FlexDAQ Setup and Installation Manual

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REVISION TABLE

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1 INTRODUCTION

FlexDAQ data loggers are versatile, custom-made systems that provide precise and reliable data acquisition from various sensor types and gauges. They are all contained in a durable, rugged enclosures that are dust-tight and water-resistant (IP-66) (Figure 1-2). The enclosures can be exposed to the elements, such as rain, snow and splashes of water, but are not suitable for submersion.

FIGURE 1-1 AN EXAMPLE FLEXDAQ CONFIGURATION FEATURING THE CR6

FIGURE 1-2 RUGGED FLEXDAQ ENCLOSURE

Due to the high customizable and unique nature of each FlexDAQ system, the information provided in this document is general and is intended to be used as a guide only. Information that is specific to your individual system, including schematic diagrams and set up instructions, has been provided on a USB drive included with your shipment. Please refer to those documents when setting up the FlexDAQ. Contact RST Instruments with any questions or concerns that may arise.

⚠	**CAUTION:**	**PLEASE USE THE DOCUMENTS SUPPLIED ON THE USB DRIVE INCLUDED WITH YOUR SHIPMENT AS THE PRIMARY RESOURCE WHEN SETTING UP THE FLEXDAQ. IT CONTAINS CUSTOM INFORMATION THAT IS HIGHLY SPECIFIC TO YOUR INDIVIDUAL SYSTEM. THE INFORMATION IN THIS DOCUMENT IS GENERAL AND WILL PROVIDE AN OVERVIEW ONLY.**

2   SAFETY

Normal safety precautions should be followed and proper personal protective equipment (PPE) should be worn when working in the field with this equipment, including safety glasses and high-visibility clothing.

Care should be taken to ensure the inside of the enclosure and the seal remain dry and free from dust and dirt. Should the FlexDAQ unit need to be opened, protect the electronics from the elements as much as possible and ensure the seal is clean before closing the cover and securing the latches.

3   COMMON COMPONENTS

The FlexDAQ components described below are some of the most typical components included in a single FlexDAQ enclosure. The type of datalogger included in a given enclosure depends on the required communication method, sensor type, and the required number of ports, switches and charging ports, among other considerations. Keep in mind that each enclosure in your system may contain different hardware. Consult the schematic drawings on the supplied USB drive (Section 5.1) to confirm the details of your specific system and each individual FlexDAQ unit.
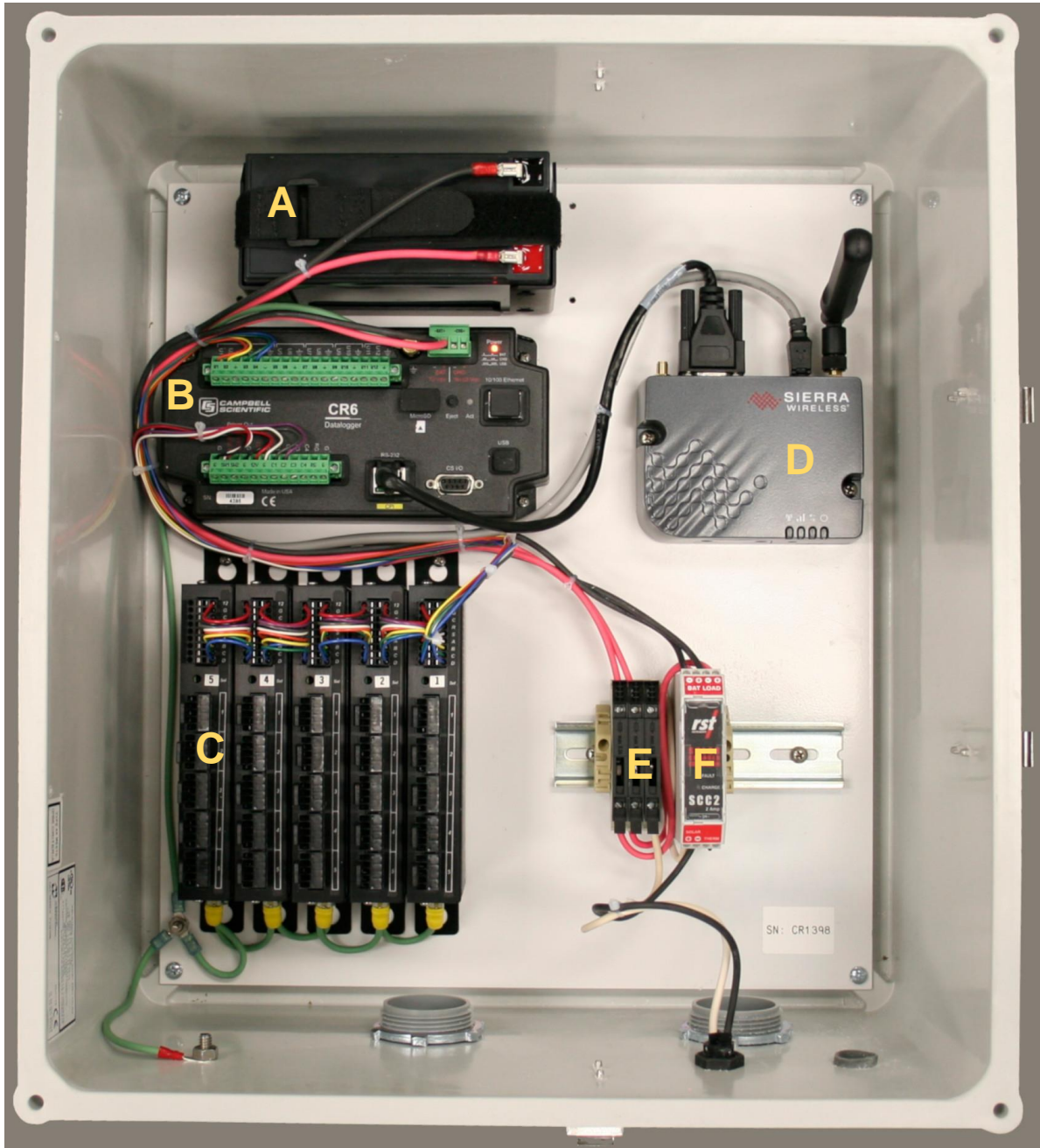
FIGURE 3-1 COMMON COMPONENTS OF THE FLEXDAQ SYSTEM

A Battery (see sections 3.1)

B Data logger (see section 3.2)

C Flexi-Mux (see section 3.3)

D Communications module (see section 3.4)

E Fuses (not covered in this document)

F Charger controller (not covered in this document)

3.1   POWER AND BATTERY

The FlexDAQ system is generally powered by 12V DC battery. The battery is charged by one of two methods:

- Solar power

- AC

The size and type of battery depends on many factors including the unit's consumptions and charger power source. Further information regarding the battery contained in your unit can be located on the USB drive included with your shipment.

3.2   DATALOGGER

The core of any FlexDAQ unit is its datalogger. It is pre-programmed in the factory, thus requiring minimal setup and configuration in the field. There are four commonly used models, each of which is briefly described in the sections below. The model in a particular unit is determined based on its application.

3.2.1   CR6

The CR6 datalogger (Figure 3-2) is a multi-purpose and low power datalogger that provides high accuracy and fast communication options such as Wi-Fi, cellular modem, ethernet, satellite, radio or USB connection to a PC. It features many different types of communication ports and its memory can be expanded with a microSD card.

FIGURE 3-2 THE CR6 DATALOGGER

3.2.2 CR300

The CR300 datalogger (Figure 3-3) is a compact, low-cost logger that features low power requirements and fast communications. This logger comes equipped with communication options such as Wi-Fi, cellular modem, radio or USB connection to a PC. With additional hardware, communication capabilities can be expanded to include ethernet and satellite.

FIGURE 3-3 THE CR300 DATALOGGER

3.2.3 CR800

The CR800 datalogger (Figure 3-4) is a simple logger ideal for situations where fewer sensors need to be monitored over long periods. It can communicate via radio or cellular modem, direct serial connection to a PC, and, with additional hardware, ethernet and satellite.

FIGURE 3-4 THE CR800 DATALOGGER

3.2.4   CR1000X

The CR1000X (Figure 3-5) is a versatile and robust datalogger. It is used in many diverse applications, can handle complex configurations and has communication options such as Wi-Fi, cellular modem, ethernet, satellite, radio or USB connection to a PC. It features many different types of communication ports and its memory can be expanded with a microSD card.

FIGURE 3-5 THE CR1000X DATALOGGER

3.3   FLEXI-MUX MULTIPLEXER

The Flexi-Mux Multiplexer (Figure 3-6) is included in many FlexDAQ systems to increase the number of sensors that can be measured by a single datalogger. It is a versatile unit that is compatible with many kinds of dataloggers and sensors. Multiple Flexi-Mux units may be used to dramatically increase the number of sensors measured by a FlexDAQ unit.

FIGURE 3-6 FLEXI-MUX MULTIPLEXER

3.4   COMMUNICATION

There are two main methods to communicate with your datalogger: wired connections and wireless. The communication method particular to your FlexDAQ will be defined upon purchase. Each method is described in the sections below.

3.4.1   Wireless

Wireless communication methods include Wi-Fi, radio, cellular modem and satellite modem. The type of communication module appropriate for a given system depends on a number of variables, including the intended location of the FlexDAQ, the type of datalogger used and customer preference. The communication method will be defined upon purchase. For generic setup instructions, see Section 4.2. For setup instructions specific to your individual system, please see the USB drive included in your shipment.

3.4.2   Wired Connections

The datalogger and any data stored in its memory can also be accessed through a wired connection. This is usually either ethernet or USB cable connected directly to the datalogger. Refer to the schematic diagram on the USB drive included in your shipment for exact configurations.

⚠	**CAUTION:** ENSURE THAT THE ELECTRONICS INSIDE THE RUGGED ENCLOSURE REMAIN PROTECTED FROM RAIN, SNOW, ICE, DIRT AND DUST. TO MAINTAIN THE INTEGRITY OF THE WEATHER PROTECTION OF THE ENCLOSURE AFTER OPENING, ENSURE THE SEAL REMAINS FREE FROM DUST AND DIRT BEFORE CLOSING THE COVER AND SECURING THE LATCHES.

4   INSTALLATION

The following section describes two common installation scenarios: mounting the FlexDAQ on a wall or pole. The location of the installation and relevant sizing information should be defined when ordering, and the appropriate hardware will be included with the shipment. Installation procedures may need to be adjusted based on the particular needs of a given site. Please read the following section and contact RST Instruments with any site-specific questions or concerns that may arise.

> ⚠ **CAUTION:** **INSTALLATION SHOULD BE HANDLED BY AT LEAST 2 PEOPLE. IF THE FLEXDAQ IS VERY LARGE, ADDITIONAL TECHNICIANS MAY BE USEFUL TO SUCCESSFULLY COMPLETE THE INSTALLATION.**

4.1   WALL MOUNT

The FlexDAQ can be mounted on a wall or any flat, secure, vertical surface. The tools and hardware required will depend on the type of wall selected. The FlexDAQ comes equipped with four steel feet (Figure 4-1) on the back of the unit to facilitate installation.

FIGURE 4-1 MOUNTING FOOT

4.1.1   Installation Tools and Materials

The following tools will be needed for installing the FlexDAQ on a wall:

- 4 bolts appropriate for the material of the wall.

- Drill.

- Drill bits appropriate for the material of the wall.

- Appropriate grounding stake and cable, if required.

- Flat-head screwdriver.

4.1.2   Installation Procedure

The following steps outline a general procedure for installing the FlexDAQ on a wall. Characteristics of individual site may require changes to the procedure. Please contact RST Instruments with any questions or concerns.

4.1.2.1   Preparation

1   Ensure the wall or vertical surface is sturdy and secure and capable of supporting the weight of the FlexDAQ.

2   Select the installation location. Ensure that the back of the wall is unobstructed, and installation of the unit will not interfere with important utilities.

3   Measure the spacing between the feet on the back of the FlexDAQ in both the vertical and horizontal direction.

4   Mark the spacing on the wall.

4.1.2.2   Installation

5   Drill guide holes into the wall, if necessary.

6   With one person holding the FlexDAQ unit in place, install the bolts through the holes in each foot into the wall.

4.1.2.3   Grounding (if required)

The unit should always be grounded. If the unit is charged using AC power, a grounding stake is not required so long as the AC power is properly grounded.

7   A grounding lug (Figure 4-2) is located on the lower side of each FlexDAQ enclosure.

FIGURE 4-2 GROUNDING LUG (HIGHLIGHTED IN RED)

8 Attach an appropriate grounding cable to the grounding lug.

9 Run the cable from the FlexDAQ to a grounding stake. Ensure the grounding stake is firmly in the ground.

4.2   POLE MOUNT

The FlexDAQ unit may also be mounted on a pole or post. If this installation method is selected, two Unistrut channels will be added to the back of the enclosure to facilitate installation.

4.2.1   Installation Tools and Materials

- Cush-A-Clamps (supplied by RST Instruments).

- Wrench.

- An appropriate grounding stake and cable, if required.

- Flat-head screwdriver.

4.2.2   Installation Procedure

The following steps outline a general procedure for installing a FlexDAQ unit on a pole or post. Individual site requirements may necessitate changes to the procedure. Please contact RST Instruments with any questions or concerns.

4.2.2.1 Preparation

1 Ensure the pole or post is firmly and securely in the ground.

2 Ensure that the Cush-A-Clamp (Figure 4-3 and Figure 4-4) fits snugly around the pole.
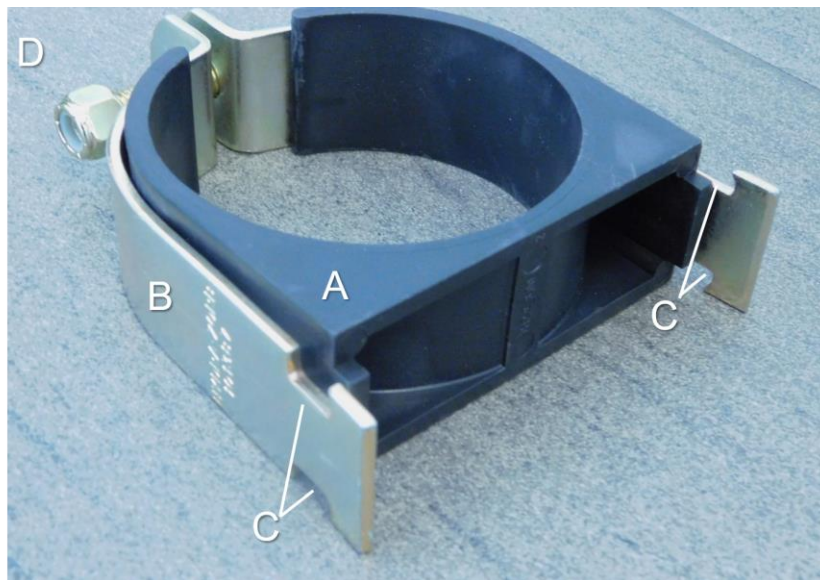

FIGURE 4-3 CUSH-A-CLAMP FOR SECURING FLEXDAQ TO POLE

FIGURE 4-4 THE CUSH-A-CLAMP

A	Thermoplastic cushion	**B**	Clamp
C	Unistrut guide	**D**	Nut and bolt

> **NOTE: IF THE CUSH-A-CLAMP DOES NOT FIT SECURELY AROUND THE POLE, PLEASE CONTACT RST INSTRUMENTS.**

3   Measure the vertical distance between the Unistrut bars on the back of the FlexDAQ.

4   Mark the distance on the pole, with the top mark corresponding to the approximate height of the FlexDAQ unit.

5   Place the black thermoplastic cushion around the pole at the markings. The flat side of the cushion should face the FlexDAQ.

6   Lift the FlexDAQ unit to the desired height.

7   Place the clamp around the thermoplastic cushion, with the bolt directly opposite from the flat edge of the cushion.

8   Thread the Unistrut guides through the Unistrut bars, as illustrated in Figure 4-5.
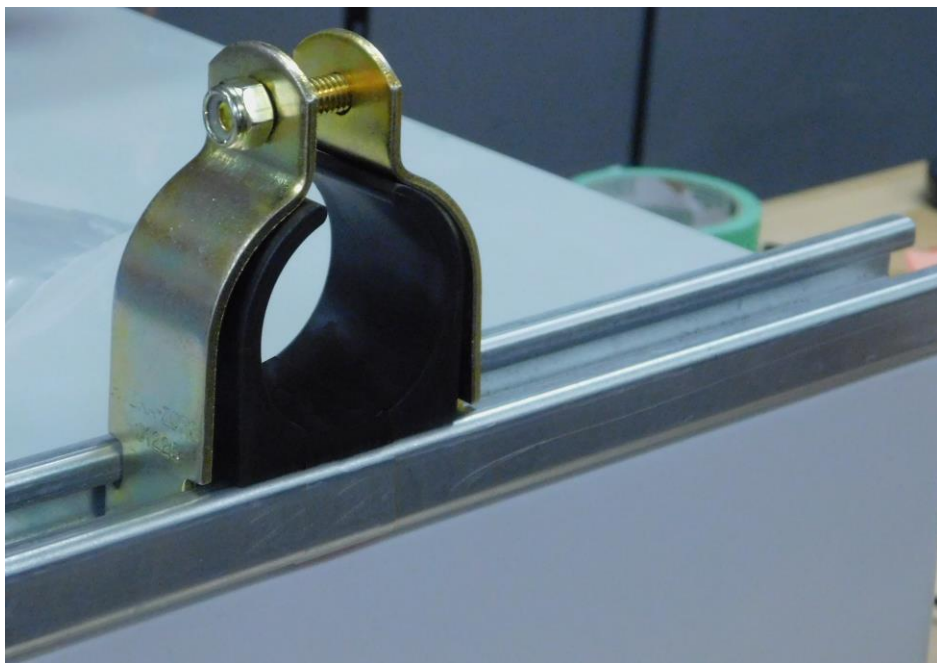
FIGURE 4-5 UNISTRUT AND CUSH-A-CLAMP ON BACK OF FLEXDAQ

9   Tighten the bolt. Final installation should resemble the example in Figure 4-6 and Figure 4-7.

FIGURE 4-6 POLE MOUNT EXAMPLE, VIEW 1

FIGURE 4-7 POLE MOUNT EXAMPLE, VIEW 2

4.2.2.2   Grounding (if required)

The unit should always be grounded. If the unit is charged using AC power, a grounding stake is not required so long as the AC power is properly grounded.

10 A grounding lug (Figure 4-8) is located on the lower side of each FlexDAQ enclosure.

FIGURE 4-8 GROUNDING LUG (CIRCLED IN RED)

11 Attach the grounding cable to the grounding lug.

12 Run the cable from the FlexDAQ to a grounding stake. Plant the grounding stake firmly into the ground.

4.3   AUXILIARY COMPONENTS

Depending on the design specifications of a FlexDAQ unit, it may require the assembly and installation of some auxiliary components. The following section outlines two of the most common: the solar panel and the antenna.

4.3.1   Solar Panel (90W)

If the 12V DC battery is charged by solar power, a solar panel will need to be erected. The following instructions detail the best method for setting up a 90W solar panel.

4.3.1.1   Installation Tools and Materials

The solar panel comes with the hardware seen in Figure 4-9.

FIGURE 4-9 COMPONENTS TO MOUNT SOLAR PANEL

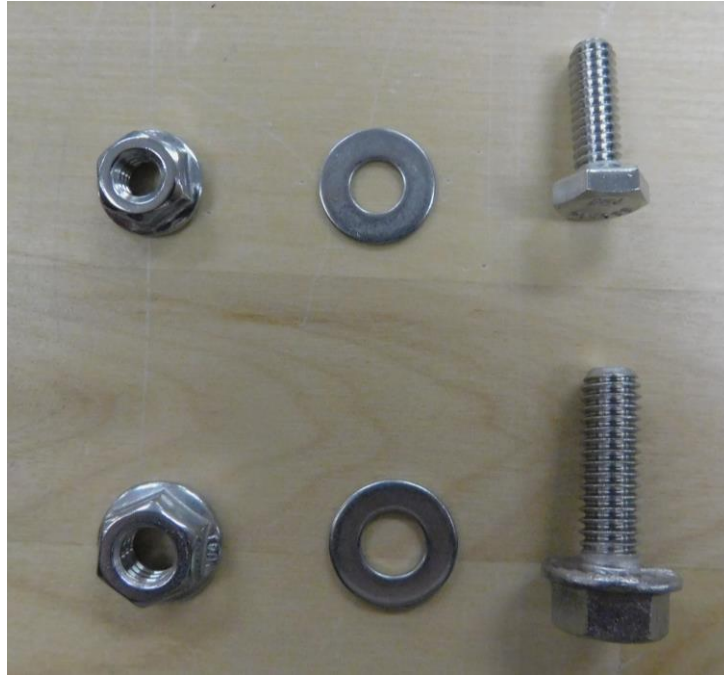|			
A	Post brackets	**B**	Panel brackets
C	Foot brackets	**D**	Pipe clamps
E	Bolts, nuts, washers, Loctite	**F**	Adjustment brackets

**FIGURE 4-10 NUTS, WASHERS AND BOLTS
(TOP ROW: SMALL BOLT. BOTTOM ROW: LARGE BOLT)**

4.3.1.2   Instructions

The following instructions detail the steps needed to correctly set up a solar power.

1 Place the panel brackets across the back of the solar panel, aligning the slots on the bracket with the inner holes on the back of the solar panel (Figure 4-11 and Figure 4-12, highlighted in red).

⚠ **CAUTION: ENSURE THAT THE SLOTTED SIDES OF THE PANEL BRACKET ARE POINTING AWAY FROM THE EDGES OF THE PANEL (FIGURE 4-11).**

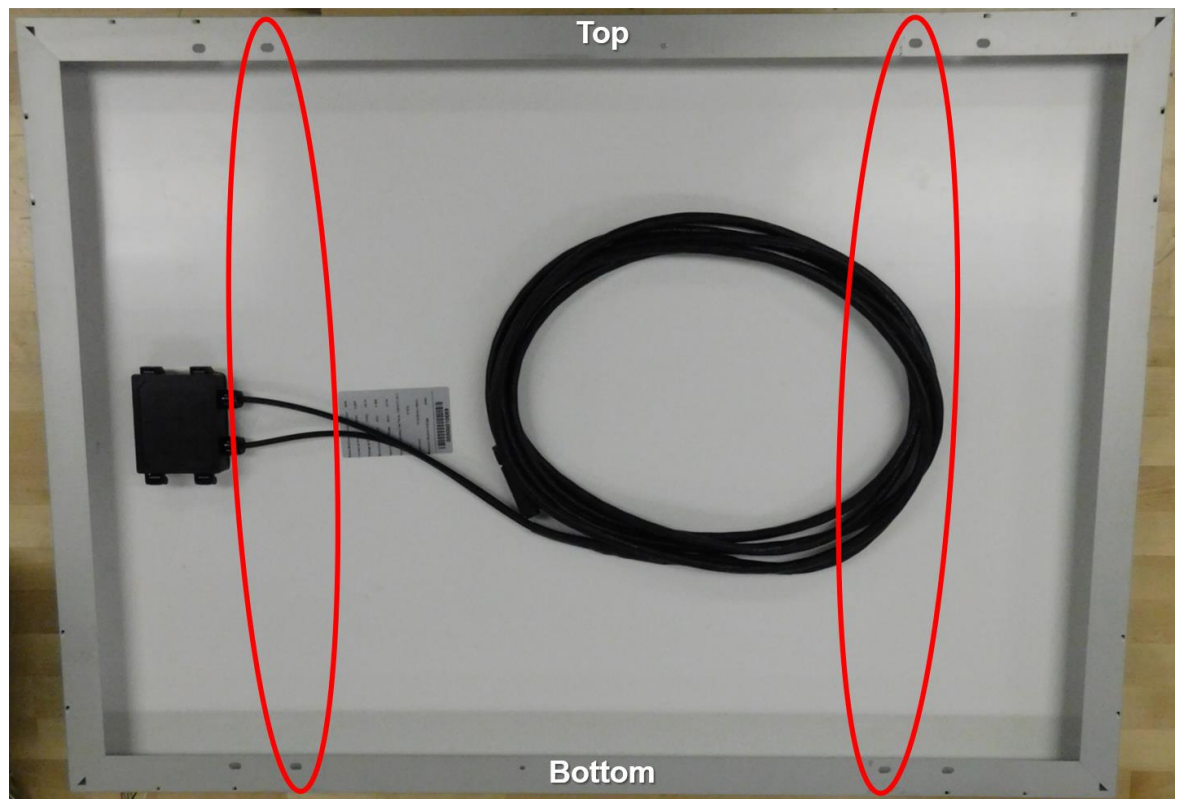**FIGURE 4-11 PLACING THE PANEL BRACKETS ON THE BACK OF THE SOLAR PANEL**

FIGURE 4-12 BACK OF THE SOLAR PANEL

2 Secure the panel bracket to the solar panel using the small bolt, washer and nut (Figure 4-13).

FIGURE 4-13 FASTENING THE NUT AND BOLT

3 Attach the foot brackets to panel bracket on the top side of the solar panel using the large bolt, washer and nut.

4 Attach the adjustment brackets to the bottom side of each panel bracket, as illustrated in Figure 4-14.

FIGURE 4-14 ADJUSTMENT BRACKETS ATTACHED TO BOTTOM SIDE OF THE PANEL BRACKETS

5   Secure a foot bracket to the free end of each adjustment bracket towards the top of the solar panel, as illustrated in Figure 4-15.
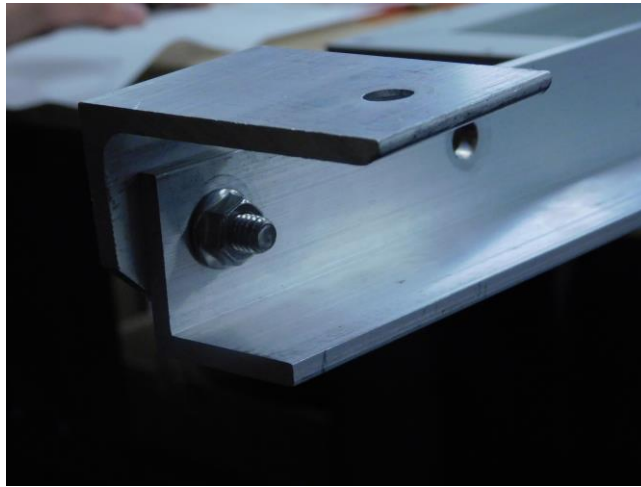

FIGURE 4-15 ATTACHING THE FOOT BRACKET TO THE END OF THE ADJUSTMENT BRACKET

6   Place a post bracket atop the foot brackets at both the top and bottom of the solar panel. Secure the post bracket with the small bolt, washer and nut (Figure 4-16).
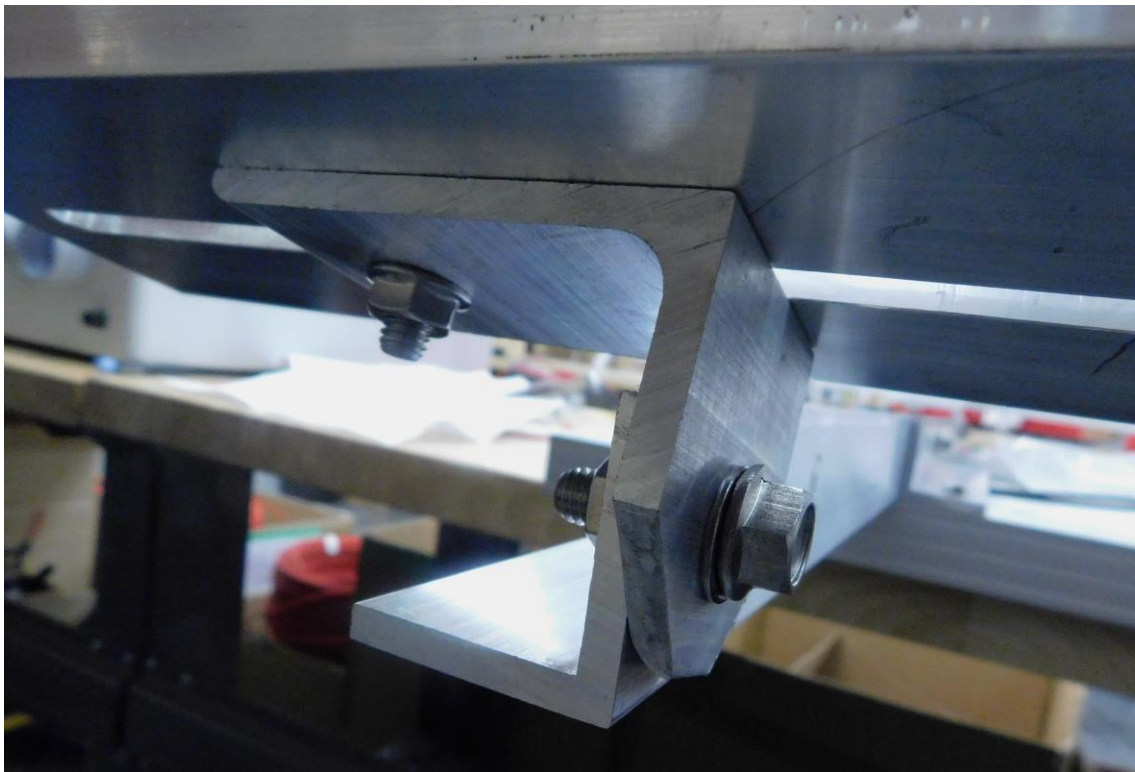

FIGURE 4-16 ATTACHING A POST BRACKET THE FOOT BRACKET AT THE END OF THE ADJUSTMENT BRACKET

7   The final solar panel assembly will resemble Figure 4-17.

FIGURE 4-17 FINAL ASSEMBLY

8   Select the correct orientation for the solar panel.

☞ | **NOTE: ORIENT THE PANEL SO THAT IT RECEIVES DIRECT SUNLIGHT DURING DAYLIGHT HOURS. IF A LARGE VOLUME OF SNOW IS ANTICIPATED AT THE INSTALLATION SITE, ENSURE THE PANEL FACE IS MORE VERTICAL TO PREVENT ACCUMULATION OF SNOW. SNOW AND ICE WILL NEED TO BE REMOVED FROM THE PANEL FACE AS SOON AS POSSIBLE.**

9   Open the pipe clamps and thread them through the vertical slots in the middle of each post bracket (on either side of the notches) (Figure 4-18).

FIGURE 4-18 ATTACHING THE PIPE CLAMPS TO THE POST BRACKET

10 Wrap the pipe clamps around the pipe or post and secure. Tighten the bolt using a flathead screwdriver or a 5/16" socket.
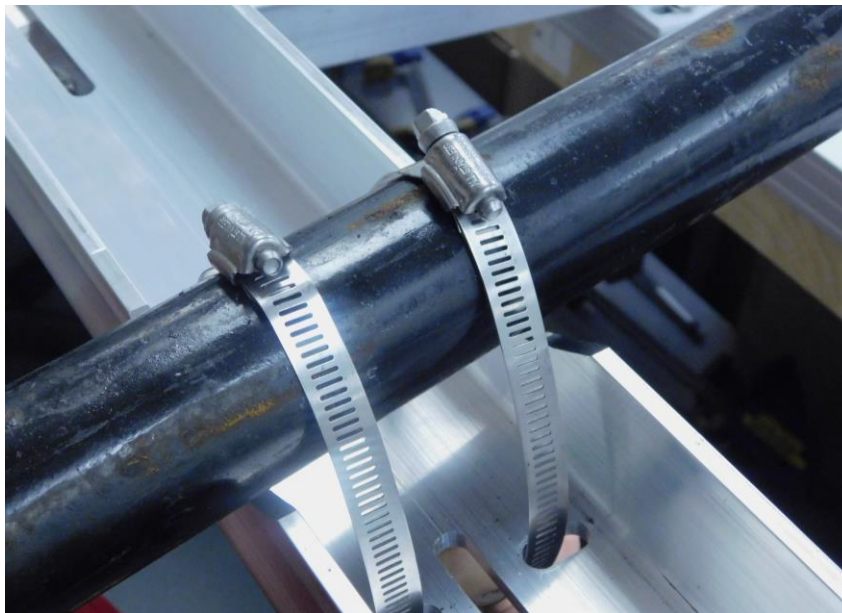

FIGURE 4-19 PIPE CLAMPS SECURED AROUND PIPE

11 Once the solar panel has been properly and securely mounted, connect it to the FlexDAQ.

4.3.2 Solar Panel (20 – 40W)

If the 12V DC battery will be charged by solar power, a solar panel will need to be erected. The following instructions detail the best method for setting up a 20 – 40W solar panel.

4.3.2.1 Components

The following components are required for the successful assembly of a 20 – 40W solar panel. Ensure that all components are present before proceeding with the assembly.
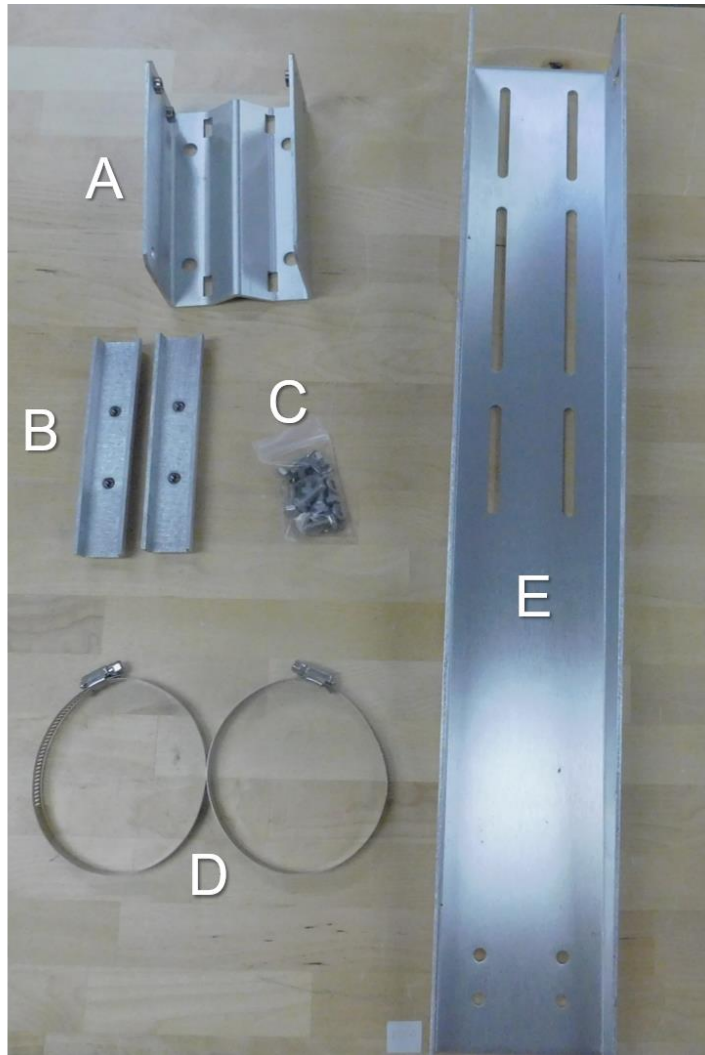

FIGURE 4-20 MOUNTING COMPONENTS

A Post bracket	**B** Clamping brackets
C Bolts, lock washers and washers	**D** Pipe clamps
E Panel bracket	

4.3.2.2 Instructions

The following steps detail how to assemble the solar panel.

12 Loosely attach the clamping brackets to the back of the panel bracket (see Figure 4-21).

☞ | **NOTE: DO NOT TIGHTEN THE BOLTS AT THIS TIME.**

FIGURE 4-21 CLAMPING BRACKETS ON BACK OF PANEL BRACKET

13 Place the panel bracket across the short side of the back of the solar panel and slide the clamping brackets under the panel's lips (see Figure 4-22).
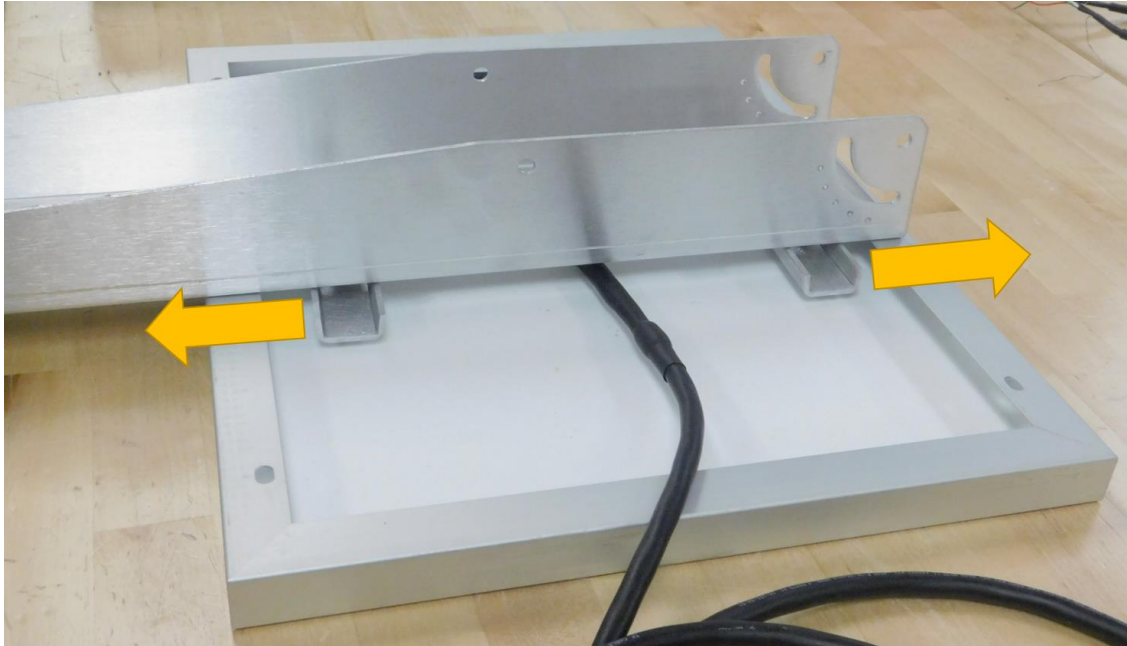
FIGURE 4-22 SECURING PANEL BRACKET TO PANEL WITH CLAMPING BRACKETS

14   Tighten the bolts on the panel bracket to secure (Figure 4-23).
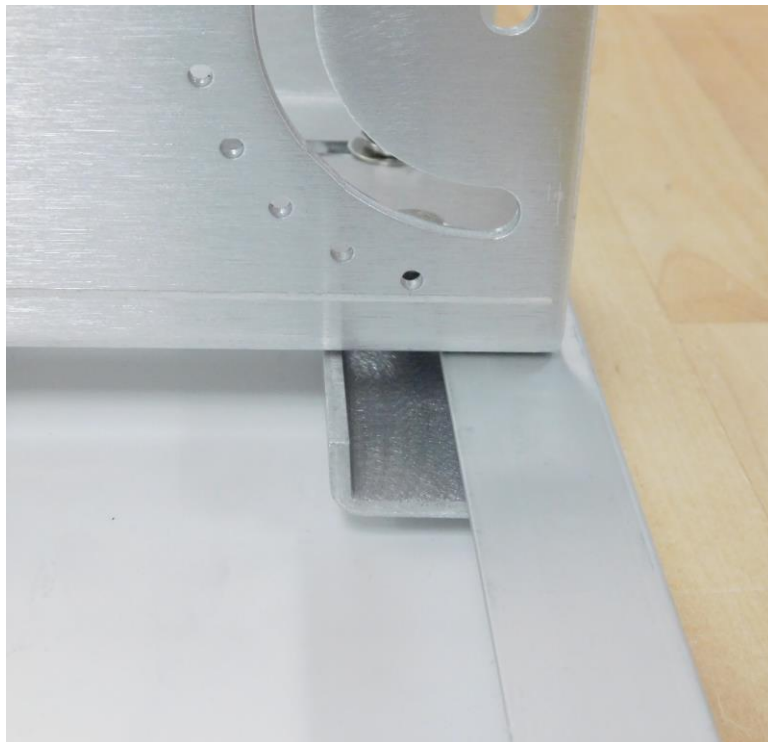

FIGURE 4-23 PANEL BRACKET ATTACHED

15   Place the post bracket in the top of the panel bracket and loosely bolt it into place, as illustrated in Figure 4-24.
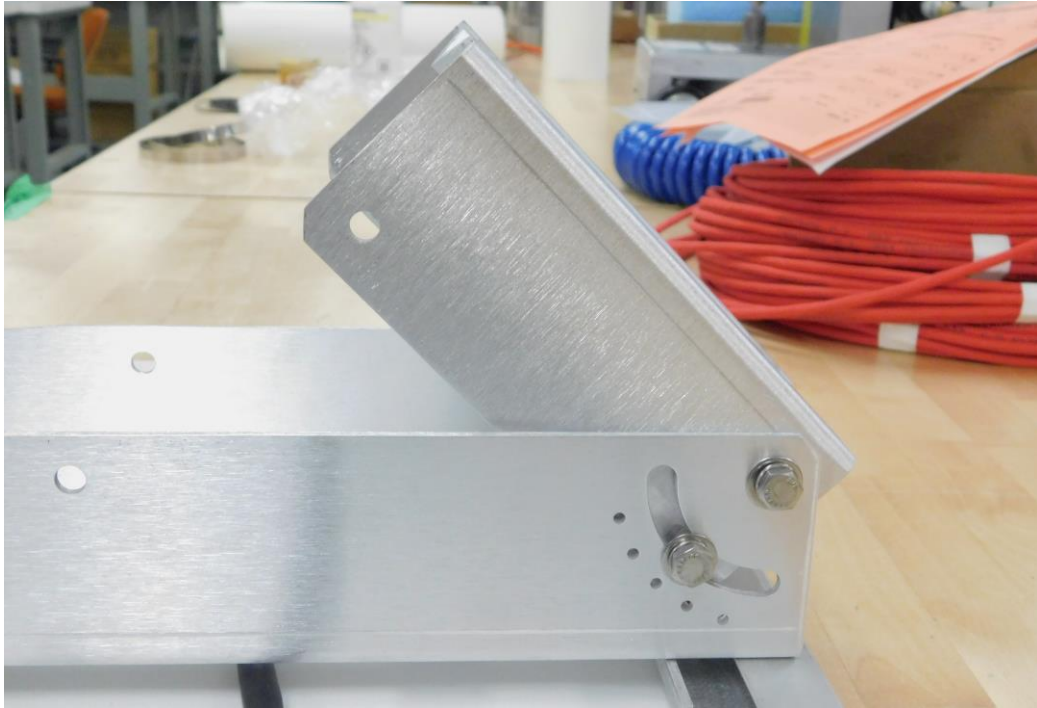
FIGURE 4-24 POST BRACKET IN PANEL BRACKET

16 Thread the pipe clamps through the slots on the post bracket (Figure 4-25).

FIGURE 4-25 THREAD PIPE CLAMP THROUGH SLOTS ON POST BRACKET

17 Select the correct angle of orientation for the solar panel and tighten the bolts on the post bracket to lock it into place.

> ☞ **NOTE: ORIENT THE PANEL SO THAT IT RECEIVES DIRECT SUNLIGHT DURING DAYLIGHT HOURS. IF A LARGE VOLUME OF SNOW IS ANTICIPATED AT THE INSTALLATION SITE, ENSURE THE PANEL FACE IS MORE VERTICAL TO PREVENT ACCUMULATION OF SNOW. SNOW AND ICE WILL NEED TO BE REMOVED FROM THE PANEL FACE AS SOON AS POSSIBLE.**

18 Wrap the pipe clamps around the pipe or post and tighten, as illustrated in Figure 4-26.

FIGURE 4-26 TIGHTEN PIPE CLAMP AROUND THE PIPE

19 Once the solar panel has been properly and securely mounted, connect it to the FlexDAQ.

4.3.3   Antennas

FlexDAQ systems may come equipped with two types of antennas. Though the Yagi and Omni antennas differ in appearance and function, the method for mounting each is similar. Please contact RST Instruments with any questions or concerns.

4.3.3.1 Components for a Yagi Antenna

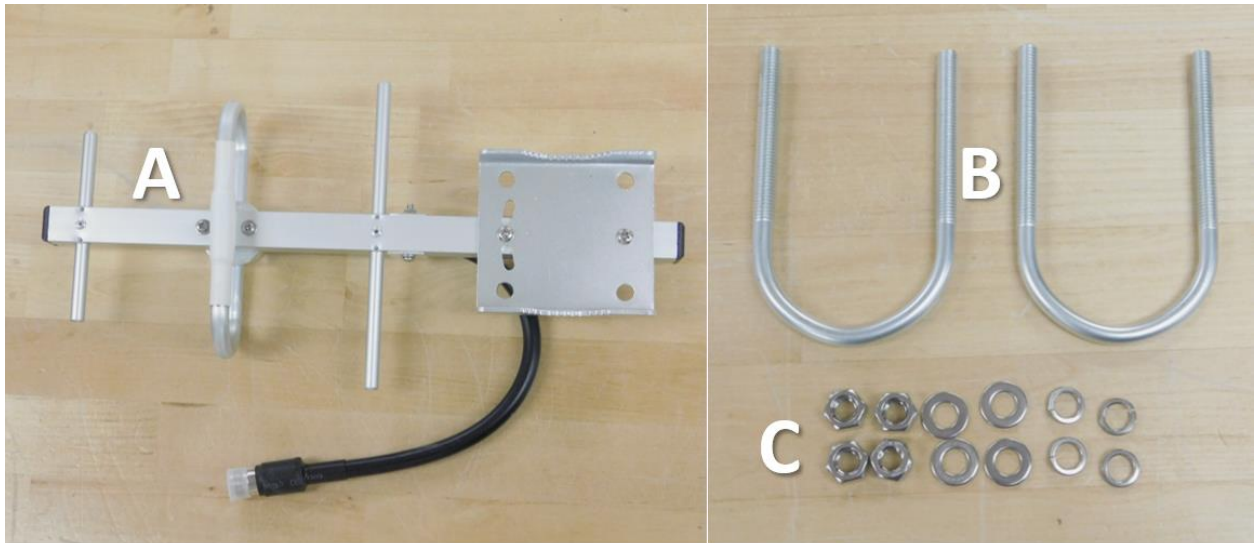The following hardware is needed to complete installation of a Yagi antenna:

FIGURE 4-27 YAGI ANTENNA COMPONENTS AND HARDWARE

A	Yagi antenna with pole bracket	**B**	U-bolts
C	Nuts, washers and lock washers		

4.3.3.2 Mounting Instructions for a Yagi Antenna

The following instructions outline the steps requires for successfully mounting a Yagi antenna. One U-bolt has been installed for illustration purposes. Please be aware that both U-bolts will be needed to secure the antenna to the post.

1 Place the bracket of the antenna on the post or pole, with the post or pole resting in the serrated groove.

2 A Yagi antenna is directional, and direction of the antenna may need to be adjusted in order to receive the strongest signal. Referring to the screw highlighted in Figure 4-28, to adjust the direction of the antenna,
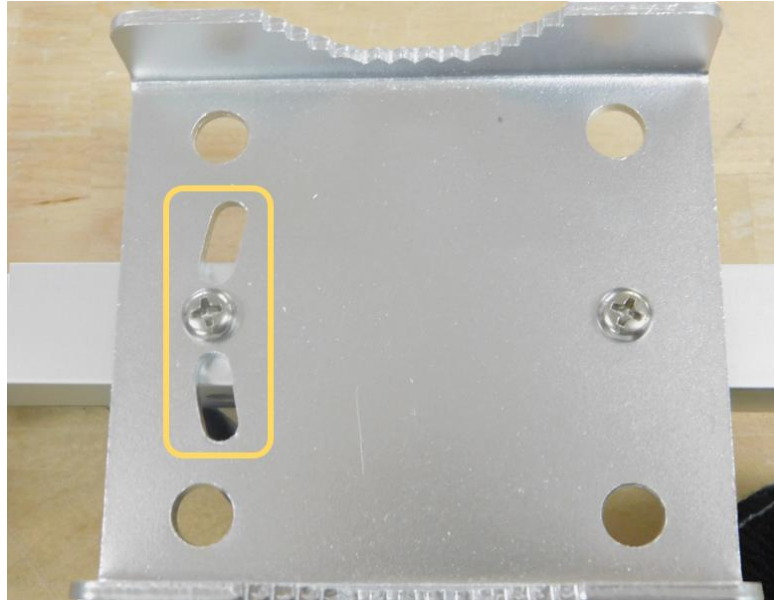
FIGURE 4-28 ADJUSTING THE DIRECTION

a. Hold the nut.

b. Remove the screw.

c. Adjust the angle of the antenna so it is oriented correctly.

d. Once the desired direction has been achieved, replace the screw to secure.

3 Place the U-bolt around the pole and feed the ends of the U-bolt through the holes in the bracket (highlighted in red in Figure 4-29).
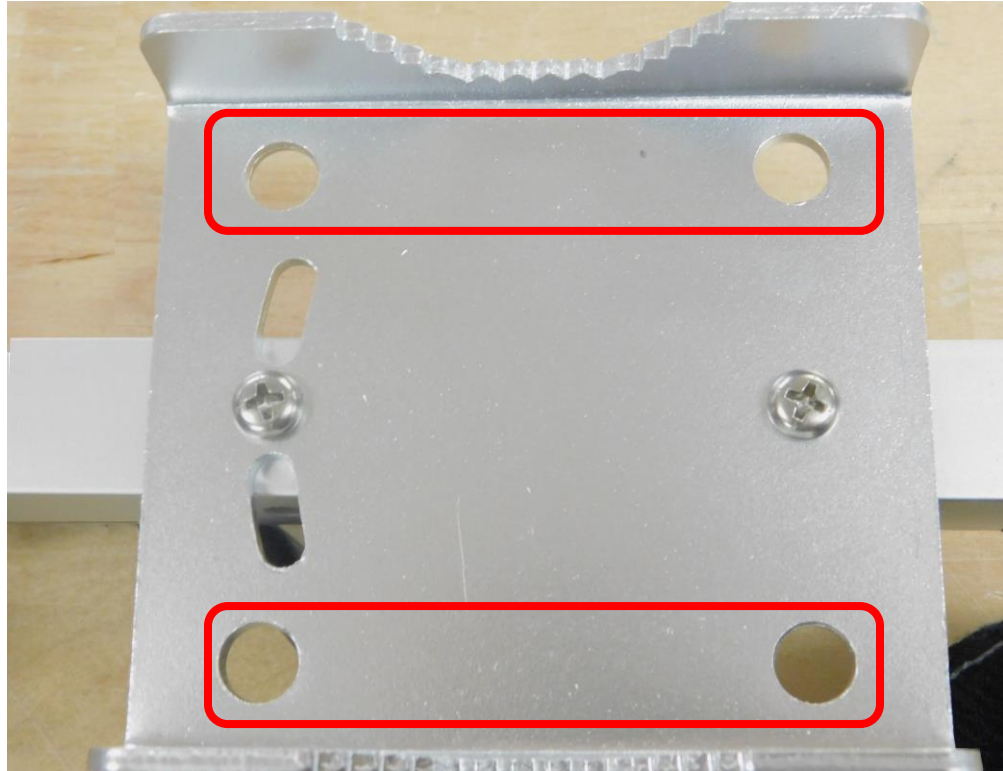
FIGURE 4-29 POST BRACKET

4   Once the U-bolt is in place, secure by placing a washer, lock washer and nut on the back of the bracket (Figure 4-30). Once both U-bolts have been secured, the installation is complete (Figure 4-31).

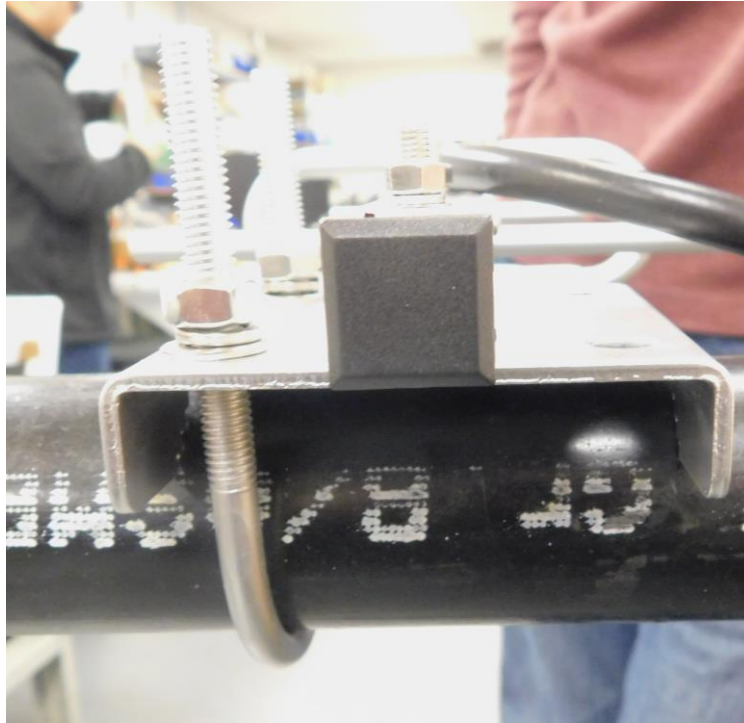**FIGURE 4-30 WASHER, LOCK WASHER AND NUT**

FIGURE 4-31 U-BOLT INSTALLED ON POST

5   Once the antenna has been properly and securely mounted, connect it to the FlexDAQ.

4.3.3.3   Components of an Omni Antenna

The following components are needed for the successful installation of an omni antenna:
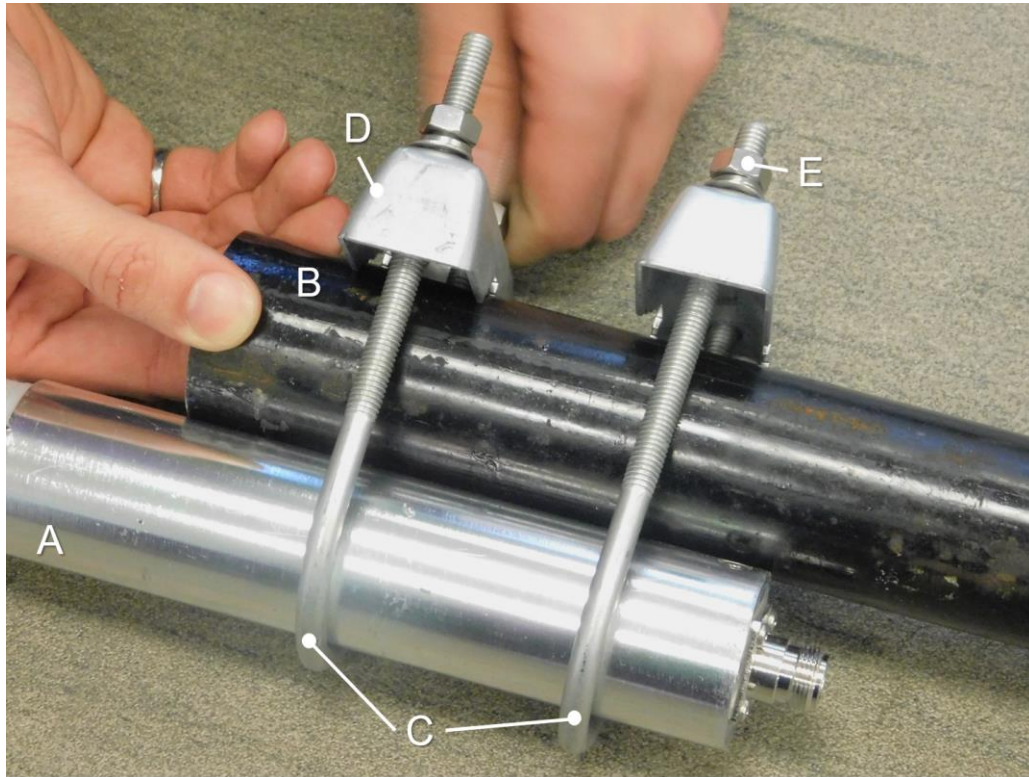
FIGURE 4-32 OMNI ANTENNA COMPONENTS

A Antenna   **B** Post

C U-bolts   **D** Post clamps

E Nut, washer and lock washer

4.3.3.4   Mounting Instructions for an Omni Antenna

The following instructions detail the steps required for successful installation of an Omni antenna:

1 Ensure that the post to which the antenna will be mounted is secured in the ground and is vertical.

CHECK: THE OMNI ANTENNA MUST BE VERTICAL AND MOUNTED ON A VERTICAL POST.

2 Place the antenna against the post, as illustrated in Figure 4-32.

3 Place the U-bolts around the metal base of the antenna, leaving 3 – 5 inches of space between them.

4 Place the post clamps on the U-bolts, as illustrated in Figure 4-33. Ensure that the serrated grooves (highlighted in yellow in Figure 4-33) on the clamps face the post.
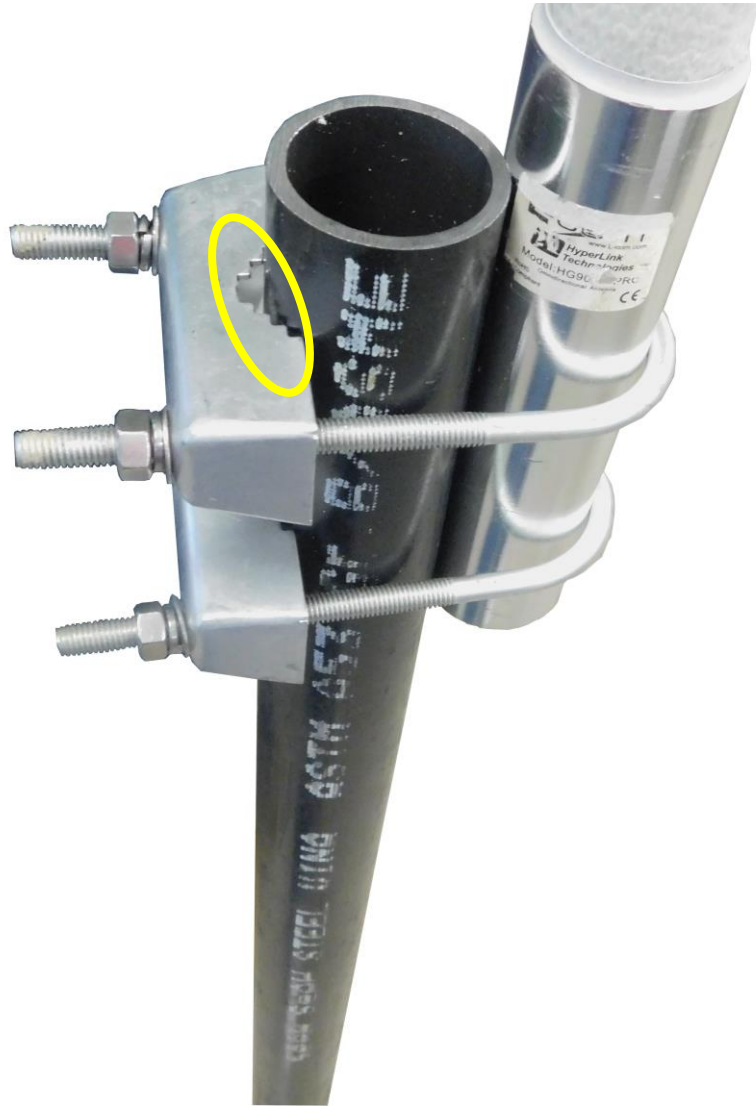
FIGURE 4-33 OMNI ANTENNA CLAMPED TO POST

> ⚠ **CAUTION:** ENSURE THAT THE SERRATED GROOVES ON THE POST CLAMPS ARE FACING THE POST TO PREVENT DAMAGE TO THE ANTENNA OR ITS BASE.

5 Place a washer, lock washer and nut on the end of each side of each bolt to secure.

6 Once the antenna has been properly and securely mounted, connect it to the FlexDAQ.

4.3.3.5   Waterproofing the Connector

Both the Omni and Yagi antennas are connected to the FlexDAQ with an NxN cable. An O-ring inside the connection ensures that moisture does not enter the connection. If additional waterproofing to the connection of the antenna is desired, the connector may be wrapped in two layer of vulcanized rubber splicing tape, followed by two layers of electrical tape. The following instructions detail the steps to successfully apply these tapes.

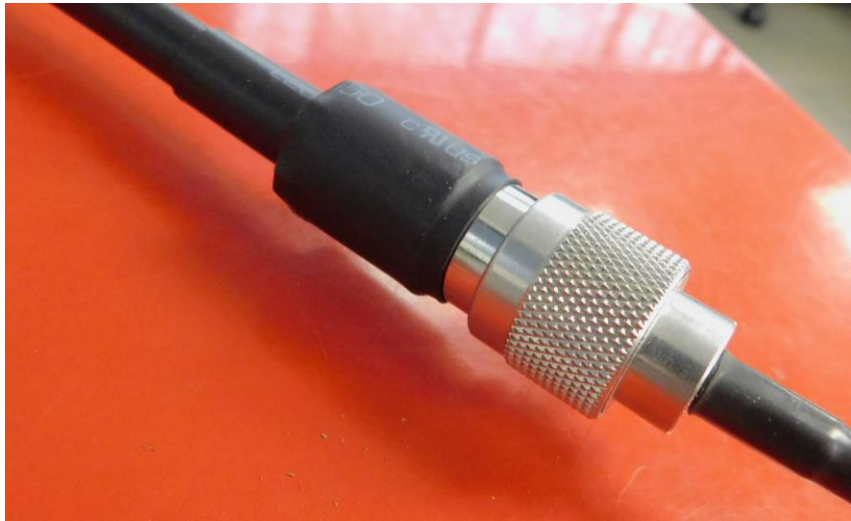1 Ensure the connection between the antenna and the FlexDAQ (Figure 4-34) is hand-tight.

FIGURE 4-34 THE CONNECTION BETWEEN THE ANTENNA AND THE FLEXDAQ

2 Beginning on one end of the connection, wrap the vulcanized rubber splicing tape around the connector, keeping it somewhat taut with a light pull (Figure 4-35). The tape is activated by stretching it during application.
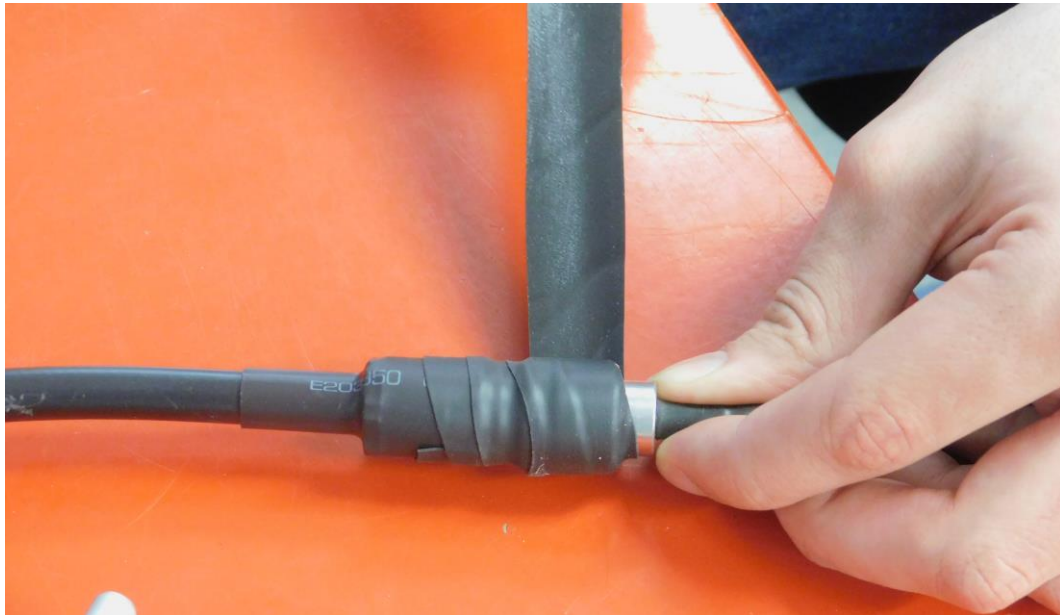

FIGURE 4-35 WRAPPING THE SPLICING TAPE AROUND THE CONNECTOR

3 Continue wrapping until two layers of tape have been applied to the connector and both ends of the connector have been sealed (Figure 4-36).

FIGURE 4-36 THE CONNECTOR WRAPPED IN TWO LAYERS OF SPLICING TAPE

4 Wrap electrical tape around the connector in the same manner. Ensure that the ends of the splice tape wrap are secured under the electrical tape.

FIGURE 4-37 WRAPPING ELECTRICAL TAPE AROUND THE SPLICE WRAP

5 The connection from the cable to the antenna should now be waterproof (Figure 4-38). The connector to the FlexDAQ does not need to be waterproofed but can be if required.

FIGURE 4-38 THE WATERPROOFED CONNECTION

5   SET UP

Due to the highly customizable nature of the FlexDAQ system, individual set up instructions have been included on a USB drive along with important information about the system. The following sections below contain generic information that may or may not be applicable to your system. Please read the information below and the information on the USB drive and contact RST Instruments with any questions or concerns that may arise.

> ⚠ **CAUTION:**   **PLEASE USE THE DOCUMENTS SUPPLIED ON THE USB DRIVE INCLUDED WITH YOUR SHIPMENT AS THE PRIMARY RESOURCE WHEN SETTING UP THE FLEXDAQ. IT CONTAINS CUSTOM INFORMATION THAT IS HIGHLY SPECIFIC TO YOUR INDIVIDUAL SYSTEM.**

5.1   USB DRIVE

A USB drive with relevant information and files is included with your shipment. It contains schematic drawings, certificates, custom logger program files, setup and backup files. Please review these documents carefully.

5.2   DAQ SOFTWARE

RST Instruments recommends using the LoggerNet program to connect to the unit and access data. The program is supplied by RST and can be located on a CD included with your shipment. The software will need to be installed on a PC or laptop in order to complete the configuration of the FlexDAQ unit and access data in the future. Detailed instructions have been provided on the USB drive. For additional support, please contact RST Instruments.

6   MAINTENANCE

The FlexDAQ system will generally not require maintenance. However, a small desiccant packet has been included in the unit to assist in keeping the electrical components inside

the FlexDAQ enclosure dry. Upon receiving the unit, open the enclosure and locate the desiccant packets. Remove them from the plastic bag and place them inside the unit. The desiccant packets will need to be replaced periodically (approximately every 6 months to 1 year, depending on the humidity of the site).

> **CHECK:** THE DESICCANT PACKET WILL NEED TO BE REPLACED EVERY **6** MONTHS TO **1** YEAR.

If the unit has a solar panel, the panel will need to be inspected for buildup of dirt, debris, ice and snow periodically and cleaned. The frequency of inspection will depend on the installation location and site weather conditions.

7 TROUBLESHOOTING

Due to the unique features and capabilities of each FlexDAQ system, please contact RST Instruments for any questions or concerns that arise.

8 SERVICE AND REPAIR

The product contains no user-serviceable parts. Please contact RST Instruments for product service or repair not covered in this manual.