



ITRON WPG-1 Metering Pulse Generator Instruction Manual

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ITRON WPG-1 Metering Pulse Generator



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INSTALLATION INSTRUCTION

INSTALLATION INSTRUCTION SHEET WPG-1 Metering Pulse Generator

MOUNTING POSITION – The WPG-1 can be mounted in any position. Two mounting holes are provided. The WPG-1 must be mounted in a non-metallic enclosure or somewhere where it can receive the wireless information from the meter without interference. The WPG-1 must be mounted within about 50 feet of your meter. Distances vary with building construction and proximity to the meter. For best results, mount as close to the meter as possible.

The pulse output lines from the WPG-1 may be run longer distances, but the WPG-1 should have uninterrupted line of sight(LOS) access to the greatest extent possible for best results. Choose a mounting location that will not have any metallic parts — moving or stationary — that can affect the RF communications.

POWER INPUT – The WPG-1 is powered by an AC voltage of between 120 and 277 volts. Connect the AC supply's "hot" wire to the L1 terminal. Connect the NEU terminal to the AC supply's "neutral" wire. Connect GND to electrical system Ground. CAUTION: Wire Phase to Neutral only, NOT Phase to Phase. The power supply is auto-ranging from 120 to 277VAC. No configuration or settings are necessary for the power supply input. Ground must be connected. If no true neutral exists at the mounting location, connect both the NEU and GND terminals to ground.

METER DATA INPUT – The WPG-1 receives data from the ITRON Riva Gen5 WiFi-enabled AMI electric meter that has been paired with the WPG-1's WiFi receiver module. The meter must be paired with the WiFi receiver module before the WPG-1 can be used. Once paired, the WPG-1 starts receiving kWh, kVARh, or kVAh information from the meter. (See Page 3.

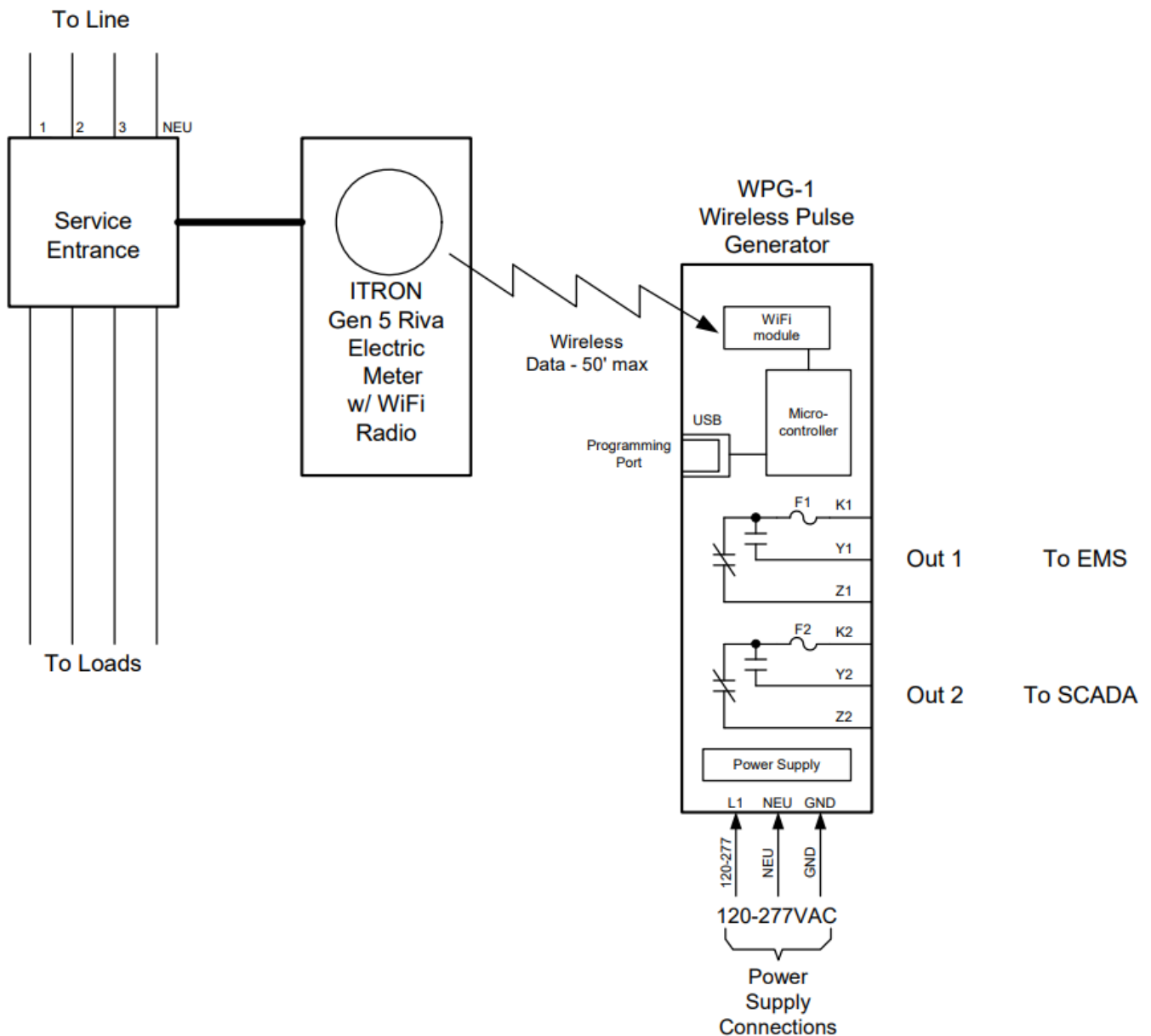
OUTPUTS – Two 3-wire isolated dry-contact outputs are provided on the WPG-1, with output terminals K1, Y1 & Z1 and K2, Y2, & Z2. Transient suppression for the contacts of the solid-state relays is provided internally. The output loads should be limited to 100 mA at 120 VAC/VDC. Maximum power dissipation of each output is 800mW. The outputs are protected by fuses F1& F2. One-tenth (1/10) Amp fuses (the maximum size) are supplied standard.

OPERATION – See the following pages for a full explanation of the operation of the WPG-1. Y2 K2 Z1 Z2

Field Deployment Manager						
Gen5 Riva Electricity Meter > Device Control Panel > Distributed Intelligence > Containers / Agents						
ID	Type	Name	Version	Current State	License Status	
50593792	Container	Ittron	1.5.127.0	Started		Change State...
117571584	Agent	HANAgent	2.0.21.19566068	Unknown	Not Licensed	Change State...

- Once you have the correct version of the HAN Agent and have it licensed, proceed to the document that follows called WPG-1 Programming Instructions.

WPG-1 Wiring Diagram



WPG-1 Wireless Meter Pulse Generator

Pairing the WiFi Radio Receiver

Make sure that all the prerequisite's have been met. See the WPG-1 Prerequisite Sheet attached.

The WPG-1 is designed to work with the ITRON Gen5/Riva Meter. The WPG-1 contains a Wifi module that acts as a Wifi

Access Point. This is called the WPG_AP. The electric meter must be paired with the WPG_AP access point. This may be accomplished by the utility or on their website if they have the process automated. The pairing process, generally known as "provisioning", varies from utility to utility, and not all utilities provide WiFi radio availability in their meters. Contact your electric utility to find out how their provisioning process is accomplished. The WPG-1 must be powered for the WPG_AP module to be paired with the meter and must be within range of the meter, usually within 50 feet. The WPG-1 and its carton are labeled with the SSID and Long Format Device Identifier ("LFDI"). These are necessary to provision the meter with the WPG-1.

The WPG-1's Wifi Module's SSID and LFDI are programmed into the meter or sent to the meter by the utility over the AMI

mesh radio network. By being "paired", the meter and the WPG-AP module have created a dedicated 2-node Wi-Fi "network".

No other Wi-Fi-enabled devices can join this network. The AP module (acting as the Client) knows that it can only ask for and receive meter data from that particular electric meter(acting as the Server).

Power up the WPG-1 (This assumes that the utility has already sent the SSID and LFID to the meter.)

Apply power to the WPG-1. The RED LED on the WiFi AP module will flash once per three seconds looking for the meter.

Once the joining process has been completed, the RED LED will remain on continuously to indicate that the meter is joined with the WiFi Module in a Wi-Fi network. This may take up to 5 minutes to connect. Once the RED LED is lit continuously, the WPG-1 can receive information from the meter. The Green LED on the Wifi module will flash 7 times, once every 16 seconds to indicate that data is being received from the meter. If no valid communication is received from the meter in the

programmed reset period, the WPG-_AP WiFi module will revert back to looking for the meter, and the LED will flash once per three seconds. If it is not continuously lit, then it is not provisioned correctly with the utility meter.

Causes may include:

the utility meter is not powered, not available by WiFi, or another problem is pre-empting the provisioning. Do not proceed

until this step is successfully completed.

WiFi Module Communication Status LEDs

Upon power-up, the YELLOW Comm LED should light indicating that the WiFi receiver module is correctly inserted, initialized and communicating with the WPG-1's main processor. After the successful completion of the pairing, the GREEN Comm LED should begin to blink once every 16 seconds. This indicates that a valid transmission has been received by the WPG_AP receiver module and has been successfully relayed to the WPG-1's processor. The Green Comm LED will continue to blink once every 16 seconds continuously as long as the meter is connected to the WPG-1. If the Green Comm LED does not blink, that is an indication that the data transmissions from the meter are not being received, may be corrupted, or in some manner are not valid transmissions. If the Green Comm LED has been blinking reliably every 16 seconds for some time, then stops for a while and then restarts again, this indicates that transmissions are intermittent and sporadic, or generally means there is a problem in the WiFi receiver module's ability to receive data reliably from the meter. To correct this, change the proximity of the WPG-1 to the meter, move it closer to the meter if possible and eliminate any metallic obstructions between the meter and the WPG-1. Also check to make sure that any walls or barriers between the WPG-1 and the meter have as little metal in them as possible. Line-of-sight with the meter is highly recommended.

Pulse Outputs

Outputs can be configured as Toggle (Form C) 3-Wire mode or Fixed (Form A) 2-Wire mode. Generally speaking, the Form

C mode can be used with either 2-Wire or 3-Wire pulse receiving devices, while the Form A mode uses only a 2-Wire

interface to the downstream pulse (receiving) device. The choice would depend on the application and the desired pulse

format that the receiving device prefers to see.

The WPG-1 will “spread out” the pulses over the next 16-second period if a high enough watt-hour value is received in a

transmission to require that more than one pulse is generated. For example, suppose you have the Output Pulse Value of 10

wh selected. The next 16-second data transmission indicates that 24 wh have been consumed. Since 24 watt-hours exceeds

the 10 watt-hour pulse value setting, two pulses must be generated. The first 10wh pulse will be generated immediately.

About 8 seconds later the second 10wh pulse will be generated. The remainder of four watt-hours stays in the accumulated

energy register (AER) awaiting the next transmission and the energy value of that transmission to be added to the contents of the AER. Another example: Assume 25 wh/p Output Pulse Value. Let’s say the next transmission is for 130 watt-hours. 130 is greater than 25, so 5 pulses will be outputted over the next 15-16 seconds, approximately one each 3.2 seconds (16

seconds / 5 = 3.2 seconds). The remainder of 5 wh will stay in the AER awaiting the next transmission. Some trial and error

may have to be done for any particular building since pulse rates will change depending on maximum load.

If the receiver module is reliably receiving data from the meter and passing it on to the WPG-1’s processor, then you should see the Red (and Green in the Form C output mode) output LED’s toggle each time the selected pulse value is reached,

and the processor generates a pulse. If the pulse output value is too high and pulses are too slow, enter a lower pulse value. If pulses are being generated too rapidly, enter a larger pulse output value. The maximum number of pulses per second in the toggle mode is approximately 10, which means that the output’s open and closed times are about 50mS each in toggle mode. If the calculation by the WPG-1’s processor is for pulse output timing that exceeds 15 pulses per second, the WPG-1 will light the RED Comm LED, indicating an overflow error, and that the pulse value is too small. It is “latched” on so that the next time you look at the WPG-1, the RED Comm LED will be lit. In this way, you can quickly determine if a pulse output value is too small. In the optimum application, pulses would not exceed more than one pulse per second at full scale demand. This allows a very even and “normal” pulse rate that as closely as possible resembles an actual KYZ pulse output from the meter.

The WPG-1 has two independent Form C (3-wire) outputs. These are labeled as K1, Y1, Z1 for output #1 and K2, Y2, Z2 for output #2. Each output can be operated as FORM C(3-Wire) output or FORM A(2-Wire). If an output is operated in the Form A mode, the K-Y output terminals are used.

Pulse Types

There are six pulse types: Wh, VARh or VAh pulses, each either as Delivered(positive) or Received(negative) quantities. The WPG-1 has the capability to output two of these at a time on the two independent pulse outputs. This manual refers to watt-hour pulses, but all references to watt-hour pulses are generally applicable to the other two pulse types as well, unless otherwise noted.

Wh Pulses: Wh pulses are the real power component of the power triangle. Wh pulses are used to derive kW. Since Wh

pulses are directly available from the WiFi-enabled meter, the Wh value of a pulse is added to the AER each time a pulse is

received. When the pre-determined output pulse value is reached, a Wh pulse is outputted on the output

assigned.

VARh Pulses: VARh pulses are the reactive power component of the power triangle. VARh pulses are used to derive VAR's. Since VARh pulses are directly available from the WiFi-enabled meter, the VARh value of a pulse is added to the AER each time a pulse is received. When the pre-determined output pulse value is reached, a VARh pulse is outputted on the output assigned.

VAh Pulses: VAh pulses are the apparent power component of the power triangle. VAh pulses are used to derive VA's. Since VAh pulses are directly available from the WiFi-enabled meter, the VAh value of a pulse is added to the AER each time a pulse is received. When the pre-determined output pulse value is reached, a VAh pulse is outputted on the output assigned.

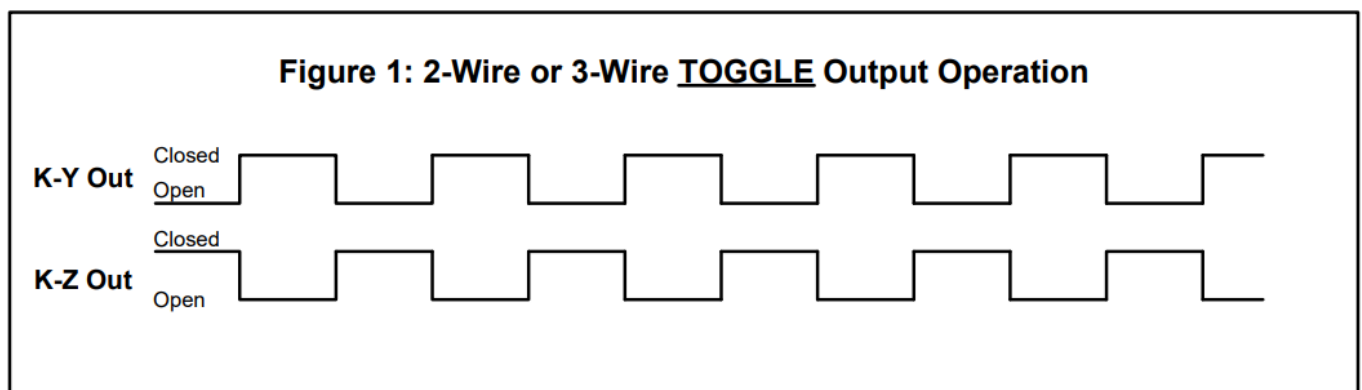
It is important that you select the correct type of pulse output. The correct type of pulse output will depend on your billing structure from the utility and what you want to use pulses for. If you are doing demand control and your demand is billed in kW's, then you want to use Wh pulses. Conversely, if you are billed for demand in kVA, then you want to select VAh pulses. If you are doing power factor control, you will likely need Wh pulses on one output and VARh pulses on the other output. Contact your utility or Solid State Instruments for technical support.

Over ranging the Output

As previously mentioned, if there are too many pulses calculated to be outputted in a 6-7 second interval than the WPG-1 can generate given the timing constraints, the WPG-1 will light the RED Comm LED. In this situation, simply increase the output pulse value by entering a higher number in the Pulse Value box, then click . This LED is intended to notify the user that some pulses have been lost and a larger pulse value is needed. As load is added to a building over time, there is a greater likelihood that this may occur, especially if the pulse value is small. Be sure to consider this if/when you add load to the building. If an error condition occurs, set the Output Pulse Value for a Wh value that is double the current pulse value. Remember to change the pulse constant of your receiving device as well, since pulses will now be worth twice the value. Cycle power to the WPG-1 to reset the RED Comm LED after increasing the pulse value.

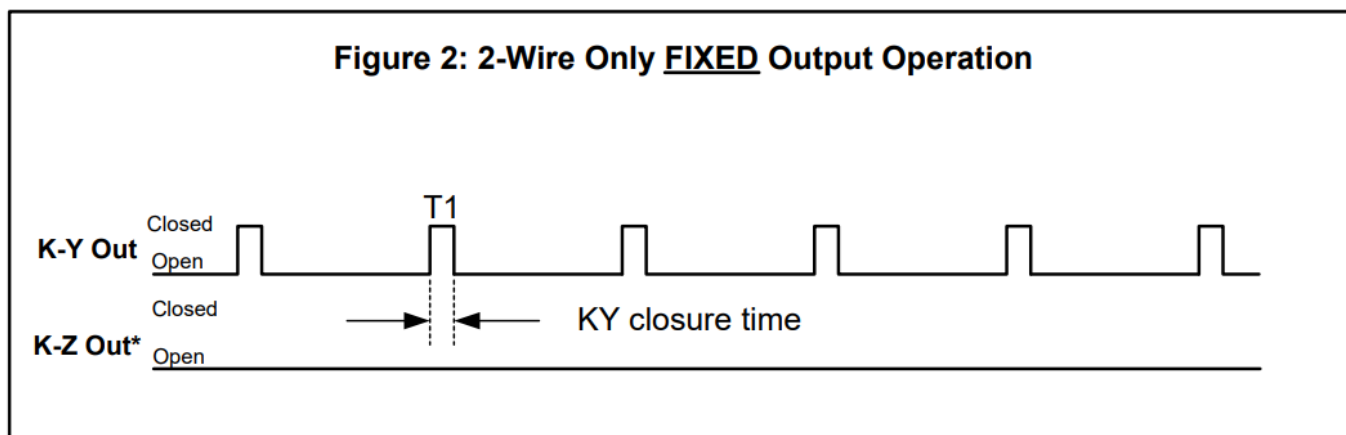
WORKING WITH THE WPG-1 RELAY

OPERATING MODES: The WPG-1 Meter Pulse Generator allows the outputs to be configured in either the "Toggle" or "Fixed" pulse output mode. In the Toggle mode, the outputs alternate or toggle back and forth between K-Y and K-Z continuity each time a pulse is generated. This is synonymous with the classic 3-Wire Pulse metering and emulates the SPDT switch model. Figure 1 below shows the timing diagram for the "Toggle" output mode. K-Y and K-Z closures or continuity are always opposite of each other. In other words, when the K-Y terminals are closed (on), the K-Z terminals are open(off). This mode is best for timing pulses to derive demand whether 2 or 3 physical wires are being used to the downstream (pulse receiving) device or system.



In the Fixed output mode, shown in Figure 2 below, an output pulse (K-Y closure only) is a fixed width (T1) each time the output is triggered. The pulse width (closure time) is determined by the setting of the Pulse Width (W)

command. This mode is best for energy (kWh) counting systems but may not be the best for systems doing demand control where pulses are timed to derive instantaneous kW demand. The K-Z output is not used in the normal/fixed mode.



*If the output is configured for Form A pulses the K-Z output is not used. In Figure 2 above, the K-Z output is disabled, thus showing no pulses.

Contact the factory for technical support at (970)461-9600.

WPG-1 Programming

Setting the WPG-1's Settings

Set the WPG-1's output pulse value, the meter multiplier, the pulse output mode, pulse type and pulse timing by using the

USB [Type B] Programming Port on the WPG-1 board. All system settings are configured using the USB Programming Port. Download the SSI Universal Programmer software (Version 1.2.0.0 or later) available as a free download from the

SSI website. Alternately, the WPG-1 can be programmed using a terminal program such as Tera Term. See "Setting up the Serial Port" on Page 9. Red (Tx) and Green (Rx) LEDs are provided next to the USB Jack on the WPG-1 to indicate communication between the WPG-1 and the programming computer.

Programmer Startup

Before starting the program connect the USB cable between your computer and the WPG-1. Make sure that the WPG-1 is powered up. Click on the SSI Universal Programmer icon on your desktop to start the program. In the upper left corner you will observe two Green simulated LEDs, one indicating that the USB cable is connected and the other that the WPG-1 is connected to the programmer. Make sure both LED's are "lit".

USB Cable Connected:



Serial Connected:



Meter Multiplier

If the building on which you are installing the WPG-1 has an "Instrument-Rated" electric meter, you must enter the Meter

Multiplier to the WPG-1's program. If the meter is a "Self-Contained" electric meter, the Meter Multiplier is 1.

If the facility's electric metering configuration is Instrument-Rated, determine the Multiplier of the meter. In an instrument rated metering configuration, the meter multiplier is normally the Current Transformer ("CT") ratio. It will also include the Potential Transformer ("PT") Ratio, if PT's are used, usually only on larger applications. An 800 Amp to 5 Amp current transformer, for example, has a ratio of 160. Therefore, the meter multiplier on a building with 800:5A CT's would be 160. The Meter Multiplier is normally printed on the customer's monthly utility bill. If you

cannot find it, call your utility and ask what the meter or billing multiplier is. To program the Multiplier in the WPG-1, enter the correct Multiplier in the Meter Multiplier box and click . See the main program screen on Page 10.

Pulse Type

The Pulse Type for the Output 1 and Output 2 are set individually. Output pulse types are Watt-hours (real power), VAR hours (reactive power) or VA-hours (apparent power), each as either Delivered or Received. Select the correct selection in the drop down menu for Output 1 Type and Output 2 Type and click . See Page 4 for a description of Pulse Types.

Pulse Value

The Output Pulse Value is the number of watt-hours that each pulse is worth. The WPG-1 can be set from 1 Wh to 99999 Wh per pulse. Select an appropriate pulse value for your application. A good starting point is 100 Wh/pulse for larger buildings and 10 Wh/pulse for smaller buildings. You can adjust it up or down as needed. Larger facilities will require a larger pulse value to keep from over ranging the WPG-1's registers. Enter the number in the Pulse Value box and click . ****NOTE****: If the pulse value you need is expressed as Kilowatt-hours (kWh), multiply the kWh pulse value by 1000 for the equivalent watthour value, if applicable.

Output Form

The WPG-1 allows either the legacy 3-Wire (Form C) Toggle mode or the 2-Wire (Form A) Fixed mode. The toggle mode is the classic pulse output mode that emulates the standard KYZ 3-Wire electric meter output. It toggles back and forth, to the opposite state, each time a "pulse" is generated by the WPG-1. Even though there are three wires (K, Y, & Z), it is common to use K and Y, or K and Z, for many two-wire systems that require or desire a generally symmetrical 50/50 duty cycle pulse at any given time. The toggle mode is used for systems that are doing demand monitoring and control and need regularly spaced or "symmetrical" pulses. If you are in FORM C Toggle output pulse mode, and your pulse receiving device uses only two wires, and the pulse receiving device only counts the output's contact closure as a pulse(not the opening), then the 3-Wire pulse value must be doubled in the Pulse Receiving Device. Red and Green Output LEDs show the pulse output status. See additional information on Page 5. Use the Output Form box, select "C" in the pulldown and click .

Use the Output Form box to enter "A" to select the FORM A Fixed mode. In the Fixed mode, only the K-Y output is used. This is the standard 2-Wire system where the output contact is normally-open until such time as a pulse is generated. When a pulse is generated, the contact is closed for the fixed time interval, in milliseconds, selected in the Form A Width box. Form A mode is generally associated with Energy (kWh) measuring systems. Select "A" in the Output Form pulldown box and click .

Set the Form A Pulse Width (Closure Time)

If you are using the WPG-1 in the Form A (Fixed) Mode, set the output closure time or pulse width, selectable at 25mS, 50mS, 100mS, 200mS, 500mS or 1000mS (1 second) using the Form A Width box. Upon a pulse being generated, the K-Y terminals of each output will close for the selected number of milliseconds and light the RED Output LED only. This setting applies only to the Form A output mode, and does not affect the toggle output mode. Use the shortest closure time possible that will be reliably received by the pulse receiving equipment, so as not to unnecessarily limit the output's maximum pulse rate. Select the desired pulse width from the pulldown in the Form A Width box and click .

Module Monitor Modes

There are three module readout modes available on the WPG-1: Normal, Echo and EAA. This determines what information is shown in the monitor box on the right-hand side of the screen when you are in the monitor mode. The Normal Mode is the default and shows you the time stamp, the demand, the internal multiplier and the divisor coming from the meter every 16 seconds. Select Normal in the Module Mode box and click .

The Echo mode allows you to view the entire transmission string coming from the meter the way it is received by the WPG1's microcontroller from the dongle in ASCII format. This mode may be useful in troubleshooting in the event of intermittent transmissions from the meter. Select Echo in the Dongle Mode box and click .

The EAA mode allows you to view the adjustments made by the Energy Adjustment Algorithm. This mode may be useful in observing how often the Accumulated Energy Register is adjusted based on differences between the

number of pulses outputted and the energy accumulated from transmissions from the meter. Readouts in this mode happen very rarely so it can easily be assumed that nothing is happening. Select EAA in the Dongle Mode box and click .

Reading back all Programmable Parameters

To view the values of all programmable settings that are currently programmed into the WPG-1, click on . The USB serial link will return the current value of each setting if you are connected to the WPG-1 with the SSI Universal Programmer software.

Reset Odometers

The WPG-1 contains a perpetual energy registers that is referred to as the Energy Odometer. This can be reset at any time and may be used with the monitor mode to track overall energy use. To reset, click on to clear out the current readings in the WPG-1's energy registers.

Reset All Setting to Factory Defaults

If you find that you want to reset all parameters back to the factory defaults, simply pull down the File menu and select "Reset Factory Defaults. The following parameters will default back to the factory settings as follows:
Multiplier: 1 Pulse Value: 10 Wh

Viewing the Firmware Version

The version of firmware in the WPG-1 is displayed in the upper left hand corner of the SSI Universal Programmer, and will read something similar: You are connected to: WPG1 V3.05

Monitoring the WPG-1 using the SSI Universal Programmer

In addition to programming the WPG-1 you can also monitor the communications or the data being received from the WiFi module. Select the mode in the Module Mode box and click as indicated above.

Once you have made the module mode selection, click on the Monitor button. The left side of the SSI Universal Programmer will be grayed out and the Monitoring box on the right-hand side of the window will begin showing transmissions each time they are received. You cannot change settings of the WPG-1 while the SSI Universal Programmer is in the Monitor mode. To go back to Programming mode, click on the Stop Monitoring button.

End-Of-Interval Capability

While the WPG-1's firmware has provisions for an End-of-Interval pulse, the WPG-1's standard hardware does not support this feature. Set the Interval box to the interval length and pulse width length desired and click on . If you need the end-of-interval output pulse capability, contact Solid State Instruments to purchase the MPG/WPG EOI add-on board. This board plugs onto the main board and provides the termination points for the End-of-Interval Pulse Output.

Programming with a Terminal Program

If you can't use the SSI Universal Programmer software to program the WPG-1, it can also be programmed using a terminal program like Tera Term, Putty, HyperTerminal or ProComm. Set the baud rate for 57,600, 8 bit, 1 stop bit and no parity. Be sure that the Receive is set for CR+LF and Local Echo is turned on.

List of WPG-1 Commands (?)

For help in selecting or using the serial commands with the WPG-1, simply press the ? key. The serial link on the WPG-1 will return a full list of the commands.

'mXXXXX or MXXXXX – Set multiplier (XXXXX is 1 to 99999).

'pXXXXX or PXXXXX – Set pulse value for output 1: Watthours, VA hours, VA hours (XXXXX is 0 to 99999)

'qXXXXX or QXXXXX – Set pulse value for output 2: Watthours, VA hours, VA hours (XXXXX is 0 to 99999)

'jX' or 'JX' – Set Pulse Type, Output 1 (X is 0-6). 0-Disabled, 1-Watthours-Delivered; 2-Watthours-Received; 3-VA Rhours-Delivered; 4-VARhours-Received, 5-VAhours-Delivered; 6-VAhours-Received
 'kX' or 'KX' – Set Pulse Type, Output 2 (X is 0-6). 0-Disabled, 1-Watthours-Delivered; 2-Watthours-Received; 3-VAR hours-Delivered; 4-VARhours-Received, 5-VAhours-Delivered; 6-VAhours-Received
 'c0' or 'C0' – Pulse Output Mode Form C Disabled Output 1(Form A Output Mode)
 'c1' or 'C1' – Pulse Output Mode Form C Enabled Output 1(Form C Output Mode)
 'b0' or 'B0' – Pulse Output Mode Form C Disabled Output 2(Form A Output Mode)
 'b1' or 'B1' – Pulse Output Mode Form C Enabled Output 2(Form C Output Mode)
 'o0' or 'O0' – Reset Odometer on Output #1
 'o1' or 'O1' – Reset Odometer on Output #2
 'd0' or 'D0' – Disable Module mode
 'd1' or 'D1' – Set into Module Normal mode
 'd2' or 'D2' – Set into Module Echo mode
 'wX' or 'WX' – Set Fixed Mode Pulse (X is 0-5). (See below)
 'eX' or 'EX' – Set End Of Interval, (X is 0-8), 0-Disabled.
 'iX' or 'IX' – Set Interval Length, (X is 1-6)

'KMODYYRHRMNSC' – Set Real Time Clock Calendar, MO-Month, DY-Day, etc.
 'tXXX or TXXX – Set Reset Time, seconds (XXX is 60 to 300).
 'z' or 'Z' – Set Factory Defaults
 'v' or 'V' – Query Firmware version
 'r' or 'R' – Read Parameters.

Form A (Fixed) Pulse Width

'wX' or 'WX' – Pulse Width, milliseconds – 25 to 1000mS, 100mS default; (Applies to both outputs)

Form A Pulse Width Selections:

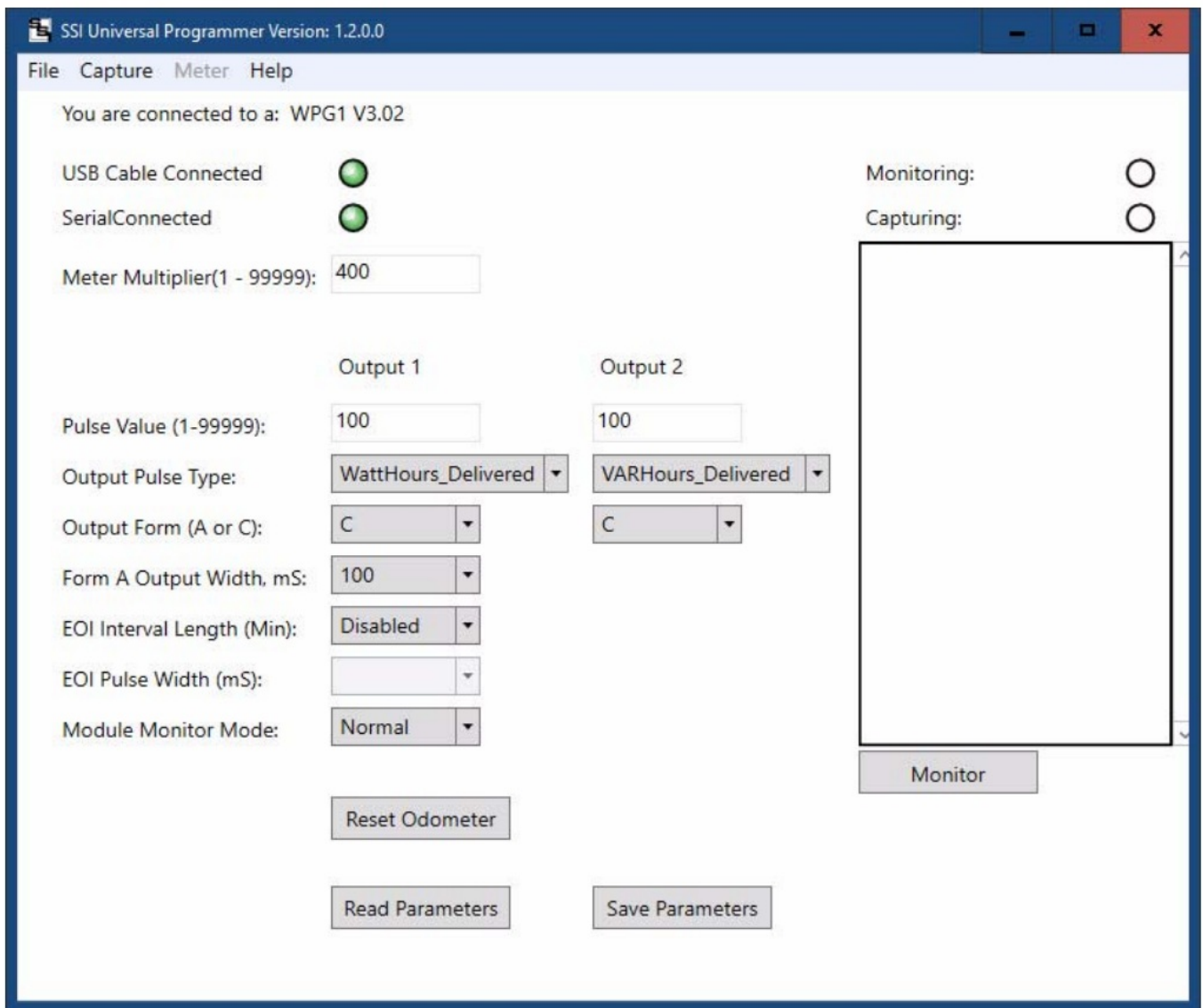
'w0' or 'W0' – 25mS Closure
 'w1' or 'W1' – 50mS Closure
 'w2' or 'W2' – 100mS Closure
 'w3' or 'W3' – 200mS Closure
 'w4' or 'W4' – 500mS Closure
 'w5' or 'W5' – 1000mS Closure

Capturing Data with the SSI Universal Programmer

It is also possible to Log or capture data using the SSI Universal Programmer. When the logging function is enabled, the information received from the Module or the meter can be logged to a file. This will be helpful in trying to troubleshoot intermittent connectivity issues. Click on the Capture pulldown menu and select setup. Once a file name and directory have been designated, click on Start Capture. To end the Logging, click on Stop Capture.

SSI Universal Programmer

The SSI Universal Programmer is a windows-based programming utility for the WPG Series and other SSI products. Download the SSI Universal Programmer from the SSI website at www.solidstateinstruments.com/sitepages/downloads.php. There are two versions available for download: Windows 10 and Windows 7 64-bit Version 1.2.0.0
 Windows 7 32-bit V1.2.0.0
 If you are using Windows 7, check your computer first to insure you download the right version.



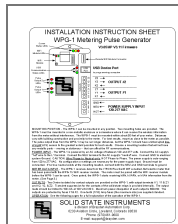
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Documents / Resources



[ITRON WPG-1 Metering Pulse Generator](#) [pdf] Instruction Manual
WPG-1 Metering Pulse Generator, WPG-1, Metering Pulse Generator, Pulse Generator, Genera
tor

References

- [User Manual](#)

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