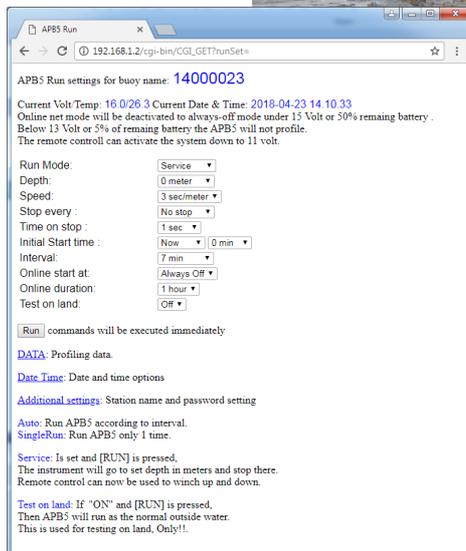


# Automatic Profiling Buoy

## APB5

### Operating Manual

#### Program version 4.xx, 5- 5.xxb



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## Introduction

The APB5 is designed for automatic profiling and monitoring of water quality in coastal waters, fjords, lakes and fish farms.

In near-shore application (such as fish farms), the buoy is normally powered from an external cable supply. Further offshore or in remote locations, the buoy is self-contained with power from a combination of solar panels and wind turbines.

Via the control unit the buoy can be remotely programmed to desired profiling frequency and depth. In between profiles, the sensor unit rests above the water inside the buoy, which eliminates befouling on the instruments. The sensor unit requires a wireless RS232 in/out feature and low battery consumption, therefore the CTD Multi-Parameter SD208/SD204W is perfect for this use.

### Versions:

- 4.xx\_xxm has lithium batteries with 16.8 volt. 3 power gates for winch, 1 for RDCP
  - 5.xxb\_xxm has lithium batteries with 16.8 volt. 2 power gates for winch, 2 for RDCP.
  - 5.xx\_xxm has lithium Lifepo4 batteries 14.4 volt. 2 power gates for winch, 2 for RDCP
  - 5.xxbHD\_xxm lithium batteries 16.8volt, 2 power gates for winch, 2 for RDCP.  
Bigger buoy.
- m = with number in front is depth. Is not possible to change rope length without changing program. More than 75 meters will need a titanium drum. Winch has a POM(Polyoxymethylene) made drum for rope up to 75 meter

### Features:

- No Biofouling on Sensors
- No Cable / Connectors
- Real-Time Data on Webpage, accessible on Internet (HTTP)
- Two-Way Communication
- Programmable Speed, Depth & Intermediate Stops
- GPRS & Satellite (INMARSAT/Iridium)
- Profiling Depth: - Standard 75m - Ext. 150m
- Weather Station (Optional)
- Current Speed/Direction from ADCP (Optional)
- FTP, E-mail, SMS, NTP, (WIFI Optional)
- 32 GByte USB memory-pen storage

### System overview

The buoy contains a control unit, CU801B, an Embedded Web Server, a GSM/GPRS/EDGE or satellite (INMARSAT/Iridium) router, a winch, a short range radio for communication with sensor unit, solar cells and battery pack (Fig 1, Appendix 1A).



Fig 1. The APB5 buoy.

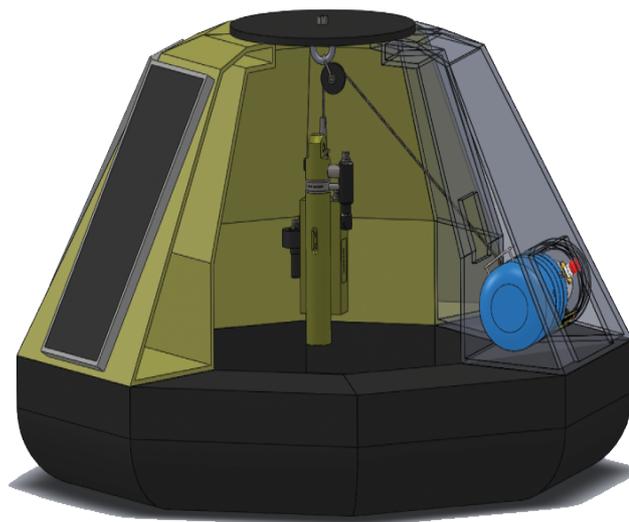


Fig 2. A cross section of the APB5 showing the multi-parameter CTD sensor in park position inside the buoy and the winch system



Fig 3. Components of the APB5: 1 = Main electronics (CU801B) and batteries (3 identical cylinders), 2 = Winch, 3 = Remote control, 4 = CTD with optional sensors and protection kit.

***Power: Solar panels or Power cabinet w/cable***

The APB5 system is powered from solar panels on the buoy body. The APB5 system can also be powered via cable connection from a power cabinet that is either placed on land or in a floating device close by. The cabinet contains 2 chargers.

**Initial setup (on land):**

- 1) Activate power switch (The Power Switch is set to off when APB5 is transported or stored for long time).
  - The power switch (Fig 4) is located on the inside of the buoy and accessible from below.



Fig. 4. Power switch box inside the buoy.

- Open the switch box with a screwdriver (4 screws)
- Turn on (=1) the black switch
- Fasten the lid back on the box with the 4 screws (not too tight)

- 2) Mount and setup the CTD sensor:

CTD/STD must be the SAIV model SD204(W)/SD208, where (W) stands for Wireless (built in radio unit). The CTD unit has been initialized for buoy deployment from the factory.

The SD204/SD208 must be mounted with a protection kit (Fig 5) before the sensor is installed in the buoy. This is usually done from the factory.

- 3) SIM card:

APB5 must have an active SIM-card installed in the router and the web address must be configured. This is done by the supplier. If the USER wishes to replace the SIM-card, see Appendix - section “LR77-v2 and SIM card” for router setup and SIM-installation.

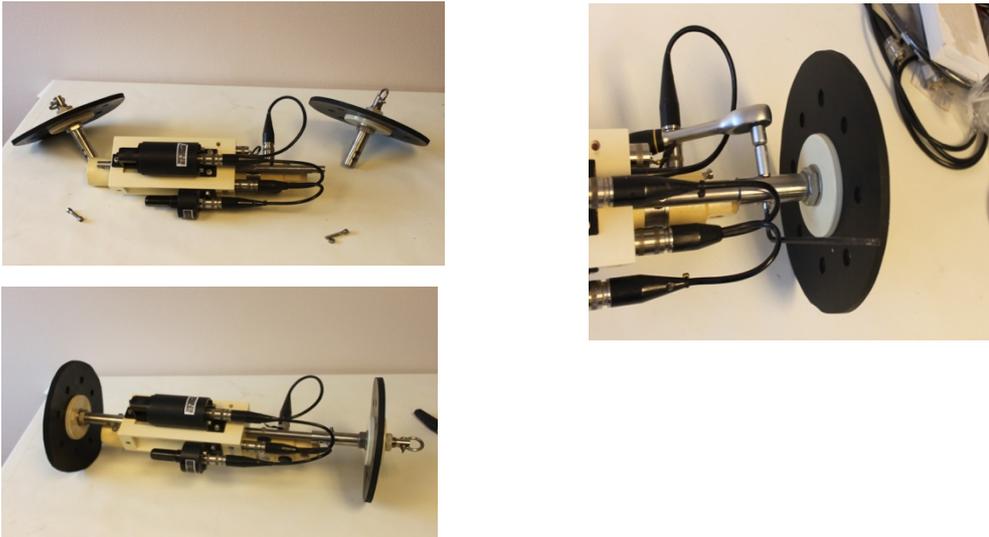


Fig.5. The CTD sensor mounted with protection kit for buoy operation.

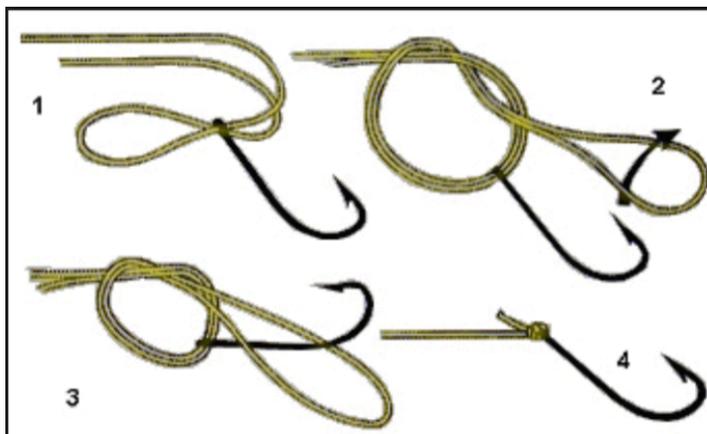
Installing the CTD: End stop and knot protector.

Connect the SD204/SD208 to the winch rope (usually prepared from factory). A combined end stop and knot protector is used. The recommended knot is a clove hitch with a half hitch to lock it.



Fig 6. A clove hitch is used to fasten the CTD to the winch rope.

Alternative is a FireLine Knot:



- 4) Test communication between CTD and web server (see page 9). **NB!** This test requires that the run settings in the operation setup (page 10) is set to [Single run] in the Run Mode, and [ON] in “Test on land” (See Fig 10) and that there is a least 1 m free clearance under the buoy. When pressing [Run] the system will perform a single run. The sensor will always stop for about 20 seconds for climate calibration half a meter below the park position, before proceeding. This test will confirm that there is communication between the CTD and the web server.

The system is now ready for deployment. Secure anchoring is performed by customer. An example is given in Fig 7:

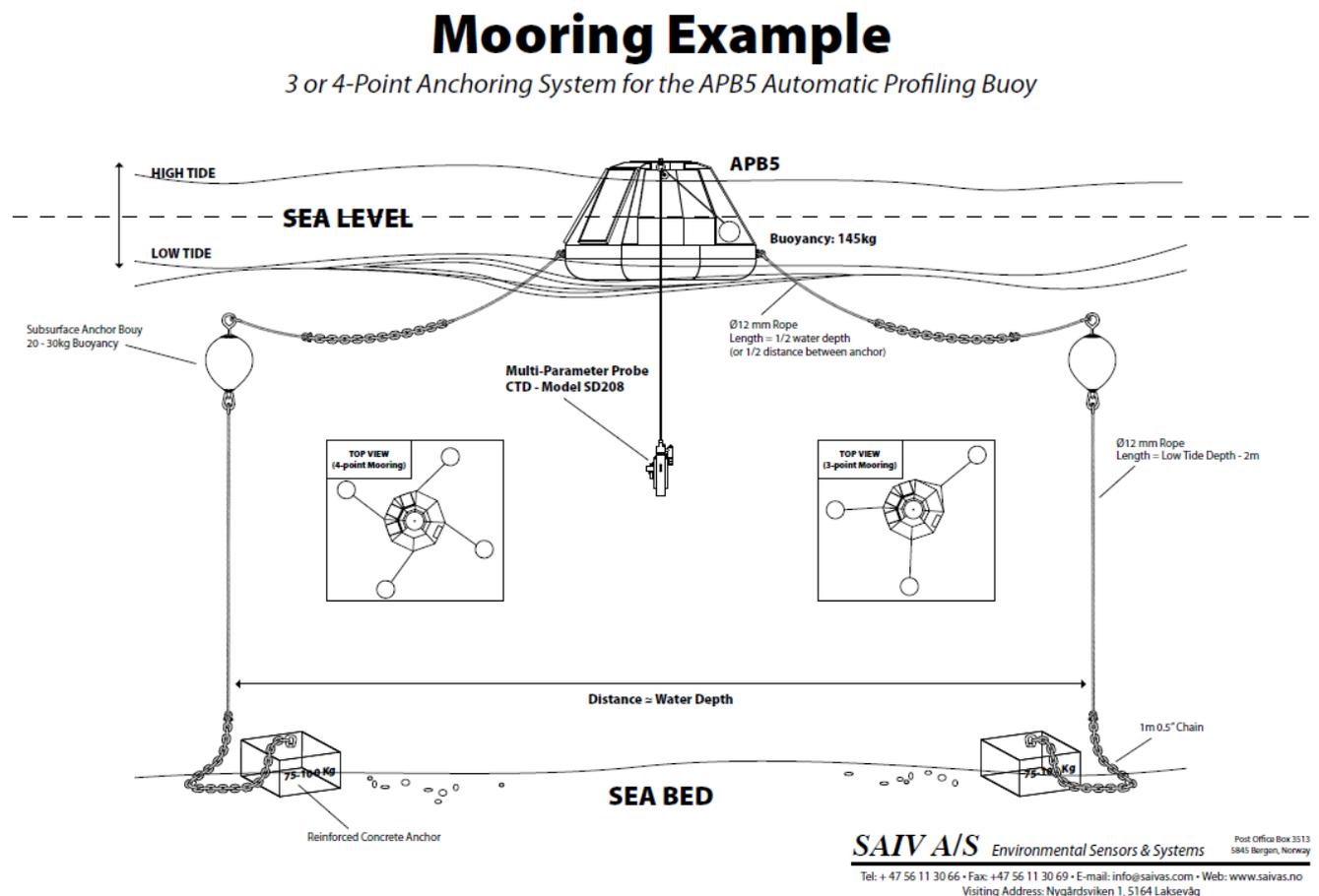


Fig 7. An example of how to moor the APB5 system. *The Illustration shows chain in the middle of the rope between surface buoy and APB5. The correct will be that the chain is fasten directly on the APB5. Length off chain is 1,5-2 meter.*

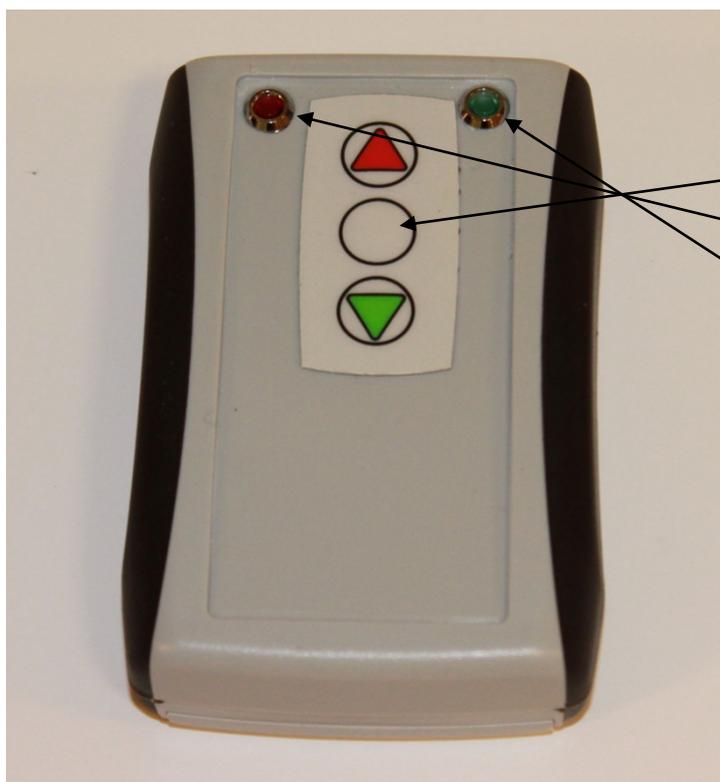
Remember to fill out the “Check list before start” (Appendix 1B) before setting the system in full operation.

### Remote control:

The remote control is usually only used to operate and control the winch when the APB5-system is in service (maintenance) mode. For communication between the remote control and the buoy, the address on the remote control has to be same as the CTD serial number.

Service mode or Maintenance mode can be obtained in 3 ways:

1. Wake with Remote Control: When the system is offline: Hold the middle of the remote control button the red light get on. Hold for at least 30-40 seconds until the red turn off and green light turns on. This option is only available between 0900 and 1600 hour. (Fig 8). NB. When using this option the system is only active until the next whole hour, after which it closes down.
2. Via WIFI(system online): Set the unit in service mode from the “Aprun.htm” APB5 internal web page (Fig 10).
3. Via external server “TOP SYSTEM”: Log into <station.saivas.net/”Serial-number”/apr> , sett system to service and always online. When APB5 check for new setting at 0900 next morning it will read this new settings and change to service mode. Access log can be checked to see if the APB5 have read setting. If depth is also set it will lower the instrument to this depth and remain there until new commands from user.
4. Some remotes have an USB cable attached, this can be used to program the remote with a different address if the instrument is changed, or used with a different APB5 unit.



**How to call and operate the buoy from remote control when system is offline:**

- Press the middle button.
- The red light will turn on.
- Hold the button until the red light goes off and the green light goes on.
- The system is now online and set in service mode.
- Arrows UP/DOWN can be used to winch the instrument up and down. Toggle arrow buttons to control speed

Fig 8. The remote control can be used to operate the winch manually in service mode or to “wake up” the buoy if offline (between 9am and 16 pm.. Maximum distance between the buoy and the remote control is 40-60 m.

The Remote Control uses 2 pc. AA 1,5volt alkaline batteries

## ***Operation of APB5***

The system is accessed and configured via the remote control, the internal APB5 web page or the web page for the APB5 Top System. The choice of these different access ways for operation is partly depending on the available power supply to the system. Under limited power supply, such as when the buoy is supplied by its own solar panels, the APB5 should preferably be offline in ‘sleeping’ mode in between profiling tasks. When the APB5 is ‘sleeping’ the system can only be contacted via the remote control within a 50-60 m radius, and only between 9 am and 16 pm ‘buoy time’ (set under Time zone and DNS settings). Direct remote access via the internet is only possible when the APB5 is ‘awake’ and online (these periods are optionally selected and depends on the profiling interval settings, see Fig 10). The ‘sleeping’ mode is thus necessary in order to save power. In case of external cable supplied power, the system can be continuously online, as power is no longer a limitation.

There are two different ways to access the APB5 via the Internet: Either instantly from the user when the system is awake and online (via Aprun.htm), or indirectly when the system ‘wakes up’, goes online and calls its command center (The “APB5 Top System”, a dedicated software package installed on a web server). Thus, when the APB5 is ‘awake’ it is also online, and the system can be accessed directly via the internet page. When the system is not ‘awake’ settings can be selected and set in “APB5 Top System”. New commands will then first be executed when the APB5 ‘wakes up’ and contacts the APB5 Top System (via GPRS or satellite). See Table 1 (page 12) for when the APB5 makes calls to the “APB5 Top System”

## ***The APB5 Top System***

APB5 is connected to a web server via the Internet and communicates with the “APB5 Top System” in order to receive operating commands and download recorded data.

To access the APB5 Top System on the web server enter:

station.saivas.net/SERIALNUMBER

Username: SERIALNUMBER

Password: \*\*\*\* (apb5)

For getting the presetting page type /apr = station.saivas.net/SERIALNUMBER/apr  
When the APB5-system is in “ALWAYS OFF” mode or “WINDOW TIME” – changes in settings can only be done from this page (Fig 9). APB5 will intermittently go online and contact the APB5 Top System (Table 1) for two-way communication. It will also read and install new settings in same request. Setting options in the command page of the “APB5 Top System” (Fig 9) are similar to the APB5’s internal webpage “Aprun.htm” (Fig 10, page 14).

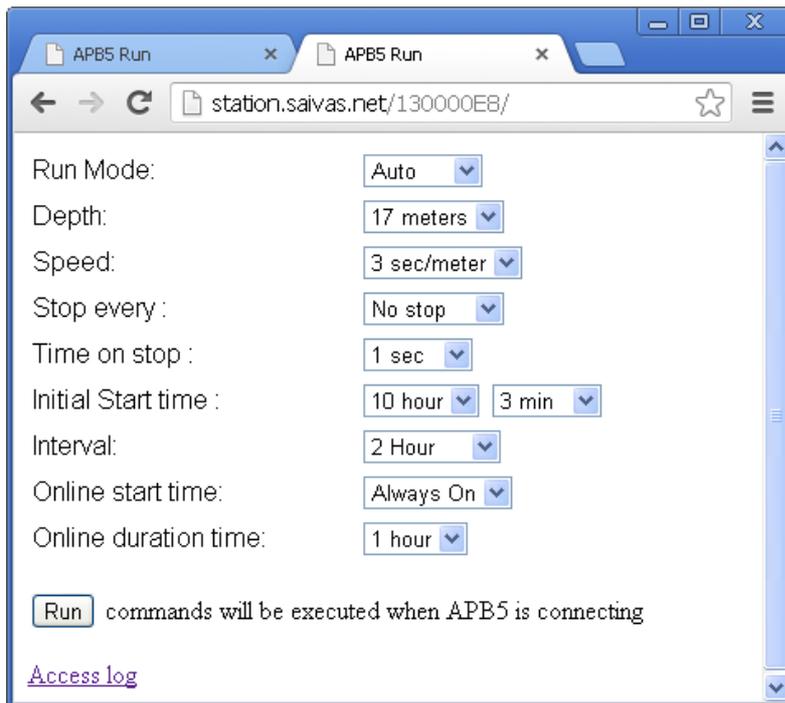


Fig 9. The Operation configuration page for the APB5 Top System.

Note that for the time being new settings will not be displayed when reopening the APB5 Top System. Only default values. You can always see the current settings in the stored data text files on the FTP server (Fig 18) or the Internet page “dump.htm” (fig 11) when the APB5 is online.

The configuration and run page (Fig 9) consists of the following operation options:

**Run Mode (options):**

- Auto:* Continuous profiling according to set intervals.
- Single run:* Performs one profile and then turns off.
- Off:* System is not active. In order to start homepage *Aprun.htm*
- Service:* Used for manual operation via remote control, maintenance, changing batteries in CTD or to change pulleys/rope See section on maintenance.
- Transport:* Used for shipment - Everything is off- Can only be woken by remote control between (9-16 buoy time)

**Depth:** Set the maximum depth of profiling (max 75 or 150 m depending on model).

**Speed:** Select between 3 profiling speeds: 3(standard), 6 or 9 seconds per meter. The speed is dependent on numbers of sensor variables and how many measurements are needed per recording interval. Example: 1 sec intervals and a speed of 9 s/m yields one measurement per 11 cm.

**Stop every:** Select stop intervals on the way down (there are no stops on the way up). If one chooses to stop the instrument every 3 meters on a profiling run of a max depth of 21 meters, the winch will stop on 3,6,9,12,15 and 18 meters before it reaches 21 meter and eventually returns to docking position.

Time on stop: Choose required time duration per stop (in seconds). Selected time will apply to all stops in a given profile.

Initial Start time: Select the desired start time of profiling. [NOW] will start the APB5 immediately when pressing [RUN] if the Aprun.htm is used (if the APB5 Top System is used, the APB5 will start immediately when the APB5 contacts the Top System). If [06 hour] is selected the system will start at 6 am, If [23 hour] is selected it starts at 23 pm etc.  
If mode= [Auto start] the start time + interval time will begin next run.

Interval: Selected interval time (in minutes) between profiles. It is important not to select a profiling interval that is shorter than the total time of one profile. Total time for one profile can be tested by running a “Single run” and the total time will then be available on the “dump.htm” page (Fig 11). See section on dump.htm (page 15).

Online start at:

*Always on:* means that the APB5 is always online. As this is power consuming the option should not be used over long periods of time, unless there is unlimited access to external power. APB5 will turn itself “Offline” if battery is below 25,0 V. If battery increase to 25,5V the APB5 will go “Online” again

*Select given online time: (Net= 9-1):*

eg.. 09: the system will go online at 09 am and be online according to selected “Online duration” (hours). The remote control can also wake system between 9am and 16pm in this mode.

*Always off:* (Net= Offline)\_System is off. Can only be woken by the remote control (between 9am to 16:00) or via the APB5 Top System at 09:00 am if command to wake up has been given in the Top System.

Online duration: allows you select the time the system is online in given online time, eg 1 hour, 3 hours etc

Access log: This will open the log window to show which changes have been executed:

When there is no change (Read = 1):

2014/01/20 12:42:24 Europe/Oslo +0100GMT IP:46.66.182.153,  
Read:1

When there are changes (Set = set is generated by Fig. 9.)

2014/01/24 10:01:20 Europe/Oslo +0100GMT IP:46.66.171.93,  
Set:0,1,5,3,0,1,24,0,30,17,1

If FTP is active:

The APB5 will check the APB5 Top System every day at 0900 for changes or each time data are sent from the APB5-buoy to the FTP server.

Table 1. APB5 calls to the command server (APB5 Top System) depends on the setup configuration of when it is Online, the selected Run mode and the FTP settings:

<b>Online start at</b>	<b>Run mode</b>	<b>FTP</b>	<b>Request Top System</b>
Always off	Profiling	On	Every profile
Always off	Profiling	Off	At 0900
Always off	Off	---	At 0900
Duration (1-6 hour)	Profiling	On	Every profile
Duration (1-6 hour)	Profiling	Off	When enter duration time
Duration (1-6 hour)	Off	---	When enter duration time
Online	Profiling	On	Every profile
Online	Profiling	Off	Never
Online	Off	---	Never

### ***Access via the APB5 intranet(direct access)***

Direct access is only possible when user is in WIFI range or Public IP is available.

Norway mobile supplier is the only one that can supply public IP form a mobile SIM card. If you not have a Norwegian SIM-card than public IP is most likely not available.

If that is the case all documentation in this manual that referring to “Serial-number”/saivas.net should be replaced with 192.168.1.2 and of course you have to be in WIFI range 100 meter and log into APB5 WIFI network (look for APB5 serial number in the WIFI list on your laptop or smartphone) .

When the APB5 is ‘awake’ and online the system can be accessed and configured directly via the internal Internet pages (htm). There are several different pages:

1. Profile configuration and run (Aprun.htm)
2. Getting the profile data (Dump.htm)
3. Set buoy (station) name and password (Config.htm)

In addition there are number of advanced configuration pages:

4. Status messages and total number of profiles (Status.htm)
5. FTP settings (Apftp.htm)
6. Time zone and DNS settings (Apdnp.htm)
7. Set profiling speeds (ApSpeed.htm)

### ***Index.htm***

When power is turned on, wait 1 minute for the system to connect to the network. Use a computer with internet access and a browser. Type the address to the APB5 in the address field. Example: (SerialNumber).saivas.net or via WIFI 192.168.1.2

The index page for APB5 looks like this:



### ***Profile configuration and run (Aprun.htm)***

If public IP is not available this configuration setup page can only be reach by WIFI (IP address: 192.168.1.2) Remember to log on APB5 WIFI network.

If public IP or WIFI:

Go to the configuration setup page. For example (when the buoy name = serial number 14000023) «<http://SERIALNUMBER.saivas.net/aprun.htm>»

If not than use WIFI( always available when remote control have waken it or service mode is active) address from browser = “192.168.1.2/aprun.htm”

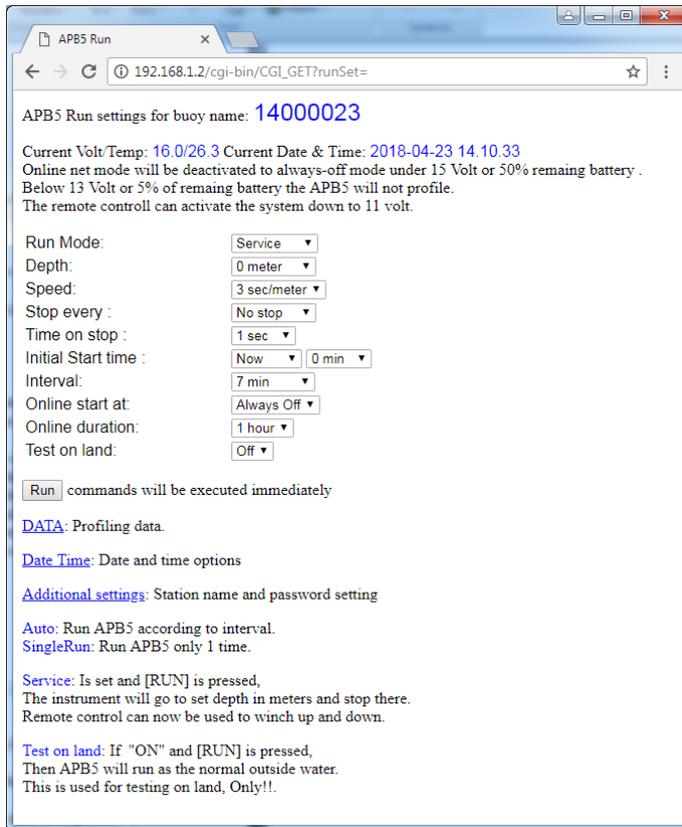


Fig 10. Screenshot of the profile configuration page using WIFI access.

The command options on the internal web page “Aprun.htm” are the same as in the APB5 Top System above (page 10). The only difference is the “Test on land” option:

**Test on land:** If the system is to be tested while the buoy is on land this option should be set to [ON] (be careful not to set the max depth deeper than the free range under the buoy, so that it doesn’t hit the ground!). Normally while doing a profile the system would be under water and radio transmission would not be applicable. If this option is set to [OFF] while testing on land, the system will stop profiling and give an error message. See section on status and error messages (page 15).

### Getting the profile data (Dump.htm)

The collected profile data is stored on the page:

[http://\(SERIALNUMBER\).saivas.net/dump.htm](http://(SERIALNUMBER).saivas.net/dump.htm) or by WIFI 192.168.1.2/dump

Text preceded by a “#” gives multiple information about the system.

Line 1: Name of buoy, this can be changed on the website *config.htm* (page 16)/ And selected Net (network)

Line 2: Depth and running Mode, this can be changed on the website *aprun.htm* (Fig 10)

Line 3: This shows time interval, start time, finish time and time until next profile.

Line 4: Shows the battery count in the instrument and battery and the temperature of control unit (CU801B) before and after profiling.

Line 5: Shows how much movement/tilt the buoy has, as well as the optional GPS Pos and Weather data

Profile data is given in a continuous stream underneath the information lines (Fig 11 using public IP and DYNDNS linked name).

```

#130000E8, Net: Online
#Depth: 3 meters, Mode:Continuously
#Time-Int: 60 min, Start:15.55.59, Finish:16.02.04, Next:2013-01-29, 16.56.00
#Bat-Count-CTD: 25, Bat-Temp-Winch: V27.8-T+13.3-V27.6-T+14.2
#Max X tilt: 3, Max Y tilt: 2, GPS: N6023.6365 E00516.2420
Date 99-12-14 Time 05-32-50 GMT Interval: 5sec
STDOXOFOT Ser No 1002 AP0976.043
N00001 S00.00 T+08.515 P0000.00 OX100.01 OF000.00 OT000.21
N00002 S00.00 T+08.510 P0000.00 OX098.77 OF000.00 OT000.21
N00003 S00.00 T+06.340 P0000.09 OX088.03 OF000.42 OT000.15
N00004 S29.43 T+04.981 P0000.18 OX095.64 OF000.87 OT000.02
N00005 S29.35 T+04.957 P0000.17 OX095.24 OF000.29 OT000.02
N00006 S29.39 T+04.938 P0000.17 OX094.48 OF000.37 OT000.02
N00007 S29.38 T+04.939 P0000.17 OX092.99 OF000.44 OT000.02
N00008 S29.43 T+04.978 P0000.87 OX091.66 OF000.53 OT000.02
N00009 S29.55 T+04.930 P0001.75 OX092.25 OF000.32 OT000.02
N00010 S29.64 T+04.917 P0002.61 OX092.40 OF002.10 OT000.02
N00011 S29.70 T+04.897 P0003.10 OX092.88 OF000.40 OT000.02
N00012 S29.72 T+04.903 P0003.09 OX092.95 OF000.43 OT000.02
N00013 S29.68 T+04.900 P0002.79 OX092.65 OF000.32 OT000.02
N00014 S29.57 T+04.900 P0002.28 OX093.26 OF000.78 OT000.02
N00015 S29.48 T+04.902 P0001.77 OX092.77 OF000.50 OT000.01
N00016 S29.42 T+04.901 P0001.26 OX093.64 OF000.55 OT000.02
N00017 S29.30 T+04.904 P0000.78 OX092.39 OF000.32 OT000.02
N00018 S29.22 T+04.915 P0000.53 OX092.38 OF000.68 OT000.02
N00019 S29.21 T+04.896 P0000.00 OX092.54 OF000.76 OT000.02
N00020 S00.00 T+04.927 P0000.00 OX095.23 OF000.00 OT000.01
N00021 S00.00 T+04.981 P0000.00 OX096.02 OF000.00 OT000.01
End of data

```

Fig 11. Profile data. The first 5 lines marked with # are metadata for system information Underneath line 5 there is the continuous stream of water quality data from the profile. See manual for SD204/SD208 for more info.

## Set buoy (station) name and password (Config.htm)

([http://\(SERIALNUMBER\).saivas.net/config.htm](http://(SERIALNUMBER).saivas.net/config.htm)) or by WIFI 192.168.1.2/config.htm

In config.htm you can change the name of the buoy and the access password.

**Enter station name**

Station name:

If you can see typed station name here: **~StationName=iMem~**

---

**Change password:**

Type old password:

Type new password:

If you can see typed password name here: **~password=passwordNew~** Then the the password has been changed

[DATA: Profiling data.](#)

[APB505 Settings](#)

Fig. 12. Set Sation/buoy name and change password.

**Buoy name:** Type in the name in the text window and click [send]. The name will then be displayed as: «StationName=iMem»

**Password:** Can only contain 5 letters and/or numbers and if the password is accepted it will be displayed as: «password=passwordNew». Activate password can be done by hidden menu, (see Appendix - section “Hidden menu <P> than <L>”)

## Status messages and total number of profiles (Status.htm)

([http://\(SERIALNUMBER\).saivas.net/status.htm](http://(SERIALNUMBER).saivas.net/status.htm)) or by WIFI 192.168.1.2/status.htm

This page gives information about the total number of profiles that the APB5 has completed. The page will also give status messages about the APB5.

When the system is running the page will show as in Fig 13.

Profile no: 322  
Status: OK, next run: 14:16:00, 24/11/2011

Fig. 13. A screen dump of the Status and messages page

When everything is running as normal the status message will display Status: OK  
When there is a problem the status message will display Status: Error  
See section on status and error messages for more information (page 23).

**FTP settings (Apftp.htm)**

([http://\(SERIALNUMBER\).saivas.net/Apftp.htm](http://(SERIALNUMBER).saivas.net/Apftp.htm)) or by WIFI 192.168.1.2/apftp.htm

Profiling and system data is by default sent to a FTP-server. The data can be *accessed* by typing [FTP://station.saivas.net](ftp://station.saivas.net) in a browser or a FTP-client program on your computer.  
FTP Settings for client program:

FTP-server name: Station.saivas.net  
FTP-port: 21  
FTP- username: SERIALNUMBER  
FTP-Password: apb5

APB5 FTP settings for buoy name: **14000023**

FTP Addr-IP :

FTP Username :

FTP Password :

FTP Port :

FTP Folder CTD :

FTP Folder RDCP :

FTP Off/On:

USB Stick Yes/No:

Settings will be stored immediately and you will be redirected to this page to verify that setting have been stored  
A test file "FTPtest.txt" will also be sent to CTD folder  
If Selecting USB Stick (yes) there must be present a USB Stick in the network router.  
A mount script has to be added to the start up of the router  
Password to root(router) has to be the same as the remote FTP server. Folder "mnt" need 3 subfolder ctd, rdcp and event.

[DATA](#): Profiling data.

[Date Time](#): Date time options

[Additional settings](#): Station name and password setting

Fig 13. A screen dump of the FTP setting page.

FTP Adrr-IP: Use the given IP address of the FTP (File Transport Protocol) server. The APB5 does not check DNS (Domain Name Server).

FTP User name: Enter the FTP username and password is for accessing the FTP Server.

The FTP server need to have CTD & RDCP folders .

FTP On/Off:

Determines whether to send to the FTP server or not. For example:

If Mode “Always Off” is selected and FTP is off. The APB5 will not go online when a profile is done. Data will be stored in internal memory of APB5. Max storage each day is 90 Kbyte. This will give space for 365 days of storage in disk A and 365 days storage in disk B (Total 2 years)

USB Stick Yes/No:

Normally the USB section is done by producer.

USB Section: USB memory –pen must be present on the LR77 v2 network router if option “yes” is selected. Also start up script for mounting USB stick “mount dev/sda1 root/usb” must be added via the LR77 v2 setup page access via <192.168.1.1> or public <serialnumber.saivas.net:81> user: root and password: apb5

Use FTP client program to log into LR77-v2 FTP server. Add <USB> directory in ROOT directory. ( beware that updates of router will delete user added directories)

The USB stick need to have <ctd,rdcp,event and batt> directories in root

For accessing FTP server on LR77-V2, make sure that you are connected to APB5 WIFI net.

FTP-server name: 192.168.1.1

FTP-port: 21

FTP- username: root

FTP-Password: apb5

If FTP is active APB5 will check the APB5 Top System every day at 0900 for changes each time data are sent from the APB5-buoy to the FTP server.

**Time zone and DNS settings (Apdnp.htm).**

([http://\(SERIALNUMBER\).saivas.net/Apdnp.htm](http://(SERIALNUMBER).saivas.net/Apdnp.htm)) by WIFI 192.168.1.2/apdnp.htm

APB5 DynDns, Request & NTP setting for buoy name: 14000023  
2014-10-14 15.25.24

DynDns Off/On:

APB5 WEB-Addr:

DynDns Addr-IP:

DynDns UserName:

DynDns Password:

Request Folder:

Request Addr-IP:

Request UserName:

Request Password:

Activate Summer-Winter time:

SummerStart Month:

Week:

Day:

SummerEnd Month:

Week:

Day:

Time Sync Off/On:

TimeZone Min:

Settings will be stored immediately and you will be redirected to this page to verify that setting have been stored

[DATA](#): Profiling data.

[Date Time](#): Date time options

[Additional settings](#): Station name and password setting

Fig 14. DynDns and time zone settings.

1. This is optional (If dyndns is used the system does not need static public IP)
2. Create dyndns account at dyndns.com
3. Insert address (that is made) and IP address to dyndns.com
4. Insert username and password

## Speed settings (ApSpe.htm).

([http://\(SERIALNUMBER\).saivas.net/apspeed.htm](http://(SERIALNUMBER).saivas.net/apspeed.htm)) by WIFI 192.168.1.2/apspe.htm

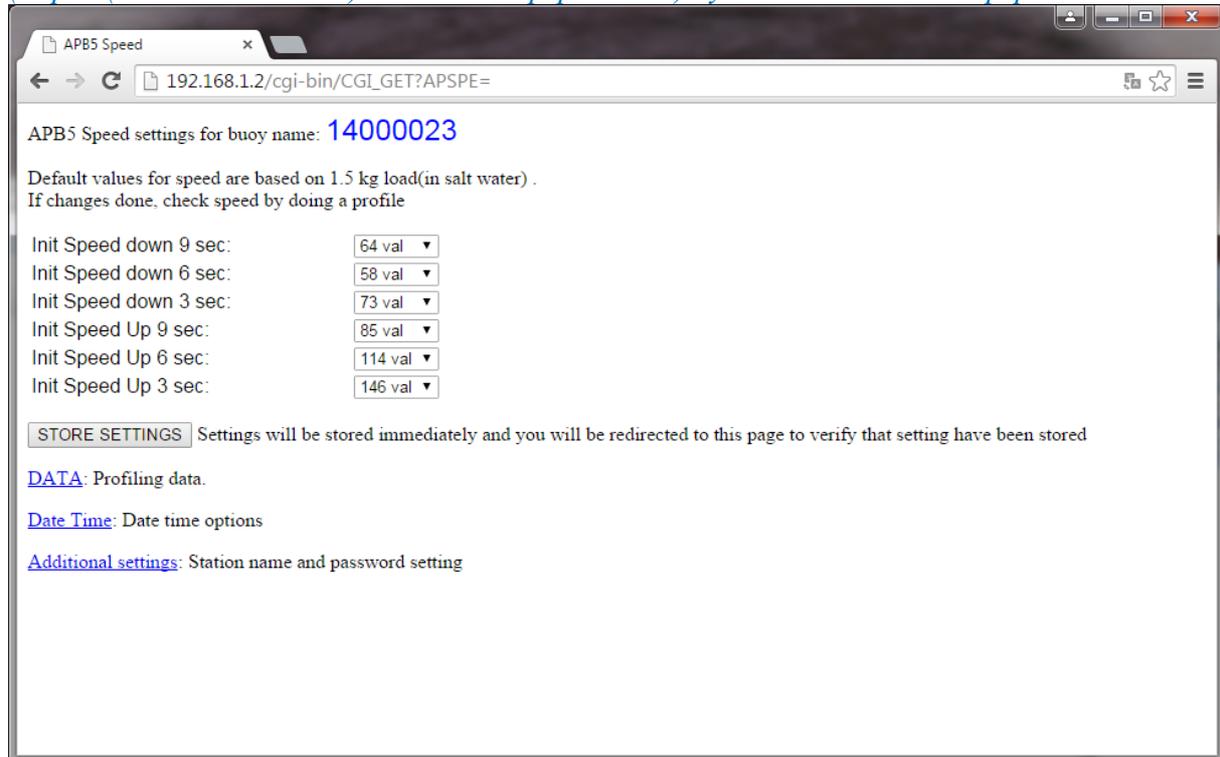


Fig 14b. Init speed settings.

Sett init speed for the 3 speed settings 3-6-9 both up and down.

## Time settings for APB5.

It is possible to include summer time and winter time and setting the date for shifting from summer to winter and back again. Check the internet for more information. For example see <http://www.timeanddate.com>. Normally it is based on a week number and week day. Time zone has to be input as minutes from GMT.

Both Summer/winter and Time zone can be enabled or disabled.

## Radio.htm

In order to make sure that the instrument (SD204/SD208) is connected to APB5, check the link: [http://\(SERIALNUMBER\).saivas.net/radio.htm](http://(SERIALNUMBER).saivas.net/radio.htm)



When clicking CTD button the SD204/SD208 serial number is visible.

In order to change serial number, type number after =(XXXX) and press enter.



The SD204/SD208 serial number is also visible on the titanium ring that connects the body and head of the instrument.



## Retrieval and viewing of profiling data

The dedicated software “SD200W” can be used for automatic retrieval of the recorded profiling data either by HTTP or FTP. The SD200W needs to be version 3.19.7.181 or later. Click [Help] and [About] to check the current version.

In order to start the data logging, SD200W needs to be configured. This can be done by pressing the [Net] icon on the top menu bar (Fig 15). There are 2 options, [FTP] or [HTTP] retrieval.

- The [FTP] option needs a running FTP server that the APB5 sends profile data to, such as the “APB5 Top System”.
- The [HTTP] option is direct collection from the APB5 internal webpage (Dump.htm, Fig 11).



Fig 15. The [Net] icon on the top menu bar of the SD200W software

NB! In HTTP mode the program SD200W has to run continuously in order to log the data and computers need to have sleep mode turned off when running this procedure.

In FTP mode it is not that important to have the SD200W running since all data is stored on in the FTP server, SD200w will collect 100 days backwards data when turning on.

To set up a new station or ‘buoy’ folder for storing data press the [Add] button (Fig 16). A new ‘station’ window will then appear (Fig 17)

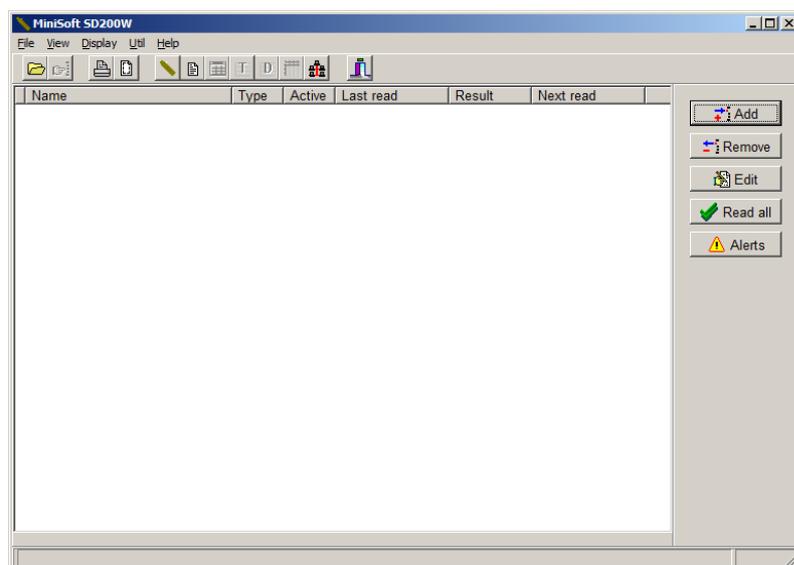


Fig 16. Adding a new station or buoy folder to the SD200W software

Fig 17. The setup dialogue for creating a new station or buoy folder for data storage

**Name:** Type in name of the station (or buoy).

It is recommended to use the actual name of the station/buoy that data is collected from.

**Station type:** Select APB5 from the dropdown combo-box.

**Folder name:** Select/create a folder to save the data.

**Filename prefix:** Select the prefix of the filename.

**Station URL:** Type the web address http:// to APB5 example: «station.saivas.net»

**Use FTP:** Check FTP if this connection is selected (default is HTTP, but requires that the buoy is online, see Operation page 9).

**Username:** Type the username: “SERIALNUMBER” if FTP else “Admin” if HTTP.

**Password:** Type in password: “apb5” if FTP or “12345” if HTTP

**Read interval:** There are two possibilities:  
 a) Select time interval (in minutes),  
 b) Auto (retrieves all data based on last profile).

**Active:** The station has to be active in order for SD200W to retrieve data.

An example of FTP connection is shown in Fig 18 and 19, and of HTTP connection in Fig 20 and 21:

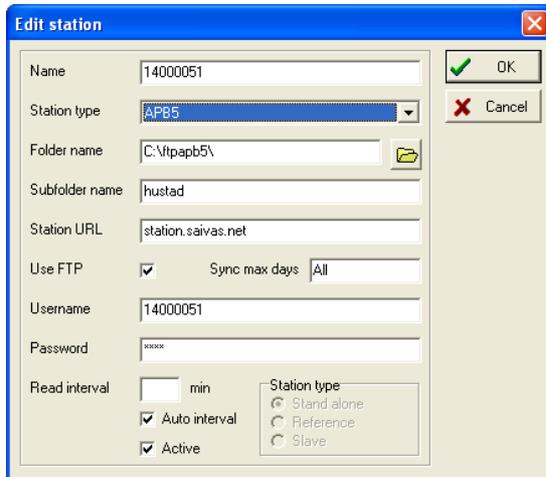
**FTP connection via SD200W:**

Fig 18. Buoy named “14000051” is set up via FTP (for example the “APB5 Top System”)

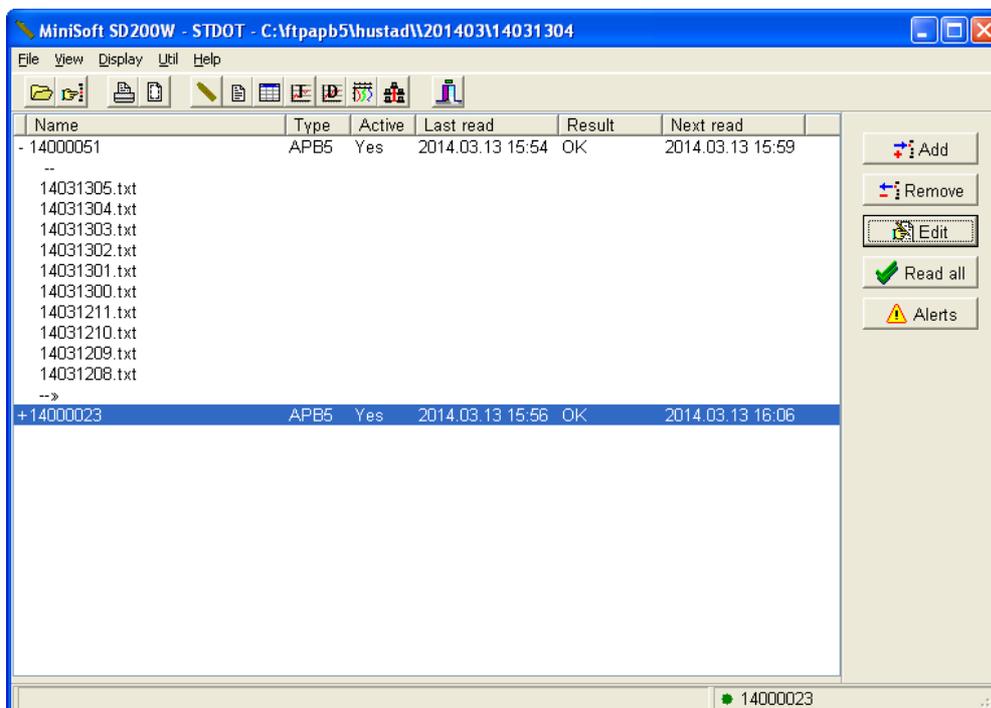


Fig 19. Buoy named “14000051” is indirectly connected via FTP (for example the “APB5 Top System”).

The data of each profile is stored as text files (.txt) with name composed of year, month, day (YYMMDD) + a number from 1..99 indicating the number of the specific profile for that day.

By double clicking on any of the text files, each containing one profile, the data from the profile will be shown, as data and a graph. There are many different graphing possibilities (Fig 22), by right clicking one can chose the graph type that is most suitable. See the graph section in the SAIV AS SD204/SD208 manual (chapter 5).

**HTTP connection via SD200W**

Fig 20. A buoy named “14000023” is connected directly by HTTP.

Name	Type	Active	Last read	Result	Next read
14000023	APB5	Yes	2014.10.16 12:46	OK	2014.10.16 12:56

test\_20141016\_124624.txt

Fig 21. Profile data from a buoy named “14000023” connected directly by HTTP.

When connected via HTTP (when APB5 is online), then the text file name is slightly different, now composed of ‘prefix’ + YYYYMMDD + HHMMSS. Txt. By double clicking on the file, you can now see the data as above under FTP connection.

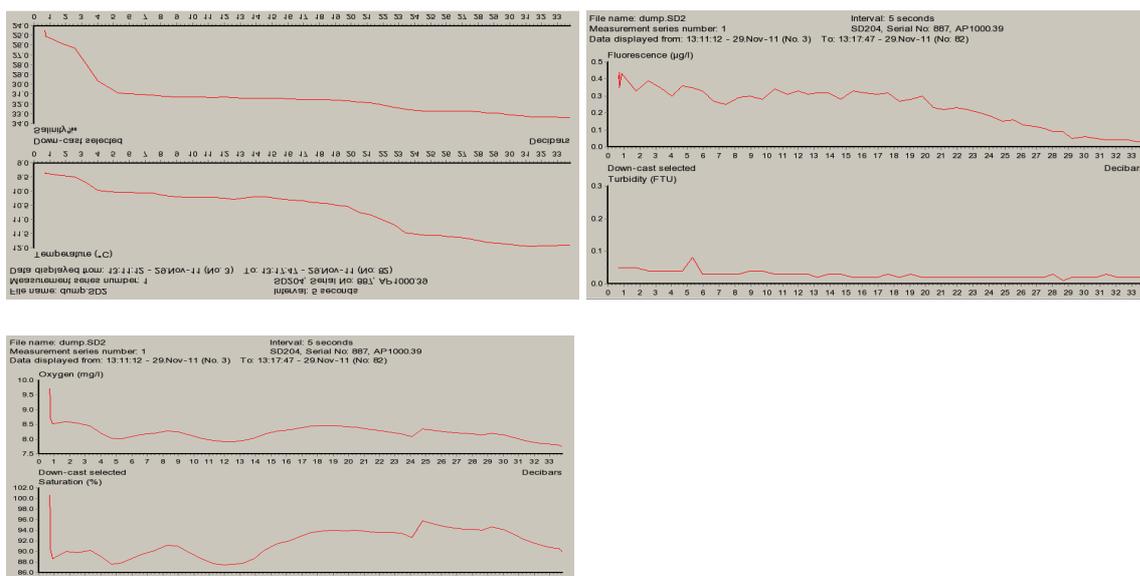


Fig 22. Showing the different graph possibilities in SD200W for viewing the profile data.

## *Status and error messages*

There is sent an Event file for each profile this contains the last 10 errors and events from the APB5. This is the same events that can be reach with direct access via 192.168.1.1/status.htm Event can be find under CTD folder on FTP server and also on the USB memory-pen under event folder.

The page ([http://\(SERIALNUMBER\).saivas.net/Status.htm](http://(SERIALNUMBER).saivas.net/Status.htm)) reports on the current status of the APB5 system while online. Some of the status messages can be delayed and will therefore not show as the last message. For example: “winch stuck” will be the first message and then the message “timeout power 003” will be shown.

The first line will always show the profile number:

*Profile no: XXX*

Then the status:

*Status: OK, next run: “TIME and DATE”*

This is normal with auto operation.

*Status: System Off*

System is not profiling.

*Status: Error, Not able to get in Contact with winch in start position.*

An error has occurred with the communication to the winch at the start of profiling.

Also sent as aFTP file.

*Status: Error, Not able to get in Contact with winch, PS! Instrument Running*

An error has occurred with the winch during profiling.

*Status: Error, Not able to start CTD*

An error has occurred with the instrument, can also be the radio unit (Tip: check the Radio address or battery). Also sent as a FTP file.

*Status: Error, Not able to stop CTD*

An error has occurred with the instrument, but this problem is probably not related to the address as the instrument was able to start at the beginning of the profile.

*Status: Error, No water detected, System Off*

This is an error that happens when the winch has been used above water. Example system is on land.

*Status: Service Initiated, system off, PS! Instrument is not docked*

APB5 is in service mode. One can now use the remote control.

Instrument is not docked when depth > 0 meter is selected.

*Status: Error, Winch is stuck, System Off, PS! Instrument Running.*

This is an error message that the winch is stuck. When this message is shown the winch has tried to get unstuck by moving the rope up and down twice. This error message is always seen in conjunction with these two messages:

*Status: Error, Timeout power winch err003*

*Status: Error, Current detected higher than soft current limit err002*

*Status: Error, Low voltage detect «voltage» next run: «time date»*

If the voltage is below 23.9 volts at the start of a profile the profile will not start. The profile will be delayed with one interval time.

*Status: Error, Power detected under 21 volt err001"*

If the voltage is below 21 volts during the profile the winch will stop. But this should not occur since the "Low voltage detect" is monitoring that the voltage is over 23.9 volts before the profile starts.

*Status: Error, High temp in controller.*

*Status: Error, Low temp in controller.*

At temperatures above 80 degrees Celsius or below -7 degree Celsius the profile will not start. This is the inside temperature of the electronics so that means that the outside temperature is higher or lower by 10 degrees.

*Status: Error, Timeout maximum profiling time.*

If the profile takes more than 1 hour the profile will end and this error message will show.

## ***Maintenance and warranty***

The APB5-system should work for 1 year continuously without any need for maintenance or battery replacement in the CTD. However, to achieve this, the following criteria must be observed:

Profiling intervals should not run too frequently and not too deep. The measuring interval of the instrument should not be too short, because this will limit the lifetime of the batteries in the SD204/SD208. With 2 hours interval, profiling depth of 40 meter and 5 seconds time interval, the lifetime of the battery in the SD204/SD208 should last for 12 months.

If there has been a storm, strong winds and/or violent sea the system needs to be checked to ensure that everything is working normal (instrument, anchoring points, ropes and pulleys i.e.) For this type of maintenance inspection, use service mode and the remote control.

After 1 year, anchor points, ropes and pulleys should always be inspected. Batteries should be replaced in the SD204/SD208. For normal use and warranty issue, the buoy needs to be kept clean from algae growth.

Biofouling/algae growth, heavy growth of algae can cause the buoy to sink deeper into the water (under normal waterline). The buoy than needs to be cleaned more often, some area in the world in growth season every 2-3 months.

Antibiofouling paint might be use to prevent this, but only local studies can give correct answer to this algae growth issue.

**Warranty:**

The APB5 system has (1) one year warranty or 5000 profiles for 75 meter version (selected depth in profiles not relevant for the 5000 profiles) 150 meter version has warranty limit of 3000 profiles.

## Appendices

### Optional power output: [apopt.htm](#) (available from ver. 5.11)

It is possible to use external equipment as a raspberry PI or similar that can use the APB5 internal WIFI and internet connection to send data.

Optional power has a webpage (IP-address/apo) that can activate and test the optional power output. Power on time will be optional from 1 – 10 minutes.

A waterproof box (type Fibox (PC 150/75 HG or PC 150/100 HG)) inner L=163mm x W=113mm x H=70mm/90mm, will be mounted inside the APB5 buoy. Inside will be a power connection that can variate from 11-25 volt (depended on battery). Max power out is limit by the BTS740 chip, that has short protection and overload protection.

Note:



There is also added an NTC resistor of 5 ohm (6.4 Amp) in series with the optional power to prevent drop in system voltage if external equipment can case high start current.



APB5 OPTION settings for buoy name: **170000FA**

Option test Off/On:    
 Enable Yes/No:    
 On time in min:

Settings will be stored immediately and you will be redirected to this page to verify that setting have been stored

About:

Option test: Is status and also a test function. Sett to ON and it will stay on recording to timer value i minutes

Enable YES/NO: Must be YES if to run automatic with APB5 time intervall

On time in min: Time that power will be on in both test and autorun

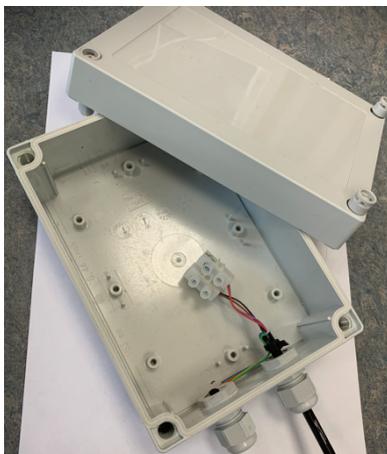
Optional power output will be turn ON after network is establish for sending profile data (note power can be 10-30 volt) .

If "always off" is active, network will be kept on together with optional power output. On time will keep APB5 router on, so keep ontime as short as possible.

[DATA](#): Profiling data.

[Date Time](#): Date time options

[Additional settings](#): Station name and password setting



**1A Components of APB5 (excl. The CTD sensor)**

<b>Name</b>	<b>Specifications</b>	<b>Supplier</b>
Rope	4 mm 850 kg pulley	
Winch	15 kg load max	SAIV AS
Batteries 1 & 2( ver 4 and 5.xxb)	16,8 volt DC 105Ah x2 Litium Ion	SAIV AS
Batteries 1 & 2( ver 5.xx)	14.4 volt DC 100 Ah x 2 LifePo4	SAIV AS/ Scanbatt
Main Unit (CU801B)	i7186, LR77 v2, PowControl, Radio	SAIV AS
Router box with Antenna	LR77 v2 incl. WiFi antenna	SAIV AS
GSM /GPRS/LTE Antenna	800-2500 Mhz	SAIV AS
Solarpanels	24 Watt *8	SAIV AS
Solarpanels cabel box		SAIV AS
ON/Off & Light (GPS/Airmar) box		SAIV AS
2 pin cable (Battery 1)	Solar cell wiring box	SAIV AS
2 pin cable (Battery 1)	Land power or Optional windmill	SAIV AS
4 pin cable (Battery 1)	Connection between Batterys	SAIV AS
6 pin cable (Battery 1)	Main battery to Main controller	SAIV AS
2 pin cable (Battery 2)	Solar cell wiring box	SAIV AS
4 pin cable (Battery 2)	Connection between Batterys	SAIV AS
12 pins cable (main Controller)	On/Off- Light, GPS/Airmar w. box	SAIV AS
10 pins cable (main Controller)	To router LR77 v2 box	SAIV AS
4 pins cable (main Controller)	Current meter(RDCP)	SAIV AS
6 pins cable (main Controller)	Battery input 16,8 volt.	SAIV AS
8 pin cabel (main Controller)	End Stop and winch	SAIV AS

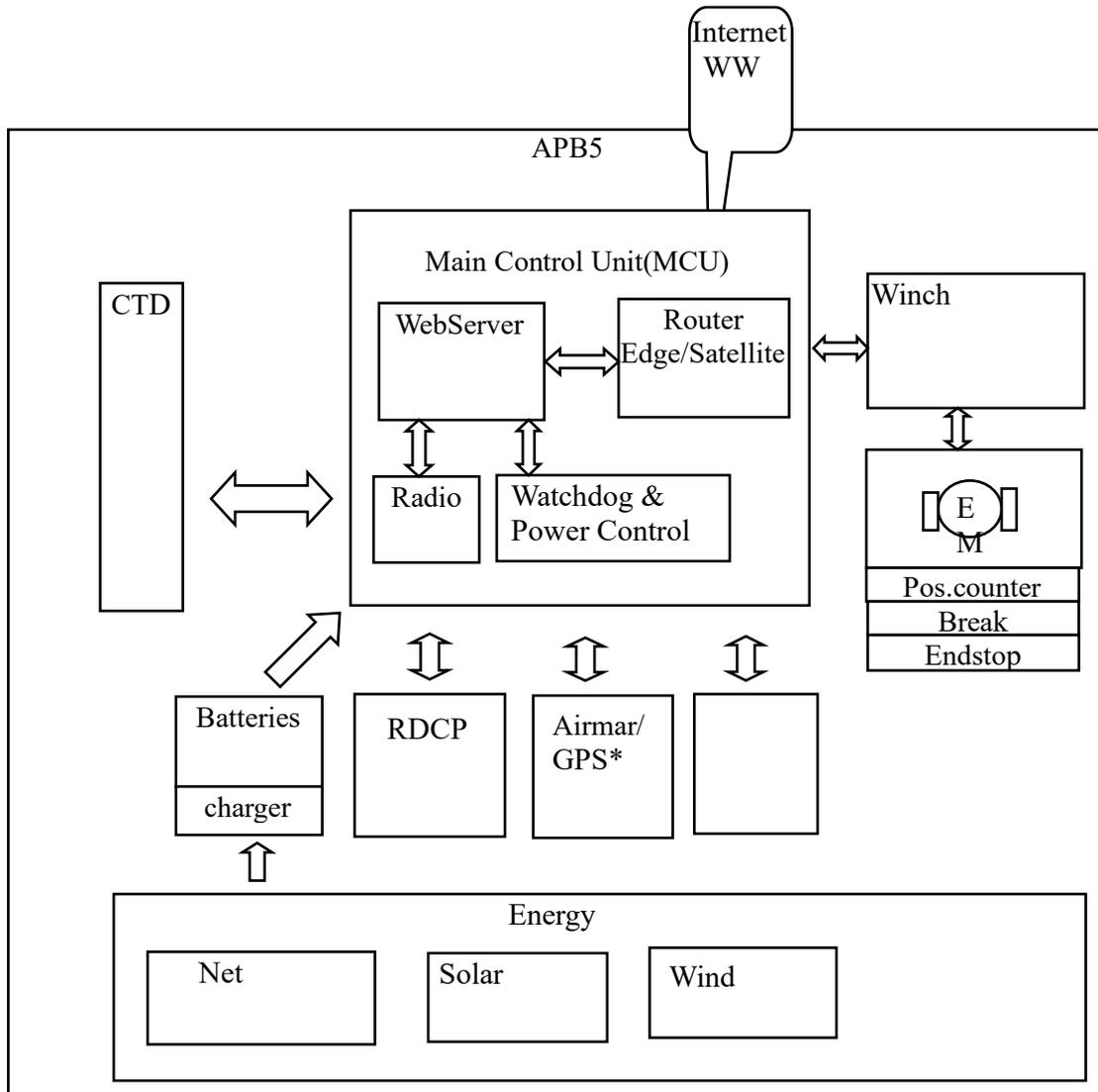
**1B. Test check list before start.**

<b>Check list before start of APB5 on land</b>	<b>Completed</b>
Sim card installed	
IP address generated by supplier if public ip available or use WIFI direct	
Turn on main power. Wait at least 20 seconds after received SMS or look for wifi	
Go to APB5 web address using a browser (WIFI connect and 192.168.1.2)	
Go to Aprun.htm and manually start a single run for 1 m with "Test on land " ON	
Make sure the winch rope does not twist during the dry land test	
Wait until instrument returns to docking position	
After 30 seconds a dump.htm (data) should be available	
Check if data has been send to FTP server.	
<b>If all above have been checked the APB5 is ready to be placed in water</b>	
Check the depth of the water were the system is placed	
Change max depth on winch if necessary	
"Single run" the system to a depth of 10 meter.	
Check that the instrument has reached the wanted depth	
When everything is ok you can change the system to auto	

**1C. Test list for simple troubleshooting.**

1. Web address for APB5 is unavailable	Try the IP number that you received on Accessl (Public IP has to be supplied by your mobile network card supplier only work in NORWAY) If this is OK it might Be a that the DYNDNS registration that is not working. Check your SMS and try the IP number that is send. Or goto the station.saivas.net/"serial nummer"/apr/ click on access log. Check last registrated IP number. Type this IP number in the address field in the browser. If you near by the APB check if there is a WIFI network that has the serial number as the APB5, try to connect and type 192.168.1.2 in the address field of the browser. If no WIFI network, make sure that the APB5 is awake by pressing the remote middle button wait for green light. (accessible between 0900-1600 )
2. Winch is not working	Check status and error message. Open communication with winch (page 28) and try different commandos. Can also try to wake APB5 with remote control and use up and down buttons to see if it's moving
3. Instrument is not responding.	Check status and error message. Check radio address on radio.htm Check direct communication with the instrument If now respond, try to wake it with Mag-key.
4. Instrument returns to the docking position immediately after starting test on land.	Check status and error message. It could be that the without water simulation is OFF.
5. Remote control is not working	It should always give red light, check batteries if not. Check address of the remote if you have several APB5 Connect the Remote to pc via USB cable and use SD200w direct communication to write address to it. In setup there is a options set radio address.

**1D. Block Diagram of APB5 system.**



## 2. Intranet TCP/IP network setup:

Unit	Port	IP Address	Netmaske	Gateway
Router/WIFI	NET1	192.168.1.1	255.255.255.0	192.168.1.1
Webserver	NET1	192.168.1.2	255.255.255.0	192.168.1.1

## 3. SD200W Direct communication

It is possible to have direct communication with all components attached to the APB5: instrument, winch, sonar, radio unit and power unit. It is also possible to disconnect and connect the different components using the direct communication.

In order to communicate directly with the APB5 using the SD200W, use the address and port: 10000 (Fig Appendix 3.1). If WIFI connection use LAN(Local Area Network address: 192.168.1.2)

This can be set up using SD200W Setup and TCP/IP settings in «select port».

It is recommended to create a folder for SD200W that is used every time data is being logged, so that one can run 2 independent SD200W-programs on the computer at the same time.

Note that a “SD200TCPdb.DBS” file is created in the folder that contains the SD200W that is logging the data. The file contains information about the system the data is retrieved from. If the program needs to be moved to another PC, this file will need to be copied and kept together with the SD200w.exe file.

All data will be saved as TXT files. The files can then be imported to SD200W files or viewed directly by right clicking on the current station and selecting the file in question. The graph options will then be as normal in the SD200W program. See SD204/SD208 manual, chapter 5.

### Open APB5 communication in SD200W.

Start SD200W by clicking the 'instrument icon' followed by the [Setup] button to open the 'Communication parameters' dialogue:

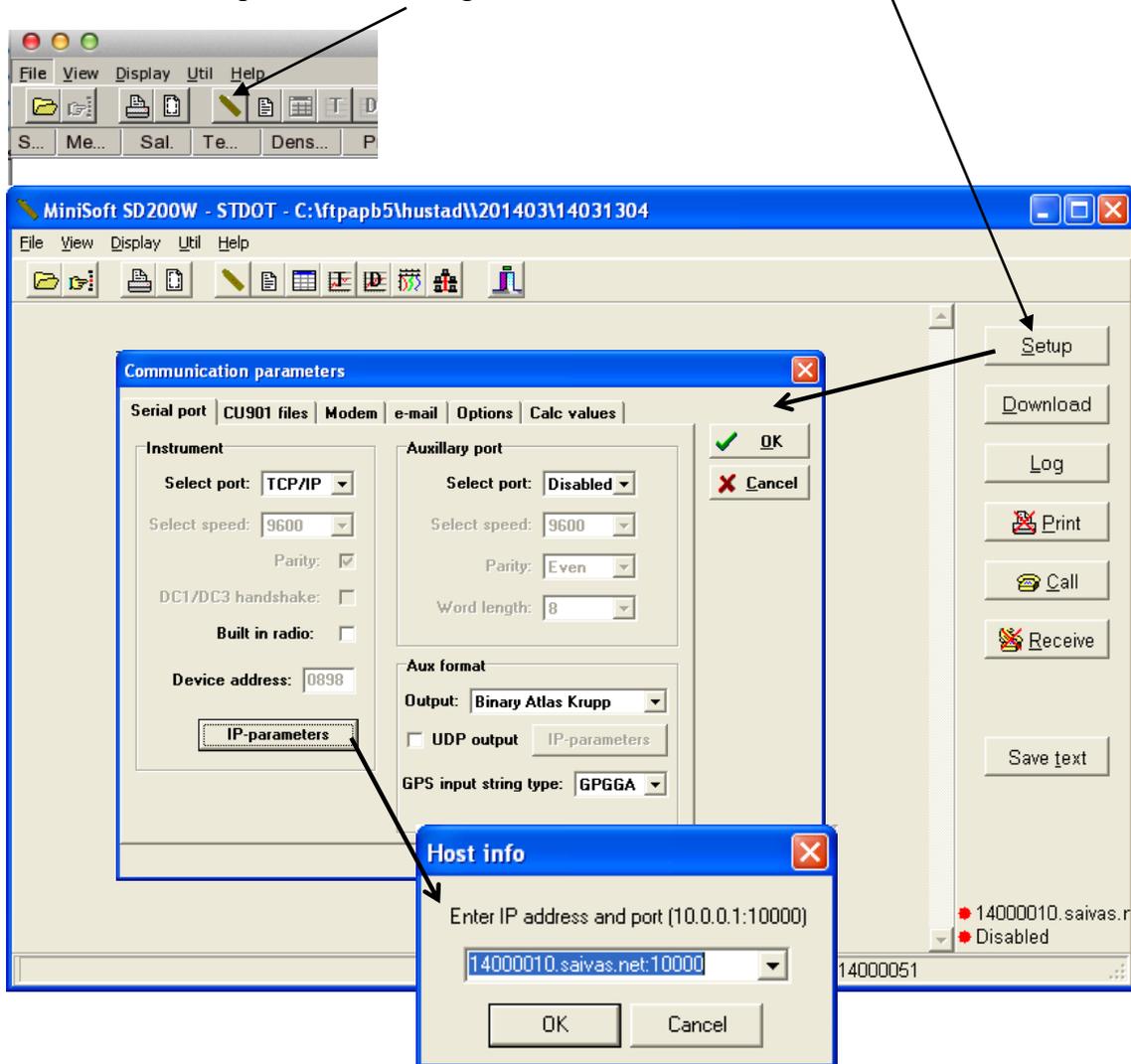


Fig Appendix 3.1. Setup of SD200W Direct communication with APB5.

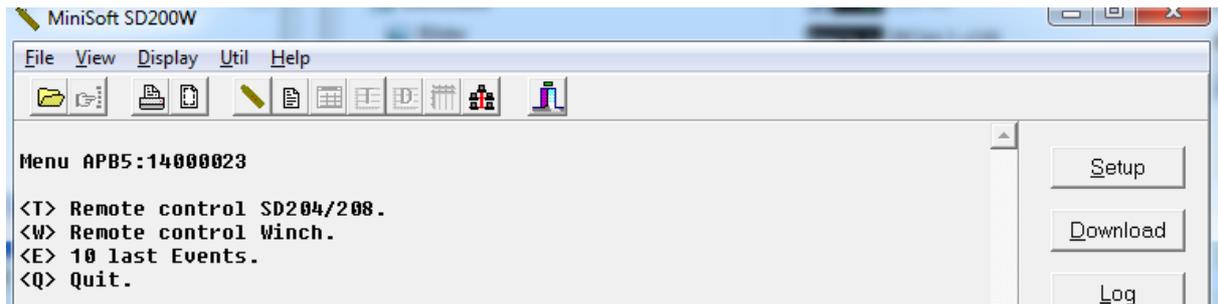
In the "Communication parameters" dialogue, click on TCP/IP in the scroll-down combo-box «select port». Type the address and the port for APB5 and click OK.

Example <http://Station.saivas.net:10000> (WIFI connection = 192.168.1.2:10000)

SD200W will open communications with CU801B. Wait until a green light is turned on in front of the address in the right bottom corner of the window.



then this light is green, click any key. APB5 menu is then shown



Use the menu to navigate. NB: If no selections are made APB5 will timeout after 1 minute and close connection.

NB! In order to stop already started communication click <CTRL+T> or <Esc> to return to the start menu.

### ***SD204/SD208 communication:***

<T>: Communication with the instrument,

NB! It can take up to 1 minute in order to wake up the radio unit inside SD204/SD208.

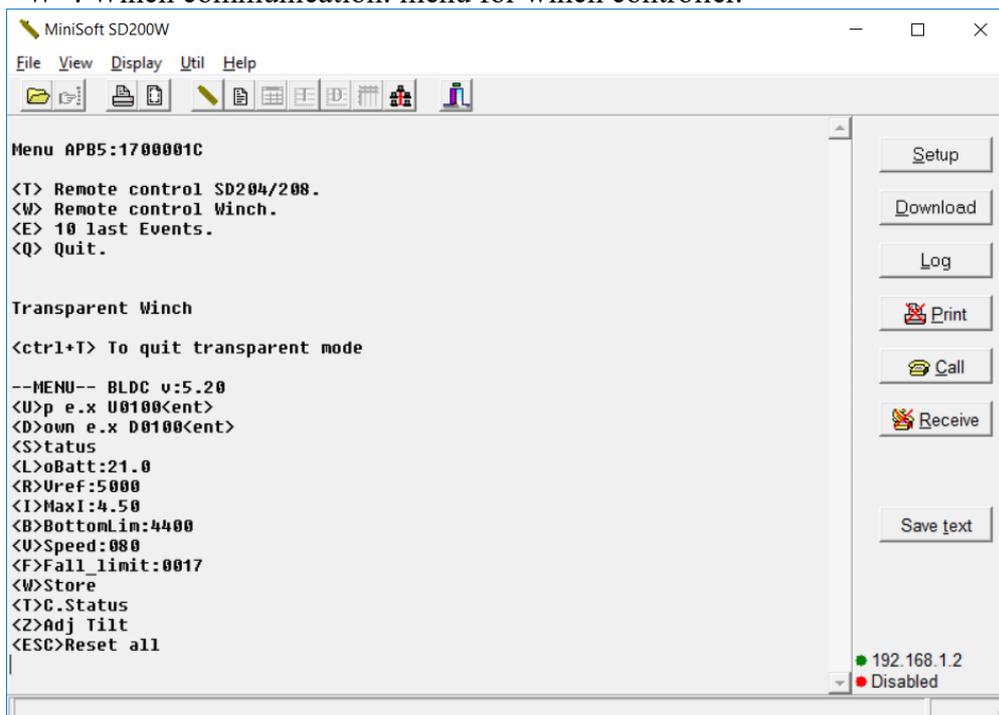
Dots will indicate the wake up. After the instrument is awake the standard SD204/SD208 menu is shown. See manual for SD204/SD208.

<ctrl+T> to end the communication with the instrument (SD204/SD208).

There are many different graphing possibilities; by right clicking the mouse one can chose the graph type that is most suitable. Ref: Graph section in the SD204/SD208 manual (chapter 5).

### ***Winch communication:***

<W>: Winch communication: menu for winch controller.



**Winch commands:**

Commands	Explanation	Result
U0000<enter>	Up	Up number is number of turn/10
D0000<enter>	Down	Down number is number of turn/10
S	Status	Printing status line. 1 time
L021<enter>	Low battery warning	Stopping winch if battery (Do not change)
R0000<enter>	Voltage calibration	(Do not change)
I450<enter>	Max current	Current protect max 900 ( Do not change)
B4400<enter>	Max depth	Bottom limit
V000<enter>	Speed	Number between 004 to 255
F0017<enter>	Max fallout	Clima sone depth fallout in start(Do not change)
W	Save	Store new settings
T	Status	Continious printing
Z	Tilt zero	Make sure that the buoy is in horisontal position
ESC	Reset	Reset of counter , running and errors

[S]tatus:

This displays the voltage, power consumption when running, temperature in winch controller, depth at current time, depth remaining, max depth, X-tilt, Y-tilt, speed and error messages.

Error:

Errxxx	Explanation	Results
0	No error	No change
1	Battery voltage under lowest level std: 21 Volt	Stop immediately
2	Over max power, std 1.8 Amp	Stop immediately
4	Cannot move the winch after a certain given time	Stop immediately

**Events**

It also possible to see last 10 events. ( Will tell if battery have been low with current time and data for event or other events)

**Radio unit communication:**

It is possible to communicate directly with the radio unit. After clicking <T> to open the communication with the instrument, click <Q> to stop the wake up. Then you are able to click <CTRL+R> an then <M> and the radio unit menu will appear. This menu is not for use, only to show that the radio unit works during a troubleshooting process.

**Hidden menus:**

Hidden menu can be reached via fist type <P> than.

<L> Menu for activate and deactivate units.

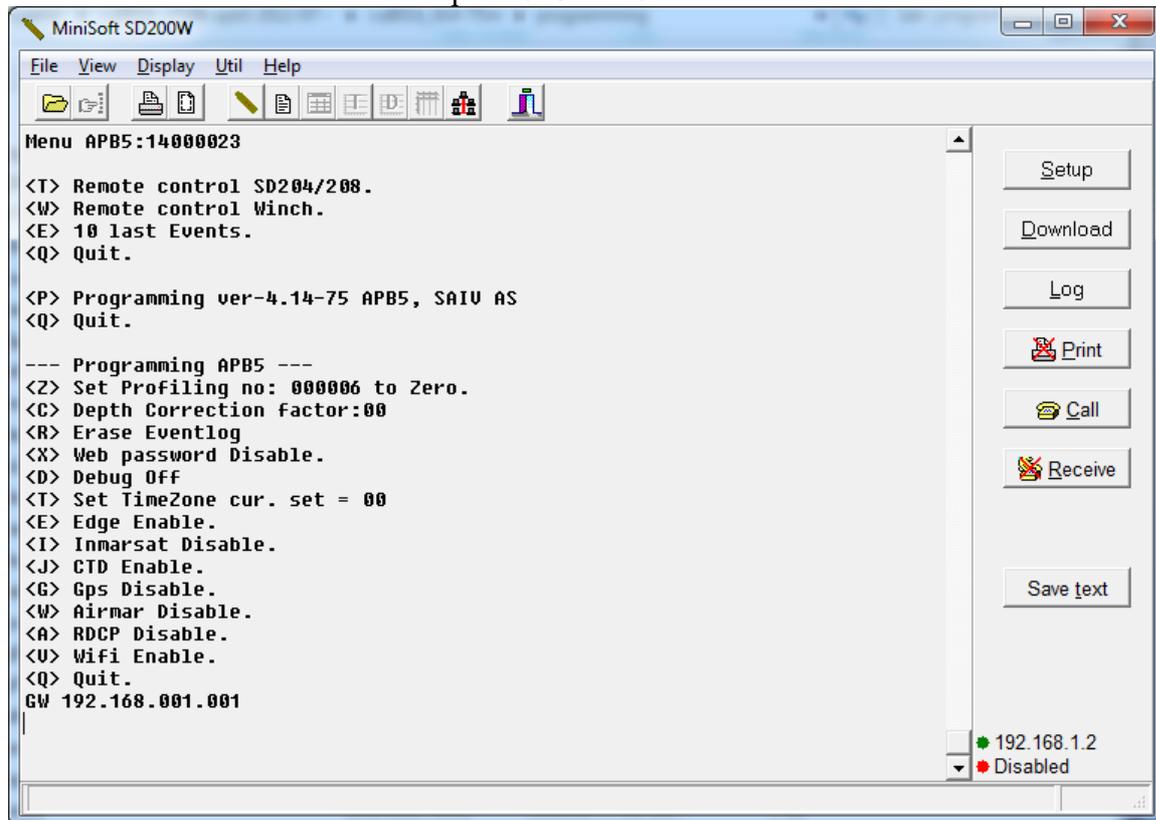
<S> Battery communication

<D> Watchdog and power controll

<G> GPS or Airmar (Weather Station) if active( set via < L>)

**Hidden menu <P> than <L>:**

Version 4.14 is the version from April 2018. Ver 5.xx has one more RDCP

**Battery communication <P> than <S>:**

Menu is displayed .

<111> Give info about battery 1.

<121> Give info about battery 2.

**Watchdog and power control communication <P> than <D>:**

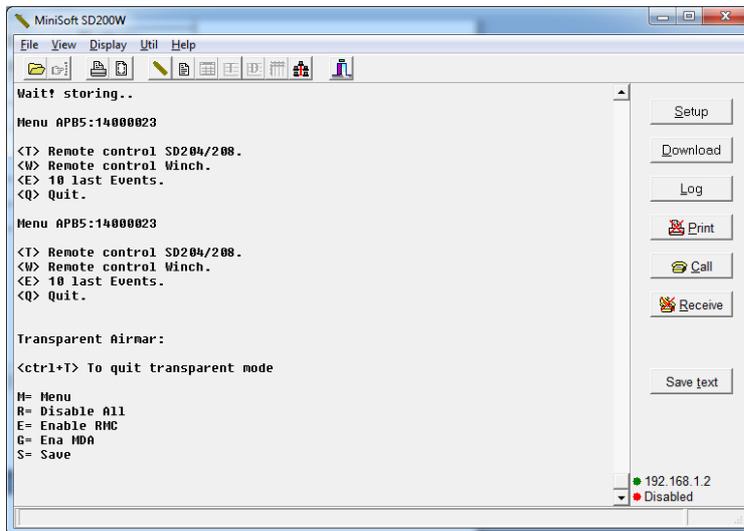
It is possible to open direct contact with the power unit.

First type <P> then <D> and the power unit menu will appear. In this menu you can control the <watchdog> signal and 5 digital ports. This function is not for use, only to show that the power unit works during a troubleshooting process.

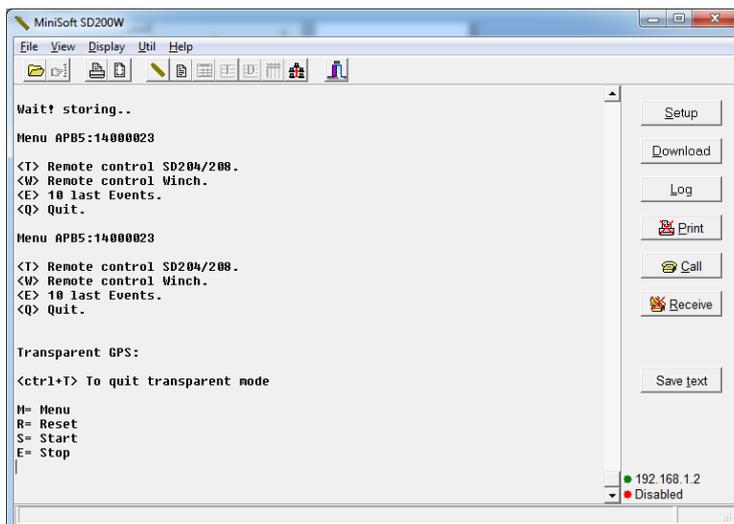
If command is send via this communication mode all this command will be returned to original settings once this communication is closed by timeout or <CTRL+T>

Power unit commands:

Commands	Description	Occurence
WDTR	Resets watchdog if it does not get a new message in 90 sec it will reset the web server	Shows status on Battery voltage, and digital exits.
D11	Digital exit 1 on	ON
D10	Digital exit 1 off	OFF
Dn1 (n=1-5)	1-5 exits on	ON
Dn0 (n=1-5)	1-5 exits off	OFF
D60	All exits on	All ON
D61	All exits off	All OFF

**GPS and Weather station(Airmar) <G>:**

*After activate Airmar weather station direct communication can be done via menu displayed by program.*



*After activate GPS(Garmin gps 17x) direct communication can be done via menu displayed by program.*

## Debug:

When doing a test on land before deployment or when profile in when deployed. Is possible to watch the ongoing process.

Make sure that WIFI connection is establish to the APB5. Open SD200w - via Instrument icon - > Setup. Select TCP/IP and type 192.168.1.1:10001. <ok>

Wait for green led in lower left corner. If debug is not active none info is printed. Type <D> for activate debug mode. <D> toggles debug mode, press more than once will turn off and on debugmode.

About:

Watchdog is being printed every 30 sec. (is not need to understand what is being printed)

When a profile is set to run, debug mode will say profiling ON: It will set some settings to the winch and after this is OK. It will open communication with instrument vi Radio. With sending <I>. Menu off instrument is being displayed when communication is up. Last command to instrument will be RUN.

Then winch communication begins. Every 3 sec winch will be pulled. Some info will be displayed- Look at E0000 and D0000 telling the turns off winch.

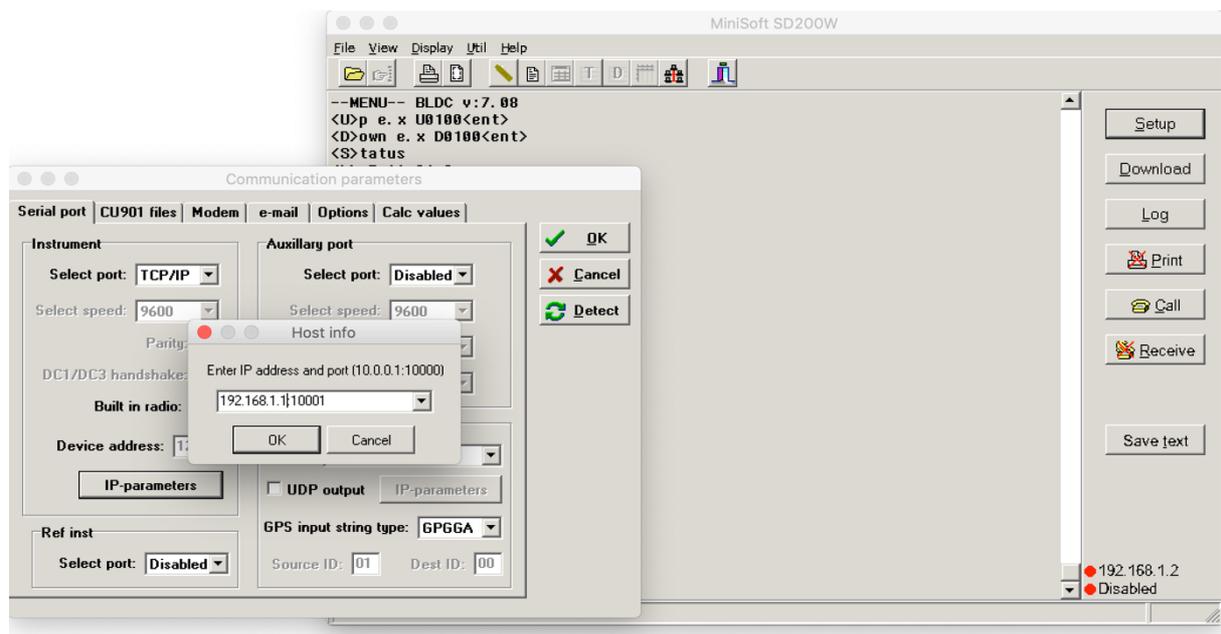
When back up last status will be PARK. After this instrument will be polled and data dumped into the controller. When finish, controller will be Restart. And FTP files will be sent after network is establish (after 90 sec mobile network and 360 sec satellite network)

Turn of Debug with <D>. Close window.

Command: ESC = reset controller.

Warning it is possible to delete the program in this mode by typing special commands. So playing with this is not recommended. If you get delete Main Y/N : type N for No.

If you in some reason is able to delete the program, do not turn of the buoys power. Leave it on and contact supplier. It possible to download new software as long as it has power and WIFI is up running.



### ***Load Default values/Reset:***

To load default values.

Turn of APB5 main switch (box next to router box)

Remove the DIV antenna to the right (Use an 8 mm wrench tool)

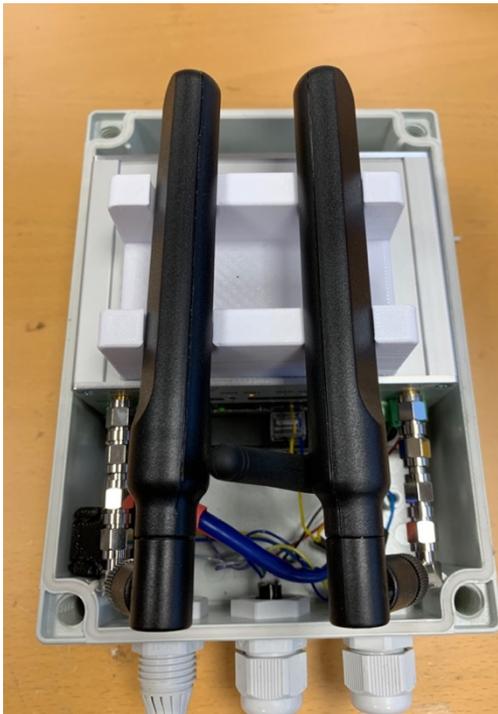
Open hatch on the black mini box at the right corner inside the router box.

Make sure that the APB5 has been power off for at least 2 min.

Hold down the reset button under the hatch while turn the power on. After about **10 sec** release the reset button. All default will be loaded, APB5 will start in service/maintenance mode, Network is set to online (LTE/WIFI), winch will be available via remote.

Time zone will be 2 hours. (Norwegian time) change in apdnp.htm

FTP servers will be station.saivas.net



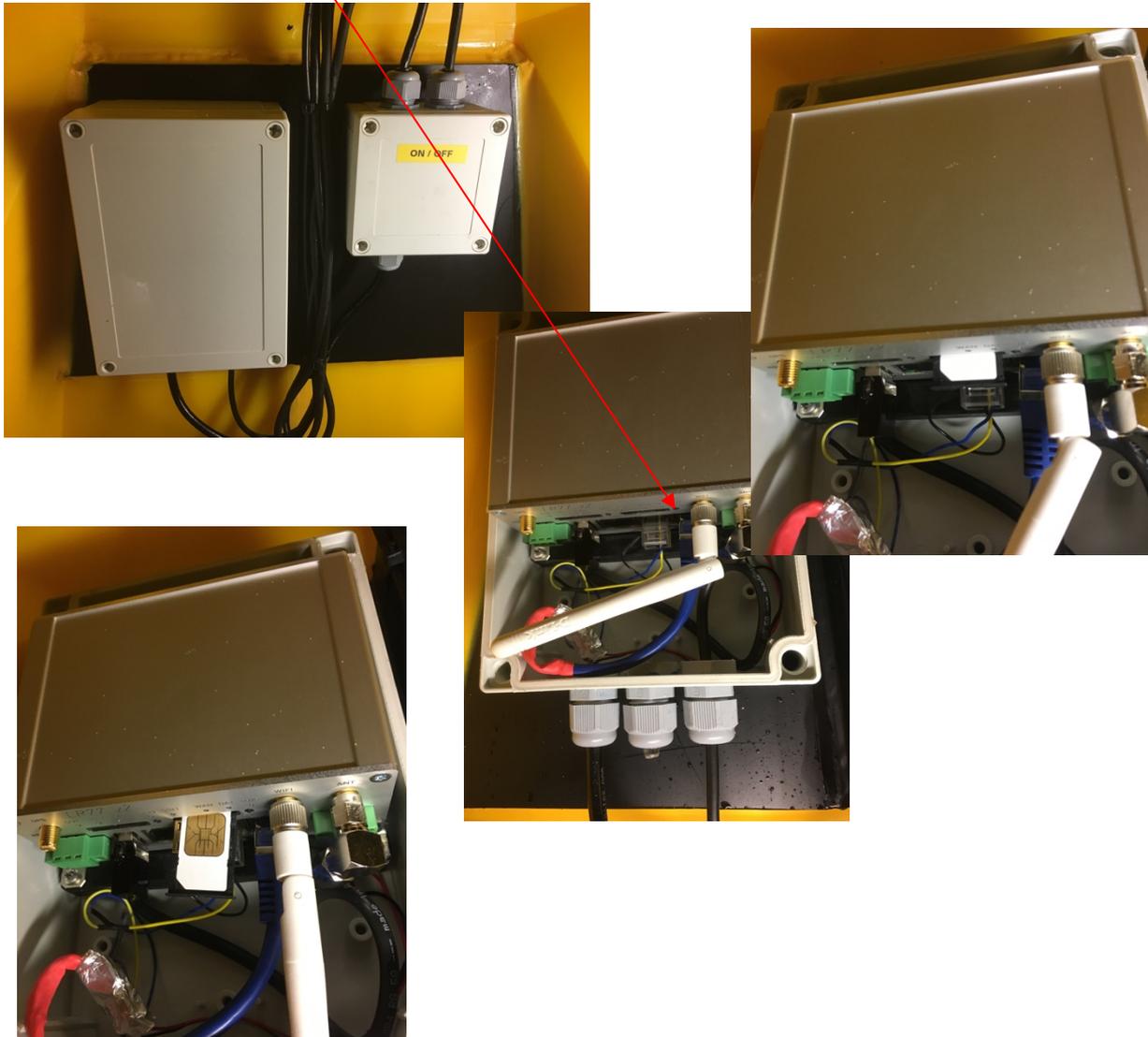
In version 5. Antennas is moved inside the router box, if network has good coverage at the area where the APB5 is placed, is recommended to use the internal antennas. External antenna is mounted on the all APB5, but user only physical connect this if network is poor. Use an 8 mm tool to disconnect the internal antenna and replace it with the cable. Use the ANT (to the left)

By having the antennas inside will protect the router form lightning and Suns “ESD” Electrostatic discharge.

## LR77-v2 and SIM card

### Physical change of SIM card

Open gray box to the left of the on/off box. Use a small screwdriver to press on the small eject button next to the SIM slot 1.



## Change APN access point name in the LR77-v2

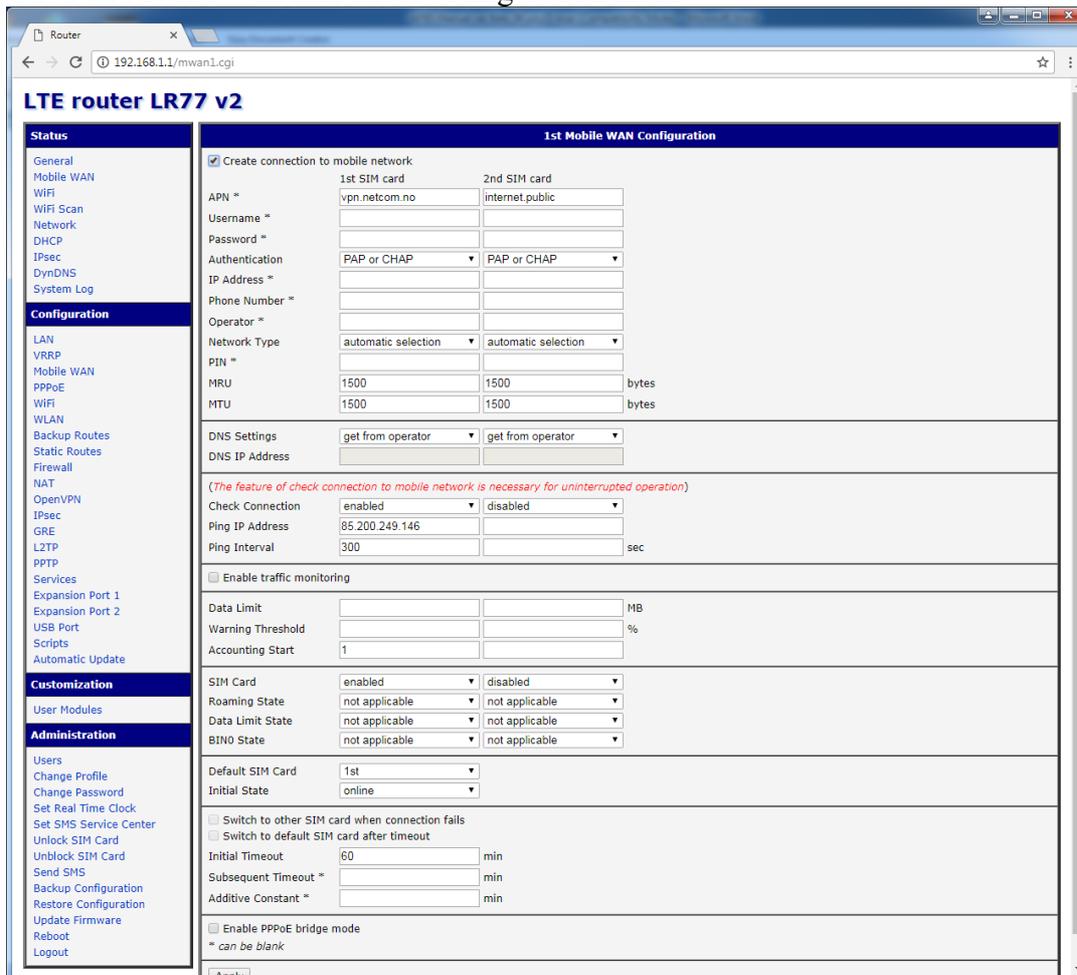
To access LR77-v2 is best done by WIFI. After activate APB5 and connected to APB5 WIFI network. Type address 192.168.1.1 in address line of a browser.

Username : root

Password : apb5



Click on Mobile Wan link under configuration menu:



Change APN: Access point name to the name your SIM provider use, 1 st sim is default.

**Get SMS when APB5 turns online:**

Click on Services than SMS, select send SMS on connect to mobile network

Add your phone number leave ID as same as serial number of APB5

Enable remote control via SMS, enable possibility to send “reboot” and some other commands via SMS from your phone. To get more info about LR77-v2 see manual.

[http://station.saivas.net/manuals/LR77\\_v2\\_Usersguide.pdf](http://station.saivas.net/manuals/LR77_v2_Usersguide.pdf)

The screenshot shows the web interface of an LTE router LR77 v2. The browser address bar shows the URL `192.168.1.1/sms.cgi`. The page title is "LTE router LR77 v2".

**Navigation Menu (Left):**

- Status
  - General
  - Mobile WAN
  - WiFi
  - WiFi Scan
  - Network
  - DHCP
  - IPsec
  - DynDNS
  - System Log
- Configuration
  - LAN
  - VRRP
  - Mobile WAN
  - PPPoE
  - WiFi
  - WLAN
  - Backup Routes
  - Static Routes
  - Firewall
  - NAT
  - OpenVPN
  - IPsec
  - GRE
  - L2TP
  - PPTP
  - Services
    - DynDNS
    - FTP
    - HTTP
    - NTP
    - SNMP
    - SMTP
    - SMS
    - SSH
    - Telnet
  - Expansion Port 1
  - Expansion Port 2
  - USB Port
  - Scripts
  - Automatic Update
- Customization
  - User Modules
- Administration
  - Users
  - Change Profile
  - Change Password
  - Set Real Time Clock
  - Set SMS Service Center

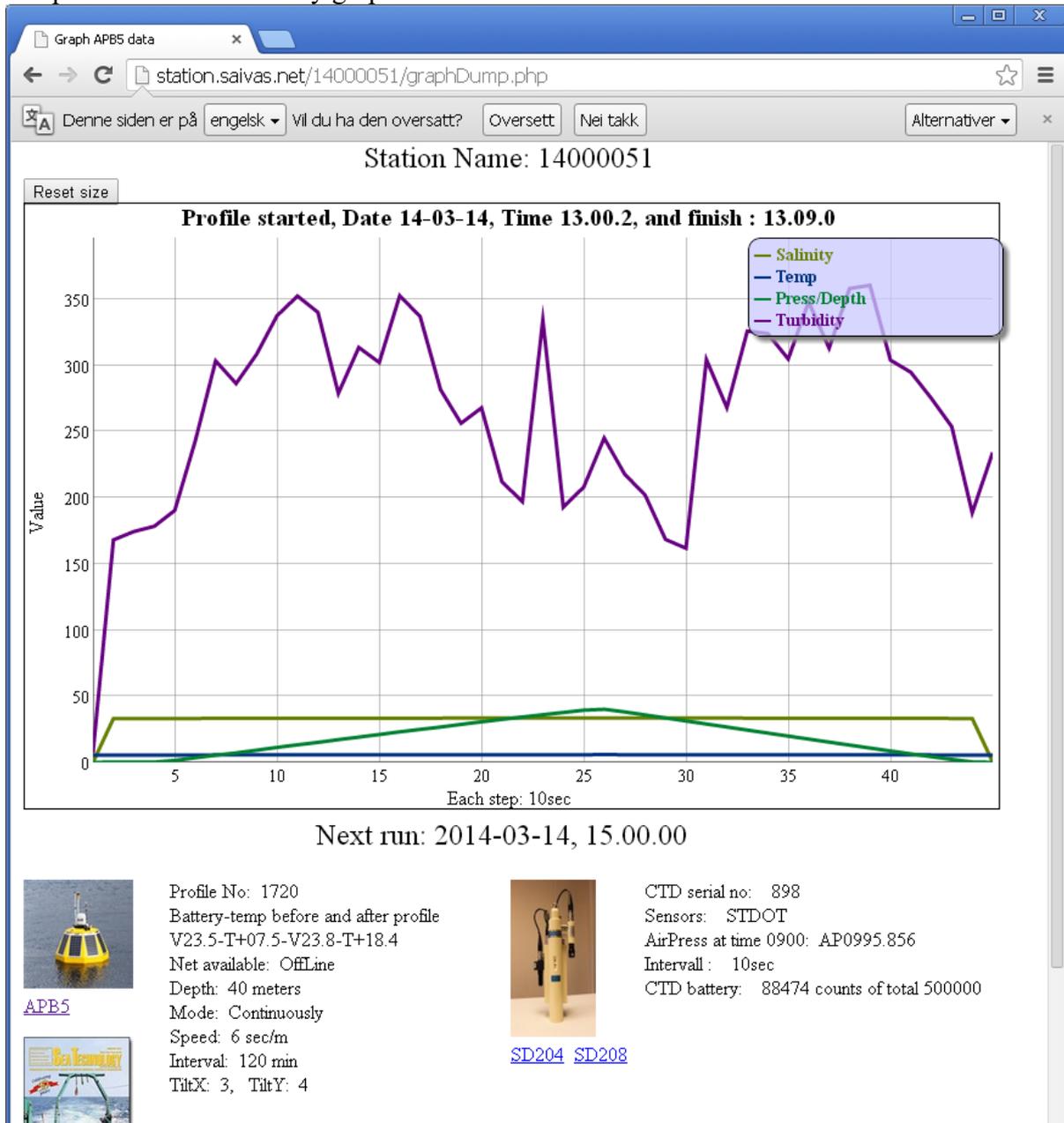
**SMS Configuration (Main Area):**

- Send SMS on power up
- Send SMS on connect to mobile network
- Send SMS on disconnect from mobile network
- Send SMS when datalimit is exceeded
- Send SMS when binary input on I/O port (BIN0) is active
- Send SMS when binary input on expansion port 1 (BIN1-BIN4) is active
- Add timestamp to SMS
- Phone Number 1:
- Phone Number 2:
- Phone Number 3:
- Unit ID:
- BIN0 - SMS:
- BIN1 - SMS:
- BIN2 - SMS:
- BIN3 - SMS:
- BIN4 - SMS:
- Enable remote control via SMS
  - Phone Number 1:
  - Phone Number 2:
  - Phone Number 3:
- Enable AT-SMS protocol on expansion port 1
  - Baudrate:
- Enable AT-SMS protocol on expansion port 2
  - Baudrate:
- Enable AT-SMS protocol over TCP
  - TCP Port:
  - \* can be blank
-

## Graphical display of data

### Station.saivas.net/Serialnumber

Enter the above address in your browser plus the serial number of the APB5 (8 digits). The last profile data is shown by graph or text.



## ***IMR welfare meter (Institute of Marine Research, Bergen, Norway)***

<http://www.imr.no/welfaremeter/index.htm>

The system collects “dump.htm” in to a local database it can be displayed as shown in Fig Appendix 4.1. The Welfare-meter is used by Institute of Marine Research, Bergen,

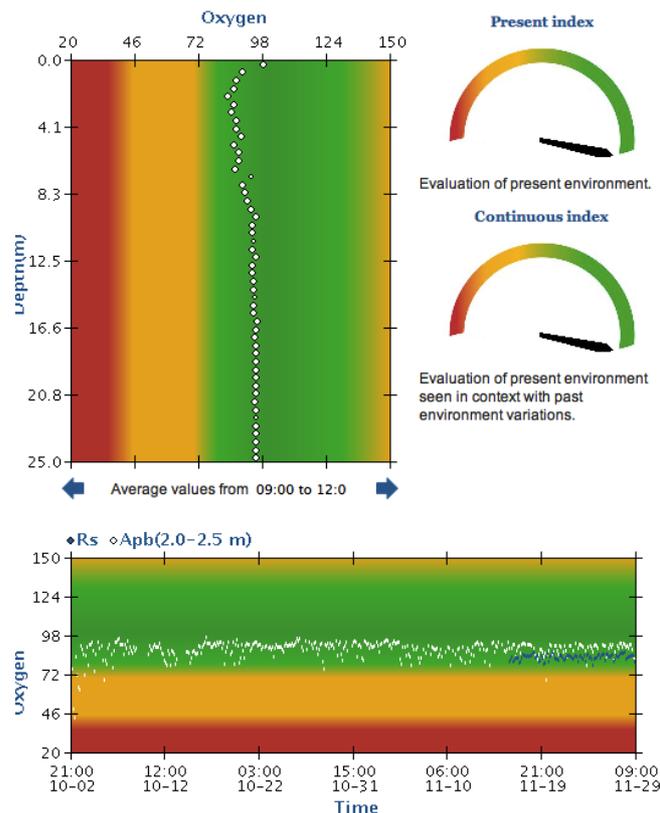


Fig Appendix . Example of graphical display of profile data using the IMR Welfaremeter.

*The Welfaremeter is an expert system for assessing fish welfare in aquaculture. The system consists of a buoy (APB5) with profiling probe (CTD, SD204/SD208) placed in the centre of a sea cage, a reference probe (CTD, SD204/SD208) placed at a distance from the fish farm, a database, an expert software program and an internet webpage. The profiling probe measures temperature, oxygen, salinity, fluorescence and turbidity for each half meter downwards in the cage. The buoy's control unit determines how often the probe profiles the water column and present data on an internal webpage. The Welfaremeter polls these data via the mobile phone network (GPRS) and stores it in the database. The data are then analysed by the expert software which gives an evaluation of the environmental conditions in the cage as either very good, fair or potentially harmful for the fish. The software also calculates a welfare index from 0 (terrible welfare) to 100 (excellent welfare). This index is based on modelling of metabolic scope (the salmon's capacity to extract oxygen beyond its basic needs from the water under the current environmental conditions) and factorial scope which reflects the salmon's robustness for stress and environmental perturbations under the current environmental conditions. The results are shown on the internet webpage (requires login).*

**Leaflet: quick Start up:****1.**

Unpack the APB5. Place it on two (2) tables (approx 1 meter over ground) or similar that make it possible to access the inside of the buoy. (Make sure that the table or other support is stable and strong.) Weight of APB5 is about 200Kg.

**2.**

Turn on the power button inside the buoy.

**3.**

Insert batteries in the Remote control. Hold middle button (red light turns on) 30-40 seconds green led turns on when the APB5 wakes up. Time has to be between 0900-1600 Norwegian time. (This can be change if your location is different.) If you not get green light try again and hold another 30-40 seconds.

**4.**

When getting green light on the remote let go of the middle button(PS. If you type middle button again on the remote, it will light up red light first, this does not mean that its offline, it just that the remote only operate on its own. You will see green light again when APB5 respond again). After 30 second you can try to use up down buttons to send the END STOP magnet unit out of the buoy. You will need to help it since the load is low. Beware that the APB5 is now only active until next full hour. Check your watch.

**5.**

Fasten CTD with the shackle and a secure it with a strips. Use remote up button to drag it in the buoy.

**6.**

Connect you laptop to APB5 WIFI. (ID = SERIAL NUMMER).

**7.**

Open a browser (google Chrom, safari, Opera .. etc) type 192.168.1.2 into the address field (remove everything else) the index page of APB5 should now be displayed.

**8.**

If SIM card not inserted you can do this now, it also possible to go to 9 without SIM card inserted, but then files will not be send to external FTP server.

**9.**

Make sure to have the APB5 in a level position and about 1 meter above the ground.

Type /apr after 192.168.1.2 = 192.168.1.2/apr

Aprun.htm page appears. Check voltage. (displayed in Blue color together with Temperature)

Do a land-test.

Sett single run, depth 3 meter , .....always On ...land test = ON. Than Press RUN button. Wait for the browser to return confirmation.

Since you have now chosen always on than the buoy will stay online as long as the voltage is a bow 15 volt.

### 10.

First thing that will happened is that the instrument will be drag into and up in the buoy. Then APB5 will try to wake the instrument. You can see for led light on the CTD to light up. When finish communicates with CTD it will lower the instrument to climate zone (30 cm under lowest ring of APB5).

Hold your hand on the CTD to help and prevent it to drop into the ground. It takes about 30 seconds in climate zone. Help the CTD out and back in to climate zone. After this it will be drag back up into the buoy. Data will now be collected from the CTD and be displayed if you click data on the index page 192.168.1.2 Data will also be available on FTP top server (<ftp://station.saivas.net>) and internal USB (<ftp://192.168.1.1>) see section FTP.

### 1.

Problems:

Download SD200w from <http://station.saivas.net/filesToPage/sd200w.zip>

Check communication with all connected unit.

### 2.

Connect to APB5 WIFI. Drag sd200w.exe file to your desktop, windows based program.

### 3.

Open program and press instrument icon and then setup. Chose TCP/IP and address 192.168.1.2:10000 ( default) click OK. And then type any key after green dot in front of address 192.168.1.2 in lover right corner. Menu of APB5 will now appear.

Look at Event log. <E>

If CTD problem, try direct communication <T>.

If none respond from CTD. Type <T> again follow by ESC. Now try to trigger the CTD with Mag-key. If led light up but none text appears on the screen. Then radio might be deactivated. Connect CTD to PC by cable and activate radio again via menu <J>. Also go to hidden menu <W> and activate buoy mode.

Disconnect cable and try again.

If Winch problem, try direct communication <W>

.....

Contact supplier.

Power problems

### 1.

Not get green light on remote. Check voltage in the on/off box. Contact supplier.

