TELEDYNE RD INSTRUMENTS
Everywhereyoulook™

# SENTINEL V

## SELF-CONTAINED DEPLOYMENT GUIDE

SC


P/N 95D-6015-00 (September 2017)

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# Preparing the ADCP


**PREPARING THE ADCP INCLUDES THE FOLLOWING STEPS:**

- Checking you have all of the Sentinel V Real-Time parts
- Installing the documentation and software CD
- Registering Velocity software
- Installing the batteries and listening for beeps
- Checking the system is closed properly

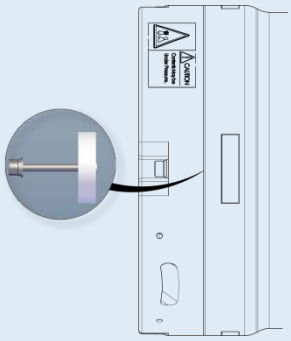
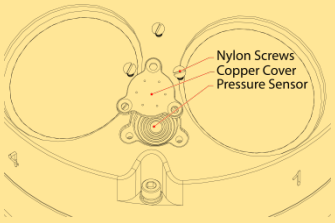
## Identifying what's in the Box

Included with the Sentinel V system:

| Kit | Part Number | Name | Description |
|---|---|---|---|
| Configuration | S20<br>S50<br>S100 | Sentinel V SC or RT ADCP with transducer cover | Sentinel V Self-Contained (SC) or Real-Time (RT) ADCP. Depending on housing type:<br>• Sentinel V battery packs are shipped inside the system but not connected.<br>• Sentinel V with D cells are shipped without batteries inside the system.<br>• Sentinel V with no battery housing uses external power. |
| | See the packing slip for more information on system configuration | | SC systems use wireless communications for setup and deployment. This means the system only requires battery power to operate the system.<br>RT systems use serial or Ethernet communications for setup and deployment. This means an end-cap with connector, an underwater cable, and DC power are required to operate the system. |
| Accessories Kit | 97D-7000-00<br>or<br>97D-7002-00 | Shipping Case | Shipping case with foam inserts. |
| | 81D-6002-00 | Handle | The handle makes it easier to carry the Sentinel V ADCP. Attach it to the slots on the ADCP's end-cap. |
| | 75DK6001-00 | Tools and Spare Parts kit | See Tools and Spare Parts for a list of parts included in this kit. |
| | 95D-6037-00 | Sentinel V SC and RT Roadmap | Use this sheet to determine where to start on setting up the Sentinel V SC and RT system. |
| Documentation Kit | 95D-8001-00 | Sentinel V Documentation and Software CD | This CD has PDF versions of all of the Sentinel V documentation and software including the Sentinel V SC and RT Operation Manual. Please read the manual and the SC and RT Deployment Guides! |
| | 95D-6016-00 | Compass Calibration Guide | Printed sheet with instructions on how to calibrate the compass. A PDF version is included on the documentation CD. |
| | 95Z-8005-00 | Velocity Activation Code | Activation code that unlocks the Velocity software. Waves processing requires a waves enabled activation code. |
| | 95D-6015-00<br>95D-6033-00 | Deployment Guide | A printed copy of the RT and SC deployment guide. |

# Tools and Spare Parts

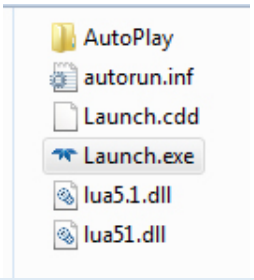
A set of tools and spare parts are included with the system (located in the canvas bag).

| Part Number | Description | Where Used |
|---|---|---|
| 81D-6003-00 | O-ring tool | Use the O-Ring tool to remove the 2-163 housing O-ring.   |
| 2-163 | 2-163 O-ring | The housing O-rings (one each end) prevent the system from flooding. |
| 5020 | Silicone lubricant, 4-pack | Lightly coat the 2-163 O-ring with lubricant before installing the O-ring on the housing. |
| DES2 | Desiccant bag | Used inside the housing to prevent water condensation. |
| 6958A14 | 4mm Hex key | Used to attach the end-cap to the housing.  |
| 81D-4002-00 | Captive Nut | |
| 81D-4003-00 | M5 Captured bolt with washers | |
| 75DK6009-00 | Silicone oil fill kit with syringe, needle, needle cover, and 1 oz. of silicone oil. | Used to fill the Pressure Sensor with oil. **Note that the sensor is NOT filled when shipped and must be properly filled with oil prior to deployment.** |
| 3/16BLADE | Screwdriver | Used to remove the Pressure Sensor cover. |
| M3X0.5X8FHN | Black nylon flat head screw | Used to hold the pressure sensor cover in place   |

# Installing Documentation and Software

The Sentinel V Real-Time system includes a CD with the documentation and all software needed for the Sentinel V RT and SC system.

To install the Sentinel V Documentation and Software CD:




1. Insert the CD into the drive and follow the browser instructions on the screen. If the browser does not start automatically, complete steps 2 through 3.
2. Use Windows Explorer® to open the CD drive folder.
3. Double-click on the *launch.exe* file. Follow the browser to view or copy the documentation to your computer.

Many companies require that Autorun be disabled. Double-click on *Launch.exe* to start the browser on all TRDI software and documentation CDs/CDs.

4. Click **Start**, **All Programs**, **Teledyne RD Instruments** to locate the installed documentation and software.

## Registering Velocity

When you purchase the *Velocity* software, you will receive an Activation code that unlocks the software.

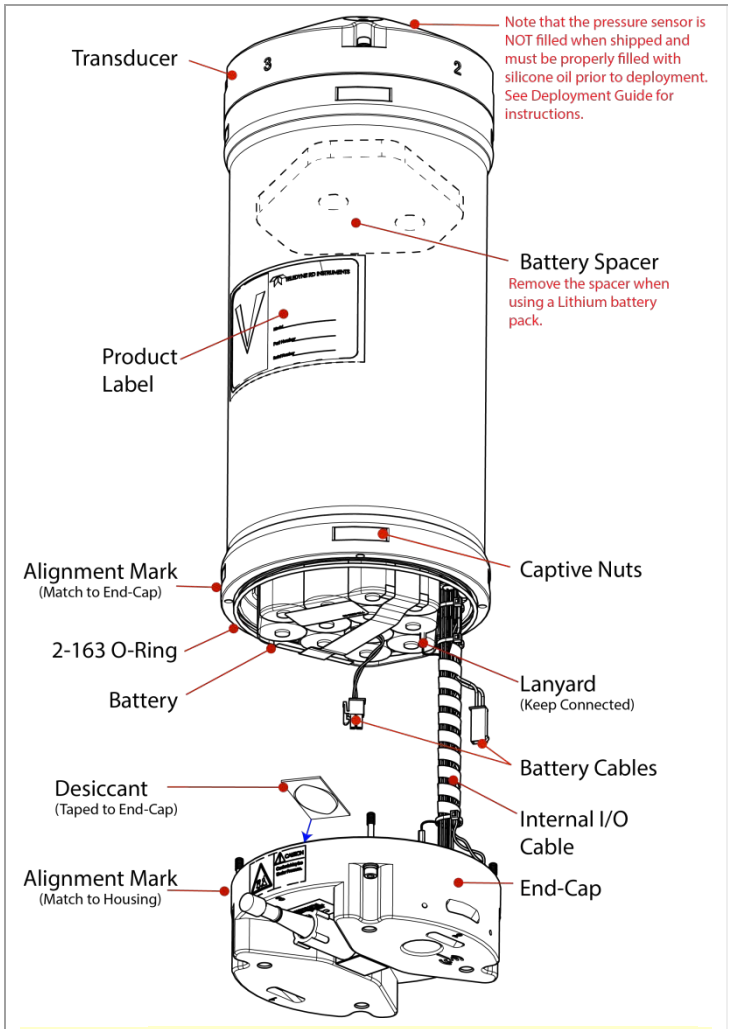
To activate *Velocity*:

- On the License Registration screen, enter your activation code (*xxxx-xxxx-xxxx-xxxx*). Click the **Activate** button. Click the **OK** button and then **OK** once more to close the License registration screen.

The Velocity Activation Code sheet is located in the documentation kit.

# Installing Batteries

## To connect the battery pack:




Sentinel V battery packs are shipped inside the system but not connected. Connect the battery and seal the Sentinel V before deployment.

1. Place the Sentinel V ADCP with the end-cap facing up. Use a soft pad or the transducer cover to protect the ADCP.
2. Using a 4mm hex key, loosen the four M5 captured bolts on the end-cap.

A 4mm hex key is provided in the canvas bag.
The end-cap hardware will stay attached to the end-cap.

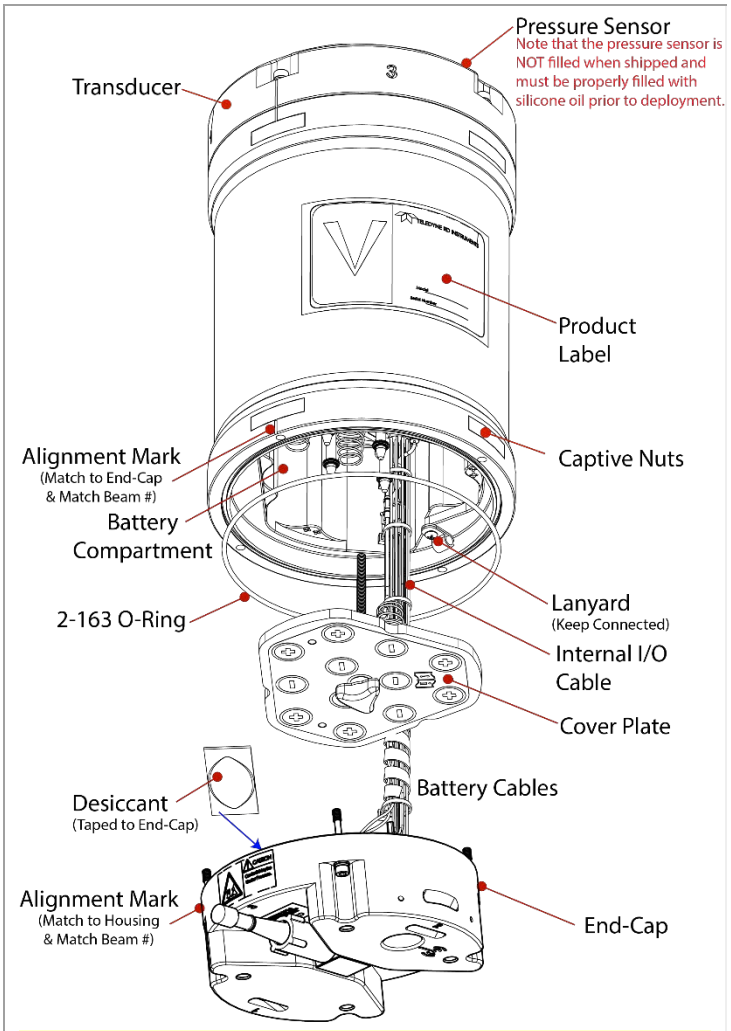
3. Carefully lift the end-cap away from the housing. Observe how the internal I/O cable is coiled inside the housing. It must be coiled exactly the same way when replacing the end-cap.

A lanyard connects the end-cap to the housing to protect the internal I/O cable. Leave the lanyard connected.

4. Let the end-cap hang from the lanyard to the side of the ADCP.
5. Connect the Red/Black 2-pin battery cable to the 2-pin battery cable connector.

After power is applied (long beep), there is a 10 to 15 second delay before the network is available (short beep); If you do not hear the beeps, repeat/check step 5 before continuing.

# To install the D cell batteries:




Sentinel V with D cells are shipped without batteries inside the system. Install the batteries and seal the Sentinel V before deployment.

6. Place the Sentinel V ADCP with the end-cap facing up. Use a soft pad or the transducer cover to protect the ADCP.
7. Using a 4mm hex key, loosen the four M5 captured bolts on the end-cap.

A 4mm hex key is provided in the canvas bag.
The end-cap hardware will stay attached to the end-cap.

8. Carefully lift the end-cap away from the housing. Observe how the internal I/O cable is coiled inside the housing. It must be coiled exactly the same way when replacing the end-cap.

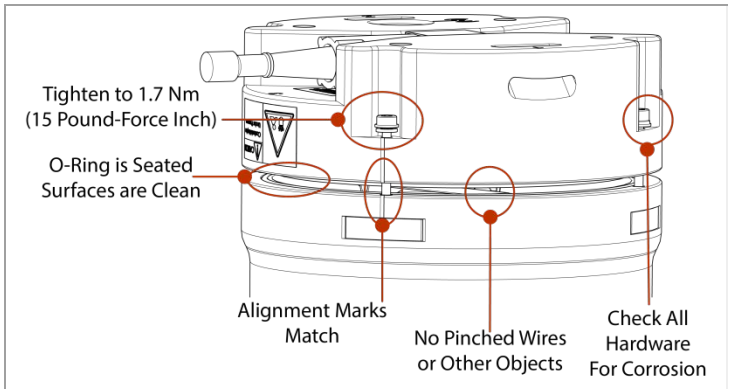
A lanyard connects the end-cap to the housing to protect the internal I/O cable. Leave the lanyard connected.

9. Let the end-cap hang from the lanyard to the side of the ADCP.
10. Remove the battery cover plate by loosening the knob (rotate counter-clockwise).
11. Use the battery cover diagram for battery orientation and slide in the D cell batteries. Ensure all batteries are fully seated by pushing them down into the battery cavity. Position the cover plate over the batteries and tighten the knob until the cover plate is flush with the surrounding surface.

As the cover is installed, there is a long beep, a 10 to 15 second delay, and then a short beep. If you do not hear the beeps, repeat/check steps 5 and 6 before continuing.

If the battery cover is loose, the D cell batteries may make intermittent contact or it may interfere with the end-cap properly closing. Tighten the knob until the cover plate is flush with the surrounding surface.

# To close the system:




1. Check the O-ring for any fibers or particles. Make sure it is seated in the groove and the surfaces are clean.
2. Verify the desiccant bag is installed and it will not interfere with the end-cap when it is installed.

TRDI recommends replacing both the O-ring and desiccant before each deployment.

3. Match the alignment mark and beam numbers embossed on the end-cap with the alignment mark/beam numbers embossed on the housing to place the end-cap on the housing. Check the cables are coiled around the inside of the housing and do not become pinched.
4. Install all four sets of hardware until "finger-tight."
5. Tighten the bolts in small increments in a "cross" pattern until the split washer begins to flatten out.
6. TRDI recommends using a torque wrench to tighten the bolts to the recommended torque value of 1.7 Nm (15 Pound-Force Inch). If a torque wrench is not available, tighten the bolts until the split washers are flat, and then turn the bolts ¼ turn more. Do not strip the bolts or captive nut threads.

# Quick Review

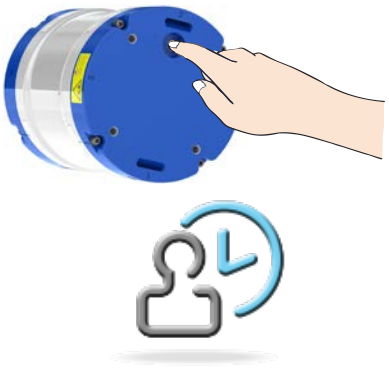
|  |  |
|---|---|
| Check that you have all of the Sentinel V parts. | If you are missing parts, contact TRDI support rdifs@teledyne.com or call +1 (858) 842-2700. |
| Check that the software and documentation is installed. | If the CD browser does not automatically start, double-click on the *launch.exe* file.<br>The software and documentation CD will install the Velocity, TRDI Toolz, Sentinel V RT Tools (Plan and CompassCal V), VmDas, and the Sentinel V documentation. |
| Check that you heard the long and short beeps when the battery was connected or the D cell battery cover plate was installed. | If you did not hear any beeps when the battery was connected, read Chapter 5 in the Sentinel V Operation Manual. |
| Check that the system is closed properly. | For more information about installing the battery and system close-up, see chapter 4 in the Sentinel V Operation Manual. |

# Connecting to the ADCP


**CONNECTING TO THE ADCP INCLUDES THE FOLLOWING STEPS:**

- Using the touch sensor
- Connecting to the WLAN
- Starting ReadyV

## Connecting to the ADCP



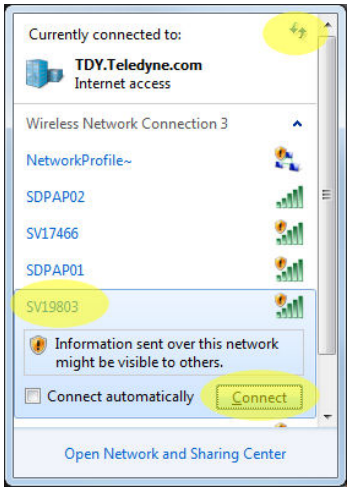
### STEP 1

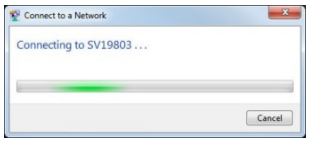
Touch the sensor

Beep(s) heard.

If the beep is not heard, check that the battery is installed.

Touching the sensor starts the ADCP's WLAN for five minutes.




Sentinel V ADCPs display as SVnnnnn (where nnnnn is the five or six character serial number shown on the product label).

### STEP 2

Click the wireless icon ( ) in the system tray.

Click the Refresh icon ( ).

Locate the ADCP on the list and click on it.

Click **Connect.**

As needed, touch the Touch Sensor, listen for the beep, and then click  until the ADCP appears on the list.

It may take several attempts of clicking Refresh before the ADCP appears on the list.


### STEP 3

Open a browser.

Type **192.168.0.2** in the address bar

It can take up to 30 seconds for the ReadyV Home panel to display.

As needed, touch the Touch Sensor, listen for the beep, and then refresh the browser page until ReadyV starts.

Complete step 3 within five minutes of completing step 2.

# Quick Review

| | |
|---|---|
| Verify ReadyV started. | If ReadyV does not start, see the Wireless Connection Common Issues section in Chapter 1 of the Sentinel V Operation Manual for more information. |
| Use the quick reference cards. | Use the Sentinel V SC quick reference cards to help remember how to connect the Sentinel V system. A PDF copy is included when you install the software/documentation CD. |

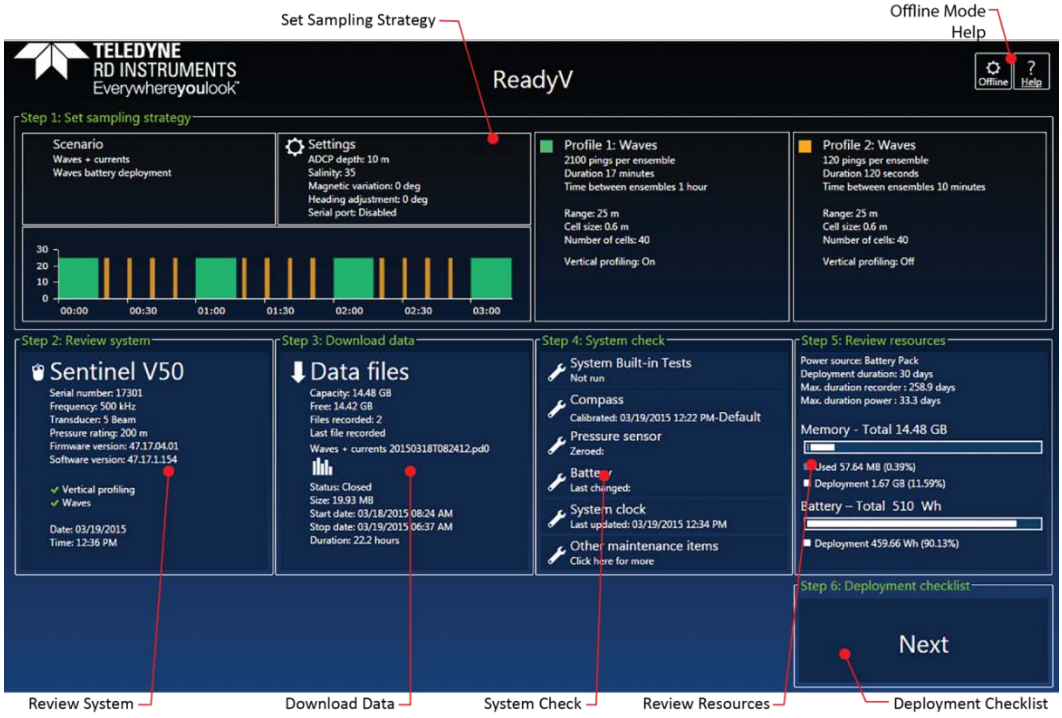
# Planning the Deployment


**PLANNING THE DEPLOYMENT INCLUDES THE FOLLOWING STEPS:**

- Creating or Importing a Scenario using ReadyV

## ReadyV Overview

Each section on the ReadyV Home panel acts as a link to a secondary control panel with a specific purpose. As the mouse is hovered over a section, it will change to a lighter blue and the mouse pointer will change to the hand icon ( ). Click to go to the panel. To return to the Home panel, click the Home button.



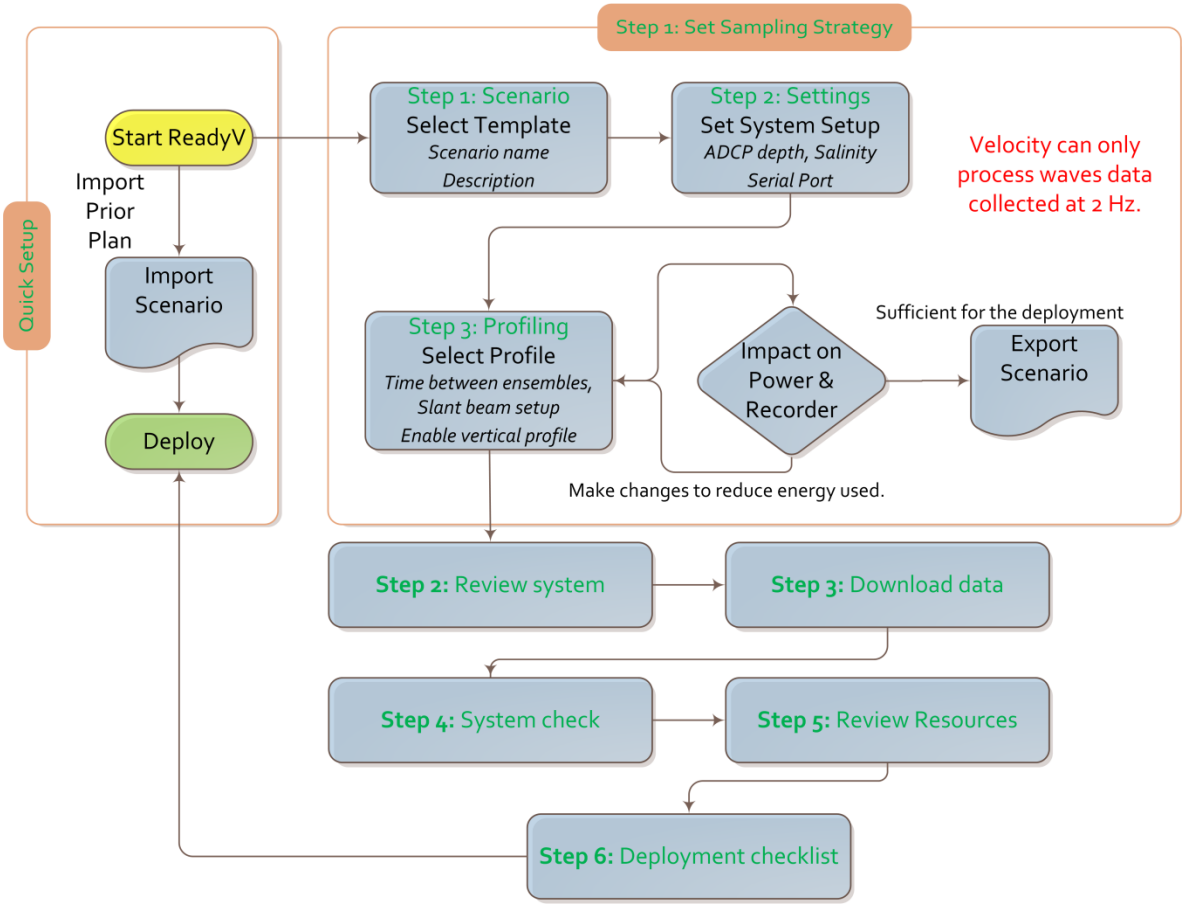

Home Panel
Each section on the Home panel acts as a link to a secondary control panel with a specific purpose.
The panels can be accessed only when the system is not deployed and when connected to the system.
To save ReadyV to your local computer, click the Offline button and download ReadyV onto the computer.

ReadyV lets you enter known or "best-guess" values for the various ADCP profiling parameters and shows predictions of expected results. This lets you play "what if?" with the input parameters to evaluate trade-offs you may have to make with regard to standard deviation, profiling range, and timing.

While entering parameters in ReadyV, if a value is entered outside the normal range, a message will appear when the box is selected. In the example shown here, selecting 1 minute for the **Time between ensembles** displays an error because the **Number of pings** is too large (180 pings @ 1 second each = 3 minutes). To correct the error, reduce the number of pings or select a larger time between ensembles. Errors must be corrected before the setting can be saved.

Scenarios with two water pings may have a ping collision error. To clear a ping collision, change the time between pings to the recommended value and then change the time between profile groups so that there is enough time for profile type 1 to finish before profile group 2 starts.

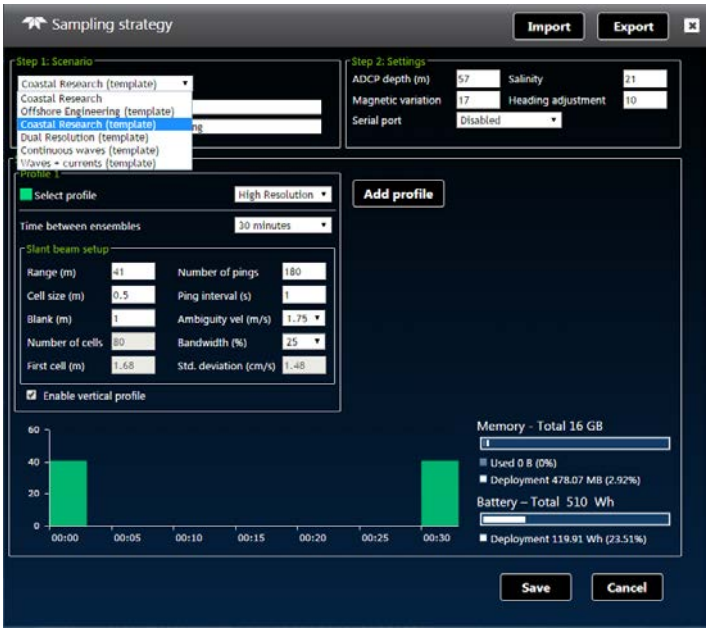
# Creating a Scenario Overview




## Creating a Scenario

To create a new scenario:

1. Start ReadyV (see Connecting to the ADCP, page 8).
2. Click anywhere on the Step 1 Set sampling strategy section on the **Home** panel. This will open the **Sampling strategy** panel.
3. For this example, select the **Costal Research** template using the drop-down list.
4. Click the **Save** button to save the scenario.




When a scenario is first created, it will use a default name. For example, selecting the **Coastal Research Template** and clicking **Save** will save the scenario as Coastal Research. Make sure to change the name of the scenario and add a description for future use.

Note how this template includes a **High Resolution Profile** that sets the **Range** and the **Cell size** (based on system frequency).

The Waves feature must be installed in the ADCP and your Velocity registration code must include Waves in order to collect and process Waves data.

# Quick Review

| | |
|---|---|
| ✔ Use a template to create a scenario. | For more information on ReadyV, see Chapter 2 in the Sentinel V Operation Manual. |
| ✔ Name the scenario file and add a description. | |
| ✔ Check that the resources for the deployment are acceptable. | |
| ✔ If you are collecting Waves data, *Velocity* can only process waves data collected at 2 Hz. | The Ping interval must be set to 0.5 s for Water Profile 1. |

# Deploying the ADCP


**DEPLOYING THE ADCP INCLUDES THE FOLLOWING STEPS:**

- Setting the ADCP clock
- Testing the ADCP
- Checking all maintenance items were performed
- Calibrating the Compass
- Filling pressure sensor with oil
- Clicking the **Deploy** button

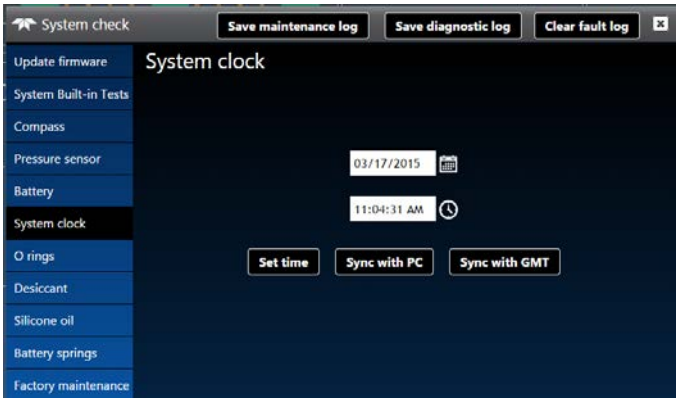
# Pre-Deployment Checks

ReadyV has a user-friendly interface for running the pre-deployment tests and setting the Sentinel V real-time clock.

## Setting the ADCP Clock

The real-time clock (date and time) within the Sentinel V maintains the correct time while system power is removed. The clock will continue to maintain the date and time during power outages of 16 to 24 hours. If power is removed from the ADCP for a longer period of time, then the clock reverts to the default value of January 1, 1970 and needs to be reset to the correct time.

To set the date and time:




1. Start ReadyV and Connect to the ADCP.
2. Click the Step 4: System check panel; this will open the **System check** panel.
3. Click on **System clock**.
   - To manually set the time, click on the clock icon. Click on the calendar icon to set the date. Press the **Set Time** button.
   - Use the **Sync with PC** button to set both the time and date of the ADCP to match the time and date on the PC.
   - Use the **Sync with GMT** button to set both the time and date of the ADCP to match the GMT time and date.
4. Click the **Close** button (⊠) to return to the Home panel.

## Testing the ADCP

To run the Built in tests:

1. Start ReadyV and Connect to the ADCP.
2. Click the Step 4: System check panel; this will open the **System check** panel.
3. Click on **System Built-in Tests**.
4. To run the tests and view the test results, click the **Run** button.

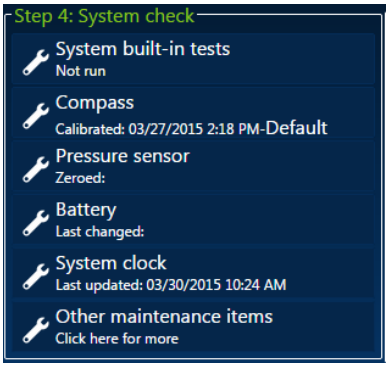

5. Click the **Close** button (⊠) to return to the Home panel.

If any of the tests fail, read Chapter 6 in the Sentinel V SC_RT Operation Manual.

# Checking the Maintenance Items

Before deploying the ADCP, use the System checks panel to check that the ADCP is ready for deployment.

Read the Sentinel V SC_RT Operation Manual, Chapter 5 Periodic Maintenance section. Make sure all maintenance items are completed as needed.




## Zero the Pressure Sensor

Use the **Pressure Sensor** panel to zero the pressure sensor at the deployment site, prior to deploying the Sentinel V ADCP in the water.

1. On the **System checks** panel, click the **Pressure Sensor** panel to zero the pressure sensor.
2. Click the **Close** button (⊠) to return to the **home** panel.

## Setting the Battery Replacement Date

Use the **Change** button to set the battery replacement date.

1. On the **System checks** panel, click the **Battery** panel. Set the date the batteries were replaced.
2. Click the **Close** button (⊠) to return to the **home** panel.

# Calibrating the Compass

The compass calibration is a sequence of 12 rotations and tilts used to correct for distortions in the earth's magnetic fields caused by permanent magnets or ferromagnetic materials near the Sentinel V. These magnetic field distortions, if left uncorrected, will create errors in the heading data from the Sentinel V.

1. Start ReadyV and Connect to the ADCP.
2. Click the Step 4: System check panel; this will open the **System check** panel.
3. Click on **Compass**.
4. Use the Compass Calibration Guide and ReadyV to calibrate the compass.
5. Click the **Close** button (⊠) to return to the **home** panel.

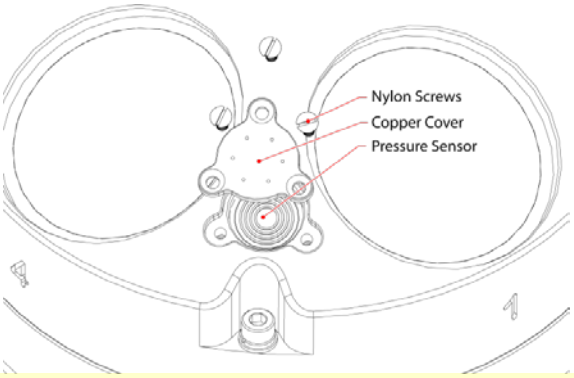
For a detailed explanation of the calibration procedure, see the Sentinel V SC_RT Operation Manual, Chapter 5.

A compass calibration should be conducted at each measurement location, and whenever the mounting fixture or ancillary equipment such as batteries are changed or rearranged.

Use the Compass Calibration Guide 11x17 laminated quick reference card included with the Sentinel V system. A PDF copy is included on the software/documentation CD.

# Filling the Pressure Sensor Cavity with Oil

The pressure sensor cavity needs to be filled with oil before deployment to deal with both trapped air and long-term reliability of the pressure sensor. Use Dow Corning Q7-9120 Silicone fluid, 12,500 CST oil. A plastic bottle with silicone oil (part number 75BK6004-00) and a syringe with 10-gauge needle are included in the spare parts kit. The sensor cavity can be filled any time before system installation; however, care should be taken to keep the ADCP from high temperature during this time. High temperatures may cause the oil to leak.




The pressure sensor cavity is not filled with oil when shipped. This must be done before deploying the Sentinel V ADCP. The pressure sensor cavity should be checked and if needed refilled between deployments.

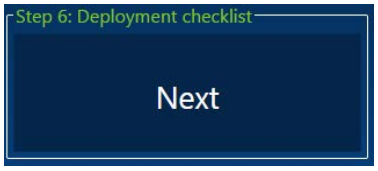
# Removing the Transducer Cover

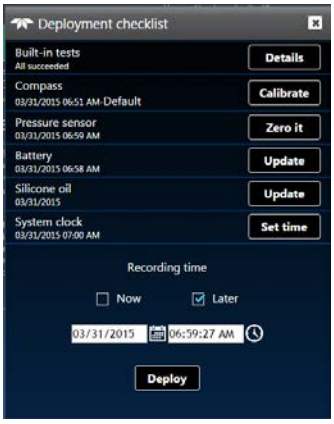
The Sentinel V Self-Contained ADCP is shipped with a transducer cover to protect the transducer faces. Remove the cover when deploying the ADCP.

You MUST remove the cover to collect good data.

# Deploying the ADCP

Click the Step6: Deployment checklist panel to open the Deployment checklist.




To start the deployment:

1. On the **Deployment checklist** panel, select **Now**. The Sentinel V ADCP will start pinging as soon as the **Deploy** button is clicked.
2. Click the **Deploy** button to start the ADCP pinging.
3. On the **Home** panel, verify that is shows **Stop recording**.
4. Close the browser page.


## Quick Review

| | |
|---|---|
| ✔ All maintenance items (as needed) were done including filling the pressure sensor with oil, zero pressure sensor, and compass calibration. | TRDI recommends that if you are having trouble calibrating the Sentinel V compass that you move the system and/or ensure the area around the system is clear of electrical equipment and ferrous materials. |
| ✔ The transducer cover is removed. | You MUST remove the transducer cover to collect good data. |
| ✔ Verify ReadyV shows Stop recording on the Home panel. | Read Chapter 3 in the Sentinel V Operation Manual for information on how to install/mount the ADCP for a deployment. |

# Recovering Data


**RECOVERING DATA INCLUDES THE FOLLOWING STEPS:**

- Stopping the deployment
- Downloading data files
- Viewing data using the *Velocity* software

## Stopping a Deployment

To stop a deployment:

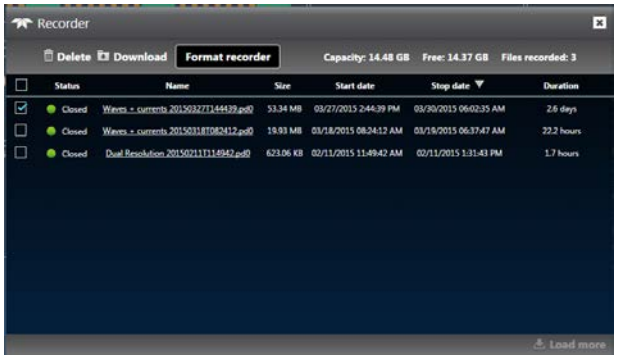
1. Connect to the system (see Connecting to the ADCP, page 8).
2. Click the **Stop recording** button to stop the ADCP pinging.
3. The data file being recorded will be closed.


If the deployment was long enough to completely drain the battery, see Installing Batteries, page **Error! Bookmark not defined.** to change the battery and then resume the process to stop the deployment.

## Downloading Data Files

To download a data file:

1. Click the Step3: Download data panel. This will open the **Recorder** panel.
2. To select a data file, click on it.
3. Click the **Download** button to save the data file to a folder on the computer. For Windows 7®, click on the ▾ triangle next to the **Save** button to select the folder where the data will be written.





Once the data has been recovered, the recorder can be erased by clicking the **Format recorder** button. Enter the code and then click the **Format** button at the prompt. *Once erased, the data is not recoverable.*

# Opening a Data File with Velocity

When a **.PD0* (pd zero, not the letter o) file is opened, *Velocity* creates a matching **.pdv* and **.pjv* files depending on the options selected. The **.pdv* file is used to process data and the **.pjv* file contains the latest information about user selections for processing parameters and data displays.

The original *.pd0 file is never changed, moved, or overwritten.

To open a data file:

1. Click the **Home** button (  ) located in the top left corner.
2. Click the **Options** button and select the options. Data averaging is on by default.
3. Do one of the following:
   - Drag a data file onto the *Velocity* desktop icon. This will start *Velocity* and open the data file.
   - With the **Start** menu selected, on the **Starting actions** area, click **Open a data file** button.
   - Click the **Open** menu button.
4. After the file is opened, a mini preview of the data file will display at the top of the Velocity screen. Click the preview to switch to the session (if other files are opened).

See the Velocity quick reference card. A PDF copy is included when you install the software/documentation CD.

## Quick Review

|  |  |
|---|---|
| Download the data. | See the Sentinel V Operation Manual, Chapter 2 for information on using download managers. |
| Check and process the data | Read the Velocity Software User's Guide for information on how to check and process data. |

# Conclusion

Congratulations! You have completed the Sentinel V Self-Contained Deployment Guide. Read the following chapters in the Sentinel V SC_RT Operation Manual for more detailed information.

## Chapter 1 – Self-Contained Sentinel V Overview

This chapter includes an overview of the Sentinel V features, options, computer and power requirements, and connecting to the Sentinel V ADCP.

See the Self-Contained Quick Start Card PDF files installed with the Documentation and Software CD.

## Chapter 1a – Real-Time Sentinel V Overview

This chapter includes an overview of the Sentinel V Real-Time features, options, computer and power requirements, and connecting to the Sentinel V ADCP.

See the Real-Time Quick Start Card PDF files installed with the Documentation and Software CD if you will be using the Real-Time mode.

## Chapter 1c – Switching RT and SC Modes

This chapter shows how a V Series Self-Contained (SC) ADCP can be converted to a Sentinel V Real-Time (RT) and vice versa.

## Chapter 2 – Using ReadyV

This chapter covers each ReadyV panel in detail. ReadyV is only used when the system is configured for Self-Contained mode.

See the ReadyV Quick Start Card PDF file installed with the Documentation and Software CD

## Chapter 3 – Installation

Use this chapter to plan your installation requirements.

## Chapter 4 – Maintenance

This chapter covers Sentinel V ADCP maintenance. Use this section to make sure the Sentinel V is ready for a deployment.

Use the Compass Calibration Guide 11x17 laminated quick reference card included with the Sentinel V system.

## Chapter 5 – Troubleshooting

This chapter covers how to troubleshoot the Sentinel V ADCP. If the Sentinel V fails a built-in test or you cannot communicate with the system, use this information to help locate the problem.

## Chapter 6 – Returning Systems to TRDI for Service

Use this information to obtain a Return Material Authorization (RMA) number if the Sentinel V ADCP needs to be returned to TRDI.

## Chapter 7 – Specifications

This chapter includes specifications and dimensions for the Sentinel V ADCP (including outline installation drawings).

## Chapter 8 – Commands

This chapter defines the Real-Time commands. This is only used when the system is configured for Real-Time mode.

## Chapter 9 - Output Data Format

This chapter explains the output data format used by the V Series ADCPs.

NOTES