NAVI-S-UX (-USB)

User's Guide

Version 1.05

Contents

Version history

Version number	Author	Changes
1.00	Fadil Beqiri	Initial version
1.01	Fadil Beqiri	Update figures, RJ11 connector plug.
1.02	Fadil Beqiri	Update figures, Modular Plug RJ11 6/4 pin-out connector plug New chapter **Fehler! Verweisquelle konnte nicht gefunden werden.** added.
1.03	Fadil Beqiri	Table 1 (Modular Plug RJ11 6/4 pin-out) updated.
1.04	Fadil Beqiri	Throughout this document the default baudrate has been corrected to 38400bps.
1.05	Michael Fritsche	Revised for NAVI-S-UX (-USB)

Cautions

Information furnished herein by FMO are accurate and reliable. However, no responsibility is assumed for its use.
Please, read carefully the safety precautions.
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0 Introduction

0.1 General about NAVI-S-UX

The NAVI-S-UX from FMO Electronics GmbH is a new GPS receiver that features the u-blox high sensitivity chipset. This complete 50 channel, WAAS-enabled provides a vastly superior position accuracy performance in a much smaller package. The NAVI-S-UX architecture includes Galileo capability, Online/Offline A-GPS support, built-in backup battery for SRAM and RTC and integrated TCXO. It delivers major advancements in GPS performance, accuracy, integration, computing power and flexibility.
Connecting to the desktop or notebook PC implementing a map or navigation software, NAVI-S-UX helps you to locate one object, conduct personal & vehicle navigation, and/or apply for geographical surveys.
The receiving side of the NAVI-S-UX is on the top side (embossed satellite). The NAVI-S-UX with a magnetic base integrated inside the casing. It is designed for in-door on-dash-board mounting. The NAVI-S-UX is delivered also with an adhesive pad and a velcro that enables to stick the unit to non-metallic parts.

Users are advised to proceed quickly to the chapter "Security" and read the hints carefully.

0.2 Used abbreviations

Abbreviation	Description
DGPS	Differential GPS
DOP	Dilution of Precision
GPS	Global Positioning System
GNSS	Global Navigation Satellite System
GGA	GPS Fixed Data
GLL	Geographic Position - Latitude / Longitude
Abbreviation	**Description**
GSA	GNSS DOP and Active Satellites
GSV	GNSS Satellites in View
RMC	Recommended Minimum Specific GNSS Data

VTG	Course Over Ground and Ground Speed
LNA	Low Noise Amplifier
NMEA	National Maritime Electronics Association
PRN	Pseudorandom Noise Number – The Identity of GPS satellites
RF	Radio Frequency
RP	Receive Protocol
RTC	Real Time Clock
RTCM	Radio Technical Commission for Maritime Services
RXD	Data input
TXD	Data output
SA	Selective Availability
WAAS	Wide Area Augmentation System
MSK	Minimum Shift Keying

0.3 Related documents

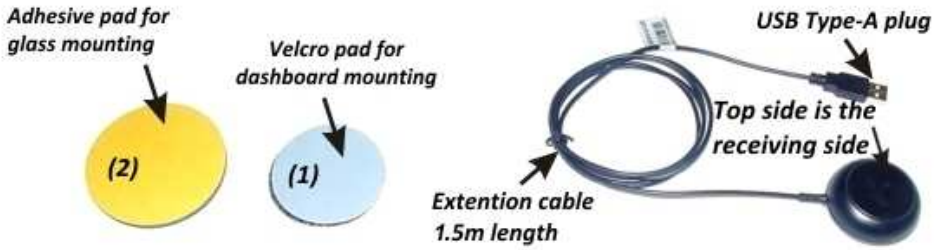
[1.] u-blox binary and NMEA protocol specification: please refer to the u-blox website: www.u-blox.com
[2.] u-center - Software: on the enclosed CD-ROM

0.4 Order options

Before you start up the receiver, make sure that your package includes the following items. If any item is missing or damaged, please contact your vendor immediately.

Standard

USB



Also included NAVI-S-UX (-USB)-LEAFLET.

1 Security

This chapter contains important information for the safe and reliable use of the NAVI-S-UX. Please read this chapter carefully before starting to use NAVI-S-UX.

1.1 General information

The Global Positioning System uses satellite navigation, an entirely new concept in navigation. GPS has become established in many areas, for example, in civil aviation or deep-sea shipping. It is making deep inroads in vehicle manufacturing and before long everyone of us will use it this way or another.
The GPS system is operated by the government of the United States of America, which also has sole responsibility for the accuracy and maintenance of the system. The system is constantly being improved and may entail modifications effecting the accuracy and performance of the GPS equipment.

1.2 Restricted use

Certain restrictions on the use of the NAVI-S-UX may have to be observed on board a plane, in hospitals, public places or government institutions, laboratories etc. Follow these instructions.

1.3 Children

Do not allow children to play with the NAVI-S-UX. It is not a toy and children could hurt themselves or others. The NAVI-S-UX consists of many small parts which can come loose and could be swallowed by small children. Thoughtless handling can damage the NAVI-S-UX.

1.4 Electrostatic Discharge (ESD)

The NAVI-S-UX contains class 1 devices. The following Electrostatic Discharge (ESD) precautions are recommended:

- Protective outer garments.
- Handle device in ESD safeguarded work area.
- Transport device in ESD shielded containers.
- Monitor and test all ESD protection equipment.
- Treat the GPS receiver as extremely sensitive to ESD.

1.5 Safety standards

The NAVI-S-UX meets the safety standards for RF receivers and the standards and recommendations for the protection of public exposure to RF electromagnetic energy established by government bodies and professional organisations, such as directives of the European Community, Directorate General V in matters of radio frequency electromagnetic energy.

2 Technical specifications

2.1 Electrical Characteristics

2.1.1 General

Frequency	L1, 1575.42 MHz
C/A code	1.023 MHz chip rate
Channels	50

2.1.2 Accuracy

Position	10 meters CEP without SA
Velocity	0.1 meters/second, without SA
Time	1 microsecond synchronized to GPS time

2.1.3 DGPS Accuracy

Position	1 to 5 meters, typical
Velocity	0.05 meters/second, typical

2.1.4 Datum

WGS-84

2.1.5 Acquisition Rate

Hot start	< 1 sec., average
Cold start	< 27 sec., average

2.1.6 Dynamic Conditions

Altitude	18,000 meters (60,000 feet) max.
Velocity	< 515 meters/second (1000 knots) max.
Acceleration	4 g, max.
Jerk	20 meters/second^3, max.

2.1.7 Default settings

RX/TX (standard):	NMEA 38400 baud (@RS232), Msg.: GLL, GGA, RMC, VTG, GSV, GSA 8 data bits, no parity, 1 stop bit

2.1.8 DC Power

- Main power
  - ♦ NAVI-S-UX : +5V DC ± 5%, 65mA (continuous mode), typical

2.1.9 Physical

- dimensions: 52 mm (diameter) x 21 mm (high) (without cable)
- weight: 30 g
- cable length 1.5 m
- temperature range: -40 to +85 °C (operation, transportation and storage)

3 Software interface

The NAVI-S-UX evaluation receiver is capable of outputting data in the NMEA-0183 format as defined by the National Marine Electronics Association (NMEA), Standard for Interfacing Marine Electronic Devices, Version 2.20, January 1, 1997.

3.1 NMEA output messages

The table below shows all NMEA output messages supported by NAVI-S-UX as well as a brief description of each output message.
For more detailed information about the output message list, please refer to the u-blox website: www.u-blox.com.

Option	Description
GGA	Time, position and fix type data.
GLL	Latitude, longitude, UTC time of position fix and status.
GSA	GPS receiver operating mode, satellites used in the position solution and DOP values.
GSV	The number of GPS satellites in view satellite ID numbers, elevation, azimuth and SNR values.
RMC	Time, date, position, course and speed data.
VTG	Course and speed information relative to the ground.

Table 4: NMEA Output Messages

4 Installation instruction

4.1 Installation instruction using NAVI-S-UX

Choose the best suitable location for mounting the NAVI-S-UX. It should be mounted in a horizontal or near-horizontal position. There should be a clear horizon-round view from the mounting position, i.e. the NAVI-S-UX should not be mounted beside objects which block part of the view. The NAVI-S-UX is designed for mounting on a sheet-metal structure. The bottom side of the NAVI-S-UX has a magnetic base, which should be attached only to a metal sheet**.**

Hints

- The receiving side of the antenna head is on the top of NAVI-S-UX.
- The device has to be installed inside the vehicle.
- NAVI-S-UX is not water resistant. Do not contact it with water.
- The adhesive or velcro fastener pad included in the delivery packing is fix on the side you need of NAVI-S-UX in case of installing on the non-metallic parts (or e.g. behind the window).

5 How to Install & Operate NAVI-S–UX

5.1 Getting Started

Step1: Before starting the installation, please refer to the previous chapter "Installation instruction".

Step 2: **standard -** Extend the cable and connect it to the controlled device and power supply, the pin-out of NAVI-S-UX is described in the table 1.

USB - Extend the cable and connect it to the controlled device. The power supply and the pin-out of NAVI-S-UX is the same as with a standard USB connector.

Pin	Name	I/O	Colour	Description	Level
1	NC	-	-	Not connected	-
2	GND	-	Green	Ground	-
3	RX	I	White	Receive Data	RS232, V24
4	TX	O	Red	Transmit Data	RS232, V24
5	VCC	I	Yellow	Power supply	+ 5 V DC
6	NC	-	-	Not connected	-

Table 1: Pin assignment of the interface connector

The NAVI-S-UX supports a full duplex serial channel. All supported variables (baud rates, data. etc.) can be controlled and configured by the appropriate screens in u-center software (See chapter "Related documents"). You can directly communicate with a PC serial port.

RX This is the main receiving channel and is used to receive software commands on the board from the used software.

TX This is the main transmitting channel and is used to output navigation and measurement data to a Map software which supports the standard NMEA protocols.

Step 3: After the user has connected the NAVI-S-UX to the controlled device, he has to choose the correct COM port number (last com port in USB-option) and baud rate for running the map or navigation software.

Step 4: Run the evaluation program (u-center).

Notice:

(1) For safety reason, please do not install NAVI-S-UX while driving.

(2) Please set-up the COM port connected with NAVI-S-UX to:
Baud rate : 38400 (standard - @RS232)
Data bit : 8
Parity : None
Stop bit : 1
Flow control : None.

(3) The formats of NMEA messages please refer to the u-blox website: www.u-blox.com

6 Troubleshooting

Problem	Reason	Solution
No connection to the NAVI-S-UX	Connection fail	Check if the NAVI-S-UX is connected to a +5 V DC power supply properly. Check the other pins, and make sure they are connected properly.
Test fail	Poor connection	Check the connector to make sure it is well connected. If you still get the testing fail message, contact your local vendor.
Open com port fail	All the serial COM port have been used for other application program	Close all the other application programs and rerun the **u-center.exe** program.
There is nothing shown on the tracking diagram.	1) NAVI-S-UX cannot receive the GPS signal in the testing area. 2) The settings are not correct.	1) Maybe the NAVI-S-UX has not a enough sight to the sky. Change the place of NAVI-S-UX to somewhere with a good view. 2) The settings are as below: 38400 bps, 8 bit data, 1 stop bit no parity.
No position Output but timer is counting.	1) Weak or no GPS signal at all can be received. 2) Maybe the GPS signals are blocked by buildings.	Place the NAVI-S-UX outdoor away from obstacles (for instance, high buildings)
The NAVI-S-UX is running for longer than 5 minutes without receiving valid positions	Maybe NAVI-S-UX receives not enough data for sure tracking.	Utilize the program **u-center.exe** to reset the NAVI-S-UX.

7 Housing

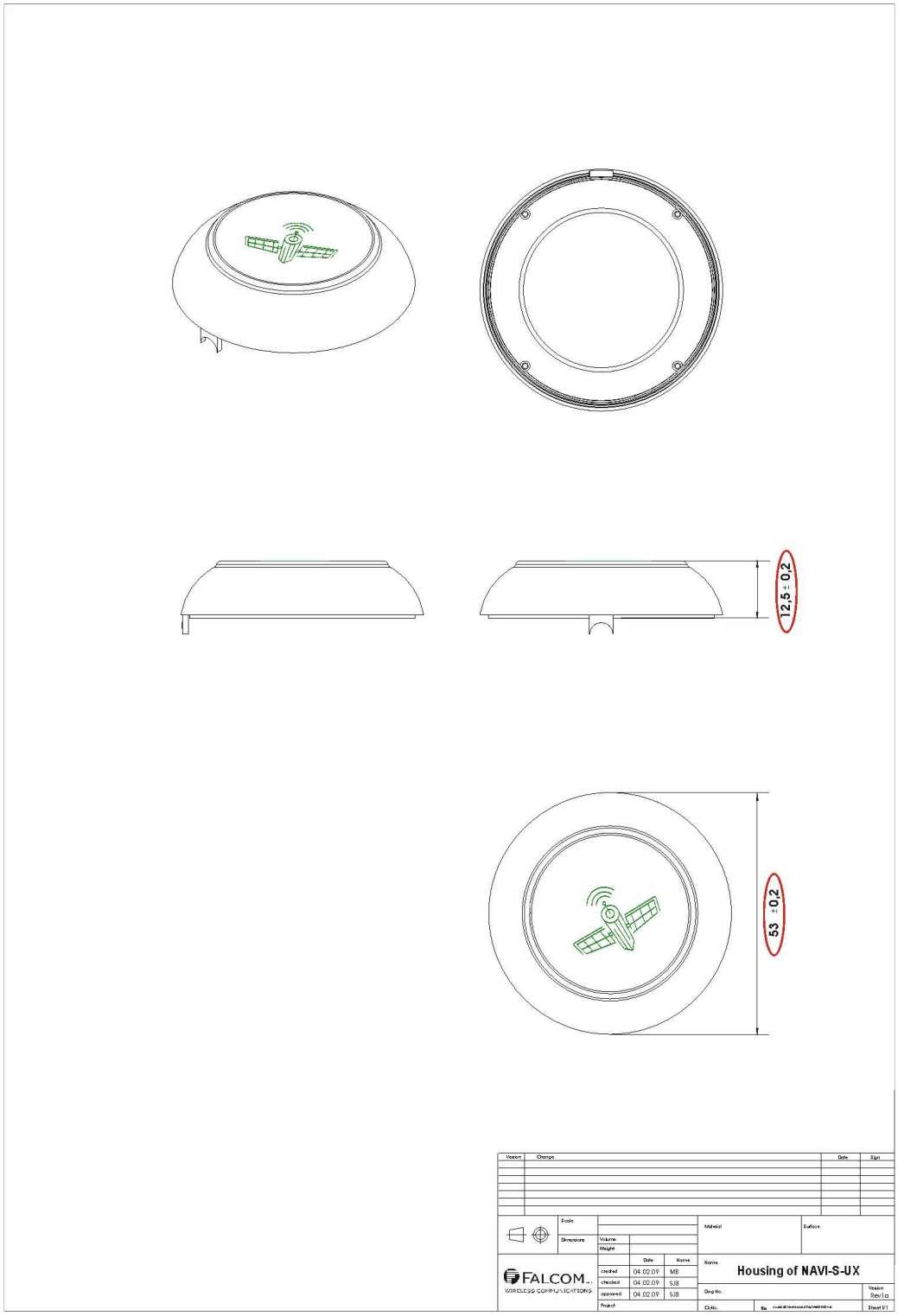


Figure 1: Housing of NAVI-S-UX (without cable set)