrong server has been configured, this can happen for example in case accidentally a configuration file with wrong server settings will be uploaded to an instrument. In this case the instrument will contact the backup server, configured in the test and configuration menu. Therefore the configuration of the backup server is very important and should not be ignored. For more information how the set the backup server see chapter 8.2.

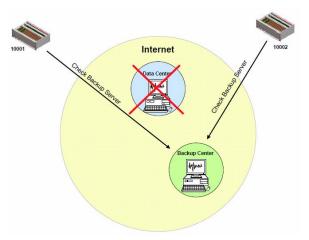


Figure 17. Connection to backup server in case connection to main server fails

8. Quick Start Up

This chapter is intended to configure simple communication between the instrument and *GeoDAS* software running on a Windows workstation, working as data server.

It is assumed that the GeoDAS software is already installed on a computer. If not, please do the installation first with help of the GeoDAS User Manual before proceeding.

8.1. Preparation

- Make sure the instrument is powered by the provided power supply
- Make sure the instrument is connected to a LAN with an Ethernet Cable
- If it is planned to use a battery with the device verify that the battery is correctly fixed and connected to the system

In case there is no LAN available, the Ethernet cable can be connected directly to a computer. In any way the instrument and the computer must be configured to have a fixed IP. Please follow the procedure to adjust these settings.

- Connect the instrument to a serial port of your computer by using a standard RS-232 patch cable.
- Open any terminal program and chose the appropriate COM port. Baud rate is 115200. Alternatively open GeoDAS, go to Tools → Terminal... and chose the COM Port. As Baud rate select 115200. Then Press Connect

2
-

Figure 18. GeoDAS terminal

• Keep the terminal open for the next step.

8.2. Set IP Address of the Instrument

Network settings of the Instrument can be changed during startup of the instrument. By default the instrument has a dynamic IP.

- Switch on the instrument by pressing and holding the POWER button for 2 seconds.
- Press <**Ctr**> + '**Z**' as soon the following message appears on the console to enter the test mode.

The following menu will appear (see chapter 12 for details):

 By default, no any passwords are set, so press 'U' to enter the User Mode, and then 'N' to enter the menu Network settings.

```
==== Network Settings ====
---- Primary network interface ----
Configure network interface (Y/N)? Y
Static IP address (1=YES, 0=AUTO)? (0 = 0x0):
```

- Select 'Y to change the settings and then select if the instrument should have a static or a dynamic IP by pressing '1' (Static) or '0' (dynamic). In case a dynamic IP is chosen, a DHCP server must be available in the network to provide the IP settings.
- In case a static IP is selected, an additional message will appear asking for the Instrument IP address, Instrument network mask and Instrument gateway IP. In case you don't know these parameters please ask your network administrator.
- The instrument allows access to the operating system from remote over SSH. This feature is not needed for the normal operation of the instrument and can be disabled in case of security concerns. By default it should be kept enabled, to disable press '1'

```
---- Miscellaneous parameters ----
Disable remote login over ssh (1=Yes, 0=Enable)? (0 = 0x0):
```

It's highly recommended to configure a recovery server IP address and recovery server port. The
instrument will contact this server with the interval defined in Recovery server contact interval in
case the connection to the main data server (configured in the configuration of the instrument) is
not possible anymore. This can, for example, happen in case a configuration file with wrong server
settings is accidentally uploaded to an instrument.

```
Recovery server IP address (192.168.10.107):
Recovery server port (3456 = 0xD80):
Recovery server contact interval, hours (24 = 0x18):
```

• As soon the following menu appears, press '5' to start the instrument.

```
Bootloader Menu of the CR-6plus s/n 100582
Access level: User
--- Flash Images and Boot Options ---
L - List flash images
Q - Reset instrument configuration to the user default
V - Reset instrument configuration to the factory default
5 - Boot now
X - Reboot the instrument
Y - Power off
---- Hardware Setup and Monitor ---
N - Network settings
---- Security ----
O - Set password
```

• As soon the instrument is up and running start GeoDAS (if not already done)

8.3. No Stations Configured at first Start Up

If the following steps require GeoDAS version 2.24 or higher. If you have any older version download the newest release from www.geosig.com \rightarrow Support \rightarrow Downloads

- When GeoDAS will be started for the first time, it will ask to add stations in its configuration.
- Click Yes

No Stations Configured	×
GeoDAS has detected no stations in its current configuration. Would you like to add them now?	
<u>Y</u> es <u>N</u> o	

Figure 19. "No stations configured" message at startup of GeoDAS

If there are already stations configured in GeoDAS, this window will not appear. Please press the wizard button in the GeoDAS menu



8.4. Adding New Stations...



Make sure the computer is connected to the same network as the instrument and in the same IP range.

 In the following window, select My GMS or CR-6plus instrument is connected to the local network and press Next >

Adding New Station	×
Please select one of the options below and click the Next button to continue:	
My GSR instrument is connected to a serial port of this computer I have the configuration file of my GSR instrument provided by its manufacturer I would like to configure the new station manually	
My GMS or CR-6plus instrument is connected to the local network	
Next > Cancel	

Figure 20. Instrument Wizard

Enter the Serial number of the instrument and press Login >. It is also possible to add more than
one station by entering only a fragment of the serial number which is similar on all instruments. For
example if there are the serial numbers 100210, 100211 and 100234. By entering '1002' all the
stations will be added. By putting '10021' just the stations 100210, 100211 will be added.

Quick Login			×
Prior to login please make connected to the local net		nt is turned on and	
Serial nu	mber		
You may leave serial numb instruments in your LAN wi detected			
	< Back	Login >	Cancel

Figure 21. Quick Login Window

• All the found stations will be listed, press Finish to add them to GeoDAS

Adding New Stations Completed				×	Adding Nev	v Stations Com	pleted		×	
Configuration of one station will be added or updated. Press the Finish button to update the required parameters and restart GeoDAS.						will be added or upd ters and restart Geo		inish button to		
Name	Instrument	Serial Number	IP Address			Name	Instrument	Serial Number	IP Address	
GS000	CR-6plus	123456	0.0.0.0			GS000	GMSplus	135905	0.0.0.0	
						GS000	GMS-XX	100666	0.0.0.0	
						GS000	CR-6plus	123456	0.0.0.0	
						GS000	GMS-XX	100210	0.0.0.0	-
,		< Back	Finish	Cancel	1			< Back	Finish	Cancel

Figure 22. List of all stations found – single station left, multi-selection right side

8.5. Configuration of Data Server

- Proceed to the menu Settings → Configure Stations...
- The following window will appear where all the instruments are listed in the area 1. To add stations make a right click and choose *Add Station to current configuration*. Please see chapter 15.1 for details.

Station BUYAD FARGE HVHRB HVBAD SINOB STRB	G57-24 Direct Life (CONL2) Records + Data 196564 G57-24 Direct Life (CONL6) Records + Data 196564 G57-24 Direct Life (CONL6) Records + Data 196564 G57-24 Direct Life (CONL6) Records + Data 196566 G57-24 Direct Life (CONL7) Records + Data 196562 G57-24 Direct Life (CONL7) Records + Data 196566 G57-24 Direct Life (CONL7) Records + Data 196566 G57-24 Direct Life (CONL7) Records + Data 196566 G57-24 Direct Life (CONL7) Records + Data 196566				ne list (optional)	Unknown _		
TUZ01 YAKUP YALST	G5D-24 G5D-24 G5R-18	Direct Link (COM14) Direct Link (COM13) Direct Link (COM1)	Recorder + Data Recorder + Data Recorder	104669 104678 0	6. Configure comm 7. Specify work op	tions		Channel Options
<				<u> </u>	8. Add new station	to the list of existing	ones	Add Now
,	6plus Stations	Serial Number	Firmware		8. Add new station	to the list of existing Public IP	Network Interface	Add Now Status
GMS and CR-			Firmware	Con				
GMS and CR-	Instrument GMS-XX GMS-XX	Serial Number 100578 123456	Unknown Unknown	Con 192	figured IP	Public IP Unknown Unknown	Network Interface Unknown Unknown	Status
GMS and CR-	Instrument GMS-XX GMS-XX GMS-XX	Serial Number 100578 123456 100210	Unknown Unknown Unknown	Con 192 192.	figured IP .168.1.37	Public IP Unknown Unknown Unknown	Network Interface	Status
GMS and CR- Station ARM00 CR6PL GS000 GS003	GMS-XX GMS-XX GMS-XX GMS-XX GMS-XX	Serial Number 100578 123456 100210 111222	Unknown Unknown Unknown Unknown	Con 192 192 192 192	figured IP .168.1.37 168.20.18 .168.1.37 .168.1.29	Public IP Unknown Unknown Unknown Unknown	Network Interface Unknown Unknown Unknown	Status C C C C
GMS and CR- Station ARM00 CR6PL GS000	Instrument GMS-XX GMS-XX GMS-XX	Serial Number 100578 123456 100210	Unknown Unknown Unknown	Con 192 192 192 192	figured IP 168.1.37 168.20.18 168.1.37	Public IP Unknown Unknown Unknown	Network Interface	Status C C C

Figure 23. Configuration and overview of the stations

 Press the button Server..., the window below appears and enter the following data: My server IP address Server port
 Select a user defined port, use 3456 by default

Station Server Parameters						
Network Settings My server IP address 0.0.0.0 Server port 3456 Timeout, seconds 40	Miscellaneous Options Station inactivity period (minutes) considered as warning 30 or error 360 Do not delete received State-of-Health files right after processing Life time of any files other than data arriving from stations, days					
Delete original data files after successful conver	sion UK Cancel					

Figure 24. Data server parameter

C.	If you don't know how to find out your IP Address, follow these steps: - Click Start \rightarrow Run \rightarrow type cmd , then press OK
	Run Classical and the second
	- Type ipconfig, then your IP appears Ethernet adapter Local Area Connection: Connection-specific DNS Suffix .: IP Address
	- Type exit



- Write down the IP and port you have configured
- Press OK two times to exit again to the main window of GeoDAS

8.6. Basic Configuration of the Instrument

• In the window Stations: General Information make a **right click** on the station name and select **Instrument Setup...**

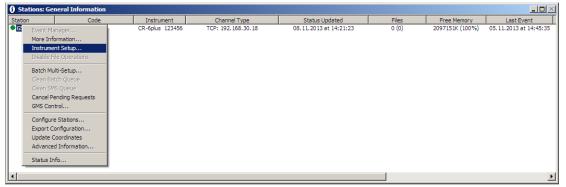


Figure 25. Instrument setup

• A window showing the Web Interface will appear.

swiss made to measure w www
Please fill in your Credentials:
Username:
Password: Jogin
Please note that switching tabs can take up to 10 seconds.

Figure 26. Web interface of the selected instrument

- To be able to adjust the configuration of the instrument it is required to authenticate oneself to the device. The default login credentials are: Username: *admin*, password: *123456.* Then press *login*
- Go to **Configuration** → **armdas Configuration** → **File Transfer Settings**, the following screen appears.

Home	Configuration	State of Health	Data Explore	er Help	Logout		
armdas (Configuration	Manage armdas Confi	gurations	Network Configur	ation We	eb Interface Configuration	
Station		Communication	ñ				
-	Description	Contact Remote Se	ervers				1
Processi	60 109 50 00	Act as Server					0
Channe							
	e Correction						
and the second sec	ased Trigger						
Data Sto and Com	rage, Transfer munication						
	age and Policies						
<u>Streamine</u> <u>Device</u>	ng Settings Detection						
<u>MiniSEE</u>							
Advance							
<u>Watchdo</u> <u>Sensor</u>							
Device In	nformation						
State Of Debugg Logfile							
		Reload Configuratio	on from Device	Save Configura	ition to Device	•	0

Figure 27. Server parameters

- Tick the flag Contact Remote Servers to configure a connection to a remote server
- Add the *IP of your server* and press *Add Server with IP*. Under *Settings...* more options can be configured. The default *Server port* is *3456* and should be kept.

	xplorer Help Logout	swiss made to measure of pair	tation Description Contact Remote Server Parameters	vers 🔽	
as Configuration Manage armdas Configuration	Network Configuration Web Interface C		ime Server Hostname	192.168.10.107	0
n Communication	ঘ	6	File Transfer Protocol	GeoSIG Protocol	· ()
Acquistion and Settings for Server			GeoSIG Protocol Options		
Swichronisation Inel Settings	R		Server Port	3456	0
Uline Correction Maximum Files per Ses	sion 10	0	a S Transfer Timeout, sec	20	0
r and Alarm r Based Trigger Time Interval, sec	10		tie S tie T	E	0
duled Trigger Configured Serv torage Transfer			elic PPP Enabled	Б	0
itorage, Transfer mmunication 192.168.10.107 Storage and Policies 192.168.10.107 S	Add Server with Hostname) #ttings		Accept and Close		
Tansfer Settings ming Settings a Detection SED Settings	C		/atto ens		
ced ndon Settings			97ce tato ebu		
Information Otheatty gaing			path		
Reload Configuration from D	evice Save Configuration to Device	6	e Ty m De Nur		

Figure 28. Added Server (left) and its parameters (right)

- Then press Save Configuration to Device
- After the instrument has restarted it is ready for operation and can be configured according to chapter 10 and 11.



9. Network Settings

9.1. Network Settings through the Web Interface or Instrument Setup...

- To open the Web Interface please do one of the following two steps.
 - In the window *Stations: General Information* of GeoDAS make a *right click* on the station name and click on *Instrument Setup ...*, or
 - Open your browser and enter the IP address of the instrument (see chapter 9.4 for details) in the address bar of your browser.
- To be able to adjust the configuration of the instrument it is required to authenticate oneself to the device. The default login credentials are: Username: *admin*, password: *123456*
- Go to the tab Configuration → Network Configuration, the following screen can be seen
- Adjust the wired Ethernet settings under eth0
- click Save Network Configuration to Device.

Home	Configuration	State of Health	Data Explorer	Help	Logout	Swiss made to measure	
armdas	Configuration	Manage armdas Con	figurations	Network Configuration	Web Interface Configuration		
	ork Interface Inf	ormation					
e	th0 Current Config Name IPv4 Address IPv6 Address IPv6 Address IPv6 Address IPv6 Netmask Interface Type Interface is Active			Active Configur 192.168.30.18 255.255.05 fe80::2fe:95ff.fe9 fff.fff.ffff.fff Broadcast Yes			eth0 Wired Ethernet - current configuration
	Loopback Interfac MAC Address Change Saved	configuration (eth	0)	No 00:FE:95:92:52:4	80		eth0
	Interface Type			Wired			Wired Ethernet - change configuration
	Network Configur	ation		DHCP	•		change configuration
		Reload Network	Configuration fro	m Device Save Netwo	ork Configuration to Device		
Device Type Station Des Serial Num	scription: GeoSIG Sta	ation			Device State Summary		

Figure 29. Configuration of network interface

9.2. Network Settings through GeoDAS

• Under Settings click on Configure Stations..., the following window appears

Station	SR Stations	Channel Type	Operation Mode		Adding New GSR Station – 1. Enter the unique station na 2. Choose the type of instrum	nent from the list	Unknown 💌
					3. Enter serial number of the	main board (optional)	0
					4. Type valid password to log	in to the instrument	
					5. Re-type the same passwor	rd to confirm it	
					6. Configure communication of	hannel	Channel
					7. Specify work options		Options
					7. Specify Work options		- 1
					8. Add new station to the list	of existing ones	Add Now
1S and CR-	6plus Stations	Serial Number	Firmware	Configured IP		of existing ones	Add Now
1S and CR- Station IS001	Instrument CR-6plus	123456	26.05.00	Configured IP 192.168.30.18	8. Add new station to the list Public IP 192.168.30.18	Network Interface Ethernet network Local Area Connection	Stat
IS and CR- station S001 S000	Instrument CR-6plus GMS-XX	123456 100210	26.05.00 20.06.03	Configured IP 192, 168, 30, 18 192, 168, 30, 15	8. Add new station to the list Public IP 192. 168.30. 18 192. 158.30. 15	Network Interface Ethernet network Local Area Connection Ethernet network Local Area Connection	Stat . CR . R
IS and CR- Station S001 S000 S002	Instrument CR-6plus GMS-XX GMS-XX	123456 100210 100666	26.05.00 20.06.03 20.04.03	Configured IP 192.168.30.18 192.168.30.15 192.168.30.87	8. Add new station to the list Public IP 192.168.30.18 192.168.30.15 192.168.30.87	Network Interface Ethernet network Local Area Connection Ethernet network Local Area Connection Ethernet network Local Area Connection .	Stat . CF . R
15 and CR- 3 tation 5001 5000 5002 5003	Instrument CR-6plus GMS-XX GMS-XX GMSplus	123456 100210 100666 100582	26.05.00 20.06.03 20.04.03 25.06.08	Configured IP 192.168.30.18 192.168.30.15 192.168.30.87 192.168.30.83	8. Add new station to the list Public IP 192, 168, 30, 18 192, 168, 30, 15 192, 168, 30, 87 192, 168, 30, 183	Network Interface Ethernet network Local Area Connection Ethernet network Local Area Connection Ethernet network Local Area Connection	Stat . CF . R . R . R
4S and CR- Station S001 S002 S002 S003 S004	Instrument CR-6plus GMS-XX GMS-XX GMSplus GMSplus	123456 100210 100666 100582 135905	26.05.00 20.06.03 20.04.03 25.06.08 21.07.00	Configured IP 192.168.30.18 192.168.30.15 192.168.30.87 192.168.30.87 192.168.30.76	8. Add new station to the list Public IP 192.168.30.18 192.168.30.15 192.168.30.87 192.168.30.76 192.168.30.76	Network Interface Ethernet network Local Area Connection Ethernet network Local Area Connection Ethernet network Local Area Connection Ethernet network Local Area Connection Ethernet network Local Area Connection	Stat . CF . R . R . R . R
4S and CR- Station S5001 S5002 S5002 S5003	Instrument CR-6plus GMS-XX GMS-XX GMSplus	123456 100210 100666 100582	26.05.00 20.06.03 20.04.03 25.06.08	Configured IP 192.168.30.18 192.168.30.15 192.168.30.87 192.168.30.83	8. Add new station to the list Public IP 192, 168, 30, 18 192, 168, 30, 15 192, 168, 30, 87 192, 168, 30, 183	Network Interface Ethernet network Local Area Connection Ethernet network Local Area Connection Ethernet network Local Area Connection	Stat . CF . R . R . R . R

Figure 30. Configuring Stations screen

• Make a *right click* on the station name and choose *Edit Network Settings of Instrument*

Station	Instrument	Serial Number	Firmware
GS001 GS000 GS002	Generate Request: Edit Network Settir	for Configuration Files	26.05.00 20.06.03 20.04.03
GS003 GS004 GS005	Add Station to Cun Add New Station M Remove Stations fi	anually	25.06.08 21.07.00 21.06.09
	Load Configuration from File Save Configuration to File Export to CSV		

Figure 31. Edit Network settings

 Adjust the network parameters in the following screen whereas the *Primary Network interface* is the wired Ethernet

twork interface	Primary Network	Interface	- Wi-FiSettings -		
AC address	00:50:C2:77:4	0:03 No bridged Wi-Fi	MAC address Network name	00:00:00:00	0:00:00 Firmware
An IP address	s is obtained autom	natically from the DHCP server	Network topolo	gy Infra	astructure 🝸 Channel 🛛 🕅
Assigned static IF	Paddress	192.168.55.100	Security type	None	Encryption
Network mask		255.255.255.0	Key index	1 -	Authentication
Default gateway		192.168.55.100	C Hexadecim	al key	Password (up to 64 characters)

Figure 32. Configuration of wired Ethernet

```
GeoSIG
swiss made to measure
42 / 112
```

9.3. Wired Ethernet settings through the local Console

Please see chapter 8.2 for details.

9.4. Get IP from Instrument

• To get the IP from the instrument please press 'S' in the main user menu

```
CR-6plus s/n 100582 version 26.05.00
Main menu:
C - Configuration
M - Messages ->
S - Shell command
L - List firmware images
X - Display errors (0) and warnings (0)
W - Clear errors and warnings
F - View/reset RTC trim values
T - File statistics
G - View RTC status
H - Set RTC time
U - User request
R - Restart
Q - Quit
```

- Enter the linux command *ifconfig* and the following reply will be shown by the instrument
- Please see the IPs of the wired Ethernet (*eth0*) listed and marked here in red.

```
Linux Command: ifconfig
eth0
         Link encap:Ethernet HWaddr 00:50:C2:77:42:8E
          inet addr: 192.168.10.133 Bcast: 192.168.10.255 Mask: 255.255.255.0
          inet6 addr: fe80::250:c2ff:fe77:428e/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
          RX packets:71 errors:0 dropped:1 overruns:0 frame:0
          TX packets:16 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:6538 (6.3 KiB)
                                  TX bytes:1678 (1.6 KiB)
          Interrupt:21 Base address:0x4000
          Link encap:Local Loopback
lo
          inet addr:127.0.0.1 Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING MTU:16436 Metric:1
          RX packets:3 errors:0 dropped:0 overruns:0 frame:0
          TX packets:3 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:172 (172.0 B) TX bytes:172 (172.0 B)
```

10. The Web Interface

The instrument can be configured over a Web Interface. To be able to use the Web Interface, it is necessary that the following criteria are fulfilled:

- The IP Address of the device has to be known or the flag *Keep connection to the server* is enabled under *Server Parameters* (see chapter 11.8 for details) must be enabled (Yes)
- In case the flag *Keep connection to the server* is disabled, the port 80 of the device has to be accessible, from the accessing computer. This usually means that the instrument is in the same network as the accessing computer and no firewall mechanism separates the two.
- A current browser version has to be available on the accessing computer.

10.1. Accessing the Web Interface

- To access the instrument please follow one of the following two steps.
 In the window *Stations: General Information* of GeoDAS make a *right click* on the station name and click on *Instrument Setup ...*, or
 - Open your browser and enter the IP-Address (e.g. 192.168.10.13) of the device in the address bar of your browser, as can be seen in Figure 35.



Figure 33. The login screen of the instrument at 192.168.10.13

To be able to adjust the configuration of the instrument or access its data, it is required to authenticate oneself to the device. This can be done, by entering a valid username and corresponding password in the fields of the same name and pressing the "login" button.

The default login credentials are:

- Username: admin
- Password: 123456

The default password can be changed as described in the chapter 10.3.4 of this manual. If the admin password is forgotten, please delete the webuser.txt file on the SD/microSD card of the instrument to restore the default password.



The Web Interface can be disabled under Network settings in the Administrator mode of the test and configuration menu. See chapter 12 for details.

10.2. The Home Panel and the General Navigation

After the login process has ended, the screen shown in Figure 34 becomes visible. The width of the Web Interface is optimised for a screen with of 1024 pixels. If the width of the browser window is smaller than that, it might be necessary to scroll horizontally.

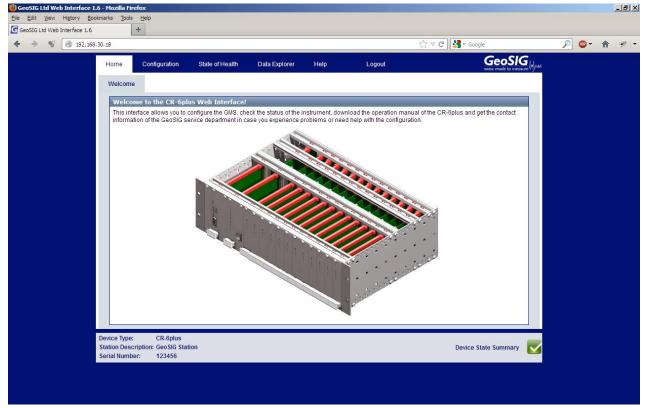


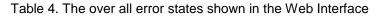
Figure 34. The Home Panel of the Web Interface

As can be seen in

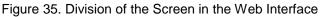
Figure 35, each screen in the Web Interface is separated into three sections:

- 1. **The Navigation Bar**: The navigation bar allows accessing all screens within the web interface. The navigation bar is further separated into two parts. The top bar is the primary navigation panel which is visible from all screens. The currently active tab marked white, while all other, inactive, tabs are blue. By changing from one tab to another, the secondary navigation panel becomes active. This secondary navigation tab allows to switch between the actual screens within a primary navigation bar.
- 2. **The Content Section**: This section will contain all information and configuration options. Most interaction will take place in this part.
- 3. **The Device State Summary**: On the left side the Station Description and Serial Number is displayed to identify the current instrument you are working on. On the right side the device state summary describes the overall status of the instrument. The states which are possible are listed in Table 4. By clicking on the overall state, information on the actual problems will be displayed. More detailed information on the error states are provided in the menu item "State of Health" as described in chapter 10.4.

Symbol	Meaning	Description
	No errors or warnings reported from the device.	As there seem to be no issues, no action is required.
A	A warning is reported from the device	There seems to be an issue in this module. Although it seems not to be critical, it is recommended to check why this warning is displayed and take actions to resolve it.
0	A warning is reported from the device	An error has occurred and it is required to check for the cause of the problem and resolve it, in order avoid limited functionality.







10.3. Device Configuration

The configuration screen of the Web Interface gives access to all configuration options, the configuration management of the Data Acquisition Software as well as the Network Configuration and the Web Interface itself.

To load the configuration can take several seconds. During this time at the right corner of the browser *Loading...* is displayed. Please be patient till the screen as shown in Figure 36 appears.





Home Configuration	State of Health	Data Explorer	Help	Logout	
armdas Configuration	Manage armdas Confi	gurations No	etwork Configuration	Web Interface Configuration	
Station Station Description					
Data Acquistion and Processing					
<u>Time Synchronisation</u> <u>Channel Settings</u> <u>Baseline Correction</u> <u>Signal Characteristics</u>					
Trigger and Alarm Event Based Trigger Scheduled Trigger					
Data Storage, Transfer and Communication					
File Storage and Policies File Transfer Settings Streaming Settings Device Detection MiniSEED Settings					
Advanced Watchdog Settings Sensor Test					
Device Information State Of Health Debugging Logfile					
	Reload Configurati	ion from Device	Save Configuration to [Device	()
Device Type:CR-6plusStation Description:GeoSIG StSerial Number:123456	ation			Device State Summary	

Figure 36. Configuration main menu

10.3.1. armdas Configuration

The *armdas Configuration* sub menu provides access to the current armdas configuration options. armdas is the data acquisition program running on the instrument. As depicted in Figure 37, the content of this tab is divided into three sections:

- 1. **The Configuration Menu**: The Configuration Menu is the additional navigation menu through the currently active configuration in this particular screen. By switching between the listed items in this menu, the Configuration Value Panel can be changed.
- 2. **The Configuration Value Panel**: This is main part of the armdas configuration screen. Within this part of the screen all the values of the configuration of the selected Configuration Menu Item can be adjusted. Most options will provide a help button in the form of white question mark on blue ground on the right part of this section. By clicking on it information over the option will be displayed. Please note that the only way to restore the original values of the fields after making changes to them is by using the "*Reload Configuration from Device*" Button in the Action Panel.
- 3. The Action Panel: This Panel is providing the option to either reload the current configuration from the device (to discard changes or load changes done by another user) or to save the edited configuration to the device. By saving the changes to the device, the data acquisition software armdas will be restarted to load the new configuration. This will interrupt the current recording for about 20 seconds. During this time, triggers will not be executed as well. Please note, that if the device is configured to use a DHCP server, the address might change during the saving of the configuration which will make the Web Interface inaccessible under the old address.

Home	Configuration	State of Health	Data Explorer	Help	Logout				GeoS	G
armdas C	onfiguration	Manage armdas Con	figurations	Network Configurat	ion VVeb	Interface Cor	nfigura	ation		
Station		Channel Mana	ger							
Station D	escription	Sensor Cha	annel Manage	,						
Data Acq	uistion and	Add New S	Sensor Channel	1						1
Processi	ng			Hardware Channel	Sampling Rate	LSB Factor	Unit	Edit Entry	Remove Entry	
	chronisation	☐ LCC04		EXT-SER-S02-C01		1	cm/s2	Edit	Remove	
Channel 8 Baseline (Correction	□ LCC05		EXT-SER-S02-C02	500	1	cm/s2	Edit	Remove	
Signal Ci	haracteristics	□ LCC06		EXT-SER-S02-C03	500	1	cm/s2	Edit	Remove	
Trigger a	nd Alarm	⊟ LCC07		EXT-SER-S03-C01	200	1	cm/s2	Edit	Remove	
Event Bas	sed Trigger	LCC08		EXT-SER-S03-C02	200	1	cm/s2	Edit	Remove	
Schedule	d Trigger	LCC09		EXT-SER-S03-C03	200	1	cm/s2	Edit	Remove	
	rage, Transfer	E LCC1		EXT-SER-S01-C01		1	cm/s2	Edit	Remove	
	munication	LCC10		EXT-SER-S04-C01	100	1	cm/s2	Edit	Remove	
-	age and Policies sfer Settings	□ LCC11		EXT-SER-S04-C02		1	cm/s2	Edit	Remove	
Streaming	q Settings	LCC12		EXT-SER-S04-C03		1	cm/s2	Edit	Remove	
Device D MiniSEE	etection D Settings	LCC13		EXT-SER-S05-C01		1	cm/s2	Edit	Remove	
		□ LCC14		EXT-SER-S05-C02		1	cm/s2	Edit	Remove	
Advanced		□ LCC15		EXT-SER-S05-C03		1	cm/s2	Edit	Remove	
Sensor T	<u>ą Settings</u> est	LCC16		EXT-SER-S06-C01		1	cm/s2	Edit	Remove	
	formation	□ LCC17		EXT-SER-S06-C02		1	cm/s2	Edit	Remove	
State Of H		☐ LCC18		EXT-SER-S06-C03		1	cm/s2	Edit	Remove	
Debuggir		□ LCC19		EXT-SER-S07-C01		1	cm/s2	Edit	Remove	
Logfile		□ LCC2		EXT-SER-S01-C02			cm/s2	Edit	Remove	
		⊟ LCC20		EXT-SER-S07-C02		1	cm/s2	Edit	Remove	
		□ LCC21		EXT-SER-S07-C03			cm/s2	Edit	Remove	
		□ LCC22		EXT-SER-S08-C01		1	cm/s2	Edit	Remove	
		ELCC23		EXT-SER-S08-C02			cm/s2	Edit	Remove	
		CC24		EXT-SER-S08-C03		1	cm/s2	Edit	Remove	
		CC25		EXT-SER-S09-C01		1	cm/s2	Edit	Remove	
		□ LCC26		EXT-SER-S09-C02		1	cm/s2	Edit	Remove	
		ELCC27		EXT-SER-S09-C03		1	cm/s2	Edit	Remove	
		ELCC28		EXT-SER-S10-C01		1	cm/s2	Edit	Remove	
		□ LCC29		EXT-SER-S10-C02		1	cm/s2	Edit	Remove	
		□ LCC3		EXT-SER-S01-C03		1	cm/s2	Edit	Remove	
		□ LCC30		EXT-SER-S10-C03		1	cm/s2	Edit	Remove	
		□ LCC31		EXT-SER-S11-C01			cm/s2	Edit	Remove	
		CC32		EXT-SER-S11-C02			cm/s2	Edit	Remove	
		LCC33		EXT-SER-S11-C03 EXT-SER-S12-C01		1	cm/s2	Edit	Remove	
				EXT-SER-S12-C01 EXT-SER-S12-C02			cm/s2	- Conc	Remove	
		LCC35		EXT-SER-S12-C02 EXT-SER-S12-C03				Edit	Remove	
		0.000		CA1-3014-512-005			UNIF82	Edit	Remove	
		Configure	Selected Sense	or Channel Re	move Selecte	d Sensor Cl	nanne	l		
		Data Chan	nel Manager							
			Data Channel						•	
				Channel Rem	ove Selected [Data Chann	el		2	
3		Reload Configuration	on from Device	Save Configura	ation to Device	•			1	
						_				_
evice Type:	CR-6plus ription: GeoSIG St	tion				Davidas	state	Rumman		
THE PARTY IN THE PARTY INTERPARTY	nption: Geo sig su er: 123456	new III				Device	atate	Summary		

Figure 37. The armdas Configuration screen

10.3.2. Manage armdas Configurations

As described in the previous chapter, the *armdas Configuration* screen only allows configuring the currently used configuration. The *Manage armdas Configurations* screen described in this chapter allows managing several configurations, changing the current configuration upload a new configuration and so on. As depicted in Figure 38, the screen is divided into three sections:

- The Configuration List: This list contains all configurations currently available on the microSD card. The Current Configuration should always be listed in this list. This configuration can be copied and downloaded, but not renamed removed or made the current configuration (as it already the current). As depicted in Figure 39, these options become available to other configurations stored on the microSD card (in this example after uploading a file to the device). When pressing Use as Current Configuration it will store this configuration as the Current Configuration. The existing configuration will be overwritten and the instrument restarted. Note that only the Current Configuration can be edited in the armdas Configuration screen. The other configuration files will remain untouched. The Current Configuration can be saved in a file by pressing Copy.
- 2. The Upload Panel: While the Configuration List allows downloading configurations from the device by clicking on the name, this part of the screen provides the possibility to upload a configuration to the web interface, by selecting a configuration on the PC and using the Upload Button. As can be seen in Figure 39, after a successful upload a new file is shown in the Configuration List and the name of the newly available configuration is written on the top of the list (the name of new configuration will be created from a random string followed by "_config.xml"). The configuration can then be changed by clicking on Rename. Note that the upload panel might look differently, depending on the Browser in use.
- 3. User Default Panel: With the *Reset To Default Config*, the *Current Configuration* will be overwritten by the user default (see command SETDEFCFG in the chapter 11.10.1) and the instrument will be restarted. The *Current Configuration* can be saved as the user default by pressing the button *Make current Config the User Default Config*

armdas Configuration	Manage armdas Configurations	Network Configuration	Web Interface Configuration	
Manage armdas Conf	igurations			
File Name Current Configuration	File Size Time of Last Status Change 15.4 KiB Fri Sep 21 16:40:42 2012	Copy Rename Copy Not Allowed	Use as Current Configuration Not Allowed	Delete Not Allowe
Backup 12120113.xml	15.4 KiB Fri Sep 21 17:07:41 2012	Copy Rename	Use as Current Configuration	Delete
config 20120731.xml	15.4 KiB Fri Sep 21 17:07:57 2012	Copy Rename	Use as Current Configuration	Delete
	Browse_			
Upload				

Figure 38. The Manage armdas Configurations screen

File Name Current Configuration	File Size 21.4 KiB	Time of Last Status Change Fri Aug 24 08:39:13 2012	Сору	Rename Not Allowed	Use as Current Configuration Not Allowed	Delete Not Allower
Backup_20120113.xml	21.4 KiB	Fri Jan 13 16:19:58 2012	Сору	Rename	Use as Current Configuration	Delete
config_20120731.xml	22.3 KiB	Tue Jul 31 15:14:25 2012	Сору	Rename	Use as Current Configuration	Delete
wtz6wcK_config.xml	26.2 KiB	Fri Aug 24 09:39:16 2012	Corv	Rename	Jse as Current Configuration	Delete
	Brows	e				



10.3.3. Network Configuration

10.3.3.1. Wired Ethernet

The *Network Configuration* screen provides the possibility to change the network configuration of all network interfaces of the instrument. For standard instrument only one network interface is available, which is the Ethernet interface and which is present in all devices. This interface can be configured in the section of the screen shown in Figure 40. The top part of that framed, red section describes the current configuration of the interface. The part below allows changing this configuration. The name of this network interface is traditionally *eth0*.

Home	Configuration	State of Health	Data Explorer	Help	Lo	ogout	Swiss made to measure with			
armdas	Configuration	Manage armdas Conf	igurations	Network Config	uration	Web Interface Configuration				
Netwo	ork Interface Inf	ormation								
ei	thO									
	Current Config	uration (eth0)	_	_	_					
	Name Active Configuration									
	IPv4 Netmask			255.255	.255.0					
	IPv6 Address fe80::2fe:95fffe92:5280 IPv6 Netmask fff.fff.fff.fff.fff.fff.									
	Interface Type Broadcast									
	Interface is Active Loopback Interface			Yes						
	MAC Address				5:92:52:80					
	Change Saved	Configuration (eth))							
	Interface Type			Wired						
	Network Configur	ation		DHCP						
		Reload Network	Configuration from	m Device Sav	e Network (Configuration to Device				
Device Type Station Des	e: CR-6plus cription: GeoSIG Sta	ation				Device State Summary				
Serial Numb						Source state summary				

Figure 40. Network Configuration Screen

10.3.4. Web Interface Configuration

The *Web Interface Configuration* screen allows configuring all settings related to the Web Interface. At the moment, this solely consists of the possibility to change the password for the login. To change the password press **Change Password**. The current password has to be known.

The default login credentials are:

- Username: admin
- Password: 123456

If the admin password is forgotten, please delete the webuser.txt file on the microSD card and restart the instrument to restore the default password.

			Submitted and Interference	Help	Logout		
armdas Confi	guration	Manage armdas Co	onfigurations	Network Config	uration	Web Interface Configuration	
Web Inter	face Configu	ration					
Change admi	in password			Change Passv	vord		

Figure 41. Web Interface Configuration Screen

GeoSIG 50 / 112

10.4. State of Health

The State of Health (SOH) menu item provides all information related to the error status of the device as well on the status of the available hardware and software versions.

10.4.1. Error Status

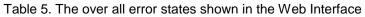
As depicted Figure 42, this screen provides basic information on the device at hand (area no 2) as well as the error status for each module (area no 3). The summery of this SOH information are visible on each page on the bottom as the Device State Summary, described in chapter 10.2. Additionally it is possible to Download the State of Health Information as a File in XML format (this is possible in all sub-menu items of the State of Health menu) and clear the errors (area no 1).

	lome	Configura	ation	State of Health	Data Explor	er Help	Logout		GeoSIG
ł	Error Stat	tus R	lecording s	-	d- and Software		equests .		
L		<i>C</i>		C	lear Errors D	ownload SOH I	nformation as File		
		nformation neration Tim				Thu Nev 7 11:	05-56 2013		
I	Device Serial Nu		Informatio	n		123456			
I		Station Des				GeoSIG Statio			
I							n		
I		Station Code				GS			
l	Current I	Network Co	de:			GS			
ſ	Errors a	and Warni	ngs		_				_
1	Event St	torage:			\checkmark	Network:	:		
1	Event St	torage Quot	a:			General	State:		~
I	Paramet	ers:			$\overline{\checkmark}$	File Rea	ding:		~
I	System	Calls:				Configur	ation (Non-Critical):		~
I	File Oper	ning:				File Inde	ox:		~
I	File Dele	ting:				General	Status (Non-Critical):		
I	Filesyste	em Request	ts:			Time Sy	nchronisation (Non-Critic	al):	
I	Firmware	e Ressource	25:			Ringbuff	fer Operations (Non-Critic	cal):	
I	Memory	Allocation:				Network	(Non-Critical):		
I	Flash Ac						sfer (Non-Critical):		
I	User Re					12C:			
1			-						
		Communicat					on-Critical):		
		e Ressource	es:			Data Pro	-		
	DSP:				<u> </u>	Alarm Ha	andling:		_
	DSP Buf	ifer:			\checkmark	Wind Se	nsor:		\checkmark
	RTC:					NTP Syr	nchronsiation (Non-Critica	al):	~
	Ringbuff	er Operatio	ns:		\sim	NTP Syr	nchronsiation:		~
	File Writi	ing:							
L	/ice Type:		R-6plus						

Figure 42. Error Status Screen

The modules in the area 3 can have one of the states defined in Table 5 at all time.

Symbol	Meaning	Description
	No errors or warnings reported from the device.	As there seem to be no issues, no action is required.
<u> </u>	A warning is reported from the device	There seems to be an issue in this module. Although it seems not to be critical, it is recommended to check why this warning is displayed and take actions to resolve it.
0	A warning is reported from the device	An error has occurred and it is required to check for the cause of the problem and resolve it, in order avoid limited functionality.



10.4.2. Recording Status

This screen provides all information on the recording and time synchronisation status of the device. As depicted in Figure 43, this contains besides information on the number of events also information on the timing and synchronisation status of the device. Also information about the GPS quality and the GPS position of the instrument can be found here

ome Co	onfiguration State of	Health Data Explorer	Help	Logout	swiss made to measure
Error Status	Recording Status	Hard- and Software Status	Requests		
		Download S	OH Information as F	ile	
Recording S	Status				
Total number	of stored event files:	0			
Queued Even	ts:	0			
Time of Last [Detected Event:	Th	u Nov 15 13:12:41 20	12	
Timestamp o	f the oldest Data:	Fri	Dec 7 08:24:13 2012		
Synchronis	ation Status				
Device Synch	ronises to:	GF	PS		
Synchronisati	ion Status:	Lo	cked		
Max. Synchror	nisation Inverval	0			
NTP Synchror	nisation Failures:	0			
Pulse Detecte	ed:	Tr	ue		
Source Valid:		Τα	ue		
Autolock Enal	bled:	Tr	ue		
Last Lock Tim	ne:	Fri	Dec 7 08:37:34 2012		
Time Elapsed	d since last lock:	No	w		
Drift Rate of th	ne Clock, PPS:	0.3	3		
GPS Status:		Va	lid		
GPS Time:		Fri	Dec 7 08:11:11 2012		
GPS Quality:		GF	PS fix		
GPS Position	5	La	titude: 47 24.3297' N,	Longitude: 008 13.0386' E	
GPS Altitude		45	6.0		
GPS Number	of Satellites	5			

Figure 43. Recording Status Screen

10.4.3. Hard- and Software Status

In the Hard- and Software Status contains information on the **Software Versions**. The **Hardware Status** provides information as uptime, available disk space and the device temperature and so on. Information about the available hardware options in the instrument can be found in the section **Hardware Configuration Status**.

Beach glass Hard- and Software Status Requests Journated SOFt Information as File Software Version: 1.6-b2 Primare Version: 2.0.6 00-010 Bootoader Version: 2.0.6 00-010 Detersing System Version: 0.0.6.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0	Home C	Configuration	State of H	Health	Data Explorer	Help		Logout				
Software Version: 1.8-82 Webinterface Version: 28.06.00-810 Bootcader Version: 28.06.00-810 Doterating System Version: 28.06.00-810 Operating System Version: 28.06.00-810 Bootcader Version: 28.06.00-810 Detecting System Version: 28.06.00-810 Hardware Status 28.02.02-81 Hardware Status 0 years. 0 months. 0 days. 5 hours. 17 minutes. 58 seconds Last Reboot Time: Ved Nov 6 18.38.32.2013 The Flasson for the last Shutdown: RTC logged: User Request Time of the last Shutdown: Wed Nov 6 13.35.12.2013 Environment Temperature: 28.23°C Available Diak Space: 7.15 G/B Free Diak Space: 4.45 G/B AC power input: ON Current Voltage (V): 13.80 Backup Bartery Voltage (V): 3.06 Hardware Configuration Status The Nov 5 14.28.31.2013 Last Incoming File from Barver; RTC_122462_0131104_103914.hex Last Incoming File from Server; Carent Number of Channels: 38 Alarm Board	Error Status	Recordi	ng Status	Hard	- and Software Sta	tus I	Requests					
Webinerface Version:1.8-82Firmuare Version:20.80.9-10Bottoader Version:20.80.9-10Operating System Version:GeoSIGI/ARM rootfs-vmxd1-3 Linux vmxd1 3.8.13-tr14-t1Real Time Clock Version:80.02.02-a1 Larchware Status ULast Reboor Time:0 years, 0 months, 0 days, 5 hours, 17 minutes, 58 secondsLast Reboor Time:Version:Real Time of the last Shutdown:RTC logged: User RequestTime of the last Shutdown:RTC logged: User RequestTime of the last Shutdown:82.20'OAvailable Disk Space:7.15 GBFree Disk Space:4.45 GBAC power input:0NCurrent Voltage (V):13.80Voltage (V):13.80Voltage (V):3.05Environment Ferepreture:3.05Act Innoming File from Server:RTC_122488_20131104_103814.hexLast Incoming File from Server:CurrentConfiguration Time:CurrentConfiguration Time:38Aam Beard enabled:CurrentNumber of Channels:38Aam Beard enabled:YESConfiguration Type:0.0.0.19075Recovery Server:0.0.0.0.19075Recovery Server:20.0.0.19075Recovery Server:20.0.0.19075Recovery Server:20.0.0.19075Recovery Server:20.0.0.19075Recovery Server:20.0.0.19075Recovery Server:20.0.0.19075Recovery Server:20.0.0.19075Recovery Server:20.0.0.19075 <td></td> <th></th> <th></th> <td></td> <td>Download SC</td> <td>OH Inform</td> <td>ation as Fi</td> <td>ile</td> <td></td>					Download SC	OH Inform	ation as Fi	ile				
Firmware Version:28.08.00-a10Bootoader Version:GeoSIGIARM rootfs-vmxd1-3 Linux vmd1 3.8.13-rt14-r1Real Time Clock Version:Booto 202-a1Hardware Status0.02.02-a1Linux Uptime at Site Generation:0 years. 0 months. 0 days. 5 hours. 17 minutes. 58 secondsLast Reboot Time:Wed Nov 8 13.8.32.2013The Reason for the last Shutdown:RTC logged: User RequestTime of the last shutdown:Wed Nov 6 13.8.12.2013Environment Temperature:28.23°CAvailable Disk Space:7.15 GBFree Disk Space:7.15 GBFree Disk Space:1.8.80Current Voltage (V):13.80Voltage Linits (V):Switch-off: 10.80 Switch-on: 12.50Minimum Messured Voltage (V):3.05Last Inooming File from Server:RTC_123469_20131104_103814 hexLast Configuration Time:98Source of Configuration:YEBConfiguration:YEBConfiguration:98Alam Beard enabled:YEBConfiguration:98Alam Beard enabled:YEBConfiguration Time:38Alam Beard enabled:YEBConfiguration:90.0.0.19675Recovery Server:0.0.0.0.19675Recovery Server:201511-106												
Bootbasier Version: 28.05.00-a10 Operating System Version: GeoSIGIARM rootfa-vmxd1-3 Linux vmd1 3.8.13-rt14-r1 Real Time Clock Version: 80.02.02-a1 Hardware Status: 0 years, 0 montha, 0 days, 5 hours, 17 minutes, 58 seconds Last Reboot Time: Wed Nov 0 13.38.32.2013 The Reason for the last Shutdoom: RTC logged: User Request Time of the last Shutdoom: Wed Nov 0 13.35.12.2013 Environment Temperature: 28.23°C Available Disk Space: 7.16 G/B Free Disk Space: 7.16 G/B Free Disk Space: 7.16 G/B Current Voltage (V): 13.80 Voltage Limits (V): Switch-off: 10.80 Switch-on: 12.50 Minimum Measured Voltage (V): 3.05 East Incoming File from Server: RTC_122460_20131104_103814.hex Last Configuration Time: Tue Nov 5 14.28.31.2013 Source of Configuration: Current Number of Channelis: 38 Alam Board enabled: YES Configuration Time: 36 Alam Board enabled: YES Configuration Envers: 0.0.0.0.18675	Webinterfac	ce Version:			1.	8-a2						
Operating System Version: GeedBIG(ARM rootfs-vmd513 Linux vmd513.8.13-t14-t1 Real Time Clock Version: 80.02.02-a1 Hardware Status 0 years, 0 months, 0 days, 5 hours, 17 minutes, 58 seconds Last Reboot Time: Wed Nov 0 13.39.32.2013 The Reason for the last Shutdown: RTC logged: User Request Time of the last Shutdown: Wed Nov 0 13.35.12.2013 Environment Temperature: 28.23°C Available Disk Space: 7.16 GIB Free Disk Space: 7.16 GIB Act power input: ON Current Voltage (V): 13.80 Voltage Linits (V): Switch-for: 10.80 Switch-for: 12.50 Minimum Measured Voltage (V): 3.05 Hardware Configuration Status Tue Nov 5 14.28.31 2013 Last Configuration Time: Tue Nov 5 14.28.31 2013 Source of Configuration: CR-Replus Version 20.05.0-10 Configuration Time: 36 Source of Configuration: YES Configuration Type: Ourent Number of Channels: 36 Alarm Board enabled: YES Configuration Date: 24	Firmware Ve	ersion:			26	.05.00-a10						
Real Time Clock Version: 80.02.02-a1 Hardware Status O years. 0 months. 0 days. 5 hours. 17 minutes. 58 seconds Last Reboot Time: Wed Nov 6 13.39.32 2013 The Reason for the last Shutdown: RTC logged: User Request Time of the last shutdown: Wed Nov 6 13.39.32 2013 Environment Temperature: 28.23°C Available Disk Space: 7.16 GlB Free Disk Space: 7.16 GlB Acc power input: ON Current Voltage (V): 13.80 Using Linits (V): Switch-off: 10.80 Switch-on: 12.50 Minimum Measured Voltage (V): 3.06 Backup Battery Voltage (V): 3.08 East Incoming File from Server: RTC_123468_20131104_103914 hex Last Configuration Time: Tue Nov 5 14/28.31 2013 Source of Configuration: CR-8plus Version 28.05.00-010 Configuration Time: 39 Alarm Board enabled: YES Configuration Eaver: 24 Mam Board enabled: YES Configuration Date: 20 20.30.19075	Bootloader \	Version:			28	.05.00-a10						
Hardware Status 0 years, 0 months, 0 days, 5 hours, 17 minutes, 58 seconds Last Reboot Time: Wed Nov 6 13:35:32 2013 The Reason for the last Shuddown: RTC logged: User Request Time of the last shuddown: Wed Nov 6 13:35:12 2013 Environment Temperature: 28 23°C Available Disk Space: 7.15 GIB Free Disk Space: 4.45 GIB AC power input: ON Current Voltage (V): 13.60 Voltage Limits (V): Switch-off: 10.80 Switch-on: 12.50 Minimum Measured Voltage (V): 3.05 Hardware Configuration Status East Incoming File from Server: Last Incoming File from Server: Current Source of Configuration: CR-4plus Version 26.05.00-a10 Configured Recovery Server: 0.0.0.0.19875 Recovery Server Contast Interval: 24 Main Battery Installation Date: 2013-11-08	Operating S	system Version:			Ge	eoSIG/ARM	l rootfs-vm	x51-3 Linux	vmx51 3.8.13-rt14-r1			
Hardware Status Linux Uptime at Site Generation: 0 years, 0 months, 0 days, 5 hours, 17 minutes, 58 seconds Last Reboot Time: Wed Nov 6 13:39:32 2013 The Reason for the last Shutdown: RTC logged: User Request Time of the last shutdown: Wed Nov 6 13:39:12 2013 Environment Temperature: 28 23°C Available Disk Space: 7.15 G/B Free Disk Space: 4.45 G/B AC power input: ON Current Voltage (V): 13.60 Voltage Limits (V): Switch-off: 10.60 Switch-on: 12.50 Minimum Measured Voltage (V): 3.05 Backup Battery Voltage (V): 3.05 Hardware Configuration Status Tue Nov 5 14:28:31 2013 Source of Configuration: CR-dplus Version 28.05:00-a10 Configuration Time: 38 Source of Configuration: YES Configured Recovery Server: 0.0.0.0:19075 Recovery Server Contast Interval: 24 Main Battery Installation Date: 2013:11-00	Real Time C	Clock Version:			80	.02.02-a1						
Last Reboot Time:Wed Nov 6 13:39:32 2013The Reason for the last Shutdown:RTC logged: User RequestTime of the last shutdown:Wed Nov 6 13:35:12 2013Environment Temperature:28:23°CAvailable Disk Space:7.15 GIBFree Disk Space:4.45 GIBAC power input:ONCurrent Voltage (V):13:60Votage Limits (V):Switch-off: 10:80 Switch-on: 12:50Minimum Messured Voltage (V):13:58Backup Battery Voltage (V):3:05Hardware Configuration StatusLast Configuration Time:Tue Nov 5 14:28:31 2013Source of Configuration:C Rr-dplus Version 28:05:00-a10Configuration Time:38Alarm Board enabled:YESConfigured Recovery Server:0.0.0.19875Recovery Server Contact Interval:24Main Battery Installation Date:2013-11-08	Hardware	Status										
The Reason for the last Shutdown:RTC logged: User RequestTime of the last shutdown:Wed Nov 6 13:35:12 2013Environment Temperature:28.23°CAvailable Disk Space:7.15 G/BFree Disk Space:4.45 G/BAC power input:ONCurrent Voltage (V):13.80Voltage Limits (V):Switch-off: 10.80 Switch-on: 12.50Minimum Measured Voltage (V):13.58Backup Battery Voltage (V):3.05Hardware Configuration StatusLast Incoming File from Server:RTC_123466_20131104_103914.hexLast Configuration:CR-4plus Version 26.05.00-a10Configuration Type:OurentNumber of Channels:38Alam Board enabled:YESConfigured Recovery Server:0.0.0.19675Recovery Server Contact Interval:24Main Battery Instalation Date:2013-11-08	Linux Uptim	ne at Site Genera	ation:		0 :	years, 0 m	onths, 0 day	ys, 5 hours,	, 17 minutes, 58 seconds			
Time of the last shutdown:Wed Nov 8 13:8:12 2013Environment Temperature:28 23°CAvailable Disk Space:7.15 G/BFree Disk Space:4.45 G/BAC power input:ONCurrent Voltage (V):13.80Voltage Limits (V):Switch-off: 10.80 Switch-on: 12.60Minimum Measured Voltage (V):3.05Backup Battery Voltage (V):3.05Hardware Configuration StatusLast Configuration Time:Tue Nov 8 14:28:31 2013Source of Configuration:CR-8plus Version 26.05.00-a10Configuration Type:CurrentNumber of Channels:38Alarm Board enabled:YESConfiguration Interval:24Main Battery Installation Date:2013-11-08	Last Reboo	t Time:			W	ed Nov 6 1	3:39:32 201	13				
Environment Temperature:28.23°CAvailable Disk Space:7.15 GIBFree Disk Space:4.45 GIBAC power input:ONCurrent Voltage (V):13.60Votage Limits (V):Switch-off: 10.80 Switch-on: 12.50Minimum Measured Voltage (V):13.58Backup Battery Voltage (V):3.05Hardware Configuration StatusLast Incoming File from Server:RTC_123456_20131104_103914.hexLast Configuration Time:Tue Nov 5 14:28:31 2013Source of Configuration:CR-8plus Version 28.05.00-a10Configuration Type:CurrentNumber of Channels:38Alarm Board enabled:YESConfigured Recovery Server:0.0.0.19075Recovery Server Contact Interval:24Main Board enabled:213-11-08	The Reason	n for the last Shu	utdown:		R	FC logged:	User Reque	est				
Available Disk Space:7.15 GIBFree Disk Space:4.45 GIBAC power input:ONCurrent Voltage (V):13.60Voltage Limits (V):Switch-or: 12.60Minimum Measured Voltage (V):13.58Backup Battery Voltage (V):3.05Hardware Configuration StatusLast Incoming File from Server:RTC_123458_20131104_103914.hexLast Onfiguration Time:Tue Nov 5 14:28:31 2013Source of Configuration:CurrentNumber of Channels:38Alarm Board enabled:YESConfigured Recovery Server:0.0.0.019875Recovery Server Contat Interval:24Main Battery Installation Date:2013-11-08	Time of the	last shutdown:			W	ed Nov 6 1	3:35:12 201	13				
Free Disk Space:4.45 GiBAC power input:ONCurrent Voltage (V):13.60Voltage Limits (V):Switch-off: 10.60 Switch-on: 12.50Minimum Measured Voltage (V):13.58Backup Battery Voltage (V):3.05Hardware Configuration StatusLast Incoming File from Server:RTC_123468_20131104_103914.hexLast Configuration Time:Tue Nov 5 14:28:31 2013Source of Configuration:CR-8plus Version 28.05:00-a10Configuration Type:CurrentNumber of Channels:38Alarm Board enabled:YESConfigured Recovery Server:0.0.0.19875Recovery Server Contaot Interval:24Main Battery Installation Date:2013-11-08	Environmen	Environment Temperature:					28.23°C					
AC power input:ONCurrent Voltage (V):13.60Voltage Limits (V):Switch-off: 10.60 Switch-on: 12.50Minimum Measured Voltage (V):13.58Backup Battery Voltage (V):3.05Hardware Configuration StatusLast Incoming File from Server:RTC_123456_20131104_103914.hexLast Configuration Time:Tue Nov 5 14:28:31 2013Source of Configuration:CR-8plus Version 28.05.00-a10Configuration Type:CurrentNumber of Channels:38Alarm Board enabled:YESConfigured Recovery Server:0.0.0.019075Recovery Server Contact Interval:24Main Battery Installation Date:2013-11-06	Available Disk Space:					7.15 GIB						
Current Voltage (V):13.60Voltage Limits (V):Switch-off: 10.60 Switch-on: 12.50Minimum Measured Voltage (V):13.58Backup Battery Voltage (V):3.05Hardware Configuration StatusLast Incoming File from Server:RTC_123458_20131104_103914.hexLast Configuration Time:Tue Nov 5 14.28:31 2013Source of Configuration:CR-8plus Version 28.05.00-a10Configuration Type:CurrentNumber of Channels:38Alarm Board enabled:YESConfigured Recovery Server:0.0.0.19675Recovery Server Contato Interval:24Main Battery Installation Date:2013-11-06	Free Disk S	Free Disk Space:										
Voltage Limits (V): Switch-off: 10.60 Switch-on: 12.50 Minimum Measured Voltage (V): 13.58 Backup Battery Voltage (V): 3.05 Hardware Configuration Status RTC_123458_20131104_103914.hex Last Incoming File from Server: RTC_123458_20131104_103914.hex Last Configuration Time: Tue Nov 5 14:28:31 2013 Source of Configuration: CR-8plus Version 28.05.00-a10 Configuration Type: Current Number of Channels: 38 Alarm Board enabled: YES Configured Recovery Server: 0.0.0.0:19075 Recovery Server Contact Interval: 24 Main Battery Installation Date: 2013-11-08	AC power in	iput:			01	N						
Minimum Measured Voltage (V): 13.58 Backup Battery Voltage (V): 3.05 Hardware Configuration Status RTC_123458_20131104_103914.hex Last Incoming File from Server: RTC_123458_20131104_103914.hex Last Configuration Time: Tue Nov 5 14:28:31 2013 Source of Configuration: CR-0plus Version 28.05.00-a10 Configuration Type: Current Number of Channels: 36 Alarm Board enabled: YES Configured Recovery Server: 0.0.0.019675 Recovery Server Contact Interval: 24 Main Battery Installation Date: 2013-11-06	Current Volt	tage (V):			13	.60						
Backup Battery Voltage (V): 3.05 Hardware Configuration Status RTC_123458_20131104_103914.hex Last Incoming File from Server: RTC_123458_20131104_103914.hex Last Configuration Time: Tue Nov 5 14:28:31 2013 Source of Configuration: CR-8plus Version 28.05.00-a10 Configuration Type: Current Number of Channels: 38 Alarm Board enabled: YES Configured Recovery Server: 0.0.0.0:19075 Recovery Server Contact Interval: 24 Main Battery Installation Date: 2013-11-06	Voltage Lim	iits (V):			Sv	vitch-off: 1	0.60 Switch	-on: 12.50				
Hardware Configuration Status Last Incoming File from Server: RTC_123458_20131104_103914.hex Last Configuration Time: Tue Nov 5 14:28:31 2013 Source of Configuration: CR-8plus Version 28:05:00-a10 Configuration Type: Current Number of Channels: 38 Alarm Board enabled: YES Configured Recovery Server: 0.0.0.0:19675 Recovery Server Contact Interval: 24 Main Battery Installation Date: 2013-11-06	Minimum Me	easured Voltage	(V):		13	.58						
Last Incoming File from Server: RTC_123456_20131104_103914.hex Last Configuration Time: Tue Nov 5 14:28:31 2013 Source of Configuration: CR-8plus Version 28.05.00-a10 Configuration Type: Current Number of Channels: 38 Alarm Board enabled: YES Configured Recovery Server: 0.0.0.0:19875 Recovery Server Contact Interval: 24 Main Battery Installation Date: 2013-11-08	Backup Bat	tery Voltage (V)	:		3.	05						
Last Configuration Time: Tue Nov 5 14:28:31 2013 Source of Configuration: CR-8plus Version 28.05.00-a10 Configuration Type: Current Number of Channels: 38 Alarm Board enabled: YES Configured Recovery Server: 0.0.0.0:19875 Recovery Server Contact Interval: 24 Main Battery Installation Date: 2013-11-08	Hardware	Configuration	n Status									
Source of Configuration: CR-8plus Version 28.05.00-a10 Configuration Type: Current Number of Channels: 38 Alarm Board enabled: YES Configured Recovery Server: 0.0.0.0:19675 Recovery Server Contact Interval: 24 Main Battery Installation Date: 2013-11-06	Last Incomi	ing File from Se	rver:		R	FC_123456	_20131104_	103914.hex	c .			
Configuration Type: Current Number of Channels: 38 Alarm Board enabled: YES Configured Recovery Server: 0.0.0.0:19875 Recovery Server Contact Interval: 24 Main Battery Installation Date: 2013-11-08	Last Config	uration Time:			Tu	e Nov 5 14	4:28:31 2013	3				
Number of Channels: 38 Alarm Board enabled: YES Configured Recovery Server: 0.0.0.0:19675 Recovery Server Contact Interval: 24 Main Battery Installation Date: 2013-11-06	Source of C	Configuration:			CI	R-8plus Ve	rsion 28.05.0	00-a10				
Alarm Board enabled: YES Configured Recovery Server: 0.0.0.0:19875 Recovery Server Contact Interval: 24 Main Battery Installation Date: 2013-11-08	Configuratio	on Type:			Ci	urrent						
Configured Recovery Server: 0.0.0.0:19675 Recovery Server Contact Interval: 24 Main Battery Installation Date: 2013-11-06	Number of	Channels:			36							
Recovery Server Contact Interval: 24 Main Battery Installation Date: 2013-11-06	Alarm Board	d enabled:			Y	ES						
Main Battery Installation Date: 2013-11-08	Configured	Recovery Serve	er:		0.0	0.0.0:19678	5					
	Recovery S	Server Contact I	nterval:		24							
Clock Battery Installation Date: 2013-11-08	Main Batter	y Installation Da	ite:		20	13-11-06						
	Clock Batte	ery Installation D	ate:		20	13-11-06						

Figure 44. Recording Status Screen

10.4.4. Requests

As shown in Figure 45, the Requests screen allows sending signal-related requests to the data acquisition software. Currently two such signal requests are supported:

• **Send a Test Pulse:** By sending this request, a test pulse will be executed. The sensor should then respond accordingly and thus provide information about its status.

• **Remove DC from Signal:** By sending this request, a baseline correction will be applied to the signal and therefore remove the DC from the value, caused by e.g. a slight misalignment of the sensor.

Home C	onfiguration	State of Health	Data Explorer	Help	Logout	GeoSIG swiss made to measure
Error Status	Recording	g Status Hard-	and Software Status	Requests		
Signal Req	uests t Pulse from Se	ensor:	S	end Test Pulse		i
Request a Baseline Correction:			Remove DC from Signal			1

Figure 45. The Requests Screen

10.5. Data Explorer

The *Data Explorer* provides the possibility to gather information on the files stored on the microSD card. The file types are separated into three different file types:

- Event- and Calibration files
- Log- and SOH-files
- Ringbuffer files

With the menu on the top of the Data Explorer it is possible it is possible to switch between the file types listed above. For each listed file, the information on its file size and the last modification time are displayed. The files can be sorted according to the file name, size or modification date. By clicking on the file name, the file can be downloaded.

ownload			
Data Explorer	_		
Event- and Calibration files Log- and SOH-files Ringbuffer	les		
Files	🔨 Size	🔨 Modification Date	*
TRG 100582 20120806 151909.msd	56 KiB	Mon Aug 6 16:22:00 2012	
TRG 100582 20120806 152317.msd	79.5 KiB	Mon Aug 6 16:29:18 2012	
TRG 100582 20120806 152815.msd	101 KiB	Mon Aug 6 16:34:18 2012	
TRG 100582 20120806 153315.msd	207 KiB	Mon Aug 6 16:39:18 2012	
TRG 100582 20120806 153816.msd	115 KiB	Mon Aug 6 16:41:12 2012	
TRG 100582 20120806 154059.msd	89 KiB	Mon Aug 6 16:47:04 2012	
TRG 100582 20120806 154602.msd	150 KiB	Mon Aug 6 16:50:38 2012	
TRG 100582 20120806 155024.msd	60 KiB	Mon Aug 6 16:53:50 2012	
TRG 100582 20120806 155335.msd	78 KiB	Mon Aug 6 16:59:28 2012	
TRG 100582 20120806 155915.msd	75 KiB	Mon Aug 6 17:04:44 2012	
TRG 100582 20120806 160430.msd	79.5 KiB	Mon Aug 6 17:10:30 2012	
TRG 100582 20120806 160928.msd	109 KiB	Mon Aug 6 17:14:56 2012	
TRG 100582 20120806 161442.msd	61.5 KiB	Mon Aug 6 17:18:20 2012	
TRG 100582 20120806 161806.msd	59 KiB	Mon Aug 6 17:21:26 2012	
TRG 100582 20120806 162112.msd	67.5 KiB	Mon Aug 6 17:25:40 2012	
TRG 100582 20120807 071719.msd	152 KiB	Tue Aug 7 08:23:20 2012	
TRG 100582 20120807 072217.msd	108 KiB	Tue Aug 7 08:24:48 2012	

Figure 46. The Data Explorer Screen



10.6. Help

The Help Menu provides help, if there are any problems the device or the web interface.

10.6.1. Online Help

On this screen, the current version of the CR-6plus User Manual can be downloaded from the device. This manual contains additional information on the instrument, which is not provided in the interface itself.

H	lome	Configuration	State of Health	Data Explorer	Help	Logout		swiss made to measure which
	Online Help	Contact Ge	eoSIG Service					
			s device please down	load the manual:				
Sta	ice Type: tion Descript ial Number:	CR-6plus ion: GeoSIG Stat 123456	tion			Dev	ice State Summary	

Figure 47. Download the CR-6plus Manual

10.6.2. Contact GeoSIG Service

This screen provides information on how to contact GeoSIG service in the case of problems. The links provided on this screen, will only work if access to the internet is available.

Home	Configuration	State of Health	Data Explorer	Help	Logout	
Online He	p Contact G	eoSIG Service				
Contac	t Information					
8952 Sc Switzerla The Geo	trasse 39 hlieren					
Device Type: Station Desc Serial Numbe	CR-6plus ription: GeoSIG Sta r: 123456	tion			Devic	e State Summary 🛛 🔽

Figure 48. Contact information

11. Detailed Configuration of the Instrument

11.1. Switch ON and OFF the instrument

The main power switch operates as follow:

- Open the cover of the instrument by removing the four screws in the corners.
- Press the *POWER* button for 2 seconds to switch the instrument **ON**.
- To turn the instrument **OFF**, press the power button for a minimum of 2 seconds.

11.2. General Comments to the Configuration

All the configuration changes can be either done over the network by the Web Interface and GeoDAS or on the instrument itself using a RS-232 cable on the serial connector and a terminal program.

11.2.1. Change Configuration by the Web Interface

- Open an internet browser and enter the IP-Address of the device in the address bar of your browser
- Login with the username: admin and the password 123456

See chapter 9.4 for the full explanation of the Web Interface.

11.2.2. Change Configuration by GeoDAS

• In the window Stations: General Information make a right click on the station name

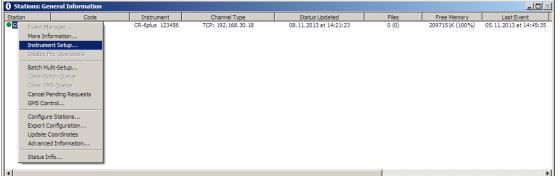


Figure 49. Instrument setup

• GeoDAS is opening the default internet browser and the Web Interface of the instrument will appear. See chapter 8.7 for the full explanation of the Web Interface.



11.2.3. Changing Configuration by the Console

- Connect the CR-6plus to a serial port of your computer and switch on the CR-6plus if not already done.
- In GeoDAS go to Tools → Terminal... and chose your COM Port. As Baud rate select 115200. Then Press Connect
- Press <*Enter*>, the following menu appears:

```
CR-6plus s/n 100582 version 26.05.00
Main menu:
C - Configuration
M - Messages ->
S - Shell command
L - List firmware images
X - Display errors (0) and warnings (0)
W - Clear errors and warnings
F - View/reset RTC trim values
T - File statistics
G - View RTC status
H - Set RTC time
U - User request
R - Restart
Q - Quit
```

- To configure armdas, from CR-6plus console, press 'C' and <*Enter>*, if you are asked, select *Edit current configuration*, by pressing 'C' again.
- Change the configuration as described in the following chapters
- Press <Esc> to leaf the configuration menu. If asked, select save as current configuration, by pressing 'C'

11.2.4. Explanation of the Structure in the Manual

As sometimes in the configuration the parameters depend on each other, not all parameters are shown all the time. The configuration is also sorted in several sub-menus. Therefore the explanation of the menu is explained as following:

Para	met	er in the menu	Possible selections or 'User selectable'	Explanation
Swite	ch-F	Parameter	Possible selections or 'User selectable'	Explanation: The following three lines depend on the selection and are only visible if not set to ' No '
vis	sible	Parameter is only e if Switch-Parameter een set to Yes	Possible selections or User selectable	Explanation
vis	sible	Parameter is only e if Switch-Parameter een set to Yes	Possible selections or User selectable	Explanation
ible if Switch-	has been set to Yes	Parameter in the Submenu	Possible selections or 'User selectable'	Explanation
Submenu. onlv visible if Switch-	Parameter has bee	Parameter in the Submenu	Possible selections or 'User selectable'	Explanation
	Pa	rameter in the Ibmenu	Possible selections or 'User selectable'	Explanation
		rameter in the Ibmenu	Possible selections or 'User selectable'	Explanation
		vitch-Parameter in the Ibmenu	Possible selections or 'User selectable'	Explanation
Submenu		This Parameter is only visible if Switch- Parameter has been set to Yes	Possible selections or 'User selectable'	Explanation

Table 6. Explanation table structure

11.3. Configuration of the Channels

11.3.1. In the Web Interface or by GeoDAS

• Go to Configuration → armdas Configuration → Channel Settings

Home Configuration	State of Health Data Explorer Help	Logout	GeoSIG
armdas Configuration	Manage armdas Configurations Network Config	guration VVeb interface Configura	ation
Station	Channel Manager		
Station Description			
Data Acquistion and	Sensor Channel Manager		
Processing	Add New Sensor Channel		
Time Synchronisation	Complete Channel Name Hardware Chan LCC04 EXT-SER-S02-		
Channel Settings	LCC05 EXT-SER-S02-		Edit Remove
Baseline Correction Signal Characteristics	LCC06 EXT-SER-S02-		Edit Remove
Trigger and Alarm	LCC07 EXT-SER-S03-		
Event Based Trigger	LCC08 EXT-SER-S03-		Edit Remove
Scheduled Trigger	LCC09 EXT-SER-S03-	C03 200 1 cm/s2	Edit Remove
Data Storage, Transfer	LCC1 EXT-SER-S01-		
and Communication	LCC10 EXT-SER-S04-	C01 100 1 cm/s2	Edit Remove
File Storage and Policies	LCC11 EXT-SER-S04-	C02 100 1 cm/s2	Edit Remove
File Transfer Settings Streaming Settings	LCC12 EXT-SER-S04-		Edit Remove
Device Detection	LCC13 EXT-SER-S05-		Edit Remove
MiniSEED Settings	LCC14 EXT-SER-S05-		
Advanced	LCC15 EXT-SER-S05-		Edit Remove
Watchdog Settings	LCC16 EXT-SER-S06-		Edit Remove
Sensor Test	LCC17 EXT-SER-S06-	C02 200 1 cm/s2	Edit Remove
Device Information	LCC18 EXT-SER-S06-	C03 200 1 cm/s2	Edit Remove
State Of Health	LCC19 EXT-SER-S07-	C01 200 1 cm/s2	Edit Remove
Debugging Logfile	LCC2 EXT-SER-S01-	C02 500 1 cm/s2	Edit Remove
Logine	LCC20 EXT-SER-S07-	C02 200 1 cm/s2	Edit Remove
	LCC21 EXT-SER-S07-	C03 200 1 cm/s2	
	LCC22 EXT-SER-S08-	C01 200 1 cm/s2	Edit Remove
	LCC23 EXT-SER-S08-	C02 200 1 cm/s2	Edit Remove
	LCC24 EXT-SER-S08-	C03 200 1 cm/s2	Edit Remove
	LCC25 EXT-SER-S09-	C01 200 1 cm/s2	Edit Remove
	LCC26 EXT-SER-S09-	C02 200 1 cm/s2	Edit Remove
	LCC27 EXT-SER-S09-	C03 200 1 cm/s2	Edit Remove
	LCC28 EXT-SER-S10-	C01 200 1 cm/s2	Edit Remove
	LCC29 EXT-SER-S10-	C02 200 1 cm/s2	Edit Remove
	LCC3 EXT-SER-S01-	C03 500 1 cm/s2	Edit Remove
	LCC30 EXT-SER-S10-	C03 200 1 cm/s2	Edit Remove
	LCC31 EXT-SER-S11-	C01 500 1 cm/s2	Edit Remove
	LCC32 EXT-SER-S11-	C02 500 1 cm/s2	Edit Remove
	LCC33 EXT-SER-S11-	C03 500 1 cm/s2	Edit Remove
	LCC34 EXT-SER-S12-	C01 500 1 cm/s2	Edit Remove
	LCC35 EXT-SER-S12-	C02 500 1 cm/s2	Edit Remove
	LCC36 EXT-SER-S12-	C03 500 1 cm/s2	Edit Remove
	Configure Selected Sensor Channel	Remove Selected Sensor Channel	
	Data Channel Manager		
	Add New Data Channel		
		Remove Selected Data Channel	
	Reload Configuration from Device Save Confi		
Davias Tupa: OD Asius			
Device Type: CR-6plus Station Description: Geo SIG S Serial Number: 123456	tion	Device State	Summary 🔽
Serial Number: 123456			

Figure 50. Channel Settings

- Add new sensor or virtual channels by the buttons Add New Sensor Channel or Add New Data Channel. Channels can be removed again by Remove.
- The edit a channel press the button *Edit* and adjust the parameters in the pop-up window. See Table 7 for additional information.
- After having selected several of the channels with the checkbox on the left side, the selected channels can be configured at the same time with **Configure Selected Sensor Channel...** or removed with **Remove Selected Sensor Channel...**

11.3.2. Via Local Serial Console

• Press '*E* to select the number of channels. By default three channels are configured as most sensors have three channels normally.

```
Main Menu
A) Station description ..... Demo CR-6plus
B) Station code .... DEMO
C) Location description ..... Switzerland
D) Seismic network code ..... CH
E) Number of Channels .... 3
F) Number of Output Streams .... 1
G) Number of Trigger Sets .... 1
H) Number of Preset Triggers .... 0
I) Channel Parameters .... ->
J) Stream Parameters .... ->
K) Trigger Parameters .... ->
M) File Storage and Policy .... ->
N) Communication Parameters .... ->
```

0) Miscellaneous Parameters ->

 Press 'I to get to the Channel Parameters menu to adjust the settings of the channels. The following menu appears

```
Main Menu | Channel 1 of 3
A) Data source ..... EXT-SER-S01-C01
E) Channel name ..... C01
F) Location code ..... CH
G) Data unit ..... g
H) LSB factor .... g
H) LSB factor .... 3.97364e-007
I) Sampling rate, sps .... 200 (0xC8)
K) Negative axis .... No
L) Offset compensation .... No
M) Fixed offset value .... 0
N) Maintain the ringbuffer .... Yes
R) Decimation and peaks .... None
```

• Each channel can be adjusted according to your wishes. To change the channels press '+' or '-'. The following parameters can be adjusted:

Data source	The source of the cha	nnel can be defined
	EXT-SER-Sxx-Cxx	See chapter 11.3.4
	DATACHAN	
	DATAVSUM	Virtual channels
	DATAVSU3	Vector sum of two channels
		Vector sum of three channels
Source channel	User selectable	The source of the virtual channel can be any other
name		channel
Second source channel	User selectable	In case of the vector sum a second or third source has to be selected
Third source channel	User selectable	
Channel name	User selectable	The channel name in the record is a combination of the location code and channel name
Location code	User selectable	
Data unit	User selectable	Data unit of the selected channel
LSB factor	User selectable	LSB factor, depending on the connected sensor. See chapter 11.3.3 for details and Table 8 for the specific values of the sensors.
Sampling rate	50, 100, 200, 500	Sampling rate of the selected channel
Negative axis	Yes	Inversion of the axis is enabled
	Νο	Inversion of the axis is disabled
Offset compensation	Yes	Compensation is enabled
	No	Compensation is disabled
		Detail behavior of the offset compensation can be configured as described in chapter 11.9
Maintain Ringbuffer	Yes	Permanent recording is enabled
Continuously Record Data	No	Permanent recording is disabled
Decimation and peaks		nated or just peaks can be stored
Online Decimation	Decimation Peak Values	Additional down sampling of the data
	Average Values	Peak values of the data within a certain interval Average values of the data within a certain interval
Decimation factor	User selectable	The signal will be decimated by the selected factor. E.g. if the sample rate is 50 and the decimation factor 10, then the output sample rate is 5 SPS. Be aware that no anti-aliasing filtering is done prior to decimation!
Interval of averaging, sec	User selectable	The Peak or Average values of the signal within the time defined in the <i>Interval of averaging</i> will be written into the
Output sampling interval	User selectable	ringbuffer with the specified <i>Output sampling interval</i> in [seconds]. Interval of averaging should be equal or higher than the Output sampling interval.

Table 7. Channel configuration menu structure

11.3.3. Calculation of the LSB factor

In the Web Interface, the conversion from LSB to Full Scale and backwards is done automatically. In case the instrument is configured over GeoDAS or the console, the LSB value must be entered.

11.3.3.1. Overview

The LSB's of all GeoSIG sensors can be found in the following table

Sensor type	Full Scale	Output Voltage Range	LSB
AC-xx	0.5 g	+/- 10 V	0.662'274e-7 g/count
	1 g	+/- 10 V	1.324'548e-7 g/count
	2 g	+/- 10 V	2.649'095e-7 g/count
	3 g	+/- 10 V	3.973'643e-7 g/count
	4 g	+/- 10 V	5.298'191e-7 g/count
VE-13	1 mm/s	+/- 10 V	1.324'548e-7 mm/s/count
VE-23	10 mm/s	+/- 10 V	1.324'548e-6 mm/s/count
	100 mm/s	+/- 10 V	1.324'548e-5 mm/s/count
VE-33	Sensitivity: 27.3 V/r	n/s (27.3 Vs/m)	4.851'822e-8 m/s/count
			4.851'822e-5 mm/s/count
VE-53	Sensitivity: 1000 V/	m/s (2x 500 V/m/s)	1.324'548e-9 m/s/count
			1.324'548e-6 mm/s/count
	Sensitivity: 200 V/m	n/s (2x 100 V/m/s)	6.622'738e-9 m/s/count
			6.622'738e-6 mm/s/count

Table 8. LSB of all GeoSIG sensors

If you have a different kind of sensor, the LSB can be calculated according to the following chapters

11.3.3.2. Calculate LSB from Sensors with given Full Scale

Output Voltage of the sensor must be +/- 10 V

$$\mathsf{LSB} = \frac{FullScale}{0.9 \cdot 2^{23}} = \frac{FullScale}{754'9747.2}$$

Example, 3 g sensor

$$LSB = \frac{3g}{0.9 \cdot 2^{23} counts} = \frac{3g}{754'9747.2 counts} = \frac{3.973643e - 7 \frac{g}{count}}{2}$$

11.3.3.3. Sensors with given Sensitivity

$$LSB = \frac{\frac{10V}{Sensitivity}}{0.9 \cdot 2^{23} counts} = \frac{1.324547e - 6\frac{V}{counts}}{Sensitivity}$$

$$\begin{array}{|c|c|c|c|c|c|c|}
\hline
\text{Example, 1000 V/m/s sensor} \\
LSB &= \frac{10V}{1000\frac{V}{m/s}} \\
\hline
\text{LSB} &= \frac{1.324547e - 6\frac{V}{counts}}{0.9 \cdot 2^{23}} = \frac{1.324547e - 6\frac{V}{counts}}{1000\frac{V}{m/s}} = \underbrace{1.324547e - 9\frac{m}{s}}_{count}
\end{array}$$

11.3.4. Channel Naming

The naming of the channels is organised as following. All cr6plus sensors start with **EXT-SER**.

EXT-SER-Sxx-Cxx



For example if there are two digitisers configured in the system, the following channels are available

EXT-SER-S01-C01	EXT-SER-S02-C01
EXT-SER-S01-C02	EXT-SER-S02-C02
EXT-SER-S01-C03	EXT-SER-S02-C03

11.4. Configuration of Data Streams

11.4.1. In the Web Interface or by GeoDAS

• Go to Configuration → armdas Configuration → Streaming Settings

Home Configuration	State of Health Data Explorer	Help Logout		
armdas Configuration	Manage armdas Configurations	Network Configuration	Web Interface Configuration	41
Station	Stream Manager			
<u>Station Description</u>	Stream Manager			
Data Acquistion and Processing	Add New Stream			
Time Synchronisation	Stream Name Stream 1	Edit Entry	Remove Entry	
<u>Channel Settings</u>	Stream 2	Edit	Remove	
Baseline Correction		Edit	Remove	
Trigger and Alarm Event Based Trigger				
<u>Scheduled Trigger</u>				
Data Storage, Transfer				
and Communication				
File Storage and Policies File Transfer Settings				
Streaming Settings				
Device Detection MiniSEED Settings				
Advanced				
Watchdog Settings				
Sensor Test				
Device Information				
<u>State Of Health</u> <u>Debugging</u>				
Logfile				
				0
	Reload Configuration from Device	Save Configuration to Devic	ce	U

Figure 51. Streaming Settings

- Add new data stream channels by the button Add New Stream. Streaming channels can be removed again by Remove.
- The edit a streaming channel press the button *Edit* and adjust the parameters in the pop-up window. See Table 9 for additional information.



11.4.2. Via Local Serial Console

• Press 'F to select the Number of Output Streams. One output stream can have several channels.

```
Main Menu
 A) Station description ..... Demo CR-6plus
 B) Station code ..... DEMO
 C) Location description ..... Switzerland
 D) Seismic network code ..... CH
 E) Number of Channels ..... 3
 F) Number of Output Streams .....
                                 1
 G) Number of Trigger Sets ..... 1
 H) Number of Preset Triggers ..... 0
 I) Channel Parameters ..... ->
 J) Stream Parameters ..... ->
 K) Trigger Parameters .....
                                 ->
 M) File Storage and Policy ..... ->
 N) Communication Parameters ..... ->
 0) Miscellaneous Parameters ..... ->
```

• Press '*J* to get to the *Stream Parameters* menu to adjust the settings of the output streams. The following menu appears

```
Main Menu | Stream
A) Stream name ..... Stream_1
B) Stream type .... GSBU
C) Port configuration .... ->
D) Channels in the stream .... 3
E) List of streamed channels ... ->
F) Data frames per packet .... 5 (0x05)
G) CRC32 protected packets .... No
H) Number of padding bytes .... 0 (0x00)
```

• Each output stream can be adjusted according to your wishes. To change the output stream press '+' or '-'. The following parameters can be adjusted:

Stream name	User selectable	Name of the output stream
Stream type	GSBU	Streaming possibly in GSBU format only
Channels in the stream	User selectable	Number of channels which should be streamed
List of streamed channels	User selectable	Depending on the number of channels for every channel a different source can be selected, '+' and '-' can be used to change the channel, the source can be selected by pressing ' A '
Data frames per packet	User selectable	Specifies the packet length of the streams, one data frame is equal to 200 ms. For example in case '5' is selected, then every second a packet with the last second of data will be sent
CRC32 protected packets	Yes or No	Whether data packets are sent CRC32 protected or 16-bit checksum protected
		See GSBU Protocol description for details.
Number of padding bytes	User selectable	The number of zero bytes added to the packet right after CRC32 or checksum

			700/0	
	C	ommunication Port	TCP/IP	Streaming over the network
			ttyUSB6	Do NOT use this port
			ttyUSB7	Do NOT use this port
5		Protocol	TCP (Server)	GeoDAS software or any other client supporting the selected protocol connects to the IP configured under 'IP Address' for data streaming
guratio		Network Port	User selectable	Server port listening for incoming connections
Port configuration		Baud Rate	1200 2400 4800 9600 19200 38400 57600 115200	Baud rate of the serial data stream. Make sure that the serial port of the computer is configured to the same baud rate

Table 9. Data streaming configuration menu structure

11.4.3. Set up of Data Streams

In this chapter there will be described how to set up an Instrument for data streaming.

11.4.3.1. In the Web Interface or by GeoDAS

- Connect to the Web Interface and go to Configuration → armdas Configuration → Streaming Settings
- Add a new stream by pressing *Add New Stream*, one output stream can have several channels.
- Click *Edit* to adjust the settings of the output streams.

11.4.3.2. Via Local Serial Console

- Connect to the Instrument and Press '*F* to select the *Number of Output Streams*. One output stream can have several channels.
- Press 'J to get to the Stream Parameters menu to adjust the settings of the output streams.

 Adjust the settings according to chapter 11.4. Carefully select the settings in the Port Configuration. In case you want to stream over Ethernet, choose TCP/IP and TCP (Server).

In case you want to stream over Ethemet, c		JE/IE		(Server)		
1ain Menu Stream Port	Hom	Configurat	on State of Health	Data Explorer Help	Logout	GeoSl
A) Communication port TCP/IP	am	adas Configuration	Manage armdas (Configurations Network	Configuration Web Inte	erface Configuration
C) Protocol TCP (Server	c) Stat	ion Stream Opti	Stream Mani	ager		
E) Network port 4001 (0xFA)	L)			Strea	m 1	
	• Tim • Co		Protocol	GSBU		0
	• <u>Ba</u>	Sa Data Fr	ames per Packet	5		0
	Trig	CRC32	Protection	E		0
	• <u>Se</u>	Padding	Bytest	0		0
	and Fil		annels to Stream 00HGE			
		- F	00HGE 00HGN 00HGZ			
	- De Mi	* E	01BGE 01BGN			
	Advi		01BG2			
	W/ Se	69	ta Interface Options	Netw	under .	
	• St		Network Options	INCO	IOIX	
	- De	ba	Network Protocol	TOP	^o (Server)	I 🕕
			Pot	4001		
	Device					
	Station Serial					
				Accept a	nd Close	

• Open *GeoDAS* and go to the menu *Settings* → *Channels of Digitizers…* The following window appears:

nnels of Digitizers	Configured Channels		
Name (three-letter code) TST Add/Modify Remove		Full Scale Unit HW Channel	DC Correction Fit
Type GeoSIG Packet Digitizer Sampling rate 200			
Local COM or USB port COM1: Baud rate 4800			
Remote host IP address and port TCP: 192. 168. 10.80: 4001			
Data packets arrive from a remote computer (virtual digitizer)			
This digitizer is supervised by a watchdog Setup.,			
Forward data to remote clients connecting at			
Listen for simple data requests at next three network ports	Use channel parameters pr	rovided by the digitizer	
Force data block protection to CRC32 Extra bytes	Enable virtual channels of i	integrated data. Channel name pref	ix:
Time source External SYNC Signal			
	Configuration target This	is Computer	OK Cance

Figure 52. Channels of Digitisers...

- Adjust the Name, chose any three-letter code for the data stream
- Select as Type the GeoSIG Packet Digitiser
- Press Add/Modify
- Make sure the selected Sample rate is the same as in the instrument
- Chose *Remote host IP address and port* (in case connected over Ethernet). The IP must be known from the instrument.
- Check the flag Use channel parameters provided by the digitizer
- Press OK
- After a restart of GeoDAS, the window Stations:Data Streams appears

Stations: Data Streams										_101>
Station and Stream	Format	Block Time	GPS status	Lost Data (%)	Trigger	DC Offset	Amplitude	Start Time	Files	5
E M Local Streams		17.10.22	1000000000000	1997.1	000			14 MERCENCE	12.000	
B B TOTOD	3 ch 24 bit 50 sps	17:10:22	Notodi	0	OFF	0.000254 g 0.00004 g 0.000	3.45E 005 g 4.09E 005 g 2.90E 005 g	Unknown	618	3.
	24 bit 50 sps	17:10:22	No Lock	0	OFF	0.00604g	4.89E-005 g	Invalid	618 206	1
	24 bit 50 sps	17:10:22	No Lock	0	OFF	0.000254 g	3.46E-005 g	Invalid	206	1
CHC03	24 bit 50 sps	17:10:22	No Lock	0	OFF	-0.000804 g	2.98E-005 g	Invalid	206	3
E B GR01			This station	does not have active d		one old data files are available		05.07.2010 11:	206 206 15 4	1
(H 💾 GURA1			This station	does not have active d	ata streams but s	ome old data files are available		05.07.2010 11:	4	3.
4										
Rie Name Blos					No G	raphs Available				

Figure 53. Stations: Data streams

• To view the data make a right click on the station name (here TST00) and select Data Monitor

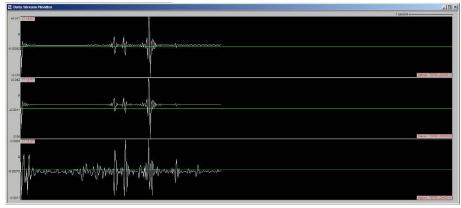


Figure 54. Data stream window

11.5. Trigger Settings

The instrument allows having several triggers with independent sources in parallel.

11.5.1. In the Web Interface or by GeoDAS

• Go to Configuration → armdas Configuration → Event Based Trigger

Home Configuration	State of Health Da	ata Explorer Help	Logout		swiss made to measure of parts.
armdas Configuration	Manage armdas Configu	rations Network C	Configuration Web	Interface Configuration	244
Station • Station Description Data Acquistion and Processing • Time Synchronisation • Channel Settings • Baseline Correction Trigger and Alarm • Event Based Trigger • Scheduled Trigger • Streaming Settings • Eile Storage and Policies • File Storage and Policies • Streaming Settings • Device Detection MiniSEED Settings • Sensor Test Device Information • State Of Health • Debugging • Logfile	Triggerset Manage Triggerset Mane Add New Trigge Triggerset Name Trigger1	ager erset	nfigured f	Edit Entry Remove Ent Edit Remove	ry
	Reload Configuration	from Device Save Cor	nfiguration to Device		1

Figure 55. Trigger Settings

- Add new triggerset by the button *Add New Triggerset.* Triggersets can be removed again by *Remove*.
- The edit a triggerset press the button *Edit* and adjust the parameters in the pop-up window. See Table 10 for additional information.



11.5.2. Via Local Serial Console

• Press 'G' to select the Number of Trigger Sets

```
Main Menu
 A) Station description ..... Demo CR-6plus
 B) Station code ..... DEMO
 C) Location description ..... Switzerland
 D) Seismic network code ..... CH
 E) Number of Channels ..... 3
 F) Number of Output Streams .....
                                 1
 G) Number of Trigger Sets ..... 1
 H) Number of Preset Triggers ..... 0
 I) Channel Parameters ..... ->
 J) Stream Parameters ..... ->
 K) Trigger Parameters ..... ->
 M) File Storage and Policy ..... ->
 N) Communication Parameters ..... ->
 0) Miscellaneous Parameters ..... ->
```

Press 'K' to get to the *Trigger Parameters* menu to adjust the settings of the triggers. The following menu appears. In case the *number of trigger sets* is set to '0' this menu can not be selected.

• Each trigger set can be adjusted according to your wishes. To change the trigger set press '+' or '-'. The following parameters can be adjusted:

Triggerset name	User selectable	Name of the trigger set
Event recording	Yes	An event file will be recorded on a trigger
	No	No event file will be recorded on a trigger
Pre-Event	User selectable	Pre-Event time, seconds
Post-Event	User selectable	Post-Event time, seconds
Max. event duration, sec	User selectable	Maximum duration of an event in seconds. After this time, an event file will be closed
Stored channels	User selectable	Number of channels, which should be stored into an event file in case of a trigger
List of stored channels	User selectable	Depending on the number of stored channels different sources can be selected. '+' and '-' can be used to change the channel, the source can be selected by pressing ' A '

Alarm activation		tivation	Yes	An alarm relay will be activated on a trigger		
(Only visible in case alarm relay			No	No alarm relay will be activated on a trigger		
card is installed)				This option has an effect only in case the		
				instrument has internal alarm relays		
Alarm output to activate		output to activate	AL1, AL2, AL3, AL4	Select alarm relay		
Alarm deactivation delay		deactivation delay	User selectable	Time in seconds the alarm relay deactivates again after the signal falls below the trigger threshold. Can be compared to the post event time for the recording		
Trigger time frame, sec		ime frame, sec	User selectable	See chapter 11.5.5 for details		
Monit	Monitored channels		User selectable	Number of channels which will be monitored by the selected trigger set		
To go th			nrough the monitored channels press '+' or '-'.			
		ssigned channel ame	User selectable			
	T	rigger filter	Yes	Trigger filter is used as defined under Filter Parameters		
			No	Trigger filter is not used		
		Filter parameters	User selectable	One can select a filter type: Low, High and Bandpass, order of the filter and corner frequency(ies)		
S	L	evel Trigger	Yes	Level trigger is enabled		
ting			No	Level trigger is disabled		
Trigger settings		Threshold	User selectable	As soon the data is above the configured threshold the trigger is activated		
igg	STA/LTA Trigger		Yes	STA/LTA trigger is enabled		
1			No	STA/LTA trigger is disabled		
		STA time frame	User selectable	Length of STA time window, seconds		
		LTA time frame	User selectable	Length of LTA time window, seconds		
		STA/LTA trigger ratio	User selectable	As soon the data is above the configured STA/LTA ratio the trigger is activated		
		STA/LTA detrigger ratio	User selectable	As soon the data is below the configured STA/LTA ratio again the trigger is deactivated		
		Clamp LTA during event	Yes	The LTA value will not be updated during the event		
			No	The LTA value will be updated during the event		



	Min. level exceedance	User selectable	The threshold or STA/LTA ratio has to be exceeded at least for the configured time in seconds to active the trigger	
	Channel trigger weight	User selectable	See chapter 11.5.4 for details	
Stored channels		User selectable	Number of channels, which should be stored into an event file in case of a trigger	
List of stored channels		User selectable	Depending on the number of <i>stored channels</i> different sources can be selected. '+' and '-' can be used to change the channel, the source can be selected by pressing ' A '	
Be a source of network triggers (received from LAN)			In case the instrument is interconnected ov LAN with other instruments.	
		Yes	All the other instruments will be alerted due to the trigger of this instrument	
		No	Other instruments will not be alerted due to the trigger of this instrument	
			A master instrument must be defined to use this functionality. See chapter 11.5.6 for details.	
Activate on network triggers (received from LAN)			In case the instrument is interconnected over LAN with other instruments.	
		Yes	The instrument will trigger in case it receives an alert from the LAN	
		No	The instrument will not trigger in case it receives an alert from the LAN	
			A master instrument must be defined to use this functionality. See chapter 11.5.6 for details.	
Event processing		None	No event processing will be done	
		PGM Parameters	Peak ground motion parameters will be calculated in case of an event and will be sent to the server if configured according to chapter 11.7	
Max	x. summary interval	User selectable	The PGM parameters will be sent after an earthquake record has been completed or latest after the defined time in seconds, whichever comes first	

Table 10. Trigger configuration menu structure

11.5.3. STA/LTA trigger

The STA/LTA (Short Time Average/Long Time Average) ratio trigger computes the short term and long term averages of the input (sensor) signal. When the STA exceeds a pre-selected multiple of the LTA (STA/LTA ratio), the instrument begins to record data. The advantage of this trigger type is that the trigger sensitivity adapts to the seismic background signal. With an increasing noise level the trigger sensitivity decreases. The probability of having a false trigger due to noise will be minimised if a long STA averaging time is selected. Obviously, the STA should not be chosen longer than the shortest event of interest. In addition, the STA should be shorter than the pre-event time. If not, the initial portion of an event may not be recorded. During the steady state of the system, the STA and the LTA will be nearly equal. The shorter STA averaging period, the more quickly it will change with the input.

11.5.4. Trigger Weight

To activate a trigger the total trigger weight must be equal or bigger than 100%. By default all channel have a weight of 100%, means if a threshold is exceeded on one channel only, then the trigger is activated. If the trigger weight would be reduced on all channels to 50%, then at least on two channels the threshold has to be exceeded to reach 100% (50% + 50%) and activate the trigger. See Figure 56 for details.

11.5.5. Trigger Time Frame

Depending on the settings it can be, that on two or more channels the threshold has to exceed to activate the trigger (see chapter 11.5.4 for details). The time of the threshold-exceedance might be slightly different on the channels, especially if two sensors are connected and installed on different places. To make sure that even due to this time difference the trigger is working a *trigger time frame* can be defined. See Figure 56 for details.



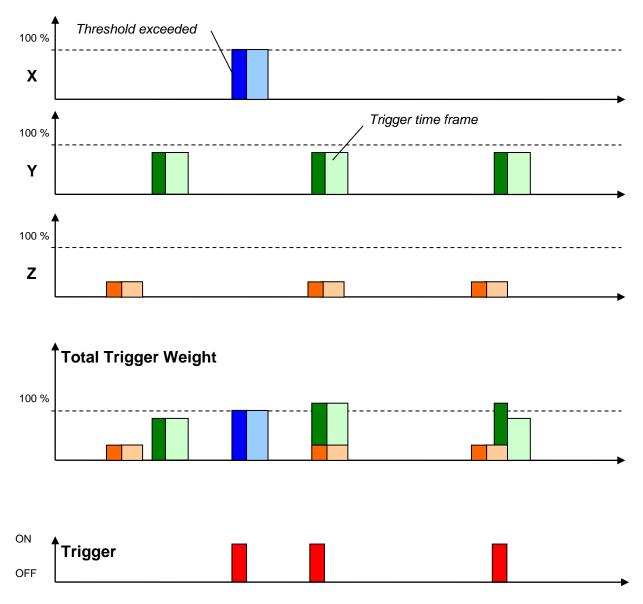


Figure 56. Overview of trigger weight and trigger time frame

11.5.6. Trigger Interconnection over LAN

In case there are several instruments in the same LAN, they can be interconnected over Ethernet for common triggering.

One instrument has to be set up as a master, whereas all other instruments are like slaves, sending the trigger alarms to the master instrument. The master instrument distributes then the trigger alarm to all slaves.

All the communication between the data server and the slave instruments will go via the master instrument. This means that the master instrument will download the requests first and forward it to the appropriate slave instrument. On the other hand, the slave instruments will upload all the files to the master, who will upload it to the data server.

- 11.5.6.1. Set up of the Master Instrument
 - Press 'K' to enter the menu Communication Parameters and activate the Server mode by pressing 'H'

```
Main Menu
 A) Station description ..... Demo CR-6plus
 B) Station code ..... DEMO
 C) Location description ..... Switzerland
 D) Seismic network code ..... CH
 E) Number of Channels ..... 3
 F) Number of Output Streams ..... 1
 G) Number of Trigger Sets ..... 1
 H) Number of Preset Triggers ..... 1
 I) Channel Parameters ..... ->
 J) Stream Parameters ..... ->
 K) Trigger Parameters ..... ->
 L) Parameters of Preset Triggers ... ->
 M) File Storage and Policy \dots ->
 N) Communication Parameters ..... ->
 O) Miscellaneous Parameters ..... ->
```

- To do the settings in the Web Interface go to Configuration \rightarrow armdas Configuration \rightarrow File Transfer Settings and Enable the flag Act as Server. Then just do the steps described below in the GUI of the Web Interface
- Specify the *Port of incoming connections* and adjust the number of slaves in the parameter *Number of clients*. Write down the *Port of incoming connections* (use **3456** as default) and the *IP of the instrument*, as they are used again during the configuration of the slave instruments.

```
Main Menu | Communication
 A) Contact remote servers ..... Yes
 B) Number of servers ..... 1
 C) Time interval, sec ..... 10 (0x0A)
 D) Maximum files per session ..... 10
                                       (0x0A)
 E) Connect if there are new files ..... Yes
 F) Connect by requests from clients ... Yes
 G) Server Parameters \dots \dots \dots \dots \dots \dots
 H) Server mode for other instruments .. Yes
 I) Port for incoming connections ..... 3456 (0xD80)
 J) Secure authentication ..... No
 K) Number of clients ..... 1
 L) Clients Parameters ..... ->
 M) Seedlink Server ..... Yes
 N) Accept connections ..... Yes
```

• The details of every slave instrument have to be filled out. Additionally make sure that the *Data forwarding* and the *Network triggers* is set to **Yes**. To change the slave (client) instrument press '+' or '-'.

Main Menu | Communication | Client 1 of 2
A) Client IP Address 0.0.0.0
B) Client serial number ... 000000
C) Transfer timeout, sec ... 20 (0x14)
D) Data forwarding Yes
E) Network triggers Yes



11.5.6.2. Set up of the Slave Instruments

• Press 'K' to enter the menu Communication Parameters

```
Main Menu
 A) Station description ..... Demo CR-6plus
 B) Station code ..... DEMO
 C) Location description ..... Switzerland
 D) Seismic network code ..... CH
 E) Number of Channels ..... 3
 F) Number of Output Streams .....
                                  1
 G) Number of Trigger Sets .....
                                 1
 H) Number of Preset Triggers ..... 1
 I) Channel Parameters ..... ->
 J) Stream Parameters ..... ->
 K) Trigger Parameters ..... ->
 L) Parameters of Preset Triggers ... ->
 M) File Storage and Policy \ldots ->
 N) Communication Parameters ..... ->
 O) Miscellaneous Parameters ..... ->
```

To do the settings in the Web Interface go to **Configuration** \rightarrow **armdas Configuration** \rightarrow **File Transfer Settings**. Then just do the steps described below in the GUI of the Web Interface

 Press 'A' and change Contact remote servers to Yes if not already set and then go to Server Parameters menu by pressing 'G'

• IP and Port from the master instrument must be adjusted in the field Server IP Address and Port (use **3456** as default). Make sure the Network triggers are activated by putting **Yes**

```
      Main Menu | Communication | Server

      A) Server IP Address

      B) Protocol

      C) Port

      J) Transfer timeout, sec

      Main Menu | Communication

      Yes

      J) Keep connected to the Server

      No

      Select <A>...<Q>.

      Select <A>...<Q>.
```

11.5.6.3. Trigger Parameters for Master and Slave instruments

The following settings must be done on the master and the slave instruments.

• Make sure on all instruments that the *Number of Trigger Sets* is not zero and then press '*K* to enter the menu *Trigger Parameters*

Main	Menu	
A)	Station description	Demo CR-6plus
B)	Station code	DEMO
C)	Location description	Switzerland
D)	Seismic network code	CH
E)	Number of Channels	3
F)	Number of Output Streams	1
G)	Number of Trigger Sets	1
H)	Number of Preset Triggers	1
I)	Channel Parameters	->
J)	Stream Parameters	->
K)	Trigger Parameters	->
L)	Parameters of Preset Triggers	->
M)	File Storage and Policy	->
N)	Communication Parameters	->
0)	Miscellaneous Parameters	->

To do the settings in the Web Interface go to Configuration \rightarrow armdas Configuration \rightarrow File Transfer Settings. Then just do the steps described below in the GUI of the Web Interface

• Configure the triggerset according to the description in chapter 11.5 and make sure that on all instruments *Be a source of network triggers (received from LAN)* and *Activate on network triggers (received from LAN)* is set to **Yes**

Main	Menu Triggerset	
A)	Triggerset name	Triggerl
B)	Event recording	Yes
C)	Record on network triggers only	No
D)	Alarm activation	No
E)	Pre-Event, seconds	5 (0x05)
F)	Post-Event, seconds	10 (0x0A)
G)	Trigger time frame, sec	3 (0x03)
H)	Max. event duration, sec	60 (0x3C)
I)	Monitored channels	3
J)	Trigger settings	->
K)	Stored channels	3
L)	List of stored channels	->
M)	Be a source of network triggers (received from LAN)	Yes
N)	Activate on network triggers (received from LAN)	Yes
0)	Event processing	None

In case an instrument should trigger on network triggers, but not alarm the other instruments about an own trigger (e.g. in a noisy area) the *Be a source of network triggers (received from LAN)* should be set to **No**

In case an instrument should alarm the other instruments over the LAN about a trigger, but not be activated on network triggers, then Activate on network triggers (received from LAN) should be set to **No**

11.6. Preset Trigger Settings

The instrument allows having several predefined triggers, e.g. time triggers in parallel.

11.6.1. In the Web Interface or by GeoDAS

• Go to Configuration → armdas Configuration → Scheduled Trigger

Home Cor	nfiguration	State of Health Data Explo	orer Help	Logout	
armdas Configu	uration	Manage armdas Configurations	Network Configuration	Web Interface Configuration	
Station Station Descrip Data Acquistio Processing Time Synchron Channel Settin Baseline Corre Trigger and Ala Event Based Tr Scheduled Trig Data Storage, and Communic File Storage an File Transfer St Streaming Setti Device Detectic MiniSEED Setti Advanced Watchdog Setti Sensor Test Device Inform State Of Health Debugging Logfile	n and isation QS iction arm igger Arm ad Policies ettings bings an ngs ngs	Time Triggerset Manager Triggerset Manager Add New Triggerset			
		Reload Configuration from Devie	ce Save Configuration t	o Device	0

Figure 57. Preset Trigger Settings

- Add new triggerset by the button *Add New Triggerset.* Triggersets can be removed again by *Remove*.
- The edit a triggerset press the button *Edit* and adjust the parameters in the pop-up window. See Table 11 for additional information.

11.6.2. Via Local Serial Console

• Press 'H' to select the Number of Preset Triggers

```
Main Menu
 A) Station description ..... Demo CR-6plus
 B) Station code ..... DEMO
 C) Location description ..... Switzerland
 D) Seismic network code ..... CH
 E) Number of Channels ..... 3
 F) Number of Output Streams ..... 1
 G) Number of Trigger Sets ..... 1
 H) Number of Preset Triggers ..... 1
 I) Channel Parameters .....
                                 ->
 J) Stream Parameters ..... ->
 K) Trigger Parameters .....->
 L) Parameters of Preset Triggers ... ->
 M) File Storage and Policy ..... ->
 N) Communication Parameters ..... ->
 0) Miscellaneous Parameters ..... ->
```

• Press 'L' to get to the *Parameters of Preset Triggers* menu to adjust the settings of the preset triggers. The following menu appears only in case the *number of preset triggers* is higher than '**0**'.

```
Main Menu | TimeTableTrigger
A) Preset trigger name ..... Trigger1
B) First trigget type ..... After Startup
H) Duration, seconds ..... 30 (0x1E)
I) Total number of triggers .... 1 (0x01)
O) Stored channels ..... 1
P) List of stored channels .... ->
```

• Each trigger set can be adjusted according to your wishes. To change the preset trigger set press '+' or '-'. The following parameters can be adjusted:

Preset trigger name	User selectable	Name of the preset trigger set	
First trigger type	There are several possible predefined triggers to choose		
	Manual Trigger	A trigger is activated/stopped by the user command TRIGGERNOW/STOPTRIGGER sent either from the console or remotely from a server	
	After Even After Startup Date and Time	A trigger is activated after recording of any event file	
		First trigger is activated after the instrument startup	
		First trigger is activated at the defined date/time	
Total number of triggers	User selectable	After reaching the configured number of triggers the preset trigger will not be activated anymore	
Delay after event	User selectable	In case After Event is selected, then the time between the end of the event to the begin of the activation of the preset trigger can be configured	
First trigger time, year	User selectable	Date and time of the first trigger	
First trigger time, day	User selectable		
First trigger time, hour	User selectable		
First trigger time, minute	User selectable		

Stored channels	User selectable	Number of channels which should be stored into an event file in case of a trigger
List of stored channels	User selectable	Depending on the number of stored channels different sources can be selected. '+' and '-' can be used to change the channel, the source can be selected by pressing ' A '

Table 11. Preset trigger configuration menu structure

11.7. File Storage and Policy

It can be configured in the instrument how all the files should be treated.

11.7.1. In the Web Interface or by GeoDAS

• Go to Configuration \rightarrow armdas Configuration \rightarrow Scheduled Trigger

mdas Configuration	Ianage armdas Configurations Network C	onfiguration Web Interface Co		
tion Italion Description	File Storage and Policies			-
ta Acquistion and	Reserved System Storage Space, MB	12		0
ime Sinchronisation	Minutes per continuously recorded File	10		0
Channel Settings laseline Correction	SOH File options	-		0
gger and Alarm	Disk Space Quota Percentage	3		0
vent Based Trigger	Action when Space exceeds Quota	Delete oldest files		1
a Storage, Transfer	Transfer Priority	High	×	1
Communication	Life Time in Days	[1		•
ile Storage and Policies ile Transfer Settings	Transfer Order	Newest first	•	0
treaming Settings levice Detection liniSEED Settings	Delete Files when transferred			1
vanced	LOG File options			
/atchdog Settings ensor Test	Disk Space Quota Percentage	10		0
vice Information	Action when Space exceeds Quota	Delete oldest files		•
tate Of Health rebugging	Transfer Priority	Low	•	1
oafile	Life Time in Days	10000		0
	Transfer Order	Oldest first		0
	Delete Files when transferred			0
	Compress Logfiles			0
	EVT File options			
	Disk Space Quota Percentage	17		0
	Action when Space exceeds Quota	Delete oldest files		6
	Transfer Priority	Mid		6
	Life Time in Days	10000		6
	Transfer Order		¥	0
		Oldestfirst		
	Delete Files when transferred			0
	MAN File options			0
	Disk Space Quota Percentage	10		0
	Action when Space exceeds Quota	Delete oldest files		0
	Transfer Priority	Mid	•	•
	Life Time in Days	10000		
	Transfer Order	Oldestfirst		0
	Delete Files when transferred	E		•

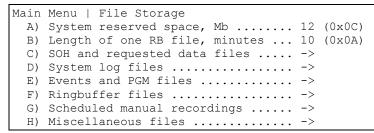
Figure 58. File Storage Settings

- Parameters for the following file types can be configured (see *Filetypes* in Table 12) SOH – State of health information and requested data files
 - LOG System log files TRG – Events and PGM files RBF – Ringbuffer files
 - MAN Scheduled manual recordings
 - MSC Miscellaneous files
- See Table 12 to get more information about the parameters which can be configured.

11.7.2. Via Local Serial Console

```
Main Menu
 A) Station description ..... Demo CR-6plus
 B) Station code ..... DEMO
 C) Location description ..... Switzerland
 D) Seismic network code ..... CH
 E) Number of Channels ..... 3
 F) Number of Output Streams ..... 1
 G) Number of Trigger Sets ..... 1
 H) Number of Preset Triggers ..... 1
 I) Channel Parameters ..... ->
 J) Stream Parameters ..... ->
 K) Trigger Parameters ..... ->
 L) Parameters of Preset Triggers ... ->
 M) File Storage and Policy ..... ->
 N) Communication Parameters ..... ->
 0) Miscellaneous Parameters ..... ->
```

• Press 'M' to get to the *File Storage and Policy* menu to adjust the settings of the file storage. The following menu appears:



- Parameters for the following file types can be configured (see *Filetypes* in Table 15)
 - SOH State of health information and requested data files
 - LOG System log files
 - TRG Events and PGM files
 - RBF Ringbuffer files
 - MAN Scheduled manual recordings
 - MSC Miscellaneous files
- See Table 12 to get more information about the parameters which can be configured.

System reserved space		User selectable	Amount of memory reserved for the operating system in [Mb]. Keep 12 Mb by default
Length of one RB file		User selectable	Permanent data will be stored in ringbuffer files; here the length of one ringbuffer file in minutes can be specified. After this time the file will be closed and a new one started.
	Disk space quota	User selectable	Reserved memory on the SD/CF-Card for the SOH files in [%]
Filetypes	lf over quota	Delete oldest files	In case the reserved memory is full the oldest files will be deleted first
	Life time	User selectable	After the configured time in [days] the files will be deleted from the SD/CF-Card
	Transfer priority	Never Transfer Low Mid High Highest	In case a lot of files have to transferred, the priority of the file upload can be configured here. If Never Transfer is configured, then no files will be uploaded
	Transfer order	Newest first Oldest first	Most recent files are transferred first Most old files are transferred first
	Delete transferred	Yes	Files will be deleted after upload to the server
		Νο	Files will be not deleted after upload to the server

Table 12. File Storage and Policies menu structure

• Additionally the system log files can be compressed. This can be separately enabled under the menu point *D*) *System log files*:

Compress files	Yes	Files will be sent gzip-compressed (.gz)
	No	Original text files will be sent (default)

11.8. Communication Parameters

This chapter explains how to set up the server parameters

11.8.1. In the Web Interface or by GeoDAS

• Go to Configuration → armdas Configuration → File Transfer Settings

Home	Configuration	State of Health Data Explore	er Help	Logout	
armdas C	Configuration	Manage armdas Configurations	Network Configuration	Web Interface Configuration	
Station		Communication			
<u>Station D</u>		Contact Remote Servers			1
Data Acqu Processin	uistion and ng	Settings for Servers			
<u>Time Syr</u> <u>Channel</u>	nchronisation I Settings	Upload new Files			1
	e Correction	Maximum Files per Session	10		1
	ased Trigger	Time Interval, sec	10		1
<u>Schedule</u>	ed Trigger	Configured Servers			
Data Stor	rage, Transfer munication	192.168.0.112 Add S	Server with Hostname		
• File Stora	age and Policies	192.168.10.107 Settings	s Remove		
 <u>File Tran</u> <u>Streamin</u> Device D 		Act as Server			1
<u>MiniSEE</u>					
Advanced	d				
• Watchdo	200				
<u>Sensor T</u>	Test				
Device In	nformation				
<u>State Of</u>					
 <u>Debuggi</u> <u>Logfile</u> 	ing				
<i>6</i>]				-
		Reload Configuration from Device	Save Configuration t	o Device	

Figure 59. Server parameters

- Tick the flag Contact Remote Servers to configure a connection to a remote server
- Add the IP of your server and press Add Server with Hostname. Servers can be removed again by Remove.
- Then press Settings... to adjust the parameters as shown in the Table 13
- In case the instrument should act as Server for other CR-6plus instruments, tick the flag *Act as Server* and follow the steps as described in chapter 11.8.2.1



11.8.2. Via Local Serial Console

Main	Menu
A)	Station description Demo CR-6plus
B)	Station code DEMO
C)	Location description Switzerland
D)	Seismic network code CH
E)	Number of Channels 3
F)	Number of Output Streams 1
G)	Number of Trigger Sets 1
H)	Number of Preset Triggers 0
I)	Channel Parameters>
J)	Stream Parameters>
K)	Trigger Parameters>
M)	File Storage and Policy $\dots \dots ->$
N)	Communication Parameters>
0)	Miscellaneous Parameters>

• Press '**N** to get to the *Communication Parameters* menu to adjust the settings of the file storage. The following menu appears:

Main	Menu Communication	
A)	Contact remote servers	Yes
B)	Number of servers	1
C)	Time interval, sec	20 (0x14)
D)	Maximum files per session	10 (0x0A)
E)	Connect if there are new files	Yes
G)	Server Parameters	->
H)	Server mode for other instruments	No
M)	SeedLink server	Yes
N)	Accept connections	Yes

• The following parameters can be adjusted:

Contact remote servers	Yes	The instrument connects to the configured data server(s)
	Νο	The instrument does not connect to any data servers
Number of servers	User selectable	Number of data servers. If the instrument can not connect to the first data server it will connect to the second data server, if this one is down it connect to the third and so on. Scanning of servers stops after first successful connection
Time interval	User selectable	Interval of connection to data servers in seconds
Maximum files per session	User selectable	Maximum number of files, which will be uploaded during one session. Although data servers support concurrent connections, this parameter helps distributing the load of data processing by the server among several instruments
Connect if there are new files	Yes	Instrument connect to the server in case there are new files recorded and are ready to be transmitted
	Νο	Instrument does not connect to the server in case there are new files. It just connects periodically as defined with the parameter Time interval

	'+' and '-' can be used	te enange between in	
	Server IP Address	User selectable	IP address of the data server
s	Protocol	Custom	Protocol of communication, can not be changed so far
eter	Port	User selectable	Communication port of the data server
arame	Transfer timeout	User selectable	Instruments gives up to contact the server after the configured timeout in seconds
Server parameters	Network triggers	Yes	Triggers are sent to the server, for event detection
		No	as described in chapter 15.2
0,			Triggers are not sent to the server
	Keep connected to	Yes	If this flag is enabled, the instrument keeps the
	the server	No	channel to the server open. This allows configuring the instrument though the web interface in GeoDAS even over the internet.
Serv	ver mode for other	Yes	See chapter 11.8.2.1 for more details
inst	ruments	No	
SeedLink server		Yes	SeedLink server is enabled for all data channels
		No	and data streams can be received by any SeedLink client from the instruments IP.
Accept connections		Yes	Allows GeoDAS to connect to the instrument.
		No	Works only if the IP of the instrument is known and reachable.

Table 13. Communication Parameters menu structure

11.8.2.1. Instrument acts as a server (Server Mode)

The instrument can be configured to act as a server. In this case other instruments can upload their files to this instrument. The server-instrument can then forward the data to a main server by another communication medium. For example, two instruments (clients) upload their files to the instrument-server, which forwards the data to a GeoDAS server.

The serial numbers and IP's of all client instruments must be configured in the server, so that requests from GeoDAS can be correctly forwarded.



This setup is not recommended, as it creates a big load for the server instrument. Special care must be taken during design and setup. Whenever possible, all instruments shall have a direct communication path to the GeoDAS server.

Server mode		Yes	The instrument acts as a data server for other instruments
		No	The instrument does not act as a data server
Port for incoming connections		User selectable	Port for incoming connections. Other instruments have to set the same port under Server parameters
Secu	ure authentication	Yes	Secure authentication (SSL encryption) enabled
		No	Secure authentication (SSL encryption) disabled
Number of clients		User selectable	Number of client instruments which upload data to this instrument
	'+' and '-' can be used to change between the clients		
4.5	Client IP Address	User selectable	IP of the client instrument which connects to this instrument
Parameters	Client serial number	Custom	Serial number of the client instrument. Use 000000 to allow instruments with any serial numbers to connect
	Transfer timeout	User selectable	Network timeout in seconds
Clients	Data forwarding	Yes	Data from the data server will be forwarded to the client instruments and the other way round
S		No	Data will not be forwarded
	Network triggers	Yes	Network triggers will be sent to the server
		No	Network triggers will not be sent to the server

Table 14. Server Parameters menu structure

11.9. Miscellaneous Parameters

The Time synchronisation, State of Health files, messaging and debugging can adjusted under this menu

11.9.1. In the Web Interface or by GeoDAS

The parameters of this menu item is splitted up in several pages on the Web Interface:

- To adjust the time synchronisation, go to **Configuration** → **armdas Configuration** → **Time Synchronisation**
- To adjust the offset corrections settings, go to **Configuration** → **armdas Configuration** → **Baseline Correction**
- To adjust how many times the SOH information shall be sent, go to **Configuration** → **armdas Configuration** → **State of Health**
- To adjust the type and the number of the sensor test pulses, go to Configuration → armdas Configuration → Sensor Test
- To enable/disable the autodetection of Web Interface, go to **Configuration** → **armdas Configuration** → **Device Detection**
- To enable additonal debug messages in the system log files, go to **Configuration** → **armdas Configuration** → **Debugging**
- To adjust, when the system log files shall be sent, go to Configuration → armdas Configuration → Logfile

Adjust the parameters as shown in the Table 15.



11.9.2. Via Local Serial Console

Main	Menu	
A)	Station description	Demo CR-6plus
B)	Station code	DEMO
C)	Location description	Switzerland
D)	Seismic network code	CH
E)	Number of Channels	3
F)	Number of Output Streams	1
G)	Number of Trigger Sets	1
H)	Number of Preset Triggers	1
I)	Channel Parameters	->
J)	Stream Parameters	->
K)	Trigger Parameters	->
L)	Parameters of Preset Triggers	->
M)	File Storage and Policy	->
N)	Communication Parameters	->
0)	Miscellaneous Parameters	->

• Press 'O' to get to the *Miscellaneous Parameters* menu to adjust time synchronisation offset detection, and other settings. The following menu appears:

Main	Menu Miscellaneous
A)	Offset detection time, sec 10 (0x0A)
B)	Offset correction time, sec 0 (0x00)
C)	Offset correction counts 1 (0x01)
D)	MiniSEED record length
E)	Extended MiniSEED formatYes
F)	Single channel ringbuffer files No
G)	State of health \ldots
H)	Test configuration>
J)	Messaging and debugging>
I)	Time synchronization>
K)	Instrument configuration options>
L)	Instrument configuration options>
M)	Time for sending daily logfile, hour 0 (0x00)
N)	Time for sending daily logfile, minute 0 (0x00)

• The following parameters can be adjusted:

Offset detection time	User selectable	Time in seconds, which the input values is measured after start-up to define the offset
Offset correction time	User selectable	The instrument takes the average over the number of seconds, configured in the <i>Offset correction time</i>
Offset correction counts	User selectable	and adds or subtracts the number of counts defined under Offset correction counts
MiniSEED record length	User selectable	Length of one data block inside the miniSEED file. In most applications, the default value 512 shall be kept.
Extended MiniSEED format	Νο	MiniSEED files do not include any additional information. This option shall be used only if you face any problems in reading extended format of miniSEED files with your customized software.
	Yes (default)	MiniSEED files include configuration and state of health information. When you open such files with GeoDAS, there is no need to enter LSB factors and units (see the chapter 15.4) as this information is retrieved from files. This feature is supported

				from GeoDAS version 2.21.
	S	OH report type	None	No State-Of-Health file will be created
			No	State-Of-Health files will be created and uploaded to the server according to the settings in chapter 11.7
		SOH reporting interval , days	User selectable	Defines the interval between the SOH reports in days, hours and minutes
		SOH reporting interval, hours	User selectable	
		SOH reporting interval, minutes	User selectable	
		ime of the first SOH	Startup	First SOH report will be created at startup
	r	eport	Random	Time of the first SOH is random. This is to avoid all instruments use the network at the same time.
health			User defined	First SOH report will be created at the user defined time
State of health		First SOH report time, hours	User selectable	Defines the hour and minute of the first SOH report
Sté		First SOH report time, minutes	User selectable	
			Yes	Activates an alarm relay in case of an error
	errors		No	Alarm relay will not be activated in case of an error
		Activate alarm when system is	Yes	Alarm relay is activated in case <i>armdas</i> is not running (e.g. during startup or after quit)
		inactive	No	Alarm relay will not be activated
		Error and inactivity alarm output	AL1, AL2, AL3, AL4	Alarm relay which should be activated in case of an error or <i>armdas</i> is not running
		Activate alarm on	No	Selected alarm relay is activated on all errors
		selected errors only	Yes	Selected alarm relay is activated on selected errors only. The errors can be selected by pressing ' <i>L</i> ' to ' <i>T</i>
	S	Sensor test type	None	No test pulse is generated
-			Pulse	Test pulse is generated, depending on the following settings
uratio		Sensor test interval	User selectable	Interval between two sensor tests
Test configuration		Time of the first test	Startup	First test will be done at startup, next after the defined interval
Test c			Random	Time of the fist test is random. This is to avoid, that all instruments in a network are doing the test in exactly the same moment. This would be critical in case of an earthquake at this time.
			User defined	First test will be done at the user defined time

	Console messages	Yes	Enables console messages
bu		No	Disables all console messages
	Debug: memory allocation	Yes No	Enables or disables specific debug messages. These are for service or advances users only.
	Debug: system and processes		Keep <i>No</i> by default.
	Debug: flash memory		
ŋgiı	Debug: configuration		
ònqe	Debug: network links		
de de	Debug: data streams		
and	Debug: data sources		
ing	Debug: ring buffers		
Messaging and debugging	Debug: event triggers	-	
W	Debug: time synchronisation	-	
	Debug: file manager		
	Debug: cryptographic info		
	Debug: hardware related info		
	Time source	RTC	RTC is not synchronizing itself to any source
		GPS	RTC is synchronizing to the connected GPS
		NTP	RTC is synchronizing to a NTP server
		Αυτο	RTC synchronizes to NTP in case GPS is not available
		NET1PPS	RTC is synchronizing to the 1PPS signal distributed by the 433 MHz module or the interconnection network.
ion	NTP server 1	User selectable	IP of the primary NTP Server
	NTP server 2	User selectable	IP of the secondary NTP Server
hroniz	NTP server query interval	User selectable	Interval time in seconds the NTP server is contacted by the instrument
Time Synchroniza	NTP requests in a row	User selectable	Every time the instrument is contacting the NTP server the configured number of requests will be sent. For service and advanced user only, do not change the default value of '4'
	NTP network timeout	User selectable	Maximum time to receive a reply from the NTP server in [seconds]. For service and advanced user only, do not change the default value of '3'
	NTP maximum error	User selectable	Above this time in [seconds] the RTC will make a time jump to the NTP time. Otherwise the time will be tuned slowly. For service and advanced user only, do not change the default value of ' <i>1</i> '
	GPS reception timeout, min	User selectable	If GPS signal is lost, after this time in [minutes] the RTC will change its synchronization to NTP

GPS check interval	User selectable	If in the ' <i>Auto</i> ' mode, the RTC is synchronized to
in NTP mode, min		the NTP the instruments checks in the configured

	GPS check duration in NTP mode, sec	User selectable	interval if the GPS is available again
	Send SOH upon RTC status change	Yes	In case RTC status changes, a SOH message will be uploaded to the server
		No	No SOH message will be sent upon RTC status change
Instrument configuration options	Enable autodetection of the instrument	Yes	Instrument can automatically be found by GeoDAS in the LAN
		No	Instrument can not automatically be found by GeoDAS
iment c opti	Configurable with a browser	Yes	Web Interface is enabled and instrument can be configured with the browser
Instru		No	Web Interface is disabled
Time for sending daily logfile, hour		User selectable	If transfer is activated in chapter 11.7, at this time the daily logfile will be sent to the server. Can be
<i>Time for sending daily logfile, minutes</i>		User selectable	adjusted to avoid that all instruments send the logfile at exactly the same time

Table 15. *Miscellaneous Parameters* menu structure

11.9.3. Time synchronization

The system has a Real Time Clock (RTC) that maintains internal time when the unit is turned off. During normal operation the RTC is responsible to provide the most accurate time possible to the system and perform time synchronization with other available external time source as:

- GPS time code receiver on the GPS interface.
- NTP (Network Time Protocol) server from the Ethernet interface.

It also keeps under control the sampling clock of the ADCs and is self-calibrating its oscillator against temperature and aging when it is connected with an accurate external time signal.

The DSP receive a continuous 1 PPS signal from the RTC with the best accuracy that can provide the RTC, including temperature compensation, based on the saved coefficients. The digitisers will sync the sampling clock with this 1 PPS signal to have accurate sample timing.

11.9.3.1. Temperature compensation

RTC uses the internal temperature sensor of the micro-controller to define the current operating temperature. When good time synchronization occurred, typically using a GPS, the RTC check its own drift against the signal of the GPS and adds the correction coefficients in a trim table. With a NTP time source, the accuracy is worst but the same process occurred with more averaging and on longer period of time.

During factory test, all the coefficients are initialized to the room temperature coefficient using a GPS. After installation, the unit will learn it self on site the correction parameters according to the ambient conditions at site and also according to the aging of the oscillator.

11.10. Other Options in the Instrument Main Menu

Next to the edit of the instrument configuration, there are other actions possible from the main menu shown below:

```
CR-6plus s/n 100582 version 26.05.00
Main menu:
C - Configuration
M - Messages ->
S - Shell command
L - List firmware images
X - Display errors (0) and warnings (0)
W - Clear errors and warnings
F - View/reset RTC trim values
T - File statistics
G - View RTC status
P - View GPS information
H - Set RTC time
U - User request
```

- R Restart
- Q Quit

l

	Action or command	Description	
С	Configuration	Change of the configuration of the instrument. See chapter 11 for details	
М	Messages →	Possibility to configure, what kind of messages are shown in the console.	
S	Shell command	Allows executing a Linux shell command from <i>armdas</i> . For advanced users only	
L	List firmware images	Displays the list of firmware images and configuration stored in the non-volatile memory of the instrument. There are two copies of each type of firmware, except for the Bootloader, which has only one image	
X	Display errors (n) and warnings (m)	Shows present errors and warnings	
W	Clear errors and warnings	Clears all errors and warnings	
F	View/reset trim values	Shows trim values of the RTC. Trim table can be erased as well. For advanced users only.	
G	View RTC status	Shows the actual state of the real time clock and if the RTC is synchronized to NTP or GPS	
Ρ	View GPS information	Shows the actual GPS information if the unit is equipped by the GPS receiver	
Η	Set RTC time	Allows setting the time of the instrument manually. Keep in mind, that if a GPS is connected or a NTP server is configured, the time will be synchronized to them after a while, not immediately.	
U	User request	See chapter 11.10.1 for details	
R	Restart	Restarts the instrument, e.g. after a change of the configuration	
Q	Quit	Stops <i>armdas</i> data acquisition and exits to the Linux console. For advanced users only	

11.10.1. User requests

Several actions can be initiated by the user:

• In the main menu press 'U' to enter the *User request* menu, type *HELP* to see all the possible commands

```
CR-6plus s/n 100710 version 20.00.97
Main menu:
C - Configuration
M - Messages ->
S - Shell command
L - List firmware images
X - Display errors (1) and warnings (0)
W - Clear errors and warnings
F - View/reset RTC trim values
T - File statistics
G - View RTC status
H - Set RTC time
U - User request
R – Restart
Q - Quit
Command or HELP for more information --> help
```

The list of all supported user requests (commands) along with their description is provided in the table below.

Action or command	Description	
Data requests, triggering:		
GETEVT YYYY-MM-DD HH:MM:SS N	The instrument creates an event with the length of N seconds from the ringbuffer data, starting from the indicated date and time and uploads the data to the server if configured (see chapter 11.8).	
TRIGGERNOW [trigger_name]	Activate a manual trigger to start recording, the manual trigger must be configured as described in the chapter 11.6	
STOPTRIGGER [trigger_name]	Deactivates the manual trigger	
Status and information:		
GETSOH	The instrument generates a SOH file with the current state-of- health information and uploads to the server if configured (see chapter 0).	
GETLOG	The instrument uploads today's logfile to the server.	
SETMSG flags	Enables/disables debug log messages. For service only, do not	
CLRMSG flags	change	
Service and recovery:		
LASTDT YYYY-MM-DD HH:MM:SS	Set date and time of the last transferred file	
	The instrument saves the date and time of the latest uploaded file and will not upload any file which is created before this date and time. Under normal conditions this will be never the case. But if the time is changed backwards by the user - e.g. from 10:00 to 06:00 - the instrument will not upload any data till 10:00 again. So the time of the last transferred file can be adjusted here and should be set to 06:00 in this example.	
FORMAT	Formats the data storage media. All data will be lost, and instrument will be restarted	
REBOOT	Performs full reboot of the instrument	
RESETERR	Reset errors and warnings of the instrument	

GETTRIM	The instrument will upload a SOH file containing the actual values from the RTC trim table. The latest SOH file can be found under \\GeoDAS_DATA\StatusFiles\InfoSOH.xml
CLRTRIM	The instrument will clear the RTC trim table
TCAL <tcur></tcur>	Calibration of the internal temperature sensor by applying the actual temperature in °C. Temperature is used for the learning of the RTC.
SETDEFCFG	Makes the current instrument configuration as user default one. Whenever you change parameters of the instrument, they are saved in the non-volatile instrument memory as Current Configuration, and used to set all parameters of the data acquisition at startup. But if due to some reason the current configuration get corrupted, and CR-6plus cannot load or cannot process it, the Default Configuration file, which is created by this command, will be used instead. Note that Default Configuration is compiled from the actual parameters of the running system, and therefore it is already approved by CR-6plus and is supposed to be correct. Thus, we recommend sending this command to the instrument after you are sure that your CR- 6plus is started with the latest configuration correctly and everything works as expected. The default configuration can also be set and restored in the
	web interface, see chapter 10.3.2
RSTUSRDEF	Reset the instrument to its user default configuration.
DELETE <file_prefix all="" or=""> [YYYY- MM-DD [HH:MM]]</file_prefix>	Delete one group of files or all groups of files from the compact flash card. One can request to delete only files, which are older than the specified date (and optionally time).
Sensor test and calibration:	
TSTSENSOR 1	The instrument generates a sensor test pulse. When a level trigger is activated an event will be recorded of this test pulse and uploaded to \\GeoDAS_DATA\Incoming\WNNNNN\
REMOVEDC	Remove offsets from signals
Others:	
CANCEL	Leave the menu



The same request can also be done from GeoDAS by choosing 'Send a Request' from the 'CR-6plus Communication Interface'. See chapter 15.3.4 for details.

12. Test and Configuration Menu

The test and configuration menu can only be accessed locally at the instrument over the serial cable

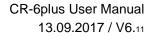
- Switch on the instrument by press and hold the POWER button for 2 seconds.
- Press <Ctr> + 'Z' as soon the following message appears on the console to enter the test and configuration mode:

Press Ctrl+Z to enter the test mode.....

• The test and configuration menu has three access levels

The test and configuration menu has three access levels as outlined above: User, Powerful User and Administrator, and each level can be protected by a password. Instead of pressing $\langle Ctrl \rangle + Z'$, once can press $\langle Ctrl \rangle + U'$, $\langle Ctrl \rangle + W'$ or $\langle Ctrl \rangle + A'$ to bypass the above messages and to proceed directly to a menu of the desired level. The Administrator has an access to the most complete menu but the majority of functions are not used for the standard instrument operation, and therefore they are not described here in details. The useful options are highlighted and described below.

```
Bootloader Menu of the CR-6plus s/n 100577
Access level: User
--- Flash Images and Boot Options ---
L - List flash images
Q - Reset instrument configuration to the user default
V - Reset instrument configuration to the factory default
5 - Boot now
X - Reboot the instrument
Y - Power off
---- Hardware Setup and Monitor ---
N - Network settings
---- Security ---
0 - Set password
--->
```



```
GeoSIG
swiss made to measure
94 / 112
```

```
Bootloader Menu of the CR-6plus s/n 100577
Access level: Powerful User
--- Flash Images and Boot Options ---
L - List flash images
\ensuremath{\mathtt{Q}} - Reset instrument configuration to the user default
V - Reset instrument configuration to the factory default
5 - Boot now
X - Reboot the instrument
Y - Power off
--- Hardware Setup and Monitor ---
K - Instrument hardware parameters
N - Network settings
T - Battery installation dates
 --- Security ---
0 - Set password
J - Reset all passwords
```

-->

Bootloader Menu of the CR-6plus s/n 100577 Access level: Administrator --- Flash Images and Boot Options ---L - List flash images Q - Reset instrument configuration to the user default V - Reset instrument configuration to the factory default 5 - Boot now X - Reboot the instrument Y - Power off --- Hardware Setup and Monitor ---K - Instrument hardware parameters N - Network settings T - Battery installation dates --- Test Functions ---P - Test RTC M - Test GPS --- Security ---0 - Set password J - Reset all passwords

12.1. Flash Images and Boot Options

L	List flash images	Lists all the current firmwares in the image
Q	Reset instrument configuration to the user default	Forces the instrument to load the user default configuration. See description of the command SETDEFCFG in the chapter 11.10.1
V	Reset instrument configuration to the factory default	Forces the instrument to load the factory default settings
5	Boot from the default image	Exits the test and configuration menu and starts the instrument normally
X	Reboot the instrument	Forces the watchdog to completely restart the instrument
Y	Power off	Forces the watchdog to switch off the instrument

12.2. Hardware Setup and Monitor

κ	Instrument hardware parameters	Check what HW is installed in the instrument and adjust the number of sensors
N	Network settings	Enters the menu to adjust the network settings (dynamic or fixed IP, subnet and gateway), the PPP settings, enable/disable the SSH and Web Interface and configure the backup server. For details see chapter 8.2.

12.3. Test Functions

Ρ	Test RTC	Runs an automatic check of the RTC
N	Test GPS	Allows to the see the NMEA messages of the GPS

12.4. Security

0	Set password	Setting the password to prevent from unauthorised access to the
		current level of the test and configuration menu.

• Leave the test and configuration menu by pressing '5' or 'Y

12.5. Comparison of User Permissions

	User	Powerful User	Administrator
Flash Images and Boot Options	1	1	
List Flash images	Х	Х	Х
Reset instrument configuration to the user default	Х	Х	Х
Reset instrument configuration to the factory default	Х	Х	Х
Boot now	Х	Х	Х
Reboot the instrument	Х	Х	Х
Power off	Х	Х	Х
Hardware Setup and Monitor			
Instrument hardware parameters		Х	Х
Network settings	Х	Х	Х
Battery installation dates		Х	Х
Test Functions		-	_
Test RTC			Х
Test GPS			Х
Security			
Set password	Х	Х	Х
Reset passwords		Х	Х

 Table 16. Comparison of test and configuration menu users



13. Firmware Upgrades

All the firmware for

- Linux operating system
- armdas firmware
- RTC

can be upgraded by the user by using *GeoDAS* as described in the following chapters. The firmware will be released only as a complete package, containing all the firmwares listed above. Please see *www.geosig.com* \rightarrow *Support* \rightarrow *Downloads* to download the latest firmware release package.



Even there is no known case of data that has been lost during an upgrade proces, we recommend to back up all recorded data and the configuration before starting the upgrade.



After any firmware upgrade, the configuration and the correct function of the instrument should be fully verified.

If the instruments are configured to contact a server, it is possible to upgrade all or specific Instruments remotely using GeoDAS. Before trying to upgrade remotely, be sure the Instruments have a working network connection to the server. To proceed with the firmware upgrade, please do the following steps:

• Make right click on the Station in the GeoDAS main window and select Instrument Control...

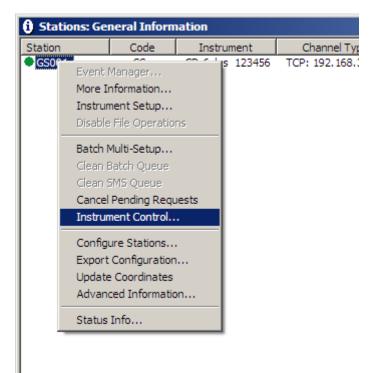


Figure 60. Select Instrument Control

• A list box will appear.

Communication Interface -	G5001	×
Action or a command	Request a File	Send
Attachment	Request a File Request Configuration Menu Options Request Network Configuration	
Request a file from the instrume	Request Recorder Configuration Request Trim Table	
User request GETEVT	Reset Error State Reset Trim Table	IM-DD HH:MM:SS N
Requests N seconds of ringbuf	Send a Request Send a Script Send an Upgrade	nd time
	Send Binary Network Configuration Send Network Configuration	
	Send Recorder Configuration	



- Select the item Send an Upgrade
- Press on the button Browse [...] to select the required firmware. Select a firmware container with the extension *.gsfw.
- If the file is selected, press the **Send** button. GeoDAS identifies the firmware and asks for confirmation. Please double check if the correct firmware has been selected.



• Upon pressing the **[Yes]** button, the firmware will be placed in the Outgoing directory, so that it can be collected by the instrument(s) upon next connection.

1 Stations: G	Stations: General Information						\times				
Station	Code	Instrument	Channel Type	Status Updated	Files	Free Memory	Last Event	Voltage	Current Ac	tivity	
GS001	GS_	CR-6plus 123456	TCP: 192.168.30.18	08.11.2013 at 14:21:23	0 (0)	2097151K (100%)	05.11.2013 at 14:45:35	AC, DC=13.58V	Not connected. Pending: RTC_123		
Figure 62, Pending upgrade on the server											

 As soon the instrument has downloaded the new firmware, the text <u>Pending: xxx.gsfw</u> disappears. The instrument will verify the firmware and once the upgrade process is finished, the instrument will restart.

When the instrument software receives such a file, it checks the actual version and only if the file contains more recent firmware than the existing one, it will start the upgrade. After the upgrade, the new firmware will be in "trial" mode and a reboot is done. If the reboot and instrument operation is correct, the new firmware will be accepted. If the instrument reboots through its watchdog because the firmware was faulty the previous firmware version will be used and the system will be restored to its state before the upgrade.

Downgrades to the older firmware versions might be required in some specific cases. They are possible, too. Please contact GeoSIG support for the exact procedure of such downgrade.

14. Remote Access to the Instrument over SSH

The following chapter is for advanced users only. Warranty will be void in case the operation of the device is negatively influenced because of changes on the root file system caused by a user.

Secure Shell (SSH) is a network protocol for secure data communication, remote shell services or command execution and other secure network services. It enables two networked computers to connect via a secure channel over an insecure network: a server and a client (running SSH server and SSH client programs, respectively).



The armdas console interface can not be used with SSH. This is a limitation of the armdas firmware

The instrument supports all types of remote access through SSH. A user can connect from his PC by SSH client program to the SSH server of the instrument. Simple ssh client program can be used for this purpose. Use *root* as login and corresponding password, the login information are

Login: root

Password: swiss

Sign '#' is a command prompt where you can type console commands.

The password can be changed by **passwd** command.

Warranty will be void in case password is changed and forgotten.

14.1. SSH Clients for Linux OS

For the Ubuntu or other Debian-like GNU/Linux OS, SSH client program, with command line interface, can be installed by command

\$ sudo apt-get install openssh-client

If a different Linux distribution is used, please refer to the documentation of your operating system on how to install the openssh client software.

To login into the instrument console, "ssh root@192.168.1.10" command can be issued from any terminal emulator as following figure shows:



Figure 63. Command line SSH client at terminal emulator

Alternatively, the PuTTY SSH client with GUI interface can be installed by command

\$ sudo apt-get install putty

This software can be found in a menu *Applications* \rightarrow *Internet* \rightarrow *PuTTY SSH Client* and its configuration dialog looks like:

×	PuTTY Configuration	
Category: Session Logging Terminal Keyboard Bell	Basic options for your PuTTY sess Specify the destination you want to connect Host Name (or IP address) 192.168.1.10 Connection type: O Raw O Telnet O Rlogin O SSH	E to Port 22
Features ▼ Window Appearance Behaviour Translation Selection Colours	Load, save or delete a stored session Saved Sessions	Load Save
Fonts Connection Data Proxy Telnet Rlogin Scu	Close window on exit: Always O Never O Only on cle	an exit
About	Open	Cancel

Figure 64. Configuration window of PuTTY

IP address 192.168.1.10 from examples above should be changed by real IP address of the instrument.

14.2. SSH Clients for Windows OS

The same PuTTY as for GNU/Linux OS or alternatively TeraTerm software can be used for Windows OS to have remote access to the instrument by means of SSH.

Its connection window is shown below

Tera Term: Ne	w connectio	n		X
⊙ TCP <u>/I</u> P		192.168.1.10 ✓ Hist <u>o</u> ry ○ Te <u>I</u> net ● <u>S</u> SH ○ Other	TCP <u>p</u> ort#: 22 SSH <u>v</u> ersion: SSH2 Proto <u>c</u> ol: <mark>UNSP</mark>	
○ S <u>e</u> rial	Po <u>r</u> t:			~
	ОК	Cancel	Help	

Figure 65. TeraTerm Connection Window

The PuTTY software for Windows OS operates the same as PuTTY for Linux OS.

The PuTTY software can be downloaded from <u>http://www.chiark.greenend.org.uk/~sgtatham/putty/</u>. The TeraTerm software can be downloaded from http://ttssh2.sourceforge.jp/.

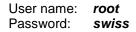
14.3. SFTP access for Windows OS

WinSCP is an open source free SFTP client for Windows. Its main function is the easy file transfer between a local computer and the instrument.

Session	Session		2000 C	
I Stored sessions	Host name:	Port number:		
Environment	192.168.1.10	192.168.1.10		
SSH	<u>U</u> ser name: <u>P</u> assword:			
Preferences	root	•••••		
	Protocol Eile protocol: SF	TP 🗾 🔽 Allow S(CP fallback	
			Select color	

Figure 66. WinSCP login window

To connect to the instrument put the IP of the CR-6plus and enter the following user name and password:



🛐 mmcblk0p1 - root@192.168.10.19 - WinSCP	
Ele <u>C</u> ommands <u>Mark</u> <u>Session</u> <u>View</u> <u>Help</u>	
Address 🗁 /media/mmcbik0p 1	- 🗃
← + → + 🖻 🙆 🖄 🙆 🗶 🐨 🖉 🏕 🗿 🔤 🧬 📽 🏵 🗞	
● 🗁 • 🗉 📦 • 🙀 Default 🔹 🍕 •	
Image: Second	A 5572 160222
	G SFIP-3 4 16:03:38

Figure 67. Explorer mode of WinSCP when connected to the instrument

It is then possible to browse through the available data on the instrument and copy files from or to the computer. The file structure is described in the following chapter.

The WinSCP can be downloaded from here: <u>http://winscp.net/eng/download.php</u>

14.4. File Structure on the Instrument

On the instrument the files are organized as following (The '/'-character separates directories):

/media/mmcblk01/... The location of the microSD card content.

Data/	Event files
Ringbuffers/	Permanent recording files
Logfiles/	Log files of armdas

The filenames contain the following information

XXX_SNSNSN_YYYYMMDD_HHMMSS.ext

	Extension	.msd .xml .txt .bin	Depending on file type MiniSEED containing waveform data SOH and PGM information LOG and ERR files MMA packets (special for Korean market)
	Time	HH MM SS	Hour Minutes Seconds
	 Date	YYYY MM DD	Year Month Day
	 S/N	SNSNSN	Six digit serial number of instrument
	Туре	TRG USR TTT CAL MAN RBF LOG SOH PGM	Event trigger User request Time table trigger File with test pulse Manual trigger Permanent recording Log files State of Health information PGM information of event

ERR Error messages

15. GeoDAS Settings

15.1. Configuration of Stations

To be able to communicate with the instrument, the GeoDAS must act as a server. This chapter should help to find the correct settings.

Open GeoDAS and Go to the menu Settings → Configure Stations..., the following window will appear

onfigured GSR Sta				Adding New GSR Station	
Station	Instrument	Channel Type	Opera Main B	1. Enter the unique station name (up to 5 characters)	
				2. Choose the type of instrument from the list	Unknown 💌
				2. Choose the type of instrument from the list	
				3. Enter serial number of the main board (optional)	0
				4. Type valid password to login to the instrument	1
				5. Re-type the same password to confirm it	
				6. Configure communication channel	Channel
				7. Specify work options	Options
			1 1		
1S Stations		1		8. Add new station to the list of existing ones	Add Now
15 Stations	Instrument	Serial Number	Firmware	8. Add new station to the list of existing ones Address	Public IP
IS Stations	GMSplus	101059	Firmware 21.03.00	8. Add new station to the list of existing ones Address 192.168.10.176:0	Public IP 192.168.10.217
IS Stations	GMSplus GMSplus	10 10 59 100 58 2	Firmware 21.03.00 21.03.00	S. Add new station to the list of existing ones Address 192.168 10.176:0 192.168.10.177:0	Public IP 192.168.10.217 192.168.10.137
IS Stations	GMSplus GMSplus GMSplus	101059 100582 100960	Firmware 21.03.00 21.03.00 (21.03.00	Add new station to the list of existing ones Address 192.168.10.176:0 192.468.10.137:0 192.468.10.137:0	Public IP 192, 168, 10, 217 192, 168, 10, 137 192, 168, 10, 188
IS Stations	GMSplus GMSplus GMSplus GMS-XX	101059 100582 100960 100844	Firmware 21.03.00 21.03.00 21.03.00 Unknown	8. Add new station to the list of existing ones Address 192. 166. 10. 176:0 192. 166. 10. 137:0 192. 166. 10. 137:0 192. 166. 10. 132:0	Public IP 192.168.10.217 192.168.10.137 192.168.10.138 192.168.10.113
15 Stations	GMSplus GMSplus GMSplus GMS-XX GMS-XX	101059 100582 100960 100844 100133	Firmware 21.03.00 21.03.00 Unknown Unknown	8. Add new station to the list of existing ones Address 192.168.10.176/0 192.168.10.137/0 192.168.10.113/0 192.168.10.113/0 192.168.10.113/0 192.168.10.113/0 192.168.10.113/0 192.168.10.113/0 192.168.10.113/0	Public IP 192, 168, 10, 217 192, 168, 10, 137 192, 168, 10, 188 192, 168, 10, 113 192, 168, 10, 113
45 Stations	GMSplus GMSplus GMSplus GMS-XX GMS-XX GMSplus	101059 100582 100960 100844 100133 100580	Firmware 21.03.00 21.03.00 21.03.00 Unknown Unknown 21.03.00	8. Add new station to the list of existing ones Address 192.166.10.176:0 192.166.10.137:0 192.165.10.137:0 192.165.10.130 192.165.10.130 192.165.10.137.0	Public IP 192.168.10.217 192.168.10.137 192.168.10.186 192.168.10.118 192.168.10.118 192.168.10.118
VIS Stations	GMSplus GMSplus GMSplus GMS-XX GMS-XX GMSplus GMSplus	101059 100582 100960 100844 100133 100580 101044	Firmware 21.03.00 21.03.00 Unknown 21.03.00 21.03.00 21.03.00	8. Add new station to the list of existing ones Address 192.168,10,176:0 192.168,10,137:0 192.168,10,118:0 192.168,10,118:0 192.168,10,118:0 192.168,10,167:0 192.168,	Public IP 192.168.10.217 192.168.10.137 192.168.10.138 192.168.10.138 192.168.10.118 192.168.10.167
MS Stations Station JEMO2 DEMO1 SS001 SS002 SS003 SS005 SS005 SS006 SS007 SS008	GMSplus GMSplus GMS-XX GMS-XX GMS-VX GMSplus GMSplus GMS-XX	101059 100582 100960 100844 100133 100580 101044 100210	Firmware 21.03.00 21.03.00 21.03.00 21.03.00 21.03.00 21.03.00 21.03.00 21.03.00 21.03.00 20.03.00	8. Add new station to the list of existing ones Address 192.168.10.176:0 192.168.10.137:0 192.168.10.1370 192.168.10.1370 192.168.10.1370 192.168.10.167:0 192.168.10.167:0 192.168.10.167:0 192.168.10.167:0 192.168.10.167:0 192.168.10.167:0 192.168.10.167:0 192.168.10.167:0 192.168.10.167:0 192.168.10.124:0	Public IP 192, 168, 10, 217 192, 168, 10, 127 192, 168, 10, 186 192, 168, 10, 186 192, 168, 10, 187 192, 168, 10, 102 192, 168, 10, 102
MS Stations	GMSplus GMSplus GMSplus GMS-XX GMS-XX GMSplus GMSplus	101059 100582 100960 100844 100133 100580 101044	Firmware 21.03.00 21.03.00 Unknown 21.03.00 21.03.00 21.03.00	8. Add new station to the list of existing ones Address 192.168,10,176:0 192.168,10,137:0 192.168,10,118:0 192.168,10,118:0 192.168,10,118:0 192.168,10,167:0 192.168,	Public IP 192.168.10.217 192.168.10.137 192.168.10.138 192.168.10.138 192.168.10.118 192.168.10.167
AS Stations	GMSplus GMSplus GMS-XX GMS-XX GMS-VX GMSplus GMSplus GMS-XX	101059 100582 100960 100844 100133 100580 101044 100210	Firmware 21.03.00 21.03.00 21.03.00 21.03.00 21.03.00 21.03.00 21.03.00 21.03.00 21.03.00 20.03.00	8. Add new station to the list of existing ones Address 192.168.10.176:0 192.168.10.187:0 192.168.10.187:0 192.168.10.1130 192.168.10.1130 192.168.10.167:0 192.168.10.168.10 192.168.10.167:0 192.168.10.167:0 192.168.10.167:0 192.168.10.168.10 192.168.10.167:0 192.168.10.168.10 192.168.10.168.10 192.168.10.168.10 192.168.10.168.10 192.	Public IP 192, 168, 10, 217 192, 168, 10, 127 192, 168, 10, 186 192, 168, 10, 186 192, 168, 10, 187 192, 168, 10, 102 192, 168, 10, 102
AS Stations	GMSplus GMSplus GMS-XX GMS-XX GMS-VX GMSplus GMSplus GMS-XX	101059 100582 100960 100844 100133 100580 101044 100210	Firmware 21.03.00 21.03.00 21.03.00 21.03.00 21.03.00 21.03.00 21.03.00 21.03.00 21.03.00 20.03.00	8. Add new station to the list of existing ones Address 192.168.10.176:0 192.168.10.187:0 192.168.10.187:0 192.168.10.1130 192.168.10.1130 192.168.10.167:0 192.168.10.168.10 192.168.10.167:0 192.168.10.167:0 192.168.10.167:0 192.168.10.168.10 192.168.10.167:0 192.168.10.168.10 192.168.10.168.10 192.168.10.168.10 192.168.10.168.10 192.	Public IP 192, 168, 10, 217 192, 168, 10, 127 192, 168, 10, 186 192, 168, 10, 186 192, 168, 10, 187 192, 168, 10, 102 192, 168, 10, 102

Figure 68. Configuration Stations

Area	Торіс	Description			
1	Configured GSR Stations	Details about the configured GSR-xx and GCR-xx stations. Check separate <i>GeoDAS Manual</i> for details.			
2	GMS / CR-6plus Stations	Details about the configured instruments. All instruments connected to the same network will be listed in grey.			
		<i>Station</i> name can be changed by a double click on the field you want to change.			
		The column <i>Instrument</i> and <i>Serial Number</i> shows the instrument type and its serial number.			
		The <i>Firmware</i> column shows the firmware version of the main data acquisition firmware.			
		The Public IP shows from where the instrument is connected to the server. In case the instrument is behind a router or firewall, then this IP will be shown. Network settings can be done according to chapter 9. In case one wants to connect manually to the instrument, then GeoDAS is trying on the address and port listed under Address .			
		The last column in the table is <i>Status</i> , which is indicated by one or more letters, which are the following:			
		 N – New instrument C – already Configured earlier A – Altered parameters R – actual settings were Received from the instrument 			
3	Server Settings	For configuration of the Server, see chapter 15.2			

GeoSIG LL 104 / 112

15.1.1. Add a new Instrument

All instruments connected to the same network will be listed in grey. To add one of these stations into the current configuration do the following steps:

- Select the instrument and make a *right click*
- Click on Add Station to Current Configuration
- Press OK

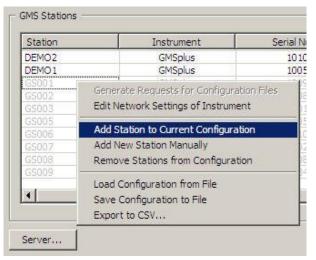


Figure 69. Add Station to Current Configuration

In case the instrument is not in the local network and can not directly be accessed, then press Add New Station Manually and enter the serial number of the instrument.

15.1.2. Remove an Instrument

To remove one of the stations of the current configuration do the following steps:

- Select the instrument and make a *right click*
- Click on Remove Station from Configuration
- Press OK

Station		Instrument	Ser
DEMO2		GMSplus	
DEMO1 GS001 GS002		e Requests for Configuration vork Settings of Instrument	r Files
GS003 GS005 GS006		ion to Current Configuration Station Manually	rs:
GS007	Remove	Stations from Configuration	
GS008 GS009		ifiguration from File ofiguration to File o CSV	

Figure 70. Remove Station to Current Configuration

For more details please see GeoDAS Manual

15.2. Configuration of Server Parameters

Network Settings	Miscellaneous Options
My server IP address 0.0.0.0	Network error is declared if no communication with a station, minutes 360
Server port 3456	State-of-health forwarding minimum interval, minutes
Timeout, seconds 40	Do not delete received State-of-Health files right after processing
	Life time of any files other than data arriving from stations, days
Event Declaration	Customised Data Processing
Declare and process triggers of seismic network	Exchange data with external applications using the following shared directory
Minumum number of stations to trigger	
Network time frame, seconds	Upload data to a remote file server Server Settings
Convert event files to the Seisan format	Force processing of data files recorded earlier Browse for Files
Seisan default database name	Support for an extended data processing and reporting, including server functions
Delete original files after conversion	Display data processing summary information screen (demo mode)
	☐ Retrieve results of processing from the server 0.0.0.0.3456

Press the button Server..., the window below appears

Figure 71. Data server parameter

Group of Controls	Description
Network Settings	<i>IP address and port</i> of the server, i.e. computer which GeoDAS is running on as well as the network <i>Timeout</i> in seconds. If server has several network interfaces and connections from Instruments are expected from only one of them, then its IP address must be specified. Otherwise, leave it zero, which means that GeoDAS accepts incoming connection at any interface. The timeout is used to decide when to terminate current network connection if the remote party does not respond within the indicated time interval.
Miscellaneous Options	Network error is declared if an instrument did not communicate with <i>GeoDAS</i> within the indicated period of time. Make sure that this parameter is higher that the communication interval set in the instrument as described in chapter 11.8.
	If State-of-health forwarding interval is set to nonzero value, then SOH reports are collected within this period of time and only then are forwarded. You can also choose not to delete SOH reports after processing. If this option is
	selected, all received SOH reports remain in the directory \\GeoDAS_DATA\StatusFiles\InfoSOH\
Event Detection	GeoDAS can be instructed to analyse event data files received from configured CR-6plus instruments to see if they belong to the same earthquake and to declare an event if it is so. You need to enable the option Declare and process triggers of seismic network in order to do so.
	A network event is declared if at least <i>Minimum number of stations triggered</i> within the <i>Network time frame</i> . Received even files can be converted to Seisan format and stored in Seisan database on the same computer.
Customised Data Processing	This is not a standard feature of GeoDAS. Therefore please check the GeoDAS Manual and contact GeoSIG for further details if you need to use this functionality.

15.3. Instrument Control in GeoDAS

By making a right click on the station name in the window *Stations: General Information* several options become available to control and check the instrument. See the figure below:

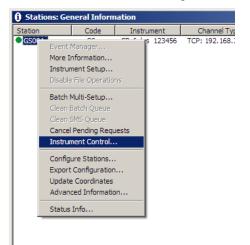


Figure 72, Instrument control of the CR-6plus in GeoDAS

15.3.1. More Information... (State of Health of the instrument)

The status of the instruments can be easily checked, if the instrument is set up to transfer periodically the SOH file to the server (See details about SOH configuration in chapter 0 and 0).

• Make right click on the Station in the GeoDAS main window and select *More Information...*, the following window will appear:

CR-6plus Status and Basic Information	
Station GS001 Serial number 123456	Status date and time 2013-11-08 13:04:42 Update Close
Firmware Linux GeoSIG/ARM rootfs-vmx51-3 Linux vmx51 3.8.1 Bootloader 26.05.00-a10 RTC 80.02.02-a1 Firmware 26.05.00-a10 DSP 50.03.00 Files and Memory D Queued events 0 Last event 2013-11-05 14:45:35 0 0 Idest data 2013-11-07 13:10:40 0 0 Total space 7319.4 MB Free space 4369.9 MB Power Source External Voltage 13.6 V Minimum voltage since last SOH report 13.6 V 3.0 V	Errors and Warnings Event storage is full Event storage is used for more than 90% Reading from a file failed. File corrupted? Non-critical configuration problem An error in a system call Error deleting a file Unexpected but not critical event Non-critical error during operation with ringbuffers Beyond the limit of a firmware resource Non-critical error during the file transfer I2C data transfer error Error ploading file(s) to a server Error allocation or hardware) DSP buffer overflow Generic DSP error (communication or hardware) DSP buffer overflow Generic RTC error (communication or hardware) An error in a file failed. Disk full? Network error Status DK Error Status DK Error Warning Notextur information available yet Status DK Error Marting Notexture infiguration or available yet Notexture infiguration available yet Nonecritical infiguration available yet Nonecritical infiguration with infiguration infiguration available yet Nonecritical synchonisation available yet N
Configuration and Restarts Runs since 2013-11-08 13:03:02 Last configuration 2013-11-05 14:28:31 Last shutdown 2013-11-08 13:02:01 Last shutdown reason User Restart	Timing and GPS Miscellaneous Time source NTP GPS Status Unavailable RTC sync status Frozen Estimated drift rate 3 PPS Last sync 2013-11-08 08:11:50

Figure 73. SOH information in GeoDAS

Information Area	Description
Status date and time	Before analysing the SOH data always make sure that the SOH files are current ones by checking the time and date here.
Firmware	Here the firmware versions of all components can be viewed.
File and Memory	Information about events and available memory.
Configuration and Restarts	Date and time of the last restart, the last configuration change and the last shutdown are shown. Additionally the reason of the last shutdown is indicated.
Miscellaneous	Ambient temperature, measured inside the instrument.
Errors and Warnings	List of all errors and warnings of the instrument.
Timing	Status of the RTC.
Power	Status of the power supply and the battery voltages.

15.3.2. Instrument Setup...

See the chapter 11.2.2 for details.

15.3.3. Cancel Pending Request

The pending requests on the server as shown in the Figure Figure 62 can be cancelled by the user.

15.3.4. CR-6plus Communication Interface

• Make right click on the Station in the GeoDAS main window and select *Instrument Control...*, the following window will appear:

Communication Interface -	×	
Action or a command	Request a File	Send
	Request a File	
Attachment	Request Configuration Menu Options	
Bequest a file from the instrum	Request Network Configuration Request Recorder Configuration	
	Request Trim Table Reset Error State	
User request GETEVT	Reset Trim Table	(M-DD HH:MM:SS N
B (N) (1 (1)	Send a Request	12
Requests N seconds of ringbut	Send a Script Send an Upgrade	nd time
	Send Binary Network Configuration	
	Send Network Configuration Send Recorder Configuration	

Figure 74. CR-6plus Communication Interface

Action or command	Description	
Request a File	Request a file from the instrument, the full path to the file must be specified	
Request Configuration Menu Options	The instrument uploads the structure of the configuration menu and saves the file in \\GeoDAS_DATA\Config\Stationname.mnu. This file is needed for offline configuration of the instrument as described in chapter 11.2.1.	
Request Network Configuration	The instrument uploads the network settings of the instrument and saves the file in \\GeoDAS_DATA\Config\Stationname.net	
Request Recorder Configuration	The instrument uploads the configuration of the instrument and saves the file in \\GeoDAS_DATA\Config\Stationname.xml. This file is needed for offline configuration of the instrument as described in chapter 11.2.1.	
Request Trim Table	The instrument will upload a SOH file containing the actual values from the RTC trim table. The latest SOH file can be found under \\GeoDAS_DATA\StatusFiles\InfoSOH.xml	
Reset Error State	The instrument will clear all errors and warnings	
Reset Trim Table	The instrument will clear the RTC trim table	
Send a Request	Sends a user request to the instrument. For details see chapter 11.10.1	
Send a Script	The instrument will download and execute the attached script. This function is for advanced users only, as it can seriously damage the instrument if the script is not written correctly.	
Send an Upgrade	The instrument will download the attached file, which can be any type of the firmware, namely: Bootloader, RTC, main firmware and/or the entire Linux image. More details about the upgrade of the firmware see chapter 13.	
Send Binary Network Configuration	The instrument will download binary network configuration file from the server.	
Send Network Configuration	The instrument will download the attached manually adjusted network configuration file from the server.	
Send Recorder Configuration	The instrument will download the attached manually adjusted recorder configuration from the server.	

15.4. Open recorded miniSEED files in GeoDAS

The system is recording miniSEED files (.MSD). For viewing such files, GeoDAS can be used. As the signal is stored inside the mini-seed file in counts, a scaling factor has to be applied when opening the data. If an *Extended format of MiniSEED files* is used (see the chapter 0), scaling factors are applied by GeoDAS automatically, and you may skip the information below.

- Open GeoDAS
- Open recorded mini-seed file from the menu *File → Open...*



Event files are stored under: Ringbuffer files are stored under: Testpulses are stored under: \\GeoDAS_DATA\Data\STATION_NAME \\GeoDAS_DATA\DataStreams\STATION_NAME \\GeoDAS_DATA\Incoming\WNNNNN

• When you open a '.MSD' file with GeoDAS, the following dialog box for scaling factor appears

Parameters of miniSEE	D files				
Channel name	Default	Add			
Physical units	g	Remove			
Counts per physical unit	2516582				
Open different channels in the same graph window					
Note: all channels must have same sampling rate and their data sets must overlap in time					
Always use the current parameters by default					
		ОК			

Figure 75, GeoDAS miniSEED parameters

• The values *Physical unit* and *Counts per physical unit* must be set for correct display data in GeoSIG software GeoDAS. The values can be found in the Table 17 or calculated as described in chapter 15.4.2.

Do not tick "Always use the current parameters by default" as it is better to be remembered that scale has to be defined manually for such file type.

Press OK

• If instead of the scale prompt you get directly the graph, use menu: Analyse → Parameters... → Parameters of miniSEED files and press Edit:

Parameters of the Analysis Functions					
Select the	function from the list and click the button to edit the d	efault			
Function	Parameters of miniSEED files	Edit			
		Exit			

Figure 76, GeoDAS analyses parameters

• Now the dialog box for scaling factor should be seen. Enter the correct values, close and reopen the file you want to see. You will be prompted again for scale, just press Ok as the scale is now correct.

15.4.1. Save predefined Scaling Factors

The scaling factor set under Counts per physical unit is always valid for all channels in the same miniSEED file. In case the channels have different physical units (e.g. if a six channel instrument with two different types of sensors is used) a scaling factor for each channel separately can be defined.

To define a scaling factor for a specific channel, enter the full channel name (e.g. LCAX1) in the *filed Channel name* and press *Add*

All channels which are not specifically defined are converted with the scaling factor saved under *Default*.

15.4.2. Calculation of the Scaling Factors

If you don't know how to calculate the scaling factor, follow these steps:

15.4.2.1. Sensors with given full scale

Output Voltage of the sensor must be +/- 10 V

$$LSB = \frac{FullScale}{0.9 \cdot 2^{23}} = \frac{FullScale}{754'9747.2}$$

Scale factor = $\frac{1}{LSB} = \frac{0.9 \cdot 2^{23}}{FullScale} = \frac{754'9747.2}{FullScale}$

Example, 3 g sensor
Scaling factor =
$$\frac{0.9 \cdot 2^{23} counts}{3g} = \frac{754'9747.2 counts}{3g} = \frac{2516582 counts/g}{2516582 counts/g}$$

15.4.2.2. Sensors with given Sensitivity

$$LSB = \frac{\frac{10V}{Sensitivity}}{0.9 \cdot 2^{23} counts} = \frac{1.324547e - 6\frac{V}{counts}}{Sensitivity}$$
Scale factor = $\frac{1}{LSB} = \frac{0.9 \cdot 2^{23} counts}{\frac{10V}{Sensitivity}} = \frac{Sensitivity}{1.324547e - 6\frac{V}{counts}}$

$$\begin{aligned}
\text{Example, 1000 V/m/s sensor} \\
\text{LSB} &= \frac{0.9 \cdot 2^{23}}{\frac{10V}{1000 \frac{V}{m/s}}} = \frac{1000 \frac{V}{m/s}}{1.324547e - 6 \frac{V}{counts}} = \frac{150994944 \frac{counts}{m/s}}{\frac{1000 \frac{V}{m/s}}{m/s}}
\end{aligned}$$

Sensor type	Full Scale	Output Voltage Range	Scaling factor
AC-xx	0.5 g	+/- 10 V	15'099'494 counts/g
	1 g	+/- 10 V	7'549'747 counts/g
	2 g	+/- 10 V	3'774'874 counts/g
	3 g	+/- 10 V	2'516'582 counts/g
	4 g	+/- 10 V	1'887'437 counts/g
VE-13	1 mm/s	+/- 10 V	7'549'747 counts/mm/s
VE-23	10 mm/s	+/- 10 V	754'975 counts/mm/s
	100 mm/s	+/- 10 V	75'497 counts/mm/s
VE-33	Sensitivity: 27.3 V/m/s (27.3 Vs/m)		20'610'820 counts/m/s
			20'611 counts/mm/s
VE-53	Sensitivity: 1000 V/m/s (2x 500 V/m/s)		754'974'720 counts/m/s
			754'974 counts/mm/s
	Sensitivity: 200 V/m/s (2x 100 V/m/s)		150'994'944 counts/m/s
			150'994 counts/mm/s

The scaling factors of all GeoSIG sensors can be found in the following table

Table 17. Scaling factors of different sensors

16. Maintenance

The Instrument has been designed in a way that it requires a minimum of maintenance. If the following procedures are performed frequently, the instrument will last for many years:

- The periodic test indicates any irregularity as soon as it occurs. Therefore it is recommended, to check the recorded sensor test at least **once a year**. Compare the signals of the 3 channels with older records. There should not be a distinctive change.
- The physical condition of the Instrument and the sensor should be checked **annually**. Make sure every cable and connector is in good condition and plugged in properly.
- The optional battery should be replaced every **3 years**. After replacement, adjust the date of installation and the date of the next replacement into the Instrument via GeoDAS.
- The backup battery on the CR6-SBC Slot-In Module should be replaced every **5 years**.

Index

Α

Accessories	
Optional	
Adding New Stations	
Alarm	
Relays	66

В

Backup Server	
Battery	
Backup	
Backup	
Main	
Battery, backup	

С

Cellular Modem	
Channel Naming	59
Communication Interface	
Configuration	
Channels	
Communication	78
Data Streams	60
Preset Trigger	73
Trigger	64

D

Data Explorer Data Server	
_	

Ε

Event	27, 64, 74
-	

F

File Structure	99
Firmware Upgrade	29

G

GeoDAS Settings	
GPRS	
GPS	

I

Interconnection	69
IP Address	
Set static or dynamic	
L	
LSB Factor	

Μ

mmcblk01	
Mobile 3G	
More Information menu	

Ν

Network Settings	
Get IP from Instrument	
Wired Ethernet	
Network trigger	80, 81
NTP	85, 86

Ρ

Post-Event Time	
Power Supply	
Pre-Event Time	
Preset Trigger	
Principle of Operation	

Q

Quick Start

S

Scaling Factors	
Scaling Factors	
SFTP	
SSH	
STA/LTA	
State of Health (SOH)	
Storage	
Files	
Instrument	
Switch ON/OFF	

т

Temperature Calibration	89
Terminal	
Test and Configuration Menu	
Administrator, Powerful User, User	
Trigger	
ŠTA/LTA	68
Time Frame	
Weight	68
5	

U

Upgrades, Firmware	
User requests	88

W

Warranty	10
Web Interface	40