TOPCON

Delta Link v2.0

ATP Box

User's Manual

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ATP Box
User's Manual

Part Number 1041258-01

The texts and graphics in this manual describe the software named below.

However, they are not always identical with the software but only exemplify the functionality and procedures.

We reserve the right to make technical changes.

Imprint

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Subject to technical changes

Manufacturer:

VMT GmbH

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Germany

Getting Technical Support

Contact your local Topcon dealer or visit the myTopcon website (https://www.topconpositioning.com/support) for technical support.

When contacting Topcon for technical assistance, provide the following information for better and faster service:

- A description of the following:
  - Action that was being performed when the problem occurred, including any screenshots and sample files where possible
  - Details of the unexpected behaviour, symptoms, and any error messages that precede or follow the problem
  - Problem occurrence frequency or pattern
- Specifications of mobile devices and computers used in the field or office exhibiting the problem. These specifications should include model information, version number, operating system information, memory and storage capacity, etc.
- Information about the system software, including the version number, license key and steps to reproduce the problem. This might also need to include Delta Link files (GKA, THP, CUI, STNI, MDM, ERR) or GPS data files and a copy of your database.
- A description of the field environment and/or observation conditions when the problem occurred.

Website

The Topcon website provides current information about Topcon's line of products. The support area of the website provides access to Topcon field and office software, manuals, frequently asked questions, and so forth. To access the Topcon website, visit https://www.topconpositioning.com.

The myTopcon website (https://www.topconpositioning.com/support) also provides complete support, such as news, updates, reminders, training, live Webinars, and customer service to help you get the information you need.

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1. Safety instructions

This is the Safety Alert Label. It indicates personal health and injury hazards.

Obey all safety messages that follow this symbol to avoid possible injury or death

The addition of this symbol to a Safety Alert Label indicates that an electrical hazard exists which may cause physical injury if the safety instructions are not obeyed.

Read these instructions carefully and look at the equipment to become familiar with the Delta Link, before attempting to install, operate, or maintain it. The following special messages may appear through this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The Delta Link is to be serviced and maintained by qualified personnel.
A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and its installation and has received safety training to recognize and avoid the hazards involved.

These directions should enable the person responsible for the installation and the person who actually uses the Delta Link to anticipate and avoid operational hazards and ensure that all users understand these directions and adhere to them.
No responsibility is assumed by VMT GmbH for any consequences arising out of incorrect use of the equipment.

Adverse Uses:

Any changes or modification made to the box without the express written approval of VMT GmbH may void the user's authority to operate the Delta Link and will void any operational guarantee by VMT GmbH.

- Use of the Delta Link without instruction
- Modification or conversion of any components
- A purpose alienation
- Use with accessories from other manufacturers without prior express approval of VMT GmbH.

In addition to the above Safety Directions, please read the corresponding Safety Instructions of the applicable Topcon total station User Manual.

2. Delta Link

The Delta Link is a weatherproof station for controlling a connected total station and saving the observed measurements.

- **The total station is connected to the box by a connection cable.**
- **The Delta Link Box initiates the measurements.**
- **The total station carries out the measurements and supplies the observed measurements.**
- **The Delta Link Box saves the observed measurements and sends them to the deformation monitoring system.**

2.1. General notes

Please observe the following notes

- The Delta Link may only be installed by qualified person.
- A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and its installation and has received safety training to recognize and avoid the hazards involved.
- The electrical contacts (plug connections) should be checked once a year (for integrity, protection against water ingress, etc.).
- Only original accessories from VMT may be connected. For the DC IN connection, the allocations in the manual must be observed. Network allocation in accordance with TIA 568A.

The Delta Link has a non-chargeable Lithium Battery type CR1216, 3V, capacity of 25 mAh, with a continuous drain of 0.2mA and operate between -30 and +50°C, its role is to maintain the clock while switched off.

This battery should not have to be replaced at any time, however if it needs to be replaced you would need to consult a VMT Engineer immediately.

These batteries are safe for disposal in the normal municipal waste stream.

Caution: Risk of fire, explosion and burns.

2.2. Technical data and Environmental conditions

Technical data		
		Comments
DC IN	21 – 31 VDC  Rated Current 4A	 The Delta Link must be powered by an approved and regulated power supply of 21-31VDC, maximum current 4A. The Delta Link may be damaged or unsafe to use if the power source exceeds the stated limits.
Internal tilt sensor	3-axis	Experimental, Indicative purpose only
Internal temperature sensor	1° resolution	
Length x Width x Height	255 x 220 x 60 mm	Box only, without connectors, antennas and mounting
Weight:	2.5 kg	Box only, without connectors, antennas and mounting

Environmental conditions › The Delta Link housing is made of aluminum and is designed to be used in any environment. It can be used indoor or outdoor, above or underground.		
Environmental temperature	-20 to 50°C	
Storage temperature	-30 to 70°C	
Protection class	IP65	IP65: Suitable for the following ambient conditions: › Protected against dust in amounts that could cause damage › Complete protection against contact › Protection against spray water (nozzle) from any angle
Wind resistance	up to 120 km/h	

2.3. Installation

The Delta Link has protection class IP65 and can thus be installed outdoors. The installation location should be selected where the box is not subject to direct sunlight. For the installation of the device, an easily accessible isolating unit is likewise to be provided in the electric circuit. Here the electrical plug serves as the isolating unit.

It is designed for installation on a pole. However, installation is also possible without a pole. For this purpose, the mounting bracket is secured directly to an object with screws in the prepared drilled holes.

- Pole diameter: 50-70 mm
- Hose clamps are supplied

Cable feedthroughs

- Ensure that all cable connections and cable feedthroughs are suitable for IP65.
- The plugs used are at least IP65 (when inserted and screwed on)
- Ensure that unused connectors have their protective sealing caps fitted.
- Warning: Failure to use the appropriate labelled cable to the Delta link can result in short circuits, fire or unintended equipment operation that may cause death, serious injury or equipment damage.

Installation on a pole

- First attach the mounting bracket to the pole.
- Use the hose clamps supplied.
- Attach the Delta Link to the mounting bracket as shown.

Installation on a wall

- Use the mounting bracket as a template to mark the location of the holes.
- All 4 holes need to be used with suitable fixings.
- Prepare holes and fixings and fix the mounting bracket to the wall ensuring all 4 positions are utilized

- Screw the captive screw on the box to the mounting bracket (see picture) using the supplied Allen key.
- To remove the Delta Link box, Shutdown the unit (see chapter 3.1). Then disconnect all antennas and cables before undoing the captive screw and removing the Delta Link from the mounting bracket.

2.4. Connections

This chapter illustrates the Delta Link connections from left to right.

Top plate

Connections (from left to right: Wi-Fi, modem)

WIFI	Connection to Wi-Fi antenna (Wi-Fi can only be used with the antenna connected!) › SMA plug › IEEE802.11 b/g/n compliant 2.4 GHz
MODEM	3G antenna (3G can only be used with the antenna connected!) › SMA plug › Supported frequencies ⌟ GSM/GPRS/EDGE: 850, 900, 1800, 1900 UMTS/HSPA: 800/850, 900, AWS 1700, 190, 2100MHz

Bottom plate

Connections listed from left to right

LAN	LAN socket
I/O	Connection for future sensors
GP	Connection for THP (Temperature, Humidity, Pressure) sensor
MDTS	Connection for the total station
DC IN	DC power supply

2.4.1. Connector pin assignment

This chapter illustrates the Delta Link box´s plug assignments; not those of the cables.

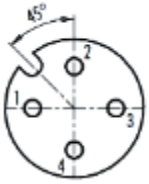
I/O

1	0 VDC	 M12-A series 713/763 female 09 3482 00 08
2	+12 VDC	
3	Input 1	
4	Input 2	
5	Output 1A	
6	Output 1B	
7	Output 2A	
8	Output 2B	

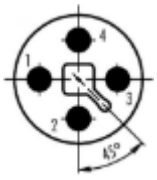
GP

1	0 VDC	 M12-A series 713/763 female 09 3482 00 08
2	+12 VDC	
3	RS232 RX / RS485	
4	RS232 TX / RS485	
5	3.3 VDC	
6	I2C SDA	
7	I2C SCL	
8	0 VDC	

MDTS

1	0 VDC	 M12-A series 713/763 female 99 3432 700 04
2	+12 VDC	
3	RS232 RX	
4	RS232TX	

DC IN

1	Earth Terminal	 M12 T series 813 male 09 0631 700 04
2	N.C. (1)	
3	Power Supply Positive	
4	Power Supply Negative	

› (1) No Connection

Network

When a network cable is connected make sure that appropriate measures against RFI suppression have been taken. For example, use a snap or split ferrite on the cable

For cable choice we recommend to use a cable similar to Megaline F6-70 S / F 11Y flex data cable of the type KS-02YSC11Y 4x2xAWG 24/7 PIMF LEONI

Composition:

- conductor: uncoated Cu-wire, AWG24/7
- isolation: Zell-PE, core diameter 1.55mm
- stranding element: pair
- Single Screen: aluminum laminated polyester film, metal side outside (PiMF)
- stranding: 4 pair
- overall screen: tinned Cu-fully braided
- outer sheath: PUR, flame retardant

Fire Behaviour:

- Flame resistance: according IEC60332-1-2
- Halogen-free: according IEC 60754-1/2
- Smoke-proof: according IEC 61034-1/2
- Fire load (MJ/m): 0,99 (approximate value)

Thermal properties:

- Temperature range for the resting state: -40°C to +70°C
- Temperature range for mobile operation: -10°C to +50°C

2.4.2. SIM card installation

The SIM card is used to activate the communication to the mobile modem for upload data from the Delta Link box to an (S)FTP Server or to allow access to the box via Cellular network.

- Before changing or inserting the SIM card, make sure that Delta Link is shutdown (see chapter **3.1 General**).
- Turn off power and unplug the cable from the box.
- Stay in an electronic protection zone (EPO).
- Removing the SIM card cover with Allen key
- Inserting the SIM card (Pay attention to the correct orientation)
  - Insert the chip side down and the cut corner on the front left side
  - A Push-Push Type SIM Card Connectors is used. Push to insert and push to eject
- Replace SIM card cover

2.5. Connect PC to Delta Link Box

The Delta Link Box can be connected to the PC in various ways.

Wi-Fi	Wi-Fi is built-in to the Delta Link Box. › The Wi-Fi for the Delta Link is activated by default. › The SSID (Wi-Fi network name) is set individually in accordance with the serial number: e.g. Delta Link Box SN: 000001 has the SSID **DeltaLinkMgmt000001**. › Wi-Fi default password: **33!dlwlandefault** › The Wi-Fi can be configured in **LinkConfig**. › The Delta Link Box can be accessed via the Wi-Fi at **192.168.88.5**.
Ethernet	The Delta Link unit can be connected, via Ethernet cable, to a wired network. The Ethernet port on the Delta Link unit is setup as a DHCP client and will connected to a DHCP Server. The unit will automatically try to obtain an IP address once connected. The Delta Link Box can be integrated into an existing network via Ethernet. Install the **Apple Bonjour Service** › Your network allocates an IP to the Box. › To establish a local connection, enter the Delta Link serial number into the Tight VNC Viewer (e.g. for the Box with serial number: 82EE12-000003, enter the host name **DeltaLink000003.local** and connect) › LAN default password: **dlvnc** To check if the Delta Link box is accessible using the bonjour service you could also use the ping. For example, “ping **DeltaLink000001.local**”, if both bonjour is installed and the box is reachable then you get a reply
LAN	It is possible to connect the PC directly to the Delta Link box via a LAN connection. › Use a crossover cable › Prerequisite is that the PC is not configured to use a fixed IP on the port used Via the host name e.g. **DeltaLink000003.local**, a connection can be established.

VNC Remote	When the Box is connected to the Internet (via LAN or mobile modem), you can also access the user interface remotely. Info: an HTML5-compatible browser is a requirement for the remote control. › Navigate to the following URL: https://deltalink.vmt-gmbh.de/ › A login window appears. › Enter your customer-specific access data. You will receive this as needed or after ordering the remote access bundles from your responsible Sales Manager. They can also be found on the paper work that came with you Delta Link › Left-click on the Delta Link Box you want to connect to. Info: Every Delta Link Box is displayed with its unique serial number › Enter the password (default password: **dlvnc**) The password can be changed in **LinkConfig** (see chapter 3**.6 Login**) › The user interface of the **DeltaLog** program appears.

2.6. Access data

Interface	Default/your setting	Changeable to ...
Wi-Fi SSID	**DeltaLinkMgmt000001(example)**	LinkConfig > Wi-Fi
Wi-Fi Password	**33!dlwlandefault**	LinkConfig > Wi-Fi
VNC IP	**192.168.88.5**	not configurable
VNC Password	**dlvnc**	LinkConfig > Remote Access

2.7. Access using VNC viewer

You can operate the DeltaLog software using a VNC viewer.

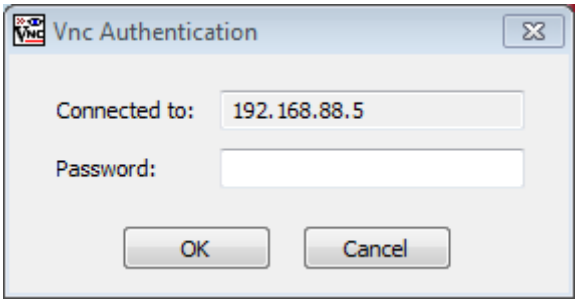
- **Your PC is connected via Wi-Fi directly to the Delta Link box or the Delta Link box is connected via Ethernet to the same network as your PC.**
- **A VNC server is installed and configured on the Delta Link so that the Delta Link can be operated using a PC with a VNC viewer.**

Installing a VNC viewer

- Install a VNC viewer (VMT recommends the Tight VNC viewer).

Starting the VNC viewer

- Ensure that the Delta Link unit and your PC are on the same network, either using the Wi-Fi access point of the unit.
- Depending on the connection to the Delta Link box, there are different logon procedures:
  - If you are connected to the Delta Link box via Wi-Fi, you need the IP (192.168.88.5) or the host name (for example, **DeltaLink000003.local**)
  - If a Wi-Fi connection is established, the connection is made via Hostname.local (for example, **DeltaLink000003.local**)
  - If an Ethernet connection exists, you can dial in via the IP address assigned by the DHCP server.

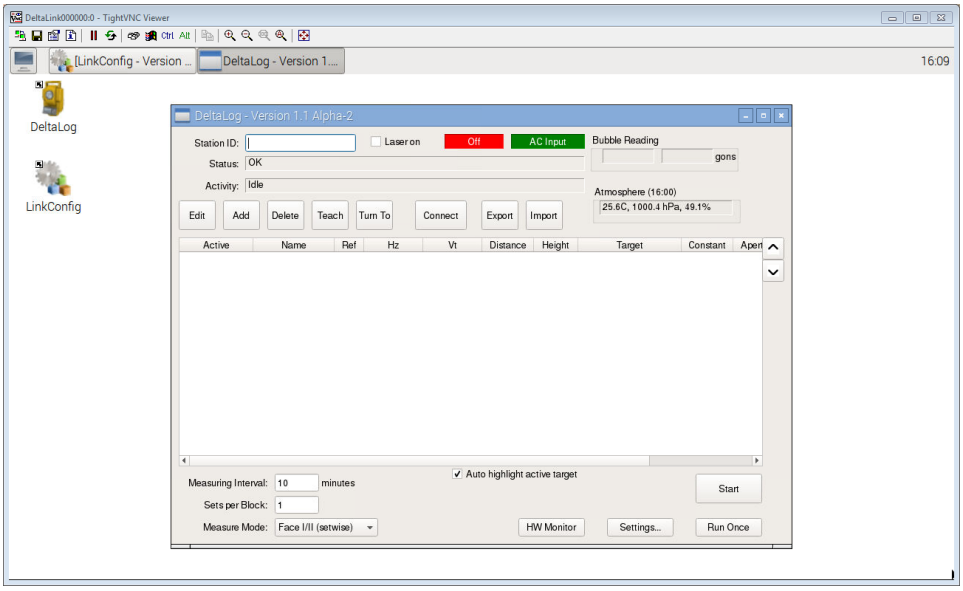


(for example Wi-Fi connection)

Default IP: **192.168.88.5**

Default password: **dlvnc**

- Enter the access data.



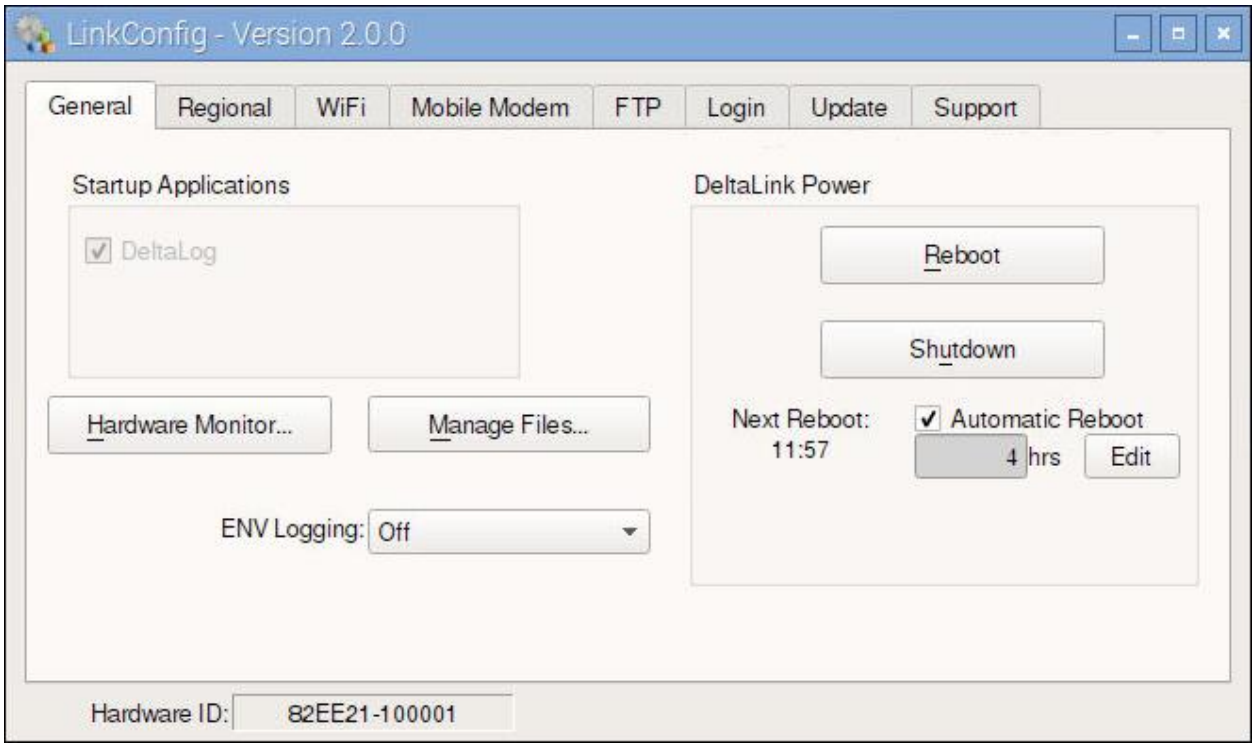
- The user interface of the **DeltaLog** program appears.
  The standard resolution is fixed at 1024x768.

3. LinkConfig

In the LinkConfig window, basic settings of the Delta Link Box can be configured.

- **This is where the data connection is configured, passwords are changed, updates are managed and installed.**

3.1. General

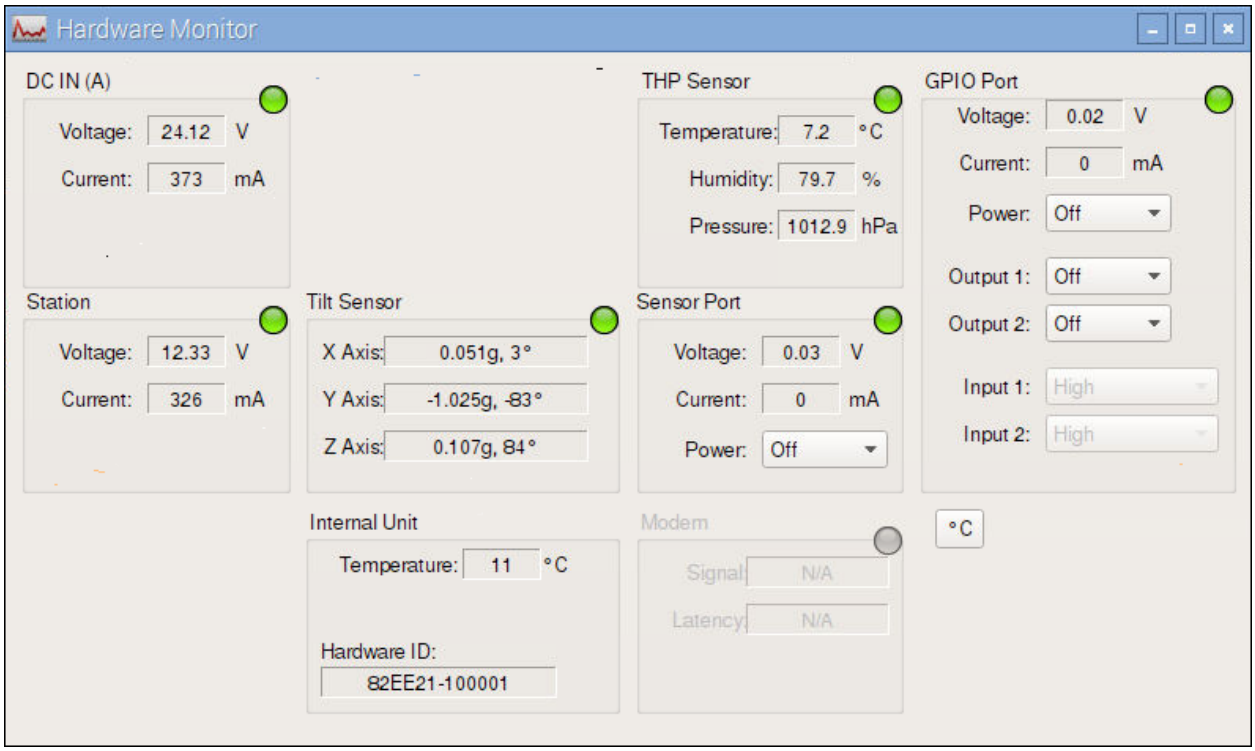


Reboot	The Delta Link Box shuts down properly, switches off the hardware and restarts. All hardware is started again.
Shutdown	This performs a managed shutdown of the Delta Link box. Apply any power source to start up again.
Automatic Reboot	An automatic reboot of the Delta Link box can be configured. This reboot is performed with a configured time interval.
Manage Files…	Opens the folder where all data is saved
ENV Logging	Here the logging interval of the basic weather station (THP sensor) can be set. The data is always logged to the .ENV and .THP file even if DeltaLog is in standby. The readings will be applied for atmospheric PPM corrections of the observed slope distance.
Hardware ID	Consists of the hardware version of the unit and the S/N of the Box.

3.1.1. Hardware Monitor (HW Monitor)

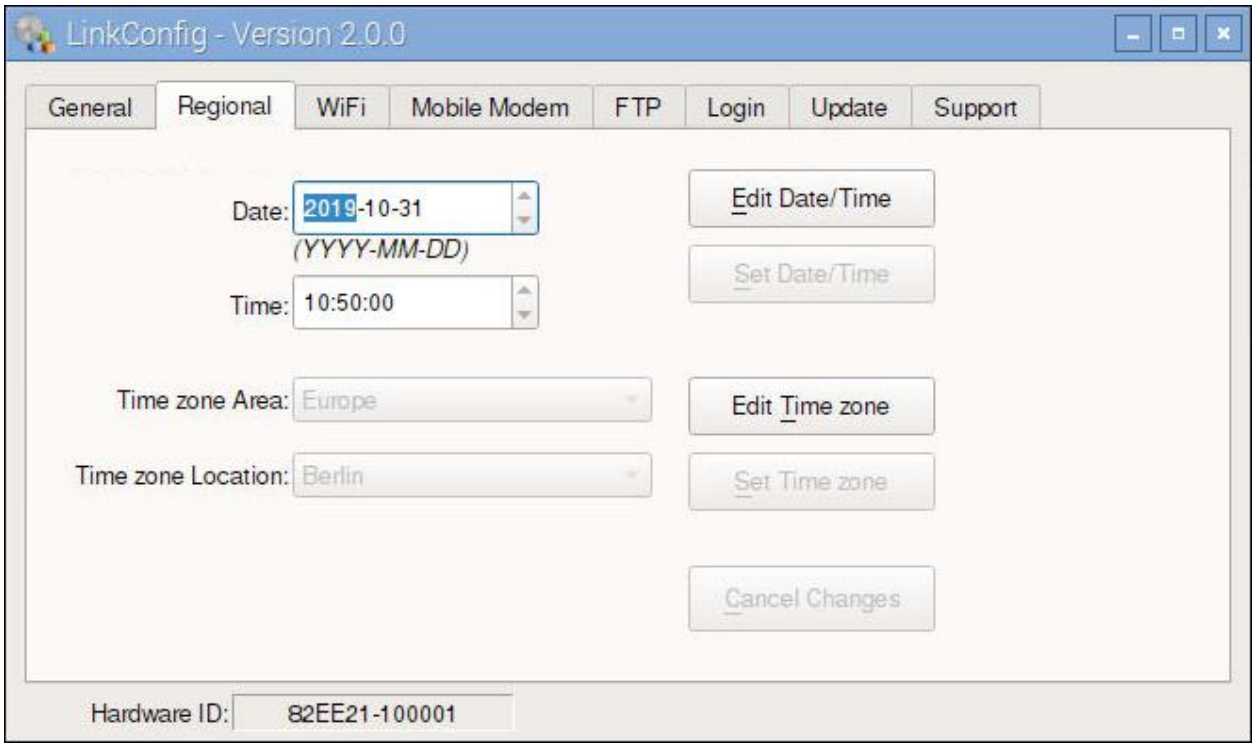
In the Hardware Monitor, the hardware status of the connected sensors is displayed.

The observed meteorology (THP sensor) will internally be utilized for ppm correction of the distances observed by the total station. In the observation file the corrected spatial distances are stored. (Certain interference frequencies may cause a defective THP sensor function)



- A green bullet indicates values within the normal or acceptable range. Exceeding the acceptable range is indicated by a red bullet.
- It is possible to switch display between degree Celsius and degree Fahrenheit.

3.2. Regional



You can set the local time in the **Regional** tab.

- The installed clock is a high-precision clock.
- It is synchronized via the Internet.

Procedure

- Click on **Edit time zone**
- Select **Time zone area** and **Time zone location**.
- Click on Set **time zone**.
- The time zone is accepted and the current date and time are entered above.
- Should the time not be correctly entered automatically, you can also enter it manually by pressing the **Edit date/time** button.

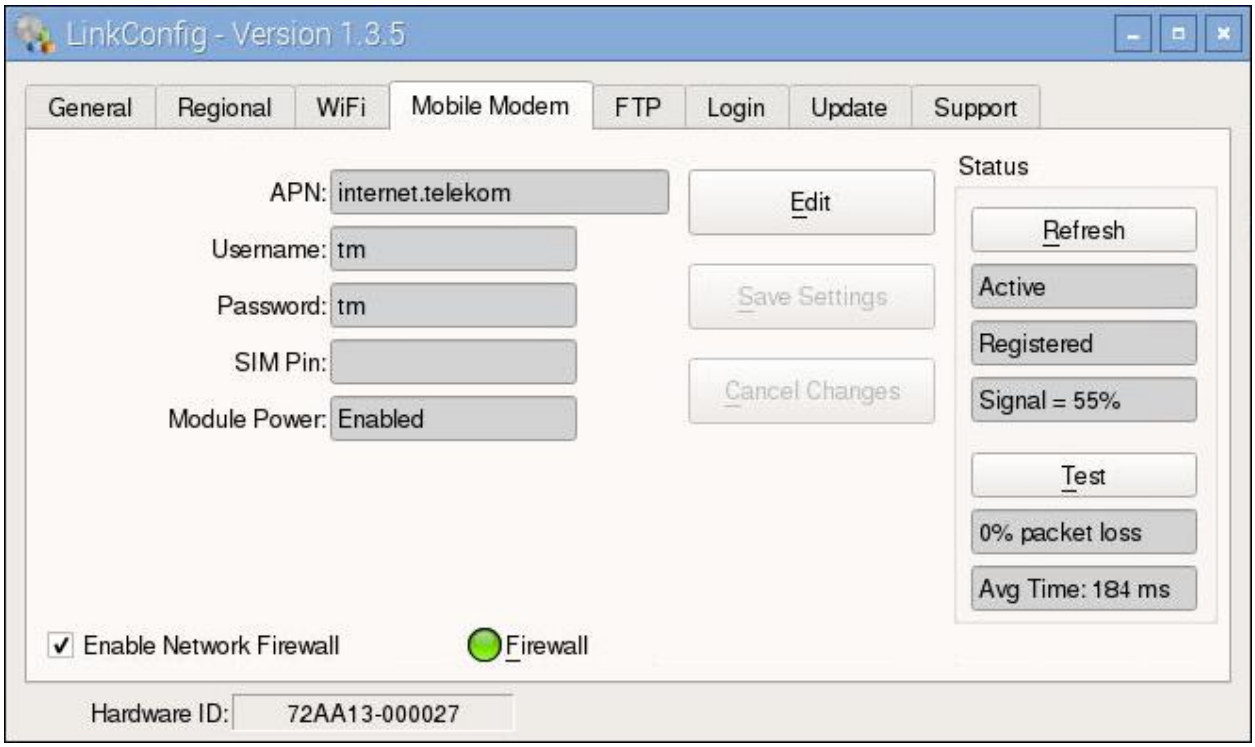
3.3. Wi-Fi

The login credentials for the Wi-Fi are specified here.

If not in use switch off the Wi-Fi!

Access password	Password for Wi-Fi. Default: **33!dlwlandefault** (WPA-PSK encryption method used)
Wi-Fi Country	Choose the country where the Delta Link unit is operated in order to limit the applied frequencies to those suitable and permitted locally according to national restrictions.
Wi-Fi Channel	Choose the channel. Channel 1,6 or 11 is usually recommended and avoid initial channel interference.
Module Power	Power control = Wi-Fi On or Off. › Switch Off Wi-Fi to save power and so that other Wi-Fi networks are not disrupted. › **Caution:** After switching off Wi-Fi the Delta Link Box is no longer accessible via Wi-Fi! (Use cable or mobile modem connection.)

3.4. Mobile Modem

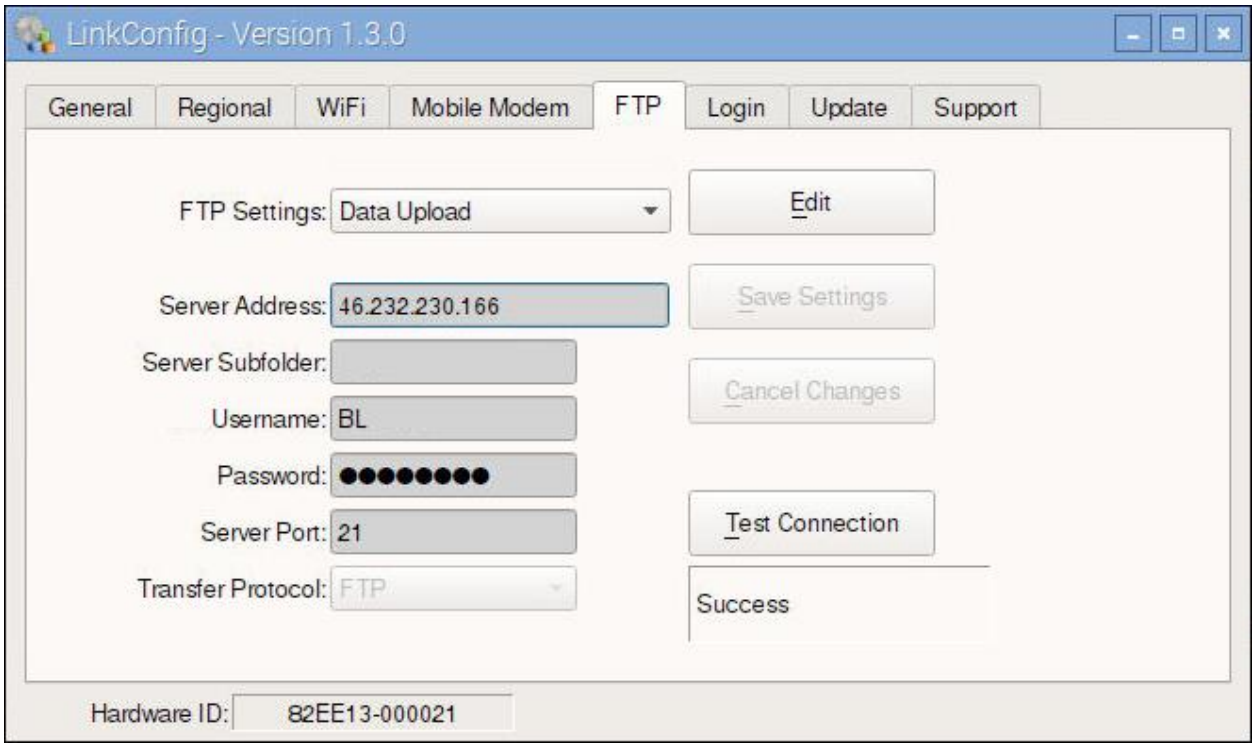


Here, the mobile modem can be configured and tested. (How to insert the SIM Card, see Chapter **2.4.2 SIM Card installation**)

APN	Your SIM card provider will supply these details
Username	
Password	
SIM PIN	Enter the SIM PIN. Leave empty if the SIM card is not locked
Module Power	› Switch mobile modem On or Off. Deactivate the Mobile Modem if Mobile Modem connection is not required or not used.
Status	› The upper status display indicates the status of the mobile modem: ″Inactive″, ″Activation″, ″Active″ › If the mobile modem is dialled in to a network, the status ″Registered″ is displayed › Signal strength varies depending on network coverage and antenna position › With clicking the Test button the mobile modem´s connectivity is checked (display of lost packets and average latency)

Enable Network Firewall	A firewall for the mobile data connection can be switched ON or OFF. A green bullet indicates an activated firewall. The Firewall allows: › SSL Portal › DNS › ICMP › Active/passive FTP and FTPS › Software Update FTP › NTP It denies all other input and output ports.

3.5. FTP



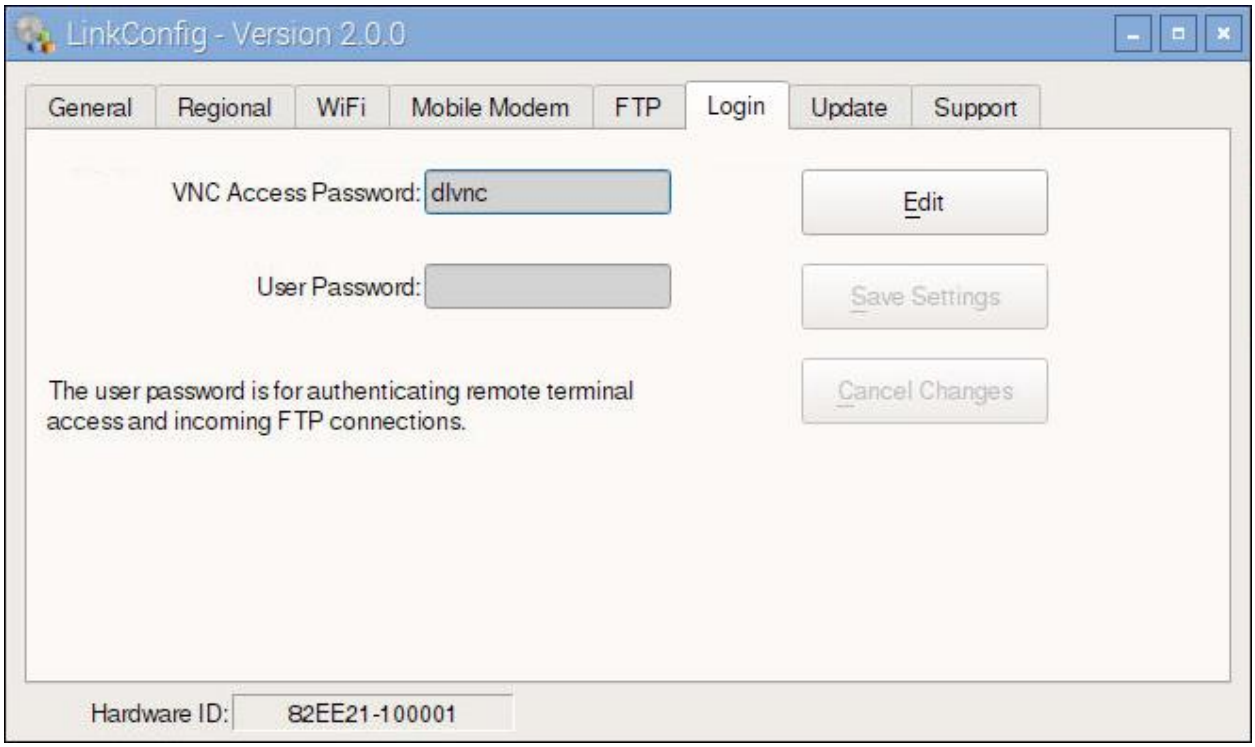
The **FTP** Upload tab contains the login credentials for the FTP server the measured data is uploaded to by the Delta Link Box. The following FTP server settings are recommended: passive FTP, at least ASCII, all read/write permissions (Create/Delete/Rename/Overwrite) assigned to the user. Also, the Settings for the software update FTP server are made here.

Server Address	■ Details of the FTP server. ■ As transfer protocol FTP or FTPS is available
Server Subfolder	
Username	
Password	
Server Port	
Transfer Protocol	

› The access/connection to the FTP server can be checked using the test connection function.

› A message about the status is displayed.

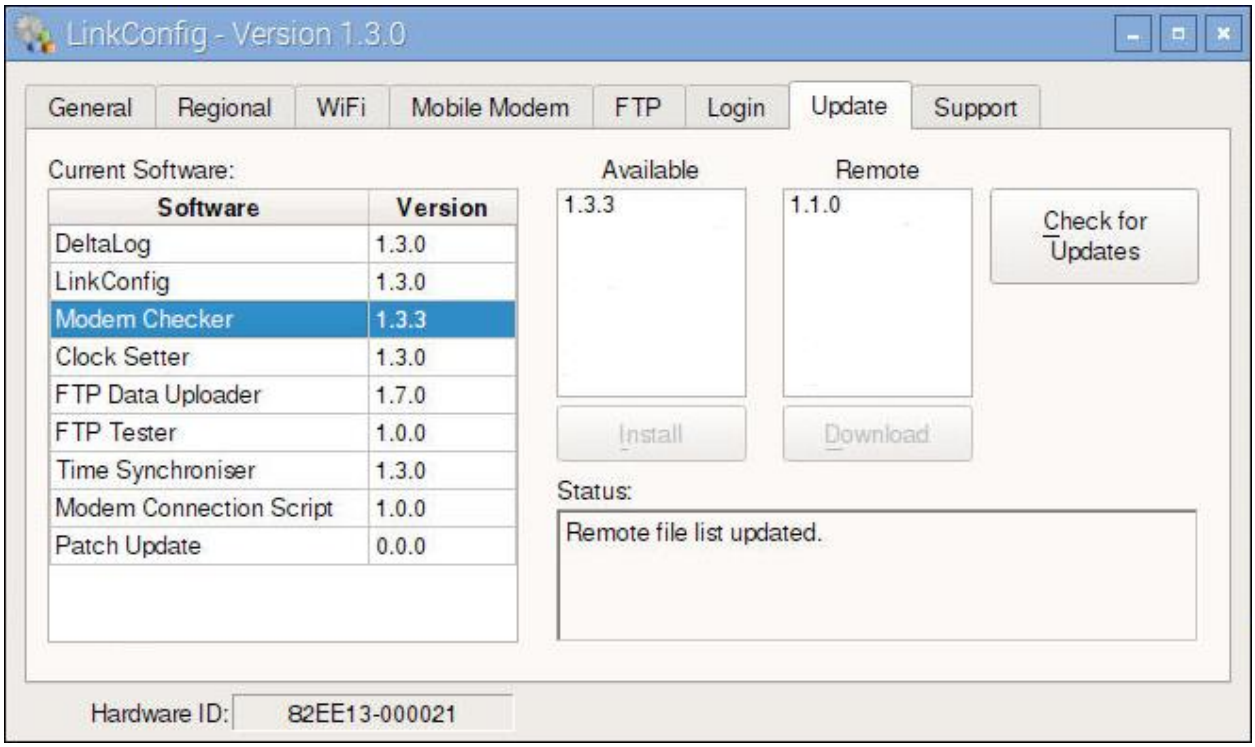
3.6. Login



In the **Login** tab, the (default) password for remote access and the SSH connection can be changed.

Remote Access Password	Password for Remote Access. › Password has to be 4 to 8 characters long › Default: **dlvnc**
User Password	Password for SSH Connection, this includes incoming SFTP connections › Password has to be 8 to 16 characters long › Default: **dldefault**

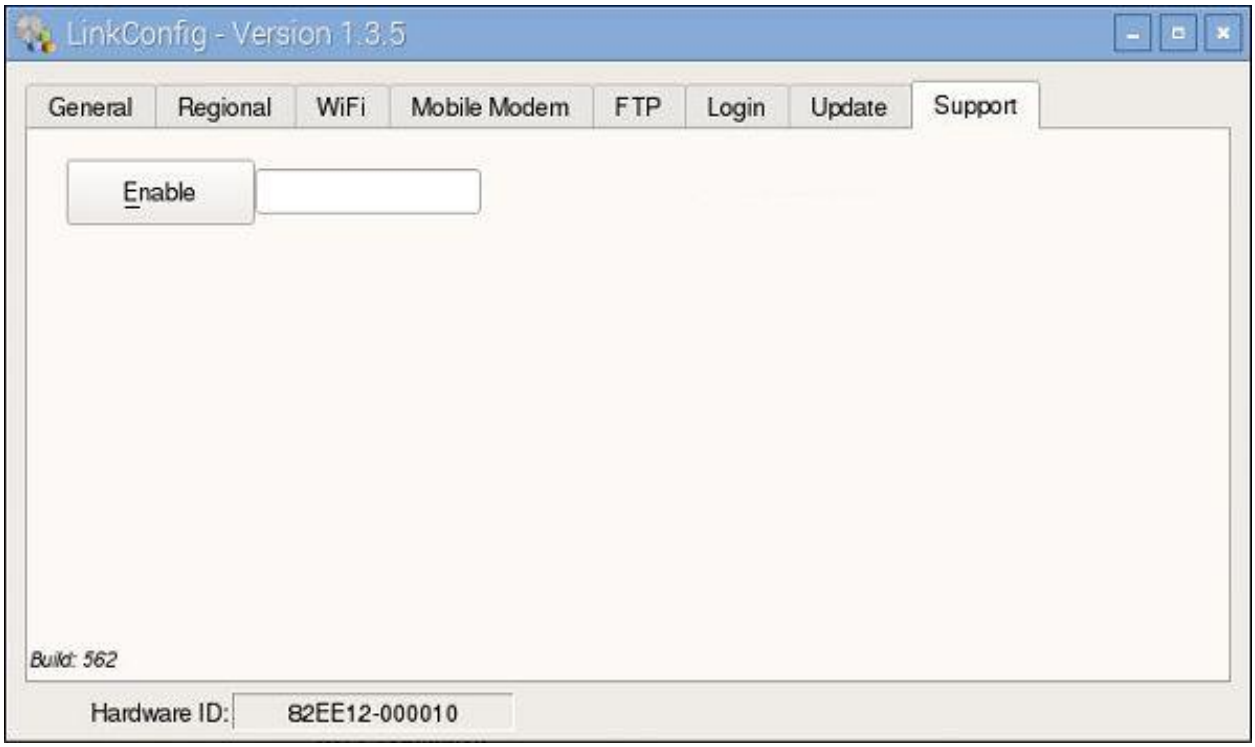
3.7. Update



In the **Update** tab, all programs and scripts operated on the Delta Link Box (primarily DeltaLog and Link Config) can be updated. Updates are only possible with a valid FTP connection, see Chapter 3.5 **FTP**.

- Use the **Check for Updates** Button to check if new versions are available.
- Compare list “Remote” with the “Available” list.
- If there is a new version, use the **Download** Button to download the new version to the Delta Link box
- Use the **Install** Button to install the new version
- Follow the instruction provided.

3.8. Support

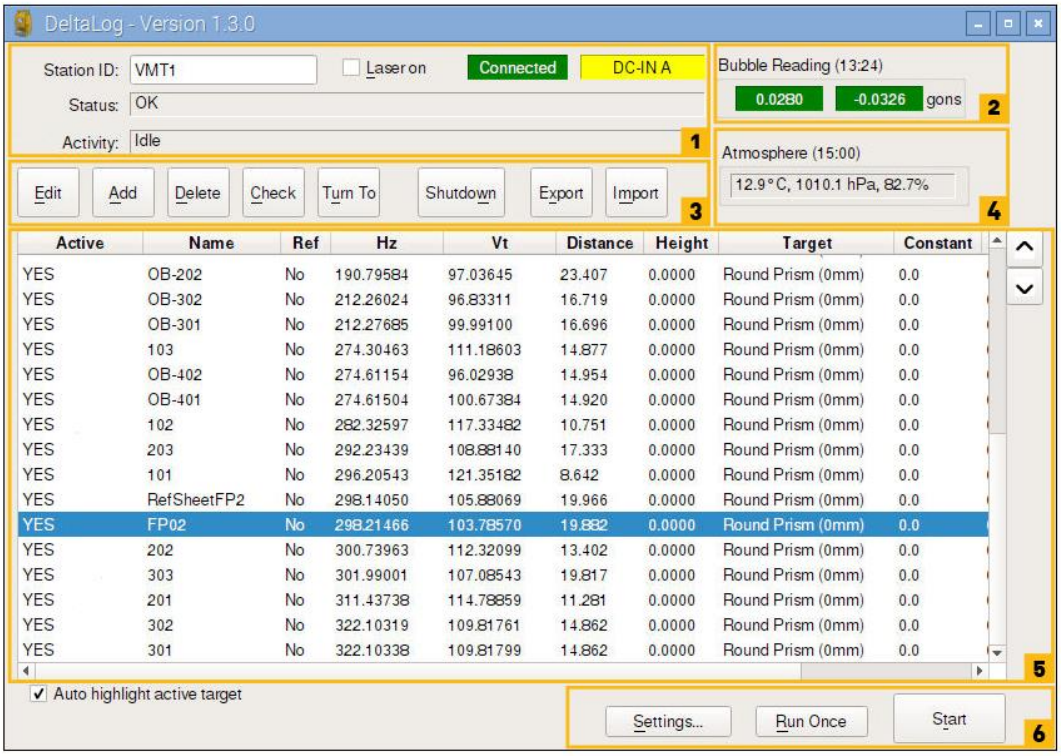


This section is intended for servicing by the manufacturer.

4. DeltaLog

The DeltaLog program runs on the Delta Link Box, and it is used control your Total Station.

4.1. Screen and operating elements



1 **Status display**

- Indicates the Status of the connected total station in traffic light colours (green, yellow, red)
- Indicating the action currently being carried out by the total station

2 **Bubble Reading**

- Displaying the last reading of the internal tilt sensor of the station

3 **Operation Buttons**

- Buttons for working with the Observation list
- See Chapter 5.3 **Operation Buttons**

4 **Atmosphere**

- Displaying the last measured ambient conditions observed by the connected THP sensor.

5 **Observation list**

- The colour background of the observation list (main observation window) changes according to the current action
- White
  - Standby, is enabled to change the configuration settings
- Orange
  - Standby in Monitoring mode, access to the **Settings** dialog and the **HW Monitoring**
- Green
  - Performing a round of observations

6 **Settings and Running a measurement**

- Various settings for measurement (see chapter **5.8 Settings**)
- Running a test measurement (see Chapter **5.6 Settings up the measurement parameters**), or
- Starting an automatic measurement cycle (see Chapter **5.7 Starting automatic measurement**)

4.2. Basic settings, configuration

When starting the Box for the first time, it has to be checked that the default settings are appropriate or whether they have to be modified according to local requirements.

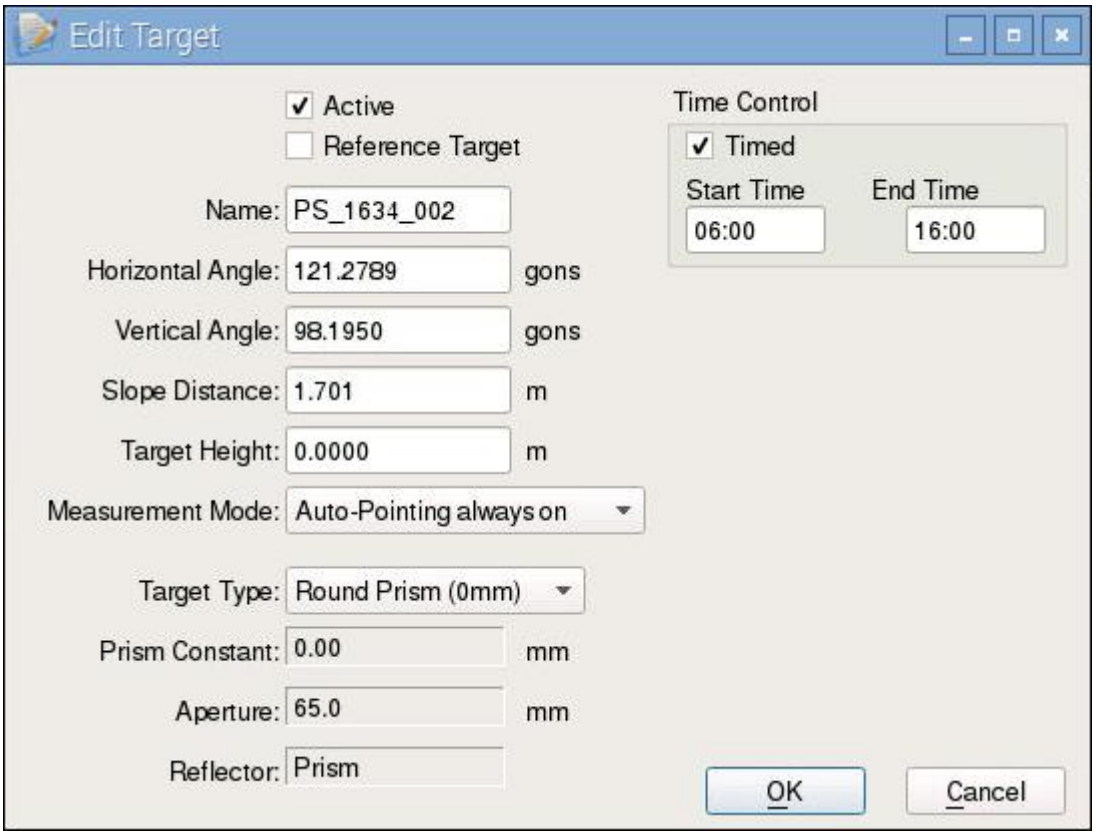
	In the program part ... / comments
› Change the login credentials and passwords as necessary.	
⌟ Wi-Fi	LinkConfig > Wi-Fi
⌟ Remote Access	LinkConfig > Login
⌟ SSH Connection	LinkConfig > Login
If you are using a SIM card: › Enter the login credentials.	LinkConfig > Mobile Modem
› Enter the FTP path and login credentials	LinkConfig > FTP Upload
› Set time and time zone. ⌟ The Delta Link Box provides a high-precision clock. ⌟ It is synchronised via Internet!	LinkConfig > Regional

4.3. Operation Buttons

Some buttons can have a double function.

Edit

- The parameters of a single selected observation can be modified.
  - Mark the observation in the list.
  - Click on **Edit**.



Add

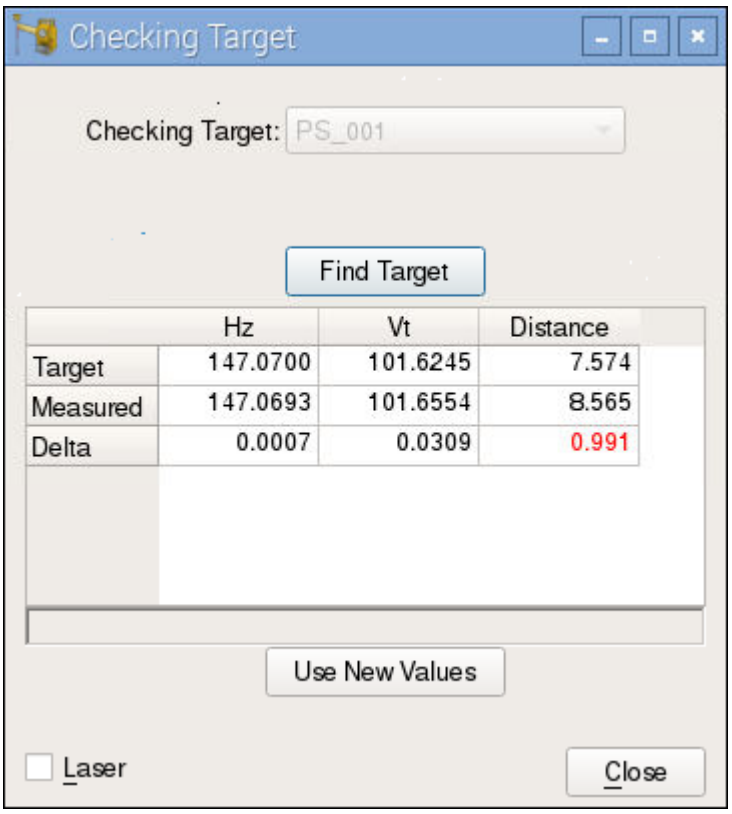
- Click on **Add** to set up a new observation

Delete

- Deletes the marked observation

Check

- Checking the observations towards a specific target (angles and slope distance).
  - Mark the target observation in the list.
  - Click on **Check**.
  - The total station takes observations towards the marked target and calculates the deviation
  - The existing target angles and distance could be overwritten with the new values
  - Note: DeltaLog does not position the total station in this action



Teach

- **Check** button changed to **Teach**, if angels and distances of a point are unknown.
- The button allows you to learn new points.
  - Click on **Add** to set up a new observation. Per default the new observation has no angels and distances.
  - Position the station on the target
  - Click on **Teach**
  - The station aims the target and measures horizontal angle, vertical angle and slope distance and add the information to the selected point

Turn To (target point)

- You can position the station to any configured target for validation purposes.
  - Mark the target of interest in the list.
  - Click on **Turn To**.

- The total station moves towards the point.

Shutdown

- The total station can be shutdown from DeltaLog via the **Shutdown** button
- (Shutdown Delta Link see chapter **4.**1 **Link Config - General**)

Connect

- **Shutdown** button changed to **Connect**, when the station is shut down.
- Click on **Connect** to turn on the station

Export

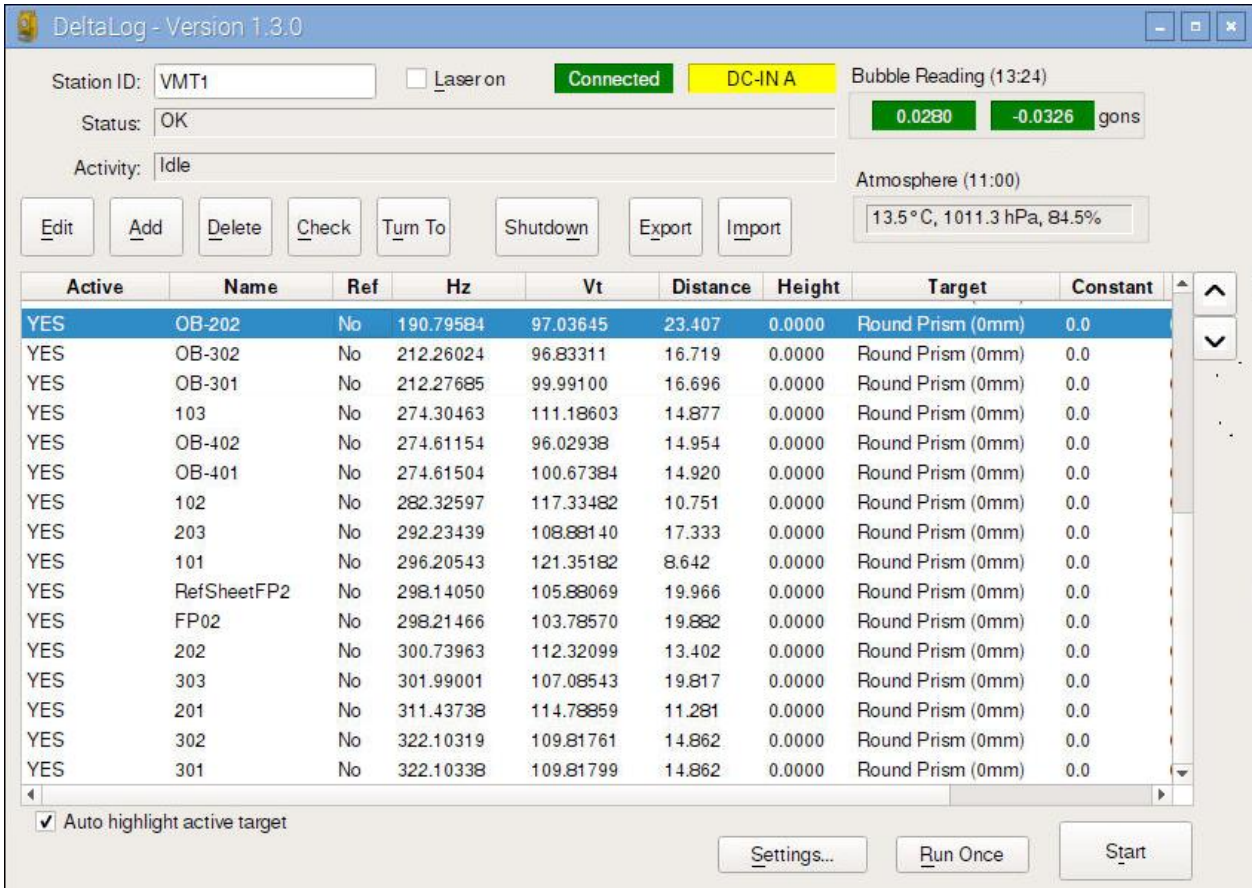
- Exports the point list as a csv file.

Import

- Imports a point list in csv file format (see chapter 6.3 **Data transfer to Delta Link**)

4.4. Connecting the total station

Here a connected total station is linked to the Delta Link Box.

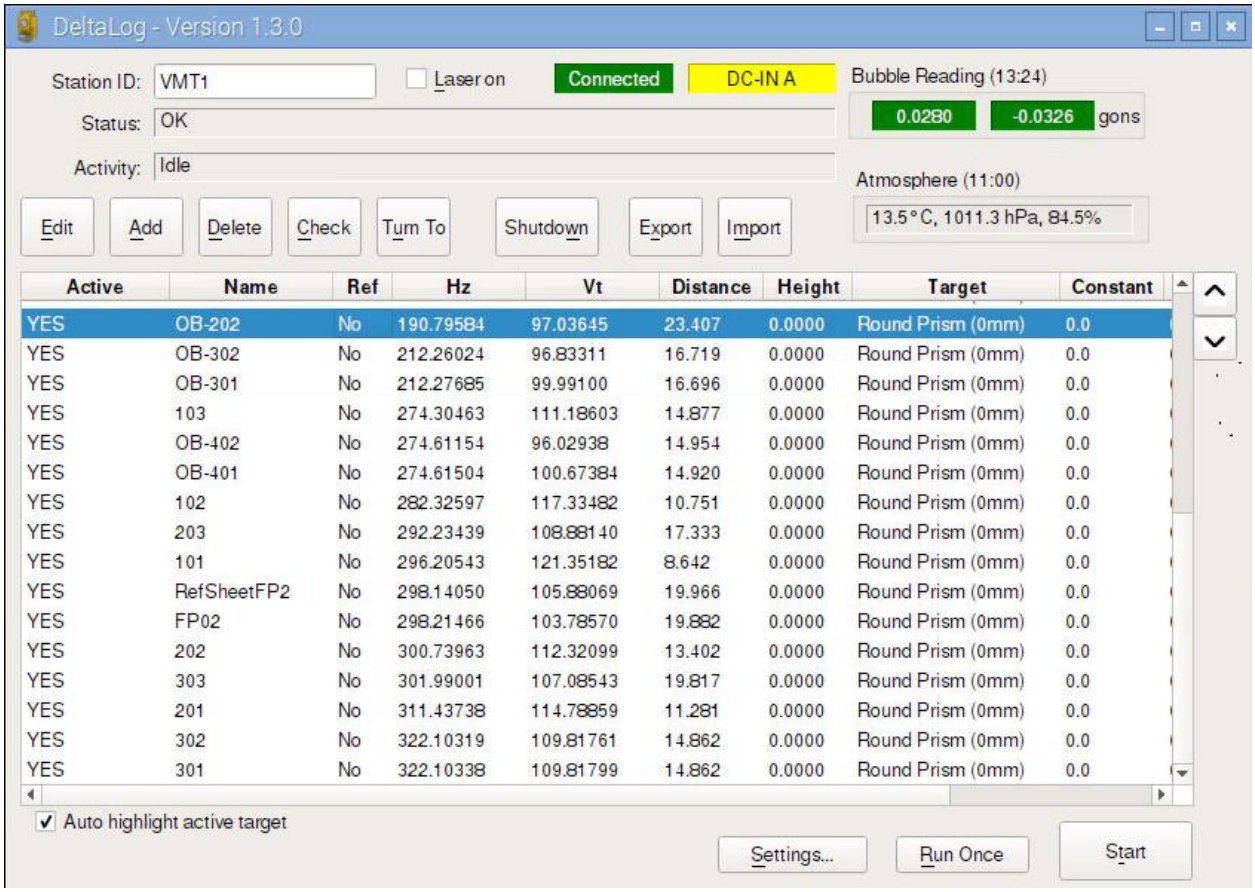


Connecting the total station

- Ensure that the total station is connected by cable to the Delta Link unit.
- The total station must be levelled to within the range of the compensator.
- Click on **Connect**.
- The total station´s **Activity** and the **Status is displayed**.
- The red display Off changes to Connected.
- Under **Settings → Tools & Info** the user can check the details of the connected station.

4.5. Setting up observations

You can set up the observations to be measured.

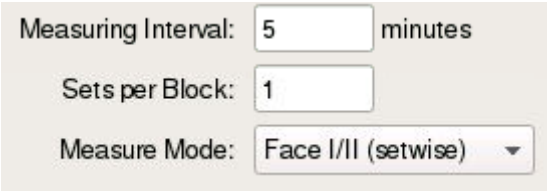


- In the main observation window list all already registered targets are displayed with the associated initial measurements.
- Click on **Add** to set up a new target.
- The new entry appears at the bottom of the list and has copied the general parameters from the previous entry.
- You can enter observation data manually (Edit button) or teach them in:
- Roughly align the total station to the point.
  Where necessary, switch on the laser (**Laser on** check-box)
- Click on **Teach** to set up a new point.
- The total station runs an automatic fine targeting procedure.
- If the target was measured successfully the angles and slope distance are written to the observation fields.
- Specify the name as necessary (**Edit** button). (The name is the ID and identifies the point. It also appears in the data file.)
- General target parameters, instrument settings or custom targets can be defined and adjusted (see chapter **4.7 Settings)**

4.6. Setting up the measurement parameters

You can specify the measurement parameters for the automatic measurement. The settings apply to all points.

- Click on the Settings button.
- Change to the **Station Options** tab.



Measuring interval	Interval at which the measurements are repeated. For each measurement, all active and scheduled targets will always be measured in the specified mode.
Sets per block	Number of measurements per interval.
Measure mode 	Measurement method › **Face I only:** The target points are only measured once in one face (Face I). › **Face I/II set-wise:** In this observation mode a sequence of point observations (first to last) is first completed in Face I and subsequently observed backwards in Face II. › **Face I/II point-wise:** In this observation sequence each target point is measured pointwise in in both Faces before turning towards the next point.

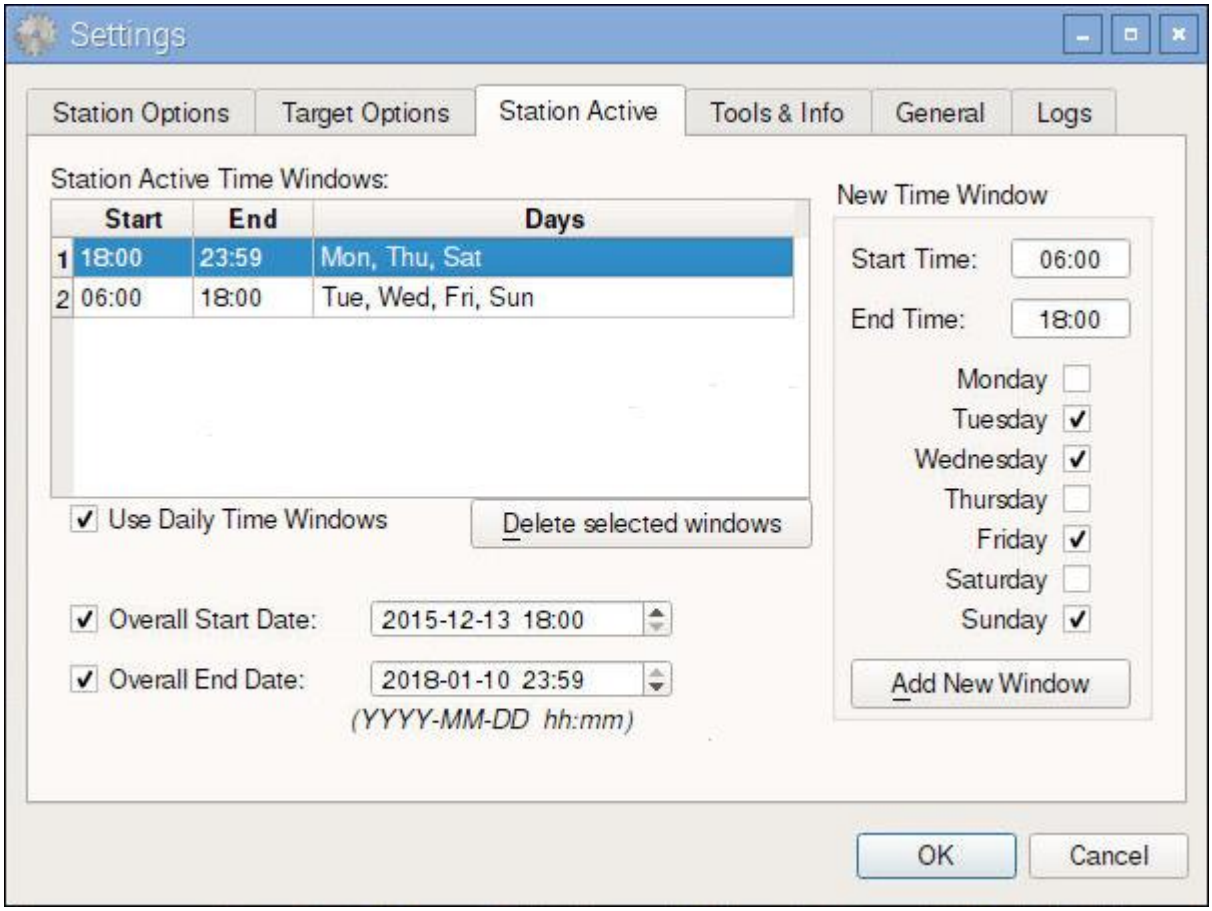
- Further settings see chapter **4.8 Settings.**

Setting up a time schedule

Setting up a time schedule.

- **You can set up one or more time windows Measurements will only be conducted within the defined time frame.**
- **You can limit the measurement period (**Overall Start Date **...** Overall End Date**)**

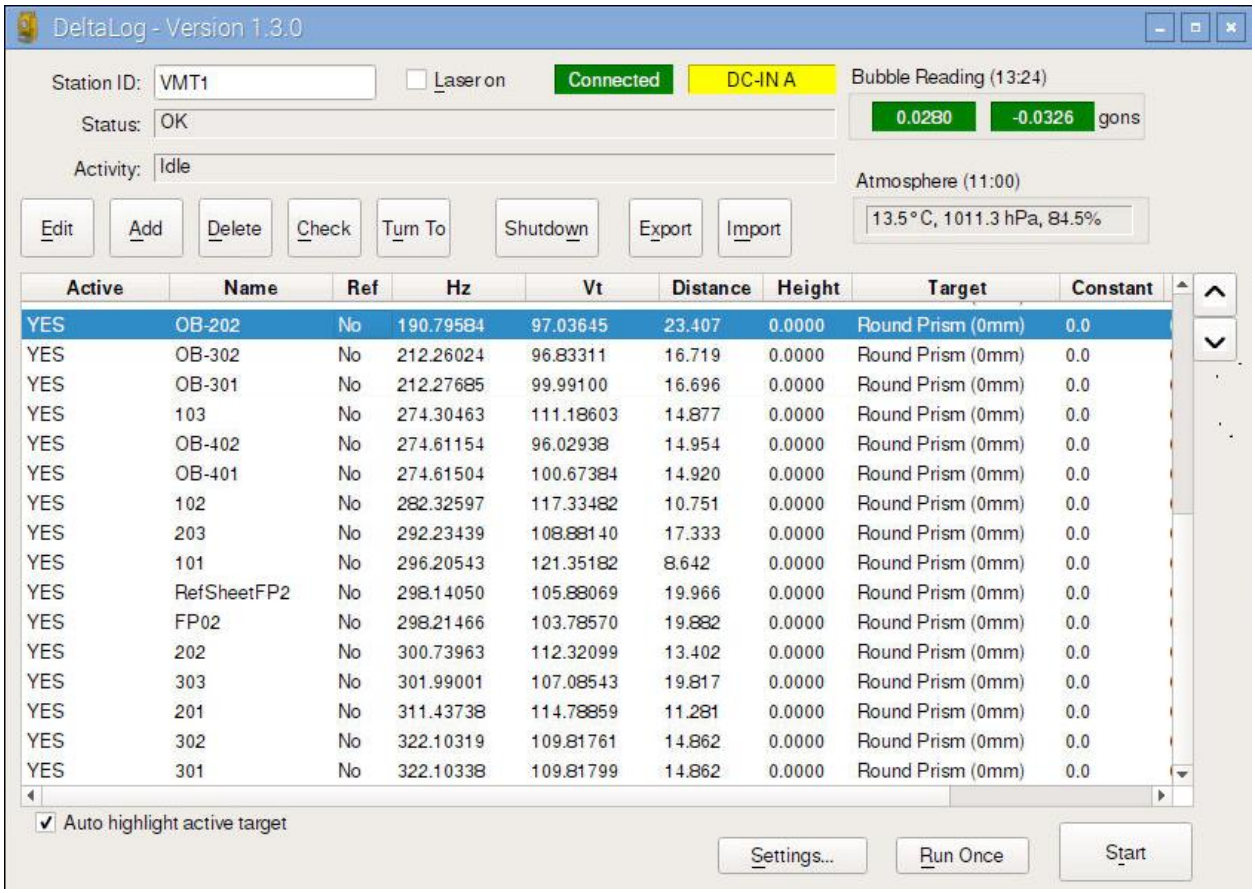
- Click on the Settings button.
- Change to the **Station Active** tab.



- Specify Overall Start and End Date as required.
- Use highlighted Daily Time Window if you want the station to only operate during specific days/times.
  - On the right, enter start and end time and select the days for the new time window.
  - Click on **Add New Window** to apply these settings and add them to the list.
- Once configured DeltaLog will only attempt observations between the overall Start and End date
- If individual time windows are configured and activated DeltaLog will only operate the total station during the configured time-windows.

Running a test measurement

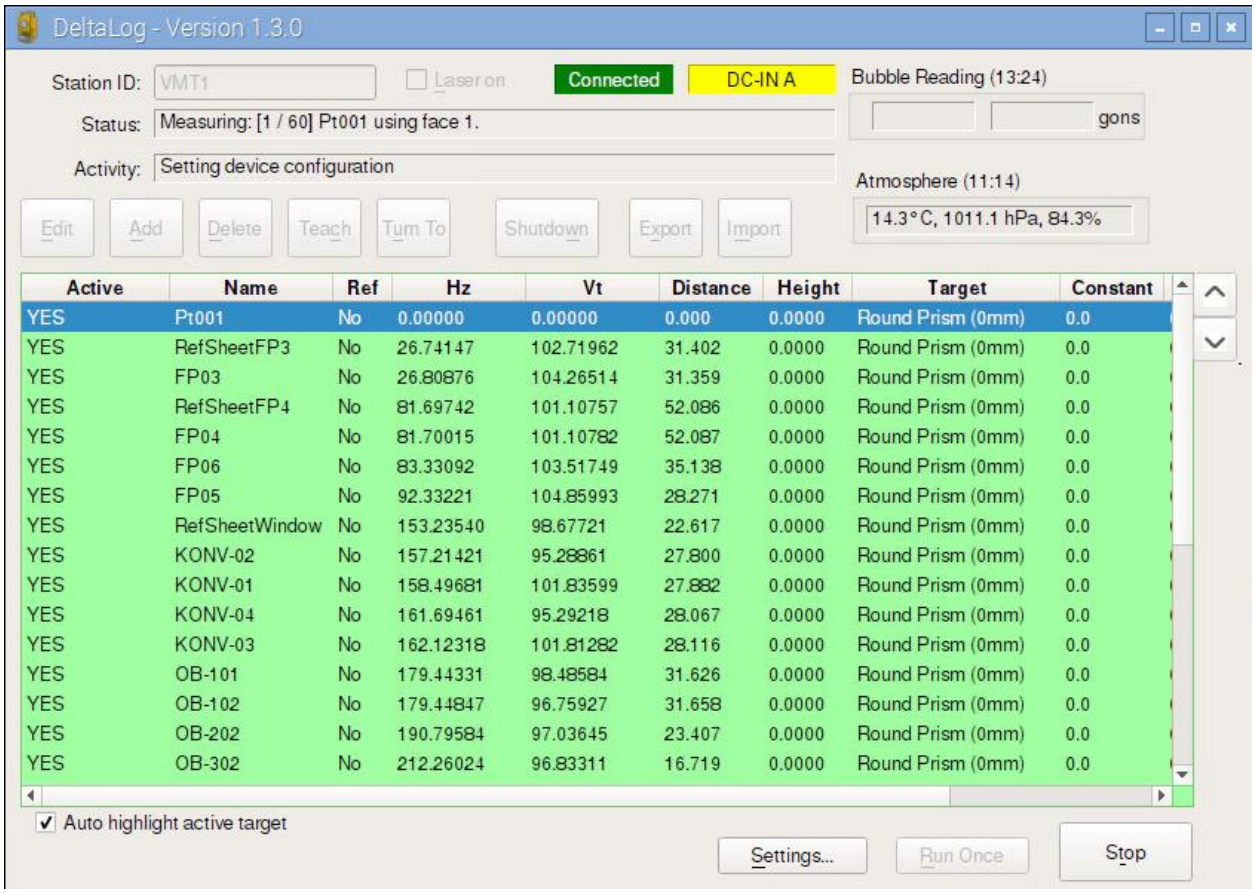
You can carry out a one-time round of observations with the specified observation values to test the settings.



Run Once

- Click on **Run Once**.
- The total station runs the measurement as specified.
- The measurement starts immediately. You can cancel the measurement by clicking on **Stop**
- You can still access the Settings dialog while the station is active.
- When completed, DeltaLog will return to standby mode

When performing a round of observations

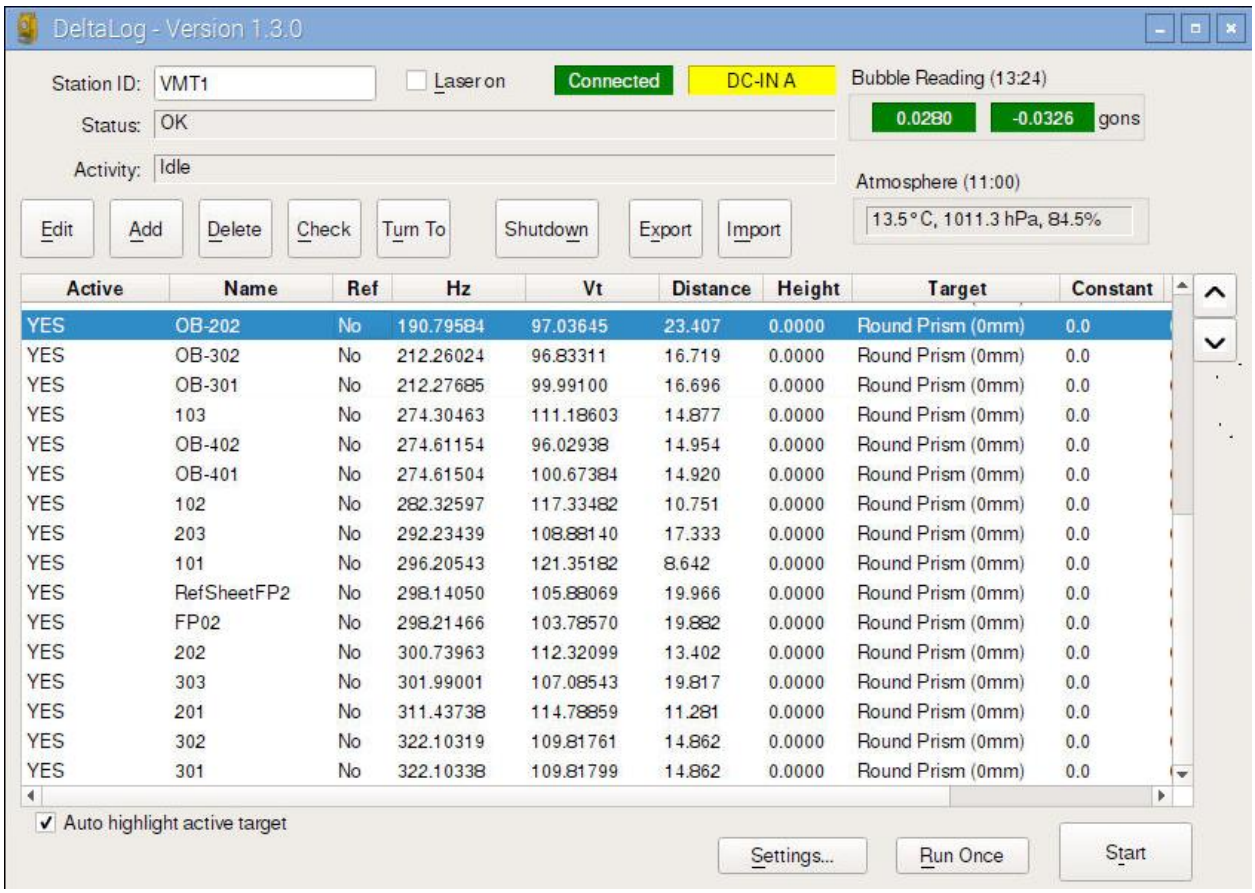


- The main observation window´s background turns green; the function buttons are shown greyed out.
- The **Start** button changes to **Stop**.
- The observations are processed in sequence. The current active observation is highlighted.
- Status and current activity are updated continuously
- The observations are saved to file (see chapter **5.8 File format**).
- When the observation cycle is completed the main observation window´s background changes back to white and the **Stop** button changes to **Start** again.

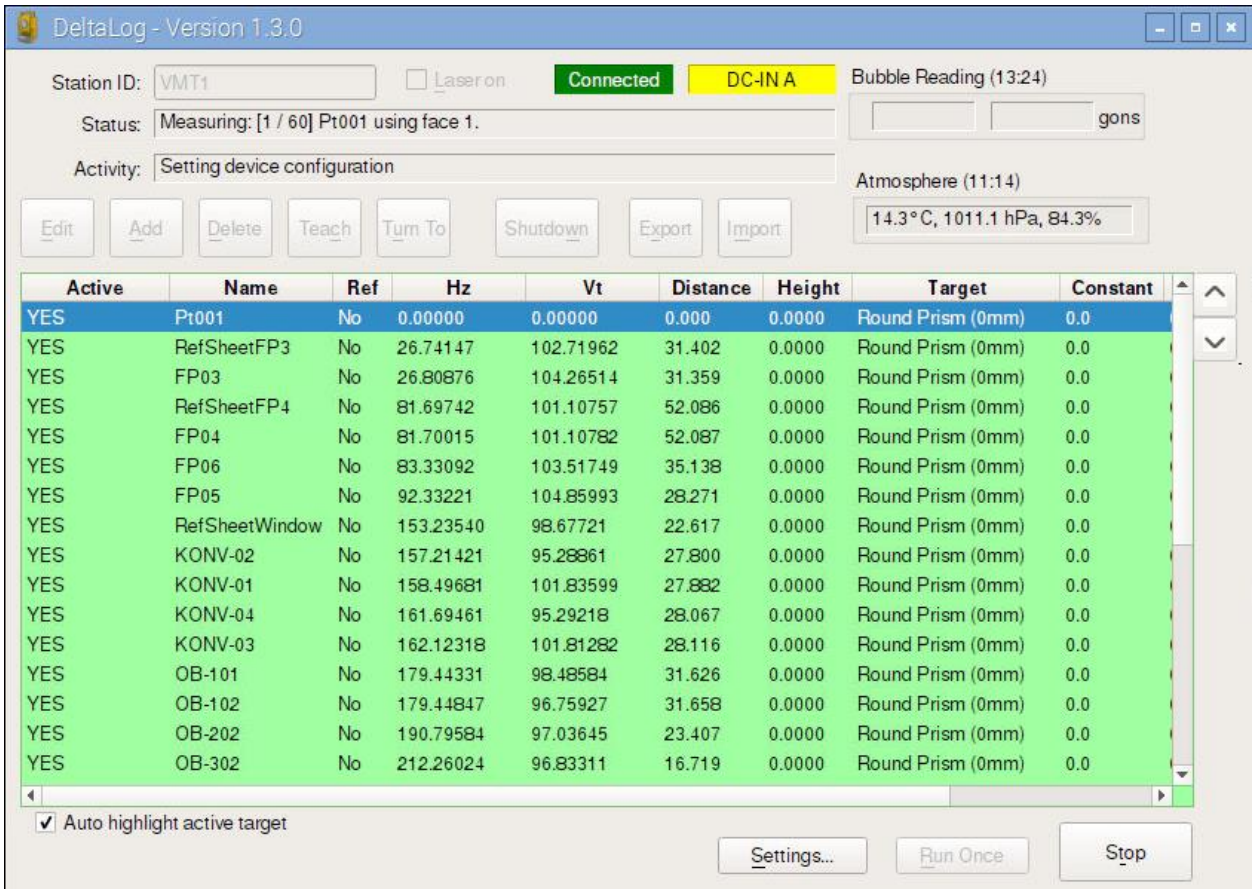
4.7. Starting automatic measurements

Here the regular automatic measurement procedure is started.

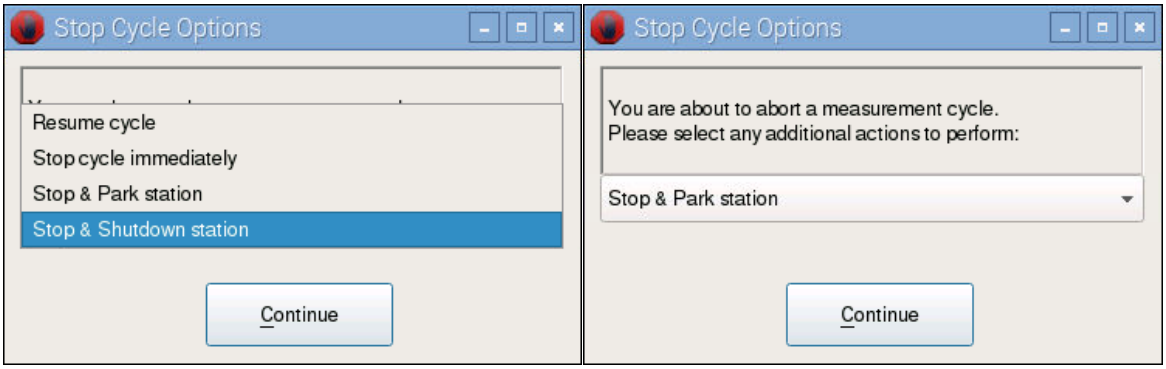
- **When automatic measurements are activated observations are taken continuously according to the defined interval. If observation schedules are defined the observations are carried out with the predefined interval only during the defined time windows. The measurement is repeated at the interval defined.**
- **The points are measured in sequence.**
- **The measurements are saved in various files.**
  (See chapter 5.1 File format.)



- Click on **Start**.



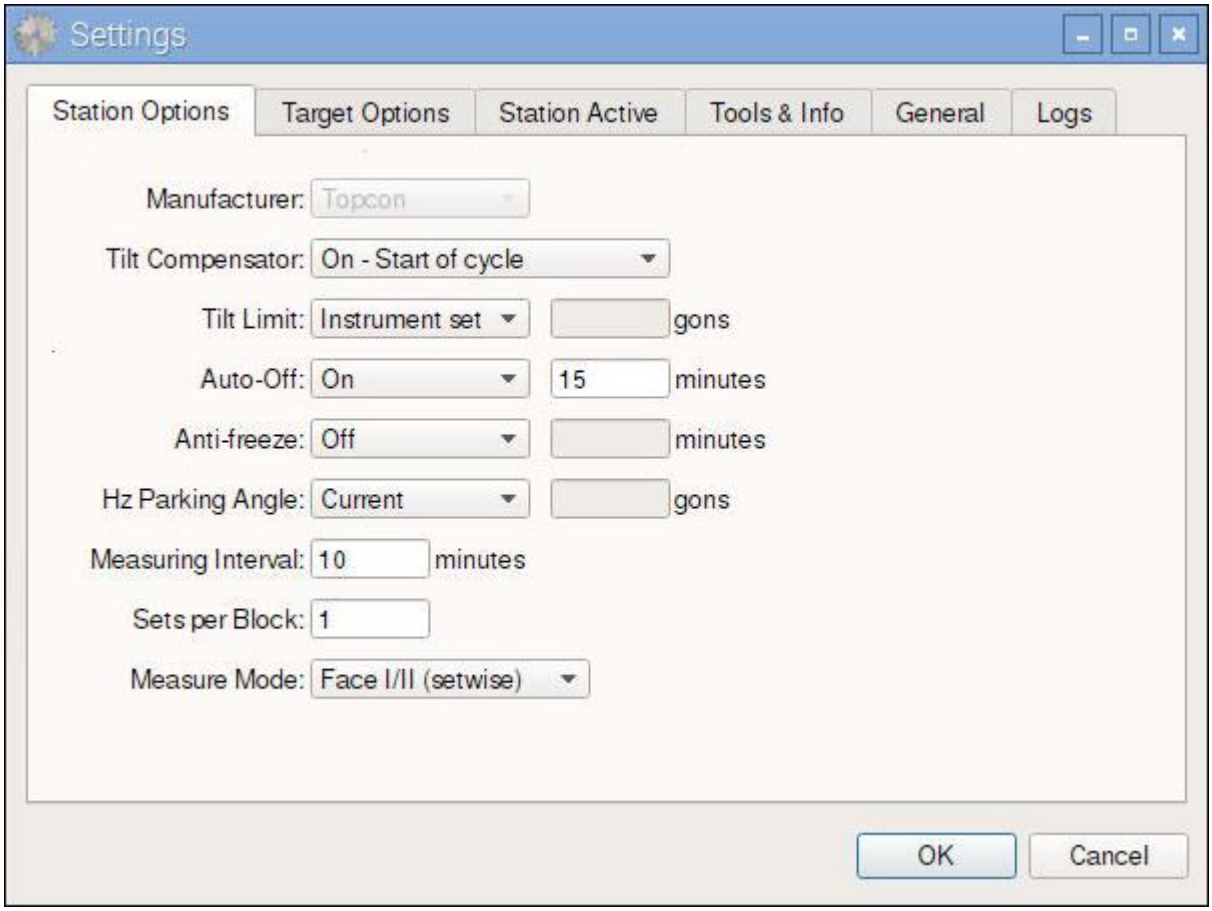
- The screen turns green
- The **Start** button changes to **Stop**.
- The measurements are repeated at the defined measurement interval.
- The main observation window´s background turns orange when DeltaLog is in monitoring mode, but not actually measuring.
- On clicking the **Stop** button, a window appears providing options how to terminate the current round of observations.



4.8. Settings

You can modify various settings.

4.8.1. Station Options

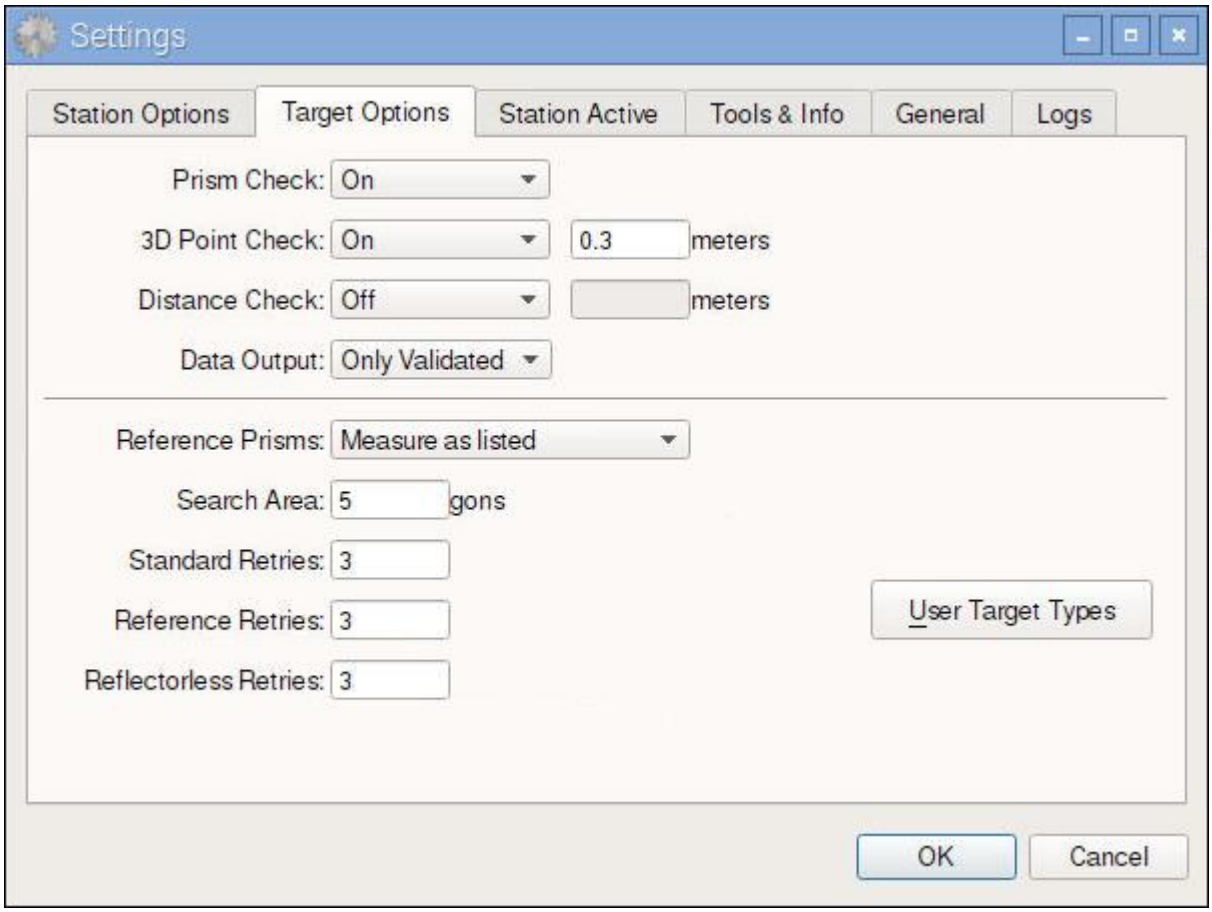


On the **Station Options** tab, you can modify various settings for the Total Station

Manufacturer	Selection of the total station manufacturer
Tilt Compensator	Will be measured as indicated
Tilt Limit	Could be Instrument set or adjusted to allow for tighter checks
Auto-Off	Automatic shutdown if at the end of a measurement cycle there is a minimum time, as defined here, before the next action. In automatic measurement DeltaLog turn the station on independently.

Anti-Freeze(experimental)	Allows for periodic movements during very long periods of no activity in order to avoid freezing of the instrument possibly due to snow and/or very low temperatures
Hz Parking Angle	Set a specific angle for the telescope when in rest. This can be used to face the lens away from for example the main wind direction.
Measuring interval	Interval at which the measurements are repeated. For each measurement, all active and scheduled targets will always be measured in the specified mode.
Sets per block	Number of measurements per interval.
Measure mode 	Measurement method › **Face I only:** The target points are only measured once in one face (Face I). › **Face I/II set-wise:** In this observation mode a sequence of point observations (first to last) is first completed in Face I and subsequently observed backwards in Face II. › **Face I/II point-wise:** In this observation sequence each target point is measured pointwise in Face I and Face II before turning towards the next point.

4.8.2. Target Options

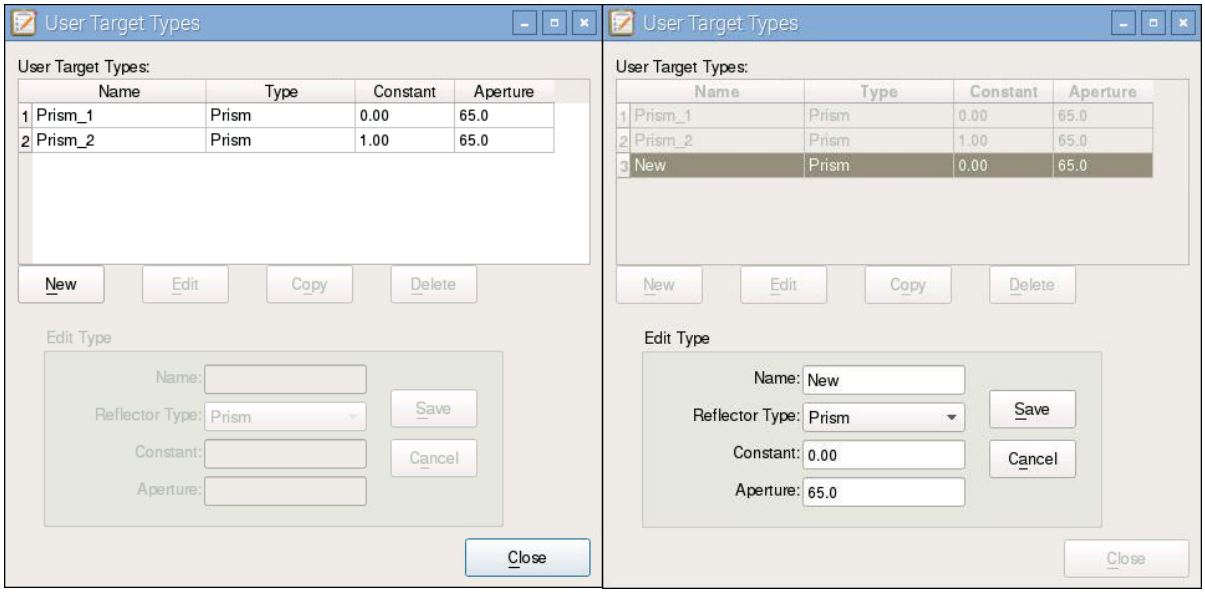


On the **Target Options** tab, various settings for prisms, prism sighting or handling with Reference Prisms can be defined.

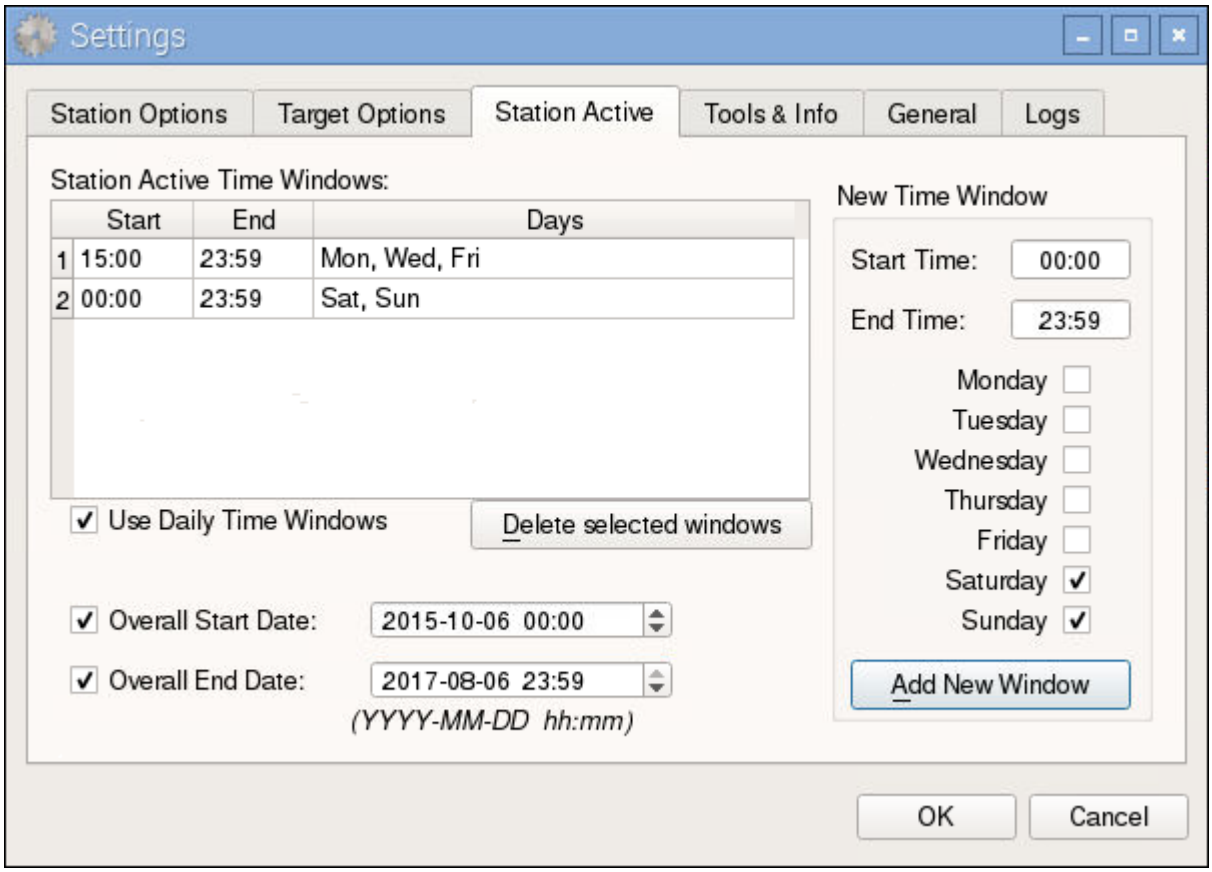
Prism Check	allows to speed up measurements on correctly sighted and clean prisms. If prisms become dirty or become difficult to observe, turn this Off or set to Auto. Auto is only effective if Number of Retries is none-zero
3D Point Check	Performs a check whether a newly measured point differs more than the specified distance in any direction from the stored data. If so the measurement is rejected. (Default 0.3m)
Distance Check	This is applied to Measurement Mode - Distance only and reflectorless measurements instead of the 3D check (see chapter 5.3)
Data Output	Only necessary for DAT file Format. You can choose if you only want valid measurements or if you also want the failed measurement entries to be stored.
Reference Prisms	setting to control when they should be measured

Search Area	the maximum area that the station should search for a prism (Horizontal and Vertical angle).
Standard Retries	Specify here how often the instrument shall attempt to retry a failed or rejected observation. Each retry will be done after a 10 second pause
Reference Retries	Reference retries can be defined separately
Reflectorless Retires	Reflectorless retries can be defined separately

- User Target Types allows you to define your own target types

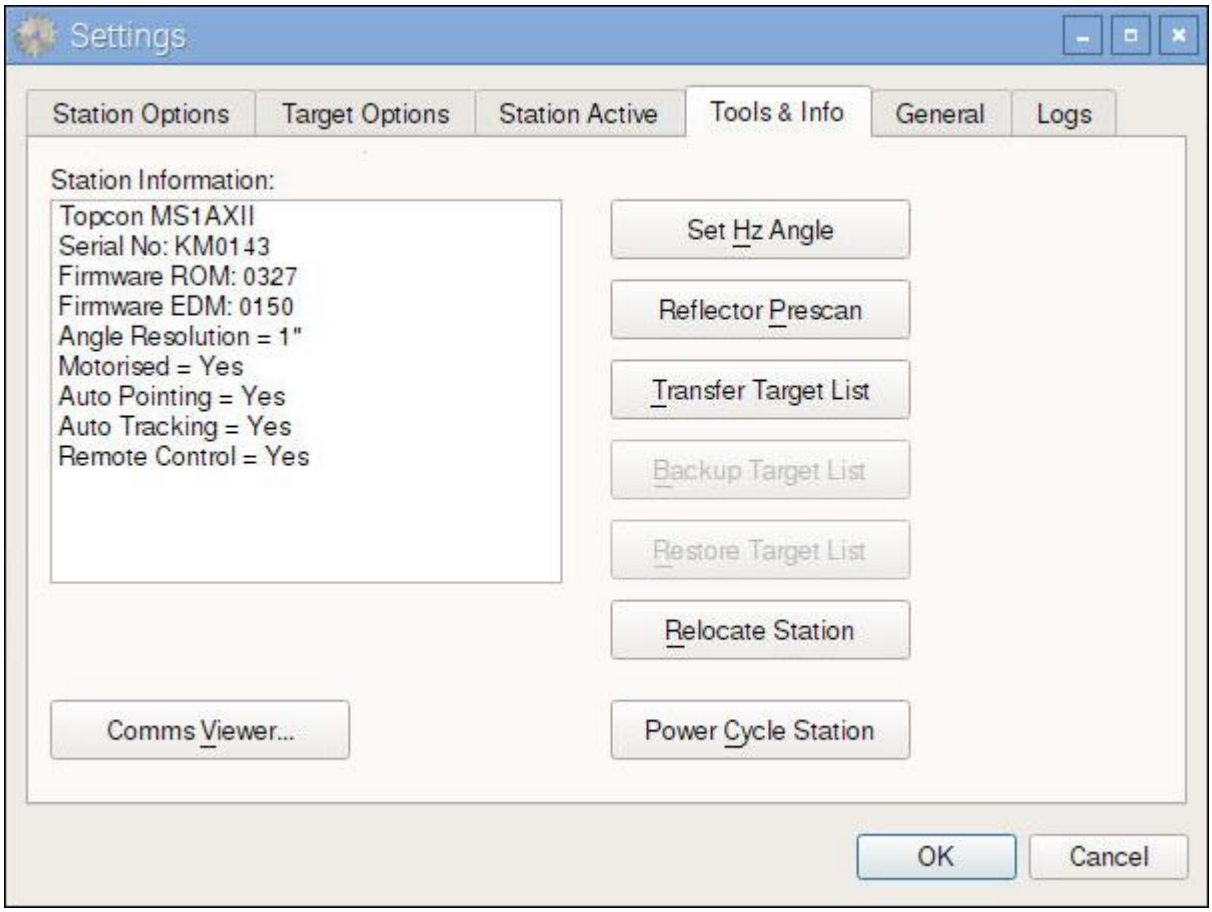


4.8.3. Station Active



Within the **Station Active** tab measurement schedules can be defined. Multiple schedules per day or group of days can be configured independently of the overall Start and End Date settings. (See also chapter **4.6 Setting up a time schedule**)

4.8.4. Tools & Info



Information is displayed on the **Tools & Info** tab and tools can be started.

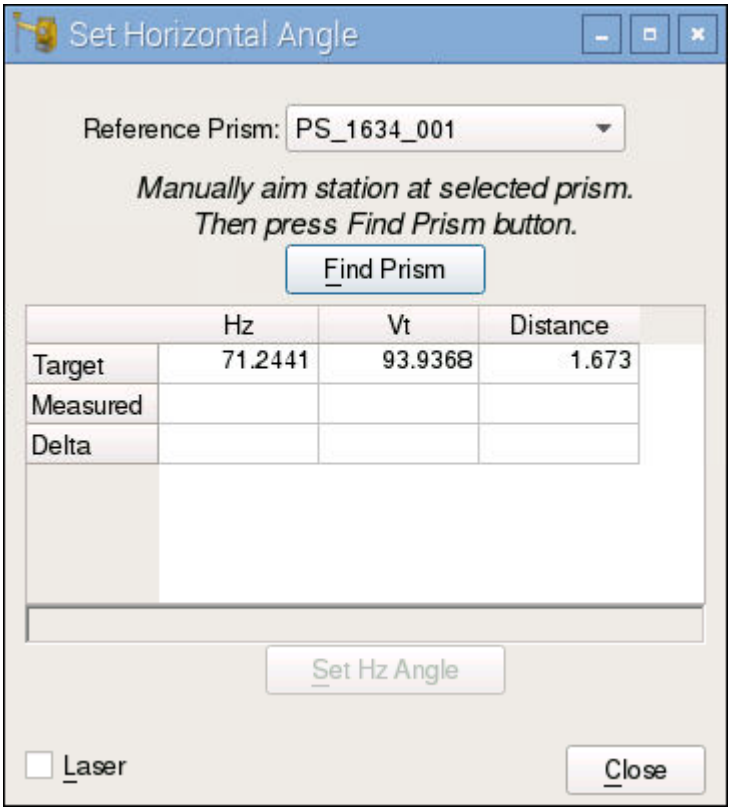
Station Information

- Hardware information for the station in use is listed here

Set Horizontal Angle

This tool allows to define the horizontal orientation of the station to match the learned observations coordinate system. You will do this, for example, after the station is replaced after it has undergone a service.

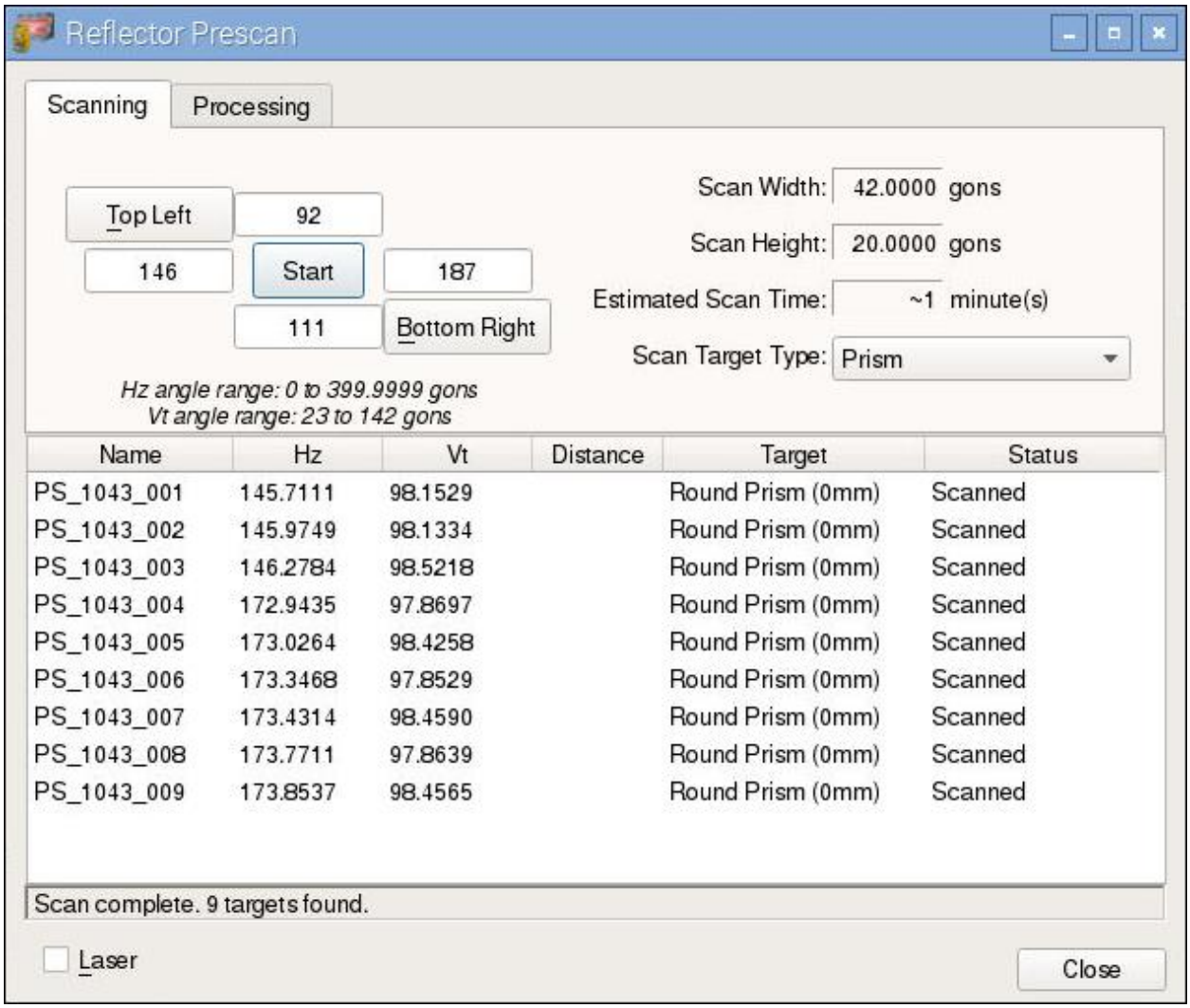
- Click on: **Set Hz angle**
- The following dialog opens.



- Follow the instruction in the dialog to re-orientate the station.
- The results will be presented and once accepted the station can resume monitoring as usual

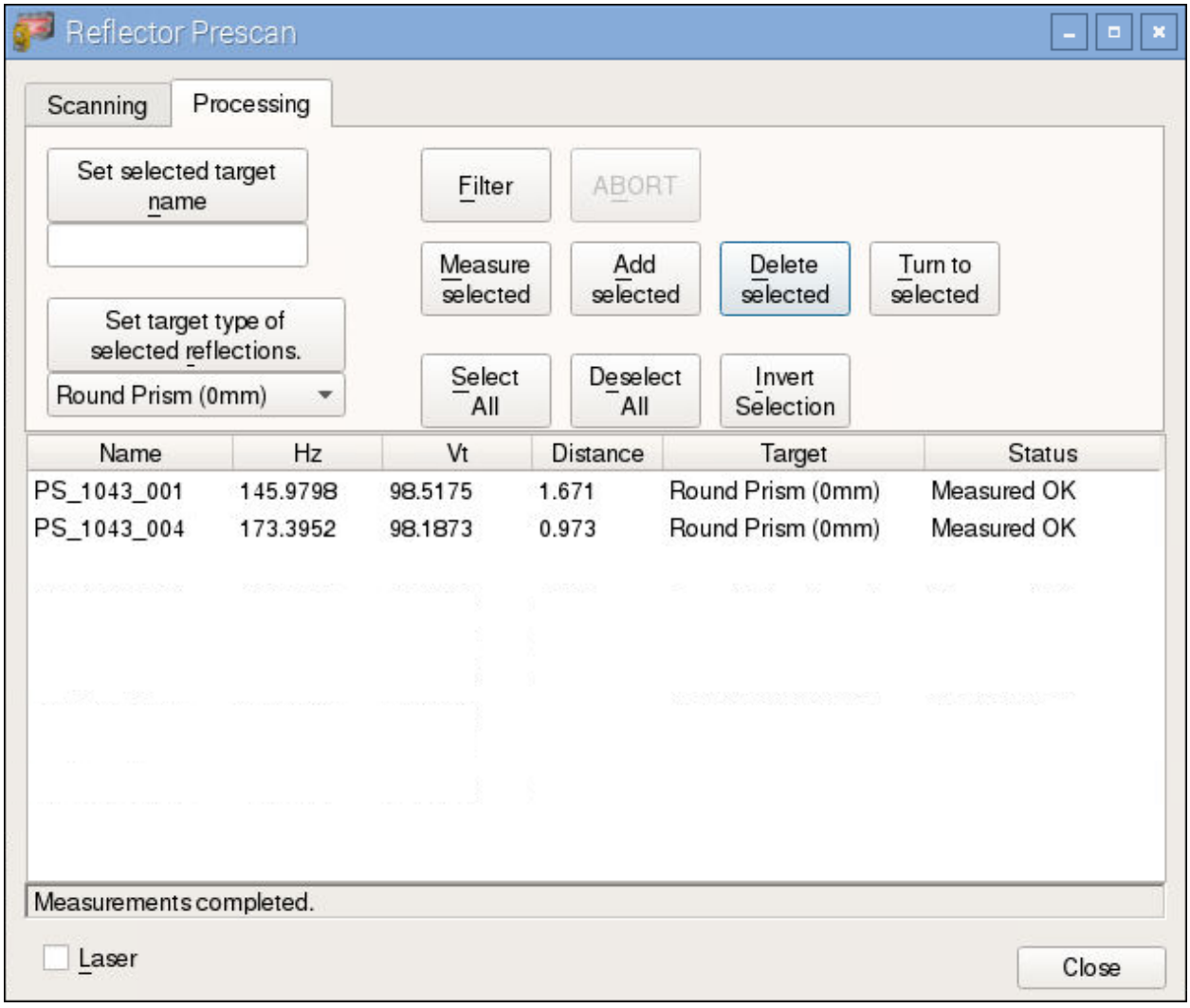
Reflector Prescan

The reflector prescan dialog allows performing scans of user defined areas. Together with the implemented check and filter functions it will ensure only new and real targets will be added to the observation list.



- Aim the station at the top left corner of the area to be scanned and press **Top Left**
- Repeat this process for the bottom right corner
- You can also manually enter the Top Left and Button right angels if required
- Press **Start** to scan the defined area.
- Depending on the size of the area this might take some time. DeltaLog will display the approximate duration while working.
- All recognized reflections will be listed when the scan is complete. The list might get updated throughout the process.
- To get the best performance out of the reflector prescan capabilities of the instrument ensure that prism targets are clean and directed correctly towards the station. If possible, perform the scan in dry and clear weather conditions.

- You can cancel the scan any time by pressing the Stop button. If any reflectors were listed, they can be processed subsequently**.**
- Switch to the **Processing** tab



This section allows you to manage the newly found reflectors. You could simply select all and let DeltaLog verify each one. For advanced users, it is possible to manually delete entries and/or adjust the Target Type before validation.

- Click on **Select All**
- Adjust the target type if required
- Click on **Measure selected**, DeltaLog now attempts to measure every single recognized reflection. If a target is found the angles and distance will be updated
- When finished measuring you can use the Filter function to remove:
  - Any duplicated target within this scan
  - Any duplicates compared to existing observations

- Now select which new observations you want to Add, optionally you can edit their names before adding, and click on **Add selected**.
- In the last step of the process you can adjust the common settings for all new observations at once; for example, the distance measuring mode or active time window
- Repeat above for any other areas

Transfer Target List

- Export the point list as csv file to the transfer folder

Backup Target List

- No functionality implemented in this version

Restore Target List

- No functionality implemented in this version

Comms Viewer

- The **View Comms** button is only provided for servicing by the manufacturer.

Relocate Station

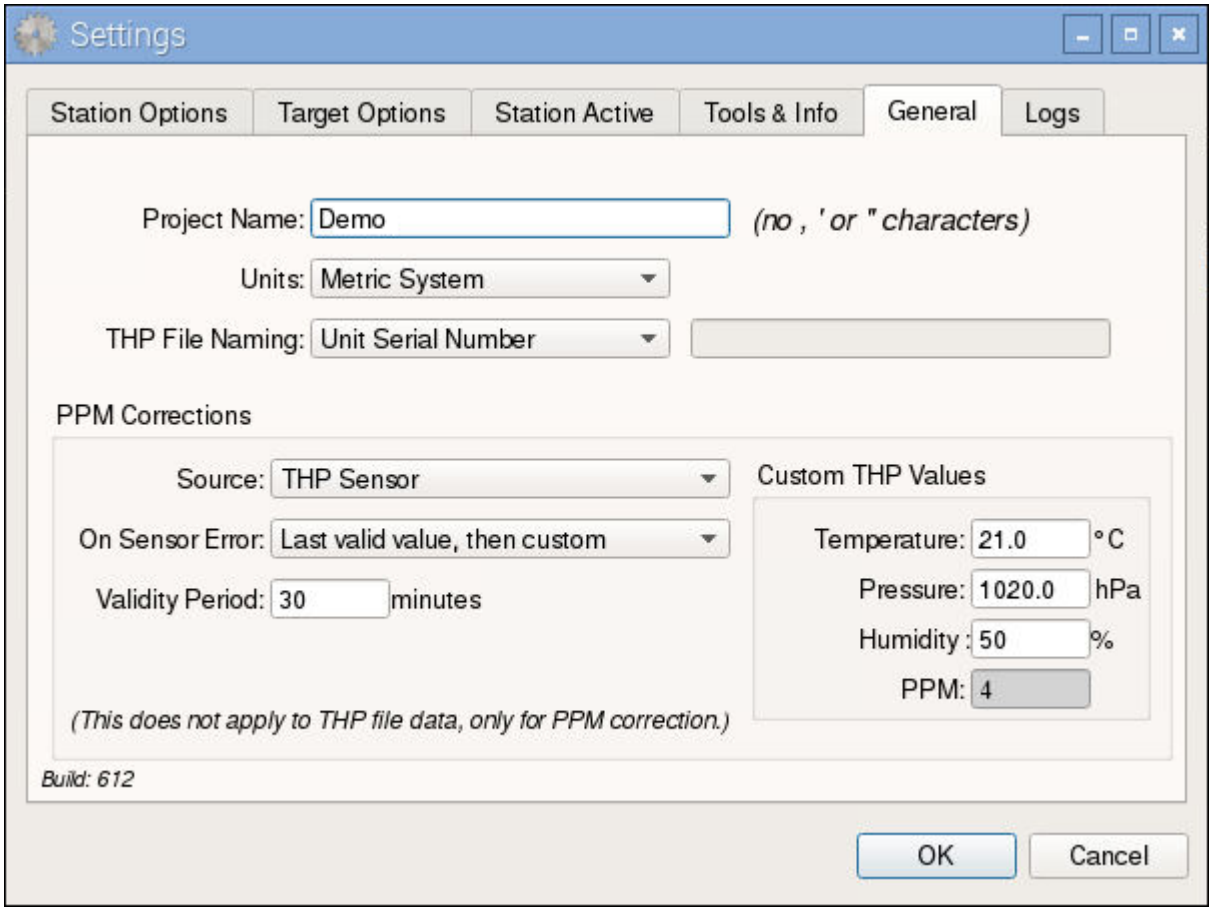
The Relocate Station function is to enable the transformation of the targetlist to the new position of the total station, if the station has been moved by a few feet.

- If possible, update angles and distance of three or more prism that will also be visible from the new position BEFORE you move the station. These prisms could be the reference prisms
- Relocate your total station at a new place where at least three identical prisms are visible!
- Click on **Relocate Station** (Function is only active, when measurement cycle is stopped.)
- Target list shows all existing points of the current target list.
- Select three identical prisms and add them to the list to be measured.
- Press **Start**
- Manually aim the total station at the first point in the list and press **Find Target**. The Total station will perform the observation to the first point. Repeat this with the remaining two targets and press **Confirm**.
- In an updated window the calculated residuals for each identical target are shown.
- Press **Transform** to apply transformation parameters to other existing targets.

Power Cycle Station

- This button will restart the total station.

4.8.5. General



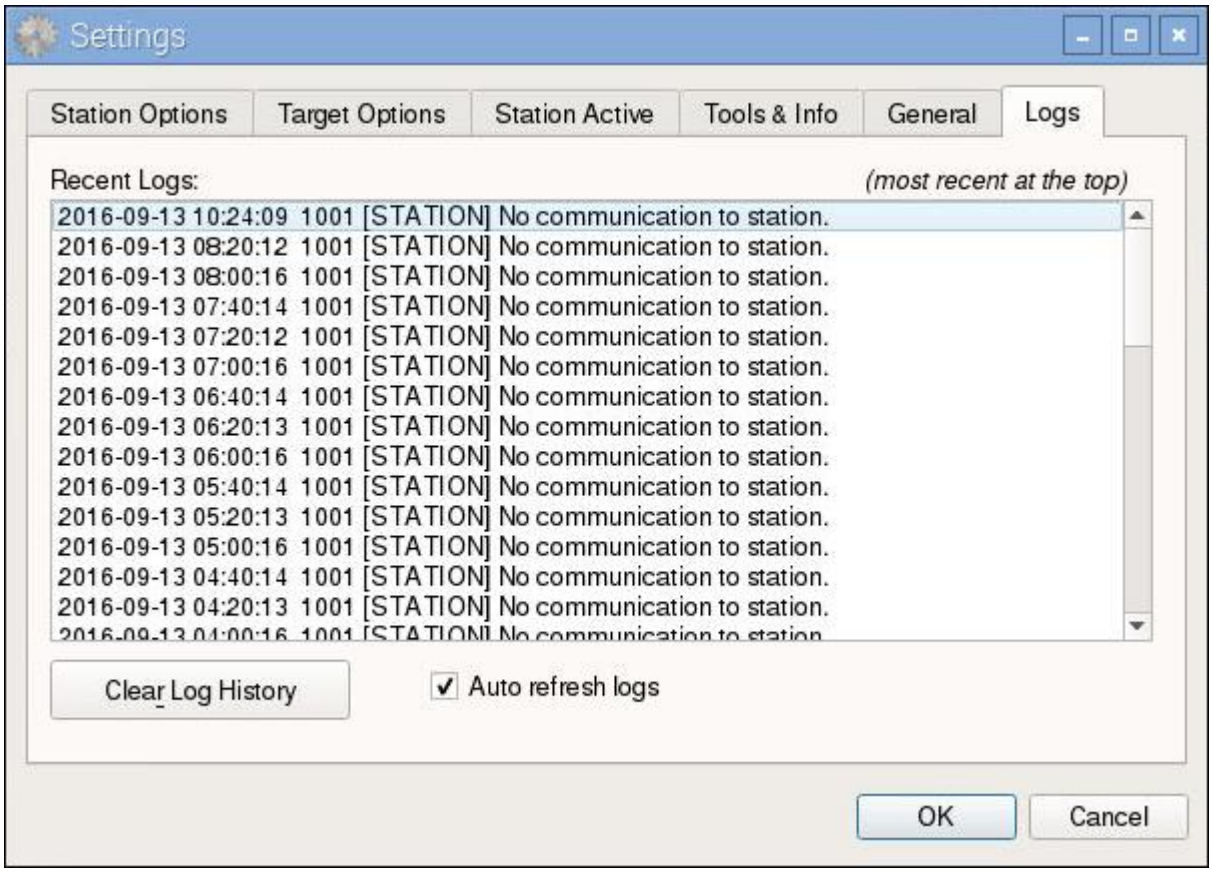
Project Name	Specific project name can be entered. This name will be stored in data files accordingly (.DAT). If left empty a default value will be used.
Units	You can choose between Metric System and US Customary System. The displays in DeltaLog switch between gon and degrees, meters and feet, as well as degrees Celsius and degrees Fahrenheit.
THP File Naming	By Default, the THP File Name will be the Unit Serial Number, however it can be customized by the user.

PPM Corrections

You can separately handle the ppm correction. These settings have no impact on THP or ENV files, there only the actually measured values are displayed.

Source	You can use different options to use/calculate the PPM correction. › None (PPM=0) corrections › Custom THP Values (Values for temperature, air pressure and humidity can be entered, from which the PPM correction is calculated) › THP Sensor (The values from the THP sensor are used to calculate the PPM correction)
On Sensor Error	If *THP Sensor* is selected, there are several options for what should happen if THP values are not available. › Always use the last valid values › Last valid value, then no correction (Enter Validity Period) › Last valid value, then custom (Enter Validity Period) › No correction › Custom

4.8.6. Logs



The **Logs** tab displays the most recent system log as it is recorded. Here you can find the following logs

- No communication to station
- THP sensor issues

Information about the file format, see chapter **5.1.4 *Err.** Information about the Error handling with recommended actions see chapter **5.2 Error Code & handling**.

5. Appendix

5.1. File format

All files created by DeltaLog when logging observations from the total station are explained here.

5.1.1. *.GKA

The measurement results are automatically saved in a gka file.

- **The file is written to the FTP transfer folder and a backup is locally stored in the Data folder.**
- **Multiple blocks, each representing a round of observations, can be stored in a single file.**
- **The file name is automatically allocated by the system.**
  Date-Time-StationID.gka
  YYYYMMDD_HHMM_[StationID].gka
  [StationID] is the name as you specified it in DeltaLog main screen

  e.g. 20161205_1330_VMT1.gka

Header (line 1)

- -gka version

Header (line 2)

- GOKA (gka) block start

Header (line 3)

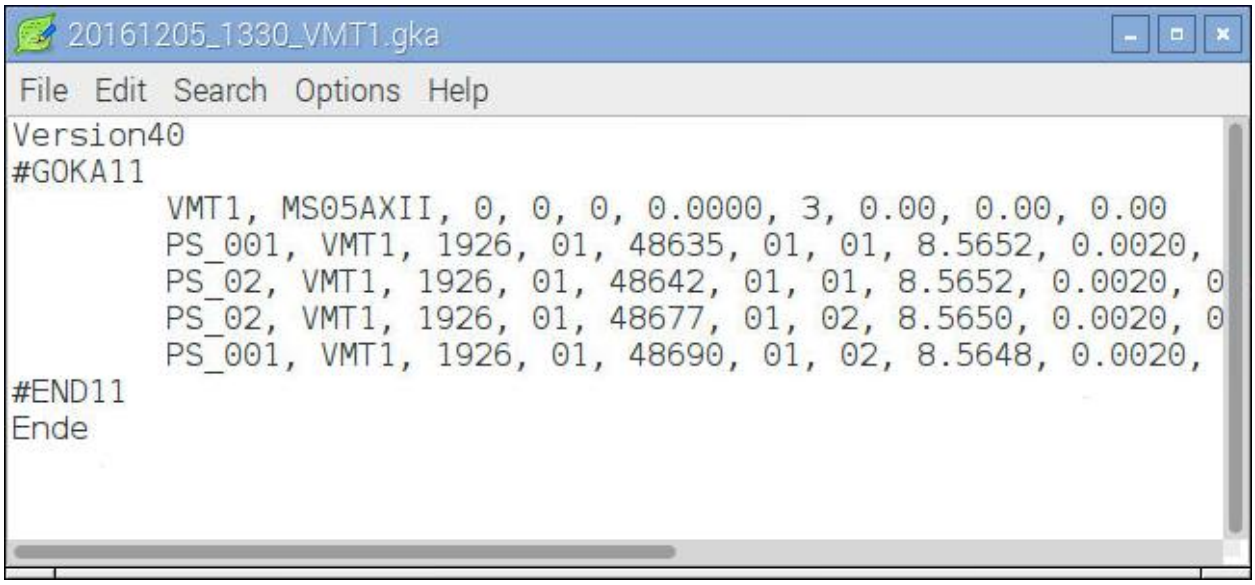
Field	Column ID	Format
1	Station ID	Text
2	Total station model	Text
3	orientation	Integer
4	Number of Hz sets	Integer
5	Number of V sets	Integer
6	Instrument height	Float

7	Excenter	Integer
8	Cartesian geocentric ITRF coordinate X	Float
9	Cartesian geocentric ITRF coordinate Y	Float
10	Cartesian geocentric ITRF coordinate Z	Float

Data line (line 4)

Field	Column ID	Unit	Format
1	Observation		Text
2	Station ID		Text
3	GPS-week	GPS-week	Integer
4	GPS-day	days	Integer
5	GPS-second	seconds	Integer
6	Set number		Integer
7	Face		Integer
8	Slope distance	meter	Float
9	Standard deviation	rad	Float
10	Target height	meter	Float
11	Hz-angle	Gon	Float
12	Standard deviation	rad	Float
13	V-angle	Gon	Float
14	Standard deviation	rad	Float
15	Target height	meter	Float

Example


20161205_1330_VMT1.gka
File Edit Search Options Help
Version40
#GOKA11
VMT1, MS05AXII, 0, 0, 0, 0.0000, 3, 0.00, 0.00, 0.00
PS_001, VMT1, 1926, 01, 48635, 01, 01, 8.5652, 0.0020,
PS_02, VMT1, 1926, 01, 48642, 01, 01, 8.5652, 0.0020, 0
PS_02, VMT1, 1926, 01, 48677, 01, 02, 8.5650, 0.0020, 0
PS_001, VMT1, 1926, 01, 48690, 01, 02, 8.5648, 0.0020,
#END11
Ende

5.1.2. *.THP

The observations of the THP sensor are automatically saved in a THP file.

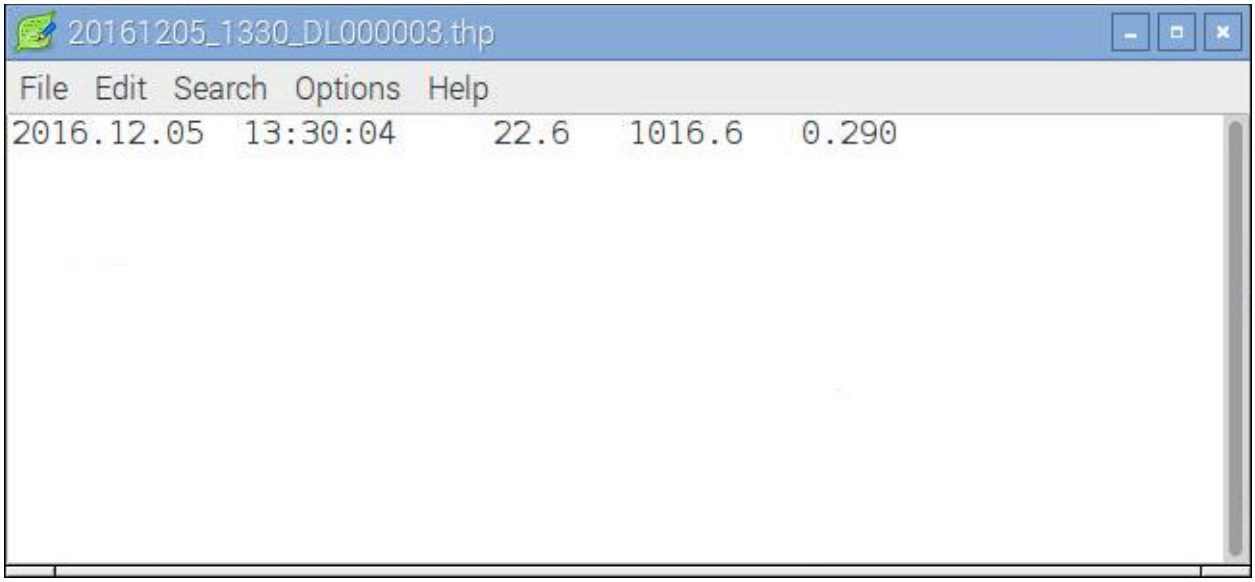
- **THP files are only written when station is active and monitoring**
- **The file is written to the FTP transfer folder and a backup is locally stored in the Data folder.**
- **The file name is automatically allocated by the system.**
  Date-Time-UnitID.thp
  YYYYMMDD_HHMM_[UnitID].thp

  e.g. 20161205_1330_DL000003.thp

Data line (line 1)

Field	Column ID	Unit	Format
1	Date	TS	timestamp
2	Time	RN	Integer
3	Temperature	Degree Celsius	Float
4	Pressure	hPa	Float
5	Humidity	Decimal	Integer

Example



5.1.3. *.BUB

The Bubble readings are automatically saved in the BUB file.

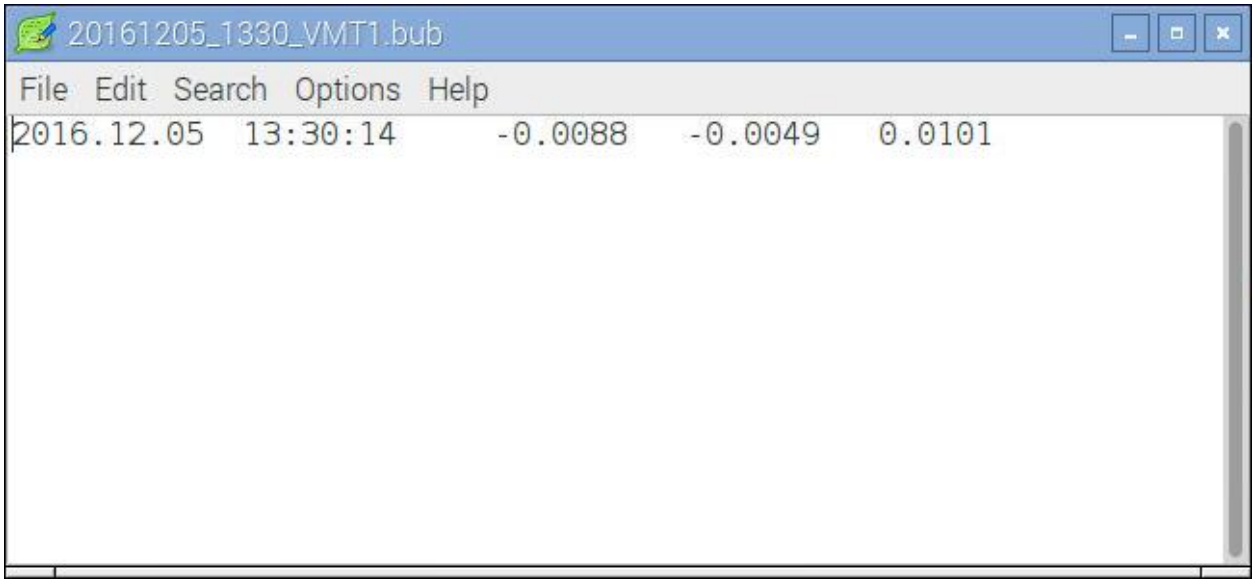
- **The file is written to the FTP transfer folder and a backup is locally stored in the Data folder.**
- **The file name is automatically allocated by the system.**
  Date-Time-StationID.bub
  YYYYMMDD_HHMM_[StationID].bub
  [StationID] is the name as you specified it in DeltaLog main screen

  e.g. 20161205_1330_VMT1.bub

Data line (line 1)

Field	Column ID	Format
1	Date	timestamp
2	Time	Integer
3	Tilt of X-axis	Float
4	Tilt of Y-axis	Float
5	combined tilt of the X and Y tilts	Float

Example



5.1.4. *.ERR

The error messages are automatically saved in an ERR file.

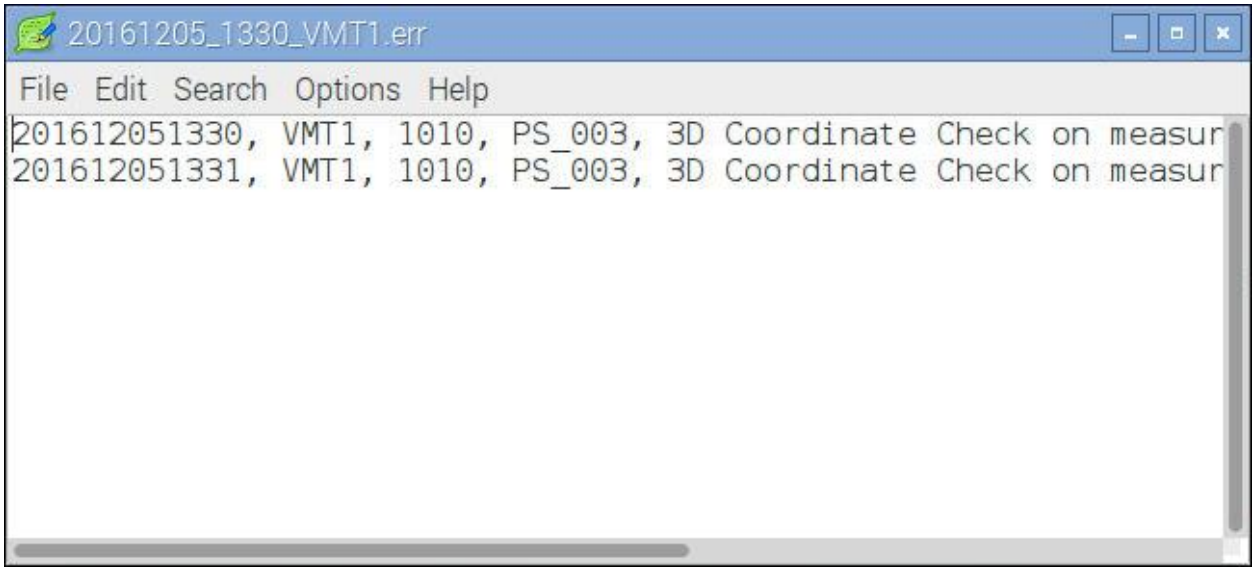
- **The file is written to the FTP transfer folder and a backup is locally stored in the Data folder.**
- **The file name is automatically allocated by the system.**
  Date-Time-StationID.err
  YYYYMMDD_HHMM_[StationID].err
  [StationID] is the name as you specified it in DeltaLog main screen

  e.g. 20161205_1330_VMT1.err

Data line (line 1)

Field	Column ID	Unit	Format
1	Date & Time	TS	Text
2	Station ID	RN	Text
3	Error Code	Degree Celsius	Integer
4	Observation		Text
5	Error Description		Text

Example



Error codes

- See chapter 6.2 **Error codes**

5.1.5. *.DAT

The .DAT file contains all relevant information that relates to an actual observation. This includes actual measured data, calculated data, target information, environmental data etc. that can be used to apply corrections.

- **The file is written to the FTP transfer folder and a backup is locally stored in the Data folder.**
- **The file name is automatically allocated by the system.**
  [FileID]-Date-Time-[StationID].dat
  OBS-YYYYMMDD_HHMM-[StationID].dat
  [StationID] is the name as you specified it in DeltaLog main screen

  e.g. OBS-20161205_1330-VMT1.dat

Header (line 1)

Field	Description	Format	Comment
1	File Type	Text, Fixed	Unique Identifier of this data file type
2	File Version	Text	File format version
3	Program ID	Text	Name of the program that created the file
4	Program Version	Text	Program version
5	Control Unit Version	Text	Hardware version number of Delta Link unit
6	Control Unit SN	Text	The unique SN of the Delta Link control unit
7	ComportID	Text	The ID of the COM-port to which this log applies
8	File Timestamp zone	Text	Timezone information, i.e. which timezone the data timestamps are in, default UTC
9	UTC-Offset	±HH:MM	The UTC offset as set in LinkConfig
10	Project Name	Text	Project name as defined in DeltaLog at time of file creation
11	GPS_Latitude	Text	Currently not used
12	GPS_Longitude	Text	Currently not used
13	GPS_Height	Text	Currently not used
14	Program specific fields	Text	Optional columns with program specific content

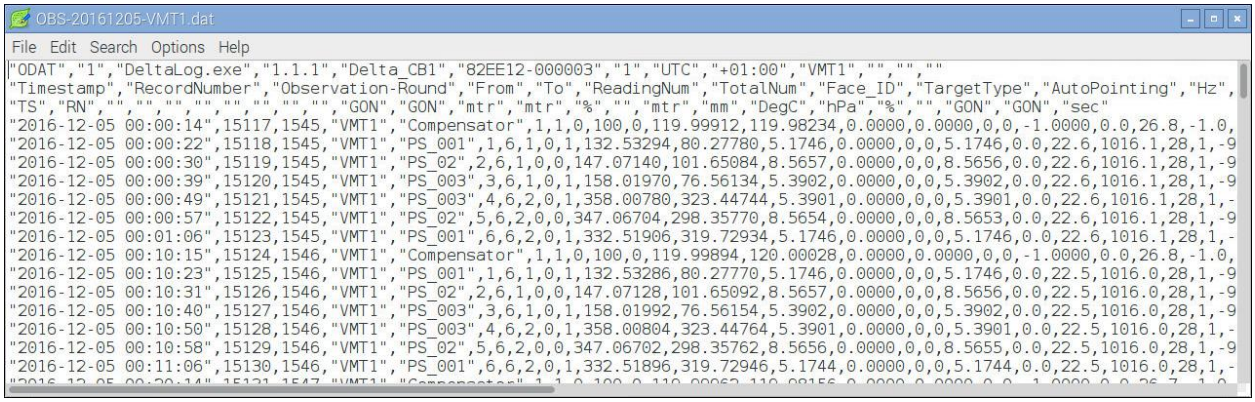
Header 2 & 3 (line 2 & 3) & Data line (line 4)

The data line contains actual observation data. Note the column with header 'optional' here.This indicates that certain columns could be omitted as they are not directly required for processing in Delta Watch and thus allows for much smaller data files. However, if you want to use for example Column 18 than currently you would have to write all the optional columns up to number 18.

Field	Column ID	Unit	Format	Optional	Comments
1	Timestamp	TS	Text	No	
2	RecordNumber	RN	Integer	No	Incremental counter
3	Observation-Round		Integer	No	Incremental counter, increases every time a new round of observations starts
4	From		Text	No	Station ID
5	To		Text	No	Target ID
6	ReadingNum		Integer	No	Current reading within this round of observations
7	TotalNum		Integer	No	Total number of observations in this round
8	Face_ID		Integer	No	Indicates if this reading was in Face1 or 2
9	TargetType		Integer	No	Numerical value to indicate the basic target type, See target Type ID table below
10	AutoPointing		Boolean	No	Auto Collimation was used for this reading (0=False, 1=True)
11	Hz	GON	Float	No	Raw measured Hz angle
12	Vt	GON	Float	No	Raw measured Vt angle
13	SDCor	mtr	Float	No	PPM Corrected Slopedistance
14	Height	mtr	Float	Yes	Target Height
15	SignalStrenght	%	Integer	Yes	Signal strength returned from the target
16	ErrorCode		Integer	Yes	Program generated error codes. The integer part is DeltaLog and the decimal part is instrument code
17	SDmeas	mtr	Float	Yes	Raw measured slope distance (0ppm and 0mm Prism constant)
18	PrismConst	mm	Float	Yes	Prism constant

19	Temp	DegC	Float	Yes	Temperature reading as used for PPM corrections
20	Press	hPa	Float	Yes	Pressure reading as used for PPM corrections
21	Humidity	%	Integer	Yes	Humidity reading as used for PPM corrections
22	CompStatus		Boolean	Yes	Indicate if compensator was On or Off
23	CompensatorX	GON	Float	Yes	Compensator X reading at time of observation, see note 1
24	CompensatorY	GON	Float	Yes	Compensator Y reading at time of observation, see note 1
25	MeasTime	SEC	Float	Yes	Total time of searching and measuring a target

Example



Notes:

1. These compensator values are only written if the compensator was read every single observation. If the compensator is only measured at the start of a cycle then these fields will contain an error code, however this does not mean the compensator was switched of.

Target Type ID table

TargetType ID	What	Comment
0	Prism	
1	Sheet	
2	Reflectorless	
3	Prism 360	
4	SMR	
100	Compensator	Compensator reading as taken at the beginning of a round of observations, this is technically not a target-type but for datafile reduction compensator readings are merged with target observations

5.1.6. *.ENV

The environmental conditions are automatically saved in an ENV file.

- **The file is written to the FTP transfer folder and a backup is locally stored in the Data folder.**
- **The file name is automatically allocated by the system.**
  [FileID]-Date-[UnitID].env
  ENV-YYYYMMDD-[UnitID].env

  e.g. ENV-20161205-DL000003.env

Header (line 1)

Field	Description	Format	Comment
1	File Type	Text, Fixed	Unique Identifier of this data file type
2	File Version	Text	File format version
3	Program ID	Text	Name of the program that created the file
4	Program Version	Text	Program version
5	Control Unit Version	Text	Hardware version number of Delta Link unit
6	Control Unit SN	Text	The unique SN of the Delta Link control unit
7	ComportID	Text	The ID of the COM-port to which this log applies
8	File Timestamp zone	Text	Timezone information, i.e. which timezone the data timestamps are in, default UTC
9	UTC-Offset	±HH:MM	The UTC offset as set in LinkConfig
10	Project Name	Text	Project name as defined in DeltaLog at time of file creation
11	GPS_Latitude	Text	Currently not used
12	GPS_Longitude	Text	Currently not used
13	GPS_Height	Text	Currently not used
14	Program specific fields	Text	Optional columns with program specific content

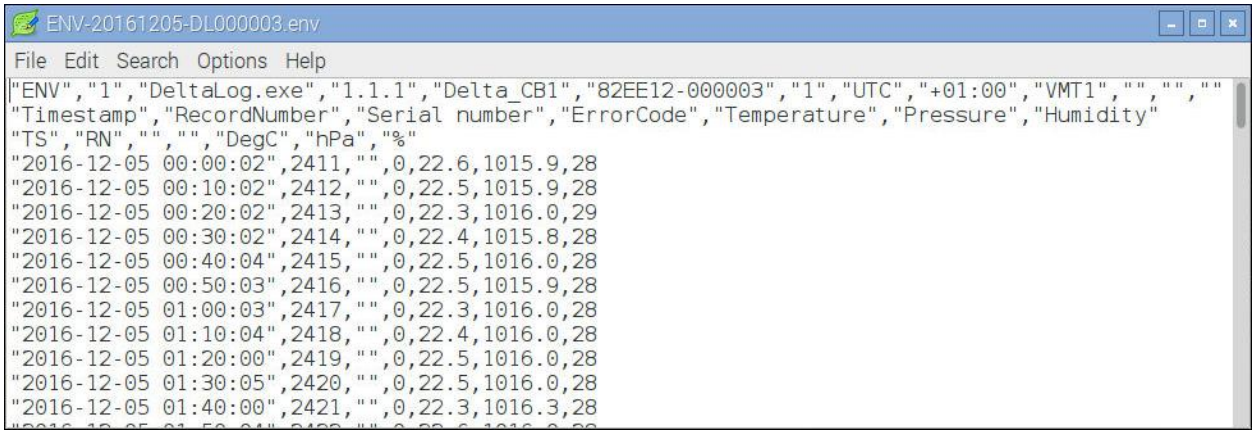
Header 2 & 3 (line 2 & 3)

- Header 2 contains the parameters and in Header 3 the corresponding units.

Data line (line 4)

Field	Column ID	Unit	Format
1	Timestamp	TS	timestamp
2	RecordNumber	RN	Integer
3	Serial number		
4	ErrorCode		Integer
5	Temperature	DegC	Float
6	Pressure	hPa	Float
7	Humidity	%	Integer

Example



5.1.7. *.MDM

The modem connectivity related values are automatically saved in a MDM file.

- **The file is written to the FTP transfer folder and a backup is locally stored in the Data folder.**
- **The file name is automatically allocated by the system.**
  [FileID]-Date-[UnitID].mdm
  MDM-YYYYMMDD-[UnitID].mdm

  e.g. MDM-20161205-DL000003.mdm

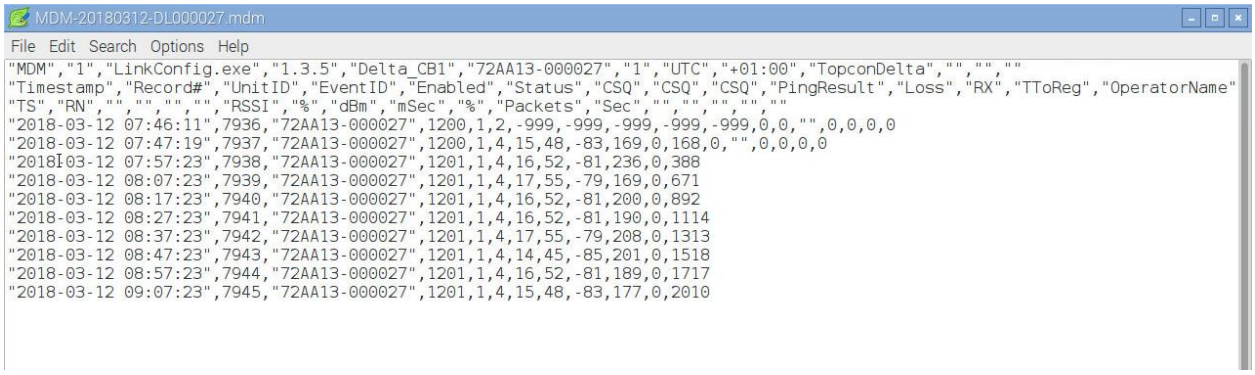
Header (line 1)

Field	Description	Format	Comment
1	File Type	Text, Fixed	Unique Identifier of this data file type
2	File Version	Text	File format version
3	Program ID	Text	Name of the program that created the file
4	Program Version	Text	Program version
5	Control Unit Version	Text	Hardware version number of Delta Link unit
6	Control Unit SN	Text	The unique SN of the Delta Link control unit
7	ComportID	Text	The ID of the COM-port to which this log applies
8	File Timestamp zone	Text	Timezone information, i.e. which timezone the data timestamps are in, default UTC
9	UTC-Offset	±HH:MM	The UTC offset as set in LinkConfig
10	Project Name	Text	Project name as defined in DeltaLog at time of file creation
11	GPS_Latitude	Text	Currently not used
12	GPS_Longitude	Text	Currently not used
13	GPS_Height	Text	Currently not used
14	Program specific fields	Text	Optional columns with program specific content

Header 2 & 3 (line 2 & 3) & Dataline (line 4)

Field	Description	Format	Unit	Comment
1	TimeStamp	timestamp	TS	
2	Record#	Integer	RN	
3	UnitID	Text		
4	EventID	Integer		
5	Enabled	Boolean		If not enabled any following fields could be omitted or 0
6	Status	Integer		
7	CSQ	Integer	RSSI	Signal indicator expressed in 3 different ways
8	CSQ	Integer	%	
9	CSQ	Integer	dBm	
10	PingResult	Integer	mSec	
11	Loss	Integer	%	
12	RX	Integer	Packets	
13	TToReg	Integer	Sec	
14	OperatorName	Text		
15	MCC	Integer		Mobile Country Code
16	MNC	Integer		Mobile Network Code
17	LAC	Integer		Local Area Code
18	CID	Integer		Cell Identity

Example



5.1.8. *.STNI

The Station Information file will contain most information that relates to the instrument used, location, control hardware and software at time of writing the data. They are automatically saved in a STNI file.

- **The file is written to the FTP transfer folder and a backup is locally stored in the Data folder.**
- **The file name is automatically allocated by the system.**
  [FileID]-Date-[StationModel_SN].stni
  STNI-YYYYMMDD-[StationModel_SN].stni

  e.g. STNI-20161205-NET05AXII_KG0001.stni

Header (line 1)

Field	Description	Format	Comment
1	File Type	Text, Fixed	Unique Identifier of this data file type
2	File Version	Text	File format version
3	Program ID	Text	Name of the program that created the file
4	Program Version	Text	Program version
5	Control Unit Version	Text	Hardware version number of Delta Link unit
6	Control Unit SN	Text	The unique SN of the Delta Link control unit
7	ComportID	Text	The ID of the COM-port to which this log applies
8	File Timestamp zone	Text	Timezone information, i.e. which timezone the data timestamps are in, default UTC
9	UTC-Offset	±HH:MM	The UTC offset as set in LinkConfig
10	Project Name	Text	Project name as defined in DeltaLog at time of file creation
11	GPS_Latitude	Text	Currently not used
12	GPS_Longitude	Text	Currently not used
13	GPS_Height	Text	Currently not used
14	Program specific fields	Text	Optional columns with program specific content

Header 2 & 3 (line 2 & 3) & Dataline (line 4)

Field	Description	Format	Unit	Comment
1	Timestamp	timestamp	TS	
2	RecordNumber or Record#	Integer	RN	
3	Instr.Manufacturer	Text		Manufacturer name of instrument, normally Topcon
4	Model	Text		Model name
5	SN	Text		Serial number of the instrument
6	FW_Rom	Text		Firmware version of the ROM
7	FW_EDM	Text		Firmware version of the EDM
8	FW_Ext	Text		Extended FW information NOTE: This string can contain comma characters, therefore this field is enclosed with double quotes.
9	Project	Text		Project name as specified in DeltaLog
10	Station ID	Text		Given name of the station as specified in DeltaLog
11	Controller ID	Text		Serial number of Delta Link unit
12	Ctrl.Prog.Version	Text		Version number of control program
13	Obs.RoundID	Integer	Count	Unique identifier to link this data to a specific dataset. In the Observation file this column is called 'Observation-Round'
14	Vout	Float	VDC	Voltage to the station as measured by Delta Link
15	Iout	Integer	mA	Current to the station as measured by Delta Link
16	Instr.PowerSource	Integer		Numerical value indicating if the instrument get power from Internal(0) or External(1)
17	Voltage	Float	VDC	Supply voltage as measured by the instrument
18	InternalTemp	Float	DegC	Instrument internal temperature
19	Boot Time	Integer	Seconds	Indicative value how long it took the turn ON the instrument at start of round of observations
20	Run Time	Integer	Sec.	Total run time for this round of observations. This is from time of instrument ready after turning on until last measured observation.
21	Motor Time	Integer	Sec. or min	Estimation of how long the motors have worked

22	Reboots	Integer	Count	Number of reboots during cycle
23	EndOfCycleStatus	integer	Code	Status indicator for how the cycle was terminated, normally=0
24	StationShutDown	Integer	Flag	Indicator if the station was turned off or not at the end of cycle
25	Measure Attempts	Integer	Count	Total measurement commands send, this includes Prism/360P/Sheet and none-prism.
26	Measure Attempts for None-prism	Integer	Count	Count of measurement commands send for Reflectorless observations
27	Total Errors returned	Integer	Count	Count of all errors returned by station while attempting an observation measurement
28	Total Errors for None-Prism	Integer	Count	Count of errors returned when attempting Reflectorless measurements
29	N/A	-	-	Field for future purposes
30	Meas.mode	Integer	Flag	Indicate in what mode the measurement where made (1=F1Only,2=SetWise,3= PointWise)
31	Max.Hz Col.Diff	Float	Seconds	Maximum angle difference between a Face1 and Face 2 reading on same prism target in this round of observations, excluded sheet and reflectorless
32	Max.Vt Col.Diff	Float	Seconds	
33	GPS_Lat			Currently not used
34	GPS_Lon			
35	GPS_Height			

5.1.9. *.CUI

The Control Unit Information file will contain information that relates to various parameters of the control box itself. They are automatically saved in a STNI file.

- **The file is written to the FTP transfer folder and a backup is locally stored in the Data folder.**
- **The file name is automatically allocated by the system.**
  [FileID]-Date-[UnitID].cui
  CUI-YYYYMMDD-[UnitID].cui

  e.g. CUI-20161205-DL012345.cui

Header (line 1)

Field	Description	Format	Comment
1	File Type	Text, Fixed	Unique Identifier of this data file type
2	File Version	Text	File format version
3	Program ID	Text	Name of the program that created the file
4	Program Version	Text	Program version
5	Control Unit Version	Text	Hardware version number of Delta Link unit
6	Control Unit SN	Text	The unique SN of the Delta Link control unit
7	ComportID	Text	The ID of the COM-port to which this log applies
8	File Timestamp zone	Text	Timezone information, i.e. which timezone the data timestamps are in, default UTC
9	UTC-Offset	±HH:MM	The UTC offset as set in LinkConfig
10	Project Name	Text	Project name as defined in DeltaLog at time of file creation
11	GPS_Latitude	Text	Currently not used
12	GPS_Longitude	Text	Currently not used
13	GPS_Height	Text	Currently not used
14	Program specific fields	Text	Optional columns with program specific content

Header 2 & 3 (line 2 & 3) & Dataline (line 4)

Field	Description	Format	Unit	Comment
1	TimeStamp	Timestamp	TS	
2	RecordNumber	Integer	RN	
3	Controller_ID	Text		Serial number of Delta Link unit
4	Event_ID	Integer		ID indicating why this record was written
5	ShutDownCode			Code indicating how the unit was shutdown the last time.
6	UpTime	Integer	Minutes	Total time the Delta Link unit has gone without reboot
7	IdleTime	Integer	Minutes	Indicative value of CPU idle time
8	CPU_Load		%	Avg.Load Last 15 minutes
9	CPU_Temp	Float	DegC	
10	Available_memory			Indicative number of free internal memory
11	RTC_Batt_Status	?	?	Currently not used
12	Ctrl.Board.Temp	Float	DegC	Internal temperature of the unit
13	Free_Disk_Space	Float	MiB	Available free space on memory card
14	Waste_Bin_Space	Float	MiB	Space taken up by deleted files
15	Transfer_Files	Integer	Count	Number of files in the transfer folder as time or creating the record
16	WiFi_Enabled	Boolean	Flag	Enabled/Disabled status or where appropriate other values indicating the current state at time of writing the record. 1=Enabled 0=Disabled
17	Modem_Enabled	Boolean	Flag	
18	ETH_Enabled	Boolean	Flag	
19	GPS_Enabled	Boolean	Flag	
20	I2C_Port	Integer	Flag	Indicator of what is connected, 0= nothing, 1=THP sensor,2=future use
21	ActiveSourceID	Integer		Indicating which power source is the main source currently. (Main=1,UPS=2,DCin1=3)
22	ACStatus	Boolean	Flag	1=On, 0=Off
23	DCUPS_Voltage	Float	Volt	Current Voltage from the Delta Link managed backup battery
24	DCUPS_Current	Integer	mA	Current flow To/From backup battery
25	DCUPS_Temp	Float	DegC	Internal Temp from backup battery

26	DCUPS_Level	Integer	%	Capacity as reported by backup battery
27	DCin1_Volts	Float	Volts	Information related to the second DC input port. Peak values are for the last hour and should be reset every hour
28	DCin1_Current	Integer	mA	
29	DCin1_Volt_Peak	Float	Volts	
30	DCin1_Current_Peak	Integer	mA	
31	DCOut1_Volts	Float	Volts	Information related to the power output on the current MDTS port. Minimum and Peak values are for the last hour and should be reset every hour
32	DCOut1_Current	Integer	mA	
33	DCOut1_Volt_Min	Float	Volts	
34	DCOut1_Current_Peak	Integer	mA	
35	DCOut2_Volts	Float	Volts	Information related to the power output on the current GP port. Minimum and Peak values are for the last hour and should be reset every hour
36	DCOut2_Current	Float	mA	
37	DCOut2_Volt_Min	Float	Volts	
38	DCOut2_Current_Peak	Integer	mA	
39	DCOut3_Volts	Float	Volts	Information related to the power output on the current IO port. Minimum and Peak values are for the last hour and should be reset every hour
40	DCOut3_Current	Integer	mA	
41	DCOut3_Volt_Min	Float	Volts	
42	DCOut3_Current_Peak	Integer	mA	
43	Output1	Boolean	Flag	Status flags of the specific I/O pin on the IO port. Possibly these fields could be split into input and output and written as fixed length integer or 2 binary values
44	Output2	Boolean	Flag	
45	Input1	Boolean	Flag	
46	Input2	Boolean	Flag	
47	TiltX	Float	Deg360	Experimental Current values of the Delta Link internal tilt sensor, range +/-90
48	TiltY	Float	Deg360	
49	TiltZ	Float	Deg360	

5.2. Error Code & handling

Here are the Error Messages listed, that might appear in the .ERR file respectively could be found in the Settings → Logs, here shown with recommended action.

Logged Error Number	Logged Error Message	Description	Information & Recommended Actions
1	Unable to run as there are no active targets.	Happens if DeltaLog has been put into monitoring mode, but somehow the targets have been deleted and there is nothing to monitor.	Check targets have been defined and that there are some active ones.
2	No output folder for error files found.	The output folder for the error log files could not be found.	Check the User folder structure is correct.
3	No output folder for atmospheric files found.	The output folder for the error log files could not be found.	Check the User folder structure is correct.
4	Unable to open COM port.	It was not possible to open the station COM port so no communication to the station is possible.	Check no other applications are running which are using the COM port. Reboot the Delta Link unit. If this persists it could be a hardware fault.
5	Failed to initialize the BCM library.	It was not possible to initialize the hardware access library.	Check the Delta Link image and user are all configured correctly. Root access rights are required for running DeltaLog.
6	Failed to create station class for this type.	The software failed to create a station handler component for driving the specified station.	Check the station manufacturer setting is set correctly. If so, contact support.
100	Scheduled measurement cycle was not started as station is not active at this time.	A measurement cycle was scheduled according to the next measurement interval, but the station is not active.	Check the Station Active dates and times in the settings.

101	Scheduled measurement cycle was not started as the backup battery is below the MDTS operation threshold.	A measurement cycle was scheduled according to the next measurement interval, but the Delta Link unit is running on the backup battery and the battery percentage is below the MDTS operation threshold.	Check the power source of the Delta Link unit. Adjust the MDTS operation battery threshold if necessary. MDTS operation will resume when the Delta Link unit is once again powered from an DC external supply.
102	Scheduled measurement cycle was aborted as the external battery is below the MDTS operation threshold.	A measurement cycle was running, but the Delta Link unit is running on the backup battery and the battery percentage dropped below the MDTS operation threshold.	Check the power source of the Delta Link unit. Adjust the MDTS operation battery threshold if necessary. MDTS operation will resume when the Delta Link unit is once again powered from an DC external supply.
103	Shutting down in 5 minutes due to low external backup battery.	The Delta Link unit is running on the backup battery and the battery percentage has reached the shutdown threshold for the unit. If this still applies after a further 5 minutes the unit will be shutdown.	Check the power source of the Delta Link unit. Restore external DC power to cancel the scheduled shutdown.
104	Scheduled shutdown was cancelled as external power was restored.	The Delta Link unit was scheduled to shutdown due to low backup battery power, but the DC power was restored and the shutdown was cancelled. The unit will resume monitoring at the next scheduled cycle.	No action, unit will continue monitoring.
105	Station communication errors were detected. The station was power cycled.	On initialization the station did not communicate as expected. The station power supply was cycled.	Initially no action. The unit will try several times to communicate with the station. If this continues to happen check station configuration and cable.
106	Station communication errors were detected after repeated station reboots.	If the station is rebooted more than 3 times in one cycle, the cycle will be aborted with this error message.	Investigate reason for target errors.

107	Communication to the station is locked.	Serial communication to this station is locked, e.g. GT/iX stations.	Contact Topcon
108	Station error count was exceeded. The station was rebooted.	If too many station errors are received the station will be rebooted (turned off and power cycled).	Investigate reason for target errors.
109	Station measurement cancellation problem detected. The station was rebooted.	When a measurement is cancelled the ST0 command is used. If this does not reply or replies NAK then the command is repeated and if after 35 seconds there is still no reply or NAK reply then the station is rebooted.	
500	No communication to THP sensor.	It was not possible to communicate to the THP sensor.	Check THP sensor is connected. Check THP sensor wires inside the connector are all still connected. Try using a different THP sensor or try a different Delta Link unit.
701	Power source change - Switching to external DC IN.	The active power source is now the external DC IN.	Message sent when DeltaLog starts up and when the power source changes. Power source is now external DC A.
702	Power source change - Switching to backup battery.	The active power source is now the backup battery.	Message sent when DeltaLog starts up and when the power source changes. Battery thresholds will apply.
708	No modem communication. The modem was power cycled.	If LinkConfig is unable to communicate with the modem management port it will power cycle the modem.	

709	Incorrect IP route detected. The modem was power cycled.	If the modem is on and communicating, but the IP route of the unit is not set to ppp0 then the modem is power cycled.	
1000	Invalid number of targets found in saved file.	The data in the targets file contains an invalid number of targets.	Check dltargets.txt file is valid. Replace with a backup file if error continues.
1001	No communication to station.	There was not communication to the station and commands could not be sent to it.	Check station(MDTS) configuration Check the MDTS cable is connected properly. Check the MDTS cable connector is wired correctly. If this persists try a different cable. If this persists try a different Delta Link unit.
1002	Target not found.	The station failed to find a valid target when searching for it.	Check the target angles taught are correct, Check the target is clean. Check the target is not blocked.
1003	Unable to measure a distance to the target.	The station was unable to measure a distance to a target due to no EDM signal.	Check the target angles taught are correct, Check the target is clean. Check the target is not blocked.
1004	No measurement due to a hardware fault on the angle or incline sensor.	A distance error was reported by the station which wasn't a 'no signal' or 'bad condition' error.	Check the target angles taught are correct, Check the target is clean. Check the target is not blocked. Check the station EDM is operating normally.
1005	No measurement. Unhandled station response.	The target was not measured and there was an unexpected station response.	Check the station can measure targets manually. Check the MDTS cable connection.
1006	No measurement. Unable to change to the required face.	The station reported an error when trying to change to the face required for the measurement.	Check the station can move freely. Check the MDTS cable connection. Check the station can measure targets manually.
1007	Wrong target found. Max distance difference check failed.	Only the distance was measured to the target and it was more than the distance check tolerance specified in the DeltaLog settings.	Check the DeltaLog settings to see what the Distance Check setting is set to. Verify the correct target is being measured.
1008	No Robotics License!	The station does not have the necessary features installed for remote control.	Check the Station Information in the DeltaLog Tools & Info settings tab. Remote Control is required.

1009	Tilt Error! Please level the instrument.	The reported station tilt angles exceed the values set in the DeltaLog settings.	Check the DeltaLog settings for the Tilt Compensator. If user set check that the value entered is not too small.
1010	3D Coordinate Check on measurement was out of tolerance, measurement ignored!	The target was measured, but the its position was further away from the taught point than set by the 3D Point Check setting.	Check the DeltaLog settings for the 3D Point Check and check the value entered is not too small.
1011	No measurement due to vibration or atmospheric disturbances.	When measuring the distance to the target the station reported an error indicating a bad measurement condition or the received light was too strong.	Check the station is not suffering from vibrations. Check the atmospheric conditions are acceptable. Check the station can measure the target manually.
1012	Unable to measure a distance to due incorrect EDM settings.	A problem has occurred measuring a distance on a Leica instrument.	
1013	No measurement due to ATR error.	Leica ATR error occurred during a measurement.	
1999	Undefined error. Please report.	The target was not measured and there was an unexpected station response.	Check the station can measure targets manually. Check the MDTS cable connection.

5.3. Data transfer to/from Delta Link

You can transfer data to the Delta Link unit.

- **For example, point lists in csv format can be transferred for import**
- **Data transfer uses the SFTP protocol**

Data transfer to Delta Link

- Data can be transmitted via the web portal by SFTP, or
- Establish a connection to the Delta Link unit via Wi-Fi or LAN
  - Use Filezilla, winSCP or similar server/client software for this to transfer data via FTP and SFTP
- The software must be configured as follows when using Wi-Fi
  - **Host:** sftp://192.168.88.5.
  - **User:** dl
  - **Password:** dldefault
  - Use **Port:** 2211
- The software must be configured as follows when using LAN
  - **Host:** sftp://DeltaLinkXXXXXX.local (Replace XXXXXX with the 6 digit serial number)
  - **User:** dl
  - **Password:** dldefault
  - Use **Port:** 2211
- The following credentials must be used when used the web portal SFTP function
  - **User:** sftp
  - **Password:** sftpdefault
- Copy/Download the file from the existing location to the Delta Link unit.
- The file is now available on the Delta Link.

5.4. Reset to factory settings

By pressing the reset button on the Delta Link Box all settings of LinkConfig will return initialized to factory default.

- Please make sure that Delta Link is shut down (see chapter **4.1**), if you have access to the box.
- Remove all power sources from the unit.
- Stay in an electronic protection zone (EPO).
- Press the reset button as indicated in the picture below and hold
- Reconnect power supply and hold reset button for 45sec
- The reset button must stay pressed while the Delta Link unit reboots
- LinkConfig will be reset to factory default settings
  - The VNC Password will be restored
  - The Wi-Fi Password will be restored
  - The Wi-Fi Module will be switched on
  - The Wi-Fi channel will be set to 1 and the Country setting will be changed to DE
  - The modem will be switched off
  - The dl-User Password will be restored
- DeltaLog will NOT be reset to factory default settings

5.5. Bonjour service

What is the bonjour service?

- Bonjour is a software that comes built-in with Apple's OS X and iOS operating systems and it provides a general method for the applications to discover shared services on a local area network, discovering local Web servers. It allows the users to set up a network without any configuration.

Is bonjour service installed on my computer?

- In essence if you open task manager and show the process of all users than you will find an image name called 'mDNSResponder.exe'. If you cannot find it than most likely bonjour is not installed

How to get the bonjour service?

- Bonjour service is downloadable from the apple support page (https://support.apple.com, search for “Bonjour for Windows”)
- Recommended: bonjour service 3.0.0 and up

www.topconpositioning.com