

High Speed Pressure Imaging System (HSS)



XSENSOR<sup>®</sup> High Speed Pressure Imaging System (HSS) is a rugged, high-speed data acquisition system that captures detailed surface pressure measurements before, during and after an impact event. HSS pairs two high-performance XSENSOR<sup>®</sup> components to provide a rugged and compact connection between HX Sensors and HS V8 Software:

- **HS Sensor Pack** is a bridge that contains sensing electronics and a communications port.
- **HS Data Logger** is a programmable controller used to configure and capture data from HS Sensor Packs. HS Data Logger can be attached to crash sleds and triggered remotely. Captured data can be streamed to HS V8 Software throughout an impact event, or stored for post-event download.

What’s in the Box?

Each HSS package contains:

- One HSS device with factory-installed HS Data logger and HS Sensor Pack modules
- One AC adapter power cord
- One SD Card
- One Operator Manual
- One Quick Start Guide
- One grounding strap for stationary use

If the HSS is damaged or parts are missing, contact XSENSOR Technology Corporation or an authorized distributor. For additional information, consult the operator manual for the HSS, or visit [www.xsensor.com](http://www.xsensor.com).

Intended Use

Unless otherwise specified at time of purchase, the HSS is intended for use as a surface pressure detection and data acquisition system for automotive impact event testing. It is designed to operate in the following conditions:

- Indoor use only
- Electronics mounted on a grounded surface, such as a crash sled
- Temperature range of +10C to +40C
- Relative humidity of 10 per cent to 90 per cent (non-condensing)

About this Publication

This publication is a concise guide to preparing HSS for first use. It also contains basic steps for using HS V8 Software to detect HSS modules, add sensors to the Sensor Catalog, configure test sessions, and capture data. For additional information, consult the operator manuals for HSS and HS V8 Software, or visit [www.xsensor.com](http://www.xsensor.com).

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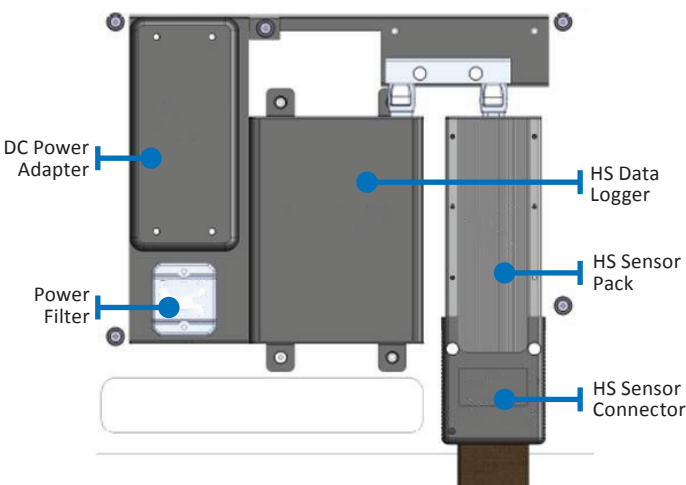
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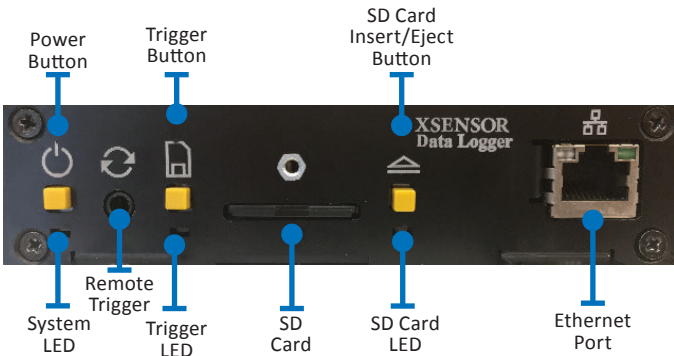
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HSS At a Glance

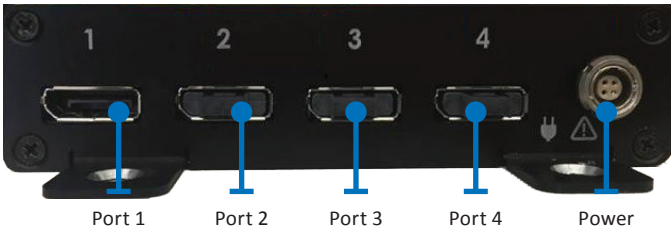


Front Panel



Back Panel

If only one sensor will be used, you must connect the sensor to Port 1. Connection to any other port will cause HSS to malfunction.



LED Status Indicators

Status	System LED	Trigger LED	SD Card LED
System Booting	Flashing Blue	Off	Off
System ready. SD Card inserted	Green	Green	Green
System ready. No SD Card inserted	Green	Green	Off
Armed for recording	Green	Flashing Blue	Green
Recording	Green	Blue	Green
Writing to SD Card	Green	Green	Flashing Blue
Error	Red	Off	Off
Error with SPK	Green	Off	Green

# HSS Quickstart Guide

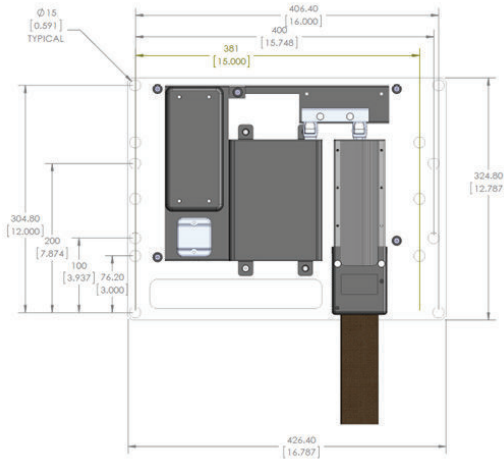
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## Module Power Requirements

For a single sensor pack system, the DC power requirement is 11W; 308mA @ 36V.

## About the Mounting Plate

The HSS mounting plate is designed to accommodate three different hole spacings — 3 inches on center, 4 inches on center, and 100 mm on center. XSENSOR recommends at least four bolts be used to attach the HSS system to the sled. Toe clamps may be used if sufficient space is not available for all bolts.



## Prepare HSS for Use

This section provides basic instructions to assemble and activate the HSS for use. The HSS can be attached to a crash sled or used as a stationary device. After the HSS is assembled and activated, use HS V8 Software to manage sensors, configure data capture, and program operating mode options. For additional information, consult the operator manuals for the HSS and HS V8 Software.

### Before you Begin

Verify that the following items are available and ready to use:

- HSS module
- HX sensors
- Laptop or PC with HS V8 Software installed
- Ethernet cable
- Active network outlet that is connected to the same network as the laptop or PC
- AC power cord that is disconnected from any electrical power outlet
- Appropriate electrical power outlet
- SD Card with at least eight gigabytes of available memory
- Grounding strap for stationary use
- Appropriate trigger mechanism (if required)

### Prepare HSS for Use on a Crash Sled

1. Verify that the AC power cord is disconnected from any power outlet.
2. Verify that sufficient and appropriate fastening hardware is available. Select fastening hardware that is suitable for the material to which the HSS is attached. The mounting holes support 3inch, 4inch and 100mm center-to-center spacing. XSENSOR recommends that four fasteners—two on each side—are used.
3. Connect the AC power cord to the HSS data logger. Tighten clamp around power connector to secure it.
4. Attach the HSS base plate to the crash sled. Use sufficient and appropriate fastening hardware.
5. Connect the sensor to the HSS sensor pack. When only one sensor is required, you must connect the sensor to Port 1. Connection to any other port will cause the HSS to malfunction. Insert the thumbscrews to secure the sensor connector to the SPK/HSS base plate.

6. Insert the SD card into the SD card slot on the HSS data logger.
7. Connect one end of the Ethernet cable to an active network outlet. Connect the other end of the Ethernet cable to the HSS Ethernet port.
8. Connect the AC power cord to an electrical power outlet.
9. Press the power button on the data logger to activate the HSS and begin the boot process. During a successful activation, the following actions occur:
  - The power LED briefly flashes red, and then flashes blue. After 30 to 60 seconds, the boot sequence is complete and the power LED changes to solid green.
  - The HSS sensor pack activates. The HSS sensor pack LED changes to solid green.
  - The SD card is mounted. The SD slot LED changes to solid green.
10. After successful activation, all of the LEDs are solid green and HSS is ready for configuration. If one or more of the LEDs is not green, then follow these steps:
  - a. Press the power button on the HSS data logger to deactivate HSS.
  - b. Eject the SD card from the SD slot. Verify that the SD card is empty, and that it contains at least 8 gigabytes of available memory.
  - c. Verify that the sensor is firmly attached to the sensor pack.
  - d. Insert the SD card into the SD slot.
  - e. Press the power button on the HSS data logger to activate HSS and begin the boot process.
  - f. After successful activation, all of the LEDs are solid green and HSS is ready for configuration. If problems persist, contact XSENSOR Technology Corporation or an authorized distributor.
  - g. If the SD card light is not green, eject the SD card and re-insert it. If it's still not green, proceed with Step C.

### Prepare the HSS for Stationary Use

1. Verify that the AC power cord is disconnected from any electrical power outlet.
2. Connect the AC adapter power cord to the data logger.
3. Connect the sensor to Port 1 on the HSS sensor pack. When only one sensor is required, you must connect the sensor to Port 1. Connection to any other port will cause HSS to malfunction.
4. Connect the grounding strap to the earth ground.
5. Insert the SD card into the SD card slot on the data logger.
6. Connect one end of the Ethernet cable to an active network outlet. Connect the other end of the Ethernet cable to the HSS Ethernet port.
7. Connect the AC adapter power cord to an electrical power outlet.
8. Press the power button on the HSS data logger to activate HSS and begin the boot process. During the boot process, the following actions occur:
  - The power LED flashes red, then flashes blue. After 30 to 60 seconds, the boot sequence is complete and the power LED changes to solid green.
  - The sensor pack activates and the sensor pack LED changes to solid green.
  - The SD card is mounted. The SD slot LED changes to solid green.
9. After successful activation, the power, sensor pack and SD slot LEDs are green and HSS is ready for configuration. If one or more of the LEDs is not green, then follow these steps:
  - a. Press the power button on the data logger to deactivate HSS.
  - b. Eject the SD card from the SD slot. Verify that the SD card is empty, and that it contains at least 8 gigabytes of available memory.
  - c. Verify that the sensor is firmly attached to the sensor pack.
  - d. Insert the SD card into the SD slot.
  - e. Press the power button on the data logger to activate HSS and begin the boot process.
  - f. After successful activation, HSS is ready for configuration.
  - g. If problems persist, contact XSENSOR Technology Corporation or an authorized distributor.

## How to Trigger an Event

HSS supports three types of event triggers:

1. **Push-button.** Press the Record button on the front panel of the HSS to begin recording.
2. **Data threshold.** Use HS V8 Software to program specific data threshold settings. HSS initiates recording when a minimum area of the sensor is at or above the threshold pressure setting for at least a period of time. Recording stops when the data threshold settings are not met.
3. **SYNC input.** Connect a suitable trigger mechanism to HSS via the SYNC port on the HSS panel. Use HS V8 Software to program HSS to begin recording when the appropriate signal is transmitted by the trigger.

## Trigger Specifications

The HS Data Logger accommodates either unpowered or a powered trigger circuits up to 15V. The trigger circuit requires a TRS 3.5mm connector. For unpowered triggers, connect the tip and ring wires to the external trigger system. For powered triggers, connect the tip — positive voltage connection — and sleeve to the external trigger system.

## Add a Connected Sensor to the Sensor Catalog

Use HS V8 Software to automatically detect the activated HSS. After the HSS is detected, you can use HS V8 Software to detect a connected sensor and add it to the Sensor Catalog. After a sensor is added to the catalog, it can be selected and configured to capture impact event data whenever it is connected to an activated HSS that is connected to the same network as the computer on which HS V8 Software is installed.

Follow these instructions to add the connected sensor to the Sensor Catalog in HS V8 Software:

1. Start HS V8 Software.
2. Click **File**, click **New**, and then click **Sensor Catalog**. The **Sensor Catalog** dialog box is displayed.



3. Click **Add HSS**. The **HSS Connect** dialog box is displayed.
4. Click **Scan**. HS V8 Software automatically detects HSS devices that are connected to the same network as the computer on which it is installed. HSS identification and IP address information is added to the **<Product ID>** list.
5. If HS V8 Software fails to detect HSS, the **No HSS found on local intranet** message box is displayed. Click **OK** to return to the **HSS Connect** dialog box. Click the **Internet (WAN IPv4)** text box, type the IP address of the HSS, and then click **Add**. HSS identification and IP address information is added to the **<Product ID>** list.
6. If HS V8 Software fails to detect HSS, the **No HSS found on local intranet** message box is displayed. Click **OK** to return to the **HSS Connect** dialog box, and follow these steps:
  - a. Press the power button on the data logger to deactivate HSS.
  - b. Verify that the Ethernet cable is connected to an activated network outlet which is connected to the same network as the computer on which HS V8 Software is installed.
  - c. Press the power button on the data logger to activate HSS.
  - d. After HSS is successfully activated, return to Step 3. If problems persist, contact XSENSOR Technology Corporation or an authorized distributor.
7. Click the **<Product ID>** list to display the list of available sensors. Click the HSS module you want to use, and then click **Add**. When the HS V8 Software successfully connects to HSS, the **HSS Connection is good** message box is displayed.

8. If the HSS connection is good, click **OK** to return to the **Sensor Catalog** dialog box. Verify that a checkmark appears beside the HSS you want to use. The sensor is ready to configure for data capture.
9. Click **Close** to close the **Sensor Catalog**.
10. If HSS connection is not good, the **HSS Connection failed** message box is displayed.
 

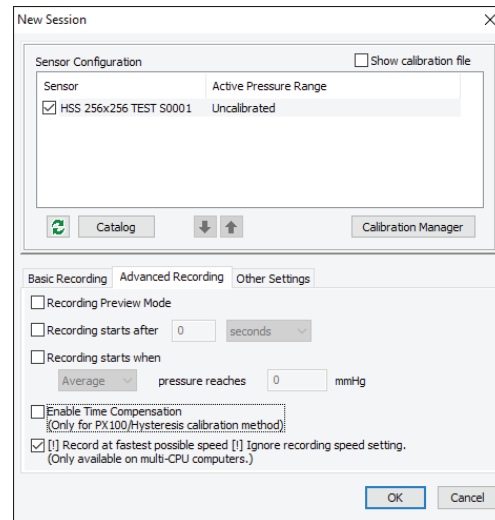
Click **OK** to return to the **Sensor Catalog** dialog box, and then follow these steps:

  - Verify that the HSS is activated and connected to the same network as the computer on which HS V8 Software is installed.
  - Verify that the selected sensor is connected to HSS.
  - Repeat steps 3 through 5. If problems persist, contact XSENSOR Technology Corporation or an authorized distributor.

## Configure HSS for Live Data Streaming

After the sensor is added to the Sensor Catalog, you can begin a new live data streaming session. For live data streaming, HSS must be connected via Ethernet cable to the computer on which HS V8 Software is installed.

1. Start HS V8 Software.
2. Connect HSS to the computer on which HS V8 Software is installed.
3. Click **File**, click **New**, and then click **Session**. The **New Session** dialog box is displayed and the **Basic Recording** tab is active.



4. In the list of available sensors, select the sensor you want to use. Use the up and down arrows below the list of sensors to scroll through available sensors. Use the green arrows below the list of sensors to refresh the list of connected sensors.
5. Select the active calibration range. In the **Active Pressure Range** list, click the calibration range.
6. Set the recording speed you want to use. Click the **Recording Speed** frames box, and then type the number of frames you want to capture. In the **second** list, click second or minute.
7. Set the recording duration. In the **Recording Duration** frames box, type the quantity of frames or time units you want to capture. In the **frames** list, click the measurement you want to use.
8. In the **SPK Performance** list, click **Recommended**.
9. Click the **Advanced Recording** tab. Verify that a checkmark is displayed beside **[!] Record at fastest possible speed** option.
10. Select a recording mode. To set a time delay, select **Recording starts after**. Type a quantity in the time unit text box, and then select a unit of time. To set a pressure trigger, select **Recording starts when**. In the **Average** list, select a pressure category, and then type a value in the pressure text box.
11. Click **OK**. HS V8 Software creates a new recording session for the configured sensor. During the test procedure, live-streamed test data is displayed and recorded via HS V8 Software.



# HSS Quickstart Guide

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Innovators in Pressure Imaging

## Programming the HSS Data Logger

You can use HS V8 Software to program HSS Data Logger and the connected sensor for data streaming or data logging operating modes. Programmed settings are saved to the SD Card for future use. Insert the programmed SD Card into HSS prior to activation to apply the saved settings during the activation process.

## About the SD Cards

Programmed settings that are saved to the SD card are specific to the sensor that is connected to the HSS. As a result, each sensor can have its own pre-programmed SD card. If you use one HSS device and then replace the sensor as required to meet test criteria, you must be prepared to:

1. **Reprogram the SD card.** Download all recorded data from the SD card, and then replace the sensor. Use HS V8 software to reprogram the card for use with the replacement sensor; or
2. **Replace the SD card.** Remove the SD card and the sensor, and then store the SD Card with the sensor future use. Connect a new sensor, and then insert a different SD card and program the sensor settings. The programmed SD card can be stored with the HSS device for future use.

When you change the connected sensor or the SD card, you must deactivate and then reactivate the HSS to ensure that the programmed settings are transferred to the HSS device.

## How to Program HSS Data Logger Settings

Follow these steps to program HSS Data Logger settings:

1. Start HS V8 Software.
2. Click **Tools**, and then click **HSS Mode Programmer**. The **HSS Mode Programmer** dialog box is displayed.
3. In the **HSS** list, click the connected HSS you want to use. Click **Connect** to refresh the connection. Settings from the selected HSS are displayed.
4. In the **Power-up State** list, click the state you want to apply to HSS during activation:
  - **Idle.** HSS waits for trigger event. In most cases, HSS is **Idle** while in Streaming Mode
  - **Pre-Armed.** HSS waits for trigger event before entering **Armed** state.
  - **Armed.** HSS waits for a trigger event to begin recording.
  - **Record.** HSS records pressure data to the SD Card, or live-streams data to the connected computer.
5. In the **Post-record State** list, click the state you want to apply to HSS after the recording is complete.
  - **Idle.** HSS does not respond to trigger events after recording is complete.
  - **Armed/Record.** HSS initiates new recording when the next trigger event occurs.

6. In the **Pressure Range** list, the available pressure ranges for the selected sensor are displayed. Click the pressure range you want to use, or click **Raw (Uncalibrated)** to record the raw, 16-bit electrical readings. Raw readings can be converted to pressure values via HS V8 Software.
7. If the **Power-up State** is set to **PreArmed**, the **PreArmed-to-Armed Event** list is available. In the list, click the trigger event you want to use. When this setting is active, HSS waits for the trigger event before entering **Armed** state. This prevents HSS from responding to a trigger event before the sensor or test environment are in place.
8. In the **Armed-to-Record** list, click the trigger event you want to use to initiate recording. The **Armed-to-Record** trigger event cannot be the same as the **PreArmed-to-Armed Event** trigger event.
9. If you select the **SYNC Input** trigger event, the **SYNC Input Polarity** list is available. Click the list, and select the polarity of the signal generated by the connected SYNC trigger. Positive polarity means the trigger event occurs on the rising edge of the pulse. Negative polarity means the trigger event occurs on the falling edge of the pulse. For the majority of trigger systems, positive polarity should be used.
10. If you select the **Data Threshold Armed-to-Record** trigger event, the **Data Threshold Trigger Settings** text boxes are available. For each setting, click the text box, and type a threshold value. HSS initiates recording when a minimum area of the sensor is at or above the threshold pressure setting for at least a period of time. Recording stops when the data threshold settings are not met.
11. **Sampling Settings** specify the rate and duration of frame or sample collection.

- **Target Rate.** A suggested rate that HSS tries to best-match based on its internal clock. The ability of HSS to meet **Target Rate** depends on the size of the sensor.
- **Max Time.** The longest period of time available for the recording, including **Pre-Trigger** and **Record Time**. **Max Time** is based on sensor dimensions, **Target Rate**, and the internal HSS memory.
- **Pre-Trigger Time.** The length of time HSS keeps samples captured before the trigger occurs. **Pre-Trigger Time** is typically a fraction of **Record Time**.
- **Record Time.** The length of time HSS records after the record trigger event occurs.

12. Click **Program Streaming Mode (SD Card)** to save the settings to the SD card for live data streaming. Click **Program Data Logger Mode (SD Card)** to save the settings to the SD card for data logging

## Transfer Data from Data Logger

To ensure that all essential data files are successfully transferred, XSENSOR recommends to use HS V8 Software to transfer data files from the HSS data logger to a computer or network location.

1. Start HS V8 Software.
2. Click **Tools**, and then click **HSS Session Download**. The **HSS Session Download** dialog box is displayed.
3. In the **Connect** list, click the appropriate sensor, and then click **Connect**. The recorded data files are displayed.
4. Click the files you want to download. To automatically open each file as it is downloaded, click the **Automatically open downloaded files** checkbox.
5. Click **Download**. The **Pressure Range** dialog box is displayed. Select the appropriate pressure range, and then click **OK**. The selected files are converted to XSENSOR session files with .xsn extension, and then saved to the **Downloads** folder in the User profile folder on your computer. If **Automatically open downloaded files** is selected, then each selected file is opened and displayed as a session in HS V8 software.
6. After the files are successfully downloaded, the **Saved files** message box is displayed. Click **OK** to return to the **Session Download** dialog box.
7. To verify that the files are downloaded and saved, click **Open Folder**. The **Users Downloads** folder is displayed in a separate window. Verify that all of the selected files are downloaded. XSENSOR recommends that you open the files in HS V8 software to verify that they are intact before you erase them from the SD card. Close the **Users Downloads** folder, and return to HS V8 Software.
8. After you verify that the download is successful, click **Erase** to remove the selected files from the SD Card.
9. Click **X** to close the **HSS Download Session** dialog box.