SIDEKICK Instrument Hub

Model: Performance

USER MANUAL

Reference Manual: UM_SDP_0226-A04

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1. Specifications

1.1 Mechanical & Environmental

Depth Rating: 2,500 meters

- Material: Hard anodized 6061-T6 aluminum with #10-24 stainless steel hardware
- Weight: 19 lbs (in air), 4.0 lbs (in water)

Depth Rating: 200 meters

- Material: PEEK Enclosure & Super Duplex Stainless Steel End-caps
- Weight: 19 lbs (in air), 4.0 lbs (in water)

Dimensions: 21" length × 6.0" outer diameter
End-caps o-rings: #243 and #244

1.2 Interfaces & I/O

- Bulkhead Connectors: 6 user-specified interface connectors
- Serial Communication: Up to 5 x RS232 inputs + 1 x RS232 output
- Network: 1 × 10/100/1000 Mbps Ethernet port

1.3 Processing & Storage

- Processor: Intel Atom or Pentium (2 or 4 cores, up to 2.5 GHz)
- Memory: 4 GB DRAM
- Graphics: Integrated Intel GPU
- Internal Storage: Up to 2 TB
- Removable Storage (optional): 4 TB SSD linked with SATA to USB 3.0 cable

1.4 Operating System

- OS: Thinned-out image of Windows IoT Enterprise

1.5 Power

- Power Input: 13–50 VDC
- Power Consumption: 15 W typical
- 3 outputs: one fixed 12 V and two configurable outputs (12 V, 15 V, 24 V, 28 V, or 48 V)

1.6 Electrical Protection & Control

- Relay Control: 4-channel relay board
- Protections: OV/OC/UV, Reverse polarity protection & inrush current limiter.
- Supports continuous operation under brown-out via current limiting, preventing power cycling.

1.7 User Interface

- Indicators & Controls:
    - Status LED light
    - ON/OFF switch
    - START switch
    - Remote-in communication port

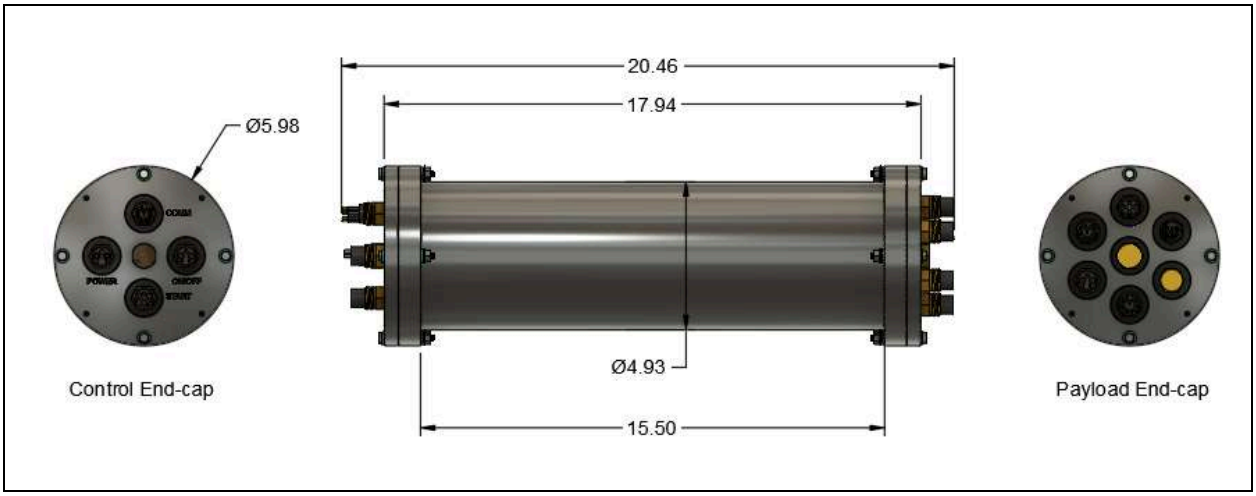


Fig 1: General dimensions

2. General Description

The SIDEKICK Instrument Hub is a user-friendly, reconfigurable, and autonomous instrument hub designed to support advanced oceanographic tasks and missions. Its core function is to streamline the deployment of oceanographic sensors with minimal setup and technical expertise required.

The system is housed in either a 2,500-meter depth-rated aluminum cylindrical enclosure, or a 200m PEEK enclosure, equipped with two modular interfaces: a Control end-cap and an Instruments end-cap.

2.1 Control End-cap

The Control end-cap is the primary interface between the user and the SIDEKICK Instrument Hub. It includes the following components:

COMM Port:
Labeled COMM, this port allows remote connection to the onboard computer.
Status LED:
Provides a visual indication of the system's operational status.
Power Switch:
Labeled ON/OFF, this switch powers the bottle and its connected instruments.
Data Acquisition Connector:
Labeled START, this connector initiates the programmed mission sequence.
Power Supply Connector:
Labeled POWER, this port connects to an external power source required for operation.

Important:

- The ON/OFF and START connectors are activated using dummy plugs.
- Both dummy plugs short pin 1 and pin 2 internally to complete the circuit.
- Removing this end-cap gives access to the optional external solid-state drive

<u>COMM</u> <u>connector:</u>
MCBH8M-CAT
wired as T568-B

<u>POWER</u> <u>connector:</u>
MCBH2M
Pin 1: Ground
Pin 2: 13-50VDC

<u>ON/OFF</u> <u>connector:</u>
MCBH2F
Pin 1: to +VDC input of POWER
Pin 2: +VDC output to Internal electronics

<u>START</u> <u>connector:</u>
MCBH3F
Pin 1: to Digital I/O pin
Pin 2: to 3V signal High
Pin 3: not used

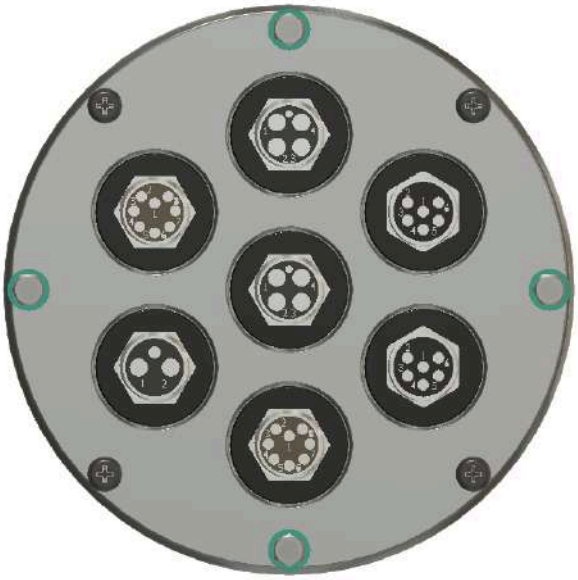
<u>Status LED Light</u>:
Colors are user defined and many colors representing various states can be configured.

Fig 2: Control End-cap

2.2 Instruments End-cap

The *Instruments end-cap* provides the interface for connecting your instrumentation suite. The internal electronic components (including the printed circuit boards and computer) are all attached/secured to this end-cap.

To access the internal electronics, you must pull the Instruments end-cap out. However, the Control end-cap must be removed first.



Instruments connectors:
Instrument connectors are assigned by the user during the initial configuration of the SIDEKICK. Not all threaded ports need to be populated; any unused ports will be sealed with protective plugs.

A connector map (sticker affixed on the cylinder) is provided with each SIDEKICK to clearly identify every connector and its corresponding position.

The SIDEKICK is designed for versatility, and users are encouraged to swap or replace connectors as their needs evolve.

Fig 3: Instruments End-cap

2.3 Block Diagram: Power and Communication

The SIDEKICK Instrument Hubs follow a simple, robust architecture: the *Main Electronics Board* conditions the incoming power to levels required by each connected instrument and the *Instruments Board* manages their data pathways. An onboard computer oversees all acquisition and control functions, operates the power-relay board, and provides the user interface for status monitoring, starting acquisitions, and retrieving data.

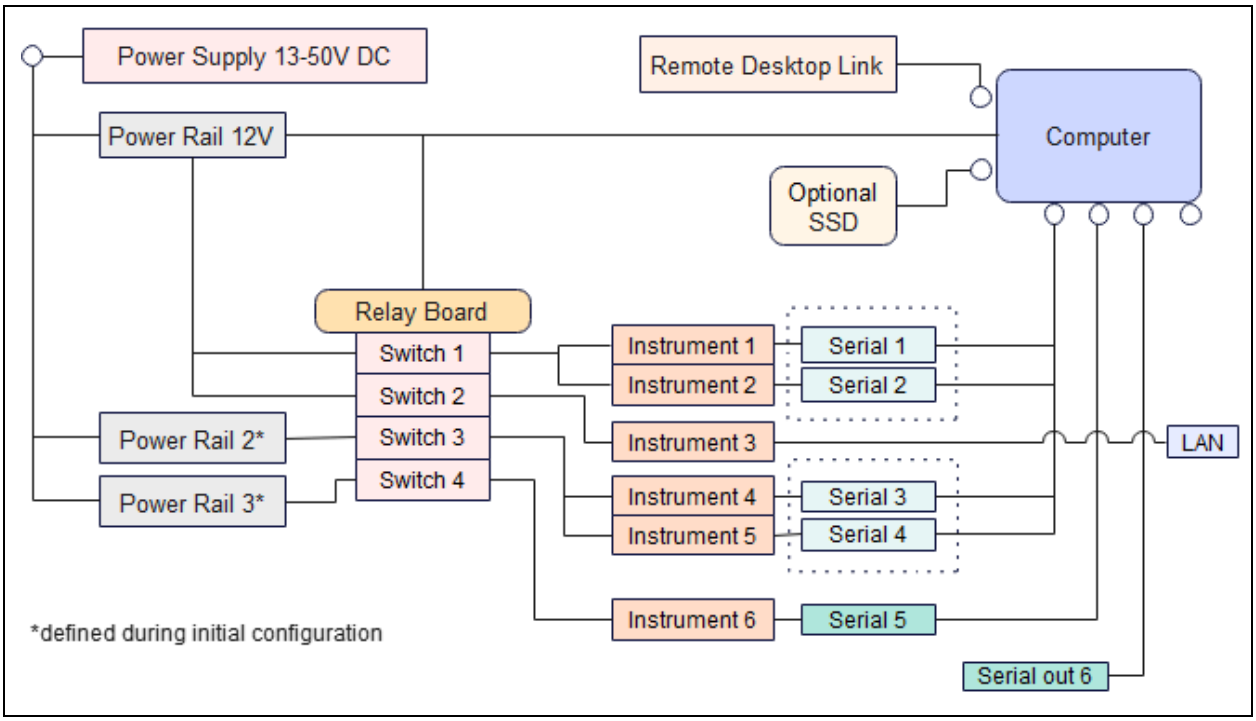


Fig 4: System's simplified block diagram

2.4 Quick Start Guide

2.4.1 Deployment Procedure - Option A (Hardware Start Trigger)

1. **Connect Instruments**
   Connect each instrument to its designated bulkhead connector on the *Instruments end-cap*.

2. **Connect Power**
   Plug an external power source to the *POWER connector*.

3. **Secure Communication Port**
   Ensure the *COMM connector* is sealed using the provided dummy plug.

4. **Power On**
   Insert the supplied 2-pin shorted dummy plug into the *ON/OFF connector* to power the system.

5. **System Ready Check**
   Wait for the *Status LED* to display its *Ready* state (typically green).

6. **Start Data Acquisition**
   Insert the supplied 3-pin shorted dummy plug into the *START connector*.
   The *Status LED* will change colors, indicating progress and/or active data acquisition

2.4.2 Deployment Procedure - Option B (Software Control Start)

1. **Connect Instruments**
   Connect each instrument to its designated bulkhead connector on the *Instruments end-cap*.

2. **Connect Power**
   Plug an external power source to the *POWER connector*.

3. **Power On**
   Insert the supplied 2-pin shorted dummy plug into the *ON/OFF connector* to power the system.

4. **Seal Start Connector**
   Install a 3-pin dummy plug in the START connector to keep it sealed during software control**.**

5. **Remote Desktop Session**
   Using the COMM connector and cable, establish a Remote Desktop connection to SIDEKICK and launch the mission via JADE software commands. Refer to Section 3.4 for connection details.

6. **Finalize for Deployment**
   Verify proper mission start and instrument communication. When ready to deploy, close the Remote Desktop session and seal the COMM connector with its dummy plug.

2.4.3 Retrieval Procedure - Short

1. **Stop Mission**
   Remove the 3-pin shorted dummy plug from the *START connector.* If configured to recognize this trigger, SIDEKICK will initiate its programmed shutdown sequence.
   Seal the START connector with a standard dummy plug.

2. **Turn Power Off**
   Allow at least 2 minutes for a complete and orderly shutdown.
   Remove the 2-pin shorted dummy plug from the POWER connector to fully de-energize the relay board, DC-DC converters, and auxiliary electronics.
   Seal the POWER connector with a standard dummy plug.

2.4.4 Retrieval Procedure - Long

1. **Remote Desktop Session**
   Using the *COMM connector* and cable, establish a remote desktop connection to SIDEKICK and stop the active JADE application. Refer to Section 3.4 for connection details.

2. **Mission Profile Sneak Peek**
   Your JADE configuration may include a Sneak Peek Data Aggregator plugin, which records a decimated subset of data from the selected instruments during the mission. Use the Mission Data Viewer (JADE) application to visualize and review the acquired profile plots.

3. **System Shutdown and Power-Off**
   Perform a clean shutdown of the GIOTA computer using the taskbar Start Menu. After waiting approximately 2 minutes, turn off power to the SIDEKICK system.

2.4.5 Retrieving Data

A. Download Logged Data

1. Open the FileZilla application on your laptop.
   (See Section 3.5 for setup and login instructions.)
2. Use FileZilla to access:
   Data log files recorded by each connected instrument
   The Profile Summary from the most recent deployment
3. Transfer the desired files to your local machine for storage, review or post-processing.

B. Retrieve the additional Hard Drive

The Control end-cap may be removed *only when the system is powered off* to access the optional 4TB hard drive.

This procedure must be performed in a clean, dry, and controlled environment, using careful handling practices to prevent damages to internal components. Refer to Section 4.2 for detailed instructions.

3. SIDEKICK Software & Communication

3.1 Software Components

The SIDEKICK Instrument Hub operates using the following components:

- Sixclear GIOTA – Serves as the onboard computer system. It runs a custom, thinned-out image of Win IoT Enterprise while still supporting custom software installation needs for your application
- Sixclear JADE – Handles data acquisition, instrument control, and logging.

3.1.1. Remote Access to GIOTA

To remotely access and control the GIOTA computer from your laptop, use the Remote Desktop Connection application (pre-installed on most Windows systems).

3.1.2. Data Transfer via FileZilla

To streamline data transfer from the GIOTA to your laptop:

- The FileZilla Server application is pre-installed and configured on the GIOTA.
- You must install the FileZilla Client on your computer to download data files.

The FileZilla Client can be downloaded at: https://filezilla-project.org/download.php

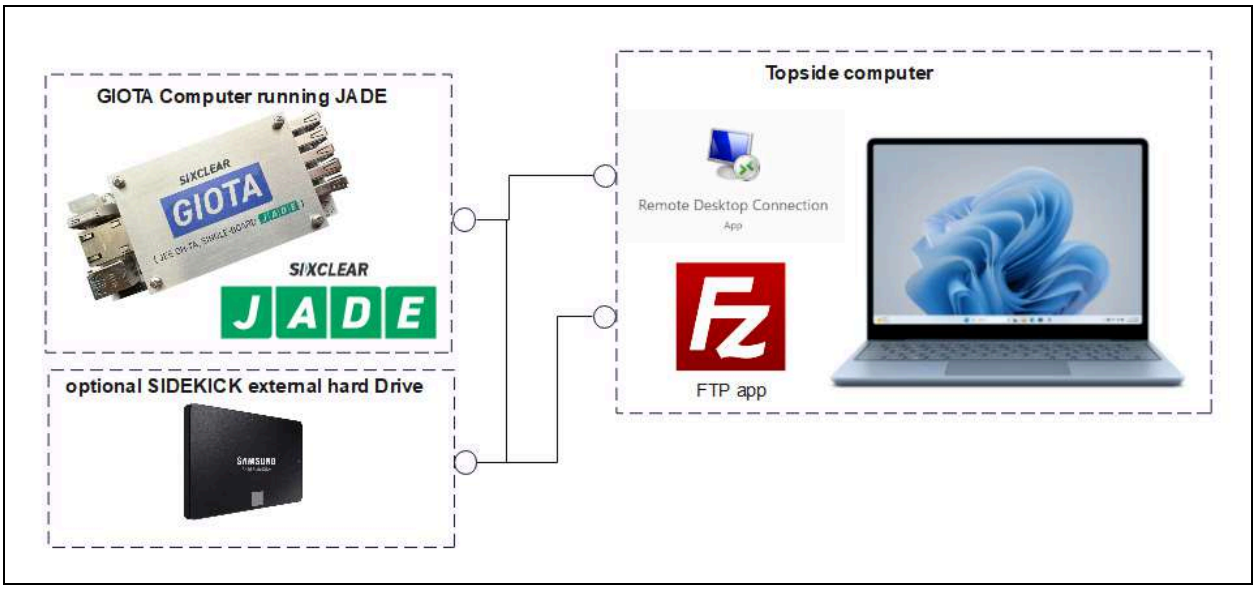


Fig 5: Software Components

3.2 Introduction to Sixclear JADE

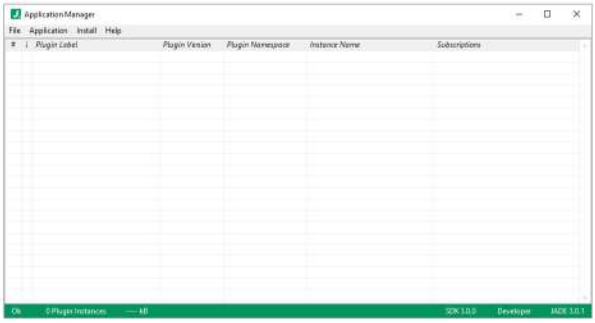
JADE by Sixclear is a modular data handling software based on a **publisher–subscriber architecture**. Each piece of data (e.g. a sensor reading) is published to a shared pool where any plugin can subscribe and access it in real time. A **plugin** is a functional module within JADE, such as a logger, display, or relay controller, that acts on data it subscribes to.
This architecture allows decoupled processing, meaning plugins operate independently while reacting to the same data stream.

The result is a flexible, extensible system ideal for controlling instruments, logging, and triggering actions.

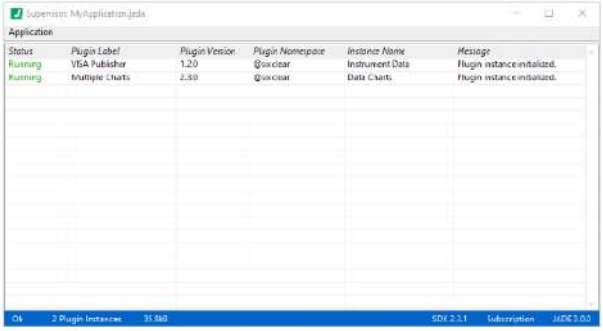
3.2.1. JADE Fundamentals

At the core of JADE are two main components:

- **JADE Manager:** JADE applications are created and composed in the JADE Application Manager, which facilitates adding, editing, and removing plugin instances. JADE Application Manager is also where you launch applications using the Application > Run Application menu item. It is easily recognized by its green sub-header

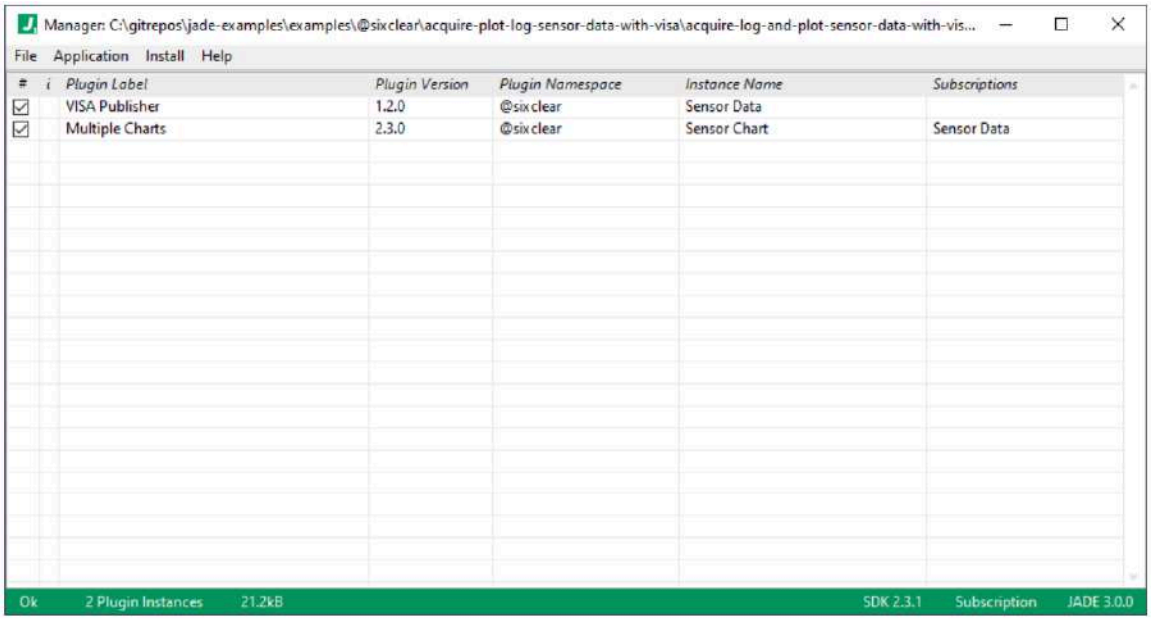


- **JADE Supervisor**: This is the user-facing interface used to monitor, control, and configure running JADE sessions. In other words, it is the running instance of the user application, as defined in the JADE Manager. It is easily recognized by its blue sub-header.



To build a JADE application or “jada”, users select a set of **plugins**: self-contained functional modules made to connect to instruments, or to display graphs, or to control relay boards, etc, that subscribe to or publish data. The image below shows the Manager

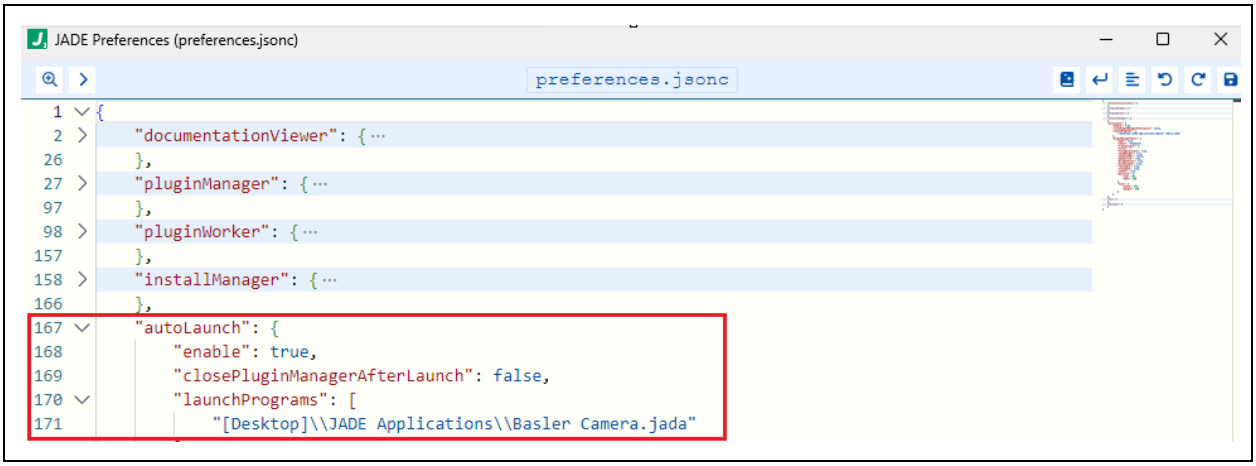
populated with two plugins, one would connect to a sensor and the other would graph incoming data.



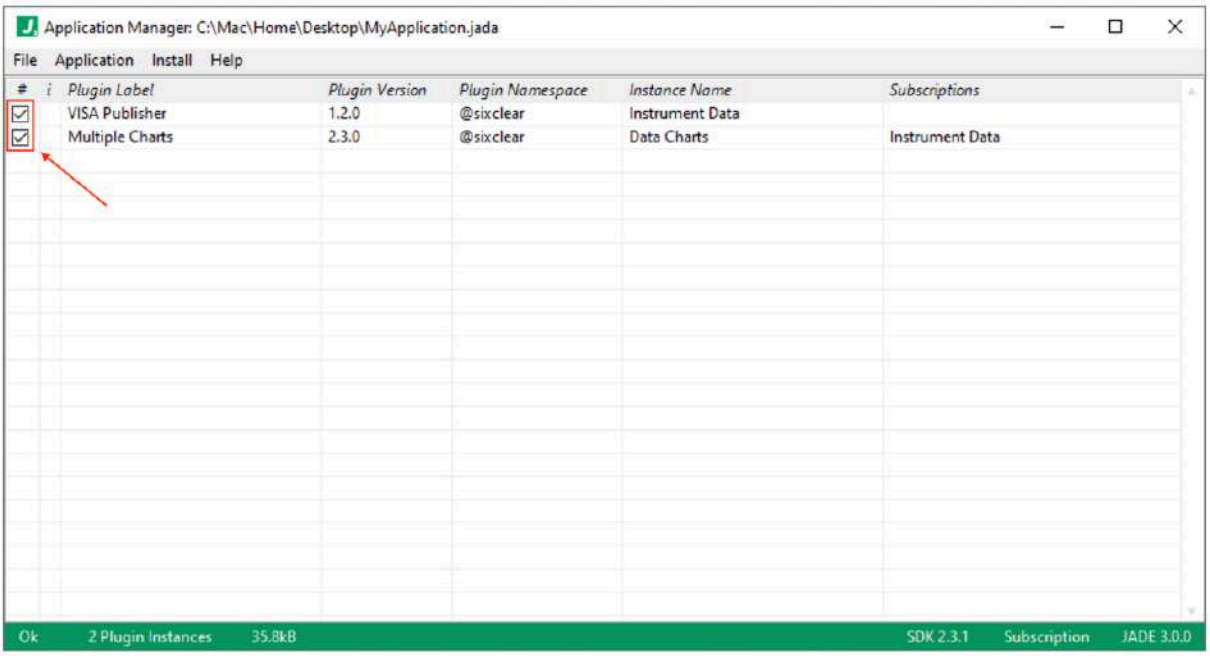
These plugins are defined in their **configuration file**, in .json, which specifies all parameters, connections, and behaviors for each plugin. This allows for fast reconfiguration of experiments without modifying core code. The configuration file concept is explained in section C below.

JADE also supports an **AutoLaunch** feature. This determines which application is automatically started at runtime. This is important for the SIDEKICK as this is how we ensure the proper JADE application is launched when JADE starts.

This feature can be accessed from JADE Manager: File > Preferences



When your application is launched, plugins assigned a tick mark will begin executing immediately upon system start-up, while others will be **loaded** but remain inactive until manually started through the Supervisor or started via a **State Machine** plugin.



A **State Machine** plugin in JADE is a specialized controller used to manage the behavior and lifecycle of other plugins. It functions as a logic-driven **orchestrator**, allowing you to define a series of operational states (e.g., Idle, Logging, Error Recovery) and transitions between them based on triggers or conditions.

This plugin has the unique ability to **control the status of other plugins**: starting, stopping, or reconfiguring them based on the current state of the system. For example, it can activate a logging plugin when a sensor is ready or shut down specific components if an error is detected.

By centralizing system behavior in a clearly defined flow, the State Machine plugin enables complex, autonomous operations to be executed reliably and predictably.

SIDEKICK comes pre-loaded with a **State Machine** plugin to orchestrate the data acquisition of your instruments for your mission profile.

For a complete guide to configuring, launching, and customizing JADE, refer to the official documentation at:
https://sixclear.com/docs/jade/latest/platform/jade-getting-started/

3.2.2. Advanced Use of JADE: Custom Plugins and Data Integration

For advanced users, JADE offers powerful capabilities beyond configuration and control: it allows the creation of **custom plugins** and the integration of external code and communication protocols.

One notable example is the **TCP/IP plugin**, which enables users to define and broadcast a **custom subset of instrument data** to other computers or external systems in real time. This is especially useful for distributing key metrics, live monitoring, or relaying status updates to topside operations or control rooms.

Users looking to expand functionality can develop their own plugins using the **JADE Developer Kit** provided by Sixclear. This SDK allows you to define fully custom behaviors, data handling routines, and control logic within the JADE framework.

Moreover, JADE supports the integration of **external code environments**: including **MATLAB**, **LabVIEW**, and **Python**, within your JADE application. This enables users to incorporate existing analysis tools, models, or control algorithms directly into the data flow, creating highly customized and intelligent workflows.

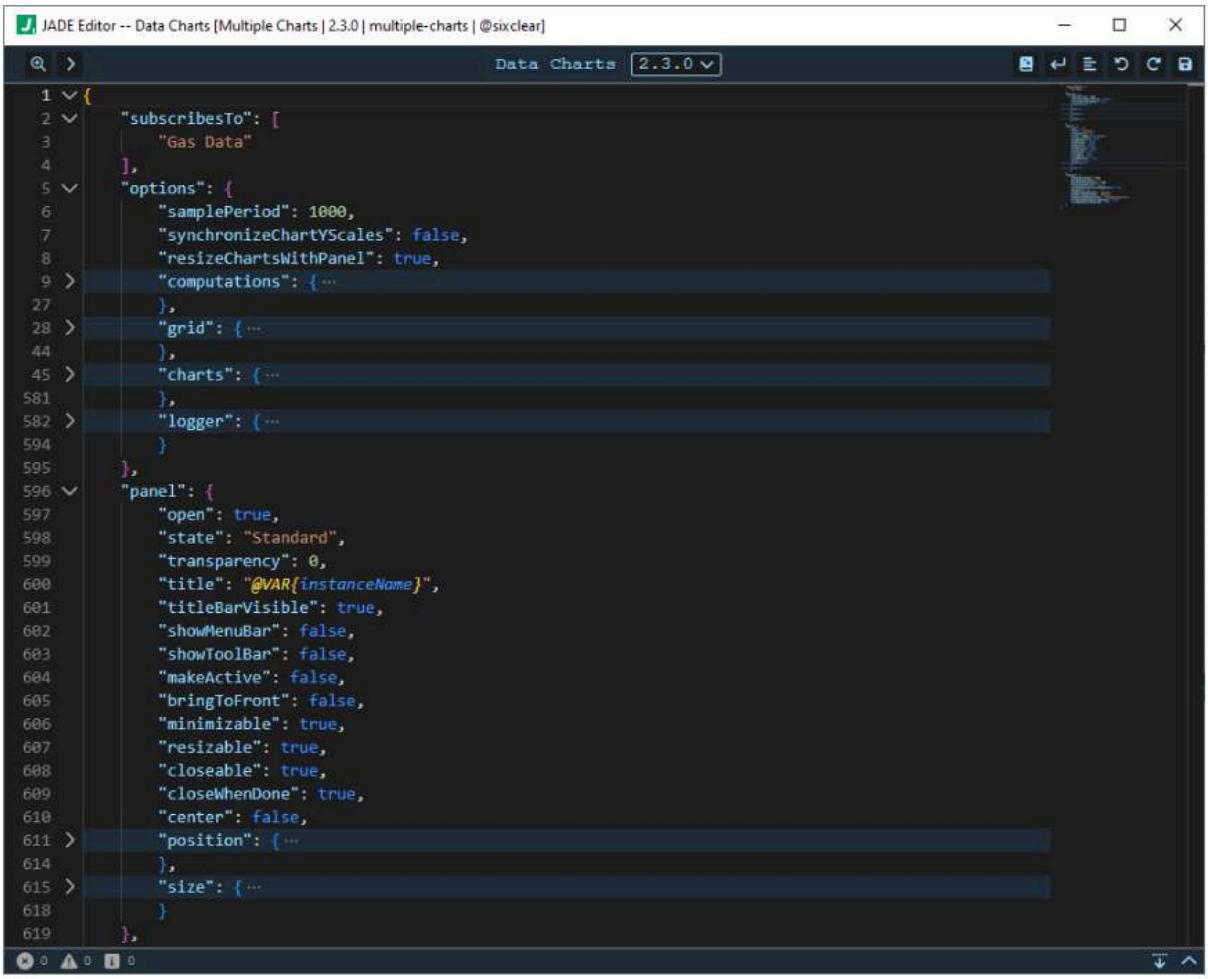
These advanced features make JADE not just a data handler, but a full-featured platform for building adaptive, mission-ready systems.

3.2.3. Plugin Configuration

A given plugin's configuration is effectively a description of how the plugin should behave. Plugin instances are configured in JADE Editor instances. JADE Editor instances are modern editors with all of the features expected for professional development including type-ahead, syntax highlighting, syntax validation, hover help, code folding, and much more.

As noted above, plugin configurations are just standard JSON with optional comments. Since JSON is inherently text-based, this conveniently facilitates copy/paste, search, formatting, and human readability. As previously alluded, in many cases plugin configurations allow for the use of variables (data supplied to the plugin) and expressions (standard arithmetic expressions, hundreds of provided functions, and even type declaration syntax).

The screenshot below shows a JADE Editor instance.



A JADE plugin's configuration file is structured in a clear and human-readable format. These files define how each plugin behaves and connects within the system.

Common entries particularly of interest to SIDEKICK users include enabling **simulation mode**, which allows testing with dummy data instead of live inputs. **Connectivity settings** such as **BAUD rate**, **COM port**, are often configured here to ensure proper communication with serial instruments. Instrument plugins support **regular expressions (regex)**—a powerful, compact way to extract specific data patterns from incoming messages.

The config file is also where you would define **logging options**, such as **file path**, **file size limits**, etc. For complete documentation, please refer to:
https://sixclear.com/docs/jade/latest/platform/jade-getting-started/

3.3 System Start-Up and Shutdown Sequence

When the SIDEKICK is powered on, the following sequence occurs:

1. **Power-Up**
   Supplying external power and inserting the shorted ON/OFF dummy plug activates the system. Power is delivered to the GIOTA computer, Relay Board, LED controller, and the START controller (micro-controller based).

2. **GIOTA Boot-Up**
   The GIOTA computer begins its boot sequence.

3. **JADE Auto-Launch**
   The JADE application is configured to launch automatically on start-up.

4. **User JADE Application Launch**
   Once JADE is running, the user-defined JADE application is also set to auto-launch.

5. **State Machine Monitoring**
   After launch, the user's State Machine plugin monitors the START switch.
   When the START dummy plug is inserted, the system initiates data acquisition, which continues until:
   - The START plug is removed, or
   - An alternate programmed command or condition stops acquisition.

6. **Shutdown Sequence**
   When the START dummy plug is removed, the State Machine typically issues a command to shut down the GIOTA computer.
   It is important to wait approximately 1 minute after removing the START plug before disconnecting power to ensure the computer shuts down completely and cleanly.

3.4 Connecting to GIOTA via Remote Desktop

To access the GIOTA onboard computer, use the **Remote Desktop Connection** application on your PC.

3.4.1 Required Hardware

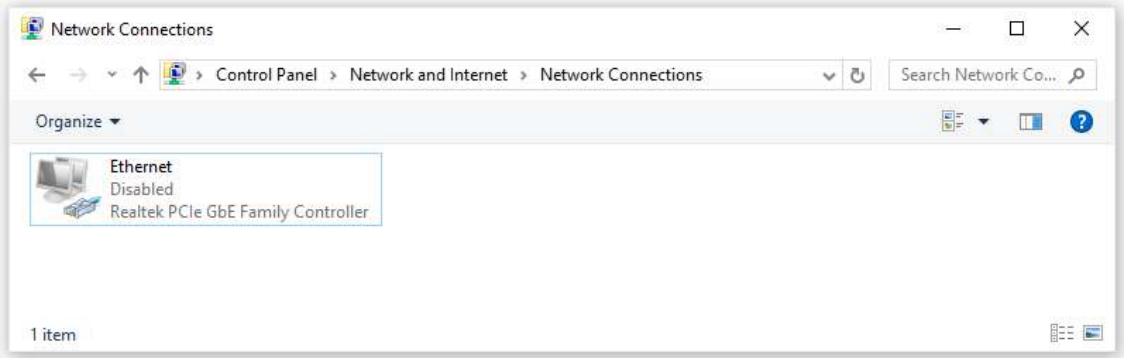
Ensure the SIDEKICK is connected to your laptop using the supplied communication cable, which consists of an MCBH8F-CAT bulkhead, an RJ45 coupler, and an Ethernet cable assembly.

3.4.2 Connection Procedure

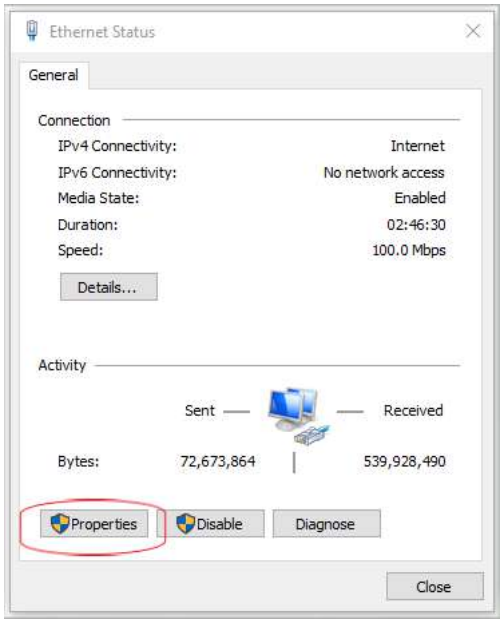
1. Connect your laptop to the SIDEKICK using the supplied communication cable.
2. Power on the SIDEKICK.
3. Open the **Remote Desktop Connection** application on your PC or the Sixclear **GIOTA Connect** application

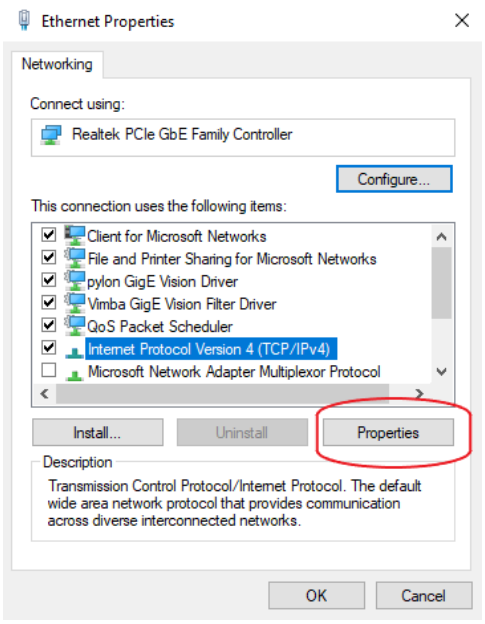
4. The GIOTA computer was assigned a fixed IP address: 20.0.1.2 with a subnet mask of 255.255.255.0
5. You will first need to configure your computer Network Connection to the matching IP address of the GIOTA computer, as such:

A. Go to “Control Panel” > “Network and Internet”. Select “Network and Sharing Center”, followed by “Change adapter setting” and Select the “Ethernet Connection” you are using.

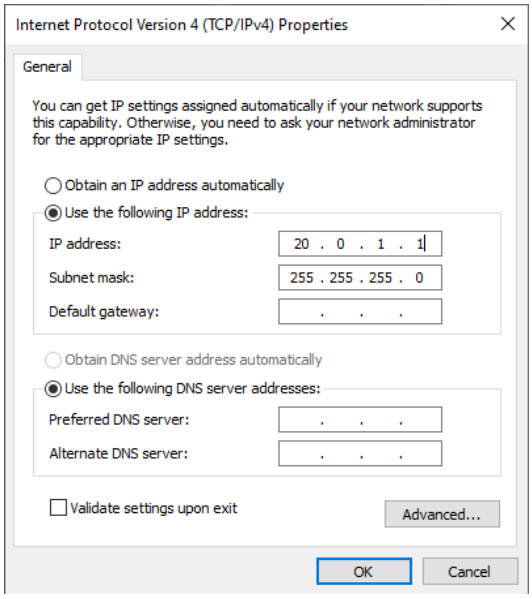


B. Then, click Properties and select Internet Protocol Version 4 (TCP/IPv4):





C. Finally, select “Use the following IP address” and enter the following IP address and matching GIOTA computer subnet mask, and click OK:



D. Your Remote Desktop Connection is now ready to be used.

6. The Remote Desktop Connection will prompt for credentials, enter:
   Username: giota
   Password: giota

7. If a security certificate warning appears, click “Yes” to proceed with the connection.

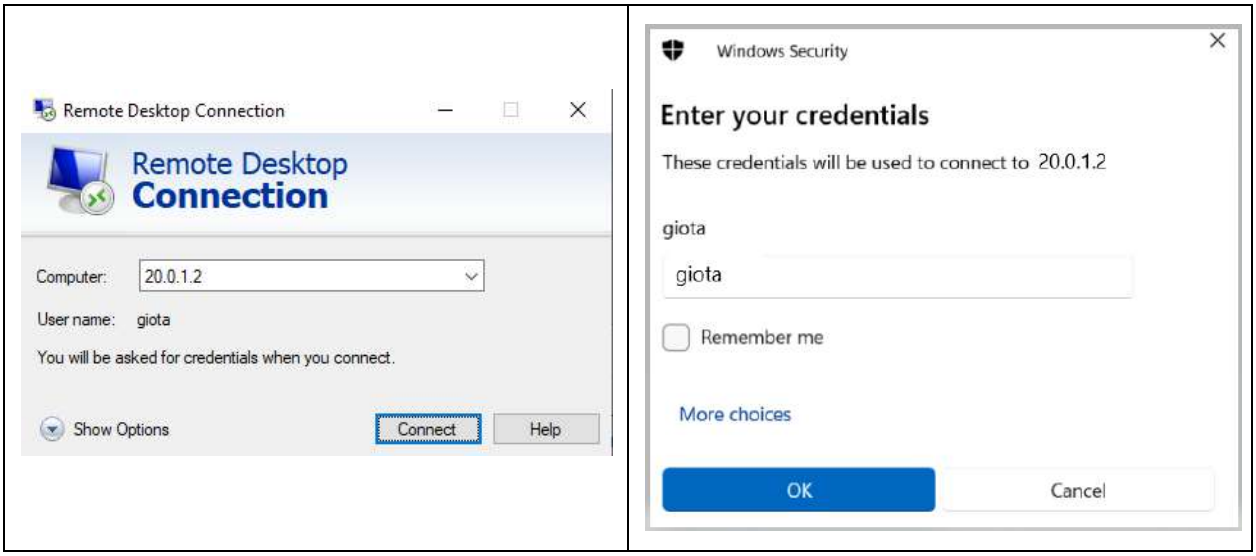


Fig 6: Remote Desktop Window and Credential Window

3.5 FileZilla Connection

3.5.1 Overview

FileZilla is a free, open-source application that supports fast file transfer using FTP, FTPS, and SFTP protocols. It provides a convenient method to access data files on the GIOTA computer or its external hard drive without removing the Control end-cap.
Note: FileZilla is not recommended for transferring large image datasets due to relatively limited transfer speeds (typically 80–125 MB/s).

3.5.2 Connection Setup

1. Connect your laptop to the SIDEKICK using the COMM port on the Control end-cap, following the same procedure described in the Remote Desktop section.

2. Open the FileZilla Client on your computer.

3. In the connection fields at the top of the window, enter the following:

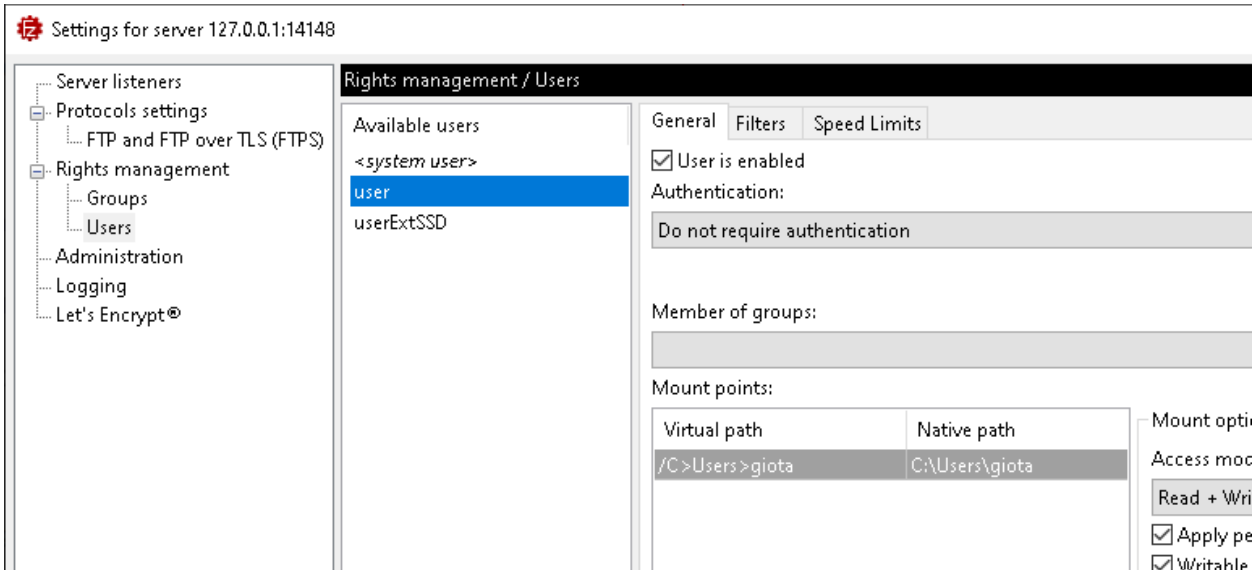
    - Host: 20.0.1.2
    - Username: user (or userExtSSD to access the external SSD)
    - Password: (leave blank)
    - Port: 21

4. Click Quickconnect.

3.5.3. Directory Access

- The "user" login connects to: C:\Users\giota on the GIOTA computer
- The "userExtSSD" login connects to: D:\ (external SSD)

You can configure the FileZilla Server on GIOTA to add custom directory paths, but by default, only the two above are preconfigured.



3.5.4 File Transfer

To download or upload files:

- Use the left panel in FileZilla to browse your local computer.
- Use the right panel to browse the GIOTA system.
- Drag and drop files or folders between the two panes to transfer.

3.6 Viewing a recently logged profile

The Sneak Peek Aggregator plugin in Sixclear JADE is a specialized tool used to collect and summarize data during a deployment for quick visualization and post-mission review.

3.6.1 A. Key Features and Purpose:

- **Data Summary Aggregation**: It selectively gathers a simplified subset of data (e.g., average depth, max value, timestamps) from various plugins throughout the deployment.
- **Lightweight Output**: The output is designed to be compact and fast to retrieve—perfect for a quick look at system performance without downloading large datasets.
- **Visualization Support**: The generated summary is typically formatted for use with the Sneak Peek JADE application, which plots key metrics such as time-depth profiles, allowing users to verify mission results immediately after recovery.
- **Non-Intrusive**: It operates in parallel with full logging plugins, meaning it won't interfere with the main data acquisition but offers a preview snapshot for rapid inspection.

In short, the Sneak Peek Aggregator plugin creates a real-time-compatible, lightweight overview

of the deployment, useful for operators and scientists needing an immediate sense of what was captured—without digging into the full data logs
.

3.6.2 Sneak Peek JADA (JADE Application) − Summary:

- **Purpose**: It is a lightweight viewer designed specifically to open and graph the summary files created by the Sneak Peek Aggregator plugin.
- **Usage**: After a deployment, you can retrieve the summary file (typically a .csv) from the GIOTA computer using FileZilla or another transfer method, then open it on your computer (if JADE is loaded) or on the GIOTA computer when remoting-in.
- **Outputs**: Commonly includes a plot of the time-depth profile and other mission-level indicators.
- **Benefit**: Gives operators and scientists immediate feedback post-recovery without needing to process full datasets.

4. SIDEKICK Instrument Hub Hardware

4.1 Opening an End-cap

1. Remove the four #10-24 fasteners.
2. Unscrew and remove the black nylon screws to expose the #10-24 threaded extraction holes.
3. Insert the supplied soft-tip set screws (#10-24 thread) into the exposed holes.
4. Using a 0.094” Allen key, gradually and evenly tighten the set screws to carefully extract the Control end-cap.
5. Note that the end-cap is sealed with both corner and bore o-rings for high reliability.
6. Before resealing, ensure the flange surface is clean, o-rings are free of debris, and properly lubricated to maintain sealing integrity.
7. Re-pack the end-cap threaded holes with grease and re-install the plastic screws to protect the treads from pitting and oxidation.

End-cap with through fasteners & plastic screws “plugs”

Remove the fasteners and plastic screws

Use soft-tip extracted set-screws to lift the end-cap out

Fig 7: End-cap Opening

4.2 Accessing the Internal Solid State Drive (SSD)

The primary reason to open the Control end-cap is to access and retrieve the optional internal Solid-State Drive (SSD).

4.2.1 Accessing the Hard Drive

- The SSD is housed in a dedicated compartment within a plastic cylinder that also supports the main SIDEKICK electronics board.
- This plastic support is designed to slide forward and backward. If needed, gently pull it toward you to access the SSD.
- When reinstalling the SSD, ensure the cable is fully seated and securely connected. We recommend using rubber bands to prevent movement due to rattling.

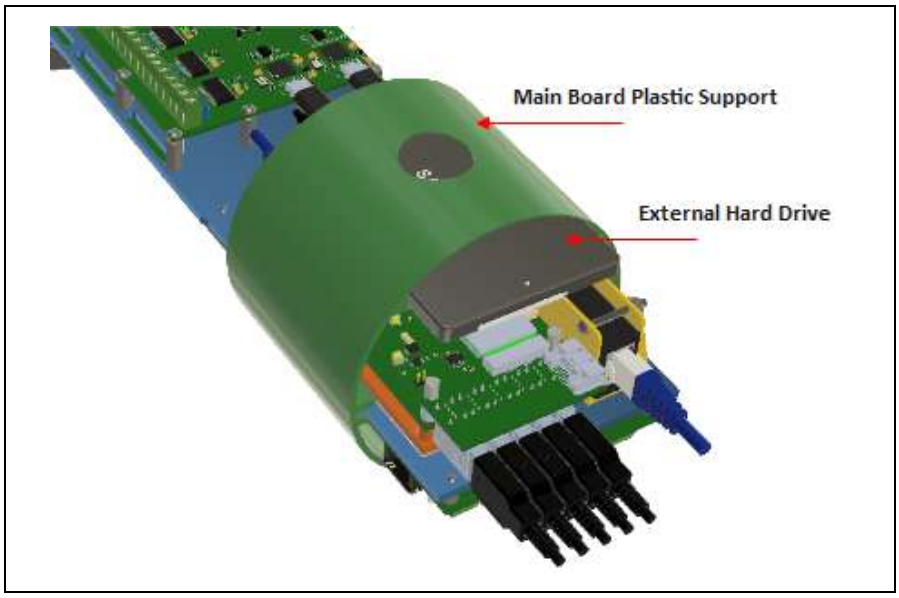


Fig 8: External Hard Drive

4.2.2 Additional Clearance (Optional)

- If more working space is required for your hands, you can disconnect the Control end-cap by unplugging the three color-coded quick-disconnect cables.
- Remember you need to remove the Ethernet cable from its RJ45 port to fully free the Control end-cap.

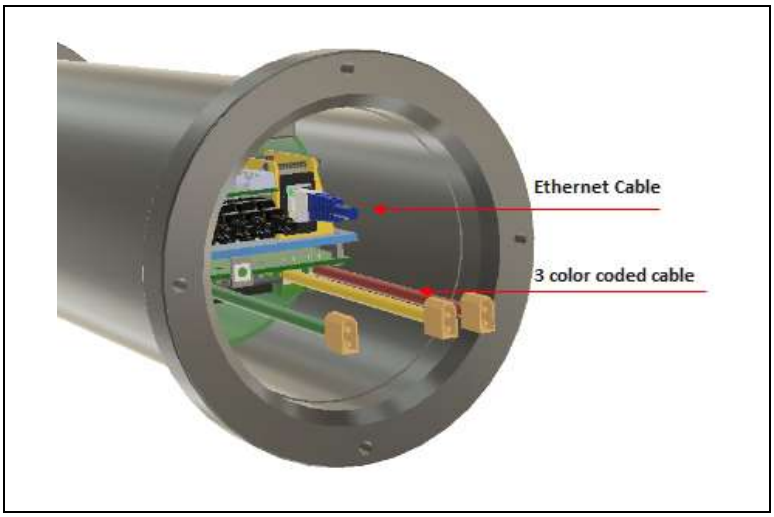


Fig 9: Cables Linking the Control End-cap to the Main Board

4.3 Internal Components

The SIDEKICK Instrument Hub consists of three main components: the **Onboard Computer** (with optional external hard drive), the **Main Electronics Board**, and the **Instruments Board.**

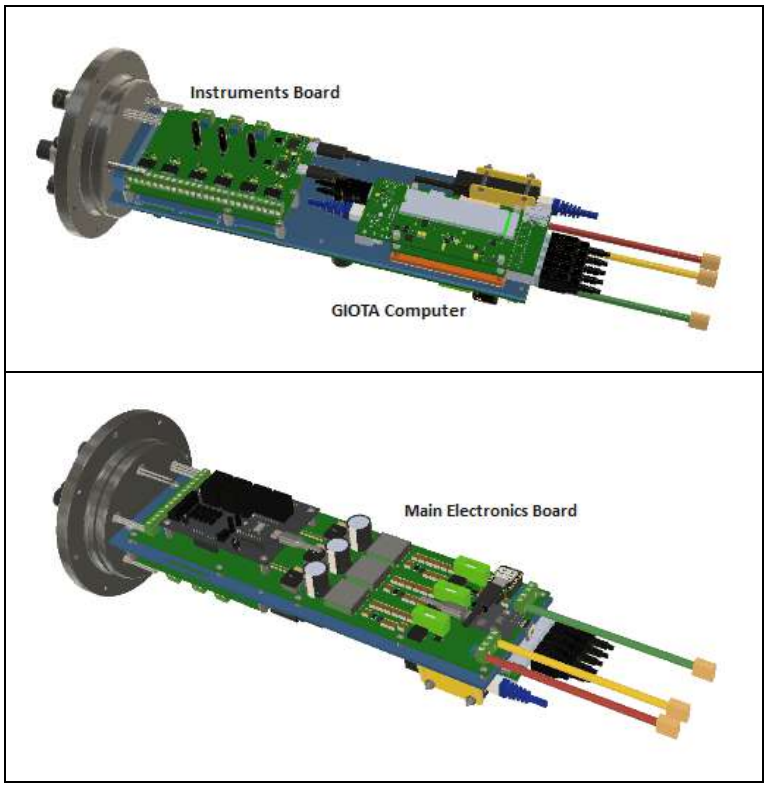


Fig 10: Main components inside the SIDEKICK Instrument Hub

4.4 Power Considerations

SIDEKICK power architecture is designed to favor stability and data integrity.

The SIDEKICK supports up to three independent, fully isolated DC-DC power converters for supplying connected instrumentation. Power distribution and routing are designed to prioritize electrical robustness, noise immunity, and long-term reliability in demanding field deployments.

A 12 V converter is installed by default on the Main Electronics Board. Two additional converters are specified at the time of order and may be configured as 12 V, 15 V, 24 V, 28 V, or 48 V outputs. Each converter is rated at 60 W, providing ample power margin and preventing operation near component limits.

The third power rail is commonly used to electrically isolate instruments known to generate switching noise or transient disturbances. In such configurations, the instrument is powered from its own dedicated converter and assigned an independent serial interface, minimizing cross-coupling and ensuring clean data acquisition across the system.

Power paths are carefully routed and filtered. Each converter includes local decoupling and bulk filtering capacitors to suppress conducted noise, while the overall board incorporates reverse-polarity protection, inrush current limiting, and comprehensive over-voltage, over-current, and under-voltage protection. Industrial-grade DC-DC modules are selected for their ability to maintain operation during input brown-out conditions through controlled current limiting, avoiding unnecessary power cycling.

Each power channel is individually fused for an additional layer of protection. When modifying or reconfiguring instrumentation, users must ensure that fuse ratings remain appropriate for the connected load.

Power delivery to instruments is managed by a dedicated relay board providing four independently controlled relays:

- One relay controls the primary 12 V instrumentation rail
- One relay switches the second DC-DC converter on the Main Electronics Board
- One relay manages an auxiliary 12 V output, commonly used for selectively powering devices such as cameras
- One relay is dedicated to the third DC-DC converter

This architecture enables precise power sequencing, electrical isolation, and clean shutdown behavior across a wide range of mission profiles.

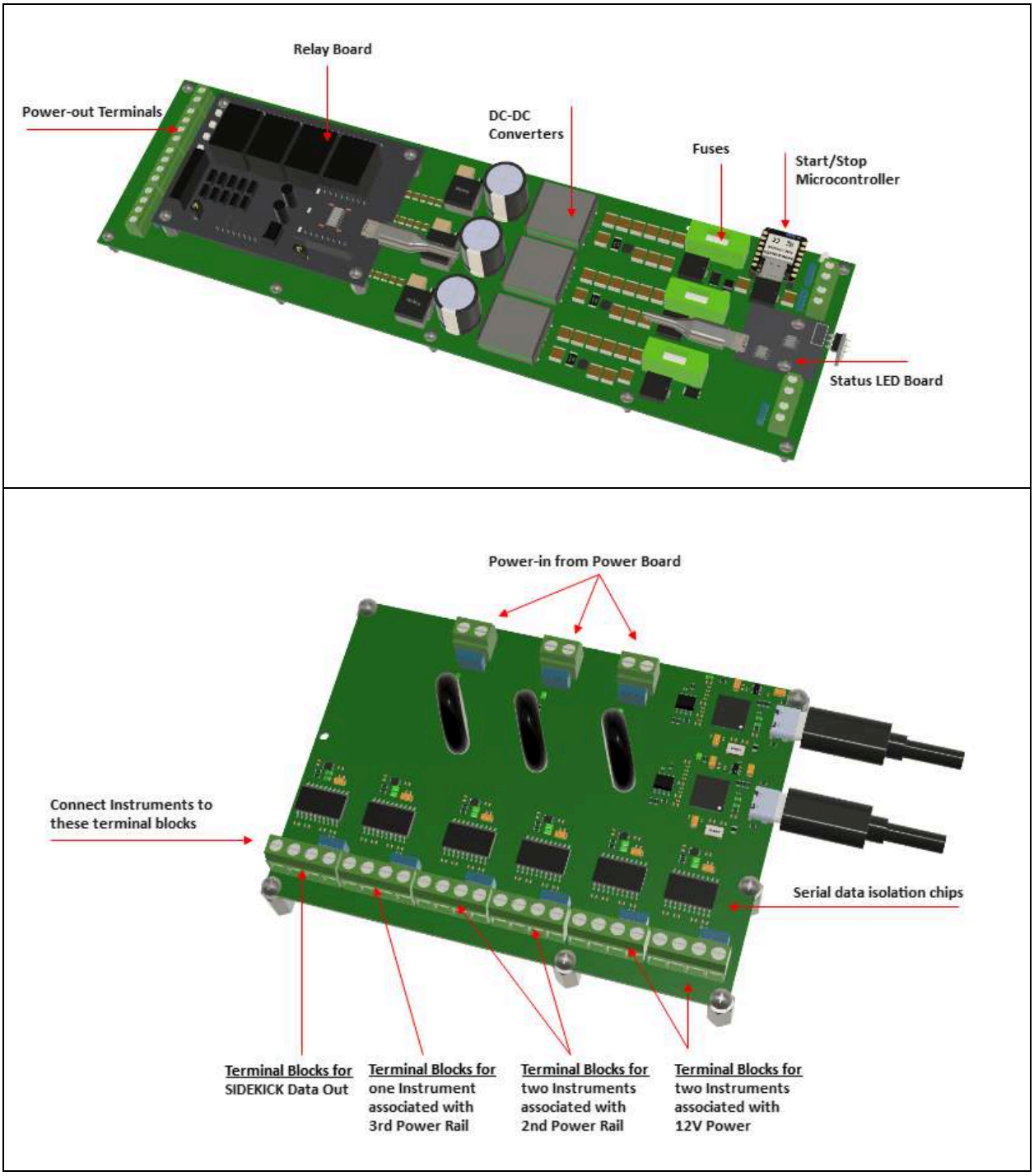


Fig 11: Description of the Printed Circuit Boards

4.5 Wiring a new Instrument and changing a bulkhead connector

4.5.1 Serial instruments:

The Instruments Board provides a clearly labeled and centralized interface for connecting serial instruments, supplying both power and RS-232 communication through dedicated terminal blocks.

- Instruments 1 and 2 are powered from the primary 12 V rail
- Instruments 3 and 4 share a common power circuit
- Instrument 5 is supplied by its own independent power rail

Connecting a Serial Instrument:

1. Wire the instrument's connector leads to the appropriate terminal block on the Instruments Board.
2. Verify correct connections for +Voltage, Ground, TX, and RX.
3. Remember that RX (instrument) connects to TX (board), and TX (instrument) connects to RX (board).
   If the communication polarity is uncertain, the TX/RX leads may be safely swapped during testing: this will not damage the instrument or the SIDEKICK.

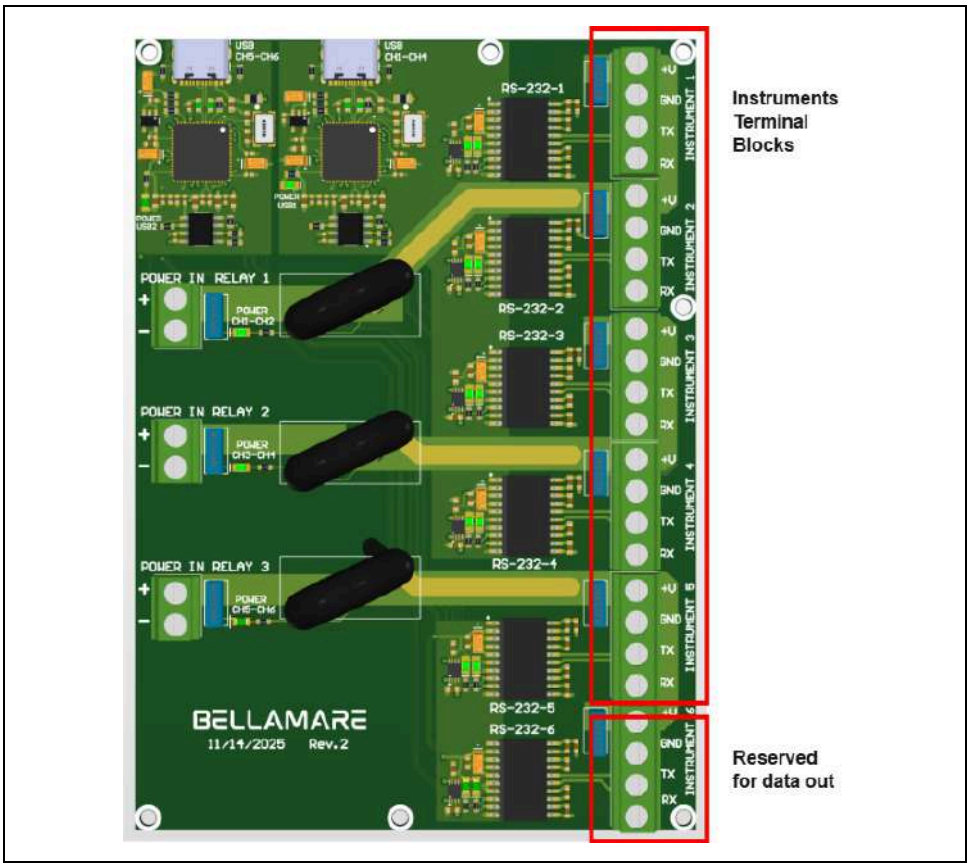


Fig 12: Instruments Board Connections

4.5.2 Ethernet and/or Power only Instrument

Ethernet-based instruments, such as GigE cameras, may be powered using the dedicated +12 V output on the Main Electronics Board. This power channel is controlled by an independent relay, allowing remote or automated power cycling, which is useful for instrument recovery, fault handling, or scheduled acquisition windows.

The instrument's Ethernet bulkhead connector should be connected directly to the LAN port of the onboard computer to establish data communication.

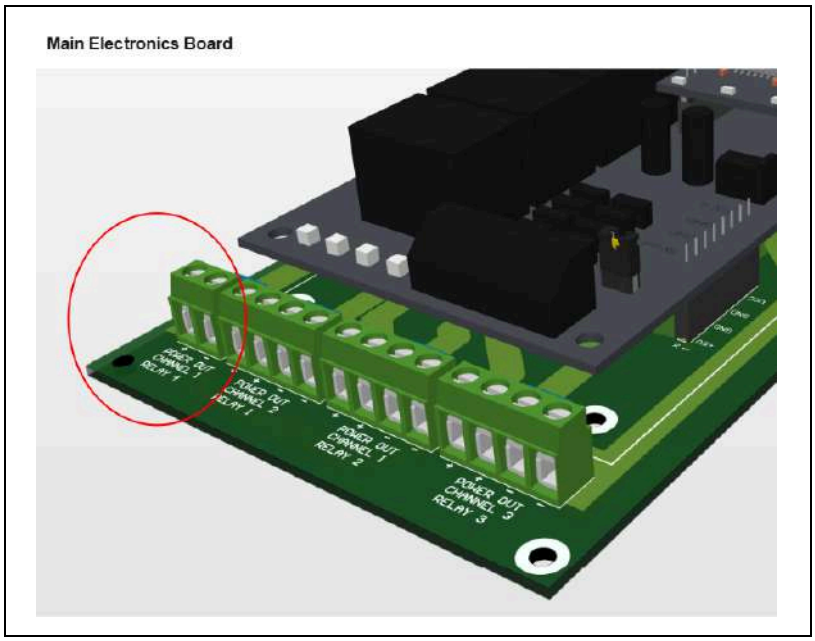


Fig 13: 12V Terminal Block controlled via Relay 4

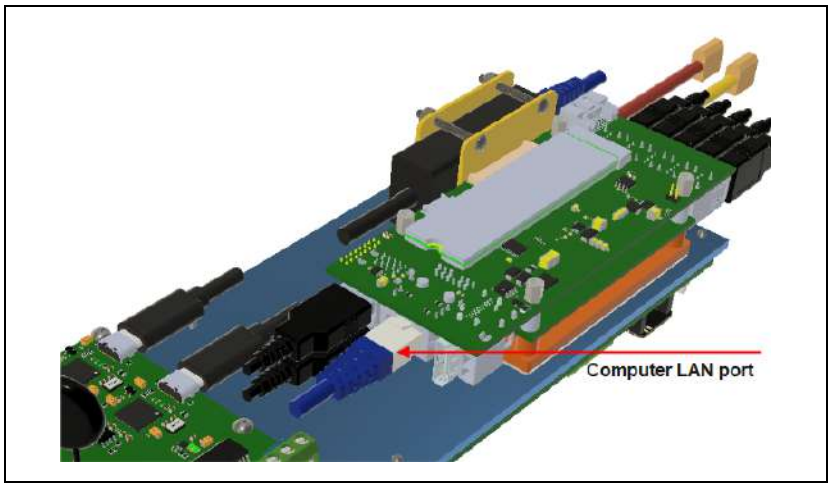


Fig 14: GIOTA Computer LAN port

4.6 Installing or Replacing a bulkhead connector

4.6.1 Connector Type

a. When installing or replacing a bulkhead connector, ensure it uses 7/16-20 threads.

b. The most commonly used connectors are the Subconn brand from *MacArtney*. Refer to the table below for standard pin-out and wire color assignments.

Face view (male)

Inline cable colour code

1: Black
2: White
3: Red
4: Green
5: Orange
6: Blue
7: White/black
8: Red/black
9: Green/black

* 3 conductor cable colour code: 1 black, 2 white, 3 green

Fig 15: MCBH Connectors pinout and wire colors

4.6.2 Connector Insulation Seat

1. Bulkhead connectors on the SIDEKICK Instruments end-cap are mounted on acetal seats, which insulate the connector body from the end-cap to prevent dissimilar metal corrosion.

2. This insulation allows the use of brass, aluminum, or stainless steel connector bodies without risk of galvanic corrosion.

4.6.3 Installation Procedure

1. Remove the existing connector or plug from the port.
2. Prepare the new connector:
    - Ensure the o-ring groove is clean
    - Lightly grease the #014 o-ring using an appropriate o-ring lubricant such as Molykote 111
3. Clean the acetal seat groove in the end-cap.
4. Lightly grease the #116 Acetal Seat o-ring, then place it into the end-cap groove.
5. Apply a small drop of removable thread locker (blue strength) inside the end-cap's threaded hole—not on the threads of the bulkhead connector.
6. Place the acetal seat into its recess.
7. Screw in the bulkhead connector and torque it firmly to approximately 30 ft-lbs.

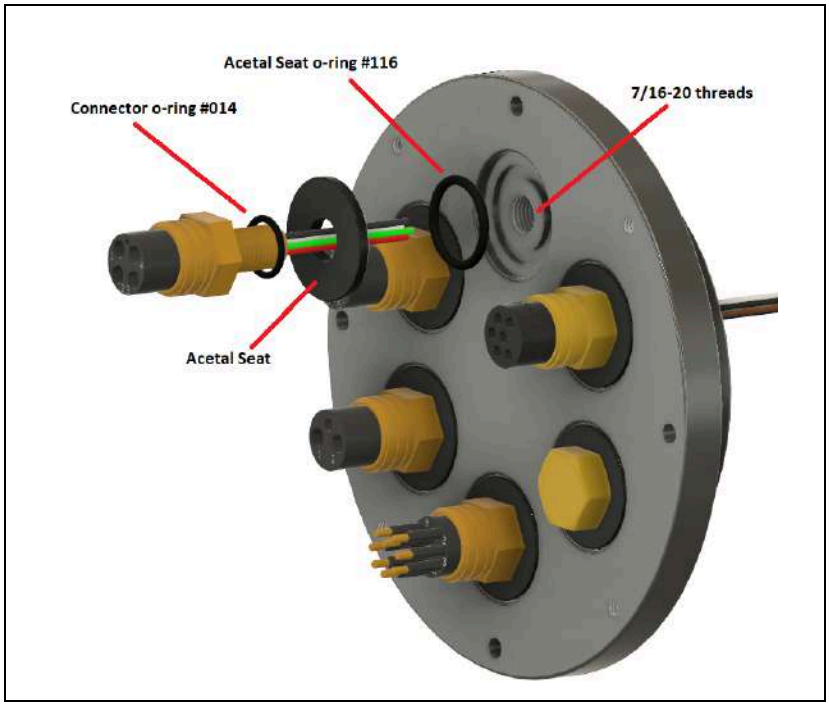


Fig 16: Connector installation

5. Post-Deployment Maintenance & Corrosion Prevention

5.1 Routine Protection

Before long-term or repeated deployments, apply a protective coat of LPS-3 to all exposed metallic surfaces of your subsea enclosures to prevent corrosion and oxidation.
After application, wipe off any excess lubricant.

5.2 After Each Recovery

After every recovery from seawater:

- Rinse the enclosure thoroughly with freshwater to remove salt deposits.
- After your mission, clean the entire enclosure using freshwater and mild dish soap.
- Allow the enclosure to dry completely, then reapply a coat of LPS-3 before storage.

5.3 Addressing Corrosion or Pitting

If you observe signs of corrosion or pitting on aluminum surfaces:

- Clean the affected area with a soft wire brush to remove oxidation.
- Temporarily seal the cleaned spot with heavy grease.
- When possible, apply epoxy over the area for long-term protection.
  Note: J-B Weld is recommended for its ease of use and strong adhesion.

6. List of spare parts, cables, dummy plugs and accessories

The SIDEKICK Instrument Hub is delivered with:

6.1 Mounting Brackets

- Two sets of plastic mounting brackets are provided for securing the SIDEKICK to a structure or frame.

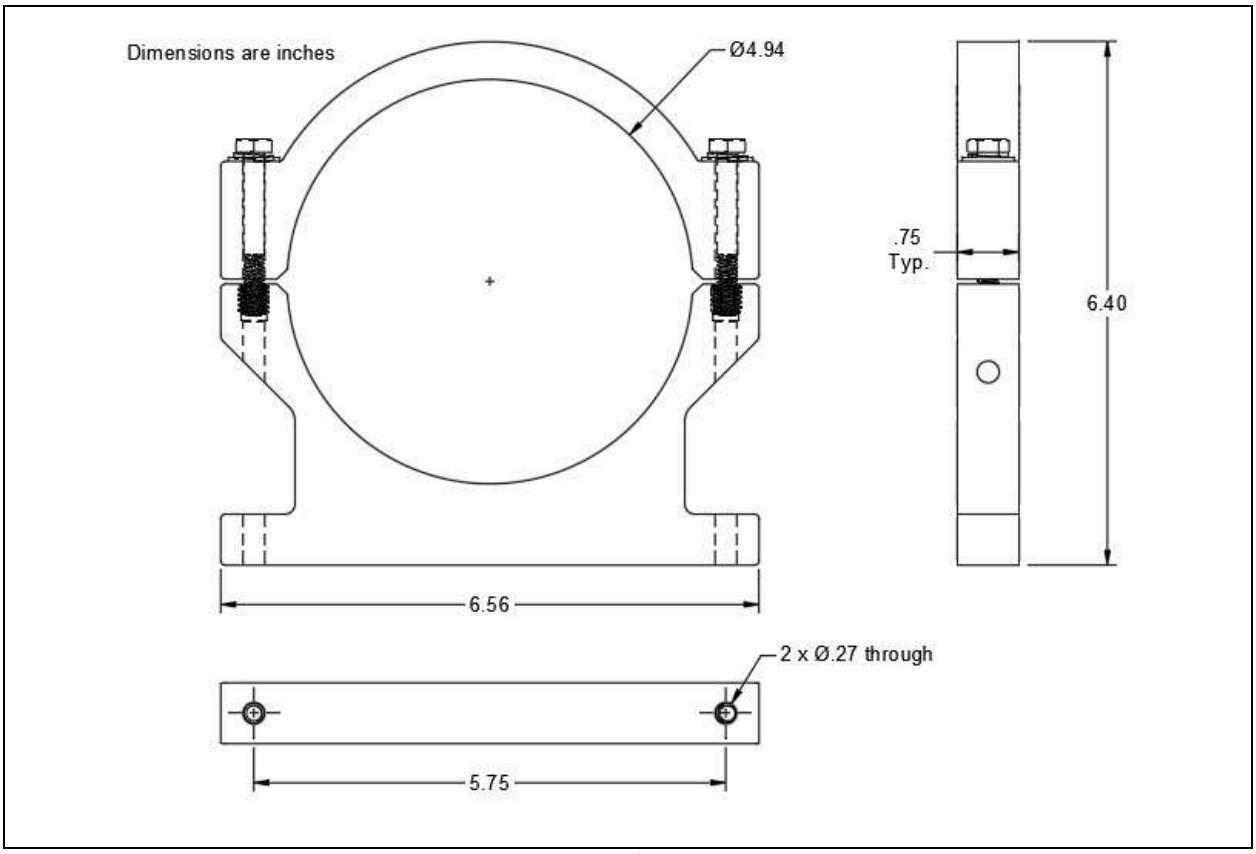


Fig 17: SIDEKICK Bracket (supplied as a set of two)

6.2 Spare Hardware

End-cap Fasteners
Included spare #10-24 hardware for securing the Control and Instrument end-caps:

- #10 Fiberglass Washers × 4
- #10 Stainless Steel Lock Washers × 4
- #10-24 Stainless Steel Flange Nuts × 4
- #10-24 Stainless Steel Hex Head Screws, 1.75" long × 2

End-cap Extraction and Protection
Hardware to safely remove the end-cap and protect threaded holes when not in use:

- #10-24 Stainless Steel Soft-Tip Set Screws, 0.75" long × 4
- #10-24 Black Nylon Round Head Screws, 0.50" long × 4

6.3 Spare O-Rings

Spare sealing o-rings are provided for field maintenance and replacement:

- 2 x Connector O-Rings (#014)
- 2 x Acetal Seat O-Rings (#116)
- 2 x End-cap Corner O-Rings (#244)
- 2 x End-cap Bore O-Rings (#243)

6.4 Provided cables and dummy plugs:

Cables	Function & Qty
MCIL2F/locking sleeve - 4FT - MCIL2M/locking sleeve	U/W Power Cable x 1
MCIL2F/locking sleeve - 4FT - pigtail (Black: ground, White: +Vin)	Deck Power Cable x 1
MCIL8F-cat/locking sleeve - 1FT - RJ45 coupler - 6ft long Cat6 cable	Deck Communication Cable x 1
MCIL*M/locking sleeve - 4FT - MCIL*F/locking sleeve	1 cable per Instrument bulkhead connector specified at purchase

Dummy Plugs	Function & Qty
MCDC2F	POWER connector plug x 1
MCDC2M MCDC2M-shorted/locking sleeve	ON/OFF connector plug x 1 ON/OFF connector activation x 1
MCDC3M MCDC3M-shorted/locking sleeve	START connector plug x 1 START connector activation x 1
MCDC8F/locking sleeve	COMM connector plug x 1
MCDC*F/M	1 dummy plug per Instrument bulkhead connector specified at purchase

7. Optional Accessories and Support Services

7.1 Support Services

To support mission readiness, system integration, and long-term reliability, Bellamare offers optional support services for SIDEKICK Instrument Hubs.

7.1.1 Hardware and Integration Support

Available as an annual subscription, sold in blocks of five (5) support hours.

This service may include:

- Electrical integration guidance
- Connector and pinout verification
- Power budget review
- Deployment configuration review
- Remote troubleshooting assistance

7.1.2 JADE Software Support

JADE software support is provided directly by Sixclear, Inc., and is available as an annual subscription in blocks of ten (10) support hours.

This service may include:

- Plugin configuration assistance
- State Machine configuration review
- Logging and data flow optimization
- Application debugging guidance

Bellamare does not modify, warranty, or control JADE source code. All software support terms are governed by Sixclear's policies and licensing agreements.

7.2 Battery Pack Enclosure

Bellamare offers optional battery enclosures designed for compatibility with SIDEKICK Instrument Hubs. Batteries are not included unless explicitly specified in the purchase agreement.

Battery selection, sizing, and mission-duration calculations remain the responsibility of the user.

7.2.1 Model: PowerCore_D-Cell_21V-45Ah

Alkaline D-cell battery pack composed of forty-two (42) D-cell batteries, delivering a nominal 21 V, 45 Ah output.

Important Performance Consideration:
Alkaline D-cell battery packs are not well suited for sustained high-current applications. Due to relatively high internal resistance, voltage sag may occur under load. In high-demand configurations, the output voltage may drop below the minimum operating threshold required by the SIDEKICK and connected instruments.

This configuration is best suited for low-to-moderate current applications.

7.2.2 Models: PowerCore_AGM_24V-10Ah & PowerCore_LiFePO4_24V-10Ah

Battery enclosure designed to house four (4) 12 V, 5 Ah batteries arranged in a 2S2P configuration. Compatible with:

- AGM lead-acid batteries
- $LiFePO_4$ (Lithium Iron Phosphate) batteries

Important Performance Consideration:
Although the nominal capacity is lower than the alkaline configuration, this architecture provides superior performance under higher current loads. It delivers improved voltage stability, reduced sag, and increased reliability during demanding deployments.

7.3 SYNCHRO Timer (Optional Accessory)

The SYNCHRO Timer is a low-power autonomous scheduling module designed to eliminate wasted energy during oceanographic and subsea deployments.

Many instruments consume power continuously, even when data acquisition is not required. SYNCHRO Timer addresses this inefficiency by physically disconnecting the main power path outside of predefined operating windows. By powering instruments only when they are needed, SYNCHRO Timer significantly extends deployment duration without increasing battery size or system complexity.

Simple, reliable, and autonomous, SYNCHRO Timer enables longer missions while preserving valuable onboard energy resources. The device is intended to be installed inline between a battery and the SIDEKICK Instrument Hub.

8. Miscellaneous

8.1 General Disclaimer

This manual and the information contained herein are provided for informational purposes only and are subject to change without notice.

The SIDEKICK Instrument Hub is supplied “as is”. System performance is dependent on proper integration, configuration, deployment practices, and environmental conditions beyond Bellamare’s control.

8.2 Safety Warnings

Failure to follow proper operating procedures may result in equipment damage, data loss, or personal injury.

- Do not operate the SIDEKICK outside its rated depth (2,500 m maximum for aluminum enclosure, 200 m for PEEK enclosure).
- Always disconnect external power and allow sufficient shutdown time before opening any end-cap.
- Use only specified voltage ranges (13–50 VDC input).
- Ensure all connectors are properly installed, sealed, and torqued before deployment.
- Only qualified personnel should open the enclosure or modify internal wiring.

8.3 Electrical Hazard Disclaimer

Improper wiring, incorrect voltage selection, fuse bypassing, or modification of internal circuitry may result in equipment damage, fire risk, or loss of mission data.

Only trained and qualified personnel should perform internal repairs or modifications.

Bellamare assumes no liability for damage resulting from unauthorized electrical modifications, incorrect fuse replacement, or improper integration of third-party instruments.

8.4 Warranty and Support

Unless otherwise specified in writing, SIDEKICK Instrument Hubs are covered by a limited one-year warranty against defects in materials and workmanship from the date of shipment.

This warranty does not cover:

- Damage caused by misuse, improper integration, or over-voltage conditions

- Corrosion resulting from salt-water exposure
- Wear components such as o-rings, connectors, fuses, or fasteners
- Damage resulting from unauthorized modifications
- Third-party instruments or software

Warranty claims require prior written authorization from Bellamare. Shipping costs to and from Bellamare facilities are the responsibility of the customer unless otherwise agreed.

8.5 Intellectual Property Notice

The SIDEKICK hardware architecture, electronics design, firmware logic, mechanical configuration, and system integration concepts are proprietary to Bellamare.

JADE software is proprietary to Sixclear, Inc., and is governed by its respective licensing terms.

Unauthorized duplication, reverse engineering, reproduction, or distribution of proprietary hardware designs, firmware, or configuration files is prohibited without written authorization.

8.6 Data Responsibility Clause

Bellamare does not guarantee uninterrupted data acquisition, data completeness, or error-free operation.

The user is solely responsible for:

- Verifying correct instrument configuration
- Validating logging parameters
- Confirming available storage capacity
- Ensuring adequate power supply margin
- Performing pre-deployment testing

Bellamare shall not be liable for any loss of data, missed acquisition events, corrupted files, or consequential damages arising from the use or inability to use the system.

Mission-critical deployments should always include independent validation and redundancy where appropriate.

9. Notes