Analog Pulse Kit
Model APK

Building or Factory Automation Controls

MADE IN USA

RoHS Compliant

2 YEAR WARRANTY

milliamp
pulse
flow switch
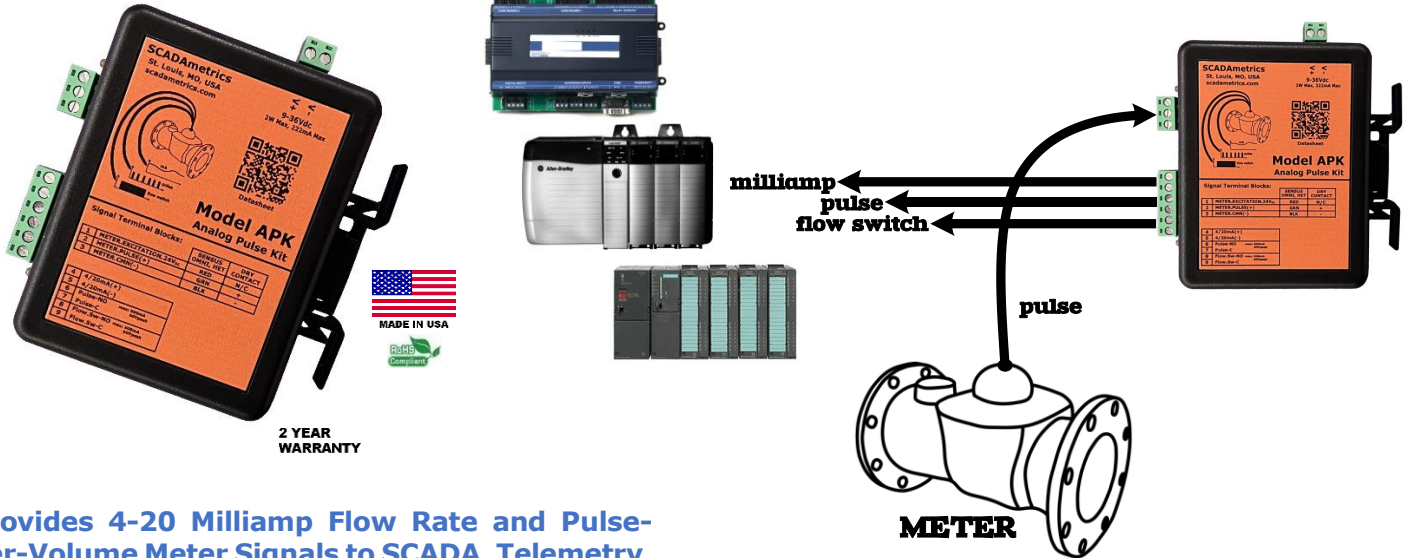
pulse

METER

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!**

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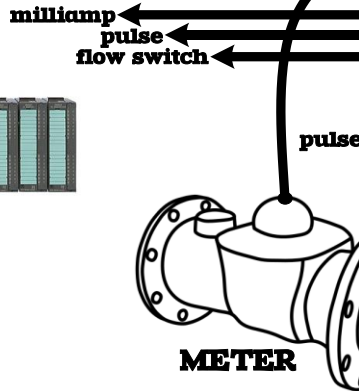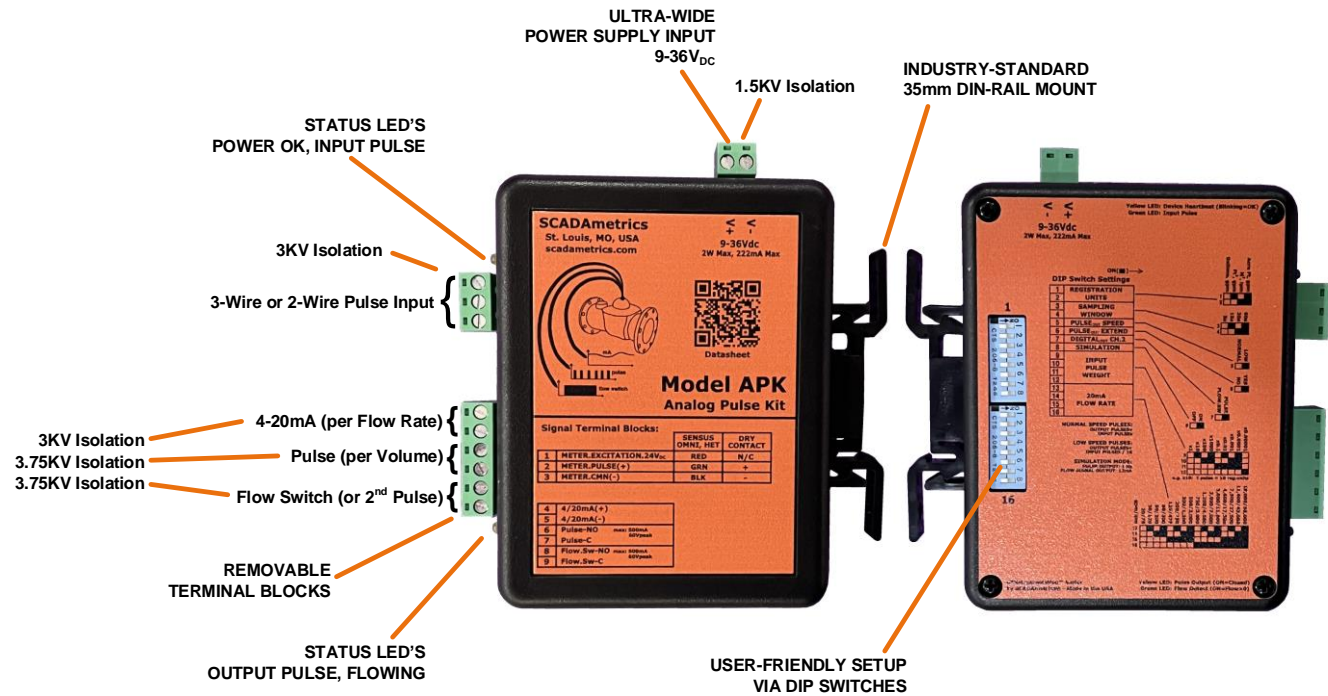
For flow meters whose pulse output signal is too short-duration (milliseconds) or too high-frequency (Hz) to be detected by certain low-pulse-bandwidth BMS systems, the **Analog Pulse Kit** provides a **Pulse Extension** feature, which lengthens the duration of each output pulse to at least 100 milliseconds;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

- 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.
- Mounts on standard 35mm industrial DIN-rail.
- 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

ULTRA-WIDE
POWER SUPPLY INPUT
9-36V_{DC}

1.5KV Isolation

INDUSTRY-STANDARD
35mm DIN-RAIL MOUNT

STATUS LED'S
POWER OK, INPUT PULSE

3KV Isolation

3-Wire or 2-Wire Pulse Input

4-20mA (per Flow Rate)
3KV Isolation
3.75KV Isolation   Pulse (per Volume)
3.75KV Isolation   Flow Switch (or 2nd Pulse)

REMOVABLE
TERMINAL BLOCKS

STATUS LED'S
OUTPUT PULSE, FLOWING

USER-FRIENDLY SETUP
VIA DIP SWITCHES

SCADAmetrics
St. Louis, MO, USA
scadametrics.com

9-36Vdc
2W Max, 222mA Max

Datasheet

Model APK
Analog Pulse Kit

Signal Terminal Blocks:

		SENSUS OMNI, HET	DRY CONTACT
1	METER.EXCITATION.24V_{DC}	RED	N/C
2	METER.PULSE(+)	GRN	+
3	METER.CMN(-)	BLK	-

4	4/20mA(+)
5	4/20mA(-)
6	Pulse-NO max: 500mA 60Vpeak
7	Pulse-C
8	Flow.Sw-NO max: 500mA 60Vpeak
9	Flow.Sw-C

Engineering Specifications –

|	
Dimensions:	4.5" x 5.0" x 1.275"
Weight:	6.1 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!
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 IP40 Specifications, Not Rated for Submersion /Outdoor Use
Manufacturing Location:	USA
Warranty:	2 Years (see www.scadametrics.com for details)

Engineering Dimensions (Inches) –
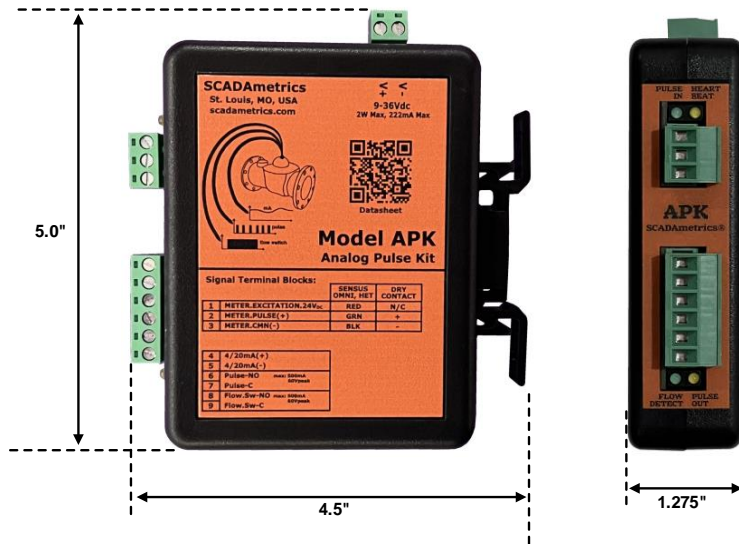
Meter Terminal Block Hookup (Table.1) –

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) –

< −   < +

9-36Vdc
2W Max, 222mA Max

Yellow LED: Device Heartbeat (Blinking=OK)
Green LED: Input Pulse

ON(■)→

DIP Switch Settings

#	Function
1	REGISTRATION
2	UNITS
3	SAMPLING
4	WINDOW
5	PULSE$_{OUT}$ SPEED
6	PULSE$_{OUT}$ EXTEND
7	DIGITAL$_{OUT}$ CH.2
8	SIMULATION
9	INPUT
10	PULSE
11	WEIGHT
12	
13	
14	20mA
15	FLOW RATE
16	

1 ... **16**

Registration Units (switches 1, 2)

	Acre Ft, gpm / M³, lpm	Ft³, gpm	Gallons, gpm
1			
2			

Sampling Window (switches 3, 4)

	60s	30s	15s	5s
3				
4				

Switch 5: LOW / NORMAL
Switch 6: YES / NO
Switch 7: PULSE / FLOW.SW
Switch 8: ON / OFF

NORMAL SPEED PULSES:
OUTPUT PULSES= INPUT PULSES

LOW SPEED PULSES:
OUTPUT PULSES= INPUT PULSES / 10

SIMULATION MODE:
PULSE OUTPUT: 1 Hz
FLOW SIGNAL OUTPUT: 12mA

Input Pulse Weight (switches 9–12)

	x1	x10	x100	x1000	x0.1	x0.01	x0.001	x0.0001	x0.00001	x1/60	x1/6	x10/6	x100/6
9													
10													
11													
12													

e.g. x10: 1 pulse = 10 reg.units

20mA Flow Rate (switches 13–16)

	gpm/lpm	20/75	30/120	50/200	80/300	125/475	200/750	300/1,200	500/2,000	750/3,000	1,200/4,500	2,000/7,000	3,000/11,000	4,600/17,500	7,300/27,500	11,400/43,000	18,000/68,000
13																	
14																	
15																	
16																	

DINstrumentation™ Series
by SCADAmetrics® - Made in the USA

Yellow LED: Pulse Output (ON=Closed)
Green LED: Flow Detect (ON=Flow>0)

QUICK-START GUIDE –

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 OPEN-DRAIN WIRING
Fig.1

...FROM EXTERNAL 24V_DC POWER ADAPTER

+24V_DC   DC Common

MODEL APK by SCADAmetrics "Analog-Pulse Kit"

2-WIRE (OPEN-DRAIN) PULSE CABLE – RED,BLACK   N/C

SCADAmetrics
St. Louis, MO, USA
scadametrics.com

9–36Vdc
2W Max, 222mA Max

Model APK
Analog Pulse Kit

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

Signal Terminal Blocks:

		SENSUS OMNI, HET	DRY CONTACT
1	METER.EXCITATION.24V_DC	RED	N/C
2	METER.PULSE(+)	GRN	+
3	METER.CMN(−)	BLK	−

4	4/20mA(+)
5	4/20mA(−)
6	Pulse-NO max: 500mA 60Vpeak
7	Pulse-C
8	Flow.Sw-NO max: 500mA 60Vpeak
9	Flow.Sw-C

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

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

OCTAVE SSR WIRING
Fig.2

...FROM EXTERNAL 24V_DC POWER ADAPTER

+24V_DC   DC Common

MODEL APK by SCADAmetrics "Analog-Pulse Kit"

EXCITATION POWER CABLE (SHORT CABLE – RED,BLACK)

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

SCADAmetrics
St. Louis, MO, USA
scadametrics.com

9–36Vdc
2W Max, 222mA Max

Model APK
Analog Pulse Kit

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

Signal Terminal Blocks:

		SENSUS OMNI, HET	DRY CONTACT
1	METER.EXCITATION.24V_DC	RED	N/C
2	METER.PULSE(+)	GRN	+
3	METER.CMN(−)	BLK	−

4	4/20mA(+)
5	4/20mA(−)
6	Pulse-NO max: 500mA 60Vpeak
7	Pulse-C
8	Flow.Sw-NO max: 500mA 60Vpeak
9	Flow.Sw-C

MASTER METER
OCTAVE ULTRASONIC METER
WITH PULSE OUTPUT MODULE
(SOLID-STATE RELAY)
OR
DUAL-OUTPUT MODULE
ENCODER+PULSE
(SOLID-STATE RELAY)

Signals to SCADA/Telemetry System

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 <u>must not</u> 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 ms)) (Enables 100ms De-Bounce Filter, if Sampling Window = 5s) (Enables 200ms De-Bounce Filter, 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

7	Configure Digital Output Channel 2: • Flow Switch Output (Contact Closure When Flow Rate > 0) • 2nd Pulse Output (Mirrors 1st Pulse Output)

8	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

9,10,11,12	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
13,14,15,16	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).

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...**

    o The #1 LED (Green) 'Pulse Input' should blink ON whenever an incoming pulse (contact closure) has been detected.

    o The #2 LED (Yellow) 'Heartbeat' should signal with an OCCASIONAL BLINK OFF, signifying that the Analog Pulse Kit is working.

    o The #3 LED (Green) 'Flow Detect' will light up SOLID GREEN during periods when Positive Flow is Detected.

    o The #4 LED (Yellow) 'Pulse Output' will follow the Pulse Output (LED ON=Contact Closure).

8. **RESET PushButton Operation:**

    o If the RESET PushButton is depressed for 1 second (or more), then the Day Totalizer will be reset to ZERO (0).

    o If the RESET PushButton is depressed for 5 seconds (or more), then the Day Totalizer <u>and</u> the Master Totalizers will <u>both</u> 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	