

# Analog Pulse Kit

## Model APK.PLUS



**Provides 4-20 Milliamp Flow Rate and Pulse-per-Volume Meter Signals to SCADA, Telemetry, and Building Automation Systems!**

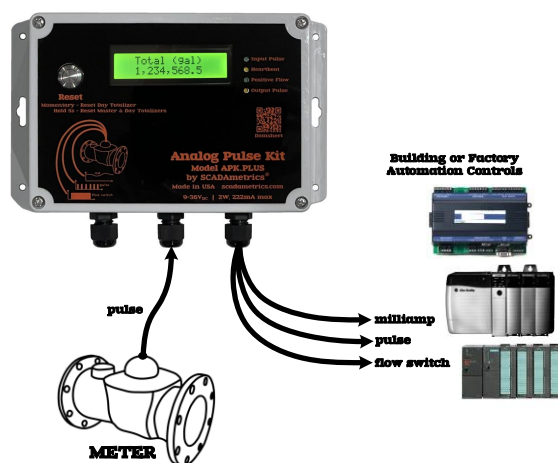
SCADAMetrics® is pleased to introduce a new member to its DINstrumentation™ series – **Analog Pulse Kit Plus!**

This new electronic signal generator for water meters provides a 4-20 milliamp (flow) output, a dry contact pulse (per volume) output, and a dry contact flow switch output!

Certain flow meters, such as the **Master Meter Octave**, are available with an open-drain pulse output signal. The SCADAMetrics **Analog Pulse Kit** was designed to expand upon this signal to provide an efficient flow meter interface to SCADA, Telemetry, and Building Automation Systems.

Furthermore, the **Analog Pulse Kit Plus** was designed using SCADAMetrics' signature approach of providing users with the capability to easily set the instrument's meter-specific behavior in-the-field, as opposed to only at the factory. All meter-specific customization is accomplished using 16 integrated DIP-switches, which are set according to our lookup table. The obvious benefits to our approach are accelerated project schedules and shortened lead-times.

The **Analog Pulse Kit** utilizes the digital pulse output from the water meter to generate a 4-20mA rate-of-flow signal and a secondary dry-contact pulse-per-volume signal. It also generates a dry-contact flow switch signal, which can be used, for example, to trigger ON/OFF a chemical disinfection pump.



For the **Octave SSR** option, the **Analog Pulse Kit** provides the necessary 24V<sub>DC</sub> auxiliary power supply for this unique meter option.

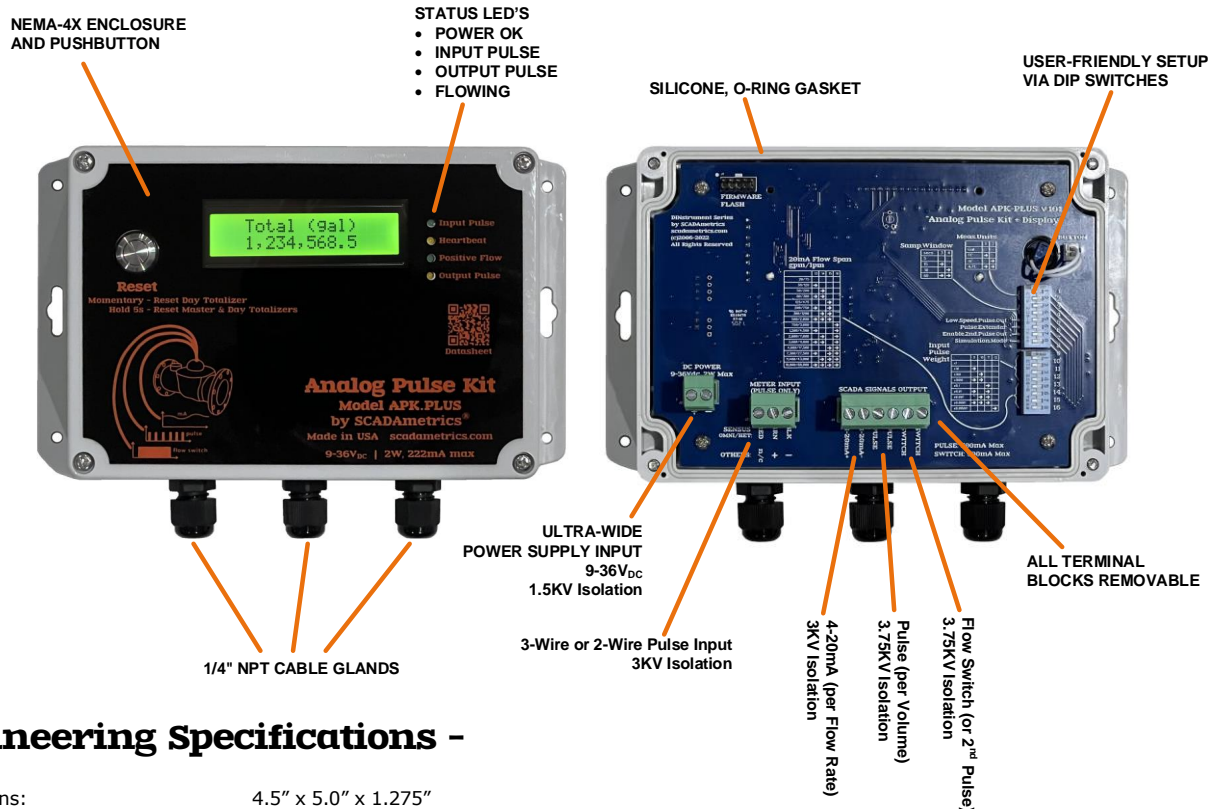
For flow meters whose pulse output signal is too short-duration (milliseconds) or too high-frequency (Hz) to be detected by certain low-pulse-bandwidth BMS systems, the **Analog Pulse Kit** provides a **Pulse Extension** feature, which lengthens the duration of each output pulse to at least 100 milliseconds; and the **Analog Pulse Kit** also provides a **Low-Speed Pulse Output** feature, which decreases the pulse output frequency (Hz) by a factor of 10.

### Key Features -

- 4-20mA Flow-Proportional Output (3KV Isolation).
- Dry-Contact, Volume-Proportional Output (3.75KV Isolation).
- Dry-Contact Flow-Switch Output (3.75KV Isolation).
- Large, 2x16 Character Backlit Display: Master Total, Day Total, Rate
- Compatible with Most Late-Model, Pulse-Type Flow Meters.
- Works with All Popular Registration Units (Gallons, Cubic Feet, Cubic Meters, Acre Feet).
- No Computer Required! – Setup via DIP Switches Only!
- Removable Terminal Blocks, Simplified Wiring Procedures.
- NEMA-4X Wall-Mountable.
- 24VDC-Powered (1.5KV Isolation). Low 1.2W Power Consumption.
- Enclosure and Circuit Board: UL 94-VO recognized materials.
- Simulation-Mode Feature: Emits 12mA and 1 Hz Pulse.

Are you interested in how SCADAMetrics meter technology can help you more closely monitor the flow through your water meters? Give us a call! We'll be glad to discuss the details!

**SCADAMetrics**  
**scadametrics.com**  
 Wildwood, Missouri USA  
 636.405.7101



## Engineering Specifications -

Dimensions: 4.5" x 5.0" x 1.275"  
 Weight: 17.1 Ounces  
 Supply Voltage: 9-36V<sub>DC</sub>  
 Supply Power: 1.25W  
 Power Supply Isolation: 1500V<sub>RMS</sub>

Solid-State Pulse Support: Yes  
 Dry-Contact Pulse Support: Yes  
 Master Meter Support: Yes – Octave with Open-Drain Pulse (preferred model configuration), Octave with SSR (solid-state relay) Pulse

Supported Units: Gallon, Cubic Feet, Cubic Meters, Acre-Feet  
 Supported Scalars: x1, x10, x100, x1,000 --- x0.1, x0.01, x0.001, x0.0001, x0.00001, x1/60, x1/6, x10/6, x100/6  
 Flow Calculation Window: 5s, 15s, 30s, 60s (User-Selectable)  
 Programming Method: Integrated DIP Switches, 16-Poles  
 Totalizer Max Unscaled Count: 999,999,999  
 Input Pulse Frequency Range: 0 – 5000 Hz  
 Minimum Pulse Width: 100 microseconds

4-20mA Flow Range (gpm): 20,30,50,80,125,200,300,500,750,1200,2000,3000,4600,7300,11400,18000  
 4-20mA Flow Range (lpm): 75,120,200,300,475,750,1200,2000,3000,4500,7000,11000,17500,27500,43000,68000  
 4-20mA Resolution: 16-Bit DAC  
 4-20mA Isolation: 3000V<sub>RMS</sub>  
 4-20mA Max Series Resistance: 500 Ω  
 4-20mA Signal Type: Active. Therefore, do not add an external loop supply, or else damage to the unit will result!

Physical Display: 2x16 Characters, Character Dimension: 0.114 x 0.203 inch  
 Displayed Metering Data: Master Totalization, Day Totalization, Flow Rate  
 Loss-of-Power Memory: Master and Day Totalizers Stored in Non-Volatile, Ferro-Electric RAM  
 Pulse Output Type: Solid-State Dry-Contact, 1 Output Pulse per Input Pulse  
 Flow Switch Output Type: Solid-State Dry-Contact, Closes if Rate-of-Flow > 0  
 Pulse Output Resolution: Normal-Speed Mode: Output Pulse Resolution = Input Pulse Resolution  
 Low-Speed Mode: Output Pulse Resolution = Input Pulse Resolution/10 (De-Activates De-Bounce Filter)

De-Bounce Filter: 200ms – Activated Only For 15s, 30s, and 60s Flow Calculation Windows When Pulse Extension Mode is ON  
 100ms – Activated Only For 5s Flow Calculation Window When Pulse Extension Mode is ON

Closed-Contact Resistance: 0.4 ohm, typical  
 Closed-Contact Max Current: 500mA  
 Open-Contact Max Voltage: 60V  
 Pulse/Flow Switch Isolation: 3750V<sub>RMS</sub>

Meter Cable Connection: 3-Position, Removable Screw-Down Terminal Block, 12-26 AWG  
 SCADA Cable Connections: 6-Position, Removable Screw-Down Terminal Block, 12-26 AWG

Temperature: -40C to 85C (-40°F to 185°F)  
 Relative Humidity: 5% to 95%, Non-Condensing  
 Enclosure Rating: Built to NEMA-4X Specifications, Not Rated for Submersion  
 Manufacturing Location: USA  
 Warranty: 2 Years (see [www.scadametrics.com](http://www.scadametrics.com) for details)

Engineering Dimensions (Inches) -



Meter Terminal Block Hookup (Table.1) -

Terminal	Function	Octave with SSR Pulse	Octave with Open-Drain Pulse (Preferred Model Configuration)
1	Excitation Power (+24V <sub>DC</sub> )	Short Cable Red	No Connection!
2	Pulse Input (+)	Long Cable Red	Red – Pulse (+)
3	Pulse Input (-)	Short Cable Black, Long Cable Orange	Black – Pulse (-)

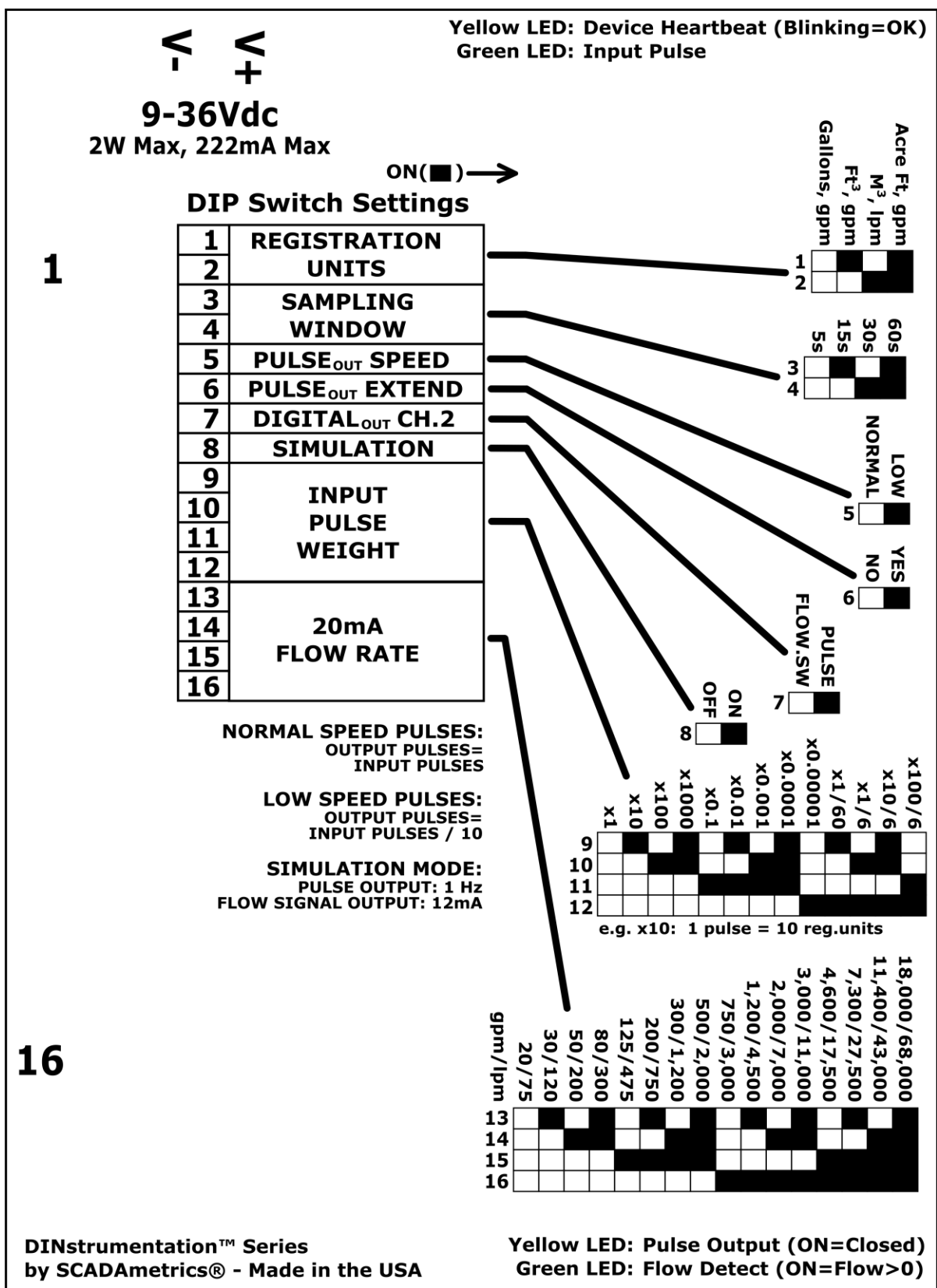
Wiring Notes:

- 1. Terminal #1 is a 24V<sub>DC</sub> Excitation Power Supply, which is provided as a convenience for Octave SSR Pulse Option only.
- 2. Octave Open-Drain Pulse should connect to Terminals #2 and #3 only.

Signal Terminal Block Hookup (Table.2) -

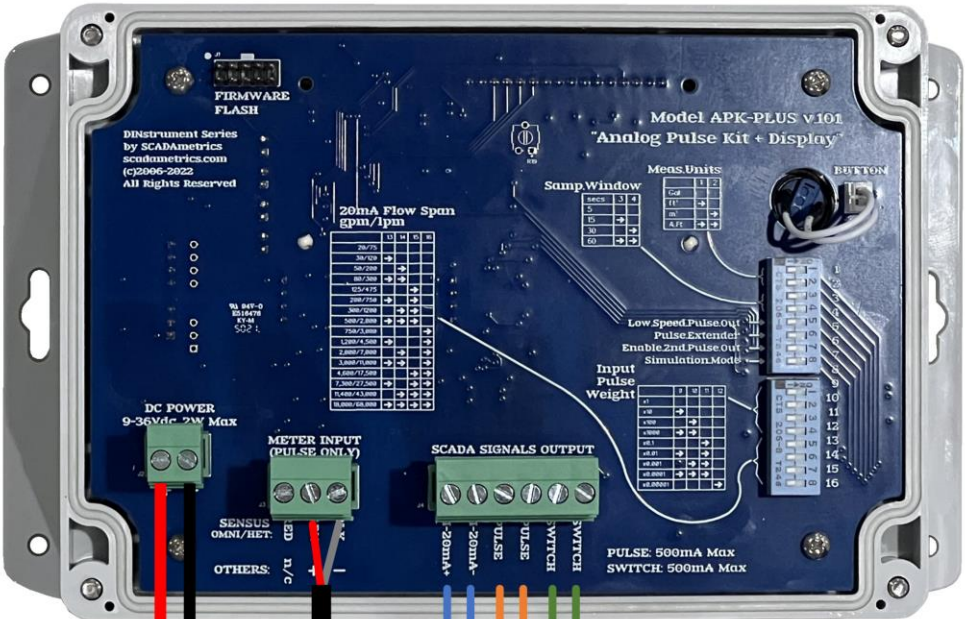
Terminal	Function	Notes
4	4-20mA +	Settable Range via DIP Switches
5	4-20mA -	
6	Pulse +	Solid-State Dry Contact (N-O) 500mA Max, 60V Max
7	Pulse -	
8	Flow Switch +	Solid-State Dry Contact (N-O) 500mA Max, 60V Max
9	Flow Switch -	

### DIP Switch Setup (Figure.1) -



# QUICK-START GUIDE -

MODEL APK-PLUS  
by SCADAmetrics  
"Analog Pulse Kit"



OCTAVE  
OPEN-DRAIN  
WIRING  
Fig1

...from  
24V<sub>DC</sub>  
POWER  
ADAPTER

DC Common  
2-WIRE (OPEN-DRAIN)  
PULSE CABLE - RED, BLACK

+4-20mA  
Output  
Pulse per Volume  
(Dry Contact)  
Flow Switch  
(Dry Contact)

Signals to SCADA/Telemetry System

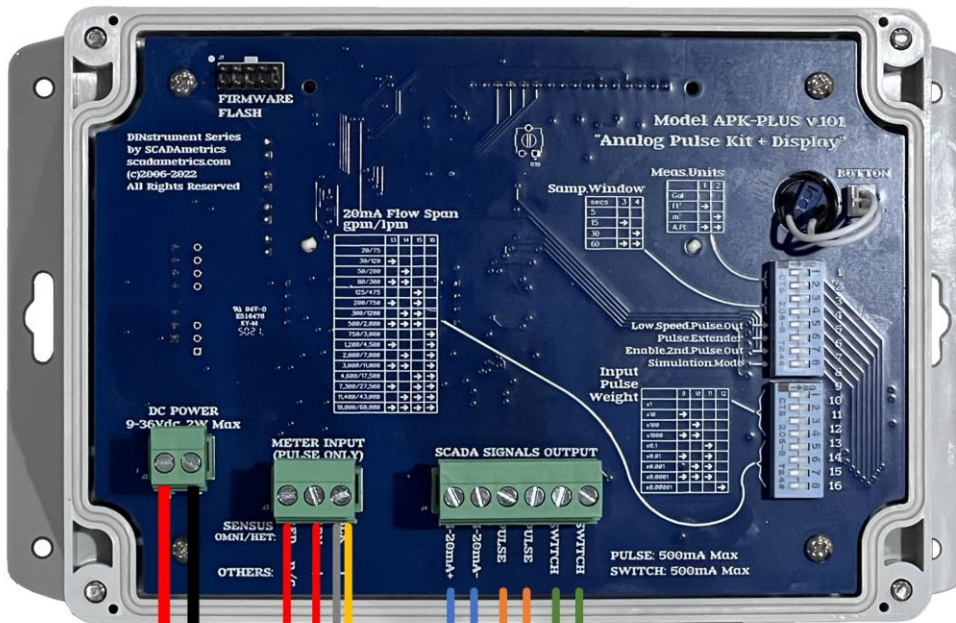


## SCADAmetrics Recommendations: Octave Pulse Module Option

Octave Diameter (in)	Pulse Weight
1.5" - 4"	1 USG 0.1 FT3 1 L
6" - 12"	10 USG 1 FT3 10 L



MODEL APK.PLUS  
by SCADAmetrics  
"Analog Pulse Kit"



**OCTAVE  
SSR  
WIRING  
Fig2**

...from  
24V<sub>DC</sub>  
POWER  
ADAPTER

+24V<sub>DC</sub> +  
DC Common -

EXCITATION POWER CABLE  
(SHORT CABLE - RED, BLACK)

SOLID-STATE RELAY  
(LONG CABLE - RED, ORANGE)

4-20mA +  
Output -  
Pulse per Volume  
(Dry Contact)  
Flow Switch  
(Dry Contact)

Signals to SCADA/Telemetry System

MASTER METER  
OCTAVE ULTRASONIC METER  
WITH PULSE OUTPUT MODULE  
(OPEN DRAIN)  
OR  
DUAL-OUTPUT MODULE  
ENCODER+PULSE  
(OPEN DRAIN)

### SCADAmetrics Recommendations: Octave Pulse Module Option

Octave Diameter (in)	Pulse Weight
15" - 4"	1 USG 0.1 FT <sup>3</sup> 1 L
6" - 12"	10 USG 1 FT <sup>3</sup> 10 L

## **Initial Setup:**

- 1. Attach the water meter's two (2) pulse wires (or four (4) pulse wires for Octave SSR option meters) Analog Pulse Kit terminals 1,2,3 (see above table for color-coding).**
- 2. (If Applicable) Connect the 4-20mA output signal to PLC/Controller: Terminals 4(+) and 5(-). Important Note! – The Analog Pulse Kit provides loop power. The user must not add an additional loop power supply, or else damage to the unit will result.**
- 3. (If Applicable) Connect the pulse output signal to the PLC/Controller: Terminals 6 and 7. Important Note! – The pulse output is a solid-state, dry-contact type. 500mA max, 60V max. Circuit must be current-limited by external means.**
- 4. (If Applicable) Connect the flow switch signal to the PLC/Controller: Terminals 8 and 9. Important Note! – The flow switch output is a solid-state, dry-contact type. 500mA max, 60V max. Circuit must be current-limited by external means.**
- 5. Set the DIP Switches, per Figure.1, and per Following Instructions:**

<b>DIP Switches</b>	<b>Function</b>
1-2	Set Registration Units to Match Target Flow Meter: <ul style="list-style-type: none"> <li>• Gallons</li> <li>• Cubic Feet</li> <li>• Cubic Meters</li> <li>• Acre Feet</li> </ul>
3-4	Set Sampling Window, Per Typical Pulse Input Frequency: <ul style="list-style-type: none"> <li>• 5s – When Pulse Input Freq &gt; 0.4 Hz</li> <li>• 10s – When Pulse Input Freq: 0.2-0.4 Hz</li> <li>• 30s – When Pulse Input Freq: 0.1-0.2 Hz</li> <li>• 60s – When Pulse Input Freq &lt; 0.05 Hz</li> </ul>
5	Set Pulse Output Speed: <ul style="list-style-type: none"> <li>• Normal (Output Pulse Speed = Input Pulse Speed)</li> <li>• Slow (Output Pulse Speed Hz = Input Pulse Speed Hz / 10)</li> </ul> Recommendation: Use Slow Speed if SCADA, Telemetry, BMS Incapable of Processing Normal Speed Pulses.
6	Enable/Disable Pulse Output Extension Mode: <ul style="list-style-type: none"> <li>• Disable (Output Pulse Width = Input Pulse Width)</li> <li>• Enable (Output Pulse Width = Max(Input Pulse Width , 100 or 200 ms) )</li> </ul> (Enables 100ms De-Bounce Filter and Extension, if Sampling Window = 5s) (Enables 200ms De-Bounce Filter and Extension, if Sampling Window = 15s, 30s, or 60s)  Recommendation 1: Enable Pulse Extension Mode If Pulse Width Too Short for Detection by SCADA, Telemetry, BMS System.  Recommendation 2: Enable Pulse Extension Mode for Low-Frequency, Mechanical Contact Closure Inputs In Order to Activate De-Bounce Function.  Note! – If Extended Pulse Width Mode Causes Output Pulses to Overlap, Then User May Also Set Pulse Output Speed to 'Slow'.  Possible Examples: <ul style="list-style-type: none"> <li>• Badger Meter HR Default Pulse Width: 50ms</li> <li>• Metron-Farnier Innov8 Default Pulse Width: 50ms</li> </ul>

7	Configure Digital Output Channel 2: <ul style="list-style-type: none"> <li>Flow Switch Output (Contact Closure When Flow Rate &gt; 0)</li> <li>2<sup>nd</sup> Pulse Output (Mirrors 1<sup>st</sup> Pulse Output)</li> </ul>																										
8	Enable / Disable Simulation Mode: <ul style="list-style-type: none"> <li>Enable (For Debugging Control Panel):             <ul style="list-style-type: none"> <li>4-20mA Output = 12mA (50%) Fixed</li> <li>Pulse Output = 1 Hz Fixed</li> <li>Flow Switch Output = ON / Closed</li> </ul> </li> <li>Disable (Run Mode):             <ul style="list-style-type: none"> <li>4-20mA, Pulse, &amp; Flow Switch Operate in Normal Run Mode</li> </ul> </li> </ul>																										
9,10,11,12	Set the Input Pulse Weight: <table border="1"> <tr><td>x1</td><td>1 pulse per 1 unit</td></tr> <tr><td>x10</td><td>1 pulse per 10 units</td></tr> <tr><td>x100</td><td>1 pulse per 100 units</td></tr> <tr><td>x1000</td><td>1 pulse per 1000 units</td></tr> <tr><td>x0.1</td><td>1 pulse per 0.1 unit</td></tr> <tr><td>x0.01</td><td>1 pulse per 0.01 unit</td></tr> <tr><td>x0.001</td><td>1 pulse per 0.001 unit</td></tr> <tr><td>x0.0001</td><td>1 pulse per 0.0001 unit</td></tr> <tr><td>x0.00001</td><td>1 pulse per 0.00001 unit</td></tr> <tr><td>x1/60</td><td>1 pulse per 1/60 unit</td></tr> <tr><td>x1/6</td><td>1 pulse per 1/6 unit</td></tr> <tr><td>x10/6</td><td>1 pulse per 10/6 unit</td></tr> <tr><td>x100/6</td><td>1 pulse per 100/6 unit</td></tr> </table> ...where unit = gal/ft <sup>3</sup> /m <sup>3</sup> /AF	x1	1 pulse per 1 unit	x10	1 pulse per 10 units	x100	1 pulse per 100 units	x1000	1 pulse per 1000 units	x0.1	1 pulse per 0.1 unit	x0.01	1 pulse per 0.01 unit	x0.001	1 pulse per 0.001 unit	x0.0001	1 pulse per 0.0001 unit	x0.00001	1 pulse per 0.00001 unit	x1/60	1 pulse per 1/60 unit	x1/6	1 pulse per 1/6 unit	x10/6	1 pulse per 10/6 unit	x100/6	1 pulse per 100/6 unit
x1	1 pulse per 1 unit																										
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x10/6	1 pulse per 10/6 unit																										
x100/6	1 pulse per 100/6 unit																										
13,14,15,16	Set the 20mA Flow Rate. (4mA Flow Rate Always Equals Zero Flow).  If Meter Registration Units = gal, ft <sup>3</sup> , or AF Set 20mA Flow Rate in GPM (gallons per minute).  If Meter Registration Units = m <sup>3</sup> Set 20mA Flow Rate in LPM (liters per minute).																										

## 6. Note the Following Behaviors of the Input Pulse De-Bounce Function and the Output Pulse-Extension Function:

Sample Period = 5 seconds...

	Pulse Extension = ON (Enables De-Bounce)	Pulse Extension = OFF (Disables De-Bounce)
Pulse Speed = SLOW (Disables De-Bounce)	Extension = 100ms De-Bounce = Disabled	Extension = Disabled De-Bounce = Disabled
Pulse Speed = NORMAL	Extension = 100ms De-Bounce = 100ms	Extension = Disabled De-Bounce = Disabled

Sample Period = 15, 30, 60 seconds...

	Pulse Extension = ON (Enables De-Bounce)	Pulse Extension = OFF (Disables De-Bounce)
Pulse Speed = SLOW (Disables De-Bounce)	Extension = 200ms De-Bounce = Disabled	Extension = Disabled De-Bounce = Disabled
Pulse Speed = NORMAL	Extension = 200ms De-Bounce = 200ms	Extension = Disabled De-Bounce = Disabled



## **7. Connect DC voltage source to the Analog Pulse Kit's V+/V- terminals. Apply Power, and Observe...**

- The #1 LED (Green) 'Pulse Input' should blink ON whenever an incoming pulse (contact closure) has been detected.
- The #2 LED (Yellow) 'Heartbeat' should signal with an OCCASIONAL BLINK OFF, signifying that the Analog Pulse Kit is working.
- The #3 LED (Green) 'Flow Detect' will light up SOLID GREEN during periods when Positive Flow is Detected.
- The #4 LED (Yellow) 'Pulse Output' will follow the Pulse Output (LED ON=Contact Closure).

## **8. RESET PushButton Operation:**

- If the RESET PushButton is depressed for 1 second (or more), then the Day Totalizer will be reset to ZERO (0).
- If the RESET PushButton is depressed for 5 seconds (or more), then the Day Totalizer and the Master Totalizers will both be reset to ZERO (0).

# MASTER METER OCTAVE WATER METERS - PERSONALITY SETTINGS.

## Recommended **DIP Switches 1-12:**

Size	Gallons	Cubic Feet	Cubic Meters
<b>1.5"</b> <b>2"</b> <b>3"</b> <b>4"</b>  OCTAVE Pulse Should be Enabled. Forward Pulses Pulse Weight:  1 pulse per 1.0 gallon 1 pulse per 0.1 ft <sup>3</sup> 1 pulse per 0.01 m <sup>3</sup>	DipSw.1= DipSw.2=  DipSw.3= DipSw.4=  DipSw.5= DipSw.6= DipSw.7= DipSw.8=  DipSw.9= DipSw.10= DipSw.11= DipSw.12=  Normal Speed Pulse: 1 Pulse / 1 Gal  Low Speed Pulse: 1 Pulse / 10 Gal	DipSw.1=ON DipSw.2=  DipSw.3= DipSw.4=  DipSw.5= DipSw.6= DipSw.7= DipSw.8=  DipSw.9= DipSw.10= DipSw.11=ON DipSw.12=  Normal Speed Pulse: 1 Pulse / 0.1 FT <sup>3</sup>  Low Speed Pulse: 1 Pulse / 1 FT <sup>3</sup>	DipSw.1= DipSw.2=ON  DipSw.3= DipSw.4=  DipSw.5= DipSw.6= DipSw.7= DipSw.8=  DipSw.9=ON DipSw.10= DipSw.11=ON DipSw.12=  Normal Speed Pulse: 1 Pulse / 0.01 M <sup>3</sup>  Low Speed Pulse: 1 Pulse / 0.1 M <sup>3</sup>
<b>6"</b> <b>8"</b> <b>10"</b> <b>12"</b>  OCTAVE Pulse Should be Enabled. Forward Pulses Pulse Weight:  1 pulse per 10 gallons 1 pulse per 1 ft <sup>3</sup> 1 pulse per 0.1 m <sup>3</sup>	DipSw.1= DipSw.2=  DipSw.3= DipSw.4=  DipSw.5= DipSw.6= DipSw.7= DipSw.8=  DipSw.9=ON DipSw.10= DipSw.11= DipSw.12=  Normal Speed Pulse: 1 Pulse / 10 Gal  Low Speed Pulse: 1 Pulse / 100 Gal	DipSw.1=ON DipSw.2=  DipSw.3= DipSw.4=  DipSw.5= DipSw.6= DipSw.7= DipSw.8=  DipSw.9= DipSw.10= DipSw.11= DipSw.12=  Normal Speed Pulse: 1 Pulse / 1 FT <sup>3</sup>  Low Speed Pulse: 1 Pulse / 10 FT <sup>3</sup>	DipSw.1= DipSw.2=ON  DipSw.3= DipSw.4=  DipSw.5= DipSw.6= DipSw.7= DipSw.8=  DipSw.9= DipSw.10= DipSw.11=ON DipSw.12=  Normal Speed Pulse: 1 Pulse / 0.1 M <sup>3</sup>  Low Speed Pulse: 1 Pulse / 1 M <sup>3</sup>

# MASTER METER OCTAVE WATER METERS - PERSONALITY SETTINGS.

Recommended **DIP Switches 13-16:**

The Following Are \*Suggested\* Flow Span Settings, and May Need to Be Adjusted Based on Anticipated Max Flow Conditions.

Size	Gallons , Cubic Feet , Cubic Meters	4-20mA Span Settings Are Based Solely on Meter Size and Maximum Expected Flow Rates.
1.5"	DipSw.13=ON DipSw.14= DipSw.15=ON DipSw.16=	
200 gpm 750 lpm		
2"	DipSw.13= DipSw.14=ON DipSw.15=ON DipSw.16=	
300 gpm 1200 lpm		
3"	DipSw.13=ON DipSw.14=ON DipSw.15=ON DipSw.16=	
500 gpm 2000 lpm		
4"	DipSw.13=ON DipSw.14= DipSw.15= DipSw.16=ON	
1200 gpm 4500 lpm		
6"	DipSw.13=ON DipSw.14=ON DipSw.15= DipSw.16=ON	
3000 gpm 11000 lpm		
8"	DipSw.13= DipSw.14= DipSw.15=ON DipSw.16=ON	
4600 gpm 17500 lpm		
10"	DipSw.13=ON DipSw.14= DipSw.15=ON DipSw.16=ON	
7300 gpm 27500 lpm		
12"	DipSw.13=ON DipSw.14= DipSw.15=ON DipSw.16=ON	
7300 gpm 27500 lpm		