Revision 1.0

User's Manual

SPC4™ Model 702-DL WiFi Data Logging and Monitoring System

- Firmware Version 1.0 -

VALLEY FORGE & BOLT MANUFACTURING COMPANY

4410 W. Jefferson St. • Phoenix, AZ 85043 • USA

Phone: (602) 269 – 5748 • Fax: (602) 269 – 7851

E-mail: sales@vfbolts.com • Web: www.vfbolts.com

WARNING

FASTENER INSTALLATION CAN BE VERY DANGEROUS OR EVEN DEADLY! ALWAYS WEAR PROTECTIVE EQUIPMENT AND FOLLOW INSTRUCTIONS CAREFULLY WHILE OPERATING YOUR TIGHTENING EQUIPMENT.

FOR SAFETY REASONS, NEVER PLACE ANY PART OF YOUR BODY, ESPECIALLY YOUR HEAD, DIRECTLY IN-LINE WITH THE FASTENER.

ELECTRICITY CAN CAUSE SEVERE INJURIES OR EVEN DEATH, SOMETIMES EVEN WITH RELATIVELY LOW VOLTAGES OR CURRENTS. THEREFORE, IT IS VITALLY IMPORTANT THAT ANY ELECTRONIC INSTRUMENTS, SUCH AS THIS SYSTEM, BE FULLY UNDERSTOOD BEFORE USE.

PLEASE DO NOT USE THIS SYSTEM, OR ANY OTHER PIECE OF ELECTRICAL OR ELECTRONIC TEST EQUIPMENT WITHOUT FIRST THOROUGHLY FAMILIARIZING YOURSELF WITH ITS CORRECT MODE OF OPERATION AND USE.

This device contains FCC ID: 2AF1WGL-AR150 WiFi Router that complies with Part 15 of the FCC Rules.
Operation is subject to the following two conditions:

(1) This device may not cause harmful interference and
(2) This device must accept any interference received, including interference that may cause undesired operation.

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1.0 Introduction

The SPC4™ Model 702-DL WiFi Load Monitoring System (SPC4™ System) is designed to facilitate the bolted structures' maintenance process by remotely receiving the clamp load seen in a bolted joint. The SPC4™ System can also store the clamp load values and it can be interfaced with a computer to download and analyze the previously stored values. This SPC4™ System is used in conjunction with fasteners fitted with load indicating hardware and SPC4™ 702-01 WiFi Load Monitoring Units.

The SPC4™ System incorporates precision electronic devices. As all attempts have been made to manufacture these components as rugged as possible, care must be taken in handling the WiFi data logging system, the power cord, antenna, and USB flash drive. Flagrant or abusive handling of these components can render them inoperable and/or compromise the accuracy of the measured load readings. The antenna and antenna connector of the system are sensitive, hence the use of a protective cap and antenna holder. Also, all of the SPC4™ load indicating fasteners have been shipped with protective caps installed to protect the datum-disk surface. These protective caps should always remain on the datum-disks and only be removed to install the SPC4™ 702-01 WiFi load monitoring unit for measuring loads. After measuring loads, the protective caps should be replaced to keep the datum-disk surface clean and to protect it from incidental contact damage. Store any protective caps in a safe and clean area whenever SPC4™ 702-01 units are installed.

With proper care and use, this system can provide years of reliable operation. To this end, it is very important to completely familiarize yourself with the operation of this system before use. Read this manual carefully and pay particular attention to all precautions and warnings.

1.1 Inspection

During unpacking of the SPC4™ System, carefully check each item for damage that may have occurred in shipment. If anything is damaged or missing, please contact:

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4410 West Jefferson Street • Phoenix, AZ 85043 • USA
Phone: (602) 269 – 5748 • Fax: (602) 269 – 7851
E-mail: sales@vfbolts.com • Web: www.vfbolts.com

1.2 Included Items

1	SPC4™ Model 702-DL WiFi Data Logging and Monitoring System	DL
1	User's Manual (this manual)	UM
5	Power Cord Tips (for international use)	PCT
1	Antenna	ANT
1	Antenna Connector Cap	ACC
1	USB Flash Drive	FD

1.3 Description of the SPC4™ Model 702-DL WiFi Data Logging and Monitoring System

1.3.1 702-DL WiFi Data Logging and Monitoring System (DL)

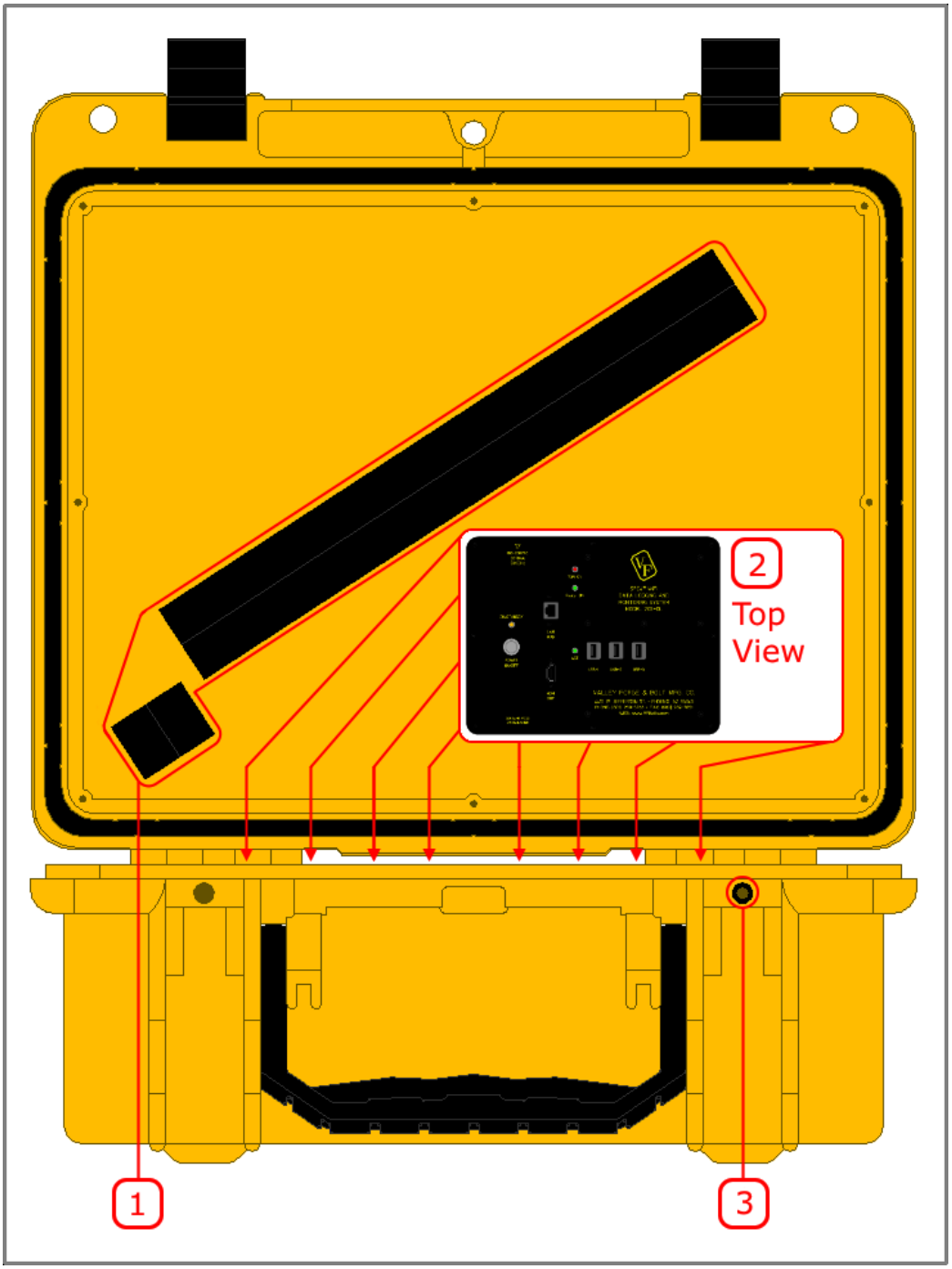

Figure 1.3.1 – 702-DL - Front View (Lid Open)

1 - ANTENNA HOLDER **2 - FRONT PANEL** **3 - PRESSURE PURGE**

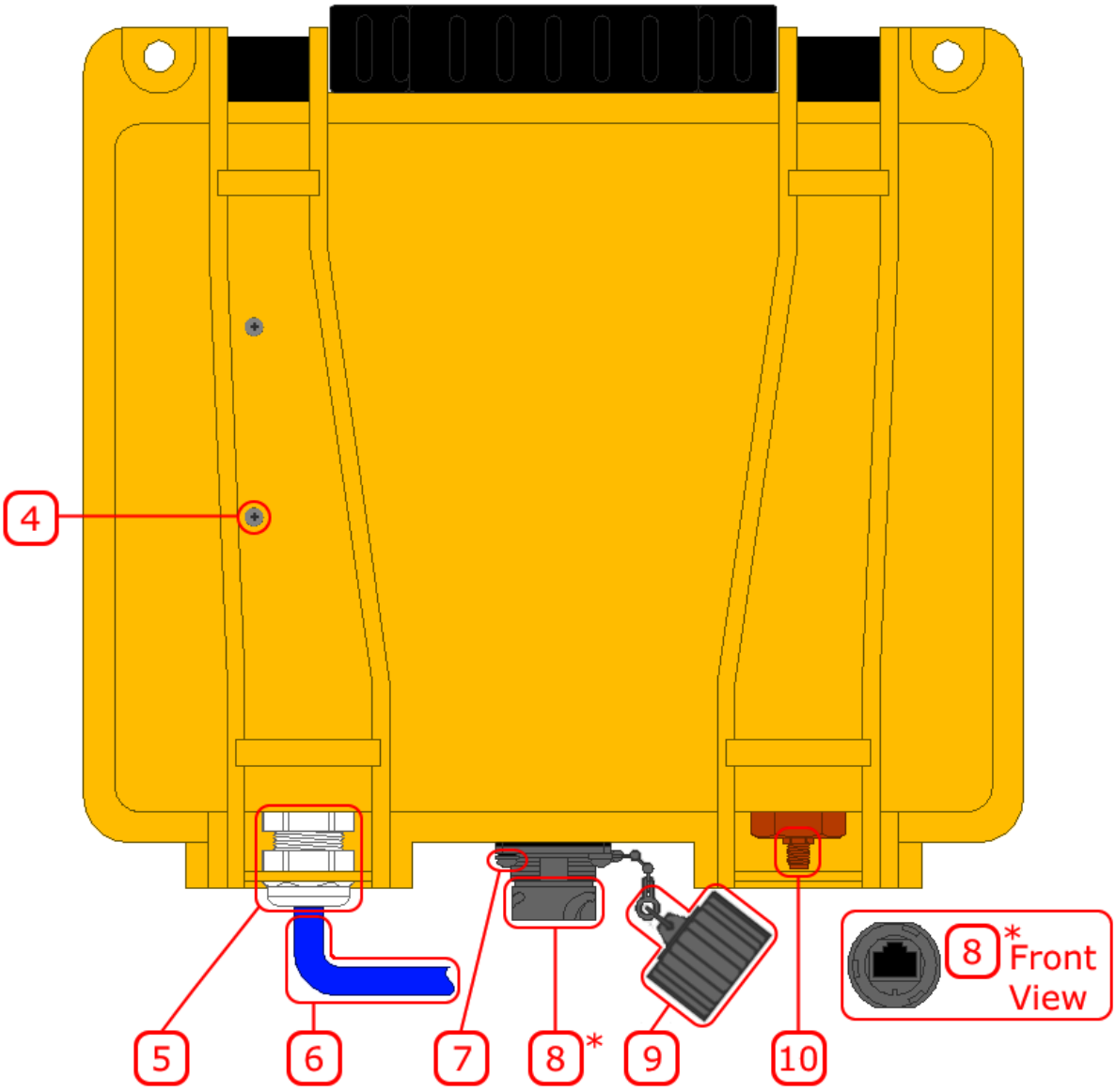

Figure 1.3.2 – 702-DL - Bottom View

4 - POWER SUPPLY SCREWS (x2)
5 - CORD GRIP
6 - POWER CORD
7 - NETWORK CONNECTOR SCREWS (x4)
8 - NETWORK CONNECTOR (* SIDE VIEW)
9 - NETWORK CONNECTOR CAP
10 - ANTENNA CONNECTOR

Please see "**Figure 1.3.1 - 702-DL - Front View (Lid Open)**" and "**Figure 1.3.2 - 702-DL - Bottom View**".

1 - **ANTENNA HOLDER**

- Storage location for the antenna when it is not in use or during transportation. Whenever the antenna is not connected to the DL, it should be placed in its holder and the antenna connector cap (ACC) attached to the antenna connector.

2 - **FRONT PANEL**

- Physical interface of the DL. Allows the user to turn on the system, understand simple system information via LEDs, access to the physical USB flash drive containing the data log, and access additional ports for debugging. Refer to "**Figure 1.3.3 - 702-DL - Front Panel**" for more information.

3 - **PRESSURE PURGE**

- Automatic pressure purge system built into the case.

4 - **POWER SUPPLY SCREWS (x2)**

- Screws that hold the system's power supply to the case. These screws should **never** be removed. These screws are sealed using silicone sealant to make the DL as waterproof as possible.

5 - **CORD GRIP**

- Holds the power cord in place so that it can not be pulled out or pushed into the case. Ensures a waterproof connection between the power cord and the case.

6 - **POWER CORD**

- Used in conjunction with an electrical outlet to provide power to the DL. Included in the kit are power cord tips (PCT) for international use outside of the United States.

7 - **NETWORK CONNECTOR SCREWS (x4)**

- Screws that hold the network connector in place. These screws should **never** be removed.

8 - **NETWORK CONNECTOR**

- Gives the user the option of expanding the DL network via an external network port. This particular port is rugged and durable for industrial use. This network connector is WAN by default but can be configured to LAN if requested

9 - **NETWORK CONNECTOR CAP**

- Protects the network connector when not in use. The network connector cap ensures that the network port is not damaged or dirtied.

10 - **ANTENNA CONNECTOR**

- Connects the antenna to the DL. Please see **2.6 Antenna Installation** when connecting the antenna. When not in use, attach the antenna connector cap (ACC) over the antenna connector to protect it from dirt and damage.

1.3.2 702-DL WiFi Data Logging and Monitoring System - Front Panel

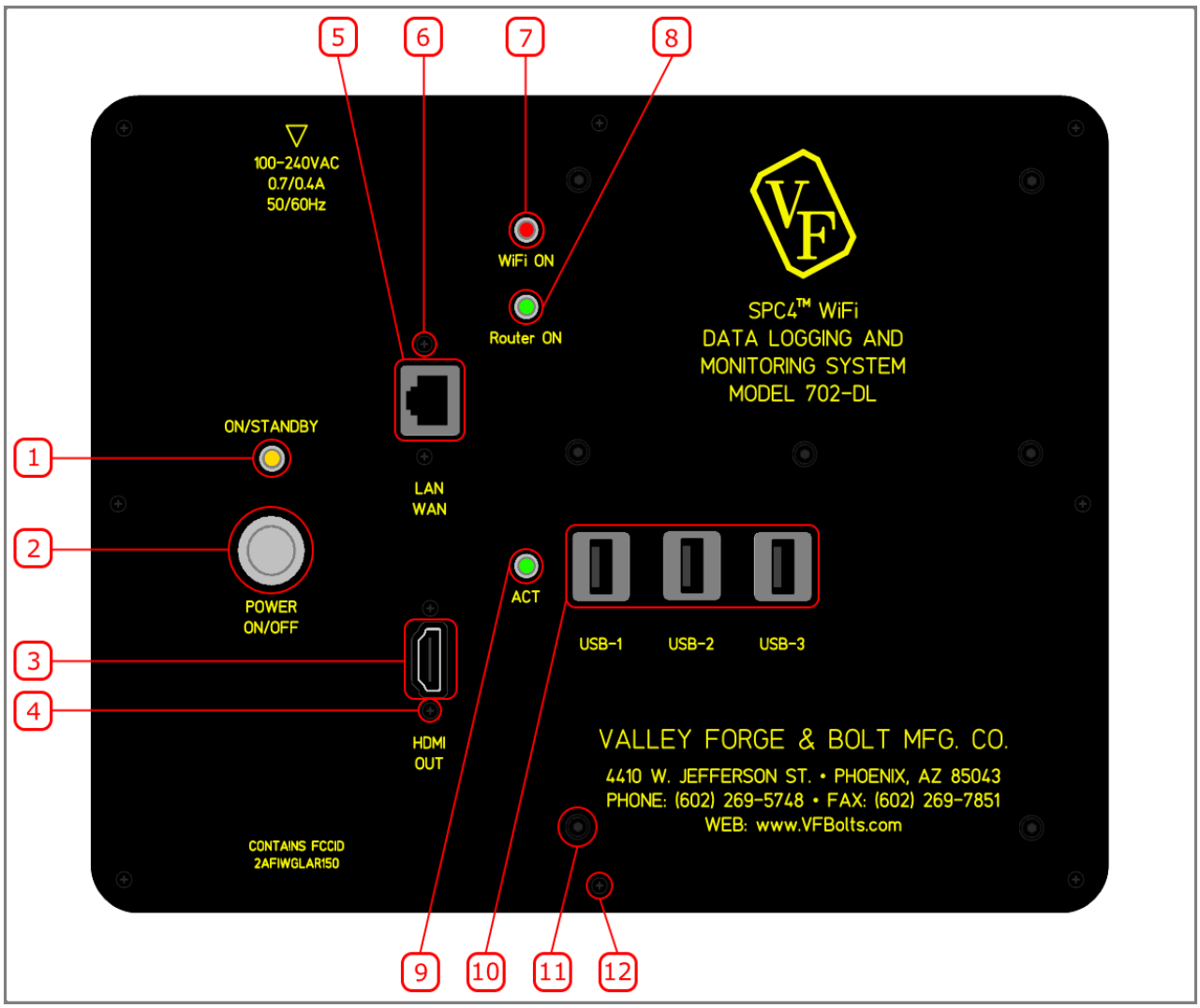

Figure 1.3.3 – 702-DL - Front Panel

1 - "*ON/STANDBY*" LED
2 - "*POWER ON/OFF*" BUTTON
3 - "*HDMI OUT*" CONNECTOR
4 - "*HDMI OUT*" SCREWS (x2)
5 - "*LAN | WAN*" CONNECTOR
6 - "*LAN | WAN*" SCREWS (x2)
7 - "*WiFi ON*" LED
8 - "*ROUTER ON*" LED
9 - "*ACT*" LED
10 - USB CONNECTORS
11 - MOTHERBOARD SCREWS (x7)
12 - CASE SCREWS (x8)

Please see "**Figure 1.3.4 - 702-DL - Front Panel**".

1 - **"*ON/STANDBY*" LED**

- A yellow LED that shows the current status of the DL. When off, the DL is not currently powered. When blinking, the DL is in its standby mode (WiFi router is powered). When purely on, the DL is currently in its on/active mode (DL can receive and store data).

2 - **"*POWER ON/OFF*" BUTTON**

- When pressed only momentarily (a press followed by a release) while the DL is in the standby mode (see previous bullet "*ON/STANDBY*" LED), the DL will start its boot up sequence and turn on. When pressed only momentarily (a press followed by a release) while the DL is on, the DL will start its shut down sequence and enter the standby mode**.**

3 - **"*HDMI OUT*" CONNECTOR**

- Used together with an HDMI cable and monitor permitting a **qualified technician or operator** to access the video output of the Raspberry Pi™ single board computer (for debugging purposes), view **2.9.2 702-DL Raspberry Pi™**.

4 - **"*HDMI OUT*" SCREWS**

- Screws that hold the "*HDMI OUT*" CONNECTOR in place. These screws should **not** be removed by anyone unless they are a **qualified technician**.

5 - **"*LAN | WAN*" CONNECTOR**

- The "LAN/WAN Connector" can be either LAN (default) or WAN. This is used together with an Ethernet cable to establish a direct connection to the DL network.

6 - **"*LAN | WAN*" SCREWS**

- Screws that hold "*LAN | WAN*" CONNECTOR in place. These screws should **not** be removed by anyone unless they are a **qualified technician**.

7 - **"*WiFi ON*" LED**

- A red LED that shows the current status of the DL's WiFi. When off, the DL's WiFi is off. When on, the DL's WiFi is on. When flickering, the DL is transmitting or receiving data. The WiFi LED will only turn on if the router is fully powered (see next bullet).

8 - **"*ROUTER ON*" LED**

- A green LED showing the current status of the on board router. When off, the router is off. When on, the router is on. The WiFi will start to boot up when the router is fully powered resulting in a short delay in the "*WiFi ON*" LED turning on after the router LED turns on.

9 - **"*ACT*" LED**

- A green LED representing the data activity of the DL. When the LED is on, the DL is currently accessing all stored memory. When off, the DL is not accessing any stored memory. The USB flash drive should never be removed when the "*ACT*" LED is on or data will be corrupted. The same result will happen if the power cord is removed from an electrical socket with the LED on.

10 - **USB CONNECTORS**

- Three USB connectors (named "*USB-1*", "*USB-2*", and "*USB-3*") connected to the on board computer which are used with USB devices such as the supplied USB flash drive. The USB flash drive must be connected in one of these slots in order for the system to log load readings. Extra USB slots are for other peripherals limited to a keyboard and mouse (permitting a **qualified technician or operator** to access the system's Raspberry Pi™ on board computer, see **2.9.2 702-DL Raspberry Pi™**). Visit **2.5.2 Flash Drive Direct Access** to remove and insert the USB flash drive to and from the DL. Be advised that a USB hub should not be used with this system. **Absolute max current per port: 500 mA.**

11 - **MOTHERBOARD SCREWS (x7)**

- Screws that attach the USB connectors to the front panel. These screws should **not** be removed by anyone unless they are a **qualified technician**.

12 - **FRONT PANEL SCREWS (x8)**

- Screws that attach the front panel to the case permitting a **qualified technician** to access the interior.

1.3.3 Description of the Power Cord Tips (PCT)

Figure 1.3.4 – Power Cord Tips (PCT)

The PCT (**Figure 1.3.5 – Power Cord Tips (PCT)**) are provided with the DL for use outside of the United States. Use the proper PCT for the local area. There are five different PCT types for these following locations:

Type 1 - Most of Europe
Type 2 - Europe, Middle East/Asia, parts of Africa, Caribbean
Type 3 - North America, South America, Caribbean, Japan
Type 4 - Australia, New Zealand, Fiji, China
Type 5 - UK/Ireland, Africa, Hong Kong, Singapore

1.3.4 Description of the Antenna (ANT)

Figure 1.3.5 – Antenna (ANT)

The supplied antenna (**Figure 1.3.6 – Antenna (ANT)**) extends the WiFi network range, allowing the DL to send and receive data over a larger area. The antenna can be found inside the DL, placed in the antenna holder.
The antenna is sensitive, so to avoid damage, see **2.2 Precautions** on how to handle it properly and **2.6 Antenna Installation** on how to install it properly.
Never connect/disconnect the antenna when the router is on! The ACC should be placed over the external antenna connector whenever the antenna is not attached.

1.3.5 Description of the Antenna Connector Cap (ACC)

Figure 1.3.6 – Antenna Connector Cap (ACC)

The antenna connector cap (**Figure 1.3.6 – Antenna Connector Cap (ACC)**) is a simple yet effective means of protecting the DL antenna connector from dirt and damage. This cap should remain on the DL antenna connector when the DL is not in use or when the antenna is removed.

1.3.6 Description of the USB Flash Drive (FD)

Figure 1.3.7 – USB Flash Drive (FD)

The supplied USB flash drive (**Figure 1.3.7 – USB Flash Drive (FD)**) is used by the DL for storing the load data that it receives.
The FD is 16 GB with a FAT32 file system. The FD should only ever have one file in it at all times, a text document (WiFiBoltLog.txt) holding the load data. The FD will come attached to the DL, being placed in one of the USB ports.
WARNING! The "VFLOG" label of the FD should never be changed when accessing the FD or reformatting the FD!

2.0 Operation and Measurement

The following paragraphs describe the operation of the SPC4™ System**,** which consists of the 702-DL WiFi data logging unit, a USB Flash Drive, and antenna.

The system is used in conjunction with fasteners fitted with load indicating hardware to monitor and record the clamp load of the bolted joints as well as 702-01 WiFi data monitoring units which send data to the data logger. Calibration certificates, supplied with each fastener, enable correlation of the 702-01 units percentage readings to joint clamp load (bolt tension) in pounds and the ability of the data logger to receive and save this data.

2.1 Warning

**FASTENER INSTALLATION CAN BE VERY DANGEROUS OR EVEN DEADLY!
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2.2 Precautions

[1] When handling the antenna, grip it with your hand in the area of the green arrows as shown in **Figure 2.2.1**. Refrain from handling the antenna in the area of the red arrows. This part of the antenna is sensitive and improper handling may cause damage to the antenna. When bending the foot (outlined in blue) of the antenna, grasp one hand on the upper part of the antenna while your other hand holds the foot at the location of the green arrows and bends.

NOTE: **Never attach/detach the antenna to/from the DL while the foot is bent.**
NOTE: **Never attach/detach the antenna to/from the DL while it is powered.**
NOTE: **Never unplug the DL power cord from the electrical outlet while the "*ACT*" LED is on.**
NOTE: **Moving the antenna while the DL is powered should be kept to a minimum.**

Following these precautions will decrease the chances that the antenna will become impaired and maintain the quality of the DL's wireless signal.

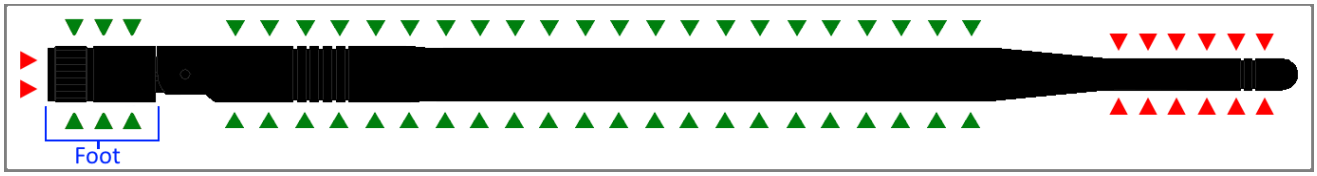

Figure 2.2.1 - Handling the Antenna

[2] The external network connector should always have its protective cap on when not in use. This protects the connector from dirt and damage.

[3] Do not attempt to carry the DL by the power cord or antenna. The DL should be closed and carried by the handle when transporting.

[4] Do not attempt to force the power cord tip into an electrical outlet of a different type. Use the additional power cord tips intended for international use outside of the United States.

[5] It is strongly recommended that you do **NOT** use any USB hubs that connect to the DL, only use the three USB ports provided. The absolute max current rating is 500 mA / port.

[6] The label of the USB flash drive is "**VFLOG**" and should **never** be changed.

[7] Do not attempt to clean the DL by abrading it with emery cloth or sandpaper.

[8] Any attempts of cleaning the DL should be made while it is completely unpowered (power cord disconnected) and the antenna removed with the ACC covering the enclosure antenna connector. The USB flash drive may remain in.

[9] Do not use abrasives, solvents or aromatic hydrocarbons to clean the DL as damage may occur to the plastic case. If cleaning is necessary, use only a mild solution of warm water and detergent on the outside of the enclosure. Do **not** use any liquids to clean on the inside of the enclosure. Only a clean cloth or the blowing dry air are permitted to be used when cleaning the inside of the enclosure.

[10] Do not attempt to repair the DL. This unit contains no user-serviceable parts inside the enclosure.

[11] Avoid placing the DL in an area where it may possibly be submerged in water. The DL has been made being completely waterproof when the lid closed, however this precaution should be taken into consideration to avoid possible damage to the DL.

[12] **Never** unplug the DL power cord from the electrical outlet while the "ACT" LED is on.

2.3 702-DL Setup

[1] Before getting started on the first time setup, it should be noted that the DL comes with some data saved to the FD. This initial data acts as a proof of calibration that the respective 702-01 WiFi probes are calibrated and work with this DL system. Starting with a fresh log is optional, visit **2.7 Creating a New Data Log**.

[2] Remove the protective cap on the antenna connector, open the DL and remove the antenna from its holder, and the install the antenna, see **2.6 Antenna Installation**.

[3] With the antenna installed, verify that the FD is connected and then connect the DL to an electrical outlet via the power cord. The "*ON/STANDBY*" LED will begin blinking indicating that it is in standby mode.
Note: Power cord tips are provided with the DL intended to be used internationally outside of the United States.

[4] While in standby, wait approximately 30 seconds for the "*WiFi ON*" and "*Router ON*" LEDs to turn on.

[5] Once the two LEDs are turned on, press the "*POWER ON/OFF*" button momentarily. The "*ON/STANDBY*" LED will stop blinking and be turn on continuously. The "*ACT*" LED will start flickering while Raspberry Pi™ loads the OS from its memory.

[6] Close the lid of the DL and lock the two latches. Wait approximately 5 to 15 minutes for the date and time of the Raspberry Pi™ to sync with the router. This is important in logging data so that the date and time is accurate and relative.
Note: Time is in UTC. We advise against changing the timezone from UTC.

[7] The DL is now ready to be used. Attach the 702-01 WiFi monitoring units that come with the 702-DL kit at the desired locations.

2.4 702-DL Shutdown

[1] Press the "*POWER ON/OFF*" button momentarily. The "*ACT*" LED will flicker while the on board computer saves any open files and will turn off when done.

[2] Wait approximately 30 seconds for the "*ON/STANDBY*" LED to no longer be on continuously and begin blinking.

[3] The system has now been shutdown and is in it's standby mode. You can remove the FD from this point for data access, but not remove the antenna. To remove the antenna, go to **2.4.1 702-DL Power Down**.
Note: While the DL has been shutdown, it cannot store any data that it receives. Therefore it is advised that shutdowns be short. This also disables the remote access to the data.
Note: Press the "*POWER ON/OFF*" button again to turn on the DL while it is in standby mode after a shutdown.
Note: **Never unplug the DL power cord from the electrical outlet while the "*ACT*" LED is on.**
Note: **Never unplug the FD from the DL while the "*ACT*" LED is on.**

2.4.1 702-DL Power Down

[1] A DL power down is the next step in a complete DL shutdown, assuming the steps of **2.4 702-DL Shutdown** are already completed.

[2] While the DL is in its standby mode, remove the power cord from the electrical outlet. The system will lose all power and the router and WiFi LED will be turned off. It is safe to remove the antenna in this mode, see **2.6.1 Antenna Removal**.
Note: **Never unplug the DL power cord from the electrical outlet while the "*ACT*" LED is on.**
Note: The 702-DL setup must be completed again after this, see **2.3 702-DL Setup**.

2.5 Accessing the Flash Drive Data

The USB flash drive (FD) is what contains all of the measured load data. Accessing the data remotely or directly will result in the same data being shown. Accessing the data directly should only be done if a new data log is desired (delete, create new, etc), otherwise remote access is more efficient and reliable.

2.5.1 Flash Drive Remote Access

[1] From a computer, connect to the DL network via Ethernet cable or through the DL WiFi network. When using WiFi, search the computer's wireless network connections for the network name (SSID) of the given DL. Type in the SSID passphrase for the DL network.
Note: The network name (SSID) and SSID passphrase are located on the certification sheet and are determined by the customer at the time of ordering. If no information was given, then the network name was assigned and the SSID passphrase randomized.

[2] Once connected to the DL network, locate the computer's file explorer and open it.

[3] Highlight the address bar and delete its contents. In the address bar type "\\VFpi" or "\\192.168.100.2" (\\192.168.100.2 is the default, consult accompanying documents for exact address).
Note: If prompted for a username or password, examine **2.9.2 702-DL Raspberry Pi™** for those credentials.

[4] A folder will appear with the name of "VFPi_Share", double click and open the folder.
Note: Depending on the computer's speed and strength of the network connection, this may take some time.

[5] A new file will appear called "WiFiBoltLog.txt". This is the where all of the bolt load data is stored. From here, double-clicking and opening the file grants access to the recorded data. The information from the file or the file itself can be copied and saved to a computer. When remotely connected, the remote user has only READ-ONLY permissions for this file.

Note: See **Figure 2.5.1 - Understanding the Data** to become familiarized with the information contents inside the log.

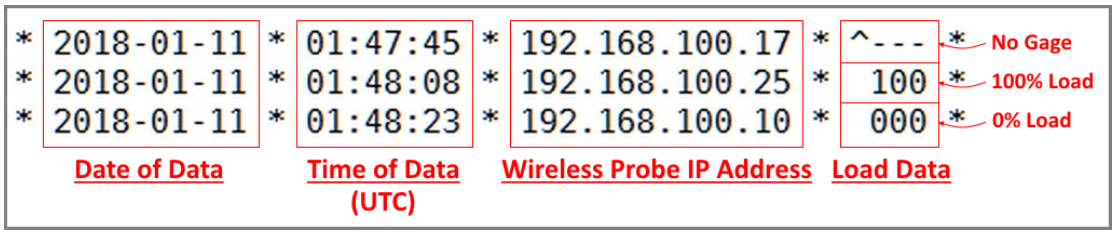

Figure 2.5.1 – Understanding the Data

If the 'B' character (see below **Figure 2.5.2 - Low Battery Indication in the Data**) is displayed at the end of the data, then that means that the battery of that particular 702-01 WiFi probe is low. A low battery will eventually cause problems in data transmission so the battery of that particular probe should be replaced as soon as possible with a new one. As a good precaution, any probe with the same transmission rate that was installed at the same time of the low battery probe should also have their batteries replaced.

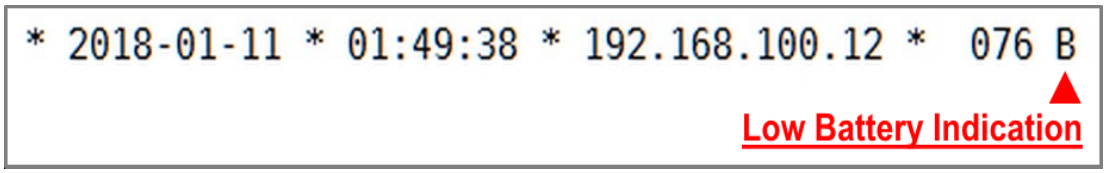

Figure 2.5.2 - Low Battery Indication in the Data

2.5.2 Flash Drive Direct Access

[1] Shutdown (recommended) or power down the DL (see **2.4 702-DL Shutdown** or **2.4.1 702-DL Power Down**).

[2] While the DL is in standby mode ("*ON/STANDBY*" LED blinking), remove the FD from the DL.

[3] Connect the FD to the computer and open it. It is labeled as "**VFLOG**".

[4] The "WiFiBoltLog.txt" file will now be visible, allowing it to be opened.

[5] The data can now be accessed, saved, edited, and removed.
Note: See below **2.7 Creating a New Data Log** about removing the log and making a new one.
Note: Never change the "**VFLOG**" label.

[6] After direct access with the data log is done, eject the FD and remove it from the computer.

[7] Remember to reconnect the FD to the DL.

2.6 Antenna Installation

[1] Remove the antenna from the holder and with the antenna in hand, bend the foot so that it is completely straight.

[2] **Make sure that the DL is NOT connected to any electrical outlets and that the ACC on the antenna connector is removed.**

[3] While holding the antenna by the foot, bring it to the antenna connector on the DL and turn clockwise to tighten it.
Note: Only hand tighten the antenna!

[4] When you have tightened the antenna, bend it to the desired position.

2.6.1 Antenna Removal

[1] Completely turn off the DL, read **2.4.1 702-DL Power Down**.

[2] **Verify that the DL is NOT connected to any electrical outlets and that everything is off!**

[3] Bend the antenna so that it is straight with the foot.

[4] While holding the antenna by the foot, turn counter clock-wise to remove it (avoid using any tools to remove the antenna).

[5] Place the ACC back onto the DL antenna connector and bend the antenna foot 90 degrees.

[6] Place the antenna back into its holder on the underside of the lid.

2.7 Creating a New Data Log

[1] Follow the steps to remove the FD from the DL and connect it to a computer found in **2.5.2 Flash Drive Direct Access**.

[2] Open the FD when it is connected to the computer. FD label is "**VFLOG**"
Note: Never change the "**VFLOG**" label.

[3] Save the current log (WiFiBoltLog.txt) to the computer from the FD, and then delete the log on the FD. Reformatting the FD is optional, make sure the FD label stays "**VFLOG**" and that it is formatted in the FAT32 file system.
Note: The DL will recreate the "WiFiBoltLog.txt" file when it is turned back on.

[4] Eject the FD from the computer and reconnect it to the DL. If desired, turn the DL back on by momentarily pressing the "*POWER ON/OFF*" button.

2.8 Transporting

[1] Verify that the DL is completely off, if not then perform a DL power down, see **2.4.1 702-DL Power Down**.

[2] Verify that the antenna is not connected, if it is then view **2.6.1 Antenna Removal**.

[3] Place the antenna properly in its holder and put the antenna connector cap on.

[4] Close the DL lid and lock the latches. Roll up the power cord and put away the power cord tip if used.

[5] The DL is now ready to be transported.

2.9 Additional Information

2.9.1 702-DL Router

The router is what allows the DL to receive and send data via the router's WiFi network. As such, the router may be accessed if desired to change specific elements at a risk that any change may hinder the DL or make it become nonoperational. The router already comes preconfigured with all correct network parameters. The information on accessing the router as well as what can and should not be changed is provided below.

Router Information:

- IP Address: 192.168.100.1 (Default, subject to change per customer requirement)
- Hostname: openwrt
- Username: root
- Password: L3t.M3.!n

Forbidden Router Changes:

- Do **NOT** change any information relating to the WiFi network. This includes SSID and the SSID passphrase.
- Do **NOT** change any information about the static leases of the router.
- Do **NOT** change the username "root".
- Do **NOT** change the router timezone (UTC) to another timezone.

We, Valley Forge & Bolts, do **not** support making any changes to the router and have only outlined some of the stricter aspects that should never be changed. Be advised that any changes to the router may break the network and affect the functionality of the DL system.

2.9.2 702-DL Raspberry Pi™

The Raspberry Pi™ (Model Zero W) is a single board computer which allows the DL to operate. The Raspberry Pi™ should **never** be accessed by anyone other than by a **qualified technician**. The credentials are only provided in the event that they are needed to access the data log.

Raspberry Pi™ Information:

- IP Address: 192.168.100.2 (Default, subject to change per customer requirement)
- Hostname: VFpi
- Username: pi
- Password: !.Want.1n

Raspberry Pi™ information should never be changed. Any changes will alter the functionality of the DL system. We advise that the Raspberry Pi™ information only be used in the event of difficulties.

2.9.3 702-DL Placement

The DL should be placed in the general location of the 702-01 WiFi monitoring units to ensure a good connection is made between the two. The antenna should be oriented in an upward (skyward) direction, **NOT** pointing at the 702-01 WiFi monitoring units (use care when repositioning the antenna; don't use excessive force and/or try to bend it). To achieve better positioning freedom, the DL can be positioned in a standing orientation (**Figure 2.9.1-B**) that allows the antenna to be located at the top compared to a normal sitting position (**Figure 2.9.1-A**). If the DL is positioned in a standing orientation, then it is suggested to place sufficient support at the back of the DL to prevent it from being knocked over.

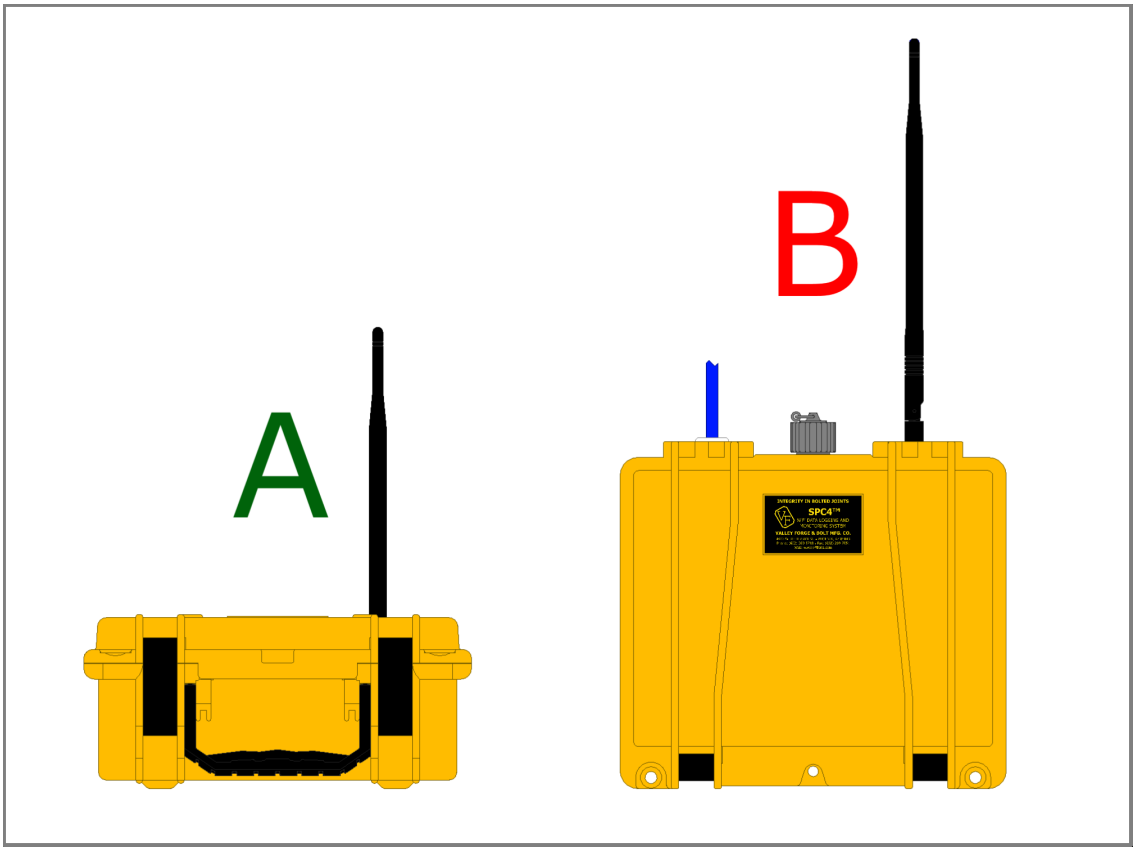

Figure 2.9.1 – DL Orientation

3.0 SPC4™ Model 702-DL WiFi Data Logging and Monitoring System Specifications

3.1 Electrical Specifications

Supply Voltage:	100 to 240 V AC
Internal Power Supply:	5.15 V_{DC}
RTC Battery:	3V Lithium (CR2032)
Power Consumption:	10 W MAX/ 8 W typical
WiFi Signal Radius:	Typically more than 30.5 m / 100 ft.

3.2 Environmental Specifications

Operating Conditions:	
Temperature:	-20 to 70 °C / -4 to 158 °F
Humidity:	80% max.
Storage Conditions:	
Temperature:	-30 to 80 °C / -22 to 176 °F
Humidity:	95% max.
Ingress Protection Class:	IP-67 (dust & water proof).

3.3 Physical Characteristics

Dimensions (W x L x H):	273 x 264 x 123 mm / 10.75 x 10.40 x 4.85 in
Weight	2.5 kilograms / 5.47 lbs

4.0 User Maintenance – Recommended Cleaning Procedures

4.1 Cleaning the Enclosure

CAUTION: Any attempts at cleaning the DL should be made in the power down state (see **2.4.1 702-DL Power Down** and the antenna should be disconnected and the antenna connector cap attached to the antenna connector. The FD may remain attached.

For exterior cleaning, wipe the case with a mild solution of warm water and detergent. Do not use any type of abrasives or solvents! Do **not** use any liquids to clean on the inside of the enclosure. Only a clean cloth or the blowing dry air are permitted to be used when cleaning the inside of the enclosure. The connectors can be cleaned using moisture-free forced air cleaning. For very dirty or oxidized connectors, use a combination of forced air cleaning and an electrical contact cleaner available in aerosol cans. Allow at least 15 minutes to dry before use.

NOTES: