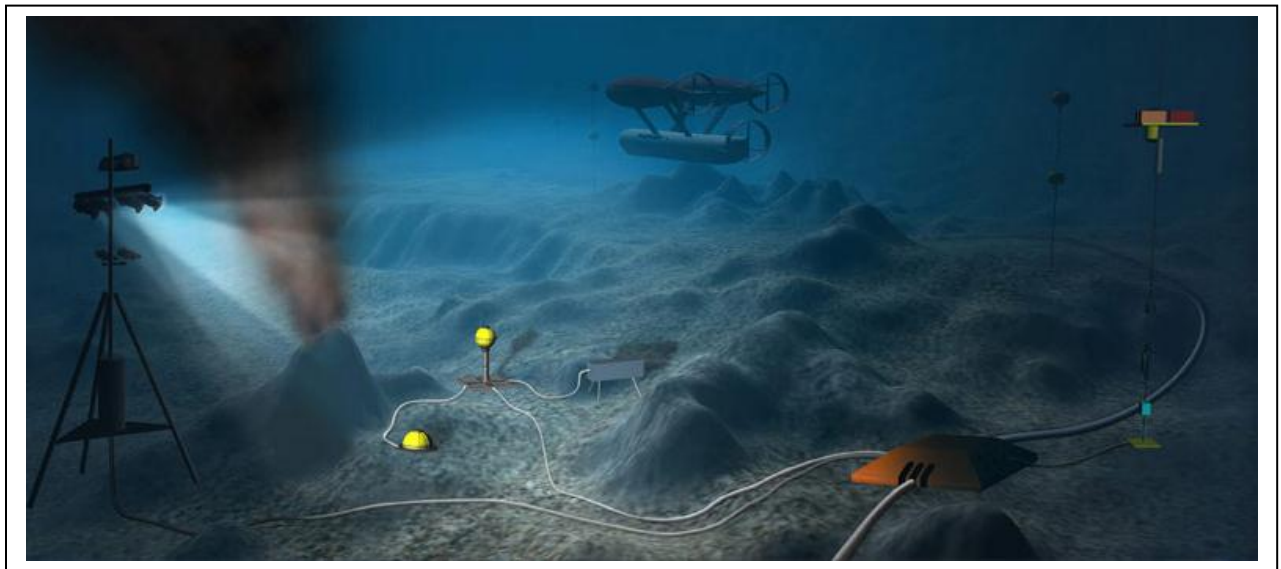


Regional Scale Nodes Low Power Junction Box Interface Control Document

Version 1-02



Prepared by
University of Washington for the
Ocean Observatories Initiative
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Ocean Observatories Initiative
Regional Scale Nodes



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Document Control Sheet

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1-00	5/25/2010	Initial Version	J. Tilley
1-01	11/20/2011	Minor Updates	J. Tilley
1-02	7/25/2012	Updated Connector Pinout, other minor changes and cleanup.	J. Tilley



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1. Introduction

The Region Scale Nodes (RSN) cabled ocean observatory off the coast of Washington and Oregon is part of the NSF funded Ocean Observatories Initiative (OOI). The nearly 800 kilometers of RSN cable will create a large-aperture natural laboratory for conducting a wide range of long-term and innovative experiments within the ocean volume using real-time control over the entire cabled system.

1.1. Purpose

This Interface Control Document (ICD) defines the relationship between the Low Power Junction Box (LP-JBox) and components connected to its Instrument Ports and Input Port.

1.2. Overview of RSN and LP-JBox

To better understand the system as a whole, a high level pictorial overview of a simplified RSN network and where the LP-JBox fits into the system can be seen in Figure 1.

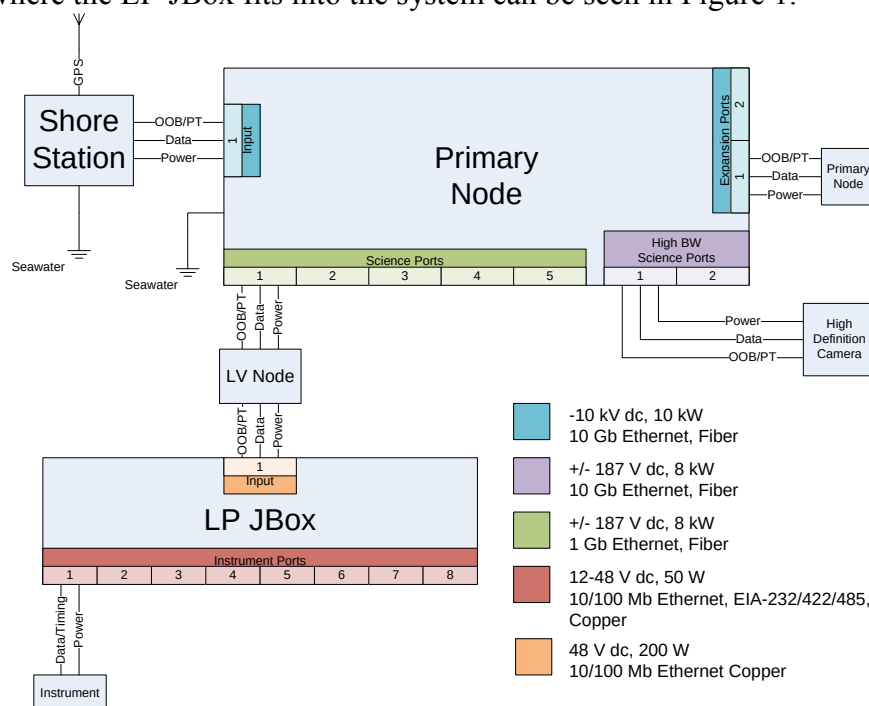


Figure 1 Simplified RSN Network

1.3. Definitions

1.3.1. Acronyms

- CTS – Clear To Send, Hardware Flow Control for EIA-232
- DGND – Data Ground



- NC – No Connection
- PGND – Power Ground
- PPS – Pulse Per Second
- RTS – Request To Send, Hardware Flow Control for EIA-232
- TOD – Time of Day

2. Low Power Junction Box Connectors

The LP-JBox interface consists of 9 ports of 2 different types. A representative connector layout can be seen in Figure 2. These different interfaces provide for connecting to the higher power primary infrastructure as well as providing an access point for lower power instruments.

Quantity	Connection Name	Connection Type	Connector Model
1	SP-100BaseT-B	Input Port	MHDXL-12-FCR
8	IP-LP	Instrument Port, Low Power	MHDXL-12-FCR

In addition to the interface connectors, there are two additional ports exposed on the LP-JBox end cap. The first is a single conductor interface for connecting to the remote seawater electrode which is used for leakage current testing. The second is a vacuum / purge port that is used when the LP-JBox is assembled for deployment. Neither of these ports is of specific interest to those connecting instruments to the system.

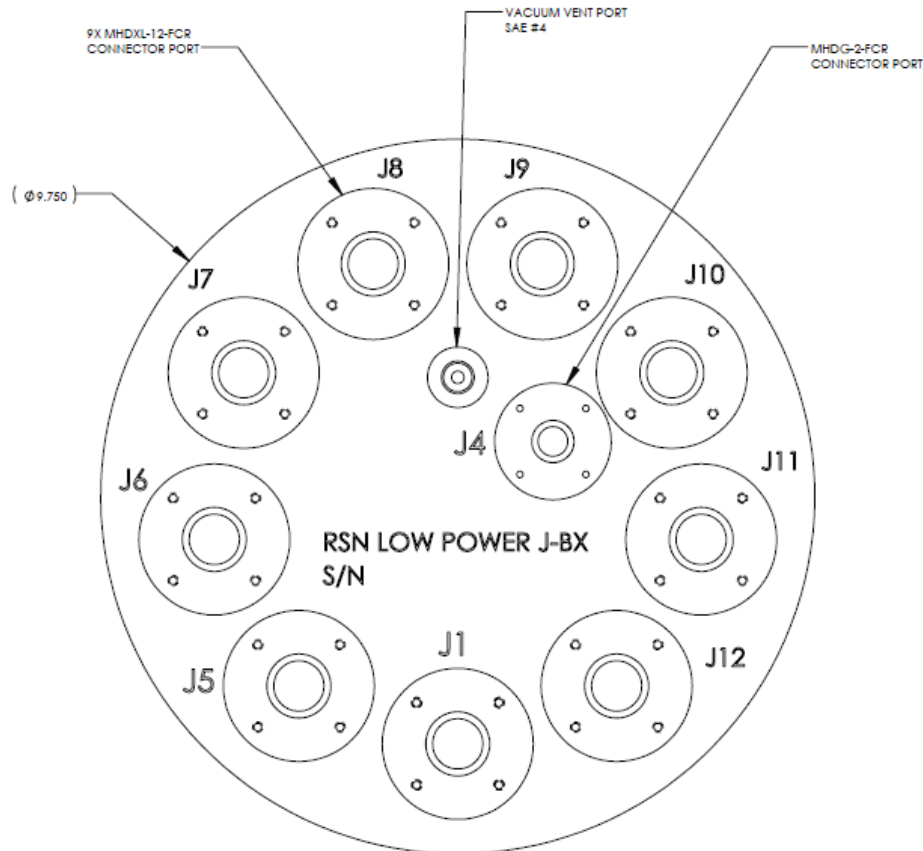


Figure 2 LP JBox Endcap [DWG# 4813-64727]

All of the science connectors for the LP-JBox will be Teledyne Impulse MHDXL-12-FCR, comprised of a Titanium Grade 5 (Ti6Al4V) body. The pinout of the MHDXL-12-FCR connector can be seen in the Figure 3.

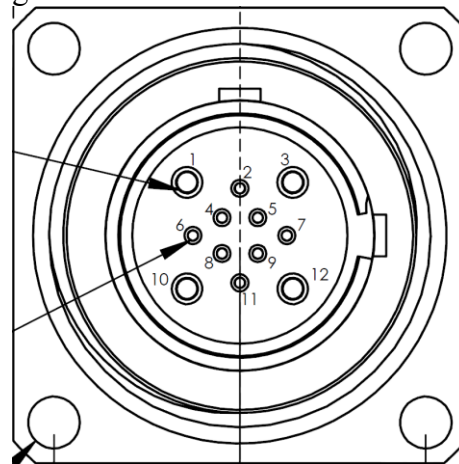


Figure 3 Teledyne Impulse MHDXL-12-FCR

2.1. Input Port (J1)

The input port to the LP-JBox receives a lower power / bandwidth link from an upstream Low



Voltage Node (LV-Node). The link is comprised of an electrical only cable providing 48V dc and a 100 Megabit Ethernet link. In addition, there is a lower bandwidth Out-Of-Band / Precision Timing (OOB/PT) electrical link.

It is important to notice that the LP-JBox is intended to be powered solely from an LV-Node.

The pin out for the input port can be seen in Table 1.

	1	2	3	4	5	6	7	8	9	10	11	12
SP-100BaseT-B	PGND	PPS+	DGND	TX-	RX-	TOD-	TOD+	RX+	TX+	48V	PPS-	NC

Table 1 Input Port pin out (NC = No Connect)

2.2. Instrument Ports, Low Power (J5-J12)

The eight Instrument Ports, Low Power (IP-LP) are the connection point for instrumentation to the LP-JBox. These ports are highly configurable and support a wide range of power and data interface options.

The IP-LP supports the following data interfaces: 10/100BaseT, EIA-232, EIA-422 and EIA-485. These interfaces are configured inside the LP-JBox prior to deployment. Refer to Table 2 for pin out configurations for the different protocols. Pin naming assumes the LP-JBox is the originating device (Tx is Output from LP-JBox, Rx is Input to LP-JBox).

	1	2	3	4	5	6	7	8	9	10	11	12
Enet	PGND	PPS+	DGND	TX-	RX-	TOD-	TOD+	RX+	TX+	24/48V	PPS-	12V
232	PGND	PPS+	DGND	TX	CTS	TOD-	TOD+	RX	RTS	24/48V	PPS-	12V
422	PGND	PPS+	DGND	TX-	RX-	TOD-	TOD+	RX+	TX+	24/48V	PPS-	12V
485HD	PGND	PPS+	DGND	DATA-	-	TOD-	TOD+	-	DATA+	24/48V	PPS-	12V
485FD	PGND	PPS+	DGND	TX-	RX-	TOD-	TOD+	RX+	TX+	24/48V	PPS-	12V

Table 2 Pinout Configurations

3. Power

The nominal power capacity for each IP-LP is 50W. This interface can be configured for regulated 12, 24, or 48V dc. Only pin 10 or 12 will be connected depending on the voltage selected. The remaining pin will be unconnected inside the LP-JBox.

Instrument power shall be delivered via the provided power and return conductors in the instrument cable. No return path thru seawater shall be used. No DC connection to the instruments pressure case shall be made.

The combined power output available at a given LP-JBox is subject to limitations from cable line losses and upstream power loads.



4. Timing

4.1. 1PPS

The LP-JBox provides a 1PPS signal for instrument timing synchronization via an EIA-485 link. The rising edge of the 1PPS is the synchronization point, and is accurate to within 10 μ s of UTC-USNO. The width of the 1PPS pulse is 20 μ s.

Optionally, a 3.3V logic level 1PPS can be configured prior to deployment and will be output in place of the PPS+ signal on the connector.

4.2. Time of Day String

In order to provide an absolute time reference, a Time of Day string is provided via an EIA-485 link. The TOD port settings are 9600 8-N-1 (9600 baud, 8 data bits, No parity bits, 1 stop bit). The string occurs approximately 20 μ s after the rising edge of the 1PPS. Thus, the data within the TOD string corresponds to the immediately preceding 1PPS rising edge.

The TOD string is formatted as a NMEA \$GPZDA string:

\$GPZDA,HHMMSS.SS,DD,MM,YYYY,XX,YY*CC<CR><LF>

HHMMSS.SS	UTC Time Hours, Minutes, Seconds
DD	Day
MM	Month
YYYY	Year
XX	Local Zone Hours
YY	Local Zone Minutes
*CC	Checksum
<CR>	Carriage Return
<LF>	Line Feed