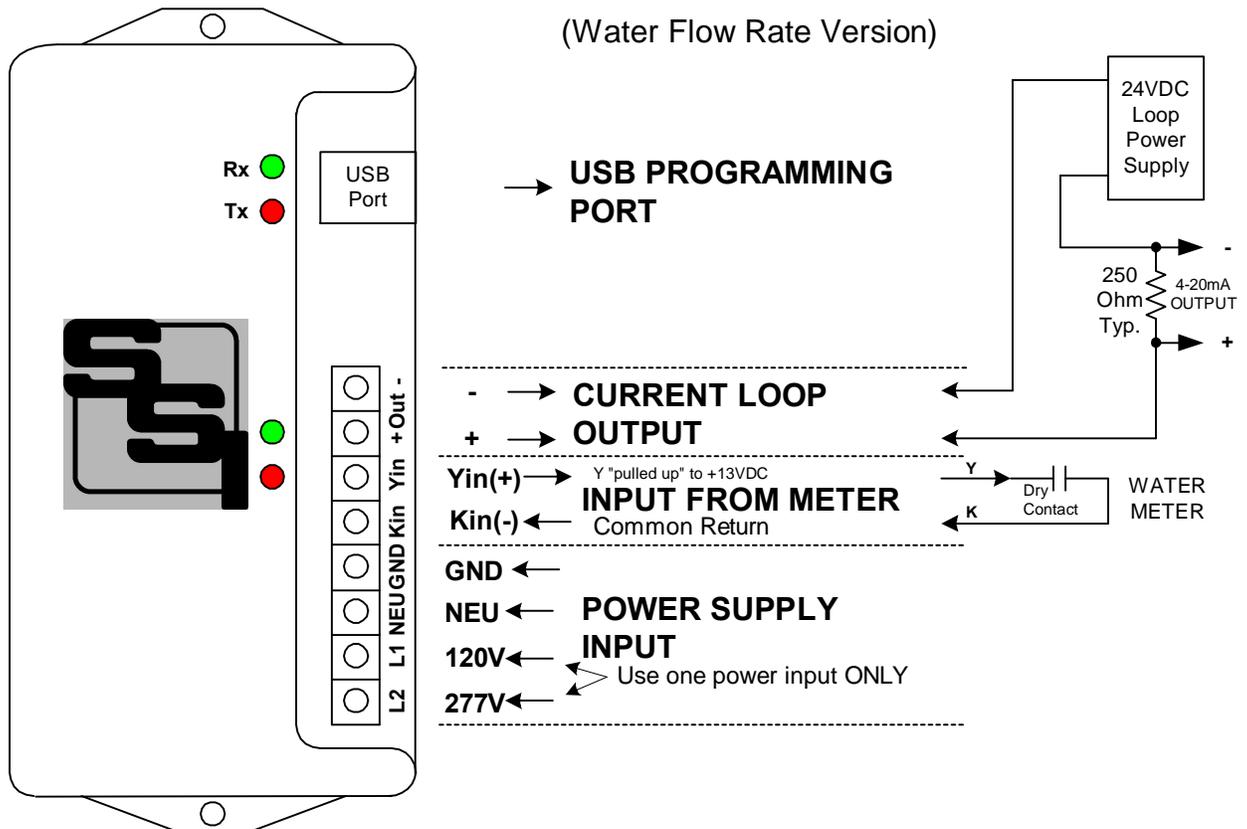


INSTALLATION INSTRUCTION SHEET

PCL-1 Pulse-to-Current Loop Converter

(Water Flow Rate Version)



MOUNTING POSITION - The PCL-1 can be mounted in any position. Two mounting holes are provided.

POWER INPUT - The PCL-1 is powered by an AC voltage of between 90 and 300 volts. For 208 to 277VAC, connect the AC line's "hot" wire to the **L2** terminal. For 120VAC, connect the AC line's "hot" wire to the **L1** terminal. Connect the **NEU** terminal to the AC line's "neutral" wire. Connect **GND** to electrical system Ground. Ground must be connect for proper operation. DC power supply input available by special order.

METER INPUT - The PCL-1 has a 2-Wire (Form A) input. Connect the PCL-1's "Kin" and "Yin" input terminals to the meter's "K" and "Y" output terminals. The PCL-1's "Kin" terminal is the common return. The +13VDC wetting voltage is "pulled-up" internally on the PCL-1's Yin terminal. Each closure of the meter's Y output will "pull down" the input line to the common return. The Red LED lights each time a pulse is received. All settings are programmed into the PCL-1 by means of the USB Programming Port, and are saved in Non-Volatile EEPROM memory so they are never lost or not inadvertently changed. See page 5 for "Programming the PCL-1".

OUTPUT - The PCL-1 outputs a current of 4 to 20mA proportional to the Flow Rate as calculated by the pulse value and system settings. Two output modes are available. Instantaneous or Average flow rate may be selected for output. The Green LED lights each time the Digital to Analog converter outputs a value. Transient voltage protection for the output is provided by MOVs and zener diodes on board. The 4-20mA loop must be powered by a 24VDC Loop Power Supply, which is external to the PCL-1. This power supply supplies all power to the output stage of the PCL-1 and is optically isolated from the rest of the PCL-1.

OPERATION - See the following pages for a full explanation of the operation of the PCL-1. Maximum output voltage is 5VDC at a full scale 20mA output.



SOLID STATE INSTRUMENTS

a division of Brayden Automation Corp.

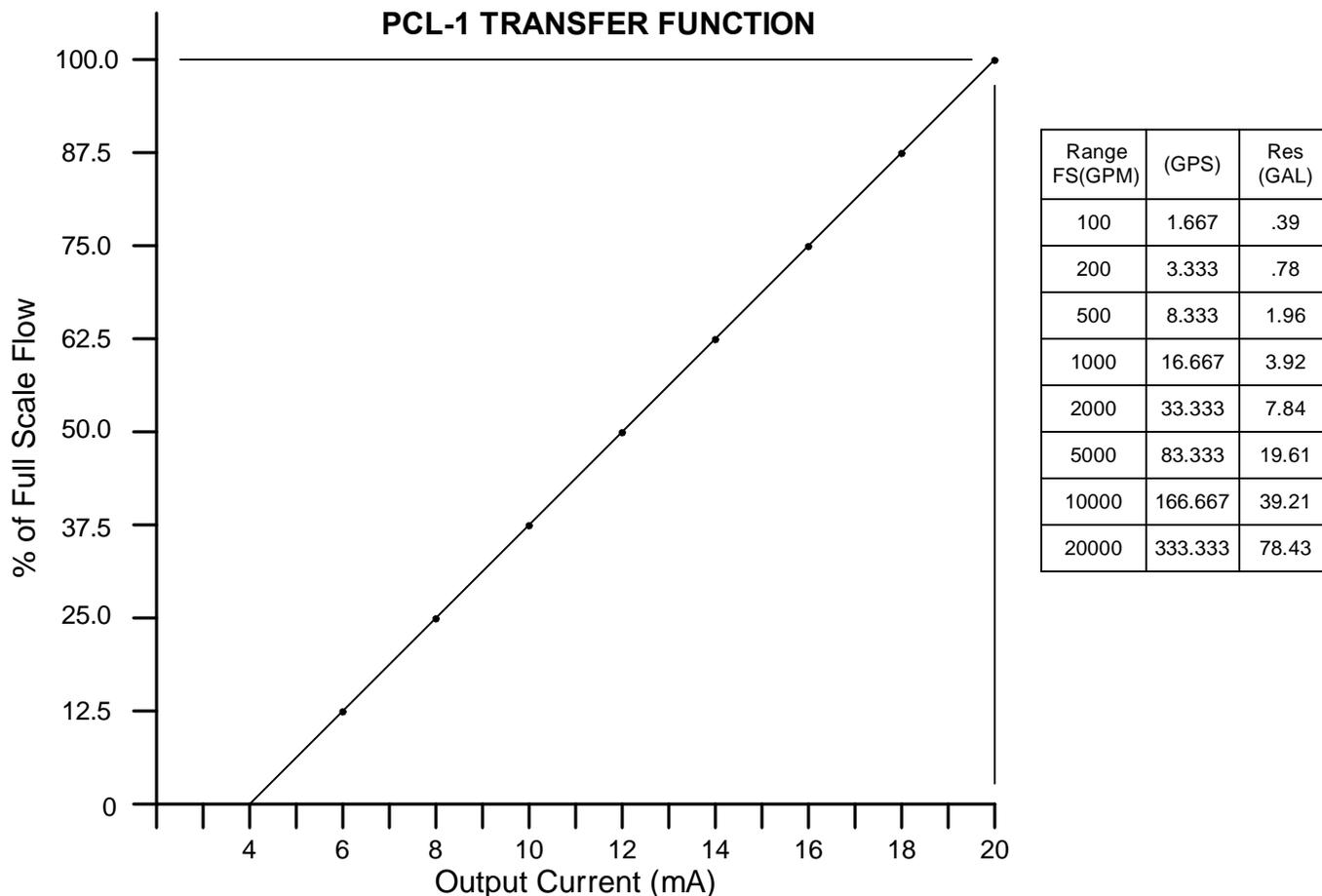
6230 Aviation Circle, Loveland, Colorado 80538

Phone: (970)461-9600

E-mail: support@brayden.com

WORKING WITH THE PCL-1 RELAY

Operation: The PCL-1 Pulse to 4-20mA Current Loop Converter Module is designed to output an analog voltage with a current between 4 and 20 milliamps, proportional to the value of the instantaneous or average water flow. Below is an example of how the PCL-1 works and how it is programmed.



Example, Assume a building has a 883GPM maximum water flow. Set the Full Scale Value at 1000GPM. Therefore, 1000GPM = 20mA. 0 GPM = 4mA. Resolution would be 1000 / 255 or 3.92 GPM (or .3922% of full scale) per step. Assume the water meter's Pulse value is 10 Gallons / pulse. Suppose that pulses being received at this moment in time are at a rate of one pulse per 4 seconds and the flow is steady. 1000GPM/60 seconds = 16.667 Gallons per second (GPS) Full scale. 10 Gallons/4 seconds = 2.5 Gallons per second. $2.5/16.667 = 14.9997\%$. Round to 15%. $15\% \times 16mA = 2.40mA + 4mA = 6.40mA$ output. Output resolution is $16mA / 256$ steps or .0625mA per step. So, $256 \times 15\% = 38.4$ steps of 256. Rounding off $38 \times .0625mA = 2.375mA + 4mA = 6.375mA$ output. Accuracy = 99.609%.

Suppose the building's flow resulted in 1 pulse per second. That would equal 10 gallons per second. $10G/16.667GPS = 59.9998\%$. Round to 60%. $60\% \times 1000 = 600$ GPM. $60\% \times 16mA = 9.6mA + 4mA = 13.6mA$ output.

Let's assume that the building has 2 pulses per second, or 20 Gallons per second. $20 \times 60 = 1200$ GPM. This would overrange the PCL-1 so the full scale would have to be changed to 2000.

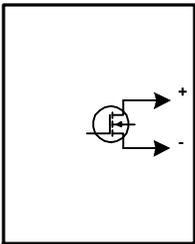
PCL-1 Pulse to 4-20mA Current Loop Converter Transfer Function		REVISIONS	
		NO.	DATE
DATE ORIGINAL	SCALE		
11/8/2020	N/A		
LATEST REVISION	JOB NO.	CHECKED	DRAWN
			WHB

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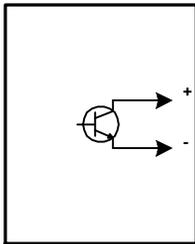
PCL-1 Wiring Diagram

METER OUTPUT TYPES

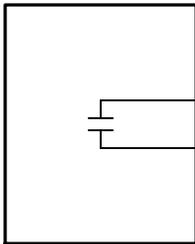
Solid State-Polarized
(Open Drain N-Channel
FET Transistor)



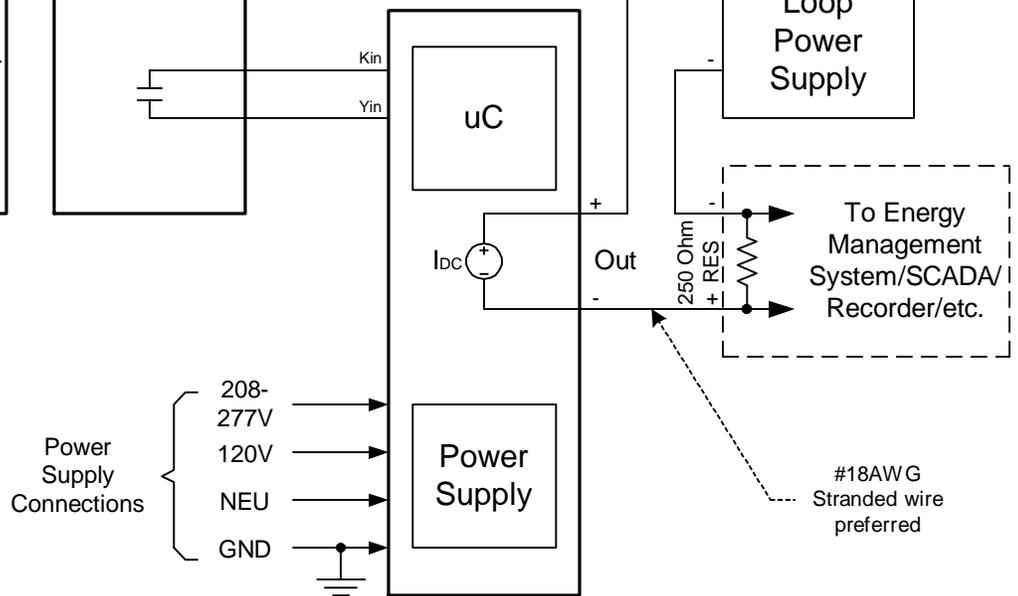
Solid State-Polarized
(Open Collector NPN
Bi-polar Transistor)



Electro-Mechanical or
Solid State
Non-Polarized



PCL-1 Pulse to 4-20mA Current Loop Conversion Relay

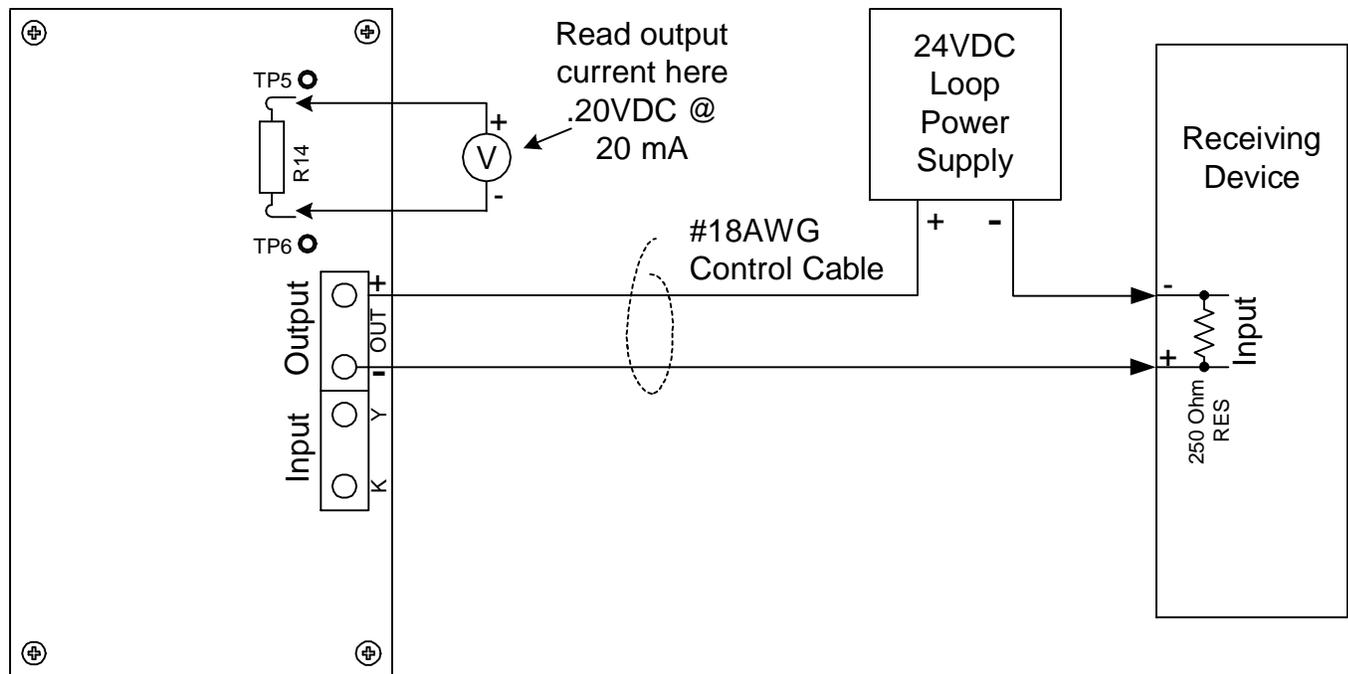


PCL-1WiringDiagram.vsd

PCL-1 Pulse to 4-20mA Conversion Relay Wiring Diagram		REVISIONS	
		NO.	DATE
DATE ORIGINAL	SCALE		
11/8/2020	N/A		
LATEST REVISION	JOB NO.	CHECKED	DRAWN
			WHB

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PCL-1 4-20mA Current Loop Converter Module



Testing the PCL-1

Using a good quality Digital Volt Meter (DVM) which is capable of reading very low voltages accurately, connect the leads across Resistor R14 above the current loop output connector. Put the PCL-1 into the test mode. (See Page 5.) The PCL-1's output must be connected to the receiving device's input and must be powered up, or connected to a suitable test setup. The voltage across R14 is proportional to the output current. At 20mA of output current, the output voltage across R14 will be .20VDC. At 4mA of output current, the output voltage across R14 will be .04VDC. In test mode the output current will sweep from 4mA to 20mA in 10 seconds, and remain at 20mA for 4 seconds. It will reset to 4mA for 4 Seconds and then repeat. Therefore, your meter will climb from .04V to .20 V in 10 seconds, stay at .20V for 4 seconds, go to .04V for 4 seconds and then climb again from .04 to .20V. This repeats continuously while in the test mode. While in Test Mode, the pulse input is ignored and does not matter if it is connected or not. Take the PCL-1 out of test mode and return to Normal Operation mode. Connect electric meter's pulse output to the input of the PCL-1 if not already connected. Ensure that the red LED next to the Yin terminal is on when the Y input line is low (has continuity with the Kin terminal).

Interfacing the PCL-1 to the Receiving Device

The receiving device must have an input suitable for accepting a 4-20mA current, equipped with a 250 ohm precision resistor, at a maximum voltage of +5VDC. Use a #18AWG to #22AWG two conductor control cable between the PCL-1 and the receiving device. 4mA will yield 1VDC across the 250 ohm resistor, while 20mA will yield 5VDC.

Programming

The PCL-1 requires you to connect it via its USB port to a computer for programming. See Page 5. Parameters that must be programmed are:

- Pulse Value in gallons
- Full Scale Value; Range - 100 to 20,000 GPM
- Operating Mode selection, either Instantaneous or Average
- Usage Rate Averaging Interval (if the above selection is Average)
- Enter and Exit Test Mode

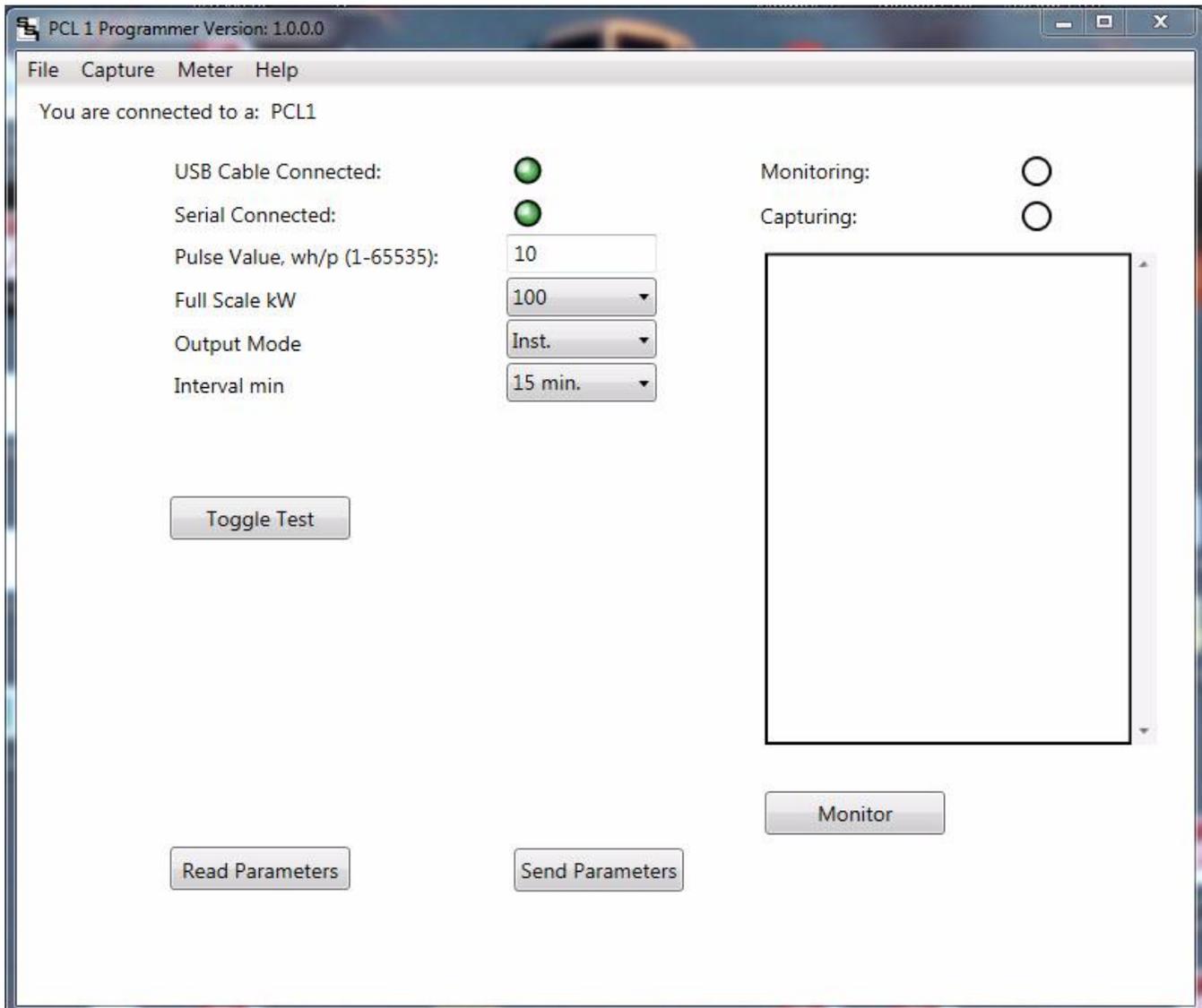
Technical Support

Contact Brayden Automation Corp. Tech Support at 888-BRAYDEN (888-272-9336) if you need assistance on the application of the PCL-1 4-20mA Pulse to Current Loop Converter Module.

Programming the PCL-1 4-20mA Current Loop Converter Module

Software Required

The PCL-1 is programmed using SSI's PCL-1 Programmer software, available as a free download on the SSI website at <http://solidstateinstruments.com/productpages/pcl-1-software.php>. Go to the Documentation tab and locate the link "Download PCL-1 Windows Software". Install the software on your PC. An Icon with the SSI Logo will be placed on the desktop for access. Be sure to have your PCL-1 connected to the USB port on the computer and powered up. Double-click on the icon to start the program. The program will open up and you should see the main page shown below.



To READ the parameters currently stored in memory, click on <Read Parameters>. The PCL-1 Programmer will return the actual values of each parameter currently stored in EEPROM memory.

To program a new setting into the memory, enter the value desired in the appropriate entry box and click on <Send Parameters>. You can change multiple values if desired and when done, click on <Send Parameters>.

Pulse Value: Enter the pulse value in Gallons per pulse, with a number from 1 to 65535. You may not enter a decimal point. The value must be in whole (integer) number. Once the correct value is entered, click on <Send Parameters>.

Full Scale: Pull down the pulldown menu under the Full Scale entry box and select a maximum GPM value. Once the correct value is entered, click on <Send Parameters>.

Programming the PCL-1 (con't)

You are connected to a: PCL1

USB Cable Connected:	
Serial Connected:	
Pulse Value, wh/p (1-65535):	<input type="text" value="10"/>
Full Scale kW	<input type="text" value="100"/>
Output Mode	<input type="text" value="Inst."/>
Interval min	<input type="text" value="15 min."/>

Output Mode: Pull down the pulldown menu and select **Inst** for Instantaneous or **Avg** for Average mode. Instantaneous Mode means that the instantaneous value in Gallons per Minute (GPM) will be updated on the 4-20mA output each time a new pulse is received. The Average Mode means that the GPM will be averaged over the interval selected and the result will be updated on the 4-20mA output every 15 seconds.

Averaging Interval: Pull down the pulldown menu and select the number of minutes over which you would like to average the incoming pulses. Enter the desired Interval value in the Interval (min) entry box and click <Send Parameters>. Intervals available are 1, 5, 10, 15, 30, and 60 minutes.

Test Mode: Click on the Test Mode button to enter the test mode. Upon entering the test mode the pulse input is ignored and the PCL-1 begins an output sweep from 4mA to 20mA in 10 seconds. It will remain at 20mA for 4 seconds, then reset to 4mA for 4 seconds. It will start again and repeat this sequence continuously until the power to the unit is cycled. Upon power up, test mode will be exited and normal operation will resume.

When programming is complete, close the software by pressing X in the upper righthand corner of the window or unplug the USB cable. When the USB cable is unplugged you will see the software attempting to reconnect. If you plug back in the USB cable the PCL-1 should automatically reconnect to the PCL-1 Programmer software.

All parameters will be saved in EEPROM memory. EEPROM memory uses no battery for backup so all parameters will never be lost. Data retention is typically 10 years in absence of power.

Technical Support

Contact Brayden Automation Corp. Tech Support at 888-BRAYDEN (888-272-9336) if you need assistance on the application of the PCL-1 4-20mA Pulse to Current Loop Converter Module.