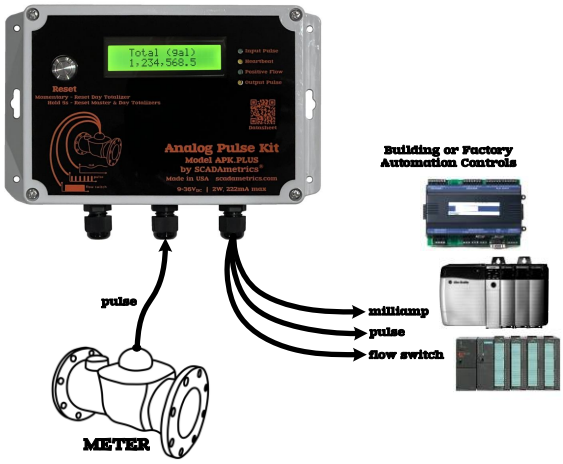
SCADAMETRICS®

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 $24V_{DC}$ 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!

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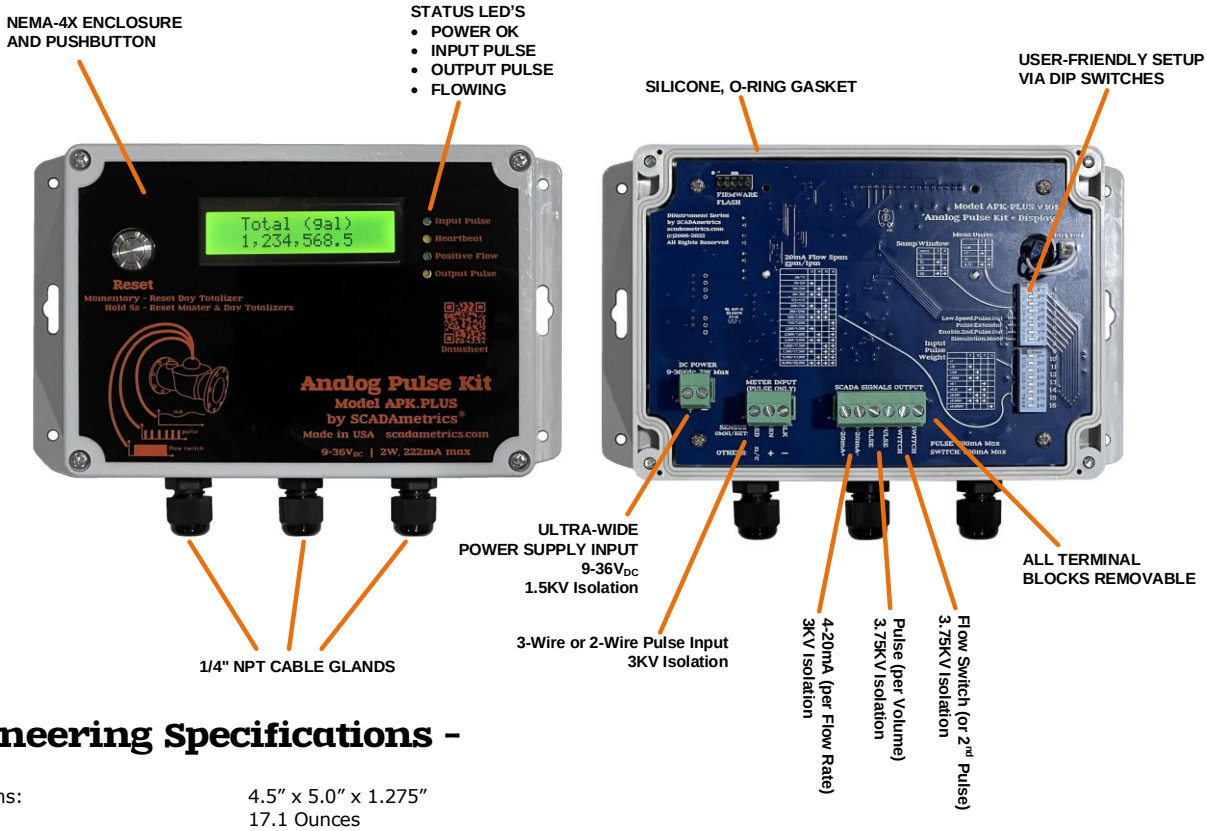


Engineering Specifications –

Dimensions:	4.5" x 5.0" x 1.275"
Weight:	17.1 Ounces
Supply Voltage:	9-36V_{DC}
Supply Power:	1.25W
Power Supply Isolation:	1500V_{RMS}
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 Scalors:	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_{RMS}
4-20mA Max Series Resistance:	500 Ω
4-20mA Signal Type:	Active. Therefore, <u>do not</u> 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_{RMS}
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 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_{DC})	Short Cable Red	No Connection!
2	Pulse Input (+)	Long Cable Red	Red – Pulse (+)
3	Pulse Input (-)	Short Cable Black, Long Cable Orange	Black – Pulse (-)

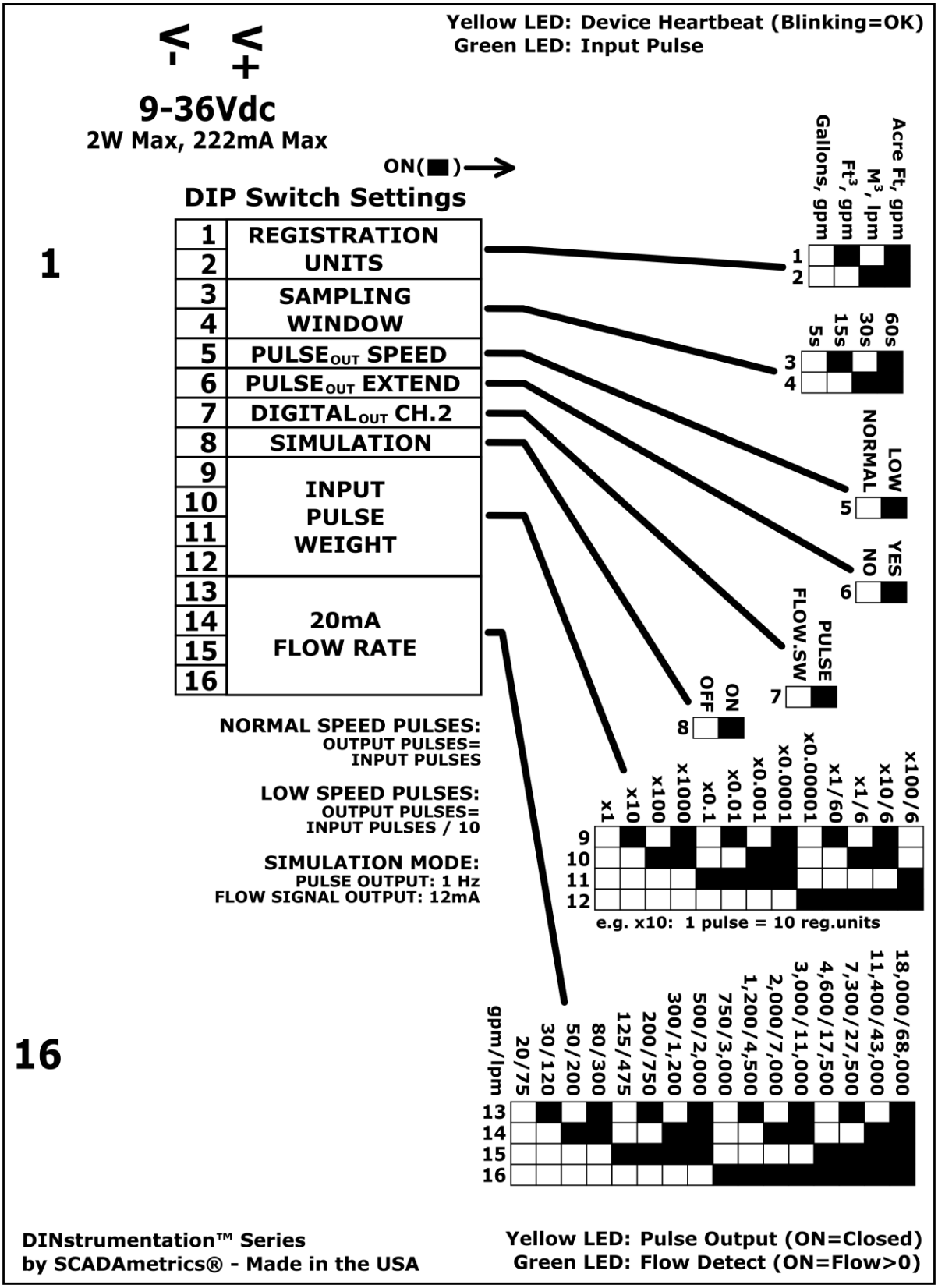
Wiring Notes:

1. Terminal #1 is a 24V_{DC} 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.

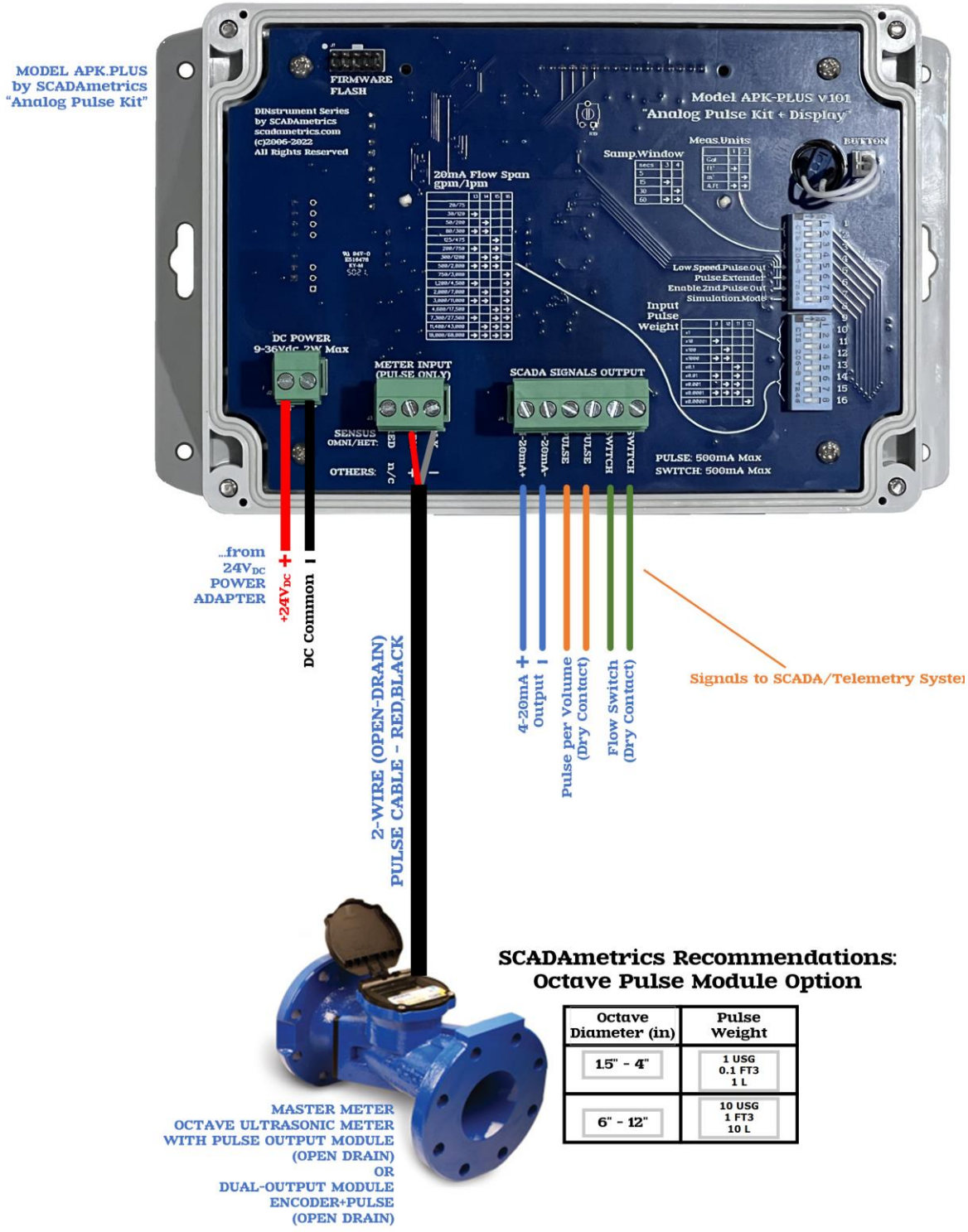
Signal Terminal Block Hookup (Table.2) –

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 –



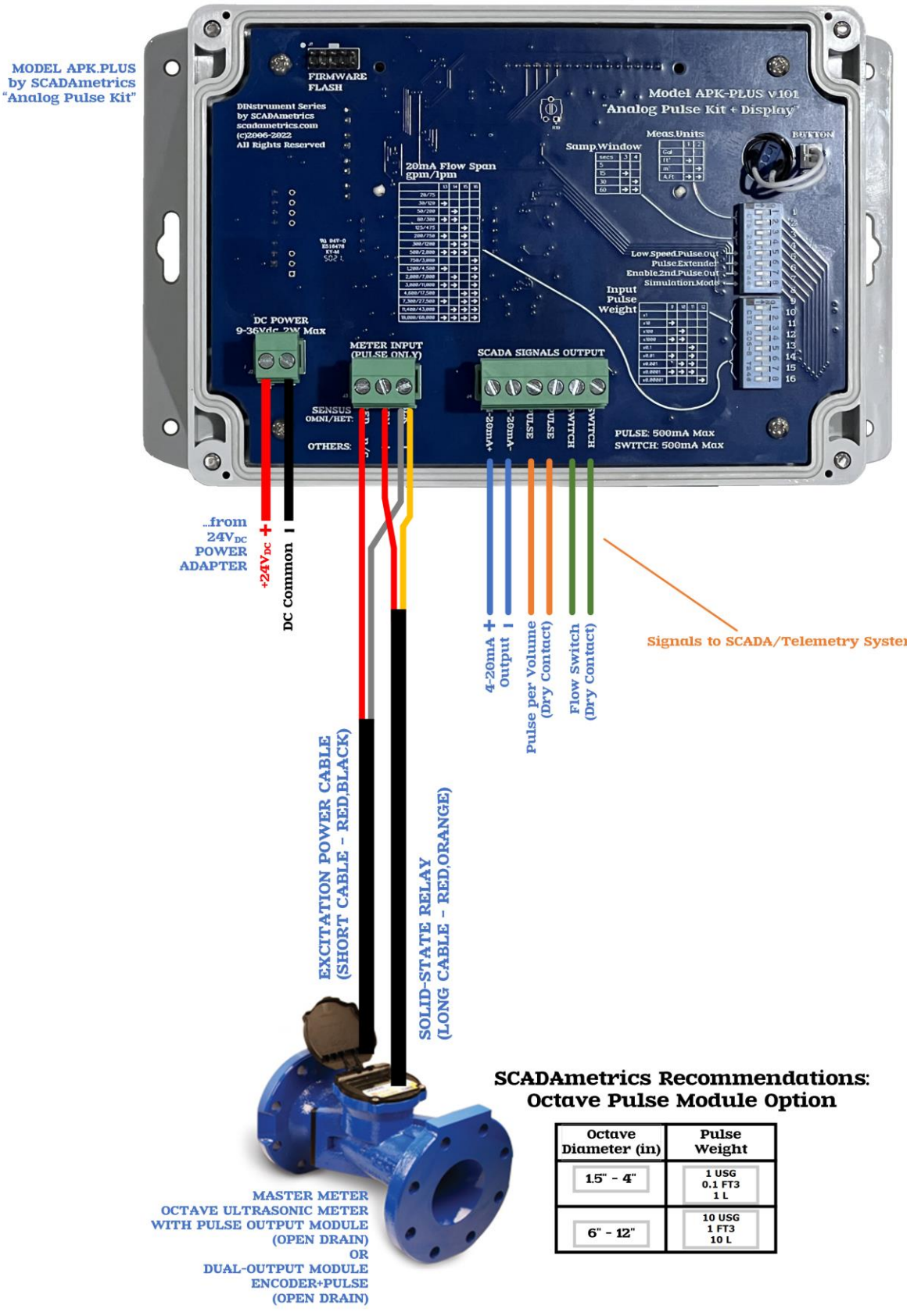
OCTAVE OPEN-DRAIN WIRING
Fig.1

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

OCTAVE SSR WIRING

Fig.2



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

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:**

DIP Switches	Function
1-2	Set Registration Units to Match Target Flow Meter: • Gallons • Cubic Feet • Cubic Meters • Acre Feet
3-4	Set Sampling Window, Per Typical Pulse Input Frequency: • 5s – When Pulse Input Freq > 4 Hz • 10s – When Pulse Input Freq: 2-4 Hz • 30s – When Pulse Input Freq: 1-2 Hz • 60s – When Pulse Input Freq < 0.5 Hz
5	Set Pulse Output Speed: • Normal (Output Pulse Speed = Input Pulse Speed) • Slow (Output Pulse Speed Hz = Input Pulse Speed Hz / 10) Recommendation: Use Slow Speed if SCADA, Telemetry, BMS Incapable of Processing Normal Speed Pulses.
6	Enable/Disable Pulse Output Extension Mode: • Disable (Output Pulse Width = Input Pulse Width) • Enable (Output Pulse Width = Max(Input Pulse Width , 100 or 200 ms)) (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: • Badger Meter HR Default Pulse Width: 50ms • Metron-Farnier Innov8 Default Pulse Width: 50ms

<table>
<tr><td>7</td><td>Configure Digital Output Channel 2:
• Flow Switch Output (Contact Closure When Flow Rate > 0)
• 2nd Pulse Output (Mirrors 1st Pulse Output)</td></tr>
<tr><td>8</td><td>Enable / Disable Simulation Mode:
• Enable (For Debugging Control Panel):
4-20mA Output = 12mA (50%) Fixed
Pulse Output = 1 Hz Fixed
Flow Switch Output = ON / Closed
• Disable (Run Mode):
4-20mA, Pulse, & Flow Switch Operate in Normal Run Mode</td></tr>
<tr><td>9,10,11,12</td><td>Set the Input Pulse Weight:<table>
<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^3/m^3/AF</td></tr>
<tr><td>13,14,15,16</td><td>Set the 20mA Flow Rate.
(4mA Flow Rate Always Equals Zero Flow).

If Meter Registration Units = gal, ft^3, or AF
Set 20mA Flow Rate in GPM (gallons per minute).

If Meter Registration Units = m^3
Set 20mA Flow Rate in LPM (liters per minute).</td></tr>
</table>

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
1.5″ 2″ 3″ 4″ OCTAVE Pulse Should be Enabled. Forward Pulses Pulse Weight: 1 pulse per 1.0 gallon 1 pulse per 0.1 ft^3 1 pulse per 0.01 m^3	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^3 Low Speed Pulse: 1 Pulse / 1 FT^3	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^3 Low Speed Pulse: 1 Pulse / 0.1 M^3
6″ 8″ 10″ 12″ OCTAVE Pulse Should be Enabled. Forward Pulses Pulse Weight: 1 pulse per 10 gallons 1 pulse per 1 ft^3 1 pulse per 0.1 m^3	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^3 Low Speed Pulse: 1 Pulse / 10 FT^3	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^3 Low Speed Pulse: 1 Pulse / 1 M^3

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″ 200 gpm 750 lpm	DipSw.13=ON DipSw.14= DipSw.15=ON DipSw.16=	
2″ 300 gpm 1200 lpm	DipSw.13= DipSw.14=ON DipSw.15=ON DipSw.16=	
3″ 500 gpm 2000 lpm	DipSw.13=ON DipSw.14=ON DipSw.15=ON DipSw.16=	
4″ 1200 gpm 4500 lpm	DipSw.13=ON DipSw.14= DipSw.15= DipSw.16=ON	
6″ 3000 gpm 11000 lpm	DipSw.13=ON DipSw.14=ON DipSw.15= DipSw.16=ON	
8″ 4600 gpm 17500 lpm	DipSw.13= DipSw.14= DipSw.15=ON DipSw.16=ON	
10″ 7300 gpm 27500 lpm	DipSw.13=ON DipSw.14= DipSw.15=ON DipSw.16=ON	
12″ 7300 gpm 27500 lpm	DipSw.13=ON DipSw.14= DipSw.15=ON DipSw.16=ON	