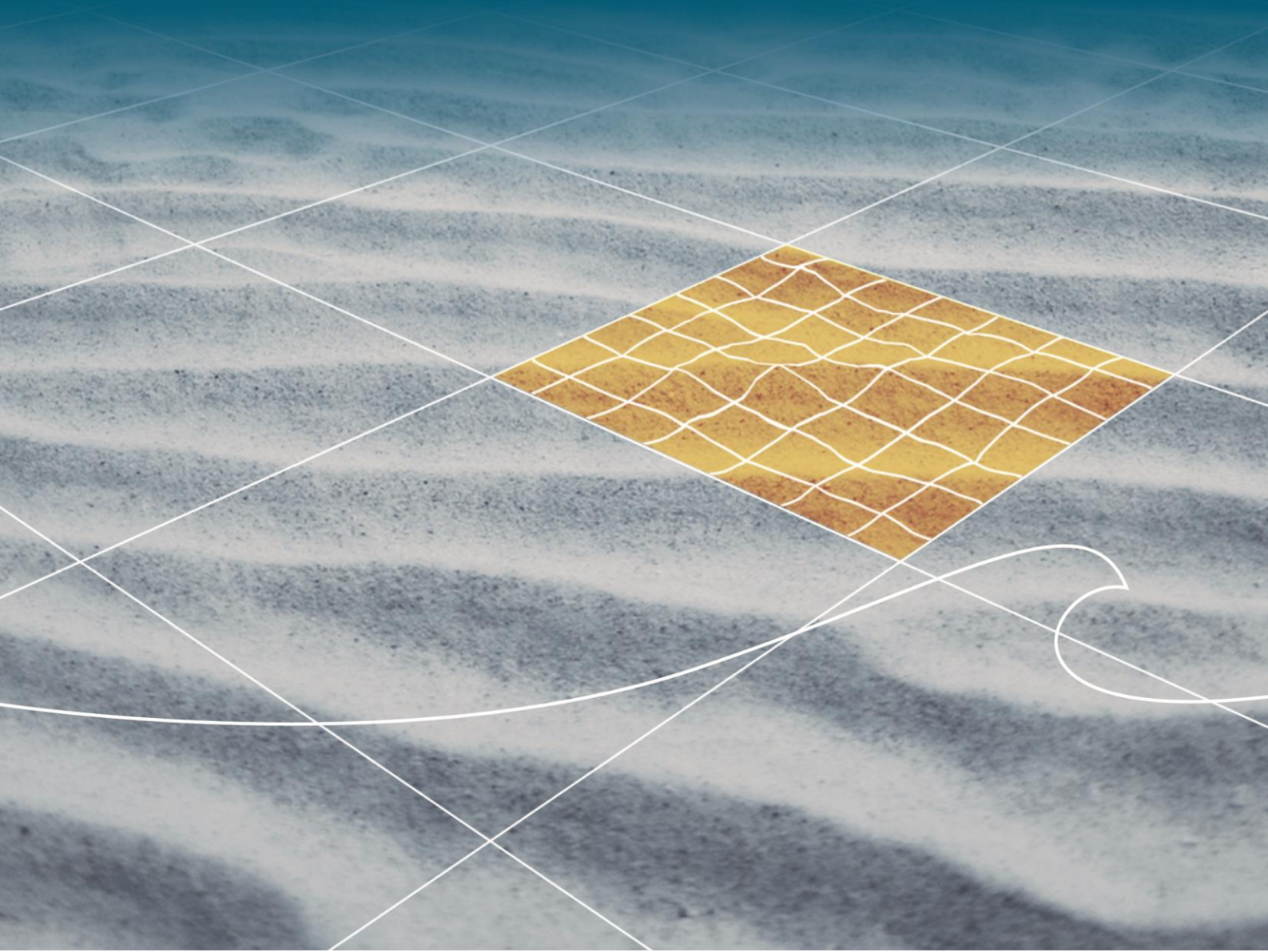


# **NAVIPAC 4.5**

## **INSTRUMENT PARAMETERS**



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# 1 Introduction

This document describes the various parameters defined for most instrument interfaces in the NaviPac configuration tool.

For general parameters such as IO, offsets etc please refer to Help on the program itself. It is important to notice

- You must select a valid I/O setting for the import as it otherwise might block the entire navigation process
  - COM Serial interfaces using build in or adapter ports
  - UDP Network broadcast messages UDP/IP
  - TCP Network server using TCP/IP
  - ATTU EIVA ATTU unit sending time tagged data on network
- The offsets may be specified as numbers (XYZ) or by selection a POI (Point of interest). Offsets are always defined as offset from CRP (local zero point – Common Reference Point) to the instrument
- String details is extremely important as it defines how NaviPac identifies a string and how many updates per second we allocate space for. Default values are normally OK – but it is a good place to start when performing troubleshooting!

All items are handled via the property selection observed at the instrument properties (default right part of the window) after selecting an instrument:

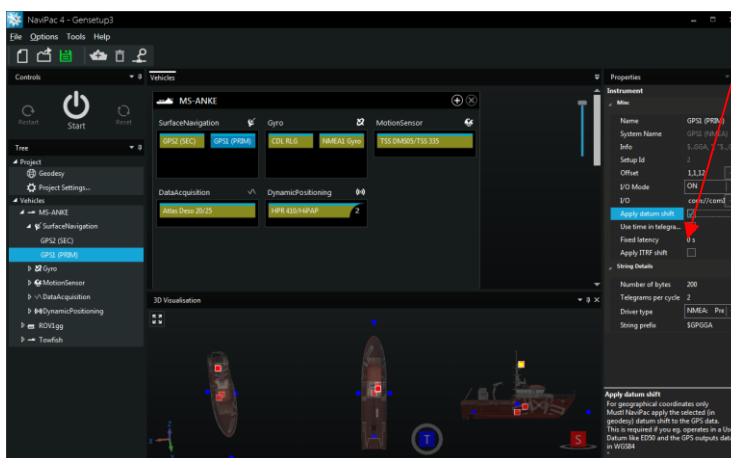
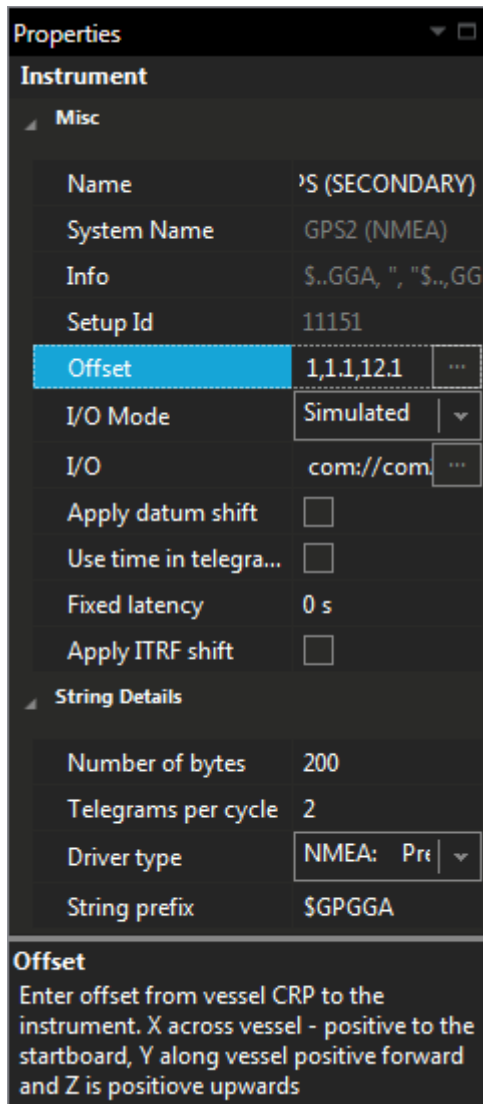


Figure 1 NaviPac config – instrument editing

## 2 GPS



**Properties**

**Instrument**

**Misc**

Name	'S (SECONDARY)
System Name	GPS2 (NMEA)
Info	\$..GGA, ", "\$..,GG
Setup Id	11151
Offset	1,1,1,12.1
I/O Mode	Simulated
I/O	com://com
Apply datum shift	<input type="checkbox"/>
Use time in telegra...	<input type="checkbox"/>
Fixed latency	0 s
Apply ITRF shift	<input type="checkbox"/>

**String Details**

Number of bytes	200
Telegrams per cycle	2
Driver type	NMEA: Prt
String prefix	\$GPGGA

**Offset**

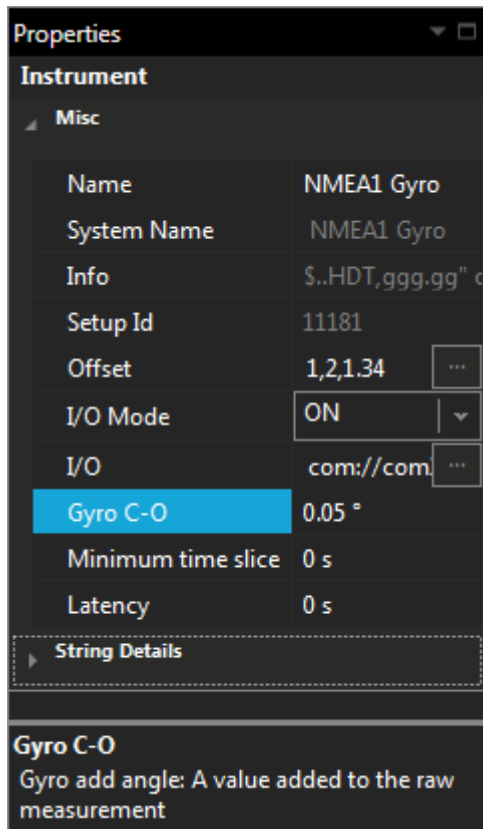
Enter offset from vessel CRP to the instrument. X across vessel - positive to the starboard, Y along vessel positive forward and Z is positive upwards

Figure 2 Detailed parameters for GPS receivers

- Apply datum shift:  
Shall NaviPac apply a datum shift (from WGS84 to User Datum) or shall we use the position directly.

- Use time in telegram  
Shall NaviPac use the timestamp in the position telegram (eg. NMEA GGA) to determine when the position is valid. This requires that the NaviPac PC somehow is synchronized in time with the GPS clock. This can be either via special time input or network time server. Please see document on *Timing Principles in NaviPac* (Manual 16)
- Use age in telegram  
Shall NaviPac use the data age given out by the GPS (eg. UKOOA GPS format or Ashtech RTK GPS) and compensate for this latency. Please see document on *Timing Principles in NaviPac* (Manual 16)
- Fixed latency  
Here the operator may enter a fixed data latency in seconds.
- Apply ITRF Shift  
Shall NaviPac include time based datum shift parameters to account for the situation where the datum shift is changing over time? The basic NaviPac datum shift parameters will be adjusted daily using the “speed of change” parameters based on the reference date.  
This type of datum shift can, for example, be relevant in North America where the use of ITRF to NAD83 is widely used and in Europe to shift from ITRF to EUREF89. Please note that this field only will be visible is ITRF is enabled globally

### 3 Gyro



The screenshot shows the 'Properties' window for an 'Instrument'. Under the 'Misc' tab, the following parameters are visible:

- Name: NMEA1 Gyro
- System Name: NMEA1 Gyro
- Info: \$..HDT,ggg.gg" c
- Setup Id: 11181
- Offset: 1,2,1.34
- I/O Mode: ON
- I/O: com://com
- Gyro C-O: 0.05 °
- Minimum time slice: 0 s
- Latency: 0 s

Below the 'String Details' section, the 'Gyro C-O' parameter is described: 'Gyro add angle: A value added to the raw measurement'.

Figure 3 Detailed setup for gyro and heading sources

- C-O  
Gyro add value – a value added to the raw instrument reading
- Minimum time slice  
Data down-sampling. If data density is closer than entered interval then data is down-sampled.
- Latency  
If the gyro has a known data delay then the latency can be entered here
- SeaPath format:  
Only for Seapath Gyro. Select the data source (binary EM1000, binary EM3000 or ASICC PSXN)

## 3.1 Gyro from RTK

This gyro will be calculated by NaviPac based on the two primary RTK GPS's antennas as the difference between observed baseline and defined baseline

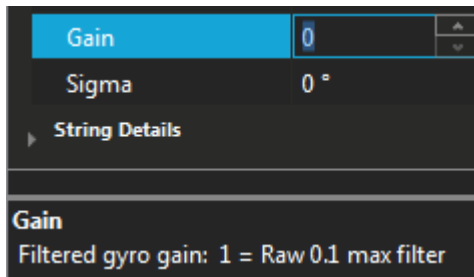
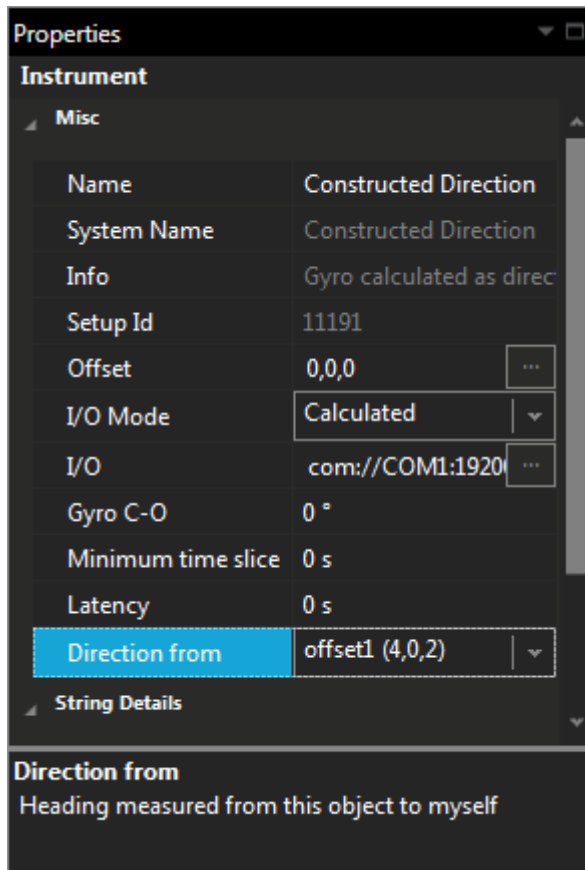


Figure 4 Special setup for RTK GPS based heading

- **Gain**  
The system may add a smoothing filter to the calculated gyro. Gain is the smoothing factor 1 defines no filter and the lower value the more smooth,
- **Sigma**  
Defines a spike detection value. Jumps above entered value is discarded



## 3.2 Constructed gyro



**Properties**

**Instrument**

**Misc**

Name	Constructed Direction
System Name	Constructed Direction
Info	Gyro calculated as direct
Setup Id	11191
Offset	0,0,0
I/O Mode	Calculated
I/O	com://COM1:1920
Gyro C-O	0 °
Minimum time slice	0 s
Latency	0 s
<b>Direction from</b>	<b>offset1 (4,0,2)</b>

**String Details**

**Direction from**  
Heading measured from this object to myself

Figure 5 Special setup for constructed gyro

This gyro will be calculated by NaviPac as the direction from selected object (Direction from) to the object where the gyro is defined (Location)

### 3.3 User defined gyro

Properties

Instrument

Misc

Name	User defined Gyro 1
System Name	User defined Gyro 1
Info	Any ASCII string with either
Setup Id	11192
Offset	0,0,0
I/O Mode	ON
I/O	ATTU://127.0.0.1:5000
Gyro C-O	0 °
Minimum time slice	0 s
Latency	0 s
Item separator	Comma (,)
Read item at field	2
Item id	G=
Item length	0
Calculation	Result = Scale*(Observed -
Scale	1
Zero level	0

String Details

Read item at field

How must NaviPac separate fields in the string? Byte count defines the number of bytes (characters) before the start of the field. Specific separator implies that each separator defines a new item. Enter number of chars/items before the field you need to

Figure 6 Additional setup for user defined gyro input

For the user defined gyro the operator must specify how and where to read the data

- Item separator:  
How shall NaviPac divide the string into items – eg. By counting bytes, comma separated or using special item identifier (the above)
- Read item at field:  
Which item (separated) or byte (byte count) shall NaviPac read from. Note first item is called number 0
- Item id:  
A special search pattern to identify where to read the value. The number will be read just after this text.
- Item length:  
For byte count only – how many characters must we read in the string. This can be very important if the string in action just gives a continuous set of numbers without any separation. Enter 0 to ignore this,
- Scale:  
Shall the resulting gyro be scaled – eg. If input is in radians. See note in dump on the calculation.
- Zero level:  
Do we need an offset (before scaling) – eg. is data is from some A/D converter. See note in dump on the calculation.

## 4 Motion Sensor

Properties

Instrument

Misc

Name

TSS DMS05/TSS 335

System Name

TSS DMS05/TSS 335

Info

:aaaaaasnhhhhqnrssn

Setup Id

4

Offset

0,0,0

...

I/O Mode

ON

▼

I/O

com://com7:9600

...

Roll C-O

-0.06 °

Pitch C-O

0 °

Heave C-O

0.04 m

Minimum time slice

0 s

Latency

0 s

Check for aiding

☒

String Details

Number of bytes

32

Telegrams per cycle

50

Driver type

CRLF: Normal A

▼

String prefix

▼

Check for aiding

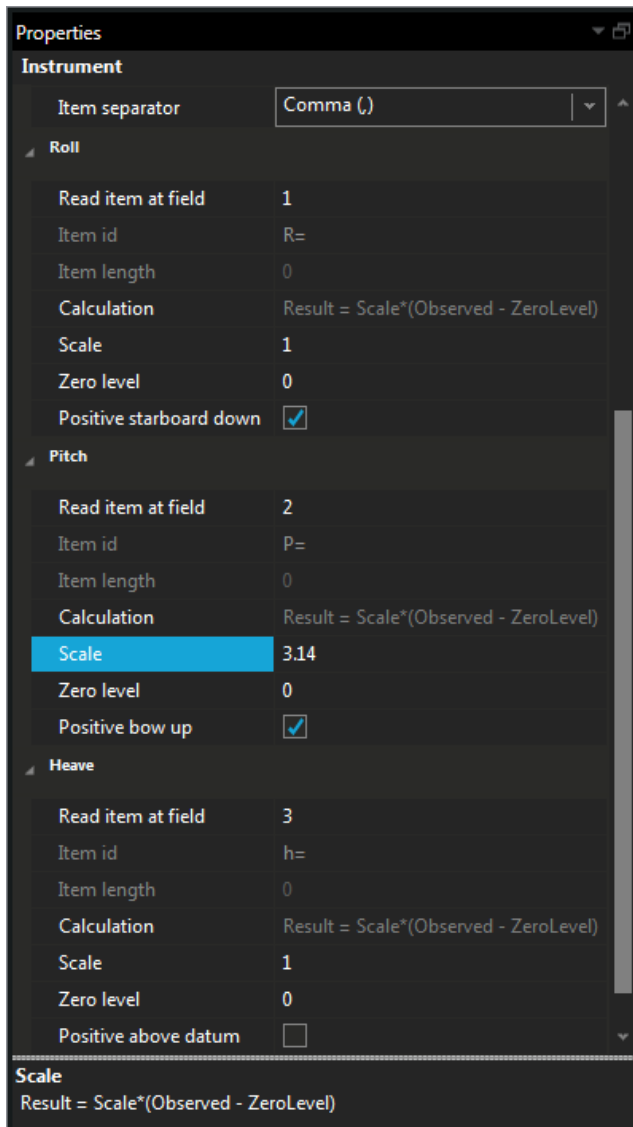
Must NaviPac discard the measurement if the sensor aiding isn't applied? Based on status flag from the TSS and Dynabase unit.

Figure 7 General setup for motion sensor input

The number of parameters may differ depending on the selected unit

- Roll, Pitch and Heave C-O  
Data add value – a value added to the raw instrument reading
- Minimum time slice  
Data down-sampling. If data density is closer than entered interval then data is down-sampled.
- Latency  
If the data has a known data delay then the latency can be entered here. Eg. For Octans.
- SeaPath format:  
Only for Seapath Gyro. Select the data source (binary EM1000, binary EM3000 or ASICC PSXN)
- Reverse Heave:  
Shall NaviPac reverse the heave sign? NaviPac uses positive above datum.  
Seen for SeaPath
- Check for aiding:  
TSS and Atlas Dynabase: Shall NaviPac flag invalid if motion system isn't aided

## 4.1 User defined motion sensor



**Properties**

**Instrument**

Item separator: Comma (,)

**Roll**

Read item at field: 1

Item id: R=

Item length: 0

Calculation:  $\text{Result} = \text{Scale} * (\text{Observed} - \text{ZeroLevel})$

Scale: 1

Zero level: 0

Positive starboard down: ☒

**Pitch**

Read item at field: 2

Item id: P=

Item length: 0

Calculation:  $\text{Result} = \text{Scale} * (\text{Observed} - \text{ZeroLevel})$

Scale: 3.14

Zero level: 0

Positive bow up: ☒

**Heave**

Read item at field: 3

Item id: h=

Item length: 0

Calculation:  $\text{Result} = \text{Scale} * (\text{Observed} - \text{ZeroLevel})$

Scale: 1

Zero level: 0

Positive above datum: ☐

**Scale**

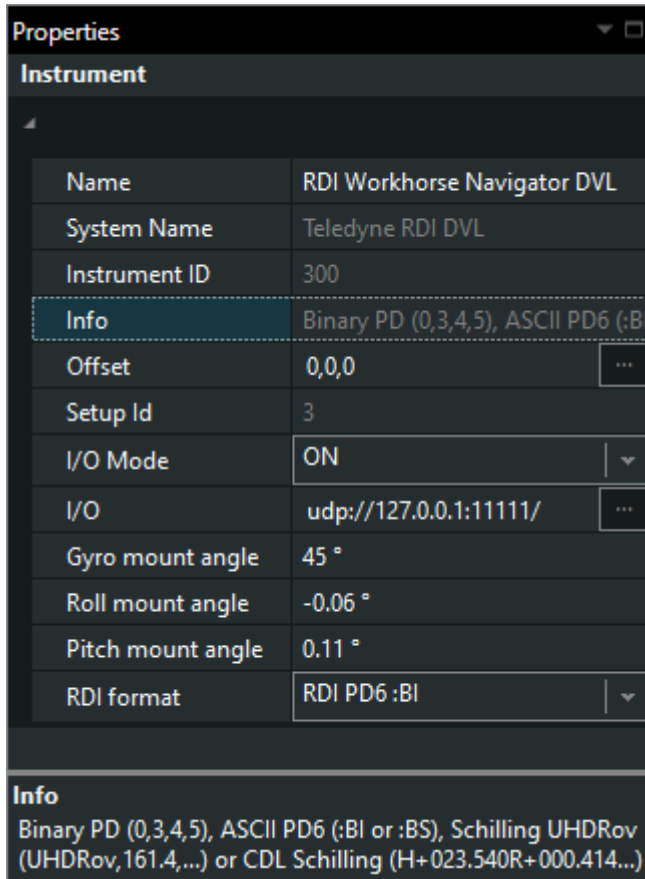
$\text{Result} = \text{Scale} * (\text{Observed} - \text{ZeroLevel})$

Figure 8 Additional setup for user defined motions sensors

For the user defined gyro the operator must specify how and where to read the data

- Item separator:  
How shall NaviPac divide the string into items – eg. By counting bytes or by comma separated (the above)
- Read item at field:  
Which item (separated) or byte (byte count) shall NaviPac read from. Note first item is called number 0. Goes for roll, pitch and heave. -1 indicates that NaviPac must ignore the item.
- Item id:  
A special search pattern to identify where to read the value. The number will be read just after this text.
- Item Length:  
For byte count only – how many characters must we read in the string. This can be very important if the string in action just gives a continuous set of numbers without any separation. Enter 0 to ignore this.
- Scale:  
Shall the resulting gyro be scaled – eg. If input is in radians. See note in dump on the calculation. Goes for roll, pitch and heave.
- Zero level:  
Do we need an offset (before scaling) – eg. is data is from some A/D converter. See note in dump on the calculation. Goes for roll, pitch and heave.
- Positive starboard down  
Is roll positive starboard down (default) or starboard up?
- Positive bow up  
Is pitch positive bow up (default) or bow down?
- Positive above datum  
Is heave positive above datum (default) or below datum?

## 5 Doppler Velocity Log



The screenshot shows the 'Properties' window for the 'Instrument' section. The 'Info' tab is selected, showing the following configuration:

Instrument	
Name	RDI Workhorse Navigator DVL
System Name	Teledyne RDI DVL
Instrument ID	300
Info	Binary PD (0,3,4,5), ASCII PD6 (:BI
Offset	0,0,0
Setup Id	3
I/O Mode	ON
I/O	udp://127.0.0.1:11111/
Gyro mount angle	45 °
Roll mount angle	-0.06 °
Pitch mount angle	0.11 °
RDI format	RDI PD6 :BI

**Info**  
Binary PD (0,3,4,5), ASCII PD6 (:BI or :BS), Schilling UHDRov (UHDRov,161.4,...) or CDL Schilling (H+023.540R+000.414,...)

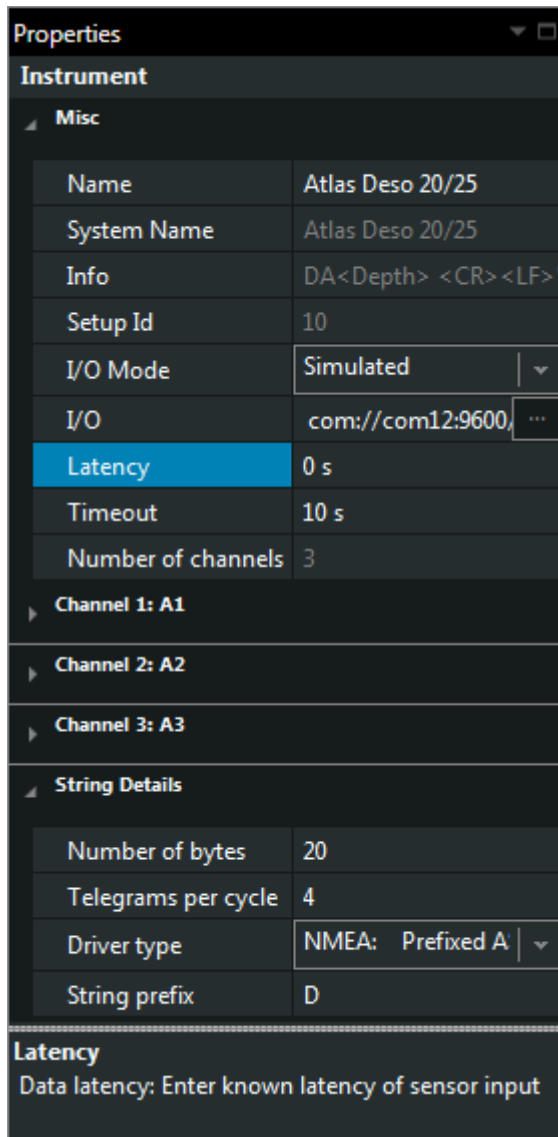
Figure 9 Detailed setup for DVL input

- RDI Format  
For Teledyne RDI DVL only.  
Select between the formats that NaviPac supports (various RDO formats and special Schilling variants)
- Gyro mount angle
- Roll mount angle
- Pitch mount angle  
Rotation mount angles for the DVL

Please note that there are no string details for Teledyne RDI DVL, as this is handled by the format selection.



## 6 Data acquisition



Properties	
<b>Instrument</b>	
Misc	
Name	Atlas Deso 20/25
System Name	Atlas Deso 20/25
Info	DA<Depth> <CR> <LF>
Setup Id	10
I/O Mode	Simulated
I/O	com://com12:9600
Latency	0 s
Timeout	10 s
Number of channels	3
Channel 1: A1	
Channel 2: A2	
Channel 3: A3	
String Details	
Number of bytes	20
Telegrams per cycle	4
Driver type	NMEA: Prefixed A
String prefix	D
<b>Latency</b>	
Data latency: Enter known latency of sensor input	

Figure 10 General setup of data acquisition input

- Latency  
If the data has a known data delay then the latency can be entered here.

- String prefix:  
Here you may enter string prefix which determines that only strings starting with this sub-string will be used. See notes on GPS
- Timeout  
Enter how many seconds NaviPac must wait before generating an alarm in case of missing data. Default is 10 seconds
- Number of channels  
read only field showing how many data items the driver supports

## 6.1 User defined data acquisition

Please note that user defined acquisition drivers may be re-used multiple times, but it is important that they are having exact same characteristics – string layout, scale etc.

Definition of free drivers is partly done on the instrument level and on the channel level – see section 6.3.

- Item separator:  
How shall NaviPac divide the string into items – eg. By counting bytes or by comma separated etc (User defined acquisition)

## 6.2 MAG G-880

Includes special scaling and offset for depth and altitude calculations

Properties

**Instrument**

**Misc**

Name	MAG G-880
System Name	MAG G-880
Info	\$<mag>, <AD Channel>
Setup Id	11190
Offset	1,2,1,0
I/O Mode	OFF
I/O	com://com93:19200
Latency	0 s
Timeout	10 s
Number of channels	3
Altitude scale	1.01
Altitude zero level	0.01
Depth scale	0.97
Depth zero level	-0.03

**Channel 1: Mag**

**Channel 2: Volts**

**Channel 3: Altitude**

**String Details**

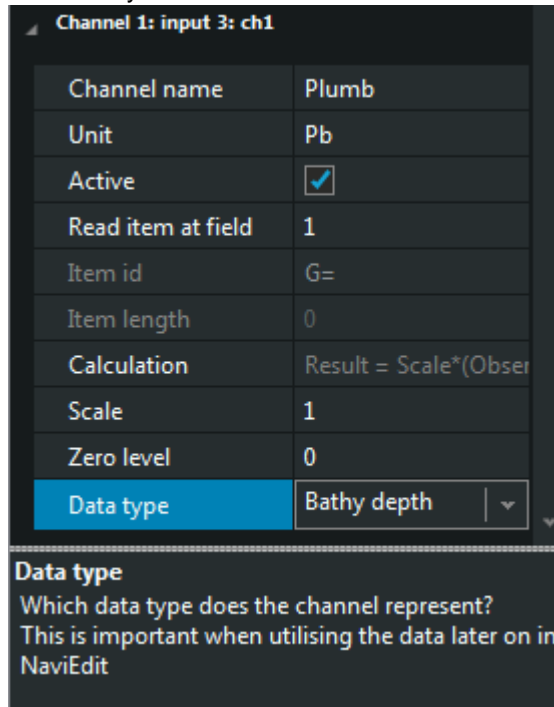
**Altitude scale**  
Result = Scale\*(Observed - ZeroLevel)

Figure 11 Special setup for magnetometer input

- Scale:  
Shall the resulting data be scaled – eg. If input is in cm.
- Zero level:  
Do we need an offset (before scaling).

## 6.3 Channel selection

Each acquisition input supports up to three channels – each channel must be defined individually.



Channel 1: input 3: ch1	
Channel name	Plumb
Unit	Pb
Active	<input checked="" type="checkbox"/>
Read item at field	1
Item id	G=
Item length	0
Calculation	Result = Scale*(Obser
Scale	1
Zero level	0
Data type	Bathy depth

**Data type**  
Which data type does the channel represent?  
This is important when utilising the data later on in NaviEdit

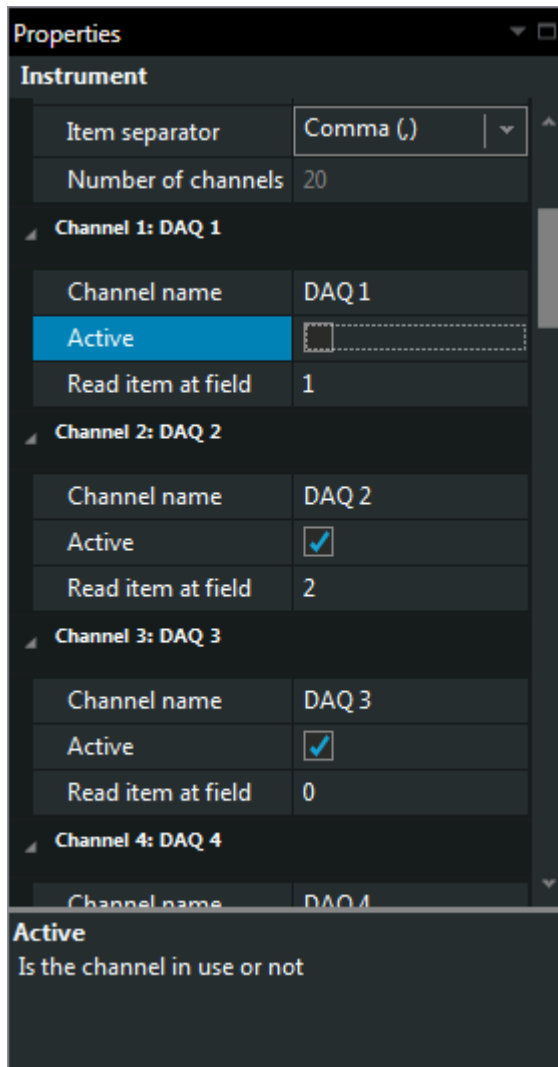
Figure 12 General channel (data source) selection

- Name  
User defined name of the data type. Please note that NaviPac requires unique naming – i.e. you must not use the same name twice
- Active  
Shall NaviPac use this channel or not
- Unit  
For display only – data unit
- Read item at field  
For user defined input: Which field shall NaviPac read. Note the first field is numbered 0.

- Item id:  
For user defined input : A special search pattern to identify where to read the value.  
The number will be read just after this text.
- Item length:  
For user defined input - byte count only: How many characters must we read in the string. This can be very important if the string in action just gives a continuous set of numbers without any separation. Enter 0 to ignore this.
- Scale:  
Shall the resulting data be scaled – eg. If input is in radians. (User defined acquisition).
- Zero level:  
Do we need an offset (before scaling) – eg. is data is from some A/D converter. (User defined acquisition).
- Data type  
For user defined input – identify the data type (echosounder, bathy, magnetometer or other). This has heavily influence on the usage in NaviEdit and various data outputs

## 6.4 Super acquisition inputs

NaviPac version 3.8.3 and onwards support a new type of data acquisition input's which allows assignment of up to 20 parameters to each input. The user defined version of this includes a huge series of parameters to define this:



**Properties**

**Instrument**

Item separator: Comma (,)

Number of channels: 20

**Channel 1: DAQ 1**

Channel name: DAQ 1

Active: ☐

Read item at field: 1

**Channel 2: DAQ 2**

Channel name: DAQ 2

Active: ☒

Read item at field: 2

**Channel 3: DAQ 3**

Channel name: DAQ 3

Active: ☒

Read item at field: 0

**Channel 4: DAQ 4**

Channel name: DAQ 4

**Active**

Is the channel in use or not

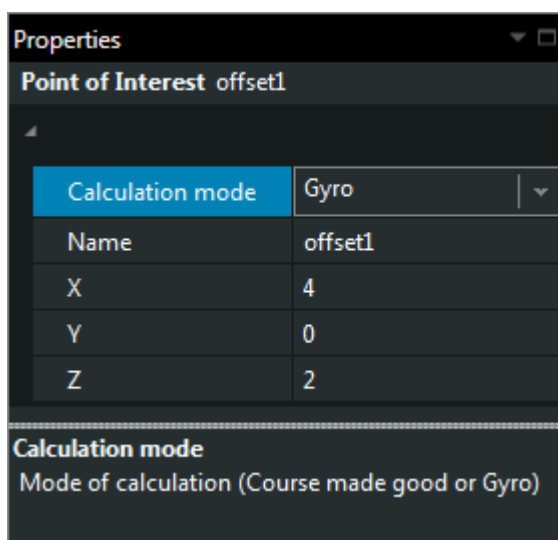
Figure 13 Special 20 channel input

- Number of channels  
Defines the number of active channels (1-20)
- Item separator  
Defines how to separate items (comma, space, semicolon, colon, tab or byte count)
- Channel  $n$  Item  
For each channel define the item number to read (or first byte in the string)

- Channel  $n$  Name  
A user defined name for the item
- Channel  $n$  Active  
is the channel in use or not

## 7 Point of interest

The POI (former known as User Defined Offsets) defines points at an vehicle



Calculation mode	Gyro
Name	offset1
X	4
Y	0
Z	2

**Calculation mode**  
Mode of calculation (Course made good or Gyro)

Figure 14 Definition of user defined offsets

- Offsets  
Specify the XYZ offset (the 3D arm) from the mother object to me.  
X: Positive starboard  
Y: Positive front  
Z: Positive up
- Calculation mode  
Select how the offset is calculated
  - Gyro  
The arm is roll, pitch and gyro corrected using gyro (required) and motion data (optional) from the primary sensors

- CMG  
The arm is gyro corrected using the calculated course (known as CMG or COG) and motion corrected using the primary roll/pitch sensor.
- Drag  
The object is considered to be dragged (pulled) in a chain after the mother object. Will give a smooth position, as the relative heading between object and mother are kept stable.  
*Defined as Dynamic Position: Dragged offset*
- Depth compensated Drag  
Same as drag – but compensated for depth below mother object. The input is treated as cable out information and the layback is calculated using simple triangle (Pythagoras) calculation of depth and cable out.  
*Defined as Dynamic Position: Dragged offset*

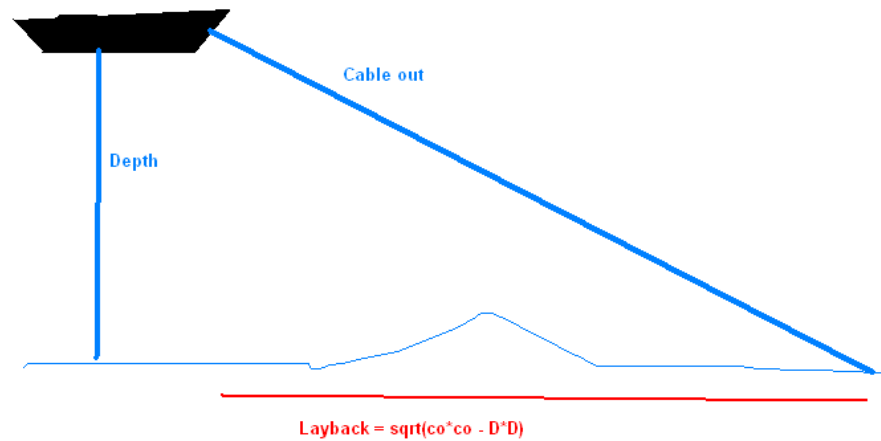


Figure 15 The triangular calculation

- Relative Positon  
The target is calculated a mid point between two other vehicles based on defined relative distance  
*Defined as Dynamic Position: Relative Offset*
- Circular Average – currently not available  
Similar to secondary. Calculates a new position based on two input's as the input is the range from both objects to the new and the resulting position is the circular crossing of the two – using the solution behind them. The resulting heading is defined as average of the two directions from new to old.



## 8 Dynamic positioning

NaviPac supports a series of what we call dynamic positioning – that is positioning of external or UW vessels. Some properties are defined at instrument level at both the main vessel (eg USBL) and the vehicle in use while other just are defined as instruments on the vehicle (eg range/bearing system)

### 8.1 USBL Position

The USBL data will be defined both on the vessel (mounting and io) and on the target vehicle

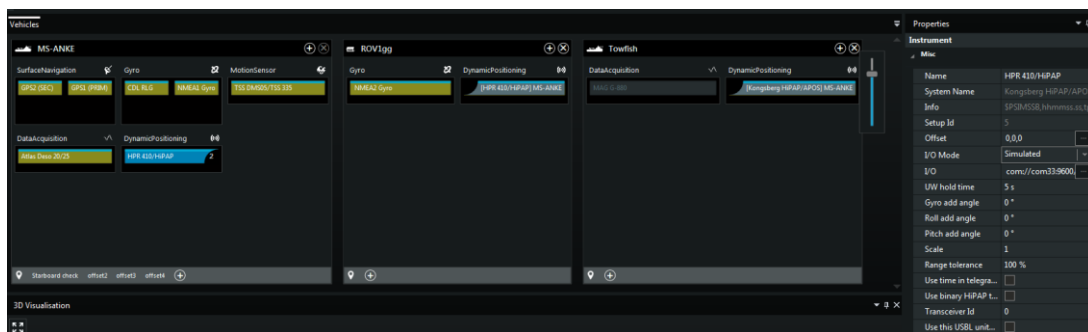


Figure 16 Vessel part of USBL configuration

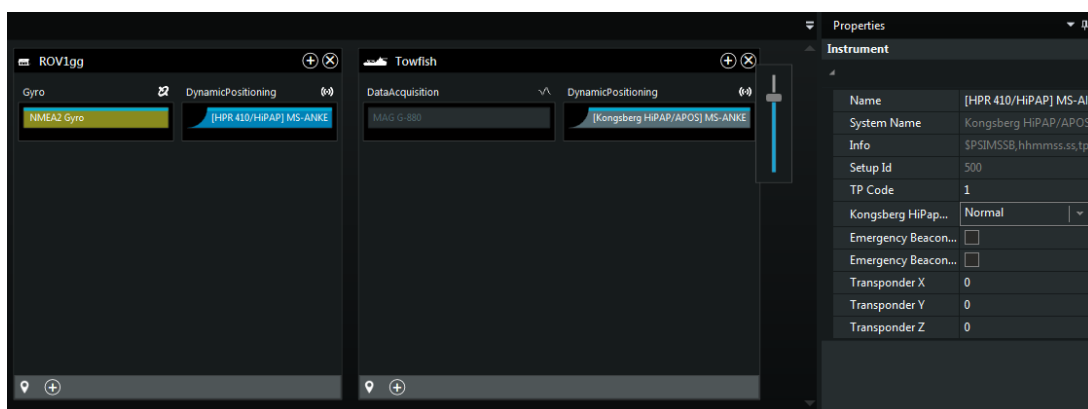


Figure 17 Vehicle part of the USBL configuration

Properties

Instrument

Misc

Name	HPR 410/HiPAP
System Name	Kongsberg HiPAP/APOS
Info	\$PSIMSSB,hhmmss.ss,tp,
Setup Id	5
Offset	0,0,0
I/O Mode	Simulated
I/O	com://com33:9600,
UW hold time	5 s
Gyro add angle	0 °
Roll add angle	0 °
Pitch add angle	0 °
Scale	1
Range tolerance	100 %
Use time in telegra...	<input type="checkbox"/>
Use binary HiPAP t...	<input type="checkbox"/>
Transceiver Id	0
Use this USBL unit...	<input type="checkbox"/>

String Details

UW hold time

How long time must NaviPac keep the position before falgging invalid due to time-out

Figure 18 Definition of an ultra-short baseline system

- UW hold time  
 How long time shall NaviPac keep the USBL position before flagging it invalid, i.e. the object state changes to red.

- Gyro add angle  
Horizontal mount error of the USBL system. Found in USBL calibration  
Note can also be entered in most USBL systems – do not enter both places!
- Roll add angle  
Vertical (XZ) mount error of the USBL system. Found in USBL calibration.  
Note can also be entered in most USBL systems – do not enter both places!
- Pitch add angle  
Vertical (YZ) mount error of the USBL system. Found in USBL calibration.  
Note can also be entered in most USBL systems – do not enter both places!
- Scale  
Gives scale factor for raw USBL range – due to wrong sound velocity or similar.  
Found in USBL calibration.
- Range tolerance  
Shall NaviPac check and de-spike data? The data tolerance (% of total range) defines how big a window we shall allow. 100% results in use all data. If you are on 700-meter range and have defined a tolerance of 2%, then jumps in data bigger than 14 meter are removed.
- Use time in telegram  
Shall we use the time in the Kongsberg HiPap string to determine age of USBL data? Require that both systems is synchronised to GPS and PPS.  
*This entry is disabled for non Kongsberg systems.*
- Use binary HiPap telegram  
Shall NaviPac read binary (HPR300 and HiPap) or ASCII (HiPap NMEA etc) from the Kongsberg system.  
*This entry is disabled for non-Kongsberg systems.*
- Transceiver id  
For Kongsberg dual transceiver only. Select transceiver number. See section in data formats for details
- Use this USBL unit for differential USBL  
NaviPac 3.5 patch 4 utilises a simple differential USBL function. The operator may use one or two objects as reference in the USBL setup. He must enter the known coordinates (X, Y, Z) in a special online window (pops up automatically) and NaviPac monitors hereafter the error between measured and entered. These values are then applied directly to all objects (or more correct copy of all objects) positioned by this USBL system – and thus delivering a solution similar to differential GPS.

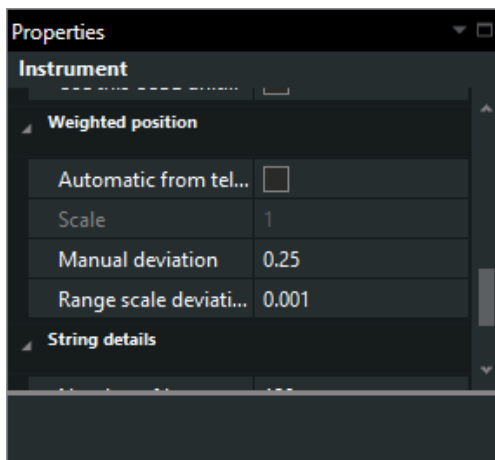


Figure 19 Dynamic positioning – weighting

The position weighting enables the operator to control how NaviPac combines multiple position items into on solution based on reverse standard deviation

- Automatic from telegram  
Use the standard deviation read from the input telegram – eg. Kongsberg \$PSIMSSB
- Scale  
For automatic – scale the value read from telegram.
- Manual deviation
- Range scale deviation  
Non-automatic. Define the deviation as a constant plus a fraction of the range

### 8.1.1 Target

For each selected vehicle, the following parameters must be defined.

Properties

Instrument

Name	[HPR 410/HiPAP] MS-ANKE
System Name	Kongsberg HiPAP/APOS - client
Info	\$PSIMSSB,hhmmss.ss,tp,Status,error,coord,ori
Setup Id	500
TP Code	1
Kongsberg HiPap Mode	Normal
Emergency Beacon A	<input type="checkbox"/>
Emergency Beacon B	<input type="checkbox"/>
Transponder X	0
Transponder Y	0
Transponder Z	0

**Kongsberg HiPap Mode**  
The Kongsberg APOS (HiPap) can be used in three modes  
Normal: The ordinary mode with one transducer  
Master: Dual transducer - use the master solution  
Slave: Dual transducer - use the slave solution

Figure 20 Definition of the USBL target(s)

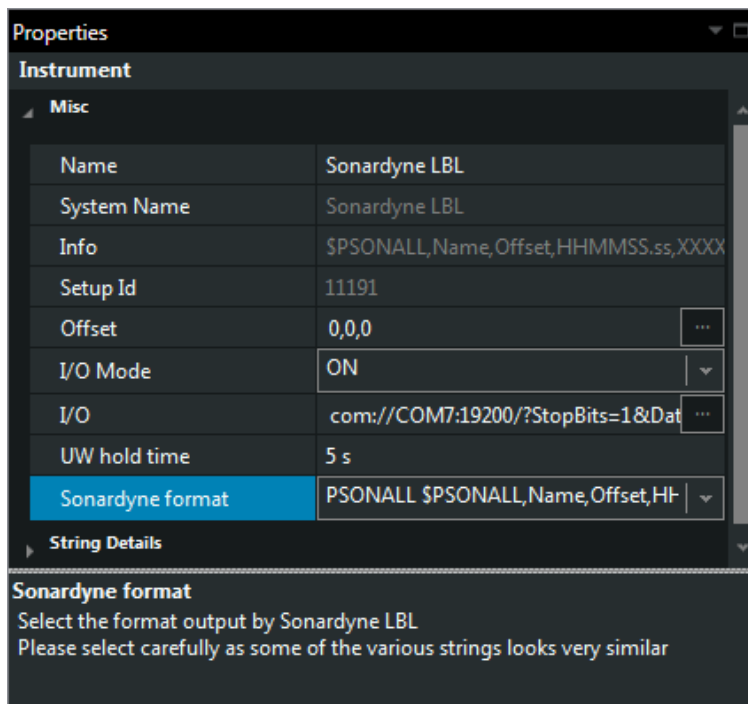
- Name  
Identifies the position source
- TP Code  
Select the transponder number defined for this object. It must correspond to the selection on the USBL system.
- Kongsberg mode (For HiPAP/APOS only)
  - Normal
  - Master
  - Slave  
Is the USBL part of a dual head solution – and is this data measured from master, slave or ordinary input.
- Emergency A

- Emergency B  
Kongsberg only (For HiPAP/APOS only) – special beacon
- Transponder offsets  
If the required position calculated for this object is different from the transponder position (eg. you just need the CRP and not the raw observed position), then the operator must specify the X,Y,Z offset here.  
Please note that these values are treated as ordinary antenna offsets, ie. Defined as offset from CRP to the transponder.  
$$CRP = raw\ TP - Offsets(3D\ compensated).$$
  
Note that this requires as minimum a gyro and preferable a motion sensor is attached to the object!  
This can also be obtained by specifying an user-defined offset on the object.

## 8.2 LBL Position

The position output is assumed to be a final computed position (in grid components or latitude/longitude) and NaviPac just assign that to internal objects.

The LBL data will be defined both on the vessel (mounting and io) and on the target vehicle



Properties	
Instrument	
<b>Misc</b>	
Name	Sonardyne LBL
System Name	Sonardyne LBL
Info	\$PSONALL,Name,Offset,HHMMSS.ss,XXXX
Setup Id	11191
Offset	0,0,0
I/O Mode	ON
I/O	com://COM7:19200/?StopBits=1&Dat
UW hold time	5 s
Sonardyne format	PSONALL \$PSONALL,Name,Offset,HH
<b>String Details</b>	
<b>Sonardyne format</b> Select the format output by Sonardyne LBL Please select carefully as some of the various strings looks very similar	

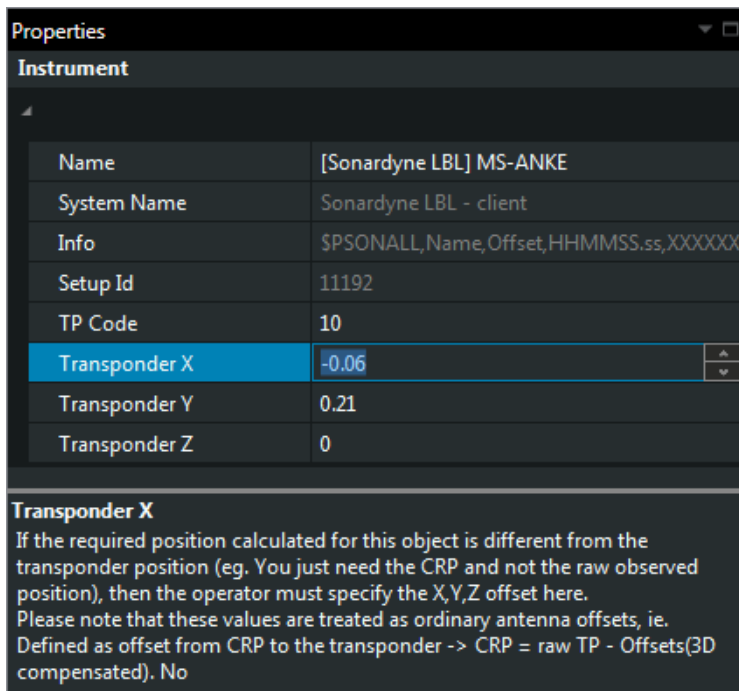
- UW hold time  
How long time shall NaviPac keep the USBL position before flagging it invalid, i.e. the object state changes to red.
- Sonardyne Format  
Select the output format from Sonardyne APS3. Supports Stolt Offshore 1 and 2, Geoconsult and special Pharos formats:
  - Mode1="FXT;time,E east, N,north,D depth,A error,H heading,T id" ->Geoconsult
  - Mode2="FXT;delay,TARGET SINGL TRAK,E east, N north,D depth,A error,H heading" -> Stolt Offshore 1
  - Mode3="FXT;tttt.tt,m,Eeeeeee. ee,Nnnnnnnn.nn,Dddddd.dd,Axx.xx,Hhhh.h ->Stolt Offshore 2
  - EIVA/Pharos =  
<sup>2</sup>"FXTNP;ID,HH:MM:SS.ss,LL.LL,Eeeeeeeee. ee,Nnnnnnnn.nn,Dddddd.dd ,Saaa.aa,Maaa.aa,Taaa.aa,Paaa.aa,Hhhh.h<cr><lf>"

<sup>2</sup> This is called Fusion in newer Sonardyne systems

- PSONALL  
\$PSONALL,Name,Offset,HHMMSS.ss,XXXXXXXXXX.xx,YYYYYYYYYY.yy,D  
DDD.dd,HHH.hh,CCC.cc,T,PP.PP,RR.RR,VVV.vv,AAA.A,BBB.B\*hh

### 8.2.1 Target

For each selected vehicle (an object assigned to a transponder/responder) the following parameters must be defined.



Properties	
<b>Instrument</b>	
Name	[Sonardyne LBL] MS-ANKE
System Name	Sonardyne LBL - client
Info	\$PSONALL,Name,Offset,HHMMSS.ss,XXXXXXX
Setup Id	11192
TP Code	10
Transponder X	-0.06
Transponder Y	0.21
Transponder Z	0

**Transponder X**  
If the required position calculated for this object is different from the transponder position (eg. You just need the CRP and not the raw observed position), then the operator must specify the X,Y,Z offset here. Please note that these values are treated as ordinary antenna offsets, ie. Defined as offset from CRP to the transponder ->  $CRP = raw\ TP - Offsets(3D\ compensated)$ . No

Figure 21 Definition of LBL targets

- Name  
Identifies the position source
- TP Code  
Select the transponder number defined for this object. It must correspond to the selection on the LBL system.
- Transponder offsets  
If the required position calculated for this object is different from the transponder position (eg. you just need the CRP and not the raw observed position), then the operator must specify the X,Y,Z offset here.



Please note that these values are treated as ordinary antenna offsets, ie. Defined as offset from CRP to the transponder.

$$CRP = raw\ TP - Offsets(3D\ compensated).$$

Note that this requires as minimum a gyro and preferable a motion sensor is attached to the object!

This can also be obtained by specifying a user-defined offset on the object.

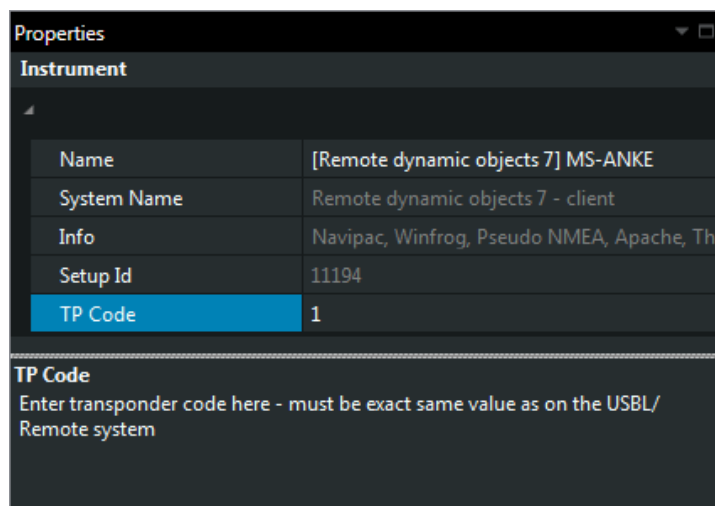
## 8.3 Remote Dynamic Objects

The position output is assumed to be a final computed position (in grid components or latitude/longitude) and NaviPac just assign that to internal objects. NaviPac supports a series of formats like NaviPac, WinFrog, IMCA, Apache, QPS Pseudo NMEA, Tracs etc.

The remote position data will be defined both on the vessel (mounting and io) and on the target vehicle

### 8.3.1 Target

For each selected vehicle (an object assigned to a identification number) the following parameters must be defined.



Instrument	
Name	[Remote dynamic objects 7] MS-ANKE
System Name	Remote dynamic objects 7 - client
Info	Navipac, Winfrog, Pseudo NMEA, Apache, Th
Setup Id	11194
TP Code	1

**TP Code**  
Enter transponder code here - must be exact same value as on the USBL/ Remote system

Figure 22 Definition of target for remote navigation input

- Name  
identification of position source
- TP Code  
Select the code number defined for this object. It must correspond to the selection in the outputting system.  
For IMCA outputs please note that a mapping between IMCA name and NaviPac numbers has to be defined. This is done in the Options, Survey Parameters menu.

## 8.4 Total station from vessel to target

The total stations like AGA, Leica and similar are always defined as measurements from the main vessel (vehicle 0) to the target. The total station is assumed to be oriented in vessel coordinate system – but has possibility to add mounting corrections for some units.

Info	Uses ASCII format item 7, 8 and 9	
Offset	10,0,0	...
Setup Id	6	
I/O Mode	Simulated	▼
I/O	com://com6:19200/?StopBit	...
Gyro add angle	1 °	
Roll add angle	2 °	
Pitch add angle	3 °	
Fixed latency	0.3 s	
Perform roll/pitch...	<input checked="" type="checkbox"/>	
Weighted position		
Manual deviation	1	
Prism		
Prism X	5	
Prism Y	-10	
Prism Z	0	

Figure 23 Leica total station

- Offset  
identification of offset on the main vessel to the tracking device
- Prism  
Offsets of the prisms on the target. Requires that you have as minimum gyro on the target vehicle

- Mount angles  
Mounting correctio of the total station relative to vessel coordinate system
- Perform roll/pitch correction  
Shall NaviPac compensate the measurements from the unit for roll/pitch from the main vessel MRU
- Weighting  
When using multiple prisms -possible to weight them individually

## 8.5 Total station from fixed location to target

You may also use a total station mounted on a fixed location and tracking a prism on the target. This will be a 2D position solution, Here you must enter the coordinates of the fixed location – and the output is assumed to be related to north.

Properties

Instrument

Misc

Name	AGA/Leica from fixed point		
System Name	AGA/Leica from fixed point		
Instrument ID	410		
Info	Uses ASCII format item 7, 8 and 9		
Offset	0,0,0	...	
Setup Id	13		
I/O Mode	ON	▼	
I/O	com://COM1:19200/?StopB	...	
Station easting	500000	▲▼	
Station northing	6300000		

String details

Number of bytes	120		
Telegrams per cycle	4		
Driver type	CRLF: Normal ASCII String	▼	
String prefix			

Station easting

Position of reference point - East

Figure 24 Leica from fixed location

## 9 Data outputs

NaviPac has many specialised outputs. Most setup should be self-explainable – some very special. Some inputs covers multiple position vehicles – than can either be performed via section of multiple vehicles or adding the output to more vehicles (eg data to external nav system)

This section covers most general items.

Properties

**Instrument**

**Misc**

Name	Position to NaviScan
System Name	Position to NaviScan
Info	E nnnnnn hh:mm:ss EEEEEEEE.EE NNNNNNN
Setup Id	11195
I/O Mode	ON
I/O	UDP://127.0.0.1:5000/
Scale positions and depths	<input type="checkbox"/>
Include MC	<input type="checkbox"/>

**File based output**

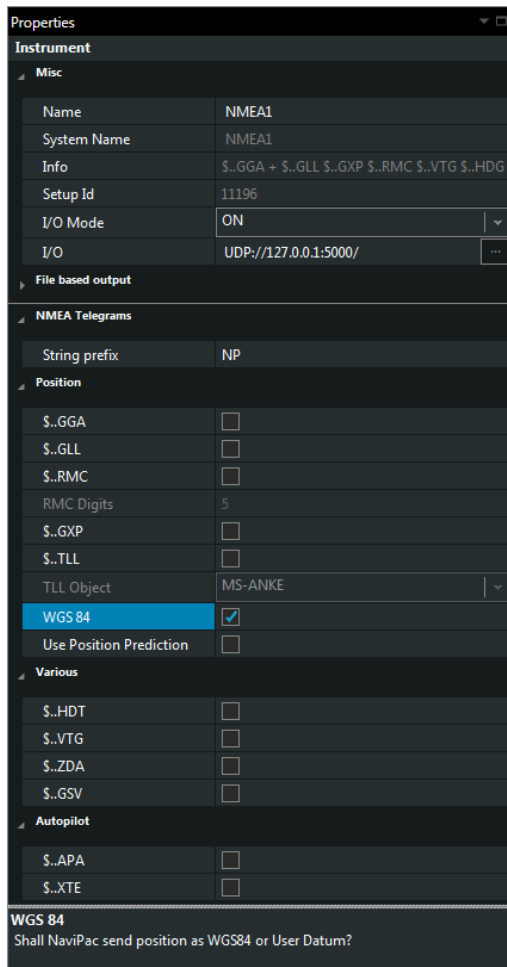
Recording path	C:\EIVA\NaviPac\Data
File splitting	No of bytes
Split after	100

**File splitting**  
Limit the file size in time (min) or size (KB)?

Figure 25 General definition of data output

- Scale positions and depths  
If you are operating in non-metric system then you may control if the output shall be in metric or in user selected data unit. (Future use)
- File information  
If data is output to a file then you may select name, path and size

## 9.1 NMEA



The screenshot shows the 'Properties' dialog box for an NMEA instrument. The 'Instrument' section is expanded, showing fields for Name (NMEA1), System Name (NMEA1), Info (\$..GGA + \$..GLL \$..GXP \$..RMC \$..VTG \$..HDG), Setup Id (11196), I/O Mode (ON), and I/O (UDP://127.0.0.1:5000/). The 'File based output' section is also expanded. The 'NMEA Telegrams' section is expanded, showing 'String prefix' (NP) and 'Position' settings. Under 'Position', several checkboxes are shown: \$..GGA, \$..GLL, \$..RMC, \$..GXP, \$..TLL, and TLL Object (MS-ANKE). The 'WGS 84' checkbox is checked, and 'Use Position Prediction' is unchecked. The 'Various' section shows checkboxes for \$..HDT, \$..VTG, \$..ZDA, and \$..GSV. The 'Autopilot' section shows checkboxes for \$..APA and \$..XTE. At the bottom, there is a 'WGS 84' section with a question: 'Shall NaviPac send position as WGS84 or User Datum?'.

Figure 26 Special setup of NMEA data output

- String prefix  
Enter the two character to put in between the \$ and the first ID (The NMEA TALKER)
- Position  
Select between various positions formats. You may select 0, 1 or more as you need.

- Datum  
Shall NaviPac output position in user datum (default) or WGS84
- Use Position Prediction  
Shall NaviPac extrapolate the position to real-time predicted value?
- TLL Object  
The target output may represent another object (eg. Towed vehicle) than the primary selected)
- Various  
Select between various auxillian formats. You may select 0, 1 or more as you need.
- Autopilot  
Select between various runline status data formats. You may select 0, 1 or more as you need.

## 9.2 User defined outputs

User defined outputs has been re-enabled in NaviPac4.5 – and works similar to the solution in NaviPac 3. Please see dedicated manual on user defined outputs for details.

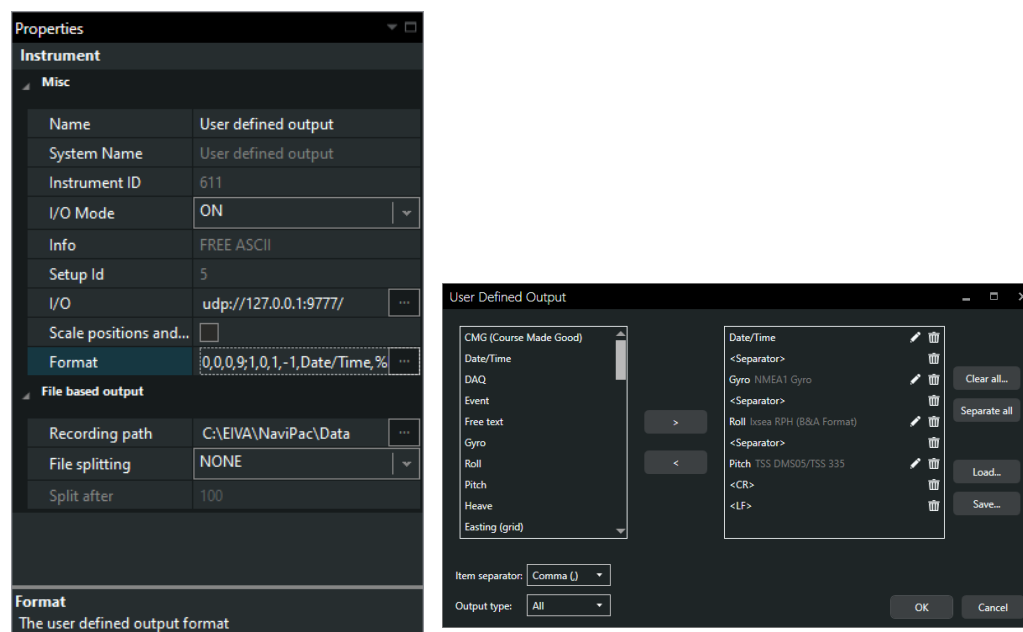
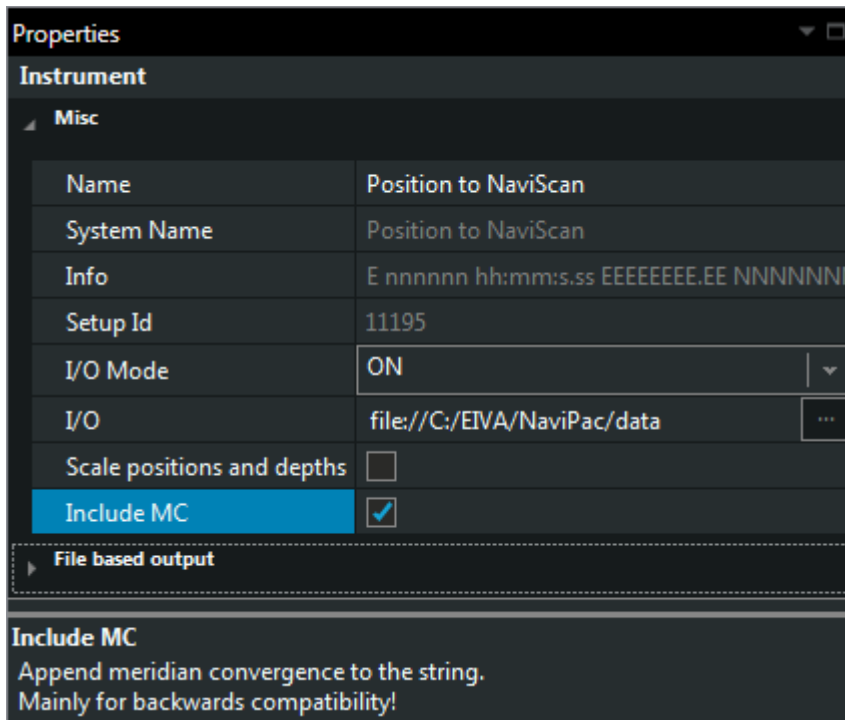


Figure 27 Details on user defined outputs

## 9.3 Data to NaviScan



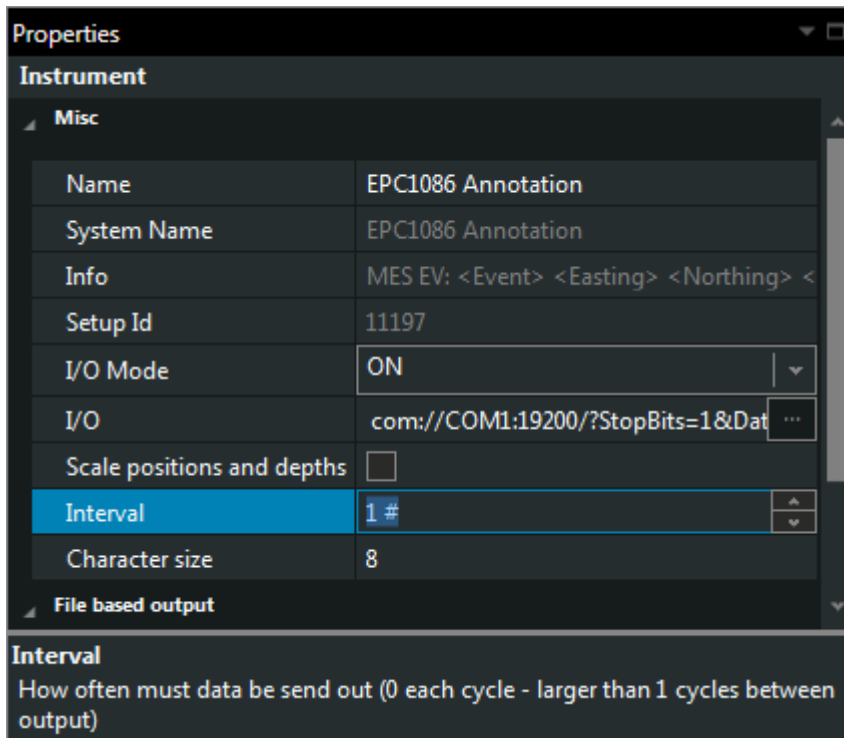
Properties	
Instrument	
Misc	
Name	Position to NaviScan
System Name	Position to NaviScan
Info	E nnnnnn hh:mm:ss EEEEEEEE.EE NNNNNNN
Setup Id	11195
I/O Mode	ON
I/O	file://C:/EIVA/NaviPac/data
Scale positions and depths	<input type="checkbox"/>
Include MC	<input checked="" type="checkbox"/>
File based output	
<b>Include MC</b> Append meridian convergence to the string. Mainly for backwards compatibility!	

Figure 28 Special parameters for data to NaviScan

- Include MC**  
Shall NaviPac send Meridian Convergence value to NaviScan. Recommended to be selected when used with older NaviScan versions



## 9.4 Annotation of EPC Recorders



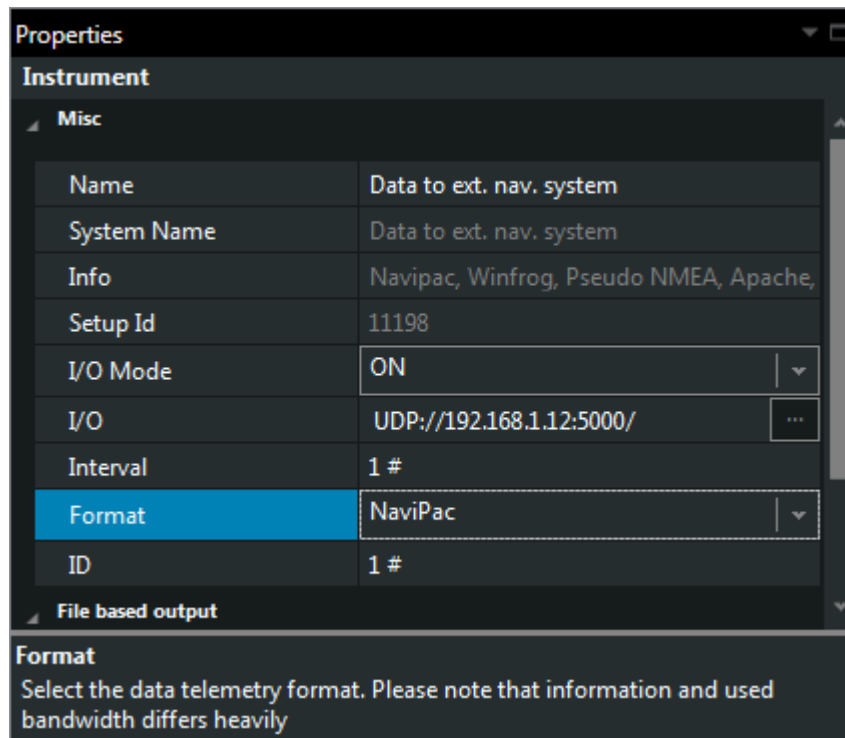
Properties	
Instrument	
Misc	
Name	EPC1086 Annotation
System Name	EPC1086 Annotation
Info	MES EV: <Event> <Easting> <Northing> <
Setup Id	11197
I/O Mode	ON
I/O	com://COM1:19200/?StopBits=1&Dat...
Scale positions and depths	<input type="checkbox"/>
Interval	1 #
Character size	8
File based output	
Interval	
How often must data be send out (0 each cycle - larger than 1 cycles between output)	

Figure 29 Special setup of EPC data annotation

- Interval  
Specify how often (event interval) the annotation must be performed.
- Character size  
Specify size of EPC characters (between 1 and 9). Changes will be applied online!

## 9.5 Data to external navigation system

Data to external navigation systems and similar contains multiple vehicles in same output. This is done by defining the output on each vehicle with same destination.



The screenshot shows the 'Properties' window with the 'Instrument' section expanded. The 'Misc' tab is selected, displaying a table of settings:

Property	Value
Name	Data to ext. nav. system
System Name	Data to ext. nav. system
Info	Navipac, Winfrog, Pseudo NMEA, Apache,
Setup Id	11198
I/O Mode	ON
I/O	UDP://192.168.1.12:5000/
Interval	1 #
Format	NaviPac
ID	1 #

Below the table, the 'File based output' section is collapsed. The 'Format' section is expanded, showing a note: 'Select the data telemetry format. Please note that information and used bandwidth differs heavily'.

Figure 30 Selection and setup of data to external navigation systems

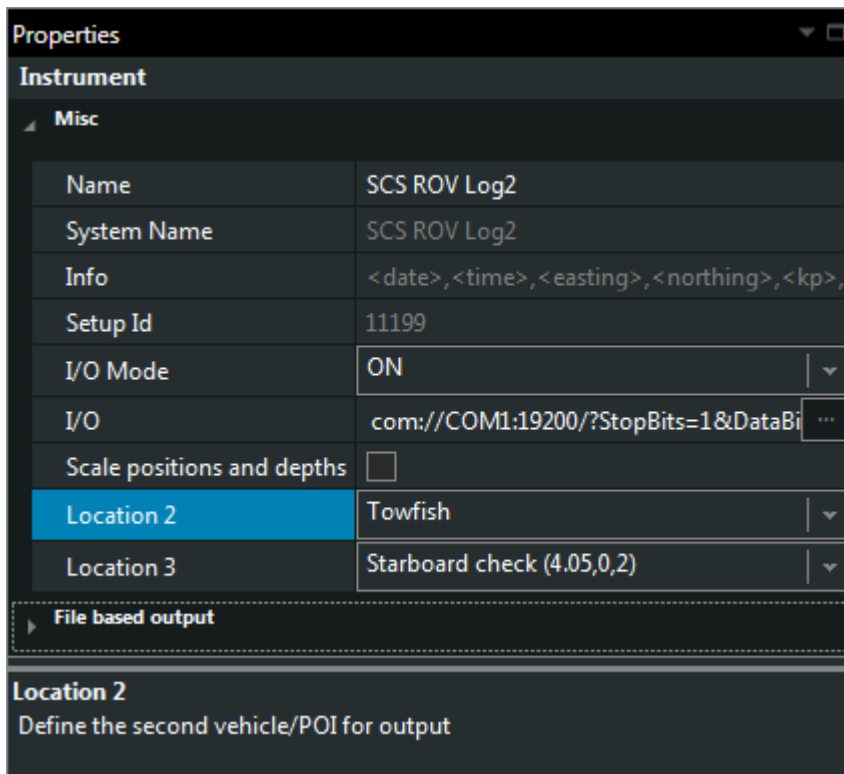
- **Format:**  
In this list you select what format you want to output:
  - NaviPac:  
Compressed format that is most efficient if two or more NaviPac systems exchange information. Includes position and heading.
  - WinFrog:  
Send data on the WinFrog format
  - NMEA:  
Send data on a pseudo NMEA format (header is \$xxGGA and \$xxHDT, where xx is the object id).

- **Expanded NaviPac:**  
Ordinary NaviPac format plus motion data, quality factors and data acquisition data.
- **\$SFPOS:**  
Output of position using the Apache format
- **IMCA:**  
Position and heading using standard IMCA format – remember to specify IMCA ID in Survey Parameters
- **NaviPac + tug State:**  
The short NaviPac format plus status of primary GPS sensor (satellites, HDOP, Quality) sent every 10<sup>th</sup> update.  
Do also output geodesy information with low frequency.  
This is mainly used between tug's and barges.
- **Sonsub \$PSURP**  
Position and attitude data in special Sonsub format.
- **Kongsberg \$PSIMSSB**  
Position data in Kongsberg NMEA format – position in radians. Compatible with IxSea ROVINS/Phins.
- **Interval:**  
Here you specify the output rate, as the value is a multiple of cycles.
- **ID:**  
Unique id number (corresponding to transponder codes).

*Similar dialogues are used for position to EIVA 3D, Acergy ACDAT etc.*

## 9.6 Dual or triple object outputs

Some outputs as data to Data to Datasonics ChirpII, ROVLOG, ArcScene etc requires specification of 2 or three objects.

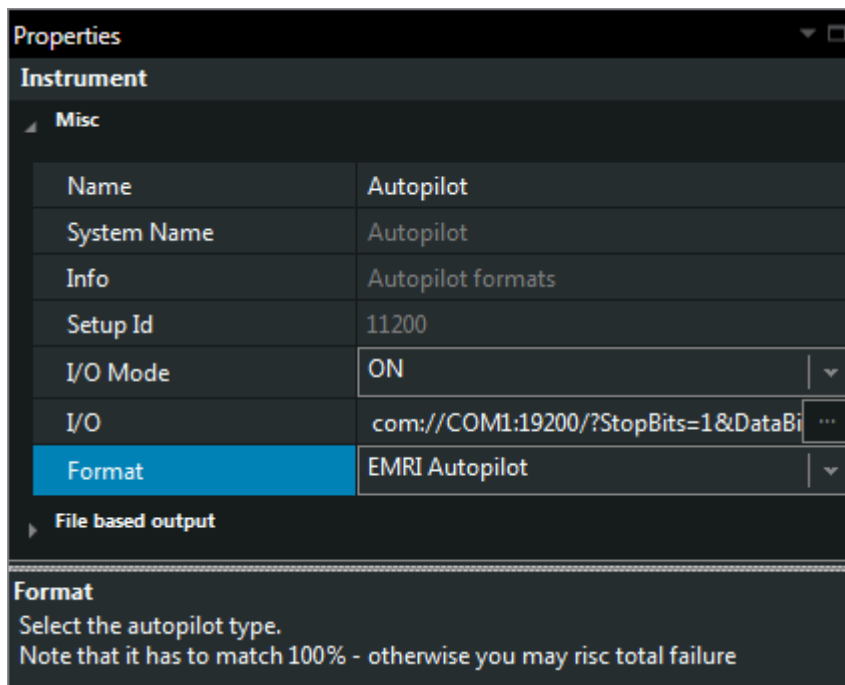


Properties	
Instrument	
Misc	
Name	SCS ROV Log2
System Name	SCS ROV Log2
Info	<date>,<time>,<easting>,<northing>,<kp>,<
Setup Id	11199
I/O Mode	ON
I/O	com://COM1:19200/?StopBits=1&DataBi ...
Scale positions and depths	<input type="checkbox"/>
Location 2	Towfish
Location 3	Starboard check (4.05,0,2)
File based output	
Location 2 Define the second vehicle/POI for output	

Figure 31 General handling of outputs with multiple objects

The first object is the vehicle where the output is attached to. The up to two other can be selected between vehicles and POI's

## 9.7 Autopilot



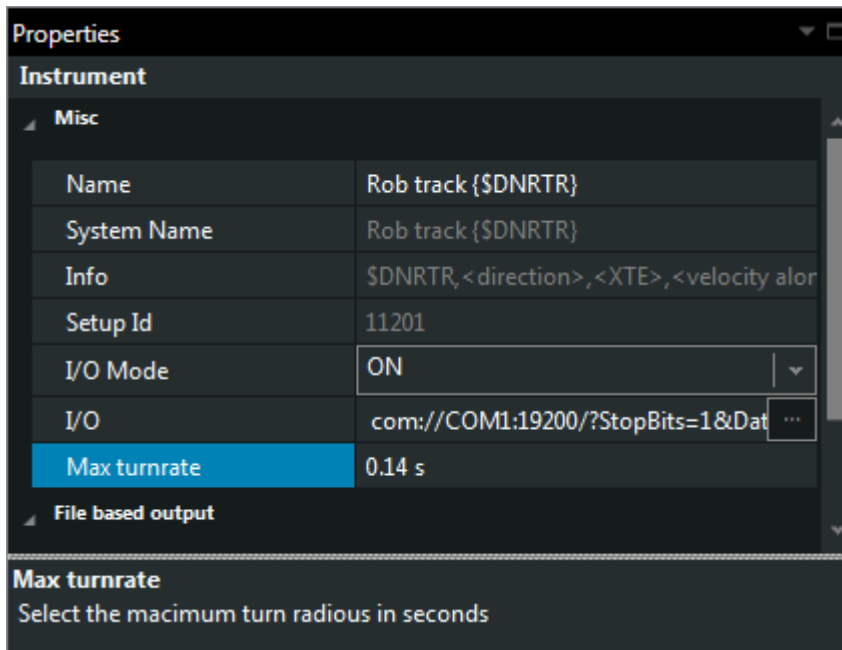
Properties	
Instrument	
Misc	
Name	Autopilot
System Name	Autopilot
Info	Autopilot formats
Setup Id	11200
I/O Mode	ON
I/O	com://COM1:19200/?StopBits=1&DataBi
Format	EMRI Autopilot
File based output	
<b>Format</b> Select the autopilot type. Note that it has to match 100% - otherwise you may risc total failure	

Figure 32 Detailed autopilot settings

The advanced (two way communication) autopilot allows selection of data format

- EMRI
- None – out dated
- Condor Autotrack
- Kongsberg DP
- EMRI SEM 200
- Sjöfartsverket Low speed

## 9.8 Data to Rob Track



The screenshot shows the 'Properties' window for an instrument. The 'Instrument' tab is selected, and the 'Misc' section is expanded. The 'Max turnrate' field is highlighted in blue and set to '0.14 s'. Below the table, there is a section for 'File based output' and a 'Max turnrate' label with a description: 'Select the macimum turn radius in seconds'.

Misc	
Name	Rob track {\$DNRTR}
System Name	Rob track {\$DNRTR}
Info	\$DNRTR,<direction>,<XTE>,<velocity alor
Setup Id	11201
I/O Mode	ON
I/O	com://COM1:19200/?StopBits=1&Dat
Max turnrate	0.14 s

**File based output**

**Max turnrate**  
Select the macimum turn radius in seconds

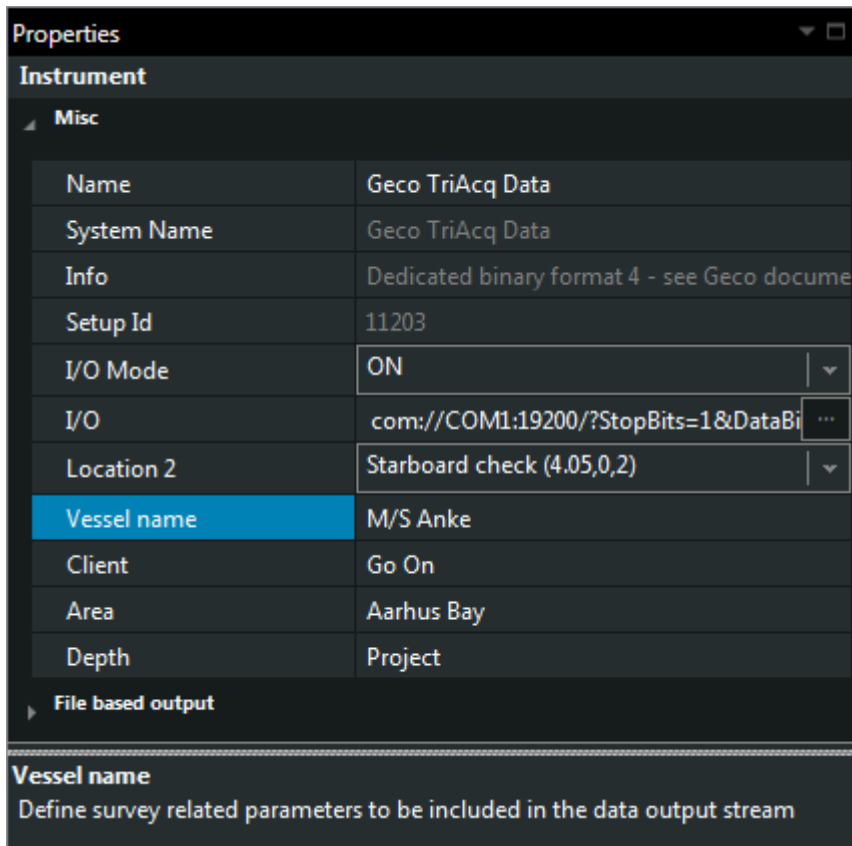
Figure 33 Special handling of Rob Track

- Max Turn rate  
Enter the maximum turn rate in seconds

## 9.9 DOF Subsea Pipe inspection

Not supported in the Kuda editon

## 9.10 Data to Geco TriAcq



Properties	
Instrument	
Misc	
Name	Geco TriAcq Data
System Name	Geco TriAcq Data
Info	Dedicated binary format 4 - see Geco docume
Setup Id	11203
I/O Mode	ON
I/O	com://COM1:19200/?StopBits=1&DataBi
Location 2	Starboard check (4.05,0,2)
Vessel name	M/S Anke
Client	Go On
Area	Aarhus Bay
Depth	Project
File based output	
Vessel name	
Define survey related parameters to be included in the data output stream	

Figure 34 Selection for Geco seismic operations

Definition of a series of parameters specific for this output

## 9.11 Data to Coda

Most settings are handled via right mouse and Edit Special Settings. Select which data shall be used for bathy and altitude.

Properties

Instrument

Misc

Name	Coda Data
System Name	Coda Data
Info	<Date> <Time> <Reference position> <Offse
Setup Id	11204
I/O Mode	ON
I/O	com://COM1:19200/?StopBits=1&DataBi
Scale positions and depths	
Depth	Atlas Deso 20/25
Channel number	2 #
Altitude	MAG G-880
Channel number	1 #

File based output

Depth

Select the source for the depth calcaultion by instrument and channel number

Figure 35 Data output to Coda Octopus



## 9.12 EMGS TX

Special output for EMGS TX recordings

Properties

Instrument

Misc

Name	EMGS TX
System Name	EMGS TX
Instrument ID	910
I/O Mode	ON
Info	EMGS TX recording
Setup Id	19
I/O	folder:///c:/eiva/navi
Offset	Rx Deploy (-20,-20,0)
Interval	10 #
Fish	Front Elec
Midpoint	COS
Tail	Tailfish

File based output

File splitting	NONE
Split after	100

Fish

Define fish location

Selection of the various data points in the subsea network