

# NAVISCAN / NAVIPAC WITH EDGETECH 6205

Last update: 14/04/2021 Version: 9.5, 4.5



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## 1 Introduction

This document includes information on the configuration of **NaviPac/NaviScan** in a combined solution in support of acquisition of multi-beam and sidescan data from an EdgeTech 6205 swath bathymetry (multi-beam) and dual frequency sidescan sonar system. Information about settings in the EdgeTech soft- and hardware are not included, please consult EdgeTech (6205: Combined Bathymetry & Side Scan Sonar) for further information.

## 2 NaviScan Configuration

The **NaviScan/NaviPac** configuration to support acquisition of multi-beam and sidescan data from an EdgeTech 6205 system is slightly different from what we normally see.

Normally the attitude and navigation-based sensors are interfaced into **NaviPac** and distributed to **NaviScan**.

In this configuration, it is the other way around, the instruments coming from the EdgeTech system are interfaced with **NaviScan**, from which data is distributed to **NaviPac**.

The following sections describe the configuration in detail.

### 2.1 Configuring the instruments from EdgeTech

The sonar data flow between the EdgeTech hardware and software and third-party software (**NaviPac/NaviScan**) is depicted below in Figure 1 (taken from the EdgeTech 6205 Hardware User Manual). Data available for the third-party software is output from the Discover software, all time-tagged in accordance with the **Time** input into the sonar interface box:

- Range/angle data (raw multi-beam datagrams)
- Auxiliary data
  - Position data
  - Heading data
  - Motion data
- Dual-frequency sidescan data



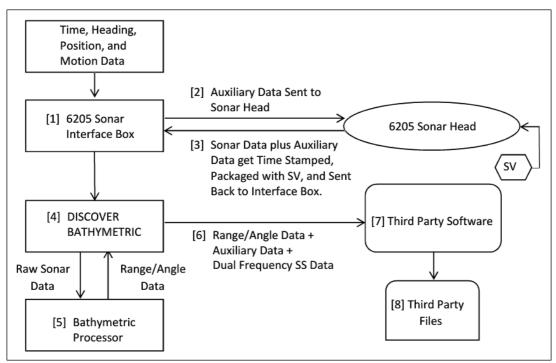


Figure 1 Dataflow in the EdgeTech 6205 system (from 6205 Hardware User Manual)

Five different instruments originating from the EdgeTech system must consequently be configured in **NaviScan**:

- Navigation
- Gyro
- Motion
- Multi-beam
- Sidescan

A few other instruments might be relevant to define in **NaviScan**. It all depends on the characteristics of the project in question. The most important ones are also described here:

- Bathymetry sensor (from NaviPac)
- Runline control (from NaviPac)



#### 2.1.1 Navigation

📝 NaviScan.BIN - NaviScan Config		_		×
File Equipment View Options Tools	Help			
	1. 🛛 🖈			
🖃 🛱 NaviScan.bin	Sensor & help	EdgeTech4600 Position		
System Parameters	Name	EdgeTech4600 Position		
🗄 🖷 Geodesy	Disabled			
🖶 🕮 Runline Control	Port setup	TCP 1901 127.0.0.1		
i™ NaviPac	Latency	0 ms		
EdgeTech4600AttGyro	Mount offset X	-3.53 m		
	Mount offset Y	8.695 m		
Edgetech4600 RPH	Mount offset Z	-4.932 m		
🚊 🕮 Bathy				
EdgeTech4600 B				
- Navigation				
EdgeTech4600 Position				
iandar in the second s				
a 2 H2_Edgetech4600/6205				
🖉 🖾 🖬 H1_EdgeTech Sidescan Dual				
H2_EdgeTech Sidescan Dual		-		
_				
i For Help, press F1	1		NUM	1 .::

Figure 2 Configuring the EdgeTech4600 navigation instrument

To configure the navigation information arriving from the Discover software, the following settings must be applied:

- Driver: EdgeTech4600 Position
- **Port setup**: TCP 1901, IP address 127.0.0.1 (IP address of computer where Discover is executed)
- **Mount offsets**: related to the antenna offsets determined in the local coordinate system defined in **NaviPac/NaviScan**



#### 2.1.2 Gyro

📝 NaviScan - NaviScan Config			_		$\times$
File Equipment View Options Tools	Help				
	1. 🛛 🖈				
🖃 🛱 NaviScan.bin	Sensor & help		EdgeTech4600AttGyr	0	
System Parameters	Name		EdgeTech4600AttGyr	o	
🖶 💭 Geodesy	Disabled				
🖶 🕮 Runline Control	Port setup		TCP 1901 127.0.0.1		
Gyro	Latency		0 ms		
EdgeTech4600AttGyro	gyroC_O		2.897 °		
🖕 💭 Motion	useGyroSpeedCorr				
Edgetech4600 RPH	GPS Data		HDT		
Bathy		~	HDT		
🔤 💼 Navigation			VEL		
di EdgeTech4600 Position			Mix HDT and VEL d	lata	
Echosounder				1010	
🖻 🖷 Sidescan					
H1_EdgeTech Sidescan Dual					
🛄 📩 H2_EdgeTech Sidescan Dual	Select the source for or GPS_VEL message		heading data from eith from both.	er GPS_	HDT
For Help, press F1 NU					

Figure 3 Configuring the EdgeTech4600 gyro instrument

To configure the gyro information arriving from the Discover software, the following settings must be applied:

- Driver: EdgeTech4600AttGyro
- **Port setup**: TCP/IP 1901 (port) and IP address 127.0.0.1 (IP address of computer where Discover is executed)



#### 2.1.3 Motion

🔰 NaviScan.BIN - NaviScan Config		_		×
File Equipment View Options Tools	Help			
	1 🛛 🖈			
	Sensor & help	Edgetech4600 RPH		
System Parameters	Name	Edgetech4600 RPH		
🖶 💼 Geodesy	Disabled			
🖮 🛱 Runline Control	Port setup	TCP 1901 127.0.0.1		
	Latency	0 ms		
EdgeTech4600AttGyro	Mount offset X	-3.71 m		
Building Motion	Mount offset Y	0 m		
Edgetech4600 RPH	Mount offset 7	-3.804 m		
🖶 🖷 Bathy	Heading mount	0.0		
🖬 EdgeTech4600 B	roll_C_O	-0.65 °		
🖶 🛱 Navigation		1,128 °		
EdgeTech4600 Position	pitch_C_O			
Echosounder	heave_C_O	0 m		
협 1 H1_Edgetech4600/6205 협 2 H2_Edgetech4600/6205				
Sidescan				
	Data: Binary data			
H2_EdgeTech Sidescan Dual	Help:			
For Help, press F1	J		NUM	A

Figure 4 Configuring the EdgeTech4600 motion instrument

The motion information arriving from the Discover software requires the following settings to be applied:

- Driver: EdgeTech4600 RPH
- **Port setup**: TCP/IP 1901 (port) and IP address 127.0.0.1 (IP address of computer where Discover is executed)



#### 2.1.4 Multi-beam

NaviScan.BIN - NaviScan Config File Equipment View Options Tools	Help	-		×
	L+ 🖄 🗡			
	Sensor & help	Edgetech4600/6205		
System Parameters	Name	H1_Edgetech4600/6205		
i∰ Ceodesy ⊟Ca Runline Control	Disabled			
NaviPac	Port setup	TCP 1901 127.0.0.1		
	Latency	0 ms		
EdgeTech4600AttGyro	Mount offset X	-3.71 m		
	Mount offset Y	0.209 m		
Edgetech4600 RPH	Mount offset Z	-4.14 m		
Bathy	Roll mount	0.42 °		
🔤 🖆 EdgeTech4600 B	Pitch mount	-1.23 °		
🖾 Havigation 🖞 EdgeTech4600 Position	Heading mount	-0.9 °		
Echosounder	Binning filter			
1 H1_Edgetech4600/6205	Method	Filter not used		
2 H2_Edgetech4600/6205	Scan Filters			
ia Sidescan	Quality threshold	0		
ធំ H1_EdgeTech Sidescan Dual ធំ H2_EdgeTech Sidescan Dual	Ind range start	0 m		
	Ind range end	20000 m		
	Incl angle start	-180 °		
	Incl angle end	180 °		
	Section exclude 🛛 🗄			
	Beam exclude 🛛 🗄			
	Data: Help: TCP port 1901 an Discover is run typ. same	nd IP address of the compute as naviscan 127.0.0.1	ter on wh	ich
For Help, press F1	,		NUM	

Figure 5 Configuring the EdgeTech4600 multi-beam instrument (head on port side)

Filter not used
 Vertical limit [m] vs across bins [m]
 Range limit [m] vs angle bins [°]
 Angle limit [°] vs range bins [m]



NaviScan - NaviScan Config			×
File Equipment View Options Tools	Help		
⊡ BvviScan.bin System Parameters	Sensor & help Name	Edgetech4600/6205 H2_Edgetech4600/6205	
⊕…© Geodesy ⊟…© Runline Control	Disabled		
NaviPac	Port setup	TCP 1901 127.0.0.1	
	Latency	0 ms	
EdgeTech4600AttGyro	Mount offset X	-3.71 m	
🖻 🛱 Motion	Mount offset Y	0.209 m	
Edgetech4600 RPH	Mount offset Z	-4.14 m	
🖮 🕮 Bathy EdgeTech4600 B	Roll mount	0.42 °	
□ Lugereen 1000 D	Pitch mount	-0.1 °	
🔤 📅 EdgeTech4600 Position	Heading mount	-1.59 °	
Echosounder	Binning filter		
	Method	Filter not used	
Sidescan	Scan Filters		
📓 🖾 Sidescan 🛗 H1_EdgeTech Sidescan Dual	Quality threshold	0	
📅 H2_EdgeTech Sidescan Dual	Ind range start	0 m	
	Incl range end	20000 m	
	Incl angle start	-180 °	
	Inclangle end	180 °	
	Section exclude	_	
	Beam exclude ±		
For Help, press F1		NUN	1

Figure 6 Configuring the EdgeTech4600 multi-beam instrument (head on starboard side)

To configure the multi-beam information arriving from the Discover software the following settings must be applied:

- Driver: Edgetech4600/6205.
- **Port setup for both heads**: TCP/IP 1901 (port) and IP address 127.0.0.1 (IP address of computer where Discover is executed).
- Offsets for both heads: related to the acoustic center determined in the local coordinate system defined in NaviPac/NaviScan. Note that the two individual acoustic centers converge at a single point (EdgeTech 6205 Hardware User Manual). The offsets are consequently identical for the two heads.



• **Mount angles**: result of a dual head patch test calibration, that will result in different (though similar) pitch, roll and heading values for the two heads.

🗾 NaviScan.BIN - NaviScan Config		– 🗆 X
File Equipment View Options Tools	Help	
	1. 🛛 🖈	
	Sensor & help	EdgeTech Sidescan Dual
System Parameters	Name	H1_EdgeTech Sidescan Dual
🔒 🗠 🖨 Geodesy	Disabled	
🖮 🖻 Runline Control	Port setup	TCP 1901 127.0.0.1
Gyro	Latency	0 ms
EdgeTech4600AttGyro	Mount offset X	-3.71 m
	Mount offset Y	0.209 m
🔤 Edgetech4600 RPH	Mount offset Z	-4.14 m
🖶 🛱 Bathy	Roll mount	0 °
EdgeTech4600 B	Pitch mount	0 °
🖶 📼 Navigation	Heading mount	0 °
<ul> <li>□・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・</li></ul>		
협 H1_EdgeTech Sidescan Dual 협 H2_EdgeTech Sidescan Dual	Data: EdgeTech Sidesc Help: TCP port 1901 ar Discover is run typ. same	nd IP address of the computer on which
For Help, press F1		NUM:

Figure 7 Configuring the EdgeTech4600 sidescan instrument

To configure the sidescan information arriving from the Discover software the following settings must be applied:

- Driver: EdgeTech Sidescan Dual.
- **Port setup**: TCP/IP 1901 (port) and IP address 127.0.0.1 (IP address of computer where Discover is executed).
- **Offset**(s): related to the acoustic centre determined in the local coordinate system defined in NaviPac/NaviScan.
- Mount angles (Roll, Pitch, and Heading mount): not relevant.



## 2.2 Configuring additional instruments

#### 2.2.1 Bathy

🔀 NaviScan.BIN - NaviScan Config		_		×		
File Equipment View Options Too						
▯▯▯ױױ	┋[] 🛛 🖈	•				
🖃 👼 NaviScan.bin	Sensor & help	EdgeTech4600 B				
System Parameters	Name	EdgeTech4600 B				
🗄 💼 Geodesy	Disabled					
in the control and the contro	Port setup	TCP 7030 127.0.0.1				
Motion	Latency	0 ms				
Bathy	Mount offset X	0 m				
EdgeTech4600 B	Mount offset Y	0 m				
🦾 (( NaviPacHeaveCor ))	Mount offset Z	0 m				
Navigation	depthC_O	0 m				
ia∰ Echosounder ia∰ Sidescan	useBarometer					
	useCTD					
	densityWater	1 kg/dm3				
	gravity	9.82 m/s2				
	presureSurface	1 atm				
		-				
For Help, press F1	]			NU .:		

Figure 8 Configuring the bathy instrument

A bathymetry instrument is only relevant when an RTK solution (or another solution that supplies adequately accurate height information) is available for the navigation. At present, **NaviScan** cannot use the navigation information arriving from the Discover to extract the vertical component. Instead this information must be defined as an output in **NaviPac**. In **NaviScan** the following settings must be applied:

- **Driver**: Bathy
- **Port setup**: TCP 7030, IP address 127.0.0.1 (IP address of computer where **NaviPac** is executed)
- **Mount Offsets**: **NaviPac** will calculate the value associated with the CRP position, by default. Therefor values of 0,0,0 are used in **NaviScan**.



#### 2.2.2 Runline Control

📝 NaviScan.BIN - NaviScan Config — 🗆 🗙					
File Equipment View Options Tools	Help				
☐ d ≝ H+ H+ E					
🖃 🗝 NaviScan.bin	Sensor & help	NaviPac			
System Parameters	Name	NaviPac			
🗄 💼 Geodesy	Disabled				
En Runline Control	Port setup	UDP 6010 127	.0.0.1		
⊕ Gyro	Latency	0 ms			
Motion	NaviPac geodesy				
Bathy Navigation Echosounder Sidescan	Data: \$S, <filename>&lt; characters&gt;<cr><lf> Help:</lf></cr></filename>	:cr> <lf> \$E,<ur< td=""><td>nused</td><td></td><td></td></ur<></lf>	nused		
For Help, press F1	1			NUM	

Figure 9 Configuring the runline control instrument

A runline control instrument is used to convey relevant information from **NaviPac** to **NaviScan**. This includes:

- A trigger to start and stop logging. Using this functionality makes it possible to synchronize logging in **NaviPac** and **NaviScan**.
- Runline information.
- Geodesy information.

In NaviScan the following settings must be applied:

- Driver: NaviPac
- **Port setup**: UDP/IP 6010 (port) and IP address 127.0.0.1 (IP address of computer where **NaviPac** is executed). Note that the port number could be any port available.



### 2.3 The output to NaviPac

To facilitate the distribution of the EdgeTech auxiliary data from **NaviScan** to **NaviPac**, the following must be configured:

In **NaviScan Config**, activate the Global Parameters dialogue (Options – Global Parameters), go to the **Instruments** tab and define the settings under the **EdgeTech4600** headline:

Specify Global Parameters		×			
Real-time Export Instruments	Height Calculations NaviScan				
Edgetech4600 🗉		^			
maximumSwath	0 m				
maximumDepth	0 m				
minimumDepth	0 m				
Navipac Repeater 📃					
Navipac IP	127.0.0.1				
Pos UDP Port	2320				
Rph UDP Port	2321				
Send position and motion data to Navipac					
Note: Restart of NaviScan Online is required for changes to be fully applied.					

Figure 10 Configuring the EdgeTech4600 Repeater

The settings are:

• Use the NaviPac Repeater

Enable this option to facilitate the distribution to NaviPac

NaviPac IP

Specify the IP address of the NaviPac computer here.

- Pos UDP Port Specify the position output port here (2320 is default, but any available number could be used)
   Rph UDP Port
  - Specify the motion and gyro output port here (By default Port 2321 is set, but any available number could be used)



## 3 NaviPac Configuration

In **NaviPac**, the **NaviScan** configuration is reflected. Only the instruments relevant for the EdgeTech 6205 based **NaviPac/NaviScan** relationship are described here:

- Navigation
- Gyro
- Motion
- Bathy output
- Runline Control

### 3.1 Configuring the Navigation instrument

💸 NaviPac - EdgeTech 💶 🗖 🗙							
File Options Tools Help							
1 🖆 🛗 🖕 ĉ 🚊	م						
Controls 🗸	Vehicles	Ŧ	Properties				
			Instrument				
	Main Vessel		⊿ Misc				
Restart Ct Reset	SurfaceNavigation 💕		Name	Edgetech 4600 (NaviScan)			
<sup>Restart</sup> Stop <sup>Reset</sup>			System Name				
Tree 👻 🗸	Edgetech 4600 (NaviScan)		Instrument ID				
▲ Project			Info				
Geodesy	Gyro 🛛 🗶		Offset	-3,53;8,695;4,932			
🛱 Project Settings	Edgetech 4600 (NaviScan)		Setup Id				
▲ Vehicles			I/O Mode	ON			
🖌 🛥 Main Vessel	Matian Canada		I/O	attu://127.0.0.1:2320/ ···			
🖌 💕 SurfaceNavigation	MotionSensor 😽		Apply datum shift				
Edgetech 4600 (NaviScan)	Edgetech 4600 (NaviScan)		Fixed latency	0 s			
🖌 🗶 Gyro			Apply ITRF shift				
Edgetech 4600 (NaviScan)	DataOutput 🕞		String details				
MotionSensor	EIVA runline control		Number of bytes	100			
Edgetech 4600 (NaviScan)			Telegrams per cycle				
⊿ ⊕DataOutput	Heave correction and GPS height		Driver type	CRLF: Normal ASCII String with 'c   👻			
EIVA runline control							
Heave correction and GPS height	<b>Q</b>						
			Info Binary Edgetech format - se	end via NaviScan on ATTU format			
3D Visualisation							

Figure 11 EdgeTech 4600 navigation in NaviPac

The following settings are of significance for the navigation sensor:

• Driver: EdgeTech 4600 (NaviScan)



• I/O

Format is ATTU (data is time tagged in the EdgeTech system. **NaviScan** is taking this time tagging into account and supplying **NaviPac** with similar information via the ATTU format. Timing in **NaviPac** and **NaviScan** are consequently identical for all instruments arriving via the distribution from **NaviScan**), port (2320) is as defined as part of the EdgeTech 4600 repeater settings in **NaviScan**.

Offsets

Similar to the ones defined in NaviScan.

## 3.2 Gyro

🐝 NaviPac - EdgeTech			_ = ×
File Options Tools Help			
🖞 🖆 🏥 🖕 Č	<u>e</u>		
Controls 🗸	Vehicles 🗧 🗧	Properties	
	A	Instrument	
	Main Vessel	A Misc	
Restart Ct Reset	SurfaceNavigation 🛛 🕰	Name	Edgetech 4600 (NaviScan)
Kestant Stop Reset	Edgetech 4600 (NaviScan)	System Name	
Tree 🝷 🖡	Eugetech 4000 (Naviscan)	Instrument ID	
▲ Project		Info	
🔀 Geodesy	Gyro 🗶	Offset	0;0;0
🛱 Project Settings	Edgetech 4600 (NaviScan)	Setup Id	
✓ Vehicles		I/O Mode	ON   *
🖌 🛶 Main Vessel	MotionSensor 😽	I/O	attu://127.0.0.1:2321/ ···
SurfaceNavigation	Motionsensor	Gyro C-O	2,897 °
🖌 💋 Gyro	Edgetech 4600 (NaviScan)	Minimum time slice	0 s
Edgetech 4600 (NaviScan)		Latency	0 s
👂 🕵 MotionSensor	DataOutput 🕞	✓ String details	
▷ ⊕ DataOutput	EIVA runline control	Number of bytes	100
		Telegrams per cycle	50
	Heave correction and GPS height	Driver type	CRLF: Normal ASCII String with 'c   👻
	<b>Ŷ</b>		
		Info Binary Edgetech format - se	end via NaviScan on ATTU format
3D Visualisation			

Figure 12 EdgeTech 4600 gyro in NaviPac

The following settings are of significance for the gyro instrument:

- Driver: EdgeTech 4600 (NaviScan)
- I/O

Format is ATTU (see above under 'Navigation instrument' for details), port (2321) is as defined as part of the EdgeTech 4600 repeater settings in **NaviScan**.



• Gyro C-O Similar to the value used in NaviScan

### 3.3 Motion

🐝 NaviPac - EdgeTech						. 🗆	×
File Options Tools Help							
🖞 🖆 🛗 🤹 Ö	<u></u>						
Controls	▼ Vehicles	Ŧ		Properties			
			h	nstrument			
	Main Vessel			Misc			<u>^</u>
0 V 0	SurfaceNavigation 💅 📕			Name	Edgetech 4600 (NaviScan		
Restart Stop Reset				System Name	Edgetech 4600 (NaviScan		
Tree	≠ µ Edgetech 4600 (NaviScan)			Instrument ID			
▲ Project				Info			Na
Geodesy	Gyro 🗶			Offset	-3,71;0;-3,804		
🛱 Project Settings	Edgetech 4600 (NaviScan)			Setup Id			
▲ Vehicles				I/O Mode	ON		~
🖌 🛥 Main Vessel	MotionSensor &			I/O	attu://127.0.0.1:2321/	Γ	
SurfaceNavigation	MotionSensor 🍪			Roll C-O	-0,65 °		
🕨 🛿 Gyro	Edgetech 4600 (NaviScan)			Pitch C-O	1,128 °		
🖌 🕵 MotionSensor				Heave C-O	0 m		
Edgetech 4600 (NaviScan)	DataOutput 🕞			Minimum time slice	0 s		
▷ ⊕DataOutput				Latency	0 s		
	EIVA runline control			String details			
	Heave correction and GPS height			Number of bytes	100		
				Telegrams per cycle	50		
	<b>Q</b>			Driver type	CRLF: Normal ASCII Str	ng witl	-
				<b>ifo</b> iinary Edgetech format - se	end via NaviScan on ATTU f	ormat	
3D Visualisation							

Figure 13 EdgeTech 4600 motion in NaviPac

The following settings are of significance for the motion sensor instrument:

- Driver: EdgeTech 4600 (NaviScan)
- I/O
  - Format is ATTU (see above under 'Navigation instrument' for details), port (2321) is as defined as part of the EdgeTech 4600 repeater settings in **NaviScan**
- Offsets
   Similar to the ones given in NaviScan
- C-O values for roll and pitch Similar to the values used in NaviScan



### 3.4 Bathy output

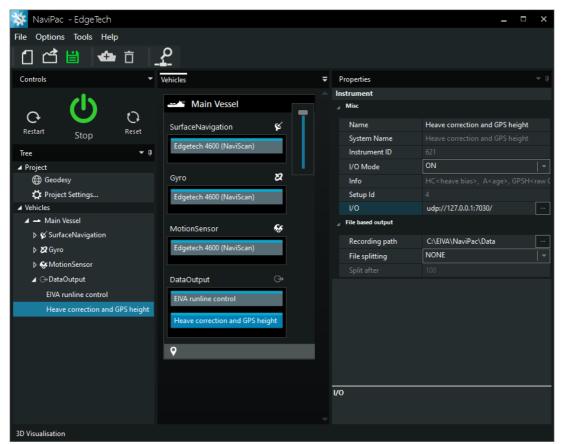


Figure 14 Bathymetry sensor in NaviPac

The following settings are of significance for the navigation sensor (remember that this instrument is only relevant in case of a surface-based system with a significant (accurate (RTK based)) height component):

- Driver: Heave correction and GPS height
- I/O

Protocol is UDP/IP, IP address is local (**NaviPac** and **NaviScan** are executed on the same computer), port is similar to the one given in **NaviScan** 

No offsets, since NaviPac per definition is calculating the values to the CRP position



## 3.5 Runline Control

🐝 NaviPac - EdgeTech			_ = ×
File Options Tools Help			
1 🖆 🛗 🕁 🗇	م		
	- <b>à</b> -		
Controls 🗸	Vehicles 🗧	Properties	
		Instrument	
e 🕛 e	Main Vessel	A Misc	
	SurfaceNavigation 🛛 🖌	Name	EIVA runline control
Restart Stop Reset	Edgetech 4600 (NaviScan)	System Name	
Tree 🗸 🗸	Edgetech 4000 (Naviscan)	Instrument ID	
⊿ Project		I/O Mode	ON   *
🖨 Geodesy	Gyro 🗶	Info	
🛱 Project Settings	Edgetech 4600 (NaviScan)	Setup Id	
▲ Vehicles		I/O	udp://127.0.0.1:6010/
🖌 🛥 Main Vessel	MotionSensor	File based output	
SurfaceNavigation		Recording path	C:\EIVA\NaviPac\Data ···
▶ 💋 Gyro	Edgetech 4600 (NaviScan)	File splitting	NONE
MotionSensor			
⊿ ⊕DataOutput	DataOutput 🕞		
EIVA runline control	EIVA runline control		
Heave correction and GPS height			
	Heave correction and GPS height		
	<b>Ŷ</b>		
		Info \$ <s e="">, <long file="" name<="" td=""><td>e&gt;<cr><lf></lf></cr></td></long></s>	e> <cr><lf></lf></cr>
3D Visualisation			

Figure 15 EIVA runline control instrument

The following settings are of significance for the Runline Control instrument:

• **Driver**: EIVA runline control I/O: Protocol is UDP/IP, IP address is local (**NaviPac** and **NaviScan** are executed on the same computer), port is similar to the one given in **NaviScan**.

## 4 Version descriptions

Version	Date	Author	Description
0.9	18-11-2015	LDA	Initial document
4.5	16-04-2021	ANS	Updated to NaviPac 4.5