Automotive
Energy & Power Analysis
Aerospace & Defense
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General Test & Measurement

DEWE-VGPS-HSC

Technical reference manual

ISO9001

Re-inventing Data Acquisition

worldwide
DEWETRON
www.dewetron.com

Content

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Warranty Information

A copy of the specific warranty terms applicable to your DEWETRON product and replacement parts can be obtained from your local sales and service office.

Support

For any support please contact your local distributor first or DEWETRON directly.

For Asia and Europe, please contact:

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The telephone hotline is available
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Printing History

Please refer to the page bottom for printing version.

Safety instructions

Safety symbols in the manual

	*Indicates hazardous voltages.*

WARNING	*Calls attention to a procedure, practice, or condition that could cause bodily injury or death.*

CAUTION	*Calls attention to a procedure, practice, or condition that could possibly cause damage to equipment or permanent loss of data.*

WARNINGS

The following general safety precautions must be observed during all phases of operation, service, and repair of this product. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the product. DEWETRON Elektronische Messgeraete Ges.m.b.H. assumes no liability for the customer's failure to comply with these requirements.

All accessories shown in this document are available as option and will not be shipped as standard parts.

Safety instructions for all DEWETRON systems

- The DEWETRON data acquisition systems may only be installed by experts.
- Read your manual before operating the system.
- Observe local laws when using the instrument.
- Ground the equipment: For Safety Class 1 equipment (equipment having a protective earth terminal),a non interruptible safety earth ground must be provided from the mains power source to the product input wiring terminals or supplied power cable.
- DO NOT operate the product in an explosive atmosphere or in the presence of flammable gases or fumes.
- DO NOT operate damaged equipment: Whenever it is possible that the safety protection features built into this product have been impaired, either through physical damage, excessive moisture, or any other reason, REMOVE POWER and do not use the product until safe operation can be verified by service-trained personnel. If necessary, return the product to a DEWETRON sales and service office for service and repair to ensure that safety features are maintained.
- Keep away from live circuits: Operating personnel must not remove equipment covers or shields. Procedures involving the removal of covers or shields are for use by service-trained personnel only. Under certain conditions, dangerous voltages may exist even with the equipment switched off. To avoid dangerous electrical shock, DO NOT perform procedures involving cover or shield removal unless you are qualified to do so.
- No modifications are allowed at the instrument. The fuse in the power module has to be replaced by the same type. For continued protection against fire, replace the line fuse(s) only with fuse(s) of the same voltage and current rating and type. DO NOT use repaired fuses or short-circuited fuse holder labels and print on the power module may not be removed.
- DO NOT service or adjust alone. Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.
- DO NOT substitute parts or modify equipment: Because of the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modification to the product. Return the product to a DEWETRON sales and service office for service and repair to ensure that safety features are maintained.
- Before opening the instrument (experts only) or exchanging the fuse in the power module disconnect power!
- Don’t touch internal wiring!
- Don’t use higher supply voltage than specified!
- Use only original plugs and cables for harnessing.
- Install filler-panels in unused slots.
- The power-cable and -connector serve as Power-Breaker. The cable must not exceed 10 feet, disconnect function must be possible without tools.
- Safety of the operator and the unit depend on following these rules.

General System Information

Environmental Considerations

Information about the environmental impact of the product.

Product End-of-Life Handling

Observe the following guidelines when recycling a DEWETRON system:

System and Components Recycling

Production of this components required the extraction and use of natural resources. The substances contained in the system could be harmful to your health and to the environment if the system is improperly handled at it's end of life! Please recycle this product in an appropriate way to avoid an unnecessary pollution of the environment and to keep natural resources.

This symbol indicates that this system complies with the European Union’s requirements according to Directive 2002/96/EC on waste electrical and electronic equipment (WEEE). Please find further informations about recycling on the DEWETRON web site www.dewetron.com

Restriction of Hazardous Substances

This product has been classified as Monitoring and Control equipment, and is outside the scope of the 2002/95/EC RoHS Directive. This product is known to contain lead.

GPS based system for speed and displacement measurement

Features:

- Synchronized data acquisition combined with real time speed measurement
- **Speed sensor:**
- 100 Hz update rate for speed and distance output
- Supports USB and CAN interface
- Supports differential GPS (SBAS) as a standard
- Online signal quality monitoring for standalone applications
- Lowest latency time at speed and distance output
- No calibration required
- **Clock output:**
- Output clock rate of up to 10 MHz
- One independent output frequency
- Synchronization of DEWE-ORION-1624 systems
- PPS accuracy of 100 ns
- Continuous synchronization to absolute GPS time
- Absolute long time stable

Specifications

DEWE-VGPS-HSC	GPS based system for speed and displacement measurement		
Measurement specifications			
Speed		Absolute position	valid for USB, CAN
Accuracy	0.1 km/h ±0.05 % of range [1]	Accuracy	< 40 cm CEP [4]
Min to Max	0.1 km/h to 500 km/h	Refresh rate	20 Hz
Resolution	0.01 km/h	Resolution	< 10 cm
Analog output	25 mV/km/h [2] (0 to 5 V)	Latency time	< 2 ms using DEWESoft
Displacement		Timing	
Accuracy	< 20 cm/km [3]	Trigger accuracy	100 ns
Digital output	500 pls/m [2] (TTL level)	Clock acc. GPS locked	without drift
Refresh rate	100 Hz	Clock acc. GPS unlocked	< 1 ppm
Latency time	12 ms	Clock/Trigger signal level	TTL (LVDS for ORION-1624)
System specifications			
Input	SMA connector for GPS antenna, event mark input		
Output	Speed, displacement, USB, CAN, VGPS display, Timebase generator		
Power Supply	9 to 36 V_{DC}, 3 W		
Dimensions	115 x 93 x 35 mm (4.5 x 3.6 x 1.4 in.)	Display: 131 x 64 x 27 mm (5.2 x 2.5 x 1.1 in.)	
Weight	740 g (1.63 lbs)	Display: 265 g (0.58 lbs)	
Operating temperature	0 °C to 60 °C (standard)		
Storage temperature	-20 °C to +70 °C		
Humidity (operating)	10 % to 80 %, non condensing 5 % to 95 %, rel. humidity		
Vibration	MIL-STD 810F 514.5 procedure I operating test procedure frequency range: 5 to 200 to 5 Hz; 5 x 12 min each direction displacement amplitude ±3.5 mm (5 to 8.45 Hz) acceleration amplitude 1 g (8.45 to 92 Hz) displacement amplitude 92 to 113 Hz: ±0.029 mm acceleration amplitude 1.5 g (113 to 200 Hz)		
Shock	MIL-STD 810F 516.5 procedure I non operating test procedure ½ sinus 11 ms 10 g, 3 shocks positive, 3 shocks negative		

(1) Acquiring more than 6 satellites, averaged over 3 values
(2) Free programmable
(3) Acquiring more than 6 satellites, driving at constant speed
(4) Circular Error Probable
- 40 cm differential operation using local base station
- 90 cm differential operation using BEACON
- 1.8 m differential operation using SBAS
- 3 m autonomous operation

DEWE-VGPS-HSC

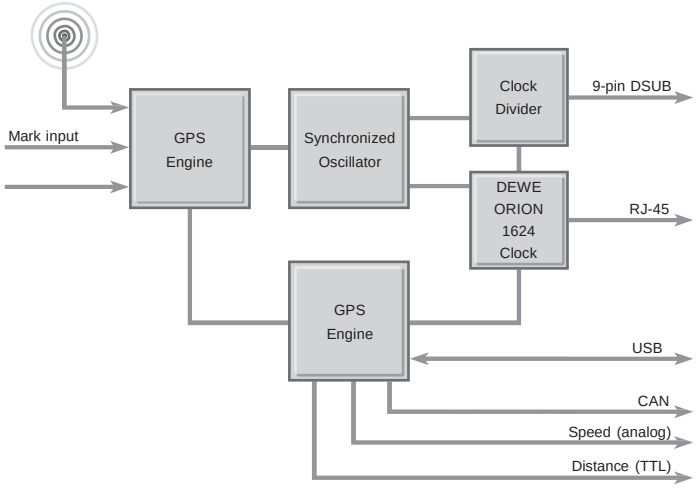
Device overview

With the DEWE-VGPS-HSC DEWETRON offers a unique combination of a high dynamic GPS based speed sensor and a GPS synchronized time base generator. This combination allows completely synchronized data acquisition of multiple systems located inside and outside of moving vehicles.

The sensitivity of the analog speed and displacement output is free programmable. Due to the 100 Hz update rate the latency time is as low as 9 ms. Using the unique PPS sync technology of DEWESoft the latency time of the digital interfaces (USB or CAN) are corrected online.

The time synchronization is supported for the whole DEWE-ORION series and also for many 3rd party A/D-boards.

The diagram below gives a basic idea about the DEWE-VGPS-HSC functionality.



The base of any GPS receiver is precise time measurement. In addition to the position information a precise PPS (pulse per second) is generated by the GPS engine. This pulse is used to synchronize a 80 MHz oscillator with software PLL (phase locked loop). The result is an ultra stable 80 MHz clock source which is completely free of drift over time.

Out of this 80 MHz base clock, the programmable clock divider generates the clock frequency for the data acquisition system. Due to the over-clocking of delta sigma converters, a special output clock is required for synchronized sampling. This is available on a RJ45 connector for clocking the DEWE-ORION-1624.

The communication to the host is provided over CAN or standard USB interface.

Functionality of the LEDs

Power

Indicates the power and hardware status. At power-on this LED indicates presence proper power supply.

Status

When the Status LED long flashes GPS is not locked to a satellites. Short flashing indicates normal operation.

Mounting the aerial

The aerial supplied with the VGPS is designed to be mounted magnetically on top of the vehicle in a horizontal plane. If the surface is not metallic, the aerial may be fixed by placing a piece of strong tape over the top of the aerial. The positioning of the aerial is critical to the correct operation of the VGPS.

Note: For correct working, the aerial requires a metallic subsurface with a minimal diameter of 15 cm. This surface doesn't has to be ferromagnetical.

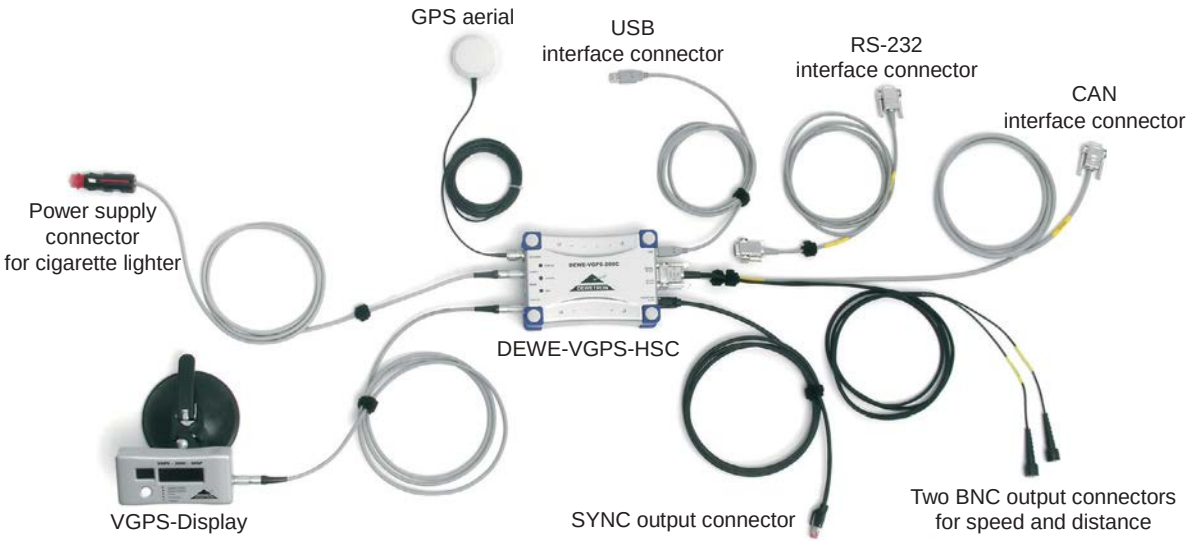
The aerial picks up the signals from up to 12 satellites which are all in different places in the sky. These satellites are not necessarily directly overhead, and can often be close to the horizon. Therefore it is best to mount the aerial in a way, that the least amount of metal obscures the view of the sky. On a domed roof, place the aerial on the top of the dome. On an open car with a roll-over bar, place the aerial horizontally on the highest point of the roll-over hoop and tape the wire securely to the frame. Although the VGPS can work with at least three satellites, it's precision increases the more satellites it finds. If one satellite disappears over the horizon, or behind an object, there are other satellites still in view.

Warm-Up time

When the VGPS is used for the first time, has been moved more than 200 km or not used for 10 hours (since last usage), it is recommended to perform a 'cold start'. To get the best performance from your VGPS in the future, perform this cold start in an open place with a good all round view to the sky. Allow the VGPS to map the satellites for at least 20 to 30 minutes. The VGPS builds up the 'Ephemeris' data on each satellite which is stored in a non-volatile memory, and means future satellite tracking is swift and stable. Once the VGPS has carried out a successful cold start, future satellite lock from power up will take between 15 seconds and 1 minute. Before going to test in a shady environment with tall objects or near to trees, allow the VGPS to settle in an open space for 5 to 10 minutes.

DEWE-VGPS-HSC

Scope of supply



Connection

Connector overview:

VGPS-Display External trigger input Aerial DC power supply connector

USB MULTI input/output Orion 1624 Sync

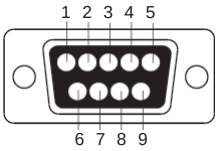
Aerial connector

Connect the GPS aerial to the TNC connector.

MULTI I/O connector

The 9-pin DSUB 9 (male) connector is configured as output connector for following signals:

9-pin SUB-D connector (male)



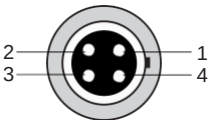
Schematic

Pin assignment
1: +5V 50mA supply
2: CAN-LOW
3: Second clock output
4: Third clock output
5: Analog speed output
6: PPS (pulse per second)
7: CAN-HIGH
8: GND (Ground)
9: AGND (Analog speed ground)

VGPS-Display connector

To connect the external display to the DEWE-VGPS-HSC system.

4-pin Lemo connector (female) EGG.1B.304.CLL



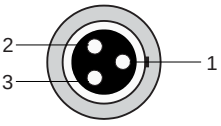
Schematic

Pin assignment
1: +5 V_{DC}
2: GND
3: TXD
4: RXD

Mark input connector

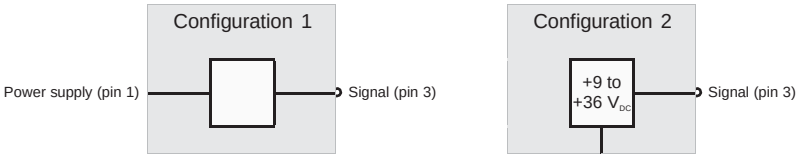
Connects an external trigger source to the DEWE-VGPS-HSC system.

3-pin Lemo connector (female) EGG.1B.303.CLL



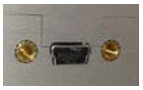
Schematic

Pin assignment
1: +9 to +36 V_{DC} power supply
2: GND power supply
3: Signal



USB connector

The USB interface connectors meets standard USB pin assignment.



4-pin USB connector

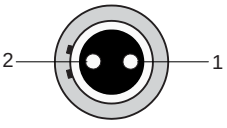
Schematic

Pin assignment
1: +5 V
2: D-
3: D+
4: ID
4: GND

Power supply connector

Connects the DEWE-VGPS-HSC system to an external DC power supply.

2-pin Lemo connector (male) EGJ.1B.302.CLA



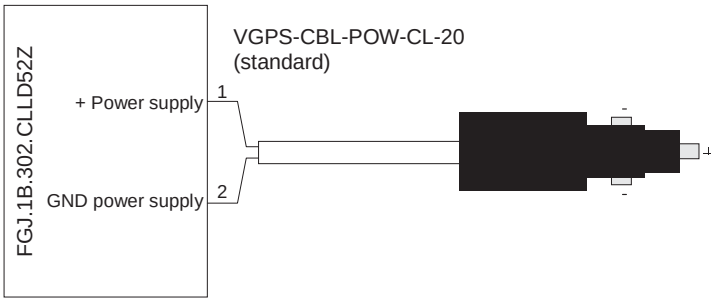
Schematic

Pin assignment
1: +9 to 36 V_{DC} power supply
2: GND power supply

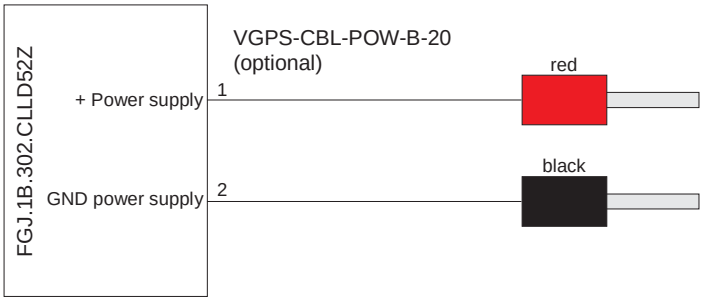
Cable for external power supply

Type of cable: LIYY 2x0.75, length: 2 m

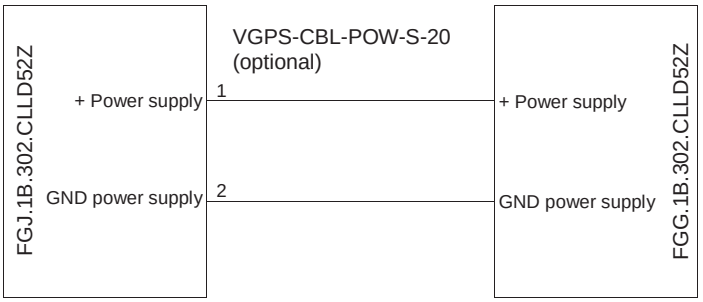
VGPS



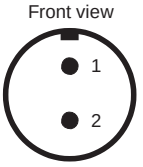
VGPS



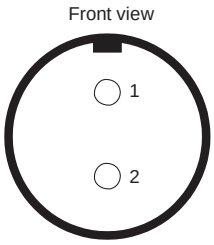
VGPS



DEWE-xxxx



FGG.1B.302.CLLD52Z
GMA.1B.045DN

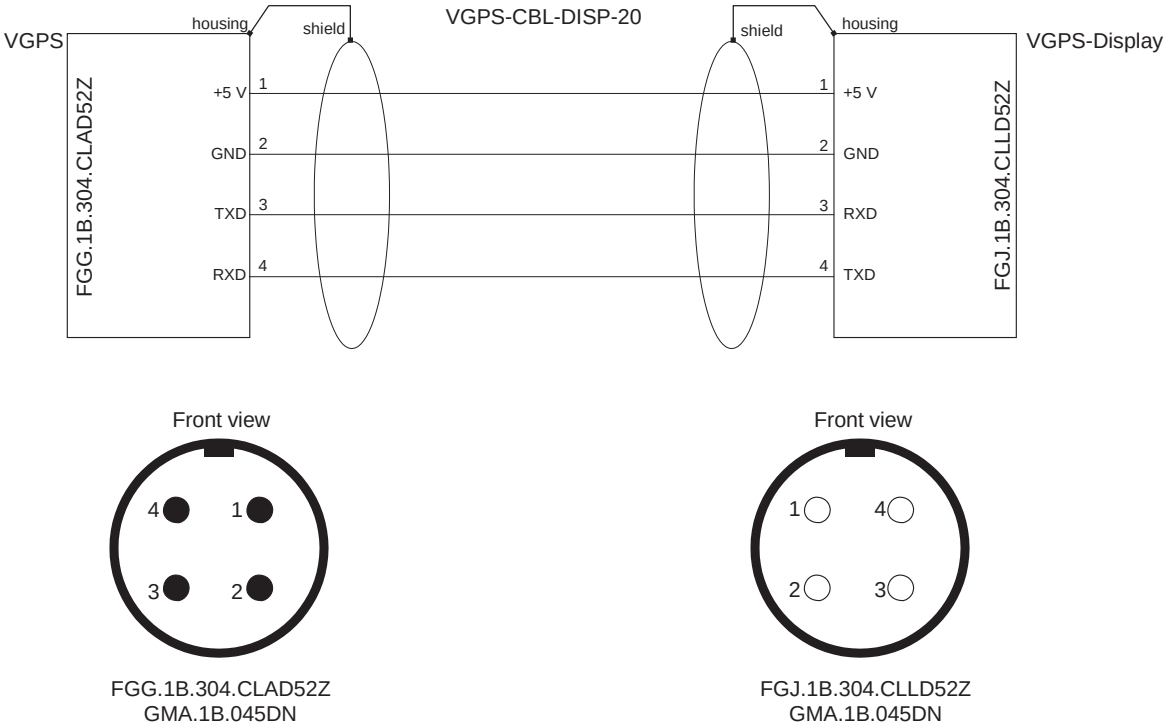


FGJ.1B.302.CLLD52Z
GMA.1B.045DN

Power supply unit
(optional)

Cable for connecting VGPS to VGPS-Display

Type of cable: LIYCY 4x0.25 shielded, length: 2 m

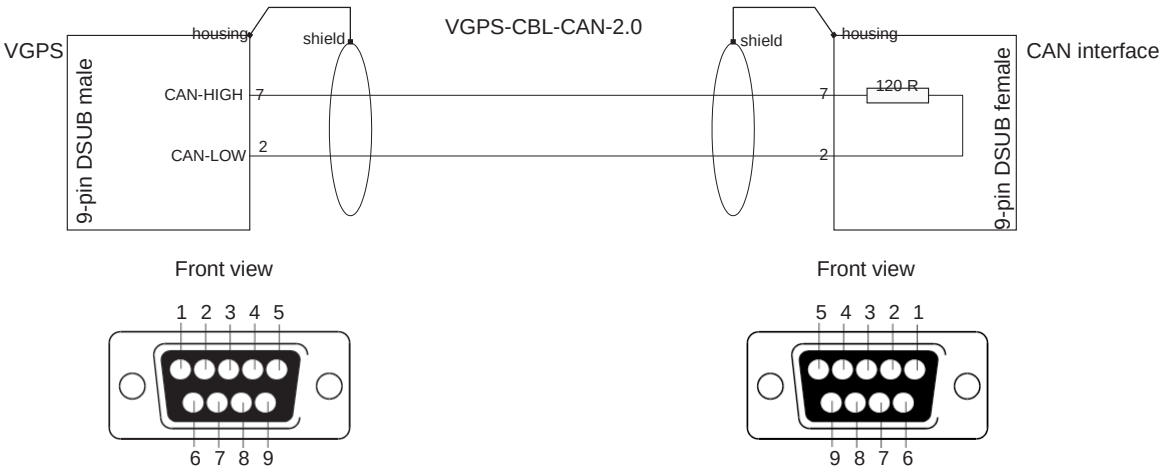


FGG.1B.304.CLAD52Z
GMA.1B.045DN

FGJ.1B.304.CLLD52Z
GMA.1B.045DN

Cable for connecting VGPS to CAN

Type of cable: LIYCY 2x0.25 shielded, length: 2 m

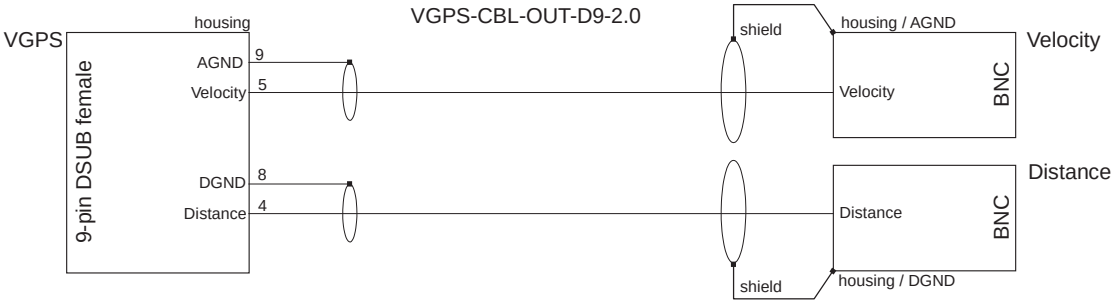


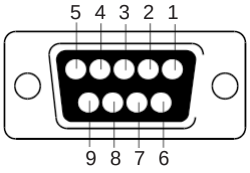
9-pin DSUB male

9-pin DSUB female

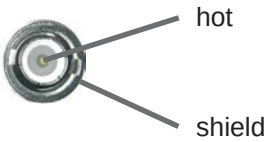
Output cable velocity and distance

Type of cable: RG-174, length: 2 m





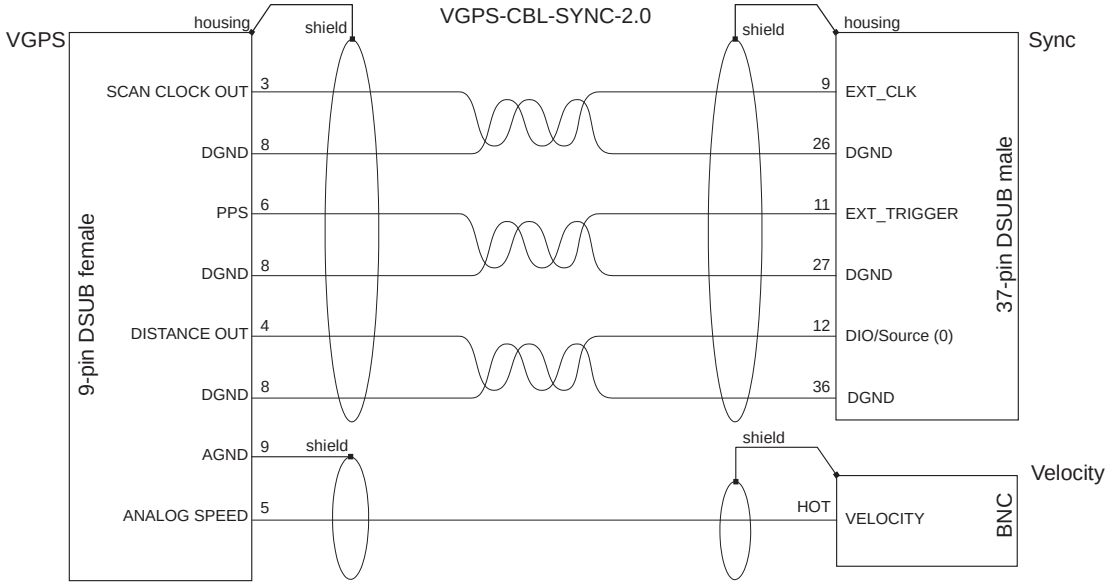
9-pin DSUB female

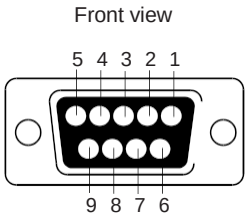


BNC male

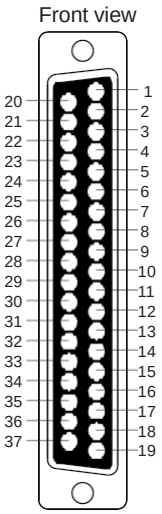
Sync and velocity output (optional cable)

Type of cable: 3x2x0.25 shielded and RG-174, length: 2 m

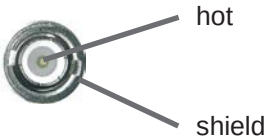




9-pin DSUB female



37-pin DSUB male



BNC male

Digital display operation

The LED display is used to monitor various GPS parameters.

Display description:

Blinking middle dashes on all digits - the display is unable to communicate with the VGPS. Pressing and releasing the push-button on the front of the VGPS-Display switches the display to different mode. After pressing the push-button, the LED beside mode changed to appropriate display mode.

Mode 01:

Number of satellites and velocity in mph.

Mode 02:

Number of satellites and velocity in kilometers per hour

Mode 03:

GPS UTC time reported by the satellites goes up in increments of 0.05 seconds. The format is: hh.mm.ss. The base for the time is Universal Time co-ordinated, derived from the atomic clocks on board the satellite and hence is extremely accurate.

Mode 04:

Heading in degrees
Number of satellites and heading of the vehicle relative to true North.
Resolution: 0.1 degree

Mode 05:

Number of satellites and height of the vehicle relative to the Datum WGS84 (approx. 50 meters below UK sea level)
Resolution: 0.1 meters

Options

Brake trigger operation

(Available to purchase as an option)

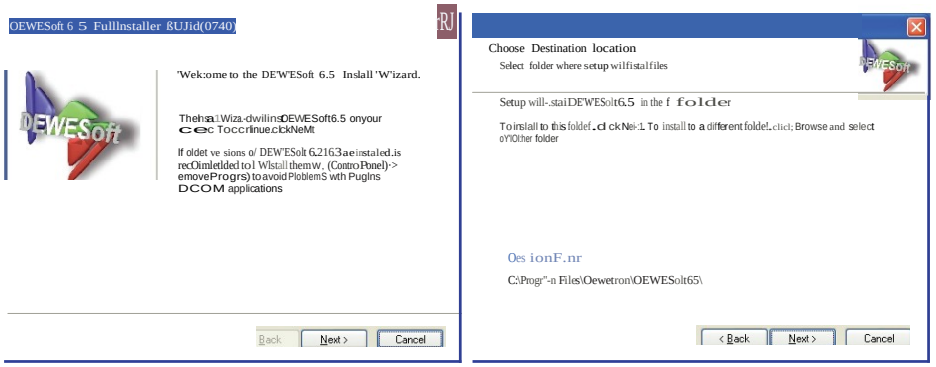
The brake trigger is designed to be mounted on the brake pedal or the accelerator pedal, and gives an indication when the pedal is pressed. The normal method of fixing is via rubber bands. The brake trigger can be used during a brake stop to determine the speed at which the brake pedal was pressed, and the braking distance from this point can be viewed. This switch can be connected directly to an input of the data acquisition system or to the DEWE-VGPS-HSC. The DEWE-VGPS-HSC will recognize the exact time of the switching point. A command with this time information will be transmitted to the data acquisition unit. DEWESoft displays this event as a separate channel. This channel can be used during post processing to calculate the brake distance.

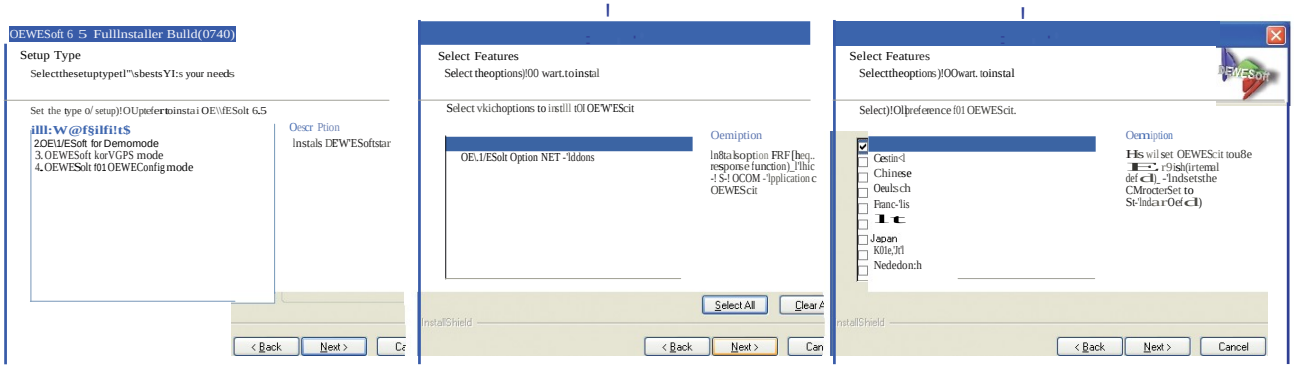
Brake trigger switch

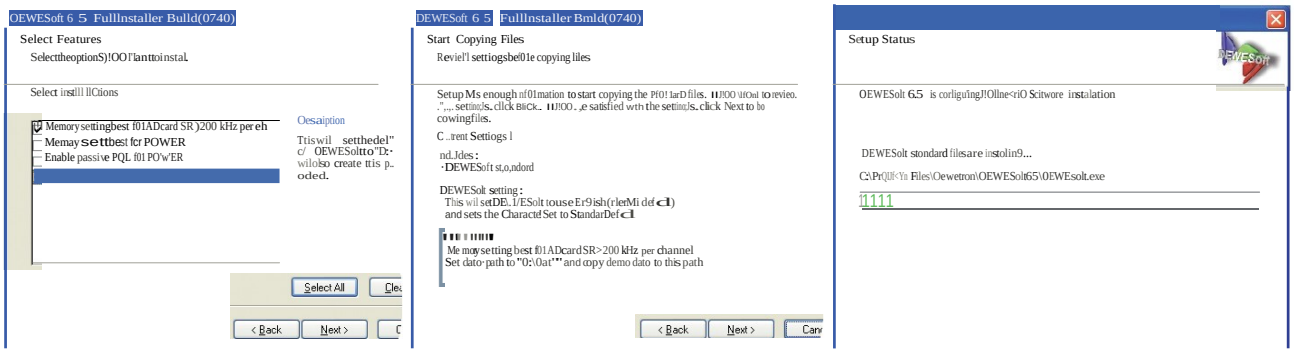
Installation of the DEWESoft measurement software

Start the installation software on the System-DVD, shipped with the system.

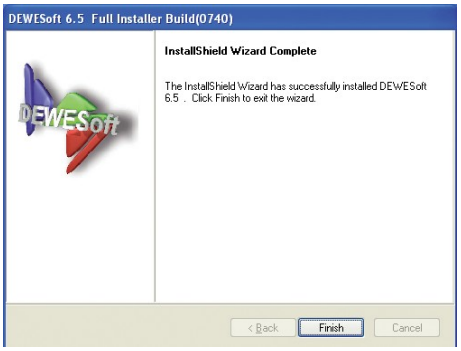
Follow the instructions of the install program according to your license.

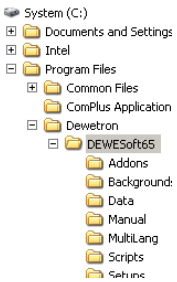






Now DEWESoft is installed on your computer. The software creates some directories on your harddisk.





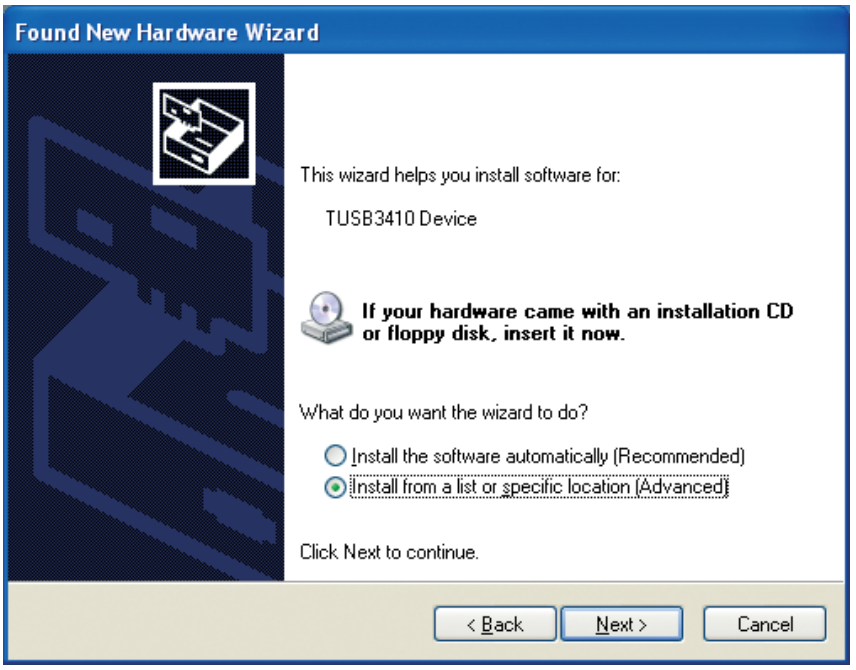
You can start the software in the Windows start menu or use the icon created on your desktop. For more information about the DEWESoft installation please refer to the *DEWESoft Software Users Manual*.

Installation of the DEWE-VGPS-HSC drivers

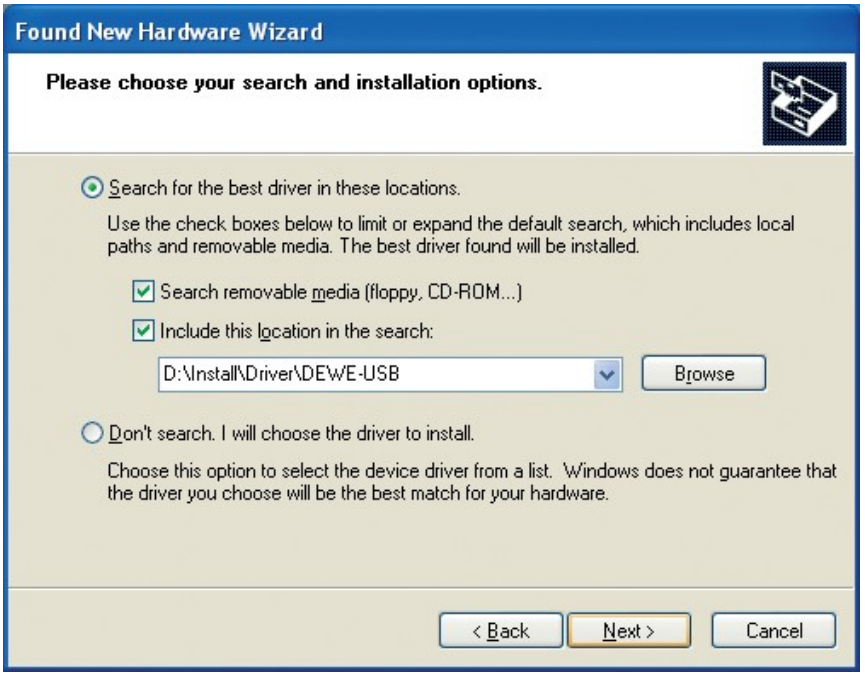
Execute the file „DEWEUSBInst.exe“ from the System-DVD
(usually D:\Install\Drivers\7_Communication\DEWE-USB where D is the units DVD-Drive letter).
Drivers are signed and windows certified.

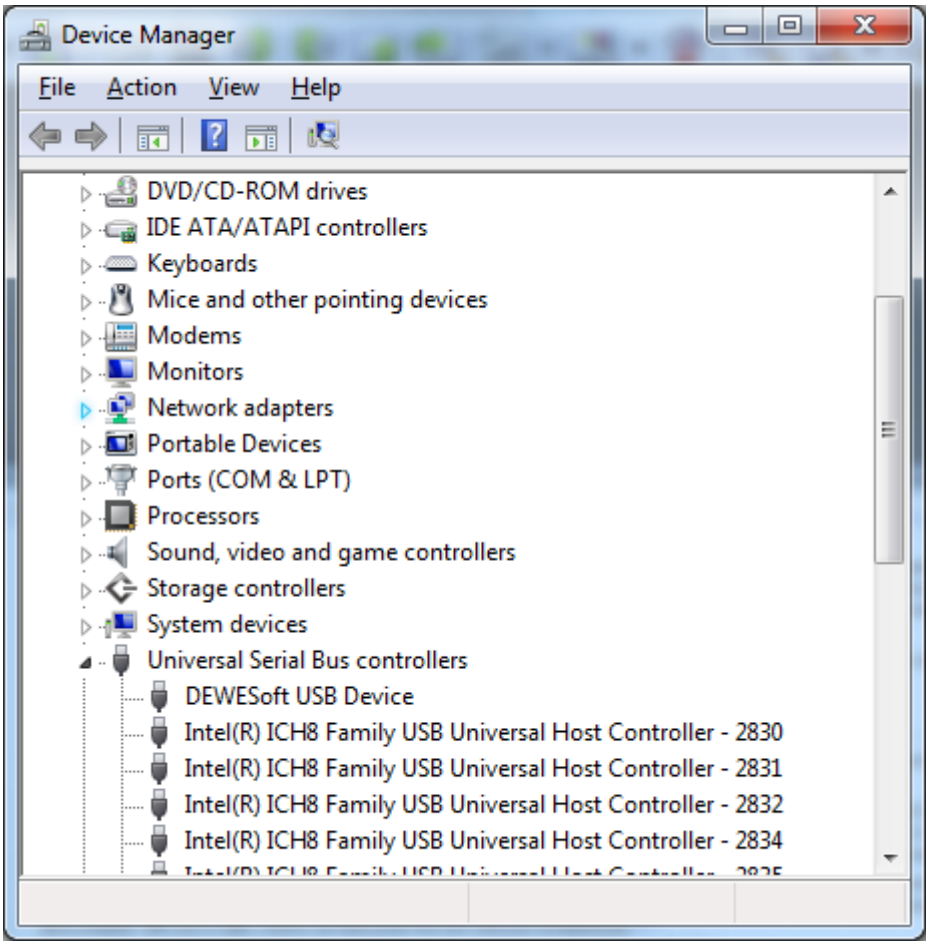
Power the DEWE-VGPS-HSC and connect it to the DAQ-System via USB.
When the hardware screen appears, select “No, not this time”

Select “Install from a list or a specific location”



Choose the DEWE-USB folder from the DEWE-System DVD
(D:\Install\Drivers\7_Communication\DEWE-USB)



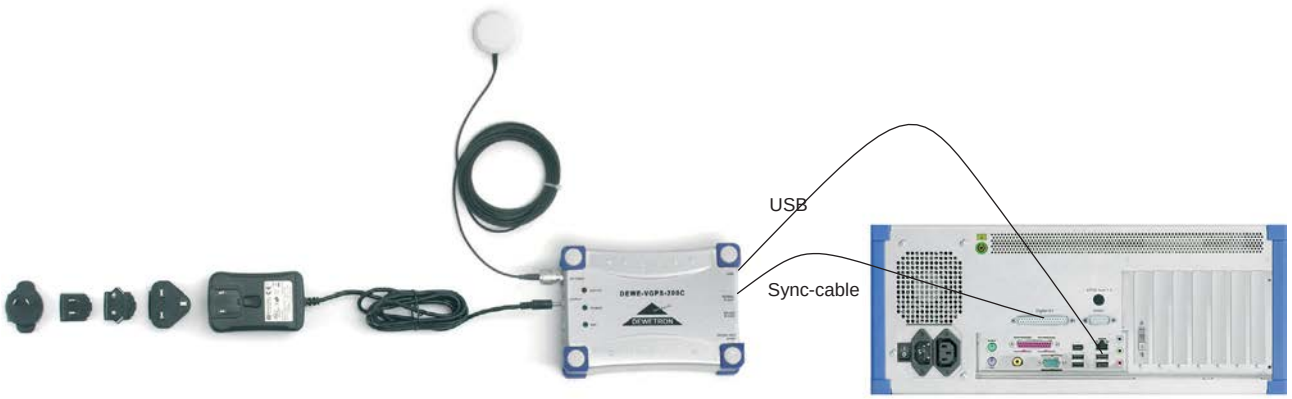


The driver has been successfully installed.

Connecting the DEWE-VGPS-HSC hardware to the DAQ-System

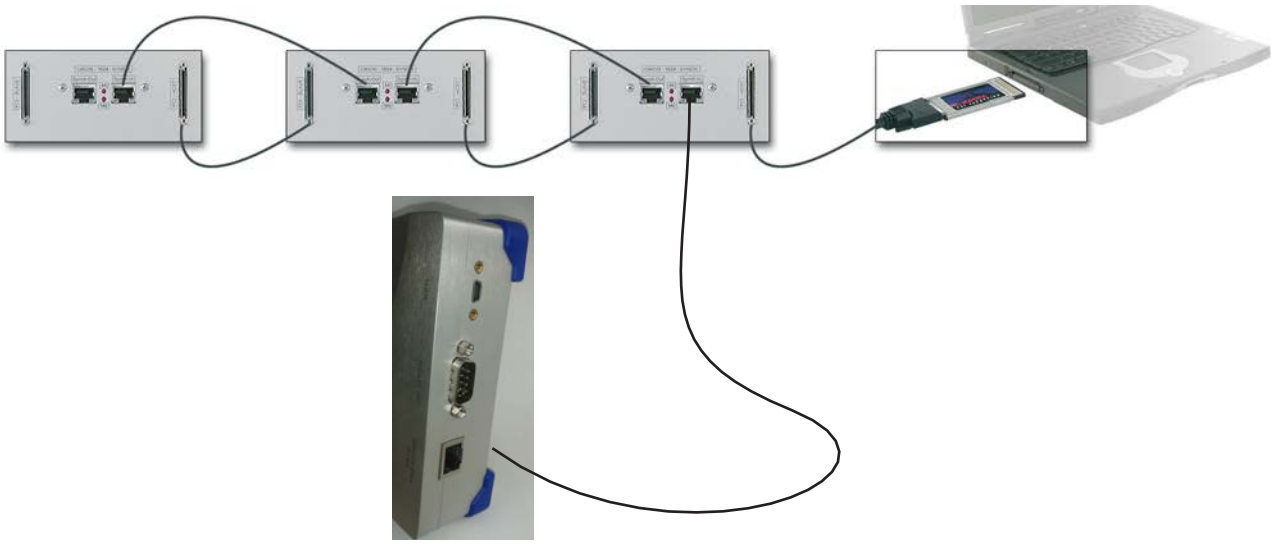
Synchronization to standard A/D-boards

To synchronize standard data acquisition systems a start trigger and the possibility of external clocking is required. Usually DEWETRON data acquisition systems are equipped with a 37-pin DSUB connector. This digital multi function connector contains the required clock and trigger input for easy connection to the clocking unit.



Synchronization to DEWE-ORION-1624

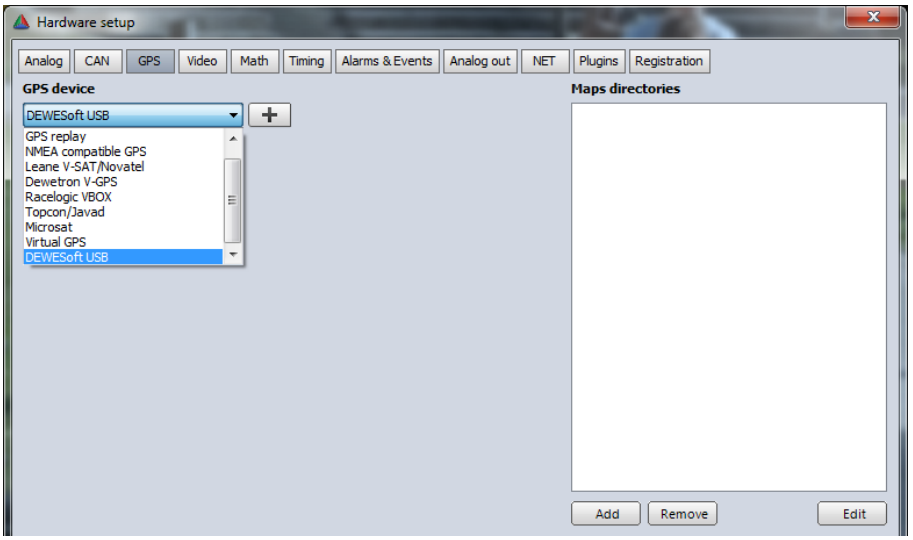
One of the unique features of the DEWE-VGPS-HSC is the possibility to synchronize also data acquisition systems using delta sigma ADC technology like DEWE-ORION-1624. The main challenge is to produce the up to 256 times over sample clock used for these types of analog to digital converters. For this purpose the DEWE-VGPS-HSC is equipped with a RJ45 connector for connection to the DEWETRON data acquisition system. A standard CAT5e or CAT6 Ethernet cable with up to 30 m can be used for connection.



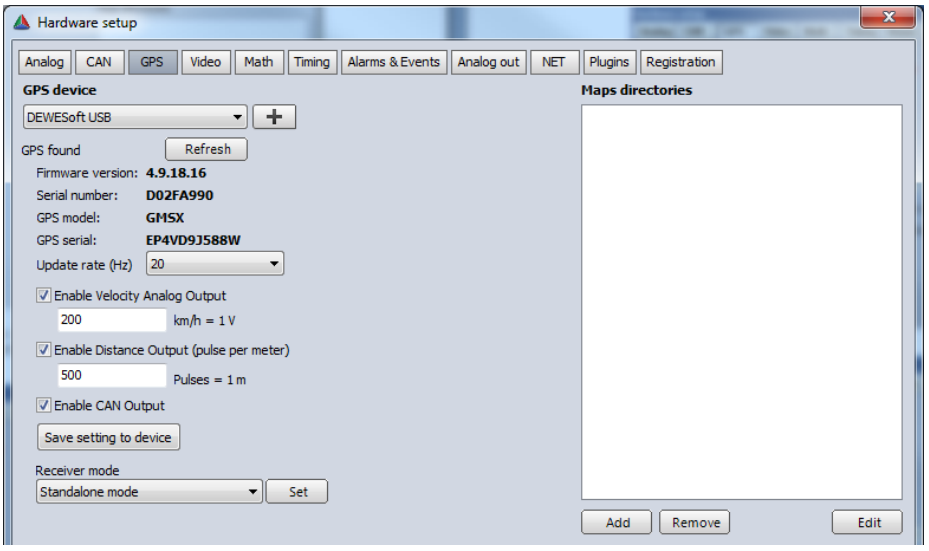
Please note: also the data acquisition has to be provided ORION-1624-SYNC option for having access to the synch bus of the board.

Configuration of DEWESoft for the DEWE-VGPS-HSC

To unlock the GPS functionality in DEWESoft the GPS has to be configured in the Hardware Setup screen (System → Hardware Setup → GPS):



Select V-GPS from the GPS device dropdown menu. DEWESoft will automatically try to find a GPS on Connected USB port.



GPS found

Automatic reconnect is done during measurement only. When changing USB ports click Refresh to reconnect in setup.

Firmware revision

Revision of firmware runiing inside connected VGPS-HSC unit

GPS model and Serial number

Model number and serial number of the connected GPS sensor. Serial number is recorded to reconstruct the measurement conditions.

Update rate (Hz)

This setting will define the sample rate of the serial data storage.

Velocity analog output

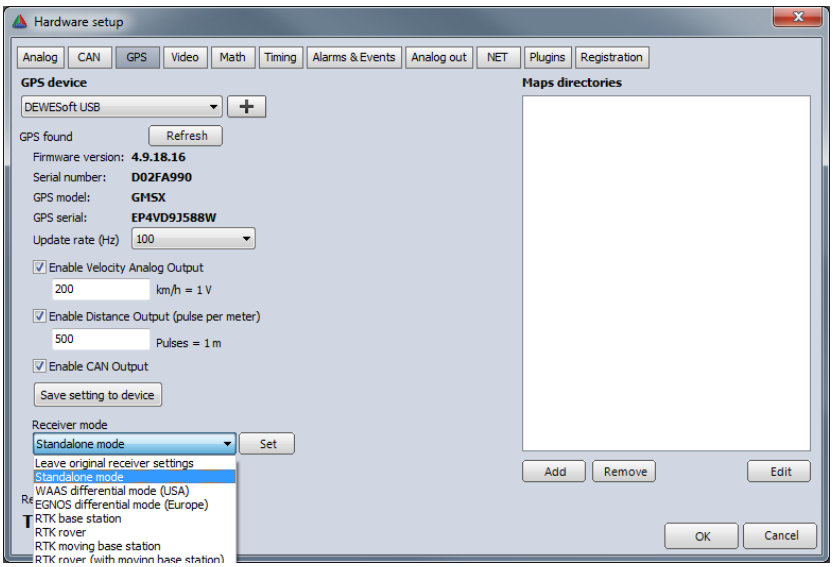
The maximum value of the analog output can be set with that input field. The valid range is between 50 and 500 km/h.

Distance output

Here you can define the number of pulses per meter of the digital distance output. Measuring the frequency of this output gives also a high accuracy speed output. For example if this output is set to 500 pulses per meter a frequency of 1 kHz equals 2 meters per second (or 7.2 km/h). Selectable ranges from 10 to 1000 pulses per meter.

Receiver mode

Select other modes for different types of measurement and at different locations to support differential GPS.



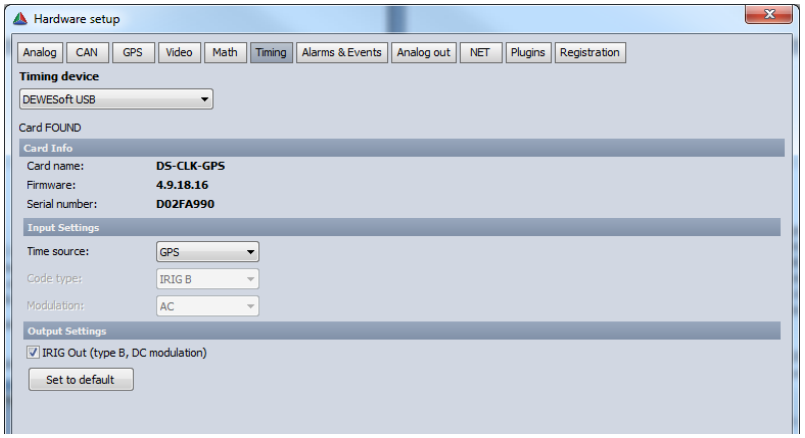
Timing settings

Hardware setup

In addition to a high precision speed sensor the DEWE-VGPS-HSC is also a high precision timing source for synchronized data acquisition. In this operation mode the DEWE-VGPS-HSC generates the clock for the data acquisition system. Beside of generating a clock from of up to 10 MHz for data acquisition systems a clock engine for synchronized acquisition using DEWE-ORION-1624 is included also.

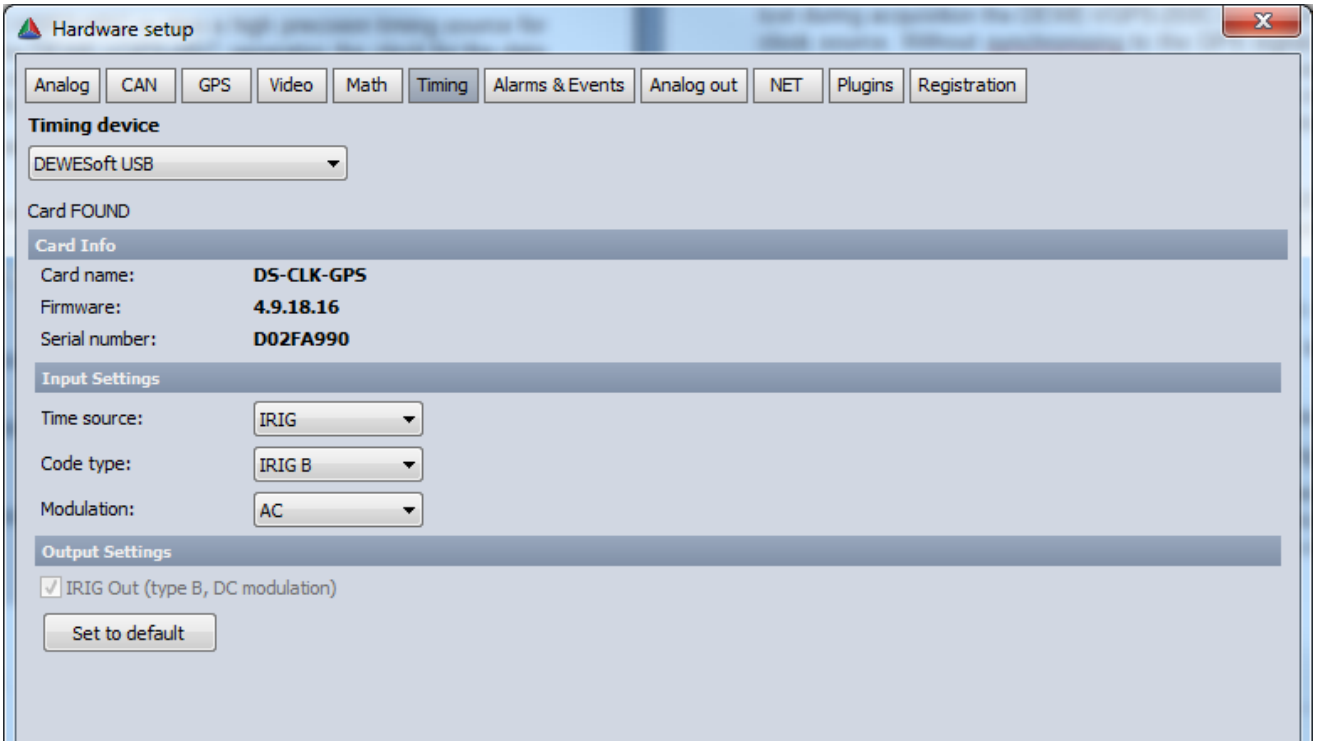
This operation mode needs to be enabled in the Hardware setup of DEWESoft: (System → Hardware Setup → Timing):

Select DEWESoft USB from the Timing device dropdown menu.



Time source

Unit can decode time from GPS or external IRIG signal (A, B, G, amplitude modulated and DC).



Correction limit

For synchronizing the internal oscillator with the PPS signal at least 4 satellites are required. If the GPS signal is lost during acquisition the DEWE-VGPS-HSC continues sourcing the data acquisition system with a precision clock source. Without synchronising to the GPS signal, the oscillator may drift. Therefore the absolute time synchronisation can not be guaranteed anymore. However, as soon the GPS signal is available again, the GPS-HSC recognizes a possible drift and tries to correct this inaccuracy. If the drift during the free-run time is higher than 100ms, a new data file is automatically generated with exact time stamping.

The graph below gives an idea how the DEWE-VGPS-HSC behaves when the GPS signal is lost during data acquisition. In this example the drift of the oscillator is smaller than the allowed correction limit.

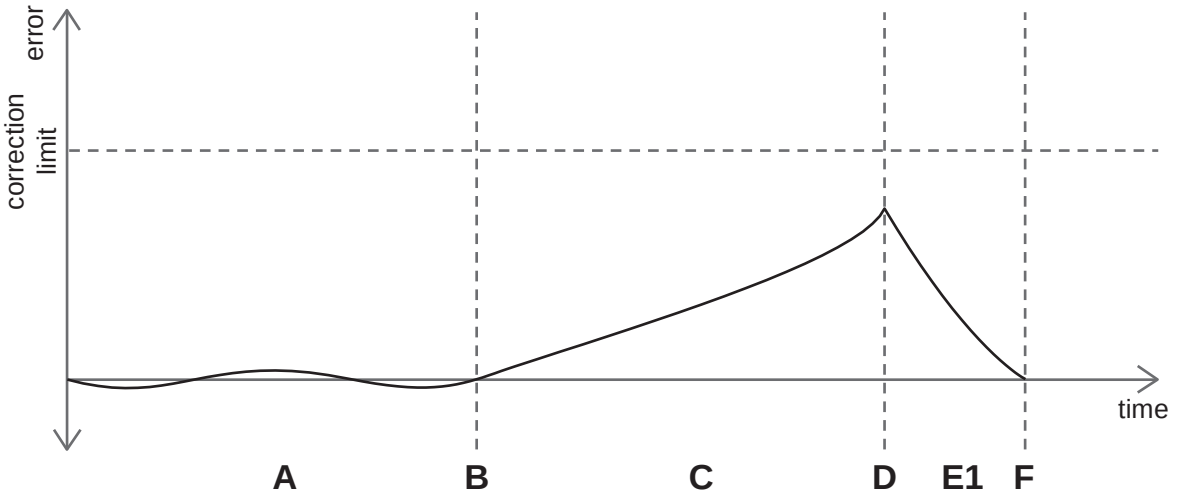
A) This state shows the normal operation. The internal clock is synchronized to the GPS once per second.

B) At this point the number of acquired satellites is lower than 4. The unit stops automatically locking for the GPS time.

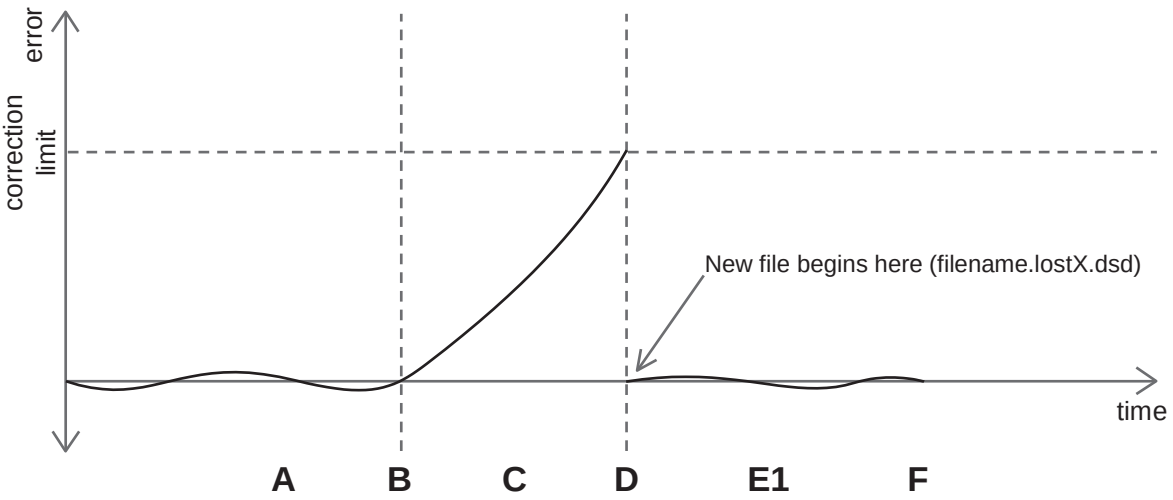
C) In the free-run operation the oscillator drift is obvious.

D) After receiving again the GPS signal the error during the free run cycle is calculated.

E1) Because the oscillator drift is smaller than the defined correction limit the DEWE-VGPS-HSC automatically corrects the drift for getting again time synchronized data. So the data acquisition is not interrupted although the GPS signal was lost. The correction is done with the maximum rate of 5 µs/sec.

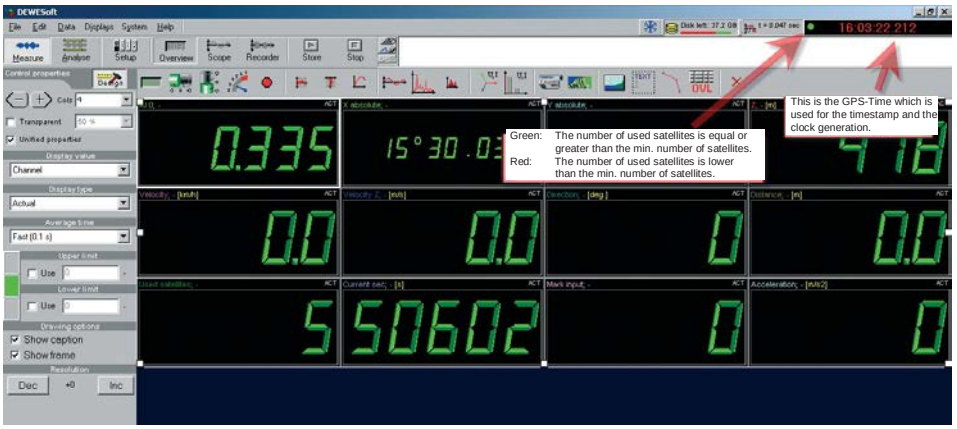


But if the interrupt is too long the oscillator drift may be higher than the defined correction limit. In this case automatically the existing data file is closed and a new file is generated with adding “Lost” of the current filename: “DataFilennameLostX” where X is a running number for each GPS signal lost.

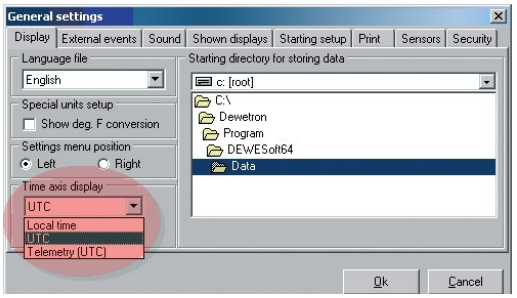


As soon the timing device is selected DEWESoft automatically sets the data acquisition hardware to external clocking for receiving the sample frequency out of the DEWE-VGPS-HSC. In addition to this each measurement starts synchronized with the PPS signal. The time information of the data file is taken out of the GPS-time and not anymore from the local PC time.

The actual time form the DEWE-VGPS-HSC is shown at the right top corner. In addition to this an indicator gives you the information if the clock generator is locked to the GPS data (green dot) or if it is operating in FREE-RUN mode (red dot).



As default the local time is stored inside the data file. But if the measurement results from multiple systems located in different time zones should be analyzed it is recommended toset to UTC or GPS time. Doing so, the data from all data acquisition systems are containing the sameabsolute time stamp.



Measurement setup

When you finished the hardware settings, click on the “Setup” button.

Channel Setup

The screenshot below shows the channel setup screen of the DEWE-VGPS-HSC. In the column *ON/OFF* you can select the channels for storing during the measurement. The default channel names are displayed in the column *NAME*. You can change them with a double click on it. Beside the channel names the actual value is displayed.

- X absolute: Longitude component of position in degrees, minutes and fraction of minutes
- Y absolute: Latitude component of position in degrees, minutes and fraction of minutes
- Z: Altitude in meters above sea level
- Velocity: Speed over ground (vector of all 3 dimensions)
- Velocity Z: Vertical component of the speed vector
- Direction: True track over ground
- Distance: Integration of speed for getting the displacement. Only speed levels above 0.5 km/h are used to calculate the distance
- Used sat.: Numbers of satellites used for calculation of position and speed
- Mark input: Indicates an event at the mark input by changing the level from 0 to 1

The circle at the left bottom corner gives an overview of the satellites in view of the GPS receiver and which of them are used from the receiver. The color of the shown satellites indicates the signal strength of them. From grey to dark green which is the strongest density. Satellites shown in the centre of the circle are directly above the GPS-aerial. Satellites shown at the border of the circle are near the horizon.

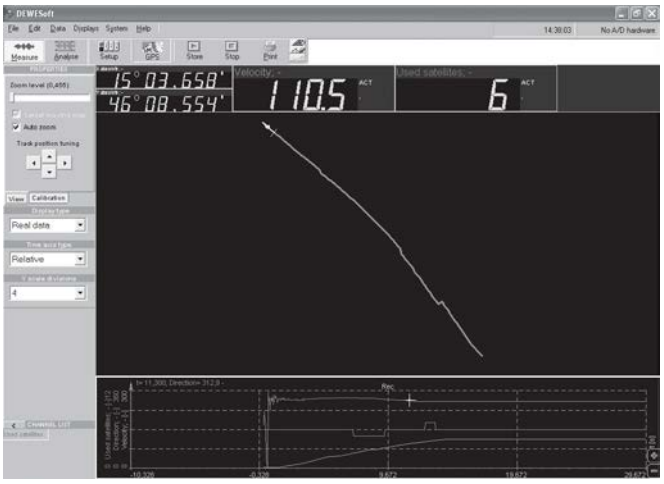
The field <PPS sync> and <Differential mode> change there color from grey to green depending if the appropriate feature is available at the moment (green means available).

The PPS synch is used for hardware synchronisation to analog channels. This will eliminate the time shift caused due the calculation time of the GPS receiver.

Measurement

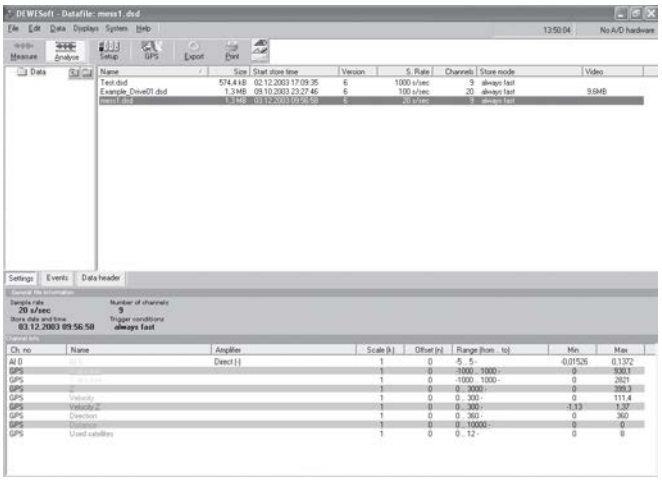
Now you are ready for measurement. Clicking the “GPS“ button opens the measurement screen.

With the “Store“ and “Stop“ button you can control the measurement manually.



Analyze

After measurement you can analyze and protocol the stored data. One click on the “Analyze“ button gives you the possibility to choose a recorded data file and analyze it.

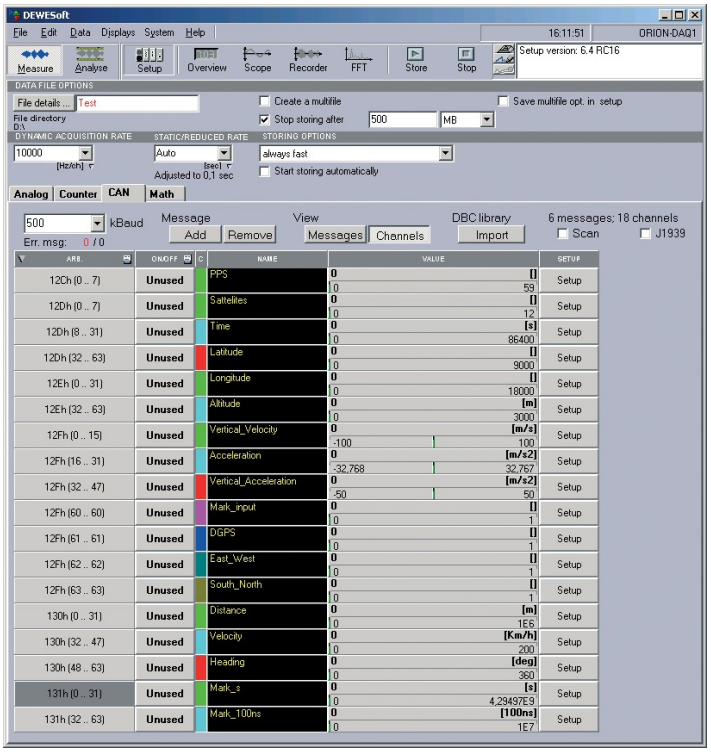


Use the cursor functions to zoom in, cut out, measure, and print out. With the “Export“ function you can export data to other applications, like Excel, Word etc.

Find details about DEWESoft in the *DEWESoft Software Users Manual*.

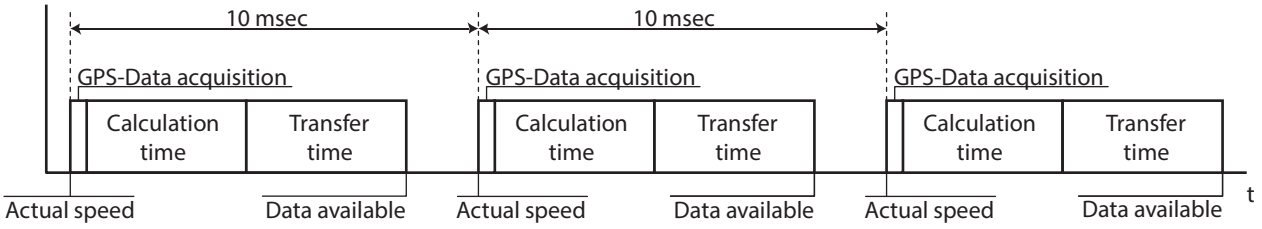
CAN BUS

Beside the USB interface the DEWE-VGPS-HSC can be also operated with a CAN high speed interface with 500 kBaud. A required DBC-file is available for automatic settings of the data acquisition system.



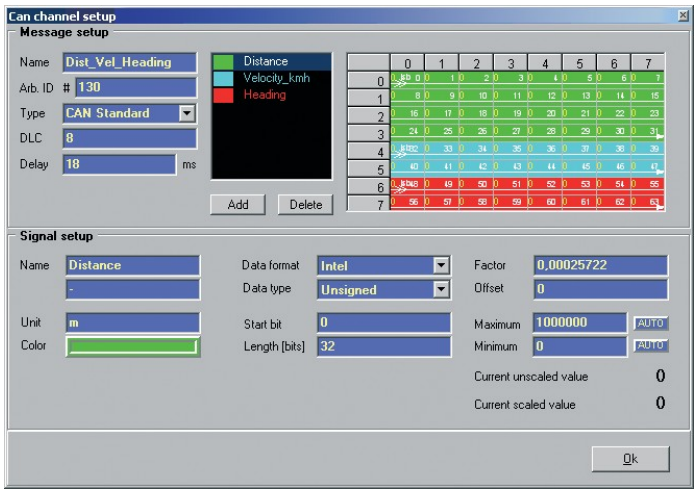
The update rate of the GPS signals is 100 times per second on the CAN bus. In addition to the standard GPS channels the PPS channel is available also. This message is generated once per second, almost latency free and can be used for defining the latency time on the CAN bus for all other GPS channels.

The latency time on the CAN channels is related to the basic structure to any GPS-based sensors. After acquiring the GPS raw data the time consuming calculation to get finally the position and speed and the data transfer time will delay the data from the DEWE-VGPS-HSC.



By comparing the CAN channel “one_pps” to all other GPS-channels on the CAN bus the latency mainly caused by calculation and data transfer time can be completely eliminated. In opposite to the general opinion the update rate does not cause the main error at the speed sensors – the main error is caused by the latency time. Therefore it is important to take care about the latency time.

The picture below shows you how to eliminate the latency time already during the data acquisition. Inside the CAN at each CAN identifier the latency can be defined for automatic correction. The typical delay on the CAN interface is around 18 ms.



Please note this delay time is not defined in the CAN-DBC file. Defining a latency time on CAN channels is a special feature of DEWESoft and not supported at the standard DBC interface!

The following list gives an idea about the available CAN channels. The standard base identifier is 0x12C (= 300 decimal).

Identifier name *PPS* (base +0: 0x12C):

1) Channel name *PPS*:
   PPS and current second. This message is sent right after PPS pulse without significant delay from GPS and it can be used for software synchronization.

Identifier name *Sats_Time_Latit* (base +1: 0x12D):

This message is sent after decoding data from GPS engine – independent of the used number of satellites.

2) Channel name *Satellites*:
   The number of satellites currently used for acquisition.

3) Channel name *Time*:
   This is a count of 10 ms intervals since midnight UTC with a resolution of 10 ms.
   (5383690 = 53836.90 seconds since midnight or 14 hours, 57 minutes and 16.90 seconds)

4) Channel name *Latitude*:
   Position in degrees and minutes (DDMM.MMMMM) with a resolution of 10 micro minutes. 515924579 = 51 Degrees, 59.24579 Minutes

   Bit 7 in the channel status of identifier VertVel_Accel_VertAccel_Status indicates northern or southern hemisphere.

Identifier name *Sats_Time_Latit* (base +2: 0x12E):

This message is sent after decoding data from GPS engine – independent of the used number of satellites.

5) Channel name *Longitude*:
   Position in degrees and minutes (DDMM.MMMMM) with a resolution of 10 micro minutes.
   5882246 = 0 Degrees, 58.82246 Minutes

   Bit 6 in the channel status of identifier VertVel_Accel_VertAccel_Status indicates eastern or western

hemisphere.

6) Channel name *Altitude*:
Indicates the height in meters relative to WGS 84 with a resolution of 10 cm

Identifier name *Vel_Status* (base +3: 0x12F):

This message is only sent if the number of used satellites is equal or higher than the minimum number of satellites set in the hardware setup of DEWESoft.

7) Channel name *Velocity*:
The velocity is given in Km/h with a resolution of 1 decimal point.

8) Channel name *DGPS*:
Is set to “1” if the GPS receiver is in differential mode. Indicates the state of the mark input connector. It is set to “1” if this input is active.

9) Channel name *East_West*:
Is set to “1” if located in the east hemisphere of globe.

10) Channel name *South_North*:
Is set to “1” if located in the south hemisphere of globe.

Identifier name *Dist_ Heading* (base +4: 0x130):

11) Channel name *Distance*:
This channel indicates the distance in meters with a resolution of 0.25 mm since unit is powered on. The distance is not updated if the velocitiy is below the threshold level. If the number of received satellites is lower than the limit the distance increase rapidly like with a speed of 500 km/h. Please refer also to the hardware setup.

12) Channel name *Heading*:
The direction (true track over ground) is measured with a resolution of 0.01°.

Notes

CERTIFICATE OF CONFORMITY

VGPS-HSC Data acquisition system

This certifies that the enclosed VGPS-HS**-C** Data acquisition system was manufactured by

DEWESOFT d.o.o

at its facilities located at

Gabrsko 11a, 1420 Trbovlje, SLOVENIA

This instrument was produced under rigorous factory production control and standard procedures. It was individually tested and calibrated for measuring performance and functionality.

The product complies with the essential requirements of the following directivities for:

- electromagnetic compatibility (EMC):

  - EN 61000-6-3:2007
  - EN 61000-3-2:2006
  - EN 61000-3-3:1995+A1:20010+A2:2005
  - EN 61000-4-3:2006
  - EN 610004-6:2007

Trbovlje: 17.9.2013 Andrej Orožen