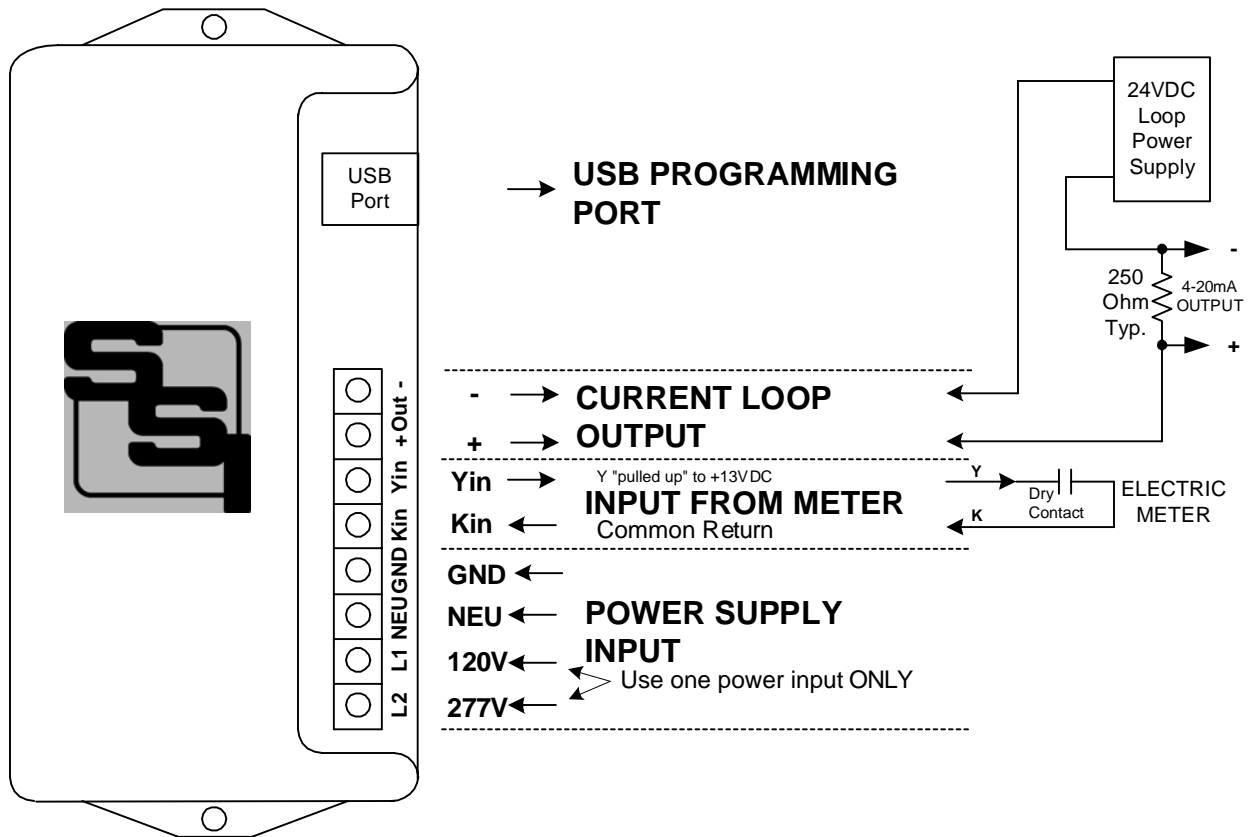


INSTALLATION INSTRUCTION SHEET

PCL-1 Pulse-to-Current Loop Converter



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. 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. 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 KW demand as calculated by the pulse value and system settings. Two output modes are available. Instantaneous or Average KW demand may be selected for output. 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

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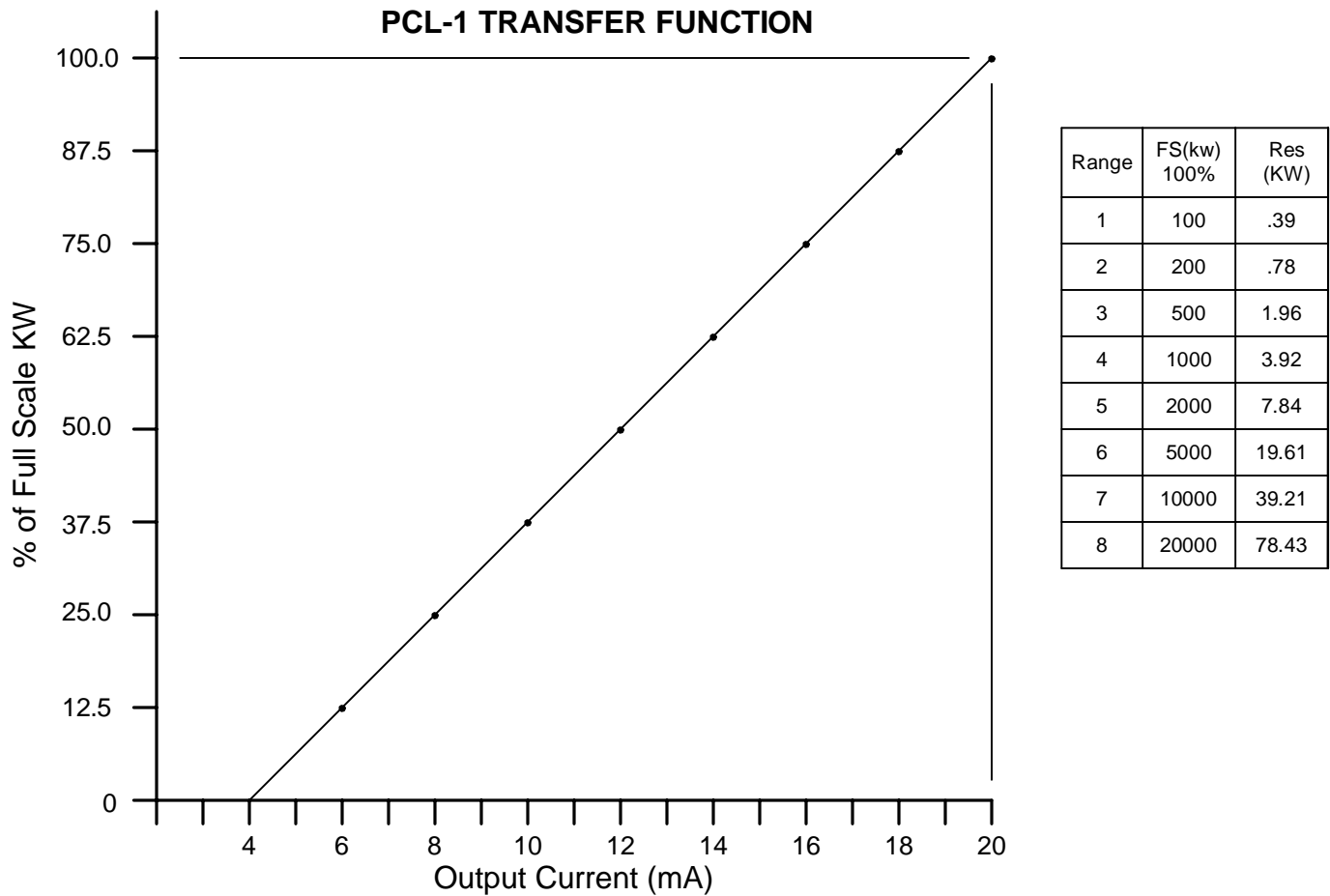
6230 Aviation Circle, Loveland, Colorado 80538

Phone: (970)461-9600 Fax: (970)461-9605

E-mail: support@solidstateinstruments.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 KW demand. Below is an example of how the PCL-1 works and how it is programmed.

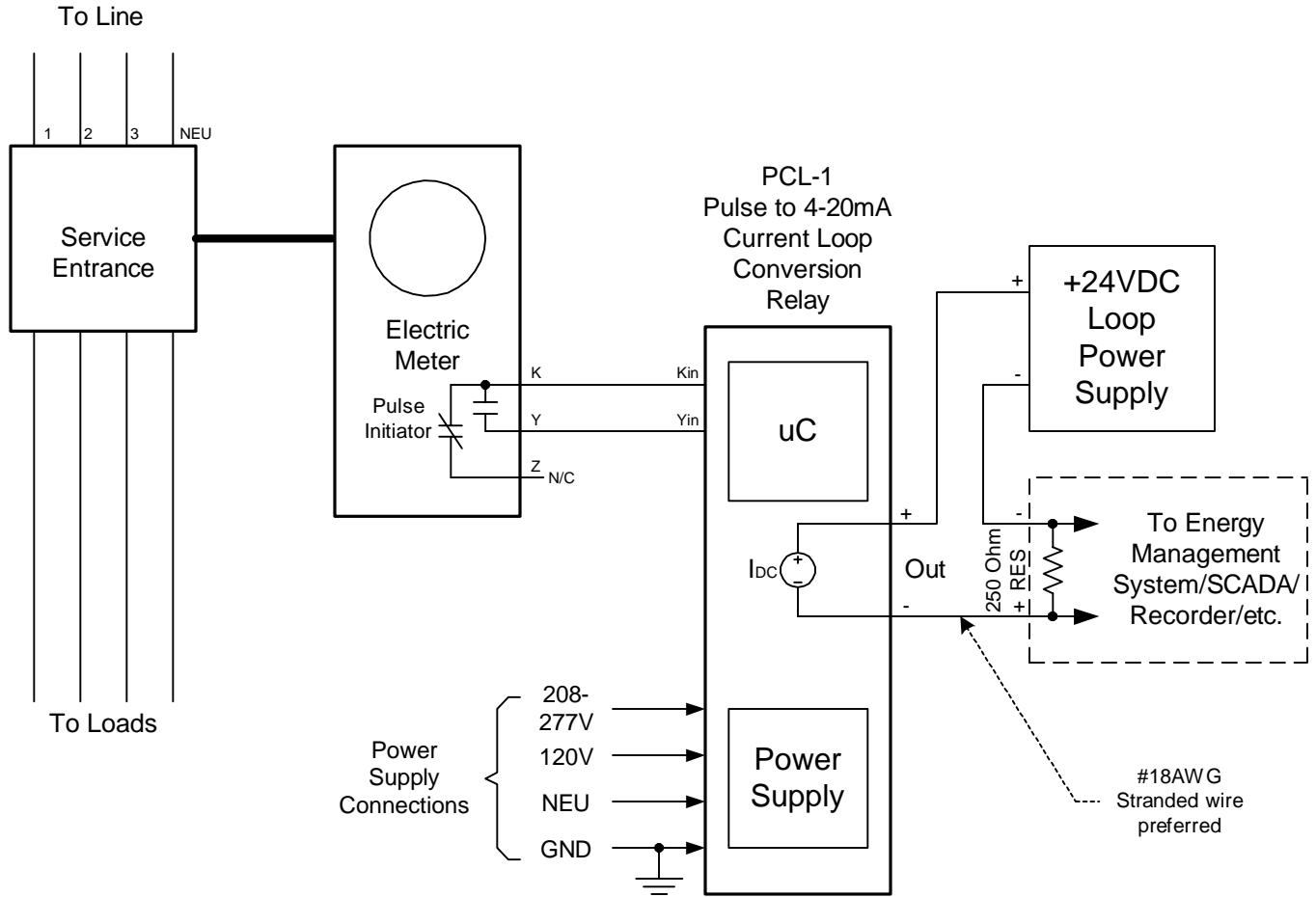


Example, if a building has a 483KW maximum demand, set the Full Scale Value at 500KW. Therefore, 500KW = 20mA. 0KW = 4mA. Resolution would be 500 / 255 or 1.961KW (or .3922% of full scale) per step. Assume the electric meter's PKe Pulse value (3-Wire) is 240 wh/pulse (or .240kwh/pulse). The 2-Wire equivalent is .480kWh/p or 480wh/p. Suppose that pulses being received at this moment in time are at a rate of one pulse per 4 seconds and the load is steady. Conversion would be: .480 Kwh X 3600 = 1728 kW-sec/ 4 sec = 432 kW. Output current would be 432/500 = 86.4% X 16mA = 13.824mA + 4mA = 17.824mA out. Output resolution is 16mA / 256 steps or .0625mA per step. So, 256 * 86.4% = 221.18 steps of 256. Rounding off 221 X .0625mA = 13.8125mA + 4mA = 17.8125mA output. Accuracy = 99.9168%.

PCL-1 Pulse to 4-20mA Current Loop Converter Transfer Function		REVISIONS		
		NO.	DATE	DESCRIPTION
DATE ORIGINAL				
04/06/2013				
SCALE				
N/A				
LATEST REVISION		CHECKED		DRAWN
				WHB

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PCL-1 Wiring Diagram

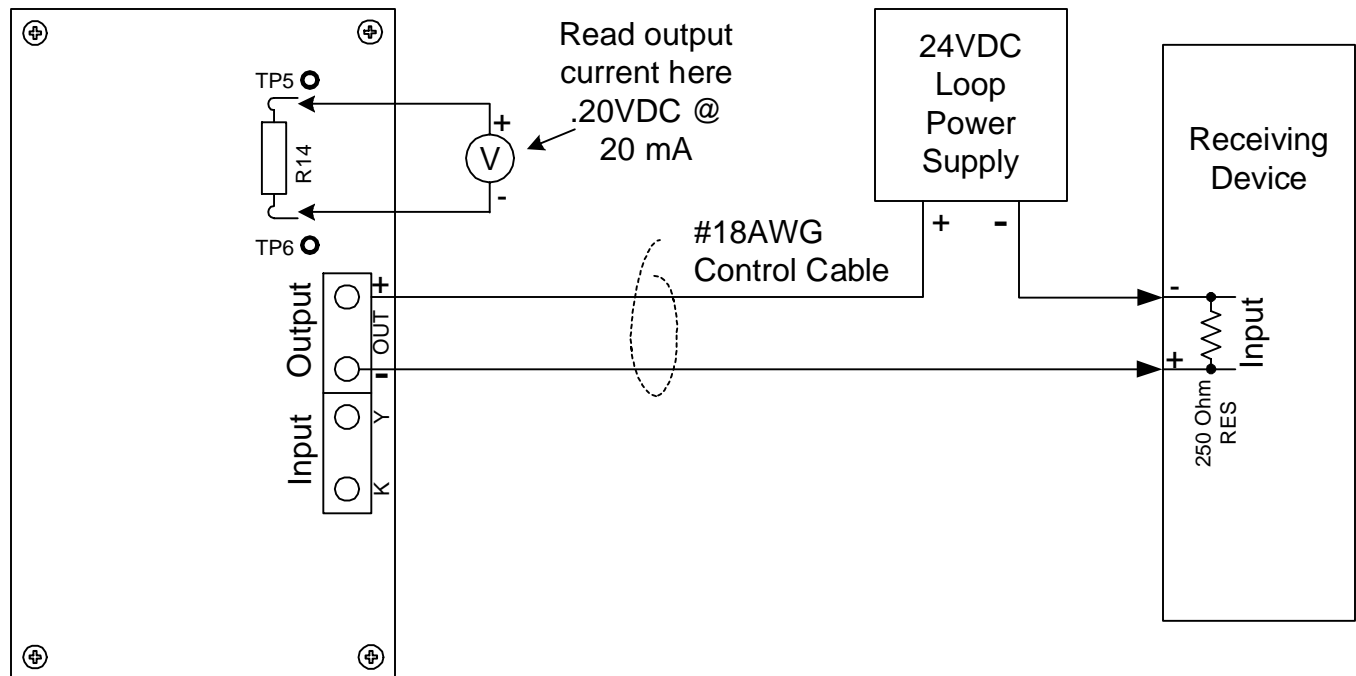


PCL-1WiringDiagram.vsd

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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 conduct or 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 Watt-hours
- Full Scale Value; Range 1 to 8 (see chart)
- Operating Mode selection, either Instantaneous or Average
- Demand 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_host.exe program, available as a free download on the SSI website at www.solidstateinstruments.com/productpages/pcl-1.htm. Download the software. See Page 6 for special instructions on setting up the pcl_host.exe software.

For subsequent programming after it has been set up the first time, follow these instructions:

Using the USB programming cable that accompanied the PCL-1, plug the "B" end into the PCL-1. Plug the "A" end into your computer's USB port. Open your computer's Device Manager and select "Ports". Identify which COM port is being used by the PCL-1. It will say "COM9 MCP2200 Microchip Technology" or similar. The Enter Key will be abbreviated below as <CR>. Each time you plug in the PCL-1 you will have to check the com port being used.

Run the pcl_host.exe as follows: Double Click on the command prompt icon that is labeled "host". If the port # is less than 9, enter pcl_host and the port #. For example, **pcl_host COM9<CR>**. If the port# is 10 or higher, enter \\.\ and then the Com port number. For example, for COM12, enter **pcl_host \\.\COM12<CR>**. Type "?" and <CR> for a list of commands.

To READ a parameter currently in memory, enter **R <CR>**. The host program will prompt the user for the parameter to read. Either upper case or lower case letters are acceptable. The PCL-1 will return the actual value of the parameter currently stored in EEPROM memory. For example, pressing **R<CR>M<CR>** to read the output mode, will return an "I" or "A" depending on the mode selected.

To program a new setting into the memory, press the bold letter below, followed by <CR> then the value desired, followed by a <CR>.

Press **V<CR>** for Pulse Value: Enter the Form A (2-wire) pulse value in Watthours, with a number from 1 to 65535. (You will need to multiply your kWh value for the pulse by 1000 to get the watthour value.) You may not enter a decimal point. The value must be in whole (integer) numbers. For example, if your Form A (2-Wire) value is .144 kWh/pulse, then your watthour value per pulse is 144wh/p. Enter **144<CR>**.

Press **S<CR>** for Full Scale: Enter the number 1 thru 8 corresponding to the desired Full Scale KW range: 1=100, 2=200, 3=500, 4=1000, 5=2000, 6=5000, 7=10000 or 8=20000. For example, for 500kW full scale, you would enter **3<CR>**.

Press **M<CR>** for Output Mode: Enter 1 for Instantaneous or 2 for Average mode. Instantaneous Mode means that the instantaneous demand on the 4-20mA output will be updated each time a new pulse is received. The Average Mode means that the demand will be averaged over the demand interval selected and the result will be updated on the 4-20mA output every 15 seconds. When reading the M mode, it will return an I or an A.

Press **A<CR>** for Interval: Enter the desired Demand Averaging Interval (if the above Mode selection is Average): 1=1 min, 2= 2 min, 3=5 min, 4=10 min, 5=15 min, 6=30 min, or 7=60 min. Enter **5<CR>** for 15 minute demand averaging interval. This setting is not used if you are operating in the Instantaneous mode.

Press **T<CR>** for Test Mode: Pressing T toggles the PCL-1 in and out of test mode and begins a 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 then repeat this sequence again. This is continuous until either **T** is pressed again or until 10 minutes elapses, in which case it returns to the blinking cursor. In addition, cycling the power will cause the test mode to be exited.

When programming is complete, simply exit out of the pcl_host software by pressing **X** and unplug the cable. 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.

Installing the pcl_host Program

Installation Procedure

- 1.) Make a sub-directory on the C drive called "host".
- 2.) Copy the contents for the pcl_host.zip file into the folder. If you copy the .zip folder into the host directory, you will need to extract the files from it.
- 3.) Go to your Desktop. Press the Start button. Drag and Drop the Command Prompt to the desktop. This may be found in your Accessories folder in the Programs folder. Right click on the icon and rename it to "host". Right click again and select "Properties". Edit the text in the "Start In" box to "C:\host". Click OK.
- 4.) Determine whether your computer and operating system are 32 bit or 64 bit. If your computer has XP as the Windows operating system, then it is 32 bit. If you are running Windows 7, you will have to check. On your Windows 7 computer, press the Start button on the Desktop. Right click on Computer, select Properties. You will see in the middle of the page whether it is 32 or 64 bit.
- 5.)
 - a. For 32 Bit: Go to the host folder in the C drive. Run the Application called 32-bit DriverInstallationTool.
 - b. For 64 Bit: Go to the host folder in the C drive. Run the Application called 64-bit DriverInstallationTool.
- 6.) Using a USB A-B programming cable, plug the "B" end into the PCL-1. Plug the "A" end into your computer's USB port. Windows will recognize new hardware and assign a COM port number to the PCL-1.
- 7.) Go to your computer's Device Manager and select Ports. Note the COM port number of the MCP2200 device. The Device Manager on Windows 7 is in the Control Panel. On Windows XP, Press Start, then Settings, then Control Panel, then System, then Hardware, then Device Manager. Click on the "+" next to Ports to see the Ports and COM #'s.
- 8.) Run the pcl_host.exe as follows: Double Click on the command prompt icon that is labeled "host". If the COM port # is less than 9, enter pcl_host and the port #. For example, **pcl_host COM9<CR>**. If the COM port# is 10 or higher, enter \\.\ and then the COM port number. For example, for COM12, enter **pcl_host \\.\COM12<CR>**.

Once the host program's box opens, type "?" and <CR> for a list of the commands. See a description of all commands and settings on Page 5.

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.