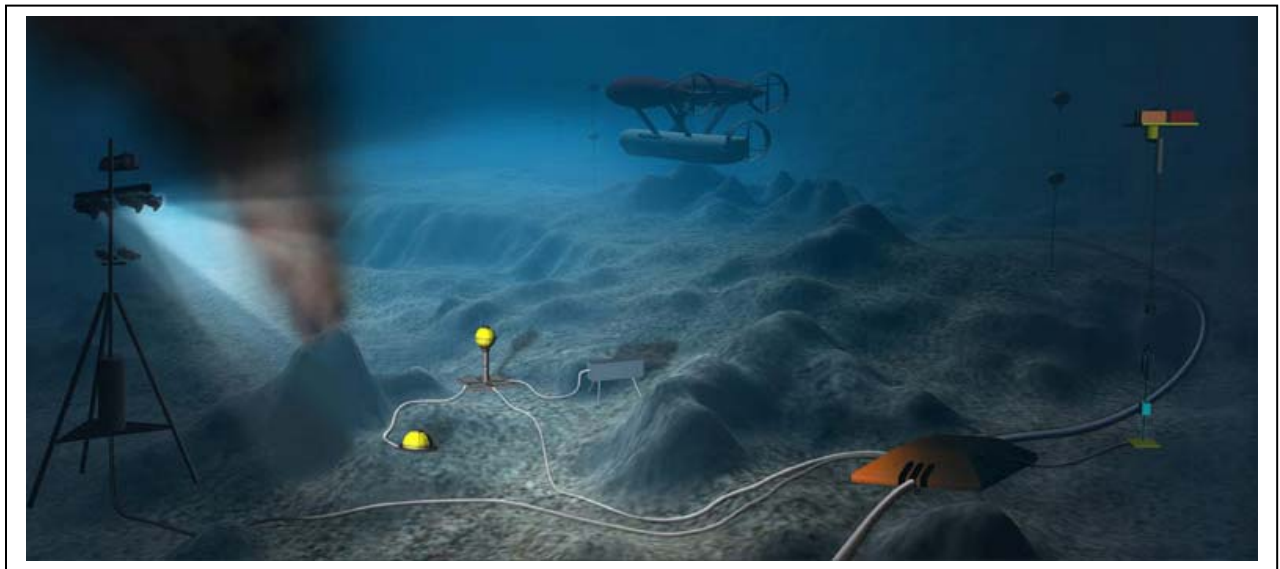


Regional Scale Nodes Low Voltage Node Interface Control Document

Version 1-01



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Regional Scale Nodes



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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 Voltage Node (LV-Node) and components connected to its Science Ports and Input and Expansion Ports.

1.2. Overview of RSN and LV-Node

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.

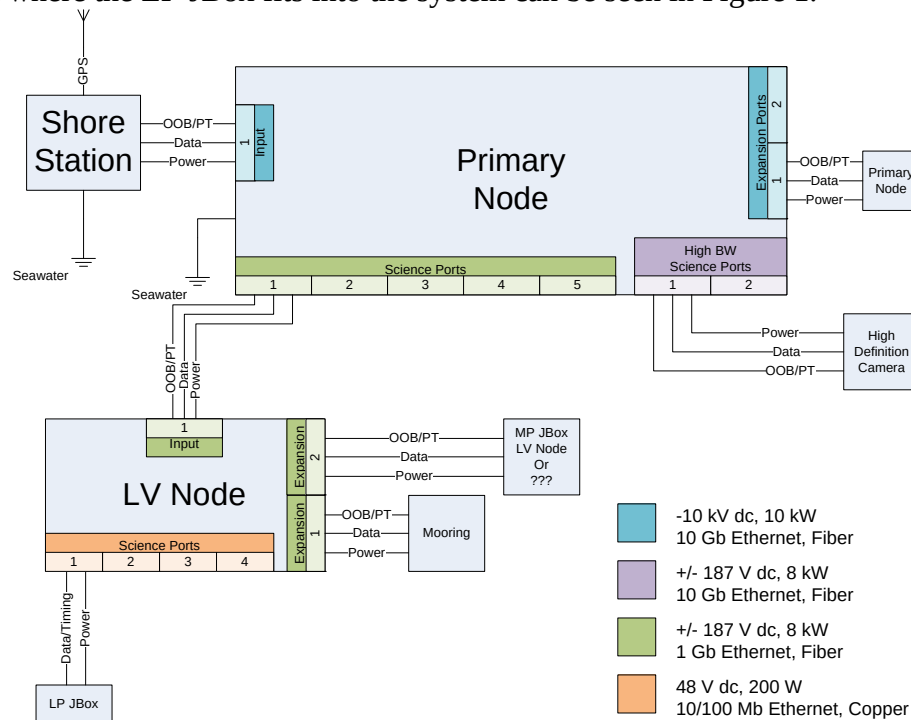


Figure 1 Simplified RSN Network

2. Low Voltage Node Connectors

The LV-Node interface consists of 7 ports of 3 different types as indicated in Table 1. 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



Low Power Junction Boxes (LP-JBox).

Quantity	Connection Name	Connection Type
1	SP-1GE-B	Input Port
2	SP-1GE-A	Output / Expansion Port
4	SP-100BaseT-A	Science Port

Table 1 LV-Node Interfaces

In addition to the interface connectors, there are two additional ports exposed on the LV-Node 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 LV-Node is assembled for deployment. Neither of these ports is of specific interest to those connecting components to the system.

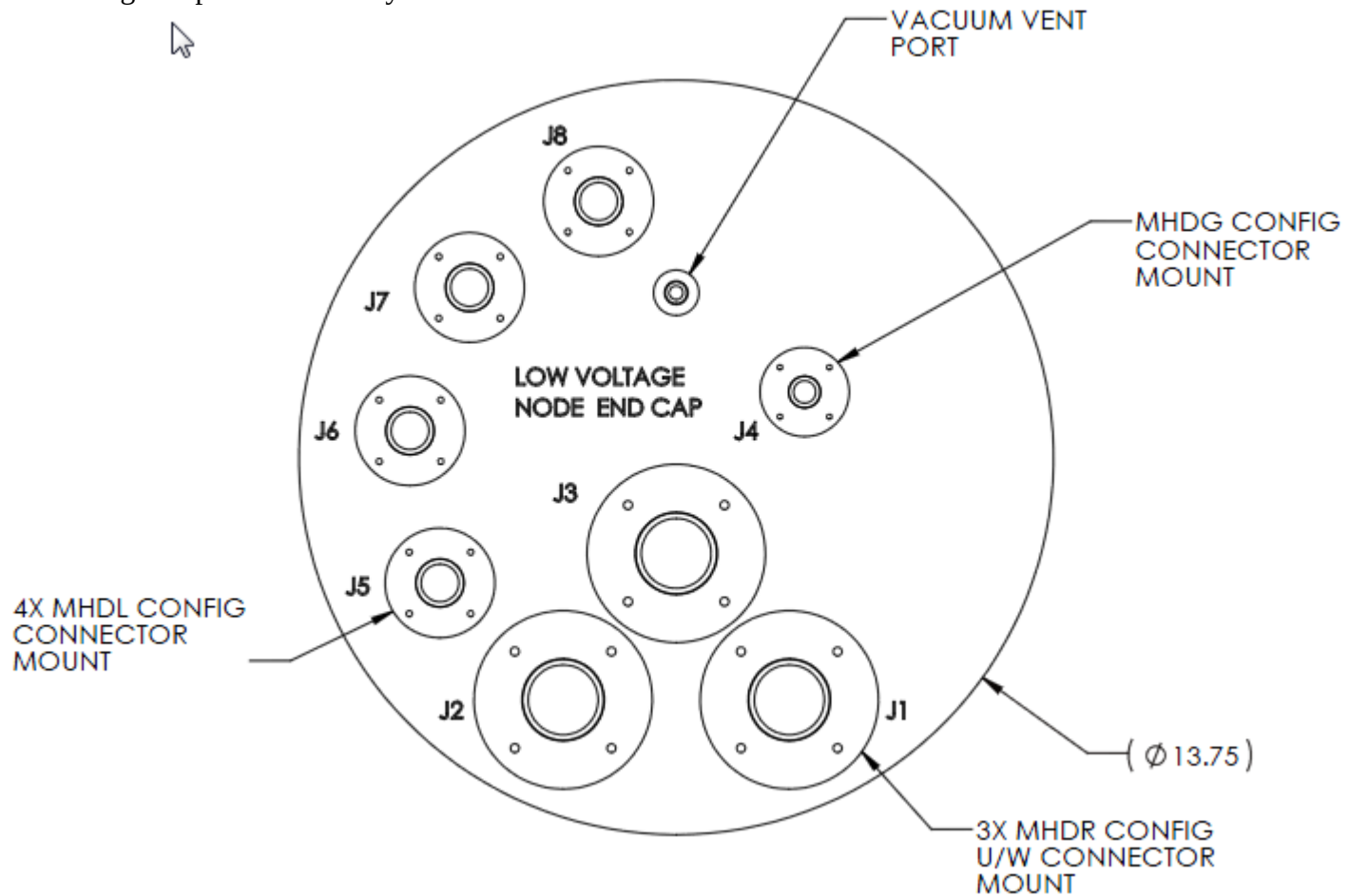


Figure 2 LV Node Endcap [DWG# 4811-64774]

2.1. Input Port

The input port to the LV-Node receives a high power / bandwidth link from upstream devices (Primary Nodes, daisy chained Secondary Infrastructure). The link is comprised of an electro-optical cable providing 375V dc and a 1 Gigabit Ethernet fiber optic link. In addition, there is a



lower bandwidth Out-Of-Band / Precision Timing (OOB/PT) fiber optic link.

The pin out for the input port can be seen in Table 2.

Pin	Signal	Notes
1	V+	Power Highside
2	V+	Power Highside
3	V-	Power Lowside
4	V-	Power Lowside
5	GbE Tx	Fiber
6	GbE Rx	Fiber
7	OOB Tx	Fiber
8	OOB Rx	Fiber

Table 2 Input Port pin out

2.2. Expansion Ports

The expansion ports on the LV-Node allows for the connection of a downstream Secondary Infrastructure device (LV Node, MP-JBox). The link is comprised of an electro-optical cable providing 375V dc and a 1 Gigabit Ethernet fiber optic link. In addition, there is a lower bandwidth Out-Of-Band / Precision Timing (OOB/PT) fiber optic link.

Pin	Signal	Notes
1	V+	Power Highside
2	V+	Power Highside
3	V-	Power Lowside
4	V-	Power Lowside
5	GbE Tx	Fiber
6	GbE Rx	Fiber
7	OOB Tx	Fiber
8	OOB Rx	Fiber

Table 3 Expansion Port pin out

The voltage output from the expansion port is unregulated and is subject to limitations from cable line losses and upstream power loads. This additionally affects the ultimate power that may be drawn from the expansion port, which is nominally 8kW.

2.3. Science Ports

The four Science Ports (SP-100BaseT-A) are the connection point for LP-JBoxes. This allows for expansion of scientific instruments at a specific site via multiple LP-JBoxes connected to a single LV-Node.

Since the LV-Node is designed to connect directly to an LP-JBox, it only supports a 100BaseT Ethernet connection. Refer to Table 4 for pin out configurations for the SP-100BaseT-A connections.



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

Table 4 Science Port pin out Configuration

The nominal power capacity for each Science Port is 200W. This interface is configured at only 48V dc. Additionally, a single Science Port may be configured for 500W, 48V dc.

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

In addition to the Data and Power interface, a lower bandwidth Out-Of-Band / Precision Timing (OOB/PT) link is provided. A unidirectional EIA-485 link is provided to distribute 1 Pulse Per Second (1PPS). The 1PPS is accurate to within 10 μ s referenced to UTC-USNO as provided by a GPS base station located at the Shore Station. The rising edge of the 1PPS signal is used as the synchronization point.

The command and control portion of the OOB/PT link is provided via a half-duplex EIA-485 link.

3. Low Voltage Node Internal Assemblies

3.1. Internal Model

3.2. Electronics Assembly List

Component	Quantity	ICD
Input Filter	1	4812-64346
Controller Interface	1	4812-64351
Instrument Interface	1	4812-64347
Hotel Power	1	4812-64348
Expansion Power	1	4812-64349
Instrument High Power	4	4812-64350
L3 OOB/PT System	1	
Network Switch	1	4812-64353