

# **SCADA 3000 PULSE COUNT MODULE**

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For information on updates to this manual, check our website at  
[www.sensaphone.com](http://www.sensaphone.com)

## Important Safety Instructions

Your PULSE COUNT MODULE has been carefully designed to give you years of safe, reliable performance. As with all electrical equipment, however, there are a few basic precautions you should take to avoid hurting yourself or damaging the unit:

- Read the installation and operating instructions in this manual carefully. Be sure to save it for future reference.
- Read and follow all warning and instruction labels on the product itself.
- To protect the Pulse Count Module from overheating, make sure all openings on the unit are not blocked. Do not place on or near a heat source, such as a radiator or heat register.
- Do not use your Pulse Count Module near water, or spill liquid of any kind into it.
- Be certain that your power source matches the rating listed in the specification section of this manual. If you're not sure of the type of power supply to your facility, consult your dealer or local power company.
- Do not allow anything to rest on the power cord. Do not locate this product where the cord will be abused by persons walking on it.
- Do not overload wall outlets and extension cords, as this can result in the risk of fire or electric shock.
- Never push objects of any kind into this product through ventilation holes as they may touch dangerous voltage points or short out parts that could result in a risk of fire or electric shock.
- To reduce the risk of electric shock, do not disassemble this product, but return it to Phonetics' Customer Service, or another approved repair facility, when any service or repair work is required. Opening or removing covers may expose you to dangerous voltages or other risks. Incorrect reassembly can cause electric shock when the unit is subsequently used.
- If anything happens that indicates that your Pulse Count Module is not working properly or has been damaged, disconnect it immediately and follow the procedures in the manual for having it serviced. Return the unit for servicing under the following conditions:
  1. Liquid has been spilled into the product or it has been exposed to water.
  2. The unit has been dropped, or the enclosure is damaged.
  3. The unit doesn't function normally when you're following the operating instructions.

## FCC Requirements

**Part 15:** 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 instructions, 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.

# Pulse Count Input Module Supplement

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# Introduction

The SCADA 3000 Pulse Count Module is an optional component for use with the SCADA 3000 system. It features four totalizing pulse count channels and four virtual channels that can be programmed to calculate various rates or to display count overflow. The module has four pulse count channels, each of which is capable of counting pulses at a rate of up to 10,000 pulses per second (10KHz). Each channel will totalize pulses up to one million and then reset to zero. The four virtual channels can be programmed to calculate the pulse as either pulses per second, pulses per minute or pulses per hour. The module is compatible with dry contact or solid state pulse generating devices such as relays or switches. The term DRY contact means that there must NOT be any voltage connected to the circuit. The module may also be connected to the logic output of another solid state computer device (e.g., Open Collector, TTL, CMOS). The module includes adjustable filtering for each channel to prevent counting errors generated by the bounce from slow-moving switches.

## Technical Support

If any questions arise upon installation or operation of the Pulse Count Module, please contact Phonetics Customer Service Department at the number shown below and have the following information:

- Date of purchase \_\_\_\_\_
- Serial number \_\_\_\_\_

Technical support is available from 8:00 AM to 5:00 PM, EST.

You can also contact technical support at any time via e-mail at:  
support@sensaphone.com

**Phonetics, Inc.**  
901 Tryens Road  
Aston, PA 19014  
Phone: (610)558-2700  
FAX: (610)558-0222  
www.sensaphone.com

# Installation

This chapter provides information to install the Pulse Count Module. Please read the entire chapter before starting.

## OPERATING ENVIRONMENT

The Pulse Count Module should be mounted and operated in a clean, dry environment. Do not mount the unit where it will be subject to shock and vibration. The unit is microprocessor controlled and as a result it should not be installed near devices that generate strong electromagnetic fields. Such interference is typically generated by power switching equipment such as relays or contactors. A poor operating environment may result in unwanted system resets and/or system lockup. The temperature range the unit can operate in is 32°F to 158°F (0°C to 70°C). If the unit needs to operate below freezing, a strip heater should be installed nearby

**CAUTION:**The Pulse Count Module is a sensitive electronic device. Personnel and work area should be grounded before coming into contact with this device. Do not install the Pulse Count Module near strong electrostatic, electromagnetic, magnetic or radioactive fields.

## MOUNTING THE UNIT

When you receive the unit, carefully remove it from the box. Mounting tabs with holes are provided on the top and bottom sides of the enclosure (see figure below). Mount the unit in a position that allows easy access to the terminal blocks.

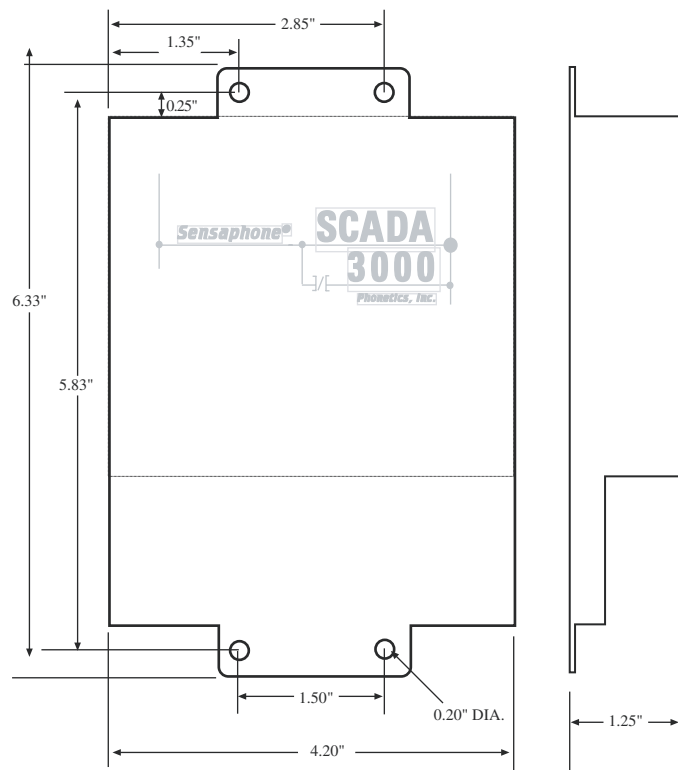


Figure 1: Module Mounting Dimensions

## Power Supply and Grounding

The Pulse Count Module operates on 10-15VDC. Typically the module is powered from the AUX PWR terminals on the SCADA 3000 main unit. This is preferred because the AUX PWR from the main unit is battery-backed in the event of a power failure, when a battery is connected to the main unit. Alternately, you may connect the module to any 10-15VDC power source. The module requires 1.5 Watts of power.

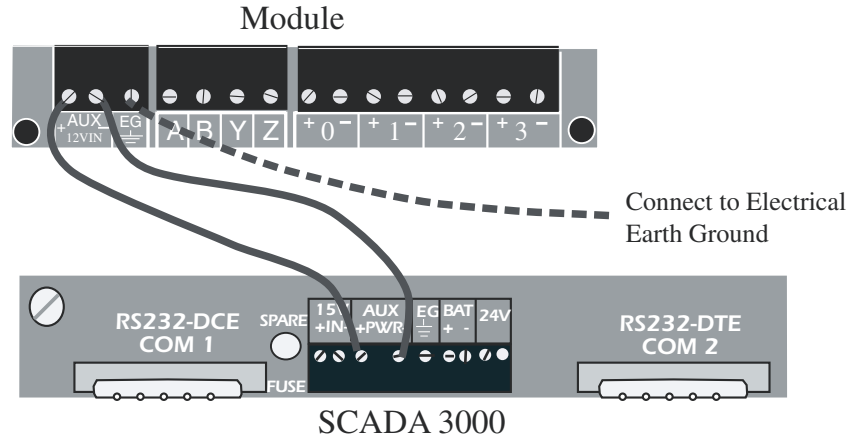


Figure 2: Pulse Count Module connected to SCADA 3000

It is extremely important that the EG pin be connected to a good earth ground. This will prevent communication errors due to differences in ground potential between modules in addition to possible damage due to voltage transients and surges.

The two LED lights in the center of the module, marked *Power* and *Pulse* indicate that the module is receiving power and operating properly. The Pulse LED will blink at a regular rate, like a heartbeat, to indicate that the unit is functioning.

## COMMUNICATIONS WIRING

The Pulse Count Module communicates with the SCADA 3000 using a high-speed serial communications bus. This 4-wire bus is used to connect up to 15 modules to the main unit to provide additional inputs and/or outputs.

Modules may be located a maximum of 2000' away from the main unit and should be connected in a daisy-chain fashion from one module to the next. Each module connects to the next via a 4-wire communications cable connected to the terminals labeled **A, B, Z** & **Y**. The cable must be **4-Conductor Twisted Pair** (shielded or unshielded). Use one pair for A & B and the other pair for Z & Y. Note how the wiring is reversed between the first module and the main unit but between modules the wiring is straight-thru. Power for the expansion modules is provided at the terminals labeled **Aux Power** on the main unit (see **POWER** section above). The proper wiring from the main unit to the modules, and from module to module, is shown in Figure 3:

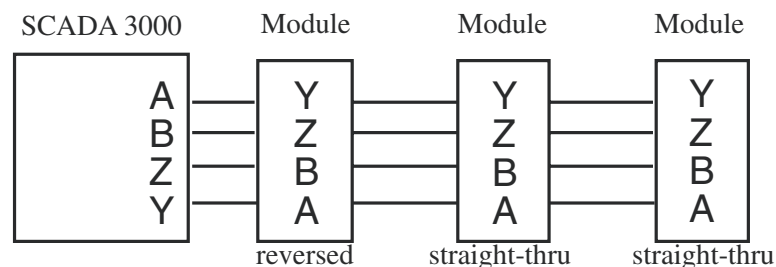


Figure 3: **Correct** daisy chain setup: Main unit on the end.

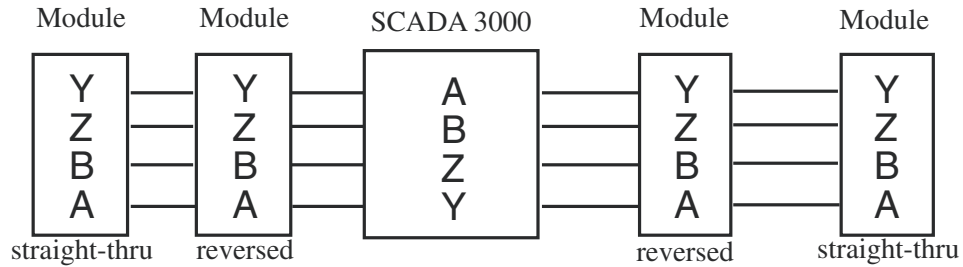


Figure 4: **Incorrect** daisy chain setup: Main unit in the middle of the chain.

**The Main Unit should always be on one end of the chain, never in the middle.**

Each module must be configured with its own **unique** address using the BUS ADDRESS jumpers. You may mix & match up to 15 modules to suit your application's requirements. The example below shows a Bus Address setting of 9.

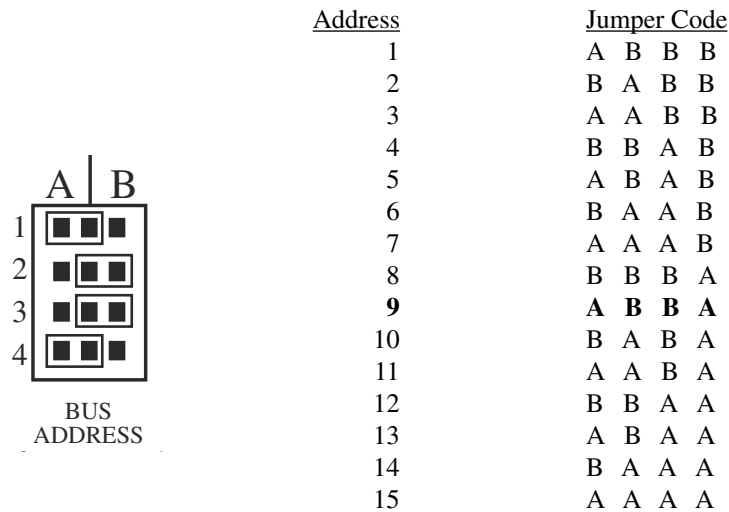


Figure 5: Setting the Bus Address

**Bus Termination**

Located on each module is a jumper labeled BUS TERM. This jumper is used to terminate the 4-wire communications bus.

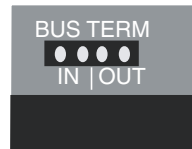


Figure 6: Bus Termination jumper

Termination is required at the extreme ends of the communications network to minimize signal reflections that would otherwise cause data communication errors. To activate the Bus Termination, move the jumper to the IN position. Note that this should only be activated if the module is at the very end of the network. All other modules in between should have the termination set to the OUT position. As a result, only 2 modules should ever have the termination activated. The diagram below illustrates proper termination of the communications bus.



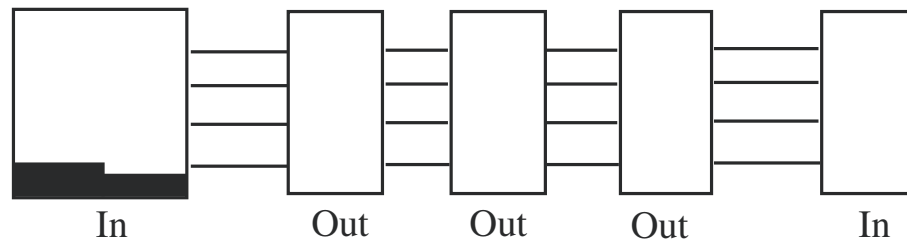


Figure 7: Correct bus termination

### Sensor/Transducer Wiring

Pulse sensors can be connected to the module using inexpensive 2-conductor cable as small as #24 AWG. When connecting the module to dry contact sensors, polarity need not be observed. Simply connect the sensor to the screw terminal pair for the selected input channel. The example below shows a sensor connected to channel 1. When connecting the Pulse Count Module to digital logic signals, follow the polarity markings shown at the terminal strip. Note that if the sensor is located far from the Pulse Count Module or if you are running cable in an electrically noisy environment, you should seriously consider using shielded cable. This will shield the signal from electrical interference, thereby preventing false readings and/or damage to the module.

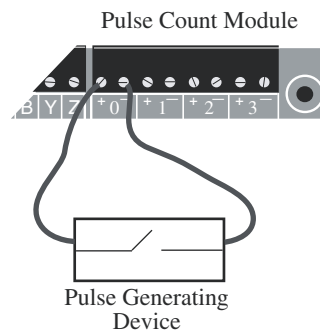


Figure 8: Module Input wiring

### Adjusting the Trimpot (Filtering)

Each channel of the pulse count module has an adjustable low-pass filter. This filter is used to prevent errors generated by the bounce from slow-moving switches. The filter cut-off frequency is adjusted by turning the trimpot (as shown in Figure 9) to the appropriate position. The trimpot range is scaled from 0 to 10. Adjust the trimpot based on the maximum pulse frequency expected in your application. The table below will help you select the correct position.

<u>Maximum Pulse Frequency</u>	<u>Trimpot Position</u>
200 Hz	0
350 Hz	2 <sup>1</sup> / <sub>2</sub>
700 Hz	5
1200 Hz	7 <sup>1</sup> / <sub>2</sub>
10,000Hz	10

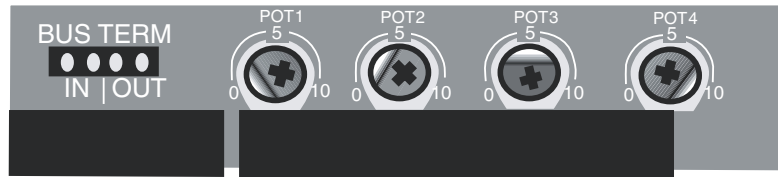


Figure 9: Trimpots, with Pot 1 set at 0, Pot 2 at 2.5, Pot 3 at 5, and Pot 4 at 10

## APPLICATION: HOW THE PULSE COUNT MODULE WORKS

The two main uses for the Pulse Count Module are:

- a) to measure and record flow rates of either liquid or gas. The liquid flow rate sensor operates like a paddlewheel, and each rotation causes an electrical pulse. Gas measuring sensors are likely to be turbines.
- b) to measure RPM. Industrial generator or motor activity is usually measured in RPMs.

The SCADA 3000 Pulse Count Module splits incoming data into four channels of accumulated pulse, and four virtual channels measuring the rate of pulses, thus generating a total of eight. Thus you can receive two different measurements from a single input.

Channels 1-4 measure Accumulated pulse from 0 to 1 million, after which the figure resets.

Channels 5-8 are virtual and offer 4 programming options:

1. pulses per second
2. pulses per minute (i.e., RPM)
3. pulses per hour
4. Accumulated pulse overflow. When selected, this option will count beyond the 1 million limit of accumulated pulse on channels 1-4, adding a “1” to the total every time the corresponding flow rate channel reaches 1 million.

The channels correspond as follows:

- |             |  |
|-------------|--|
| Channel #1: | Pulse Count Total from input #1            |
| Channel #2: | Pulse Count Total from input #2            |
| Channel #3: | Pulse Count Total from input #3            |
| Channel #4: | Pulse Count Total from input #4            |
| Channel #5: | Rate or Count Overflow from pulse input #1 |
| Channel #6: | Rate or Count Overflow from pulse input #2 |
| Channel #7: | Rate or Count Overflow from pulse input #3 |
| Channel #8: | Rate or Count Overflow from pulse input #4 |

**Calibration**

Each channel of the Pulse Count Module can be individually calibrated with a multiplier. The calibration multiplier can be used to properly scale the information coming from your transducer.

Example 1: Suppose you are monitoring liquid flow and each pulse from your transducer represents 50 gallons. If you enter a calibration multiplier of 50 for channel 1, then each pulse will increment the total by 50. By calibrating the signal you can now keep a total that represents total gallons instead of total number of pulses.

# Appendix A: Specifications

<b>4 Pulse Count Inputs</b>	
<b>Compatible with dry contact switches, relays, solid state switches and digital 5V logic.</b>	
<b>Input Voltage range Vin+:</b>	-0.5V to +5.5V DC maximum
<b>Input Voltage range Vin-:</b>	-0.5V to +5.5V DC maximum
<b>Input Sense Voltage (provided by the module):</b>	5VDC @ 2mA
<b>Pulse Counting Range:</b>	0 to 10,000 pulses per second (0-10KHz)
<b>Input Protection:</b>	1500 Watt transient voltage suppressor on each input
<b>Network Data Rate:</b>	153.6 Kbps
<b>Power Requirements</b>	10-15VDC 100mA, 1.5W
<b>Power Fuse Rating &amp; type</b>	500mA 250V, Size TR-5 (Wickmann # 3720500041)
<b>Operating temperature</b>	0 to 70 degrees Celsius (32 to 158 degrees F)
<b>Storage Temperature</b>	-20 to 70 degrees Celsius (-4 to 158 degrees F)
<b>Humidity</b>	5 to 90% non-condensing
<b>Dimensions</b>	4.2" x 6.3" x 1.2"
<b>Weight</b>	0.75 lbs.
<b>Enclosure</b>	Aluminum Housing with integral mounting flanges for wall or panel installation.

# Appendix B: Troubleshooting

Question: If the pulse count total overflows, does that cause the rate calculation to be incorrect?
Answer: No. The rate is computed independent of the pulse total.
Question: If I need to retrofit an existing application, how do I preserve the accumulated total so far?
Answer: The Scada 3000 software will allow you to enter a preset value to the count total. Additional pulses will add to the preset so that no data is lost.
Question: Can I automatically have the pulse-count total RESET back to zero?
Answer: Yes. You can reset the total from the ladder program by using the RES function.
Question: I have power wired to the Pulse Count Module but no lights are on.
Answer: You probably have a blown fuse.

## Appendix C: Replacement Parts

This appendix provides a list of replacement parts and part numbers for the FGD-3020 Pulse Count Input Module. Contact the Phonetics Customer Service Department for availability, at (610)558-2700.

ASY-0049	Pulse Count Module Circuit Board
CON-0033	2 Position Jumper Shunt
CON-0034	4 Position Terminal Block Plug
CON-0101	8 Position Terminal Block Plug
CON-0106	3 Position Terminal Block Plug
FUS-0005	500mA 250V TR5-style Time-Lag Fuse (Wickmann #3720500041)
HSG-0044	Enclosure Base
HSG-0045	Enclosure Cover
LIT-0021	SCADA 3000 Pulse Count Module Owners Manual Supplement

# Appendix D: Returning Module for Service

In the event that the Pulse Count Module does not function properly, we suggest that you do the following:

- 1) Record your observations regarding the Pulse Count Module malfunction.
- 2) Call the Customer Service Department at (610)558-2700 prior to sending the unit to Phonetics for repair.

If the module must be sent to Phonetics for Servicing, please do the following:

- 1) Disconnect all wiring and unplug the unit.  
Note that the terminal blocks can be unplugged from the unit to maintain your input wiring.
- 2) Carefully pack the module to avoid damage in transit. Use the original container (if available) or a sturdy shipping box.
- 3) You must include the following information to avoid shipping delays:
  - a) Your name, address and telephone number.
  - b) A note explaining the problem.
- 4) Ship your package to the address below:

SERVICE DEPARTMENT  
Phonetics Inc.  
901 Tryens Road  
Aston, PA 19014

- 5) Ship prepaid and insured via UPS or US Mail to ensure a traceable shipment with recourse for damage or replacement.

## Important Information for Canadian Customers

In the event that your Sensaphone Thermocouple Input Module does not function properly, Canadian customers have the option of shipping the unit to one of the following Phonetics-authorized Canadian Repair facilities:

Microwise Computer Systems  
100 Covington Crescent  
Kitchener, Ontario N2N 2X3  
(519) 744-9892

G.A.S. Analytical Systems, Ltd.  
Head Office  
Bay V, 1338 36 Avenue NE  
Calgary, Alberta T2E 6T6  
(403) 253-6576

Please record your observations regarding the unit's malfunction and follow the procedures outlined on the previous page.

For Technical Support questions, you may call Phonetics Technical Service Department at (610) 558-2700, or by E-mail at [support@sensaphone.com](mailto:support@sensaphone.com).

### 3 YEAR LIMITED WARRANTY

1. **WARRANTOR:** Dealer, Distributor, Manufacturer
2. **ELEMENTS OF WARRANTY:** This Product is warranted to be free from defects in materials and craftsmanship with only the limitations and exclusions set out below.
3. **WARRANTY AND REMEDY: Three-Year Warranty** — In the event that the Product does not conform to this warranty at any time during the time of three years from original purchase, warrantor will repair the defect and return it to you at no charge

This warranty shall terminate and be of no further effect at the time the Product is (1) damaged by extraneous cause such as fire, water, lightning, etc. or not maintained as reasonable and necessary; (2) modified; (3) improperly installed; (4) repaired by someone other than warrantor; (5) used in a manner or purpose for which the Product was not intended; or (6) sold by original purchaser.

WARRANTORS' OBLIGATION UNDER THIS WARRANTY IS LIMITED TO REPAIR OR REPLACEMENT OF THE PRODUCT. THIS WARRANTY DOES NOT COVER PAYMENT OR PROVIDE FOR THE REIMBURSEMENT OF PAYMENT OF INCIDENTAL OR CONSEQUENTIAL DAMAGES.

It must be clear that the warrantors are not insuring your premises or guaranteeing that there will not be damage to your person or property if you use this Product. The warrantors shall not be liable under any circumstances for damage to your person or property or some other person or that person's property by reason of the sale of this product or its failure to operate in the manner in which it is designed. The warrantors' liability, if any, shall be limited to the original cost of the Product. The warrantors assume no liability for installation of the Product and/or interruptions of the service due to strikes, riots, floods, fire, and/or any cause beyond Seller's control.

4. **PROCEDURE FOR OBTAINING PERFORMANCE OF WARRANTY:** In the event that the Product does not conform to this warranty, the Product should be shipped or delivered freight prepaid to a warrantor with evidence of original purchase.
5. **LEGAL REMEDIES:** This warranty gives you specific legal rights, and you may also have other rights which vary from state to state to the extent allowed by law expressly in lieu of any other express or implied warranty, condition, or guarantee.

Effective date: 1 November 1998

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