Centre de Brest
Département Recherche et Développements Technologiques

Programme 8, projet 8

Observatoires fond de mer pluridisciplinaires

NEPTUNE CANADA : Piezometer V2 documentation

établi le :	par :	Réf :	n° analytique :	
23/02/11	J. Legrand	RDT/EIM/11-005	A080806	

Diffusion

IFREMER	NEPTUNE CANADA
Auffret Yves (RDT/EIM) Coail Jean-Yves (RDT/EIM) Delauney Laurent (RDT/EIM) Bescond Tanguy (RDT/EIM) Woerther Patrice (RDT/IPR)	Pirenne Benoît (Neptune Canada) Lavallee Tim (Neptune Canada) Hasanen Reece (Neptune Canada) Wallace Kim (Devocean)

Versions du document

Version	Date	Description	Reference
A	19/02/10	Document creation	RDT/EIM/10-016
B	17/02/11	§5 creation, §6 and §7 modification	RDT/EIM/11-05
C	23/02/11	§8 creation	

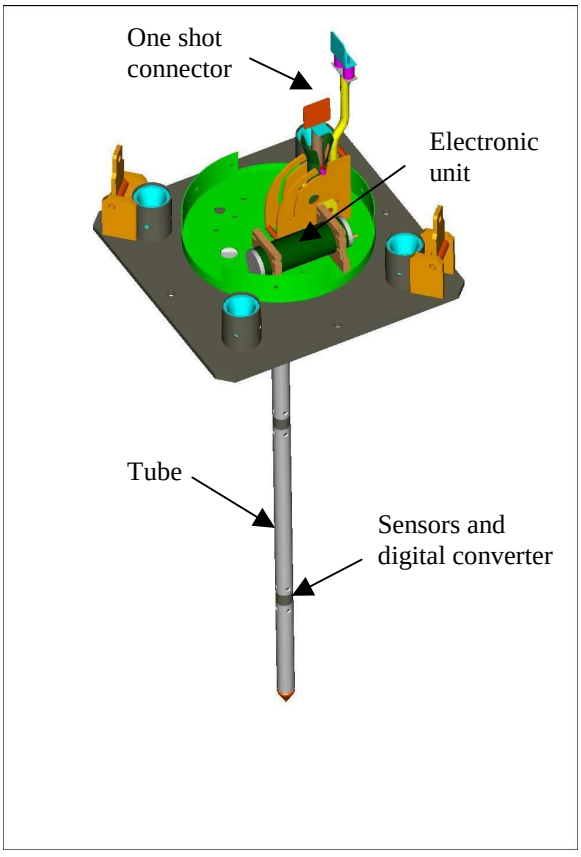
Diffusion : confidentielle ☑ restreinte ❑ libre ❑

SUMMARY

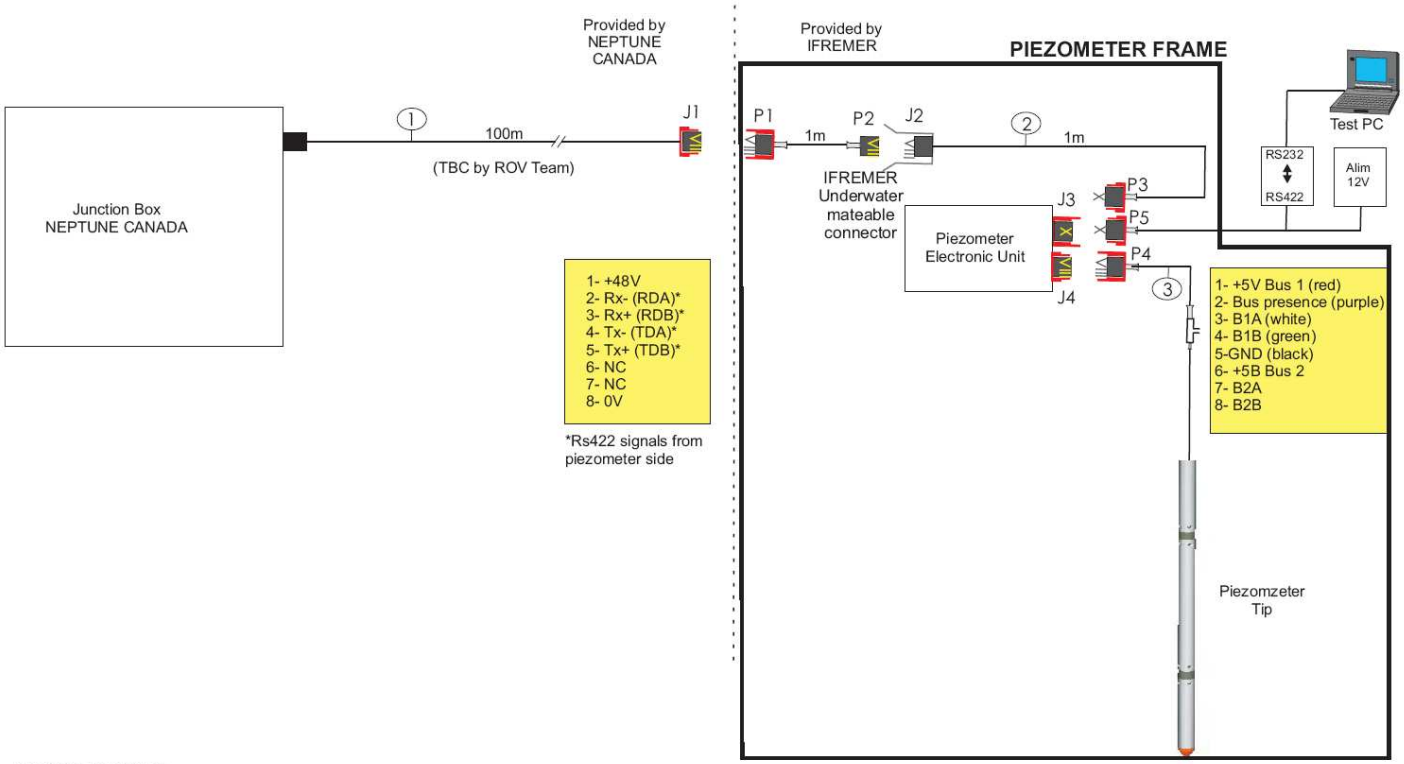
1 – Description

The Ifremer piezometer is a free-fall device with a sediment-piercing lance attached to a recoverable instrument part. It is ballasted with lead weights to penetrate a range of sediment types in water depths of up to 6000 m. The length of the lance used depends on the stiffness of the sediment with a maximum length of 12 meters. Pore pressures are measured relative to hydrostatic pressure at different ports on the 60 mm diameter lance using specially adapted differential pressure transducers connected to the pressure ports and the open seawater. The piezometer pore pressure sensors have an accuracy of ± 0.4 kPa. The piezometer lance is also equipped with temperature sensors located at the same level as the pore pressure sensors. Temperature sensors have an accuracy of 0.05 °C.

In NEPTUNE CANADA configuration, the piezometer will be fitted with 6 Pressure and Temperature sensors.



2 – Synoptic drawing



CONNECTORS

J1 - SUBCONN MCPBOF8F or MCIL8F + MCDLSM
J2 - SUBCONN MCBH8M
J3 - SUBCONN MCBH10FTI + MCDLSF
P3 - SUBCONN MCPBOF10M + MCDLSM
J4 - SUBCONN MCBH8FTI + MCDLSM
P4 - SUBCONN MCPBOF8M + MCDLSF
P5 - SUBCONN MCPBOF10M + MCDLSM

Ifremer
INSTITUT FRANCAIS DE RECHERCHE POUR L'EXPLOITATION DE LA MER

indice:	modifications:	date:	par:

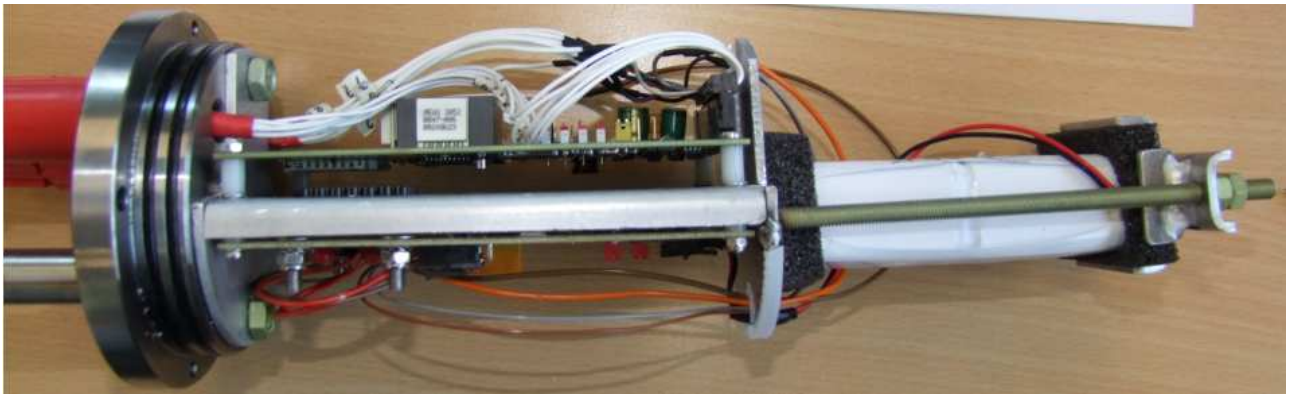
Vérifié par: A. Ferrant
Dessiné par: J. Legrand
Date: janv 2010
ENSEMBLE: Piezometer NEPTUNE Canada
TITRE: Synoptic wiring
N° Analytique:
Tolérance générale:
Usinage:
Masse:
Format: A3
Matière:
Traitement:
Ind
Echelle: 1

3 – The electronic unit

The Electronic unit is composed with :

- A processor board,
- An energy board for battery management,
- A Lithium-ion battery for data continuity in case of power failure.

These electronic parts are integrated in a titanium housing with the following characteristics :
Inner diameter = 90mm
Outer diameter = 110mm
Inner lenght = 320mm
Outer lenght = 350mm
Total air weight = 6,6kg
Maximum operation depth = 6000m



4 – Connector

The PC Connector connected to NEPTUNE CANADA network is a Subconn MCBH10F with the following pinout :

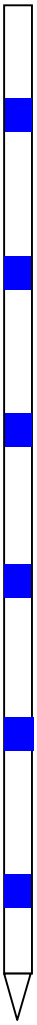
MCBH10F	**Function**
1	+48V
2	RX- (RDA)
3	RX+ (RDB)
4	TX-(TDA)
5	Tx+(TDB)
6	DCF77
7	PPS
8	GND
9	
10	

5 – RS422 configuration

The configuration of the RS422 link is the following :

Baudrate	Parity	Data bits	Stop bits
115200	None	8	1

6 - Pressure and temperature sensors configuration :



Position	Depth in the sediment	Serial Number
1	TBD	1111
2	TBD	1115
3	TBD	1087
4	TBD	1114
5	TBD	60
6	TBD	20

7 – Data format

After power-up a configuration has to be send to the piezometer before starting measurement.
This configuration will be done once by IFREMER team after first power up.
In case of power failure, the Li-ion battery can provide power to the piezometer during around 10 days. This means that for a short power failure, the sampling doesn't stop and we don't need to configure the piezometer.
In case of a long power failure, the piezometer will stop and then we will have to configure it before restarting sampling. This will be done on demand, with a distant VPN connection to the piezometer from IFREMER.

Once the piezometer is configured, the protocol to retrieve data is the following.
For a better comprehension, 2 different colors are used to detail the frames sent to the piezometer (blue) and the frame received from the piezometer (green).

The following command allows to retrieve all data stored in the piezometer memory, since the last interrogation :

<NULL><NULL>data=1;y<CR><LF> *retrieve all the measurements*
After a few seconds, the piezometer answers :
#all data<CR><LF>
YYMMDDHHMMSS<CR><LF>
B1;N01;P1;D1;Q1;C1<CR><LF>
B1;N02;P2;D2;Q2;C2<CR><LF>
B1;N03;P3;D3;Q3;C3<CR><LF> } n times (1 per measurement)
B1;N04;P4;D4;Q4;C4<CR><LF>
B1;N05;P5;D5;Q5;C5<CR><LF>
B1;N06;P6;D6;Q6;C6<CR><LF>
……
#end of data, CHK: xxxxxxxxxx<CR><LF>

Where
YYMMDDHHMMSS is the Date & Time ,
B1 is the bus number (Always B1 for NEPTUNE CANADA deployment),
N01 to N06 are the sensor number (see table),
P is the physical temperature value from the sensor (in °C),
D is the raw temperature value from the sensor,
Q is the physical pressure value from the sensor (in kPa),
C is the raw pressure value from the sensor.

NB:
P and Q have the following format : +/-XXX.YYY
D and C have the following format : +/-XXXXX

Example :

<NUL><NUL>data=1;y<CR> *Last Data recovery command*

#all data<CR><LF> *Response from the piezometer*

100225095818 <CR><LF>
B1;N01;+015.977;27112;+000.743;30191<CR><LF>
B1;N02;+016.426;26531;+002.904;31729<CR><LF>
B1;N03;+016.085;27078;+002.199;31243<CR><LF>
B1;N04;+016.226;26856;+001.015;32170<CR><LF>
B1;N05;+016.388;26701;+000.676;32988<CR><LF>
B1;N06;+016.278;26799;+000.404;33017<CR><LF>
100225095848 <CR><LF>
B1;N01;+015.987;27100;+000.743;30191<CR><LF>
B1;N02;+016.430;26525;+002.904;31729<CR><LF>
B1;N03;+016.088;27074;+002.199;31243<CR><LF>
B1;N04;+016.230;26851;+001.015;32170<CR><LF>
B1;N05;+016.389;26700;+000.676;32988<CR><LF>
B1;N06;+016.283;26794;+000.404;33017<CR><LF>
100225095918 <CR><LF>
B1;N01;+015.994;27091;+000.743;30191<CR><LF>
B1;N02;+016.434;26521;+002.894;31728<CR><LF>
B1;N03;+016.092;27069;+002.207;31244<CR><LF>
B1;N04;+016.234;26847;+001.015;32170<CR><LF>
B1;N05;+016.394;26693;+000.676;32988<CR><LF>
B1;N06;+016.285;26791;+000.404;33017<CR><LF>
#end of data, CHK: 0000036557<CR><LF>
$

Wake-up problem :

If the piezometer does not answer to a command or send the following error frame :
*Error: wrong char<CR><LF>
Please wait 1 second and send again the command, this can be the result of a wake-up problem.

8 – Time compensation

The piezometer has its own Real Time Clock which has to be read regularly to correct its drift and correctly time-stamp data with a common time for all the NEPTUNE instruments.
The following command allows to read the RTC :

<NULL><NULL>date?<CR><LF> *read date and time from the RTC*
After a few seconds, the piezometer answers :
#date:<SPACE>YY/MM/DD<SPACE>HH:MN:SS<CR><LF>

example :
<NULL><NULL>date?<CR><LF>
#date: 11/02/23 17:11:06<CR><LF>