Manuals+ — User Manuals Simplified.

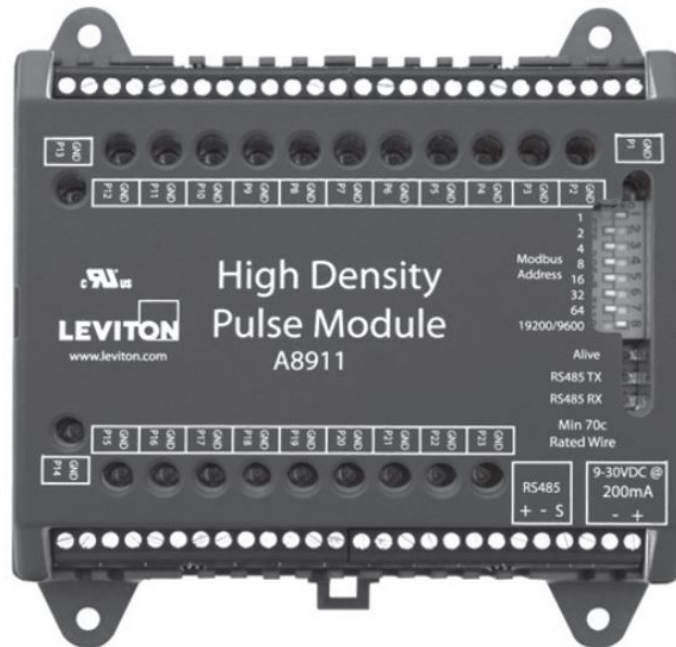# LEVITON A8911 High Density Pulse Input Module User Manual

Contents

LEVITON A8911 High Density Pulse Input Module

WARNING:

- TO AVOID FIRE, SHOCK OR DEATH; TURN OFF POWER at circuit breaker or fuse and test that the power is off before installing product or servicing current transformers.
- TO AVOID FIRE, SHOCK OR DEATH; Look inside the meter and electrical panel for possible exposed wire, broken wire, damaged components or loose connections.
- Make sure all tools used during installation have proper installation ratings.
- Installations should be done in accordance with local codes and current National Electric Code requirements, and performed by trained, qualified professionals.
- Equipment used in a manner not specified by this document impairs the protection provided by the equipment.

CAUTIONS:

- Verify the model number and electrical specifications of the device being installed to confirm they are appropriate for the intended electrical service (see Section 3).
- Consult local codes for any possible permits or inspections required before beginning electrical work.
- Ensure the conduit for the installation is flexible and non-metallic. For outdoor applications conduit and conduit fittings must be rated UL Type 4X for outdoor enclosures. Failure to use the appropriate conduit impairs the degree of equipment protection.

PRODUCT APPLICATION LIMITATION:

- Leviton products are not intended for use in critical applications such as nuclear facilities, human implantable devices or life support. Leviton is not liable, in whole or in part, for any claims or damages arising from such uses.
- Leviton strongly believes in continuous improvement, therefore we must reserve the right to change specifications and product offerings without notice. Where possible, we will substitute products with equivalent functionality when necessary.

NOTICE
This product is not intended for life safety applications.
Do not install this product in hazardous or classified locations.
The installer is responsible for conformance to all applicable codes.

OVERVIEW

The A8911-23 is designed for pulse counting applications where large number of pulse output devices need to be connected to a Modbus network. The A8911-23 will count contact closures on 23 separate inputs and store the totalized pulse count internally using non-volatile memory. The pulse count totals are then read using the RS485/Modbus protocol. Applications include reading gas/water/electric meters in common building areas for energy information and reporting purposes.

Features and Specifications

- Processor Arm7, field upgradeable firmware.
- LED 23 input status LEDs (red), 2 Modbus TX/RX (yellow), 1 power/alive status. (green) Modbus/RTU
- Protocols 9VDC to 30VDC, 200mA, Required (not included)
- Power Supply The unit is to be sourced by a NEC Class 2 power supply, or Listed ITE power supply marked LPS and rated from 9 to 30Vdc, 200 mA minimum but not to exceed 8A
- Serial Port1 RS-485 two wire, 19200 or 9600 baud. N81
- Pulse Inputs1 23 independent pulse count inputs.
- Isolation2: Intended for use with isolated dry contact outputs.
- Environmental Pulse rate/width user selectable to 10hz, 50hz or 100hz. Pulse rate option: 10hz minimum pulse width 50ms Pulse rate option: 50hz, minimum pulse width 10ms Pulse rate option: 100hz, minimum pulse width 5ms
- Safety UL61010 Recognized
- EMC File: E320540 (Model A8911-23)
- Size 4.13" x 3.39" x 1.18" (105mm x 86mm x 30mm)
- Mass 3.7 oz (105 g)

1. inputs are intended for low voltage NEC Class 2 or equivalent outputs.
2. if the product is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.
3. Devices manufactured before Nov 1, 2011 are rated to 0 ~ 50c, and are not UL recognized.

INSTALLATION CHECKLIST

The following components are required for a complete A8911-23 I/O module installation:

- A8911-23 I/O module
- Modbus/RTU master device such as an AcquiSuite™ A8812 server
- Pulse output meter
- Power supply: 24VDC typical. (9VDC to 30VDC ok)
- Wire. Typically 18 to 24 gauge 3 for pulse meter connection.

- 2 wire, twisted pair with shield for Modbus/RS485 connection. (Belden 1120A or equivalent)1
- Optional: Termination resistor (120 ohm) for long RS485 runs over 200ft.

ELECTRICAL CONNECTIONS

Hardware Installation
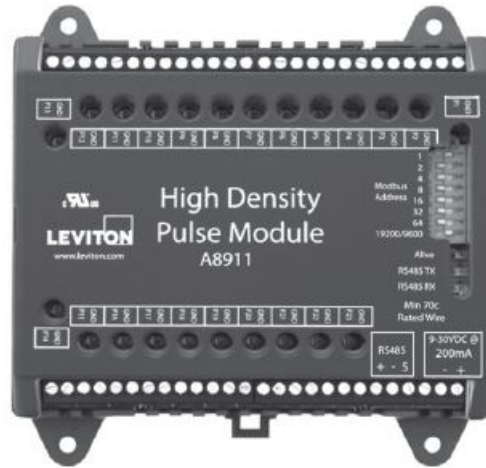
1. Mount the A8911-23 on a DIN-Rail or appropriate mounting enclosure.
2. Attach the power supply to the input terminals on the A8911-23 module.
3. Turn on the power supply. Confirm the green Alive LED starts blinking. Turn off the power to the module.
4. Attach the RS485 +, – and shield wires to the A8911-23 module. Attach the other end of the RS485 line to the Modbus master device, such as an AcquiSuite. Be careful to observer polarity on both ends of the RS485 connection. RS485 wiring runs should be limited to 4000 ft.
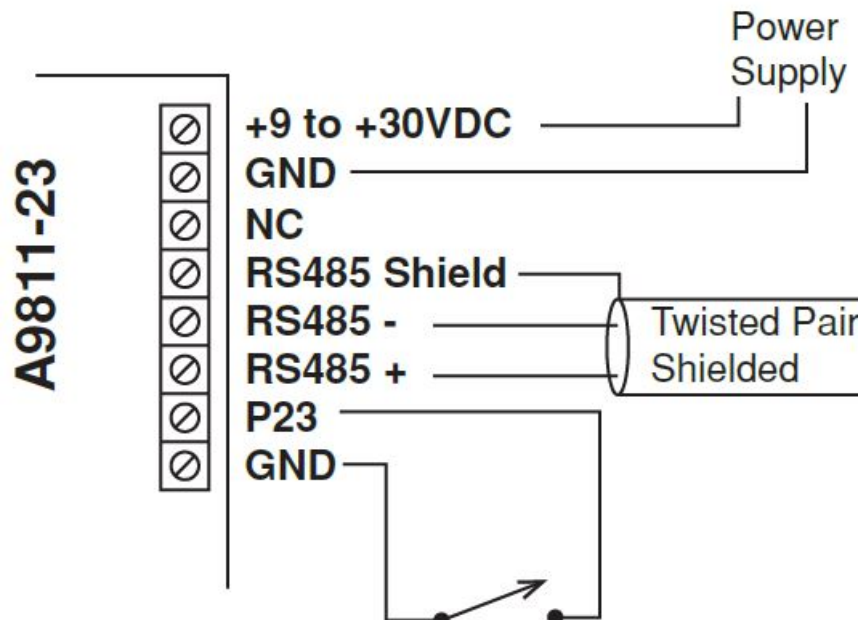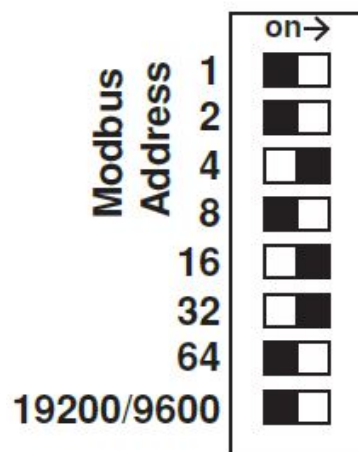

5. Set the Modbus address dipswitches and baud rate dipswitch. For more information on the switch options, see the section below for configuration.
6. Turn on the power supply. Confirm the green Alive LED starts blinking. Also check the RS485 yellow LEDs.
    1. If the yellow RX led is blinking, the A8911-23 is receiving Modbus traffic on the RS485 port.
    2. If the yellow TX led is blinking, then the A8911-23 is receiving a Modbus query specifically addressed to it and will respond to the query.

3. If you are using an AcquiSuite Data Acquisition Server, the A9811-23 should appear in the Modbus device list after about 2 minutes. Click on the device, and select "Configure" to give the A8911-23 a logical name. This will allow the AcquiSuite to begin logging data for the device.

7. With the power disconnected, attach the pulse input lines to the pulse terminals. Each pulse input should have a GND and a P# terminal. If the pulse output device is polarity sensitive, attach the pulse – terminal to the A8911-23 GND terminal, and the pulse + terminal to the A8911-23 P# terminal. The A8911-23 provides 3-5 volts on the P# terminal for sensing. The remote pulse output device must not supply voltage to the terminals.

8. Power up the A8911-23. The Input LEDs for each connected input should now blink. The input LED will be on when the contacts are closed.

WARNING: After wiring the A8911-23, remove all scraps of wire or foil shield from the electrical panel. This could be dangerous if wire scraps come into contact with high voltage wires.

CONFIGURATION

Modbus Address

Before the A8911-23 can be used, you must set the Modbus address of the A8911-23. This address must be unique among all Modbus devices in the system. The A8911-23 supports address 1 through 127. Select an address and set the DIP switches to match. The sum of the value of the switches is the address. In the example to the right, address 52 is set by placing switch 4, 16 and 32 to the on position. **Note**: 4 + 16 + 32 = 52

Baud Rate:
This option sets the serial port speed for the RS485 port. Set this option to [OFF] for 19200. Set the switch to [ON] for 9600 baud.

OPERATION

The device should power up and be ready in a few seconds. The LEDs should blink in the following manner.

- The green "Alive" LED should start to blink approximately once per second.
- The yellow RS485 TX and RX LEDs will blink for local Modbus activity.
- The red input status LEDs will blink when input contact closures are detected. Input status LEDs are adjacent to the corresponding input screw terminals.

If the A8911-23 is attached to an AcquiSuite Data Acquisition Server, you will need to configure each pulse input with a Name, Engineering Unit, and Multiplier.

TROUBLESHOOTING

Pulse count not incrementing:
Check the input LED for the specific input that is not working. The LED should blink when the pulse meter closes the contact output. If it is not blinking, try bridging the input terminals with a short piece of wire to confirm the LED comes on. Try bridging the terminals at the other end of the pulse wiring run. This will confirm there are no breaks in the wire. Verify the pulse output device is operating. Disconnect the A8911-23 input and use a hand held digital meter and measure resistance of the pulse output device. Verify that the pulse output device is operational and the contact closure reads less than 1000 ohms when closed. For high resistance pulse devices such as intrinsic barriers, the "contact closure threshold" register may need to be configured to a larger value. The default is 1k however up to 2.5k is allowed. If using the AcquiSuite data acquisition server, use the advanced configuration page of the A8911-23 in the Modbus/device list to set this option.

REGISTER LISTING

The A8911-23 responds to the following Modbus/RTU functions:

- 0x11 Report slave id.
- 0x03 read holding registers (multiple)
- 0x06 preset single register

All Modbus registers are read-only unless otherwise noted. Registers listed as "NV" are options that are stored in non-volatile memory and will be preserved when power is removed from the device.

REGISTER FUNCTIONS

Pulse Count: The pulse count is stored as an unsigned 32bit integer. This allows for 2^{32} pulses (4.2billion) to be counted before rollover. On Modbus systems that do not allow you to read 32bit values, you can calculate the pulse count as follows:Pulse count registers accumulate a total number of pulses received on each pulse input. The pulse count totals always increment and can not be cleared or set to an arbitrary value to prevent tampering. All pulse count totals are stored in non- volatile memory to preserve counts during power failure. The unsigned 32 bit counter values can accumulate up to 4.29 billion (2^{32}) pulses before rollover. All 32 bit data point values are encoded in 2 Modbus registers (16bits each). Modbus master systems should always query the A8911-23 using a single query to read an entire block of registers. Never use two queries to read one register and then combine the two results into a single 32 bit value. Doing so will allow the pulse count to increment in the middle of the two Modbus queries, and will cause intermittent data readings that are incorrect.
**EXAMPLE:**
A pulse input has a count of 65534. This is represented as a 32 bit hex number 0x0000FFFE. The first 4 digits are the MSW register, the second 4 digits are the LSW register. The Modbus Master reads the first (MSW) register and gets 0x0000. In between the two readings, the pulse input counts 2 more pulses, making the total 65536 or 0x00010000 in hex. Next the Master reads the second (LSW) register and gets 0x0000. When the two registers are combined, the result is 0x00000000. The proper way to handle this situation is to simply read both registers in a single Modbus query.

A8911-23 FIRMWARE UPDATE

From time to time, Leviton may release firmware updates with additional features and system changes. To find out what firmware your A8911-23 has installed, read the firmware version register with a Modbus utility, or use the "Advanced configuration" page in the AcquiSuite setup menu. Firmware update files may be obtained from Leviton technical support. The firmware update process requires an RS232 serial port and a windows computer to run the

firmware update utility. Before starting this process, verify your computer has a serial port available. You may need to deactivate other software such as the palm pilot utility or ups monitor software. USB connected serial ports may be used, however these are not as fast or reliable as standard computer serial ports and may fail to upgrade the firmware correctly. To update the firmware, use the following procedure.

1. Install the Philips LPC2000 software as provided by Leviton.
2. Remove power and DC load current from the A8911-23. Power can be disconnected by removing the + 24V wire from the screw terminal from the A8911-23 power connection. **WARNING**: Disconnect power and lock-out all power sources during installation. DO NOT CONNECT RS232 PORT WITH CURRENT INPUTS LIVE
3. Remove the plastic lid from the A8911-23 module. The plastic lid is held in place with two plastic clips, one on each side.
4. Attach the A8911-23 to your computer with an RS232 serial cable. The A8911-23 programming connector is the 9 pin RS232 connector on the top of the device.
5. Power up the power supply to the A8911-23. The Green Alive LED should light up and blink.
6. Run the LPC2000 Flash Utility. The following screen will be displayed.
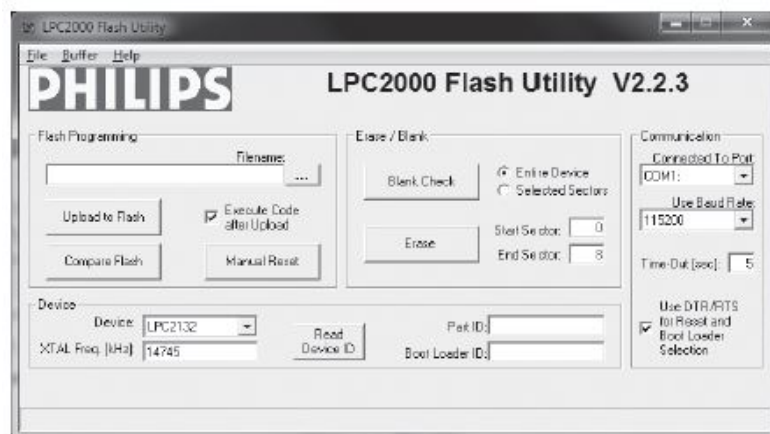
7. Set the following communications options: COM1 or COM2 depending on your computer serial port. Use baud rate: 38400 or slower. Check "Use DTR/RTS for Reset" XTAL Freq[kHz] = 14745
8. Click the "Read Device ID" button. The PartID and BootLoaderID fields will be shown if successful. Also, the "Device" dropdown menu should switch to LPC2131. The bottom of the window will display "Read Part ID Successfully."
9. Click the "Filename" "…" button. A dialog box will appear. Locate and select the A8911-23 firmware image file. In the example above, this is named "A8911-23_v1.07.hex".
10. Click the "Erase" button. This will remove the existing firmware from the A8911-23 device.
11. Click the "Upload to Flash" button. The firmware update will start, and a blue progress bar will be shown across the bottom of the screen. While the upload is in progress, the green Alive LED on the A8911-23 will stop blinking and stay on solid.
12. When the update is complete, disconnect power from the A8911-23. Remove the RS232 serial cable.
13. Place the lid back on the body of the A8911-23. The lid should snap into place.
14. Re-attach any signal and data connections. Power up the A8911-23. The new firmware should now operate. To confirm the new firmware is installed, use the AcquiSuite device details page, click the "configure" button, and then the "Advanced" button. The firmware version number will be displayed on the lower right side of the advanced details page.

MECHANICAL DRAWINGS

DIN-Rail (EN50022) mount package: Width 105mm (6 modules)
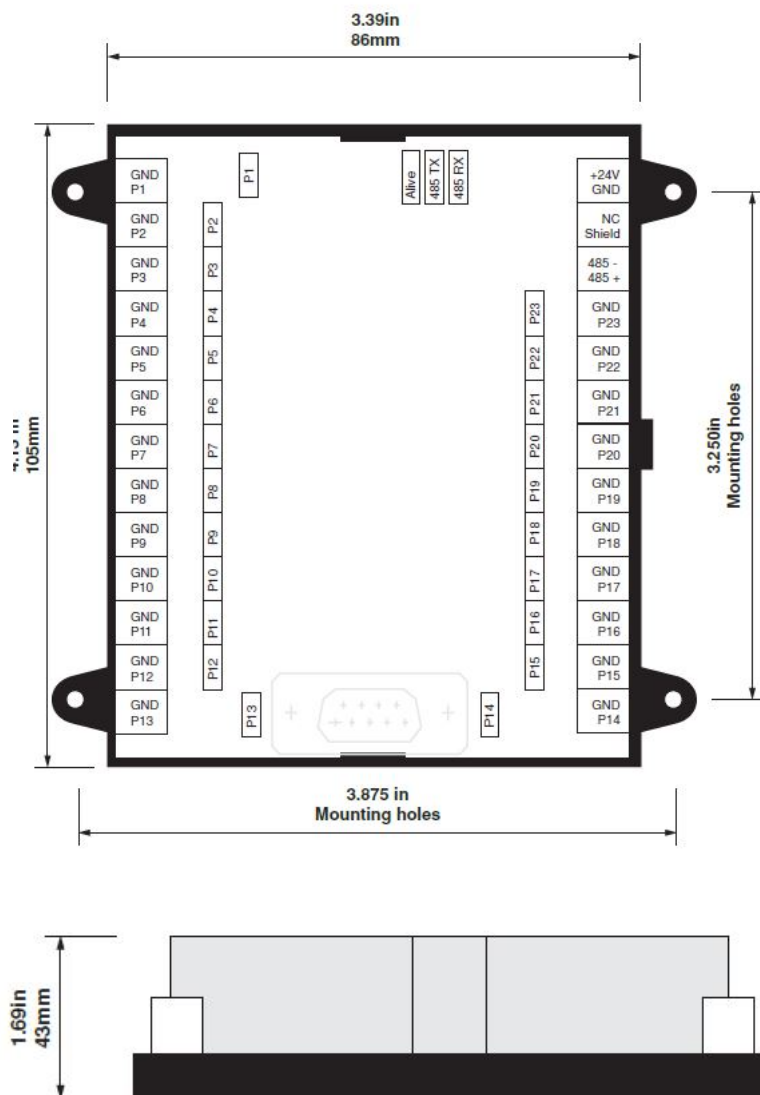
WARRANTY AND CONTACT INFORMATION

FCC STATEMENT:
This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. Any changes or modifications not expressly approved by Leviton Manufacturing Co., could void the user's authority to operate the equipment.

FCC SUPPLIERS DECLARATION OF CONFORMITY (SDOC):
Model A8911 manufactured by Leviton Manufacturing Co., Inc., 201 North Service Road, Melville, NY 11747, www. leviton.com. This device 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.

IC STATEMENT:
This device complies with Industry Canada license-exempt RSS standard(s). 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.

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FOR CANADA ONLY

For warranty information and/or product returns, residents of Canada should contact Leviton in writing at Leviton Manufacturing of Canada ULC to the attention of the Quality Assurance Department, 165 Hymus Blvd, Pointe-Claire (Quebec), Canada H9R 1E9 or by telephone at 1 800 405-5320.

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Leviton warrants to the original consumer purchaser and not for the benefit of anyone else that this product at the time of its sale by Leviton is free of defects in materials and workmanship under normal and proper use for five years from the purchase date. Leviton's only obligation is to correct such defects by repair or replacement, at its option. For details visit www.leviton.com or call 1-800-824-3005. This warranty excludes and there is disclaimed liability for labor for removal of this product or reinstallation. This warranty is void if this product is installed improperly or in an improper environment, overloaded, misused, opened, abused, or altered in any manner, or is not used under normal operating conditions or not in accordance with any labels or instructions. There are no other or implied warranties of any kind, including merchantability and fitness for a particular purpose, but if any implied warranty is required by the applicable jurisdiction, the duration of any such implied warranty, including merchantability and fitness for a particular purpose, is limited to five years. Leviton is not liable for incidental, indirect, special, or consequential damages, including without limitation, damage to, or loss of use of, any equipment, lost sales or profits or delay or failure to perform this warranty obligation. The remedies provided herein are the exclusive remedies under this warranty, whether based on contract, tort or otherwise

Documents / Resources

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A8911, High Density Pulse Input Module

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