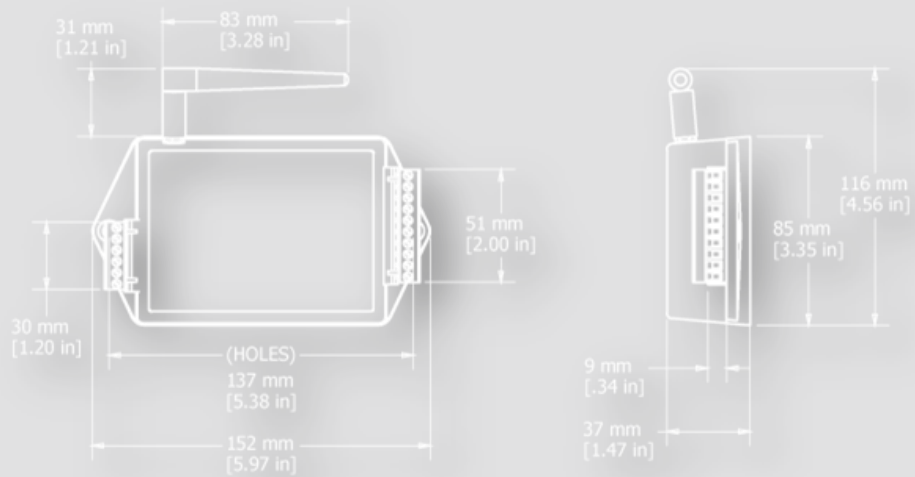# Watt-Link™

Software Operating Instructions

LORD MicroStrain®
SENSING SYSTEMS

LORD MicroStrain®
SENSING SYSTEMS

©2013 LORD Corporation
MicroStrain® Sensing Systems
459 Hurricane Lane
Suite 102
Williston, VT 05495
United States of America
Phone: 802-862-6629
Fax: 802-863-4093

www.microstrain.com
support@microstrain.com

REVISED: June 06, 2013

Table of Contents

LORD MicroStrain®
SENSING SYSTEMS

Chapter 1 - Precautions

Buyer Acknowledgement

BUYER ACKNOWLEDGES AND AGREES THAT THE WATT-LINK PRODUCTS (THE "PRODUCTS") MUST BE INSTALLED ONLY BY A LICENSED ELECTRICIAN AUTHORIZED TO CONDUCT BUSINESS IN THE JURISDICTION IN WHICH THE PRODUCTS ARE TO BE INSTALLED. IN ADDITION, BUYER AGREES THAT SELLER SHALL HAVE NO LIABILITY WHATSOEVER FOR ANY DAMAGES RESULTING FROM THE INSTALLATION OF A PRODUCT BY ANY PERSON THAT IS NOT A LICENSED ELECTRICIAN IN THE JURISDICTION IN WHICH THE PRODUCT IS INSTALLED. FURTHERMORE, REGARDLESS OF WHETHER THE PERSON THAT IS INSTALLING A PRODUCT IS A LICENSED ELECTRICIAN, BUYER AGREES THAT SELLER SHALL NO LIABILITY WHATSOEVER IN CONNECTION WITH ANY DAMAGES RESULTING (i) DURING THE INSTALLATION OF THE PRODUCT AND/OR (ii) FROM THE IMPROPER INSTALLATION OF THE PRODUCT.

LORD MicroStrain®
SENSING SYSTEMS

Precautions

These software operating instructions are for use by qualified personnel only. To avoid electrical shock, do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so. For installation instructions, **please refer to the Watt-Link Installation Guide**.

Always adhere to the following checklist when handling the Watt-Link product:

1. Only a licensed electrician qualified to conduct business in the jurisdiction where the products are to be installed may install the Watt-Link™ meter. **The mains voltages of 120 Vac to 600 Vac can be lethal!**

2. Follow all applicable local and national electrical and safety codes.

3. Install the meter in an electrical enclosure (panel or junction box) or in a limited access electrical room.

4. Verify that circuit voltages and currents are within the proper range for the meter model.

5. Use only UL recognized current transformers (CTs) with built-in burden resistors, that generate 0.333 Vac (333 millivolts AC) at rated current. Do not use current output (ratio) CTs such as 1 amp or 5 amp output CTs: they will destroy the meter and may create a shock hazard.

6. Ensure that the line voltage inputs to the meter are protected by fuses or circuit breakers (not needed for the neutral wire).

7. Equipment must be disconnected from the **HAZARDOUS LIVE** voltages before access.

8. The terminal block screws are not insulated. Do not contact metal tools to the screw terminals if the circuit is live!

9. Do not place more than one line voltage wire in a screw terminal; use wire nuts instead. You may use more than one CT wire per screw terminal.

10. Before applying power, check that all the wires are securely installed by tugging on each wire.

11. Do not install the meter where it may be exposed to temperatures below –30°C or above 55°C, excessive moisture, dust, salt spray, or other contamination. The meter requires an environment no worse than pollution degree 2 (normally only non-conductive pollution; occasionally, a temporary conductivity caused by condensation must be expected).

12. Do not drill mounting holes using the meter as a guide; the drill chuck can damage the screw terminals and metal shavings can fall into the connectors, causing an arc risk.

13. If the meter is installed incorrectly, the safety protections may be impaired.

14. Read and fully understand this software operating instructions and the installation guide in entirety before attempting to install or operate the Watt-Link™.

LORD MicroStrain®
SENSING SYSTEMS

Table 1. Symbol Definitions

Symbol	Definition
⚠	Read, understand, and follow all instructions including warnings and precautions before installing and using the product.
⚡	Potential shock hazard from dangerous high voltage.
⏚	Functional ground; should be connected to earth ground if possible, but is not required for safety grounding.
(UL)	UL Listing mark.
FC	FCC Mark. This logo indicates compliance with part 15 of the FCC rules
CE	Complies with the regulations of the European Union for Product Safety and Electro-Magnetic Compatibility.
V~	This indicates an AC voltage.

LORD MicroStrain®
SENSING SYSTEMS

Chapter 2 – Software Operation

Software Installation

The Watt-Link™ is configured and operated using LORD MicroStrain's Node Commander® software. Place the Node Commander® CD into your CD-ROM drive (or download at http://www.microstrain.com/wireless/software) and follow the on-screen instructions to install the software. The software is written for the Microsoft Windows operating system; the software will also work in Windows emulators on the MAC OS.

Communicating via Node Commander®

Establish communication with the Base Station

1. Launch Node Commander software.
2. The base station will appear as Base Station Com X or WSDA Com X in the Controller frame, e.g., Com 8 indicating the base station has been assigned com port 8.
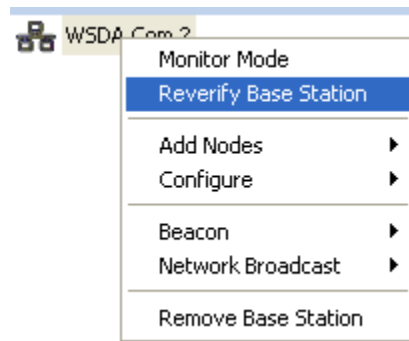3. If it is grayed-out, right-click the Base Station and click Reverify Base Station. See Figure 1.

Figure 1. Reverify Base Station

Establish communication with the Watt-Link™

1. Right-click the Base Station and a pop-up menu will appear.
2. Click Add Nodes.
3. Click Node Discovery and the Node Discovery window will appear. See Figure 2.
4. Turn the Watt-Link™ wireless node on.
5. The Node and its unique address, e.g. Node 5 (NEW), will be discovered automatically and appear in the tree under the Base Station.
6. Click the Stop button and the Node Discovery window will disappear.
7. Right-click the '+' sign to the left of the Node.
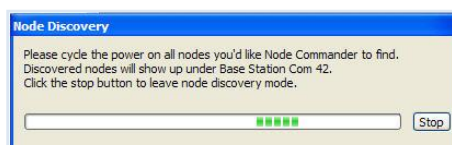8. A tree containing the model, serial number, and firmware version will appear. See Figure 3.
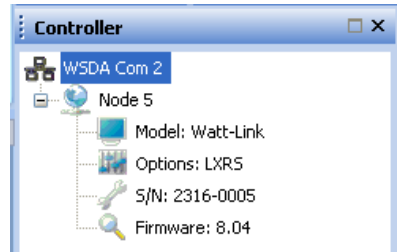

Figure 2. Node Discovery

LORD MicroStrain®
SENSING SYSTEMS

Figure 3. Node Information

Setting the Measurement Registers

Node Commander® provides a high level interface that allows the user to read and write to the Watt-Link™ data registers. The Watt-Link™ provides eight configurable measurement channels. Each channel represents a floating point measurement. The register type and measurement type can be selected using drop down menus. A comprehensive list and descriptions of the floating point registers can be found in the documentation entitled "Watt-Link Data Register Lists."

To configure the channels to read measurements navigate to the "Watt-Link™ Configuration" pop-up window:

1. Right click on the node and a pop-up menu will appear
2. Select "Configure" and "Configure Node." See Figure 4.
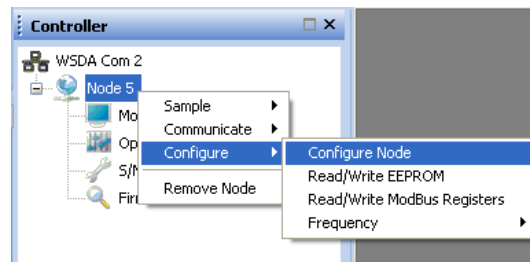

Figure 4. Select Configure Node

3. On the following pop-up menu, the user can select the channel, the register type, and the measurement type. In the following figure, channel 1 is configured to report phase A voltage and channel 2 is configured to report phase A current. See Figure 5.
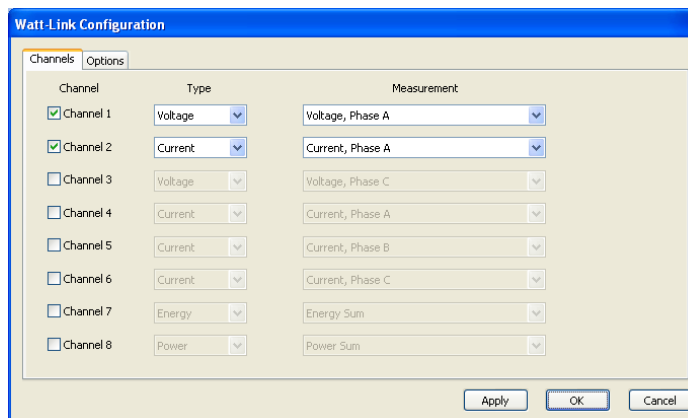

Figure 5. Example Channel Configuration

LORD MicroStrain®
SENSING SYSTEMS

Setting the Configuration Registers

The configuration registers configure and customize the Watt-Link™ meter. For more information on the configuration registers refer to the section below entitled "Watt-Link™ Register List."

The configuration registers can be accessed through the "Watt-Link™ Configuration" pop-up window. Follow the same steps as in the above section "Setting the Measurement Registers" and select the "Options" tab in the "Watt-Link™ Configuration" window. See Figure 6.
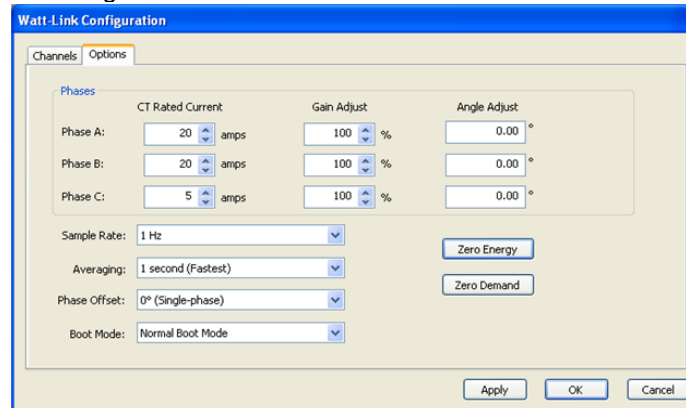
Figure 6. Watt Link Configuration Options

The following fields as shown in the figure on the right will be displayed.

CT Rated Current: This is an integer value in amps used to set the rated current of the attached current transformer (CT) for each phase. Rated current is the 100% value; the current that results in a 0.33333 VAC output from the CT.

Gain Adjust: You may need to adjust the Watt-Link™ meter to match the results from a reference meter or to correct for known CT errors. This value effectively adjusts the power, energy, and current calibration for each phase. The value can be set between 50% and 200% of the default value (default value is 10,000).

Angle Adjust: This is used for adjusting the phase angle error of the CT. The angle can be adjusted by up to ±8 degrees in increments of one millidegree. For example, if your CT causes a phase lead of 0.6 degrees (or 36 minutes), you could correct for this by setting Phase Adjust for A, B, and C to -0.6, which subtracts 600 millidegree or 0.6 degree from the phase lead. Use negative values to compensate for a phase lead in the CT (most common).

Sample Rate: Set the sample rate for the node. Available sample rates range between 1 Hz and 1 Sample / Hr.

Averaging: The Watt-Link™ includes averaging for the voltage measurements, current measurements, apparent power measurements, reactive power measurements, and power factor measurements. Averaging reduces noise, and if the Watt-Link™ is being polled less than once a second (say once a minute), then the average over the last minute provides a more accurate reading than just the data from the last second.

Phase Offset: The Watt-Link™ meter cannot directly measure line-to-line voltages. To estimate these voltages, the meter must know the phase offset of the electrical service being measured. This setting has no effect on any other measurements and is only needed if you plan to monitor line-to-line voltages.

Boot Mode: This is the mode which the node will boot into if it is restarted.

Zero Energy: This button will simultaneously set all of the energy registers to zero, except the non-resettable ones (marked by NR in the Measurement dropdown list).

<u>Zero Demand:</u> This button will zero all of the demand registers.

Alternative Modbus Register Read/Write Option

An additional feature allows the user to read and write to any register using address numbers instead of the drop down menus. This feature can be found by right clicking on the node, selecting "Configure" and then selecting "Read/Write Modbus Registers." See Figure 7.
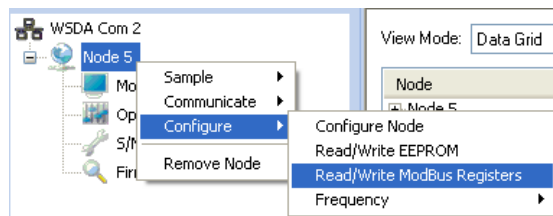

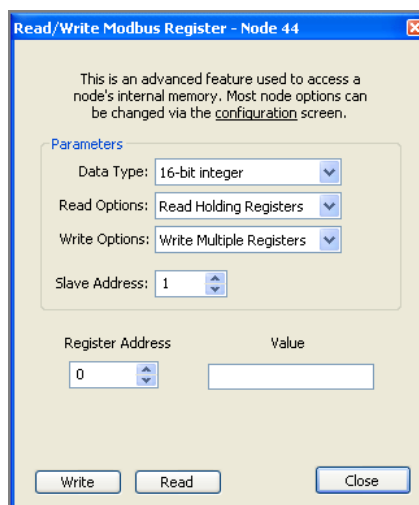**Figure 7. Select Read/Write Modbus**

Figure 8. Read/Write Modbus Register Menu

The Read/Write Modbus Register window will appear (see Figure 8). By entering a register address and a value (the bottom two fields) and pressing "write" the user can write a value to a register. The value in a register can be read by entering the register address and pressing "read." The Watt-Link supports three data types: 16-bit Integer, 32-bit Integer, and single precision floating point. The corresponding register address for a given measurement and data type can be found in the "Watt-Link™ Register List."

IMPORTANT: The slave address field should always be set to "1".

LORD MicroStrain®
SENSING SYSTEMS

Setting the Frequency

The frequency determines the band over which the base station and the Watt-Link^{TM} communicate. The base station and the Watt-Link^{TM} must be set to the same frequency in order to communicate. The frequency can be set by right clicking on the node in node commander, selecting configure, and selecting frequency. The "scan for node" option at the bottom can be used if the user does not know at what frequency the node is communicating. See Figure 9.
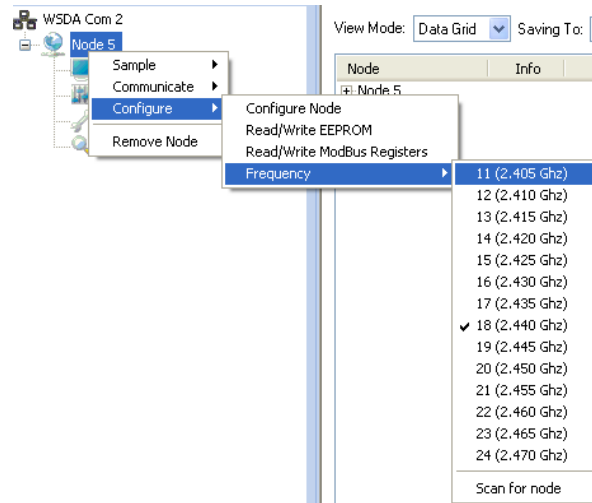

Figure 9. Select Wireless Channel Frequency

Stopping the Node and Other Communication Options

> **IMPORTANT:** In order to configure the node, it must first be stopped.

To stop the node, right click on the node, select "Communicate" and select "Stop Node".   See Figure 10.
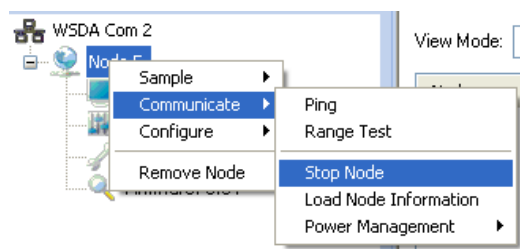

**Figure 10. Stop Node Menu Option**

From this menu, the user can also ping the node, test the communication range, load the node information, and change the power management scheme. (The last option is not relevant to the Watt-Link^{TM} because it draws its power from the circuit it is measuring, not batteries.)

**LORD MicroStrain®**
SENSING SYSTEMS

Setting the Sample Mode

IMPORTANT: In order for the Watt-Link™ to start sampling and transmitting data, the sample mode must set.

Setting the sample mode is the last step in configuring a node. The node will not start sampling and transmitting until this is done. To set the sampling mode, right click on the node, select "Sample", and select either "Synchronized Sampling" or "Low Duty Cycle". See Figure 11.
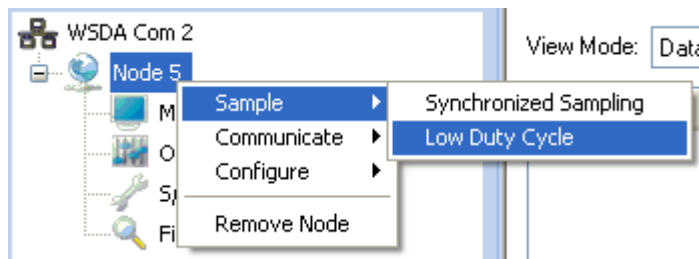
Figure 11. Sample Mode Selection

The following "Sampled Data" window will pop up in Node Commander. It details the active channels and the current floating point value in the register that corresponds to that channel. The figure below shows that channel 1 is active and that it holds a floating point value of 123.006V and that channel 2 holds a floating point value of 0.0130568 A. See Figure 12.

Figure 12. Data View

LORD MicroStrain®
SENSING SYSTEMS
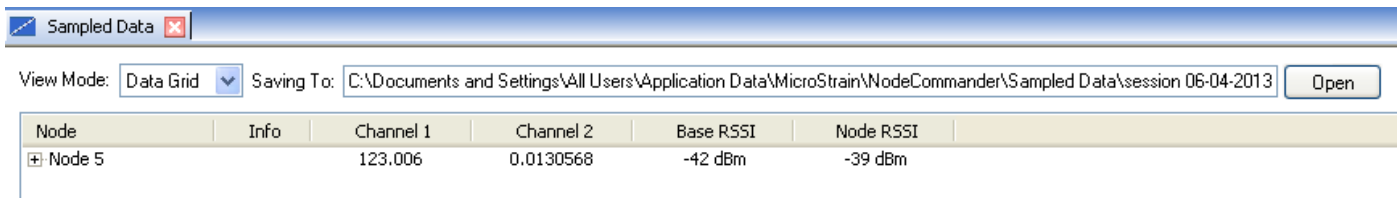
Chapter 3 - Limitation of Liability

BUYER ACKNOWLEDGES AND AGREES THAT THE WATT-LINK PRODUCTS (THE "PRODUCTS") MUST BE INSTALLED ONLY BY A LICENSED ELECTRICIAN AUTHORIZED TO CONDUCT BUSINESS IN THE JURISDICTION IN WHICH THE PRODUCTS ARE TO BE INSTALLED. IN ADDITION, BUYER AGREES THAT SELLER SHALL HAVE NO LIABILITY WHATSOEVER FOR ANY DAMAGES RESULTING FROM THE INSTALLATION OF A PRODUCT BY ANY PERSON THAT IS NOT A LICENSED ELECTRICIAN IN THE JURISDICTION IN WHICH THE PRODUCT IS INSTALLED. FURTHERMORE, REGARDLESS OF WHETHER THE PERSON THAT IS INSTALLING A PRODUCT IS A LICENSED ELECTRICIAN, BUYER AGREES THAT SELLER SHALL NO LIABILITY WHATSOEVER IN CONNECTION WITH ANY DAMAGES RESULTING (i) DURING THE INSTALLATION OF THE PRODUCT AND/OR (ii) FROM THE IMPROPER INSTALLATION OF THE PRODUCT.