Content

Notes

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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.

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The telephone hotline is available
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08:00 and 17:00 CET (GMT +1:00)

For the Americas, please contact:

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The telephone hotline is available
Monday to Friday between
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DEWETRON GesmbH
Parkring 4
A-8074 Graz-Grambach / Austria

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.

Notes

GPS based system for speed and displacement measurement

Operation modes:

- RS-232 to PC operation
- Stand alone operation via analog / digital output

Features:

- Lowest available latency time at the speed and distance output
- 200 Hz update rate for the speed and distance output
- Online signal quality monitoring for using without serial interface
- Complete elimination of latency time using DEWESoft and PPS synch
- Easy-to-install, Easy-to-use
- Portable and rugged construction
- No calibration required
- Insensitivity to road surface (can be used on mud off-road, water, snow, ice, ...)
- Programmable Analog speed and digital displacement output
- Additional display to show results
- Supports differential GPS (SBAS) as standard function

* programmable values (25 mV/km/h and 500 pulses/m are standard settings)

System specifications

VGPS-200	GPS based system for speed and displacement measurement		
Measurement specifications			
Speed		Displacement	
Accuracy	0.1 km/h(1)	Accuracy	< 20 cm/km(1)
Refresh rate	200 Hz	Refresh rate	200 Hz
Min to Max	0.5 km/h to 500 km/h	Digital output	500 pls/m(3) (TTL level)
Resolution	0.01 km/h	Latency time	12 msec
Analog output	25 mV/km/h(3) (0 to 5 V)	Absolute position	
Latency time	12 msec	Accuracy	< 40 cm CEP(2)
		Refresh rate	20 Hz
		Resolution	< 10 cm
(1) Performance depends on the number of available satellites *(2) 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* *(2) Circular Error Probable* *(3) Free programmable*			
System specifications			
Input	TNC connector for GPS antenna, event mark input		
Output	Analog, displacement, RS232, VGPS display		
Power Supply	9 to 36 V_{DC}, 3 W		
Enclosure			
Dimensions	200 x 94 x 59 mm (7.9 x 3.7 x 2.3 in.)	Display: 128 x 61 x 26 mm (5 x 2.4 x 1 in.)	
Weight	900 g (2 lbs)	Display: 252 g (0.6 lbs)	

Hardware

General Description

The main VGPS unit contains a powerful GPS engine that measures the position and velocity of the vehicle 20 times a second. Coupled to this GPS engine is a control board which contains the signal conditioning. The result of the combination of 200 Hz GPS data acquisition and high calculation performance is a GPS based sensor with the lowest latency time of around 12 msec. The VGPS can be powered from 9 to 35 V_{DC}. The current consumption of the VGPS is around 3 Watt.

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 don't have 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 is better when it finds as many as possible. If a satellite disappears over the horizon, or behind an object, there are other satellites still in view.

Aerial with magnetical mounting plate

Warm-up time

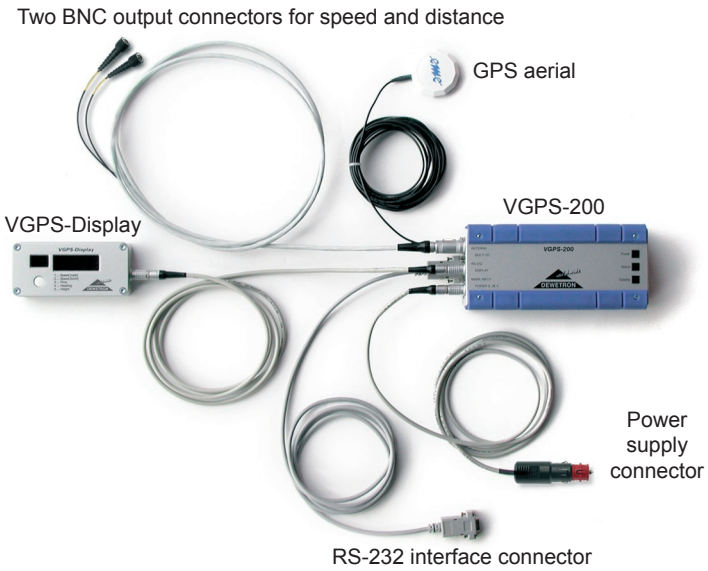
When the VGPS is used for the first time, or has been moved more than 200 km (or not used for 10 hours), since it was last used, it is best to perform a 'cold start'. To get the best performance from your VGPS in the future, perform this cold start in an open place with a good all round view of the sky. 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 to 1 minute. If you are going to test in a shady environment with tall objects or in close proximity to trees, the VGPS allows to settle in an open space for 5 to 10 minutes beforehand.

Function of the LEDs

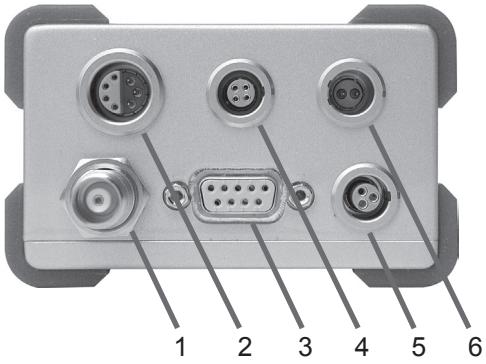
There are three LED's on the top of the VGPS, two green and a red one. The first green LED indicates power, the second green and the red LED are GPS state LED's. When the red LED is flashing alone, the GPS is not locked onto any satellite. The green LED flashes out the number of satellites it is tracking and then the red LED flashes once. A short flash means it has locked onto the satellite, but is not yet being used in the calculation of position. A long flash means the satellite is fully locked in and being used by the GPS.

Scope of supply

- VGPS-200 sensor
- VGPS display with cable
- GPS aerial with cable
- Power supply cable
  with cigarette lighter connector
- RS-232 interface cable
- Output cable with two BNC connectors



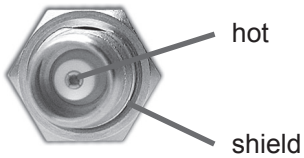
Connection



Connector overview:
1 Aerial
2 Multi I/O
3 RS-232 interface to PC
4 VGPS-Display
5 Mark input
6 DC power supply connector

Aerial connector

Connect the GPS aerial to the TNC connector.

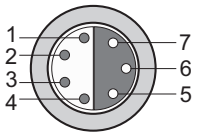


TNC connector

Multi I/O connector

Data-connector for communication with the DEWE-xxxx system.
A cable for analog and pulse signal output to BNC is available as an option.

7-pin Lemo connector (4 female, 3 male) ERA.2S.307.CLL

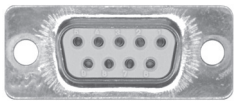


Schematic

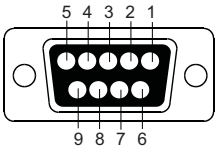
Pin assignment
1 Analog signal (+)
2 GND analog signal
3 Pulse signal (+)
4 GND pulse signal
5 +9 to 36 V_{DC} power supply
6 GND power supply
7 Not connected

RS-232 interface connector

The RS-232 interface connector (female) is configured as standard RS-232 interface.



9-pin SUB-D connector (female)



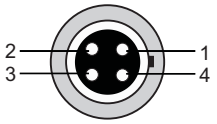
Schematic

Pin assignment
1: Not connected
2: RXD (Received Data)
3: TXD (Transmitted Data)
4: Not connected
5: GND (Ground)
6: PPS (pulse per second)*
7: Not connected
8: Not connected
9: Not connected
* with RS-232 level, Rev. 1.0 not connected

VGPS-Display connector

To connect the external display to the VGPS-200 system.

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



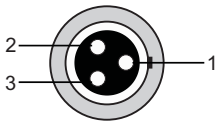
Schematic

Pin assignment
1 +5 V_{DC}
2 GND
3 TXD
4 Not connected

Mark input connector

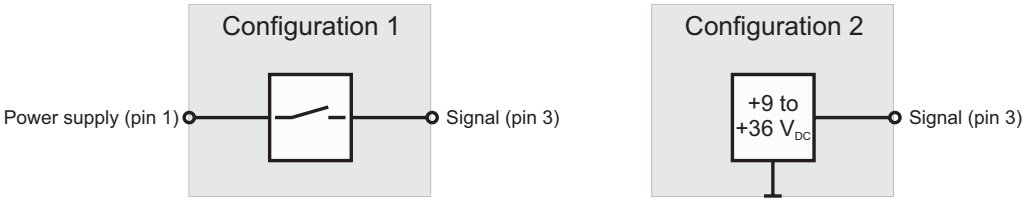
Connects an external trigger source to the VGPS-200 system.

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



Schematic

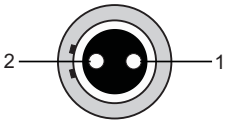
Pin assignment
1 +9 to 36 V_{DC} power supply
2 GND power supply
3 Signal



Power supply connector

Connects the VGPS-200 system to an external DC power supply.

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

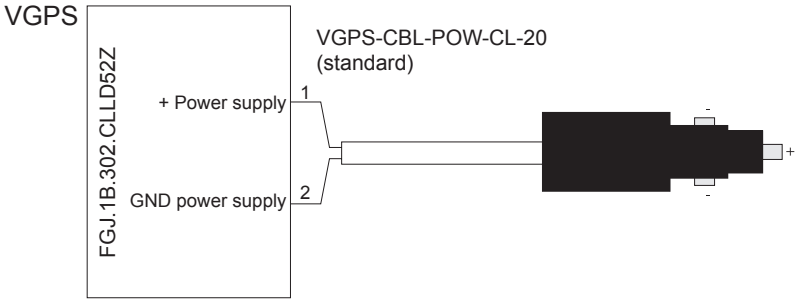


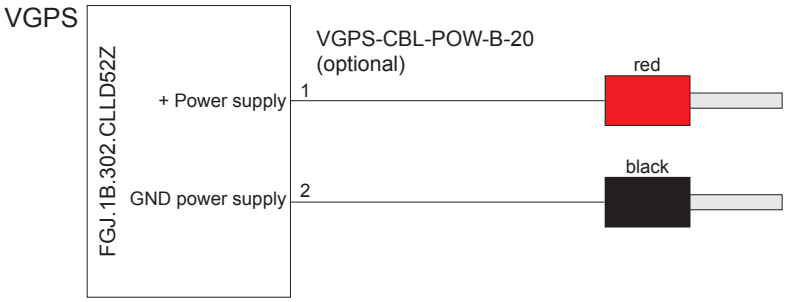
Schematic

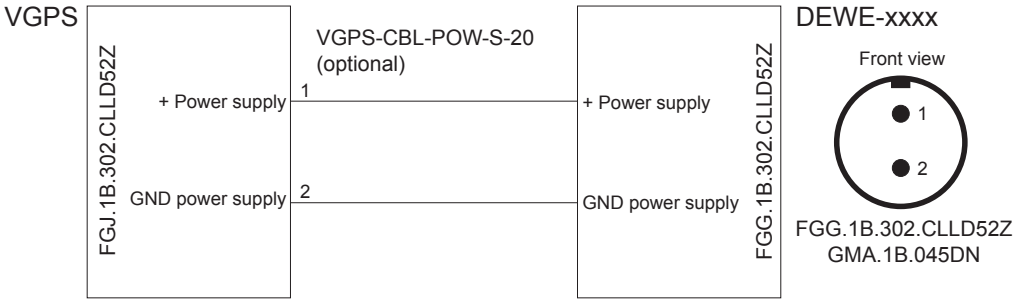
Pin assignment
1 +9 to 36 V_{DC} power supply
2 GND power supply

Cable for external power supply

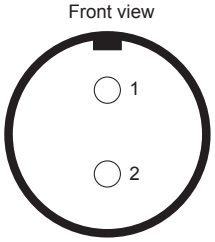
Type of cable: LIYY 2x0.75, length: 2 m







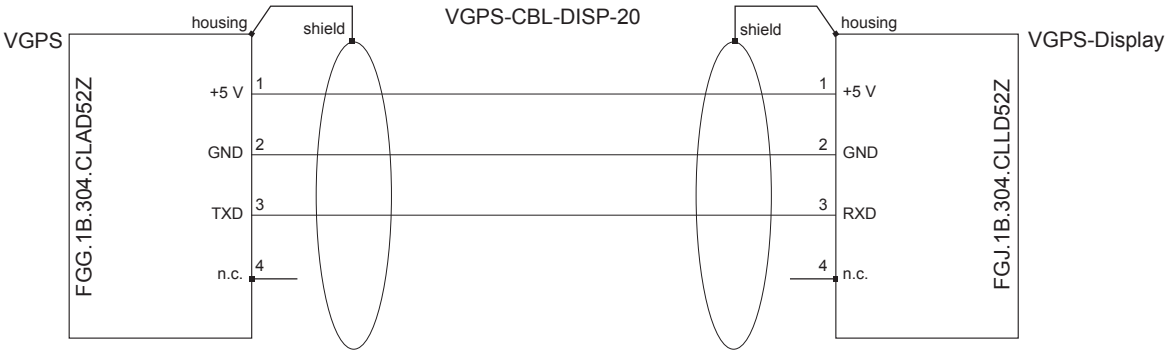
FGG.1B.302.CLLD52Z
GMA.1B.045DN



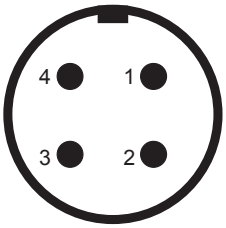
FGJ.1B.302.CLLD52Z
GMA.1B.045DN

Cable for connecting VGPS to VGPS-Display

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

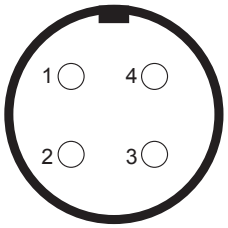


Front view



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

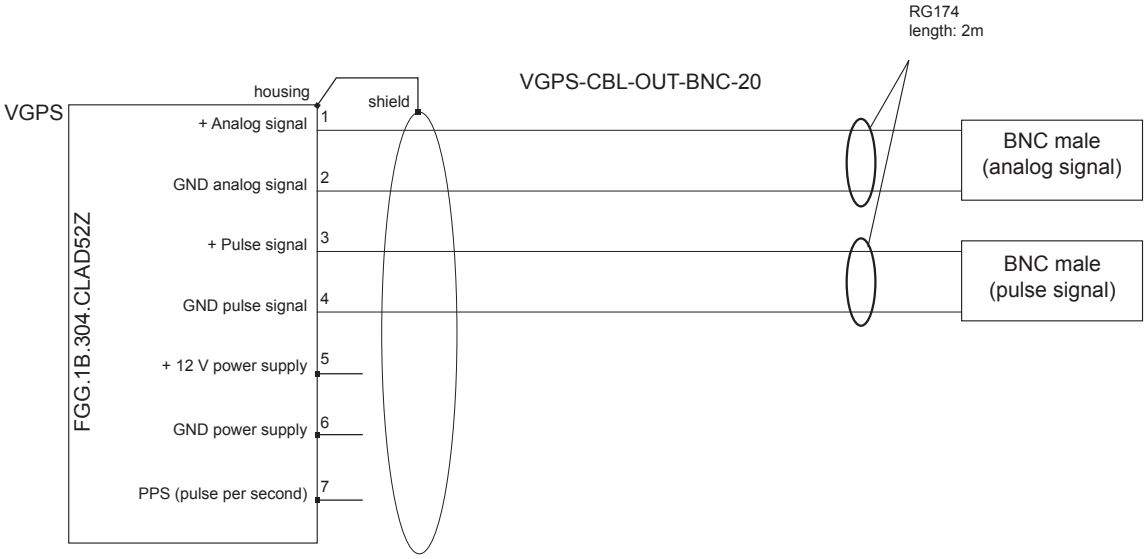
Front view

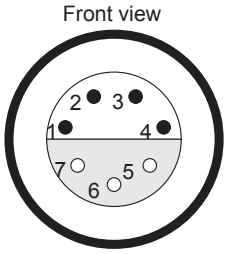


FGJ.1B.304.CLLD52Z
GMA.1B.045DN

Data-cable for using VGPS without DEWE-xxxx system

Type of cable: RG174, length: 2 m

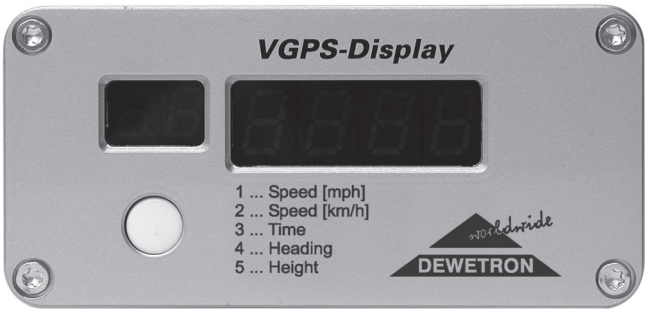




FFP.2S.307.CLAC72Z
GMA.2B.060.DN

Digital display operation

The LED display is used to monitor various GPS parameters.

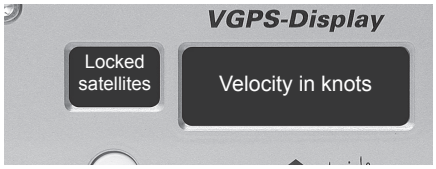


Display description:

Blinking middle dashes on all digits - the display is unable to communicate with the VGPS.

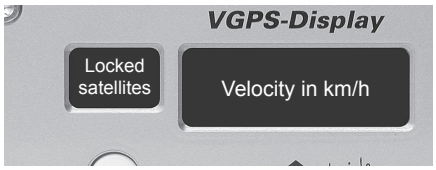
Pressing and releasing the push-button on the front of the VGPS-Display switches the display to different modi. After pressing the push-button, the left display shows the actual display mode for a short time. First shown display mode is 01. The 01 disapears and the number of locked satellites is displayed at the left side. The right display shows the velocity in knots.

Mode 01:



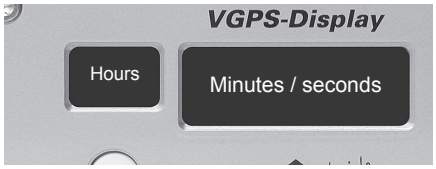
Number of satellites and velocity in knots. Some versions displays the speed in miles per hour. Refer to the information, printed below the display.

Mode 02:



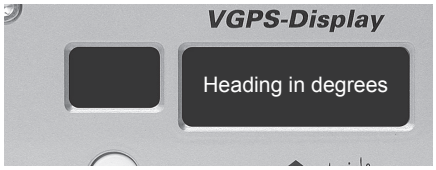
Number of satellites and velocity in kilometers per hour

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 of the vehicle relative to true North.
Resolution: 0.1 degree

Mode 05:

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 VGPS-200. The VGPS-200 will recognize the exact time of the switching point. A serial command with this time information will be transmitted to the data acquisition unit. DEWESoft displays this event as an separate channel. This channel can be used during the post processing to calculate the brake distance.

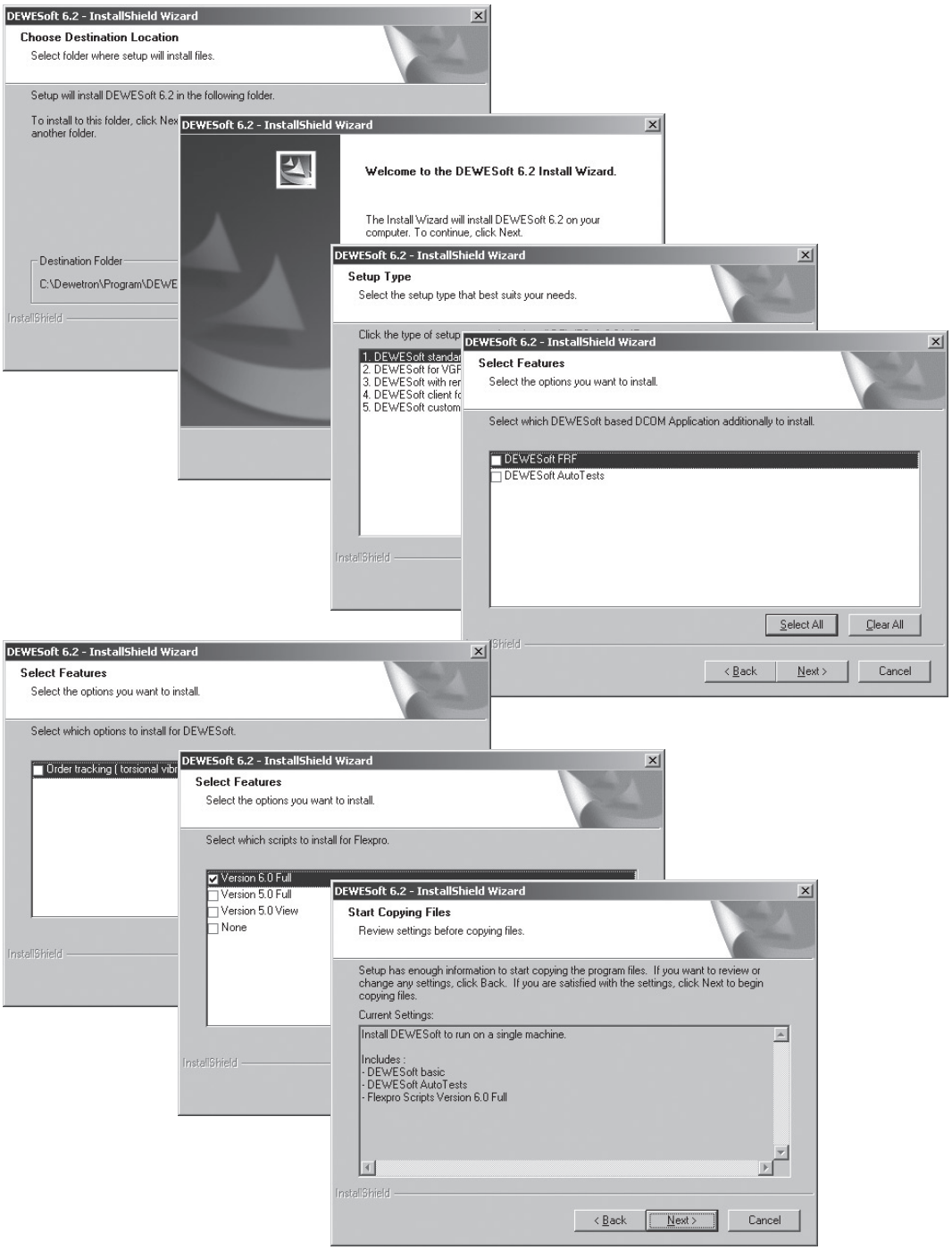
Brake trigger switch

Software

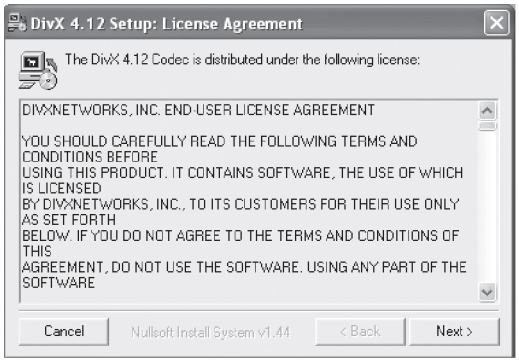
Installation

Start the installation software on the CD, shipped with the system.

Follow the instructions of the install program.

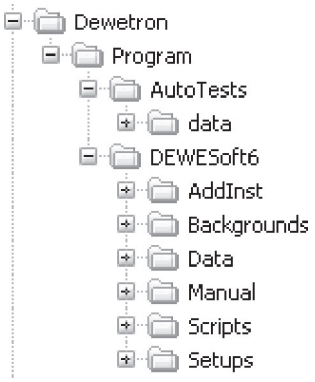


Optionally you can install the DivX codec to compress video data.



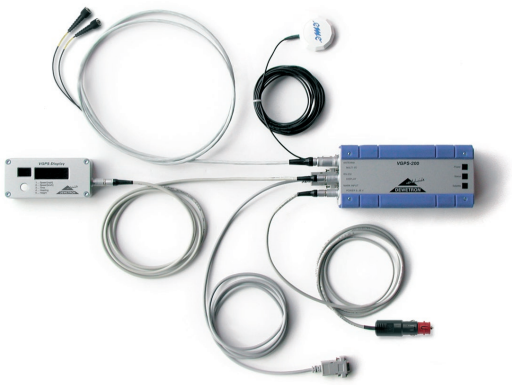
The installer creates two icons on your desktop. “Auto Tests“ for standard measurements and “DEWESoft6“ for data acquisition.

The software also creates some directories on your hard disk (C:\Dewetron\Program\...).



The standard communication port to connect the VGPS sensor is COM1. If you want to operate the VGPS sensor on another port, change the communication port in the setup function of the software.

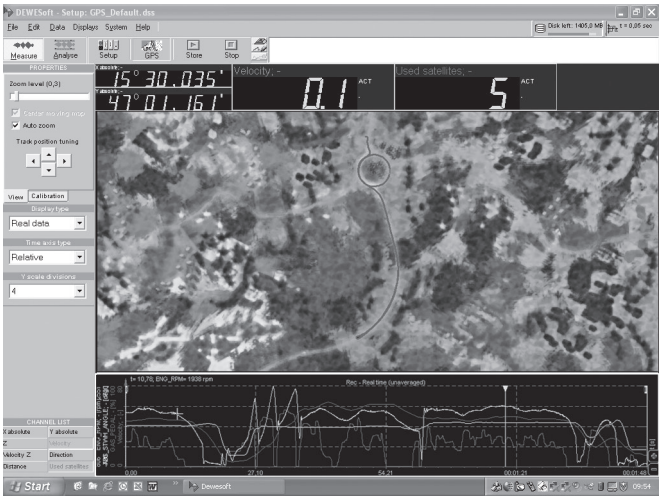
Connect the VGPS sensor with the RS-232 cable to the selected communication port on your computer. Connect also the power supply, the aerial and, if required, the external VGPS-Display to the VGPS sensor. Satellite lock will take about one minute after power up (initialization time).



Using DEWESoft

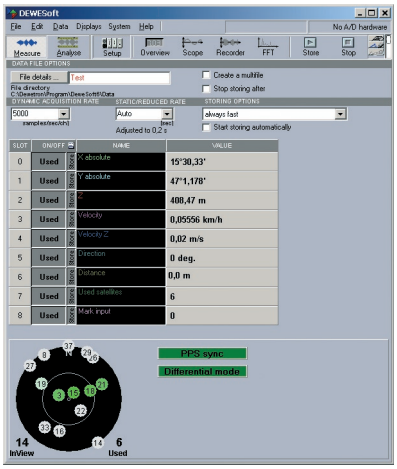
Click on the icon on your desktop to start DEWESoft. Read the DEWESoft manual (on the System-CD) for further information.

If the sensor is installed correct, you should get this start screen with actual data of the VGPS sensor.



Channel Setup

The screenshot below shows the channel setup screen of the VGPS-200. 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 the an event at the mark input by changing the level from 0 to 1

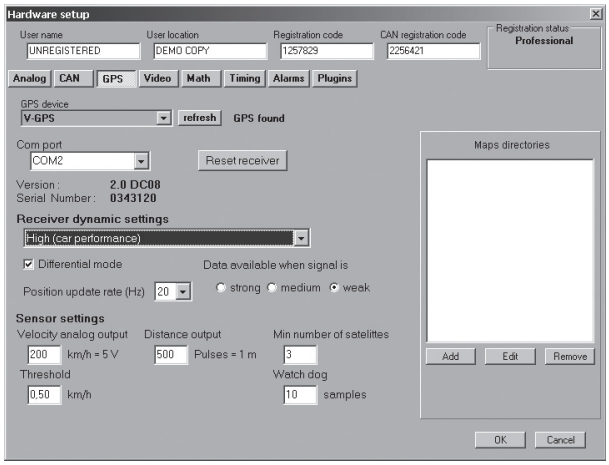
The circle at the left bottom corner gives an overview of the satellites in view of the GPS receiver and which of them are used from the receiver. The color of the shown satellites indicates the signal strength of them. From grey to dark green which is the strongest density. Satellites shown in the centre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

The field <PPS synch> 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 and of the data transfer time of the RS-232 port.

Hardware setup

To modify the VGPS settings, select the menu item “System” followed by the “Hardware setup” item in the menu bar. Make your settings and finalize with the “OK“ button.



GPS-device:

Support for different GPS systems. Select the VGPS device.

Com port:

Communication port selection Com 1 (standard setting) to Com 8.

Version:

Hardware version of the VGPS system.

Serial number:

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

Receiver dynamic settings:

Depending on the application, the VGPS-200 offers the possibility to set it into three different settings. You can change them in the pull down menu *Receiver dynamic settings*.

Highest (car performance for analog out): This setting should be used if the low latency time of 12 msec at the analog and speed output is needed.

High (car performance): Because of the PPS-synch facility of the VGPS-200, this setting will not increase the latency time and the dynamic behavior using the serial interface for data acquisition. The delay time at the analog and displacement output may be up to 22 msec.

Normal (data logging): For highest accuracy and lowest noise of the position and velocity signal this mode is useful.

Receiver setup:

The “Reset receiver” button will reset the internal used receiver. This function has no influence on all the settings below.

Update rate (Hz):

This setting will define the sample rate of the serial data storing. This command will not influence the update rate of the analog and digital output.

Differential mode:

The VGPS allows differential operation also in the standard configuration. There are in principal three varying types of differential mode supported:

- SBAS
- Beacon
- Local Base Station

The SBAS differential mode is supported within the standard shipment. By simple enabling the differential mode the SBAS is selected. The SBAS is based on additional satellites which send correction values for getting higher accuracy of the absolute position. Depending on the location the SBAS mode is automatically selected: WAAS in Northern America, EGNOS in Europe and MSAS in Japan.

For the Beacon differential operation a different aerial is required. The Beacon is based on additional signal sent in the middle wave frequency. For information about the availability of Beacon signals please refer to: http://www.iala-aism.org/web/pages/publications/cadrepubli.html

The most accurate operation is the differential mode using a additional Local Base Station. For that operation two VGPS systems are needed: One VGPS system is fixed mounted (at a Local Base Station) the second is for mobile operation. The fixed VGPS sends the correction data (for example via GSM-modem) to the mobile VGPS.

Because of the analog speed and the digital distance output is not calculated based on the absolute position the accuracy of them will not increase significant by using the differential mode.

Data available:

Of coarse the number of satellites which are received is an indicator of the accuracy of any GPS based sensor. But not only the satellite count is the condition for the quality of the received signal. Also the arrangement or the geometry of the satellites are important to get high reliable GPS data. The VGPS sensor can automatically calculate the reliability of the received GPS signals. Based on that calculation the VGPS disables automatically the data transfer. This is especially a feature using the VGPS as a stand alone speed sensor where only the analog speed and the digital distance output is used. Please refer also to the **Watch dog** description.

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.

Threshold:

Defines the minimum speed for the output. All values below the specified values are automatically set to 0 km/h. This will eliminate the output noise at fixed position of the sensor. The input range can be set between 0.00 and 10.00 km/h. This function is available at rev. 1.1 or higher.

Min. number of satellites:

When the number of satellites is less than specified input, the analog output will be set to the maximum output. The digital output is set to the same corresponding frequency. For example if the analog output is set to 200 km/h and the digital output is set to 500 pulses per meter the output frequency can be calculated as follows:

$$f_{out}[kHz) = \frac{analog\ outputrange * pulses\ per\ meter}{3600} = \frac{200 * 500}{3600} = 27.77$$

This setting is very important if the sensor is only used for speed measurement without serial data connection to guarantee the quality of the analog and digital output.

Please note that the VGPS will not work properly just receiving 3 satellites. So the setting make only sense at 4 or higher. The maximum satellites which can be received are 12. Function can be disabled by setting 0. This function is available at Rev. 1.1 or higher.

Watch dog:

If the sensor lost the satellites, the VGPS stops automatically sending data. In this case also the digital and analog output will not be updated. Only the last valid value is shown at these outputs. To prevent this condition or to be sure that the analog and digital output always are correct you have to activate the watch dog function of the sensor. For example if you set the watch to 1, the analog and digital output goes immediately to there limits (please refer to **min. number of satellites)** after one missing update from the receiver.

This function can also be combined with the **data available** setting. As soon as the received signal is not within the specified reliability, the VGPS will stop sending the measured data. If the watch dog is enabled, the analog and the digital output were set to their limits. This function is available at Rev. 1.1 or higher.

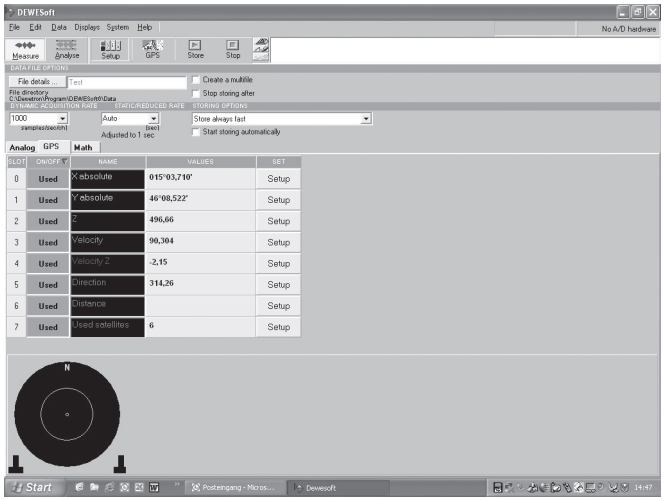
Maps directories:

Select the directories, where you stored your maps. The standard setting is C:\Dewetron\Program\DEWESoft6\Maps. You can copy your maps into this directory, add individual directories or remove unused directories from the box. Convert the maps to jpg or bmp format before selecting them.

Measurement setup

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

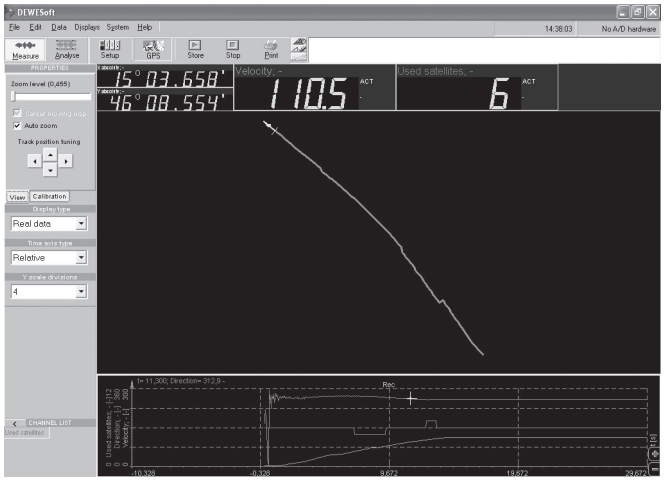
You can choose the required acquisition channels, sample rate, trigger- and storing options.



Measurement

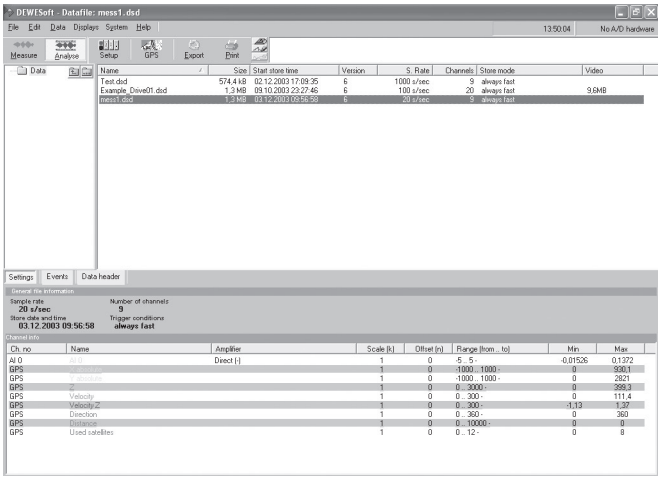
Now you are ready for measurement. Clicking the “GPS“ button opens the measurement screen.

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.



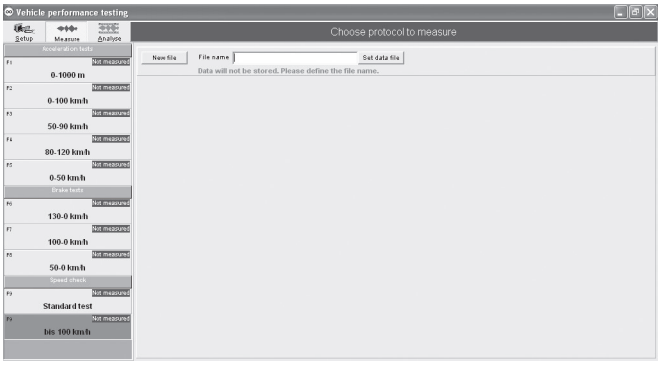
Use the cursor functions to zoom in, cut out, measure, and print out. With the “Export“ function you can export data to other applications, like Excel, Word etc.

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

Using Autotests software

Click on the icon on your desktop to start Autotests software.

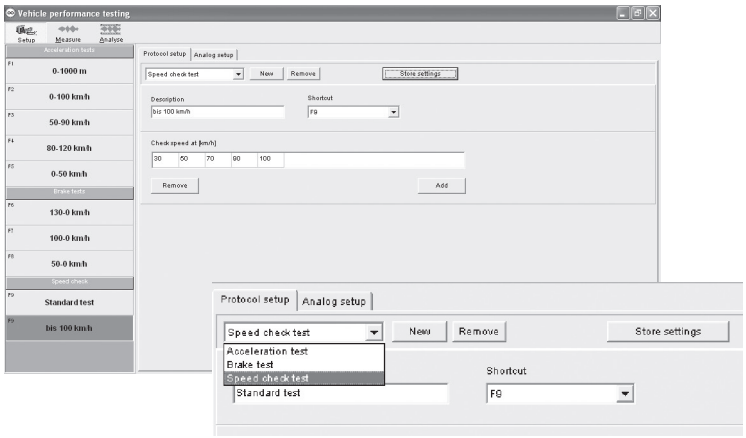
You should get this start screen.



Hardware and measurement settings

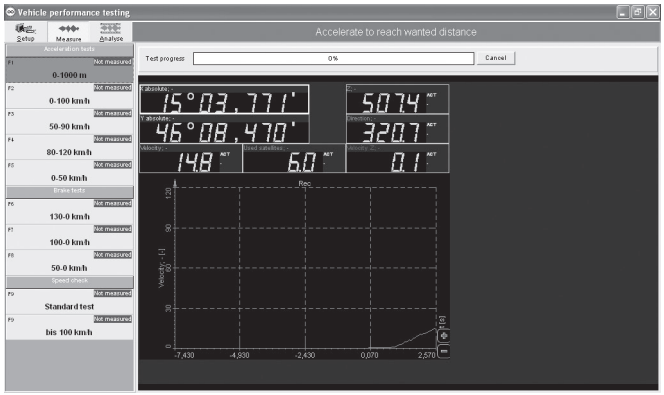
To modify the settings, select the menu item “Setup”.

Find the settings for test-measurements in the “Protocol setup“ area. The “Analog setup“ area is for VGPS sensor configuration, like the “hardware setup“ in DEWESoft.

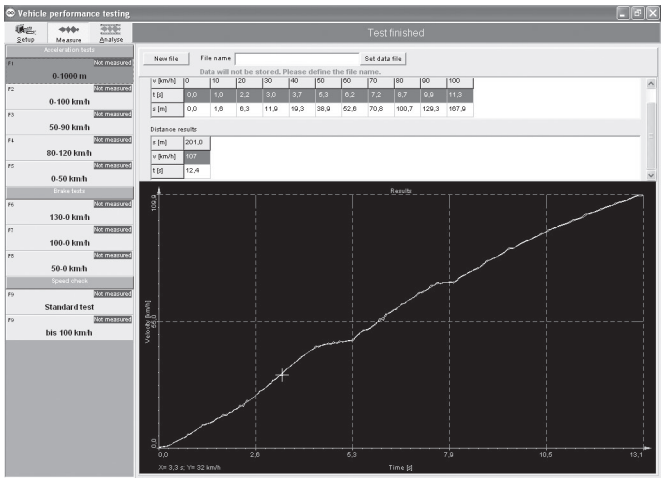


After configuration of the test procedures and the hardware settings you can start measurement.

Start the tests of the predefined measurement series with the button “Measure“. The measurement happens automatically. That means, if you program a acceleration test up to 1000 m, the VGPS sensor waits until the vehicle is moving and measures the first driven 1000 m. The acceleration parameters will be calculated automatically after the test-drive.

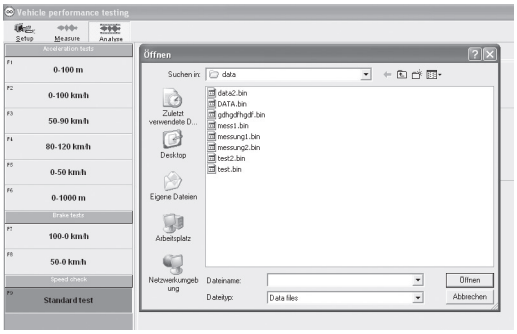


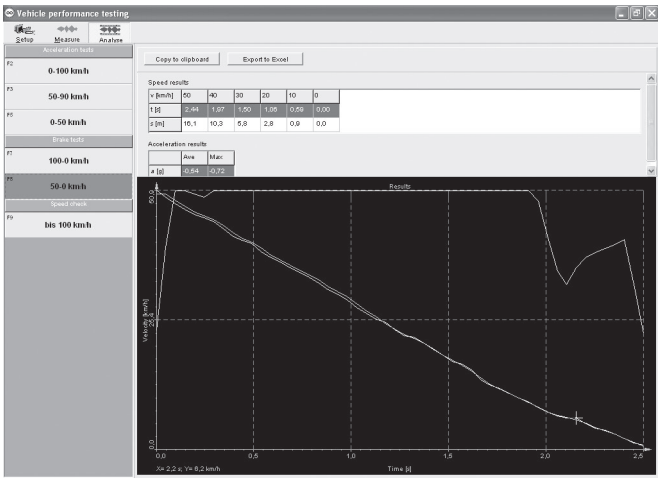
Continue with the other test series in this way. The last measurement stays in the memory. So you can retry the measurement if there are any errors. If you are ready with your measurement series, enter the file name and store your results with the “Set data file“ button.



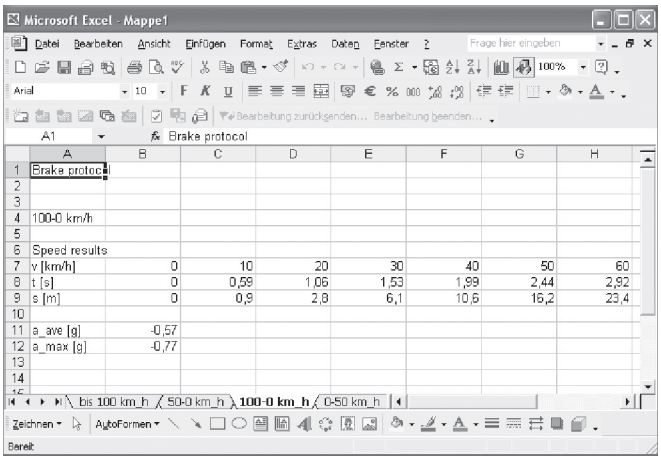
Analyze

Stored measurement series can be opened and analyzed with the “Analyze“ function.





Use the functions “Copy“ and “Export“ to process the data in other applications.



Serial RS-232 communication

General settings:

Communication with VGPS over RS-232 straight cable runs at 57.600bps,8,N,1.

Data Output

POS Message Format

The standard data output format of the VGPS is the POS message format. For getting the data with the POS message format you have to send only one command. After that the VGPS will send continuously data to the data acquisition system. One additional command stops the VGPS sending the POS message.

Enabling POS message:
$PASHS,NME,POS,A,ON<CR><LF>
Response: $PASHR,ACK*3D

Description of POS command:
$PASHR,POS,d1,d2,m1,m2,c1,m3,c2,f1,f2,f3,f4,f5,f6,f7,f8,f9,s1*hh

d1 Indicates whether the position solution has been computed autonomously or with the aid of RTCM differential corrections:
- 0: Autonomous position
- 1: Corrected position

Range: 0, 1

d2 Indicates the number of satellites used in computing positions
Range: 0 to 12

m1 Current time (UTC)
Range: 00 to 235959.50

m2 Current latitude measured in degrees, minutes, and decimal minutes (ddmm.mmmmm)
Range: 0° to 90°

c1 Latitude sector
Range: N or S

m3 Current longitude measured in degrees, minutes, and decimal minutes (dddmm.mmmmm)
Range: 0° to 180°

c2 Longitude sector
Range: E or W

f1 Current altitude (±aaaaa.aa) ellipsoid height in meters. In 2-D positioning mode, this field contains the fixed altitude value
Range: -3000.00 to +3000.00

f2 Site ID
Range: ????

f3 Course over the ground (ttt.tt); referenced to true north
Range: 0.00°-359.99°

f4 Speed over the ground (knots)
Range: 000.00 to 999.99

f5 Vertical velocity (meters per second)
Range: -999.9 to +999.9

f6 Current computed PDOP value
Range: 0.00 to 99.9

f7 Current computed HDOP value
Range: 00.0 to 99.9

f8 Current computed VDOP value
Range: 0.00 to 99.9

f9 Current computed TDOP value (seconds)

Range: 0.00 to 99.9
s1 Firmware version code
Range: 4-character ASCII
hh Checksum
Range: 2-character hex

Typical Response:
$PASHR,POS,0,06,183805:00,3722.36221,N,12159.82742, W, +00016.06,????,179.22,021.21,+003.96+34,06.1,04.2,03.2,01.4,GA0 0*cc

Item	Description
$PASHR,POS	Header
0	Position is autonomous
06	Number of satellites used in position computation
183805.00	Time of position computation
3722.36221	Latitude
N	North
12159.82742	Longitude
W	West
+00016.06	Altitude in meters
????	Site Name
179.22	Course over ground in degrees (True)
021.21	Speed over ground in knots
+003.96	Vertical velocity in meters per second
06.1	PDOP
04.2	HDOP
03.3	VDOP
01.4	TDOP
GA00	Version number
cc	Message checksum in hexadecimal

Disabling POS message:
$PASHS,NME,POS,A,OFF<CR><LF>
Response: $PASHR,ACK*3D

External event message format
At an external event (Mark Input Connector) an additional serial command is send immediately with exact time information when the event occurs.

$PASHR,TTT,6,17:11:25.2293249*0C

NMEA Message Format

The VGPS can also be used as a standard NMEA compatible device. The commands for starting and stopping the data transfer using NMEA format are shown below. In principal also the commands enabling the NMEA data transfer are standard. The only additional is the string ‘PASHS’ and the letter ‘A’ within the command for selecting the serial port number inside the receiver.

Enabling GGA message
$PASHS,NME,GGA,A,ON
Response: $PASHR,ACK*3D

Disabling GGA message:
$PASHS,NME,GGA,A,OFF
Response: $PASHR,ACK*3D

Enabling VTG message:
$PASHS,NME,VTG,A,ON
Response: $PASHR,ACK*3D

Disabling VTG message:
$PASHS,NME,VTG,A,OFF
Response: $PASHR,ACK*3D

Setting of VGPS

The configuration of the VGPS can be divided into two separate settings

Setting of the VGPS signal conditioning
Setting of the VGPS receiver

Setting of VGPS signal conditioning

For the setting of the VGPS signal conditioning at there have to be send some special commands to enable the communication. After all settings are finished this communication mode has to be cleared for enabling the data transfer to the VGPS receiver itself.

Entering communication mode:
$PASHS,NME,POS,B,OFF<CR><LF>
Response: $PASHR,ACK*3D

$PASHS,DSY,B,A<CR><LF>
Response: $PASHR,ACK*3D

$PASHS,DSY,A,B<CR><LF>
Response: $PASHR,ACK*3D

Setting maximum speed:
$MOD,SP,xxxxx#<CR><LF> where xxxxx equals maximum kilometres per hour,
eg. 00200 (= 200Km/h).
The data format is five byte ASCII. Leading zeroes cannot be omitted.
Response: $MOD,AC<CR><LF>

Setting pulses per meter:
$MOD,PL,xxxxx#<CR><LF> where xxxxx equals number of pulses per meter,
eg. 00500 (= 500 pulses/meter).
The data format is five byte ASCII. Leading zeroes cannot be omitted.
Response: $MOD,AC<CR><LF>

Setting treshold:
$MOD,TR,xxxxx#<CR><LF> where xxxxx equals kilometres per hour x100,
eg. 00050 (= 0.5Km/h).
The data format is five byte ASCII. Leading zeroes cannot be omitted.
Response: $MOD,AC<CR><LF>

Setting watchdog:
$MOD,DL,xxxxx#<CR><LF> where xxxxx equals delay in 50ms frame eg. 00020 (=1 second).
The data format is five byte ASCII. Leading zeroes cannot be omitted.
Response: $MOD,AC<CR><LF>
If value is set to zero this function is disabled.

Setting minimum number of satellites:
$MOD,SA,xxxxx#<CR><LF> where xxxxx equals minimum satellites eg. 00004.
The data format is five byte ASCII. Leading zeroes cannot be omitted.
Response: $MOD,AC<CR><LF>
If current number of satellites in used is less than set then pulse and analog output will be at maximum level. If value is set to zero this function is disabled.

Getting status:
$MOD,ST,00000#<CR><LF>
Response: $MOD,STvv,ww,xx,yy,zz,uu,<CR><LF>
vv - pulses per meter in binary MSB to LSB format (HighByte:LowByte). eg. 1:244 equals 500 pulses
ww - maximum speed in binary MSB to LSB format (HighByte:LowByte). eg. 0:200 equals 200km/h
xx - threshold in binary MSB to LSB format (HighByte:LowByte). eg. 0:50 equals 0.50 km/h
yy - serial number in binary MSB to LSB format (HighByte:LowByte). eg. 0:200 equals 200
zz - firmware revision x10 in binary MSB to LSB format (HighByte:LowByte). eg. 0:20 equals 2.0
uu - minimum number of satelittes in binary MSB to LSB format (HighByte:LowByte).
eg. 0:004 equals 4

Exiting communication mode:
$PASHS,DSY,OFF<CR><LF>
Response: $PASHR,ACK*3D
$PASHS,NME,POS,B,ON<CR><LF>
Response: $PASHR,ACK*3D

Setting of VGPS receiver

Enable prediction:
$PASHS,KFP,ON<CR><LF>
Response: $PASHR,ACK*3D

Setting prediction interval:
$PASHS,KFP,PRI,value<CR><LF>
where value is 1 to 99
Response: $PASHR,ACK*3D

Disable prediction:
$PASHS,KFP,OFF<CR><LF>
Response: $PASHR,ACK*3D

Speed smoothing:
$PASHS,SMV,value<CR><LF>
where value is 0 to 99
If value is set to 0 the speed smoothing is automatic disabled.
Response: $PASHR,ACK*3D

Enable Differential mode
$PASHS,RTC,REM,ON<CR><LF>
Response: $PASHR,ACK*3D

$PASHS,RTC,AUT,Y<CR><LF>
Response: $PASHR,ACK*3D

Disable Differential mode:
$PASHS,RTC,REM,OFF<CR><LF>
Response: $PASHR,ACK*3D

$PASHS,RTC,AUT,N<CR><LF>
Response: $PASHR,ACK*3D

Enable data accuracy calculation:
$PASHS,PDP,xxx<CR><LF>
where xxx is the calculated PDOP (Position Dilution of Precision) value.
The standard settings are 40 for weak signal, 10 for medium and 6 for strong signal.
Response: $PASHR,ACK*3D