

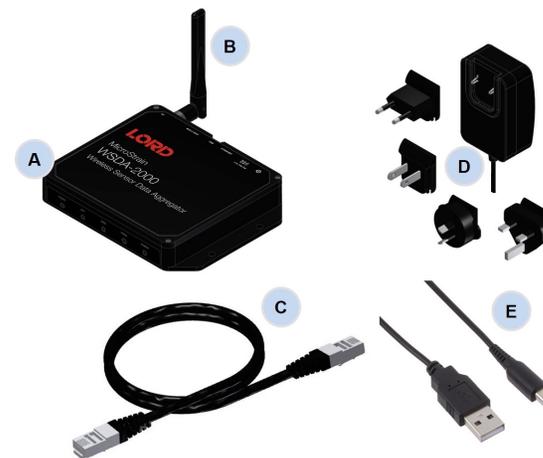
# LORD QUICK START GUIDE

## WSDA<sup>®</sup>-2000

### Wireless Sensor Data Aggregator

The WSDA<sup>®</sup>-2000 is a data acquisition gateway designed to configure, coordinate, and collect sensor data from LORD Sensing wireless sensor nodes. The gateway supports all data acquisition sessions between wireless nodes and host computers including: continuous sampling, burst sampling, and datalogging. The gateway also facilitates precision sampling synchronization between sensor nodes by transmitting a continuous, system-wide timing reference known as the beacon. Communication between the nodes and gateway is wireless and uses the LORD Sensing LXRS and LXRS+ data communications protocols.

The WSDA-2000 utilizes Ethernet and USB interfaces to transfer data from the wireless nodes to a host computer for viewing, analysis, and storage. It also provides a CAN data output.



Item	Description
A	WSDA-2000
B	Antenna
C	Ethernet cable, 10 ft
D	Power supply & plug adapter kit
E	USB cable
--	SensorConnect download at: <a href="http://www.microstrain.com/software">http://www.microstrain.com/software</a>

Figure 1 - Starter Kit Components

The indicators on the WSDA-2000 include several device and data status indicators, and a power indicator. The following table describes basic indicator behavior.

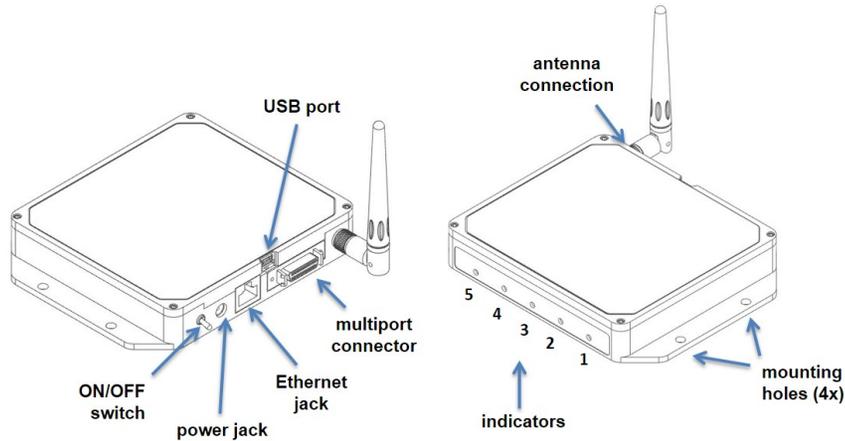


Figure 2 - Ports and Indicators

Indicator	Behavior	Node Status
1. POWER	OFF	Gateway is off
	ON green	Gateway is on
2. WSDA	ON green	Fully booted & idle
	Flashing blue & green	Sampling and porting data through SensorConnect™
3. DATA	Flashing green	Receiving wireless data
	Flashing blue	Sync sampling beacon enabled
	Flashing red	WARNING: another gateway beacon is detected on the same frequency
4. ACT	--	(future use)
5. CLOUD	Flashing blue	Uploading data to SensorCloud™
	ON green	Web upload successful
	ON red	Web upload error

Table 1 - Basic Indicator Behaviors

## 1. Install Software

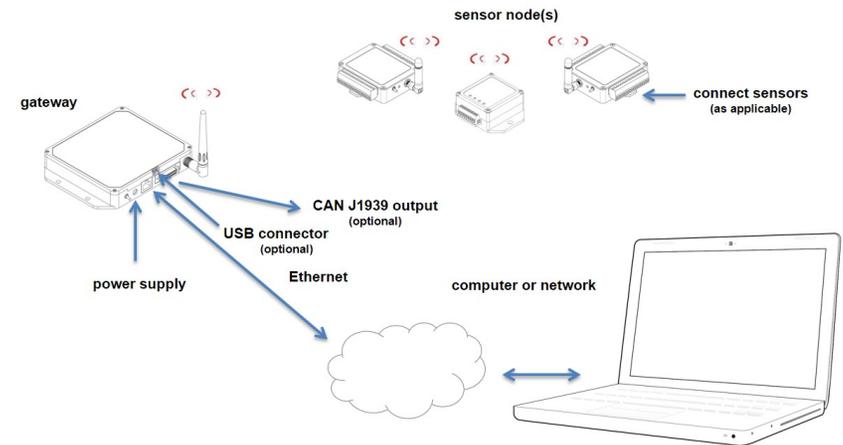
Install the **SensorConnect** software on the host computer before connecting any hardware. Access the free software download on the LORD Sensing website at:



<http://www.microstrain.com/software>

## 2. Make System Connections

To acquire sensor data, the WSDA-2000 is compatible with all LORD Sensing LXRS and LXRS+ sensor nodes.



## Gateway Operation

### NOTE

The default configuration of Ethernet gateways is for DHCP network connectivity. If no DHCP network is available, the USB port can be used for most operations, including device configuration, local data acquisition, and to access the network configuration menu (WSDA Control Panel). SensorConnect detects USB devices automatically and adds them to the Devices list.

The Ethernet gateway has three primary operating sequences including gateway configuration, node configuration, and data acquisition, viewing and analysis.

### 3. Establish Gateway Communication

- Power is applied to the gateway through the power jack on the back of the WSDA-2000. The Ethernet jack is connected to the network using a CAT5 or better Ethernet cable.
- Open the SensorConnect™ software and select Add Device
- Select the gateway and confirm the IP address shows in the IP Address field. The IP address can be entered manually in the IP Address field above the Discovered Gateways section. If the gateway does not appear, confirm that the host computer and the gateway are connected to the same Ethernet network.

USB devices are automatically discovered when plugged in.  
To add a TCP/IP or Serial device, use the form below.

Connection: TCP/IP

IP Address: 10.42.0.109

Port: 5000

Name	IP Address	Port
W015000000045109	10.42.0.109	5000

Add Device

- Select the green Add Device button.
- The gateway will appear in the Controller window.

Home Devices Data

local

Base Station 62314

Base Station 71430

Node 19

Node 31

Base Station 71430

Frequency 18

Serial 6314-2000-71430

Firmware 5.39217

Connection TCP/IP, 192.168.10.

### 4. Connect to Nodes

Several methods can be used in SensorConnect to establish communication with the nodes: the automatic node discovery on the same frequency, automatic node discovery on a different frequency, and add node manually.

#### A. Automatic Node Discovery on Same Frequency

If the base and node are on the same operating frequency, the node will populate below the Base Station listing when powering on the WSDA-2000.

Home Devices Data

local

Base Station 62314

Base Station 71430

Node 19

Node 31

Base Station 71430

Frequency 18

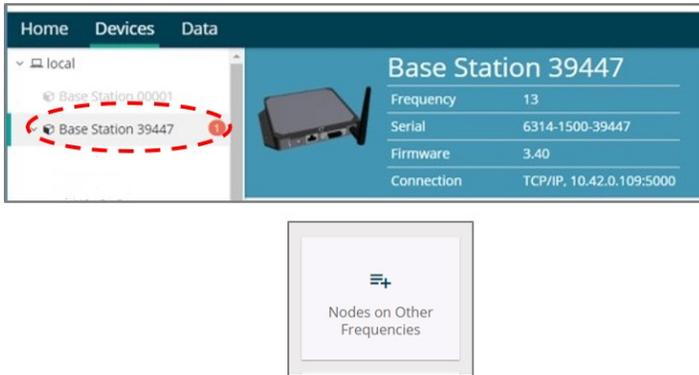
Serial 6314-2000-71430

Firmware 5.39217

Connection TCP/IP, 192.168.10.

### B. Automatic Node Discovery on Different Frequency

If a red circle with a number appears next to the Base Station, the node is operating on a separate radio channel. Select the Base Station and then select the Nodes on Other Frequencies tile.



Highlight the new node being added and select Move Node to Frequency (#).

Select a Node to move to this BaseStation's frequency.

Node	Frequency	Last Heard
61506	13	6 minutes ago
62884	11	8 minutes ago

Refresh Move Node to Frequency 24

### C. Manually Add Node

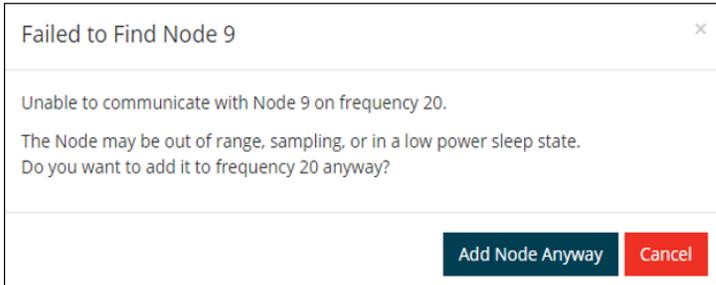
Adding a node manually requires entering the node address and its current frequency setting.

The 'Manual Add Node' form contains two input fields: 'Node Address' with the value '197' and 'Frequency' with the value '18'. An 'Add Node' button is located at the bottom right.

If the node was successfully added, two confirmation messages will appear and it will be listed under the Base Station.

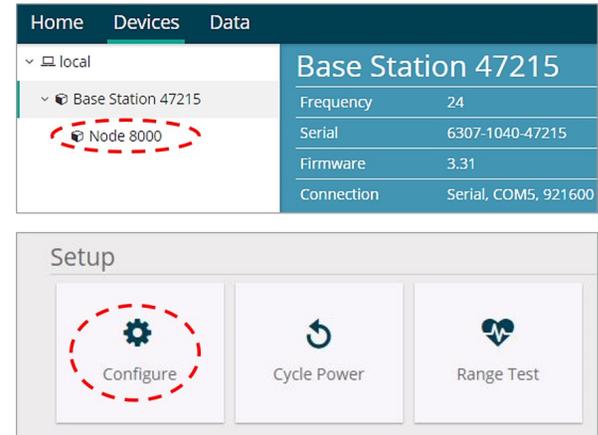
The confirmation messages are: 'Node Added' (Added node 9 on frequency 14) and 'Pinging Node 9 on frequency 14' (Node 9 added on frequency 14).

If the node failed to be added, a failure message will appear. This means the node did not respond to the base station which could indicate the node is not in idle mode or it may be on another frequency. If "Add Node Anyway" is selected, it will associate that node with the channel entered but it is likely there will be a communication error. If the node was not in idle, move the base station to the frequency of the node and issue a "Set to Idle" command.

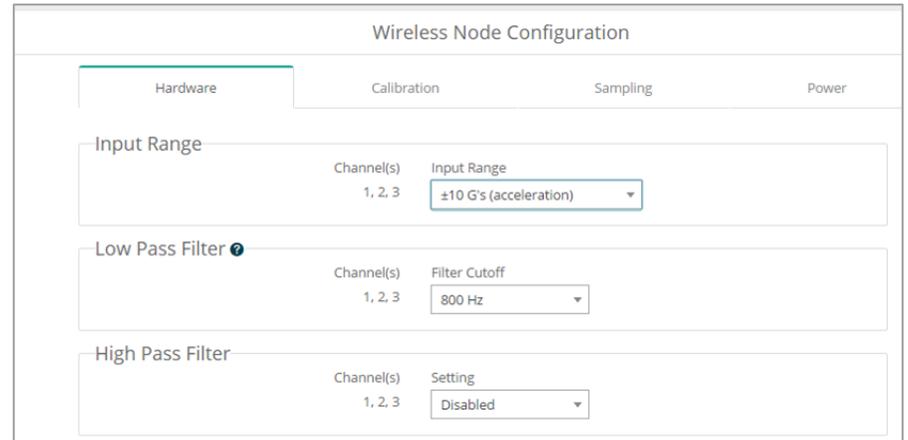


## 5. Configure Node

Node settings are stored to non-volatile memory and may be configured using SensorConnect. To access the node configuration menu, under Devices select the node and then the Configure tile.

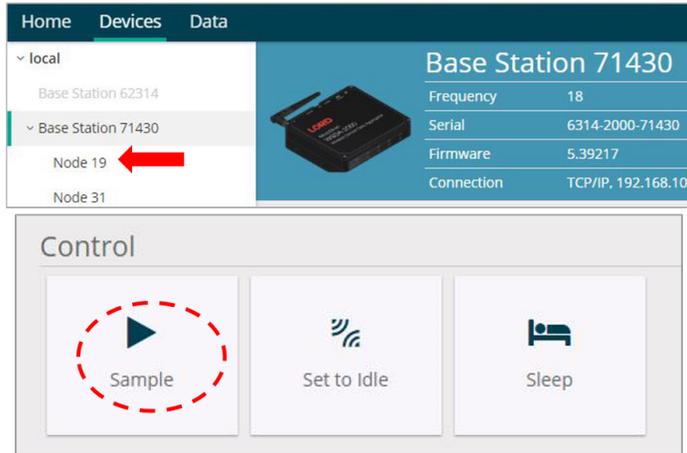


The configuration menus show the channels and configuration options available for the type of node being used.

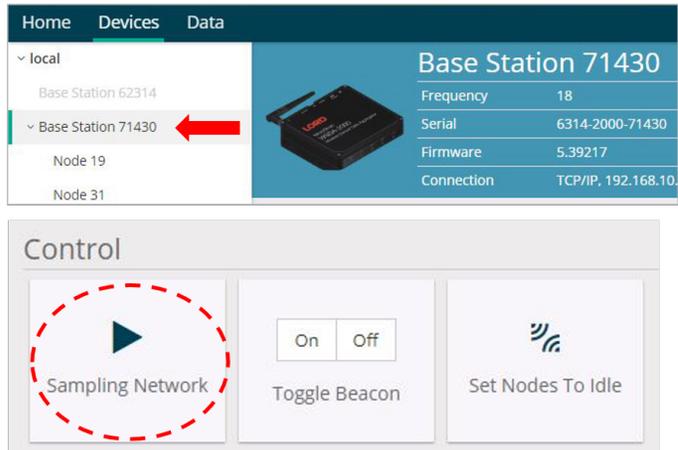


## 6. Configure and Start Sampling

To start a sampling session, nodes can be selected individually by selecting the Node name and then the Sample tile.



To sample multiple nodes as a group, select the Base Station and then the Sampling Network tile.

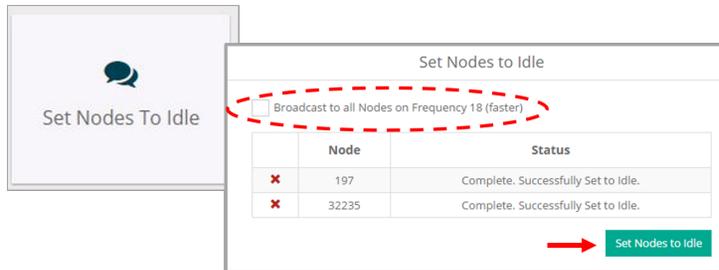


The Network Settings menu includes Synchronized and Lossless sampling options, while the Node settings menu offers multiple configuration options to customize the data sampling for a single node, or a group of nodes.

Wireless Network							
Network Settings: <input checked="" type="checkbox"/> Synchronized <sup>?</sup> <input checked="" type="checkbox"/> Lossless <sup>?</sup>							
<input checked="" type="checkbox"/>	Node	Channels	Sampling	Data Type <sup>?</sup>	Log/Transmit <sup>?</sup>	% Total	Status
<input checked="" type="checkbox"/>	32235	1 Channel ▾	512 Hz continuously ▾	uint16 (2 bytes) ▾	Transmit ▾	25.02%	✓ Ok

## 7. Stop Sampling

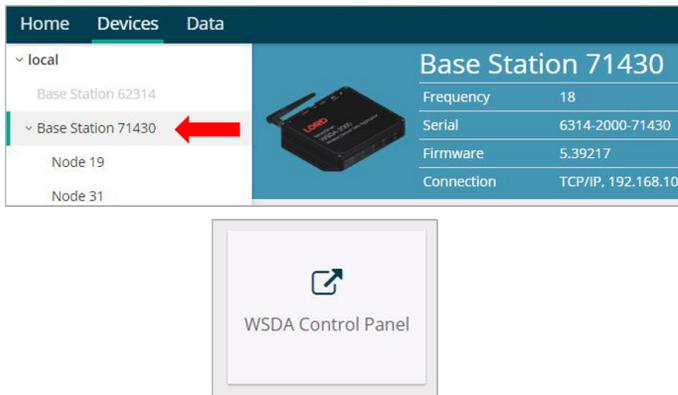
To stop all (or selected) nodes on a network, select the Set Nodes to Idle tile and indicate with a check mark which nodes are to be set to idle mode. If the Broadcast option is enabled, a signal to all nodes (including unsolicited nodes) will be sent out to request they return to idle. The nodes must be moved to the same frequency as well.



## 8. Additional Gateway Settings

### A. Access WSDA Control Panel

The WSDA Control Panel menu provides access to gateway network settings, time synchronization options, CAN output configuration, and more. To view the WSDA Control Panel, from the Devices window, highlight the base station and select the WSDA Control Panel tile.



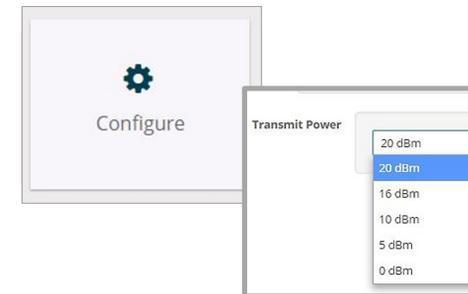
Log in to the gateway Control Panel with the default credentials:

- Login: wsda
- Password: wsda



### B. Change Transmit Power

From the Base Station, select Configure > Transmit Power for a drop down menu of five power options ranging from 0 dBm to 20 dBm.



### C. Change Frequency

There are 16 available frequency channels between 2.405 and 2.480 GHz. Wireless nodes and the gateway must be on the same frequency channel to communicate.

To move the gateway to a different frequency, select Base Station and then the Change Frequency tile. To move the node to the same frequency, select the Nodes on Other Frequencies tile after the gateway has been changed.

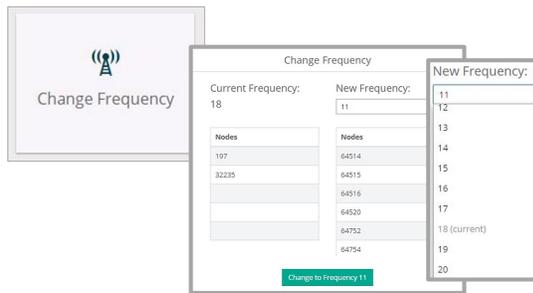


Figure 3 - Gateway Frequency

## Viewing Data

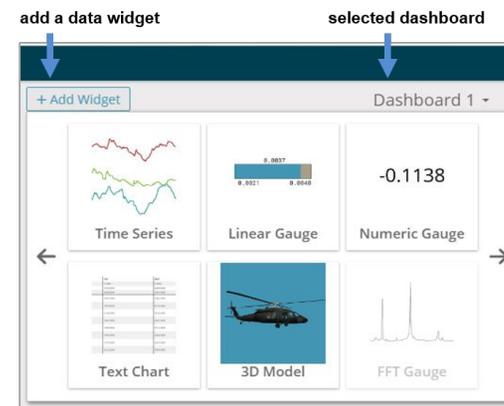
### 9. SensorCloud

Data acquired through SensorConnect is automatically saved on the host computer. Saved data can be uploaded to SensorCloud. Ethernet gateways provide the option to automatically port the data to SensorCloud during data acquisition for near real-time display and aggregation. Ethernet gateways can also be configured to save data locally to internal memory for future upload to the host computer or SensorCloud. Basic SensorCloud services are available to all users free of charge at: <http://www.sensorcloud.com/>.



### 10. SensorConnect

Collected data is viewed on the Data page through the creation of dashboards and widgets. Think of dashboards as individual pages and widgets as an illustration on the page.



Use the mouse along with the shift and control keys inside the graph window to adjust the data view.

Control	Action
Mouse wheel	Zoom in/out on x-axis
Shift + mouse wheel	Zoom in/out on y-axis
Mouse double-click	Zoom to extends
Shift + mouse left-click, drag left/right	Zoom window left/right
Shift + mouse left-click, drag up/down	Zoom window up/down
Ctrl + mouse left-click, drag	Zoom box

The widget configuration menu is different for each type of widget but typically includes sensor or channel selections and widget settings such as titles and legends.

After adding a widget, left click to select and configure it in the Channels and Settings left sidebar menu. Under Channels, the channel(s) for the widget can be enabled and disabled.

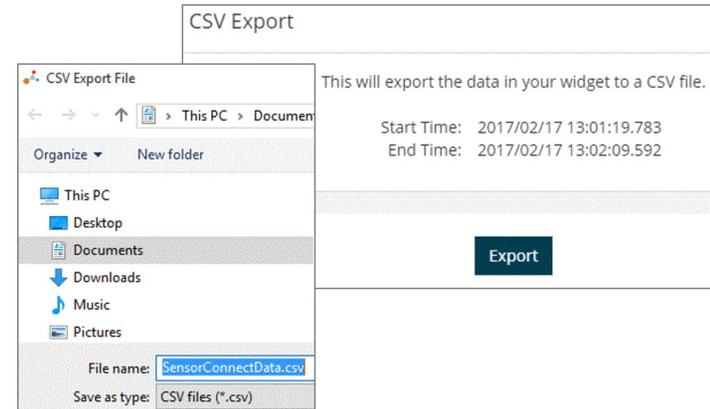


The Time Series Widget menu has two features to help optimize sensor data collection for export to a .csv file. *Snap to Latest* captures the most recent data and *Zoom* isolates specific events from a larger data sample.



### Exporting Data Files

To export data to a .csv file, select the Export Data button on the Time Series widget > Export > name the document > save to the preferred location on the host computer.



## Radio Specifications

The WSDA-2000 employs a 2.4GHz IEEE 802.15.4-compliant radio transceiver for wireless communication. The radio is a direct-sequence spread spectrum radio and can be configured to operate on 16 separate frequencies ranging from 2.405 GHz to 2.480 GHz. Following the 802.15.4 standard, these frequencies are aliased as channels 11 through 26. For all newly manufactured nodes, the default setting is 2.425 GHz (channel 15).

### Contains LORD Sensing 200 Series Radio Module

FCC ID: XJQMSLINK0007

IC ID: 8505A-MSLINK0007

This device complies with Part 15 of the United States FCC Rules, and Industry Canada's license-exempt RSSs. Operation is subject to the following two conditions: 1) This device may not cause interference, and 2) This device must accept any interference, including interference that may cause undesired operation of the device. Changes or modifications, including antenna changes not expressly approved by LORD Corporation could void the user's authority to operate the equipment.

Cet appareil est conforme à la Partie 15 des Règles de la FCC des États-Unis et aux RSSS exempts de licence d'Industrie Canada. Le fonctionnement est soumis aux deux conditions suivantes: 1) Cet appareil ne doit pas causer d'interférences et 2) Cet appareil doit accepter toute interférence, y compris les interférences pouvant entraîner un fonctionnement indésirable de l'appareil. Les changements ou modifications, y compris les changements d'antenne non expressément approuvés par LORD Corporation, pourraient annuler l'autorisation de l'utilisateur d'utiliser l'équipement.

## Power Output

The transmit power level may require adjustment if power consumption is a concern or in regions where there are transmit power restrictions. Lowering the power output reduces power consumption, but it also reduces the wireless communication range between the gateways and nodes.

Setting	Power Output
Extended	20 dBm (100 mW)
Standard	10dBm (10mW)
Low	0dBm (1mW)

## ESD Sensitivity



The WSDA-2000 is susceptible to damage and/or disruption of normal operation from Electrostatic Discharge (ESD). ESD may cause the device to reset, which may require user intervention to continue data acquisition.