Digital Pulse – Modbus Smart Sensor Connectivity Kit

SENSING INCREDIBLE THINGS

OMEGA™
a spectris company

Digital Pulse Signals

What are Digital Pulse Signals

- Ability to measure rate and phase relations of digital pulses produced by rotating or moving electro-mechanical devices

- Can be used to measure Speed, Distance, Flow rate, Position, presence/absence, totalize events.

- Common in *Intrinsically Safe* applications where sensor measurement is isolated from the detection system.

- The rate and phase relationship of the pulse (clock) signals determines the measured quantity

- The signal is typically *scaled* to represent engineering units, for example, for a FTB4607 flow meter:
  - 75.7 pulses/sec == 1 gal/second

- **Devices <u>may</u> require additional operating power (PSU-93)**

- The number of detection repetitions that can be output per second when the standard sensing object is repeatedly brought into proximity.
- See the accompanying diagram for the measuring method.

$$f = \frac{1}{t_1 + t_2}$$
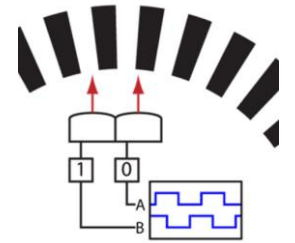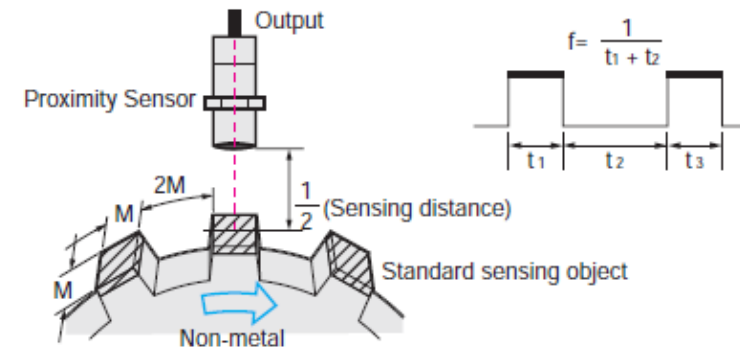
Input Options

- **Digital Inputs:** Switch/relay closures, Proximity Switches, Photo detectors
- **Pulse Rate**: Frequency, speed
- **Pulse Width**: Duration (time) of signal
- **Duty Cycle**: Percent of time signal is active, accepts PWM input signals
- **Pulse Delay:** Time between two events
- **Counter:** Number of occurrences
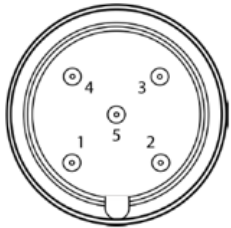- **Up/Down Counter:** Quadrature inputs, totalizer

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Digital – Modbus Smart Sensor Connectivity Kit

External Device

Digital (Pulse) Signals

M12.8-S-M-FM   SP-013-1   IF-002   M12.5-B-S-M-FM

PSU-93 (Powered)

Digital - Modbus
Smart Sensor Connectivity Kit

SmartEdge Gateway

Up to 32 RS485 Devices

- ➤ **M12.5-S-M-FM** provides 5 pin Screw Terminal connector
- ➤ **SP-013-1** processes and converts digital pulses to Smart Sensor digital interface
- ➤ **IF-002** → Smart Sensor to Modbus conversion
- ➤ **M12.5-B-S-M-FM** → 5 pin Screw Terminal connector (B type)
- ➤ **PSU-93** → included in Powered Kit for external device power
- ➤ IF-002 Supports up to 32 devices on RS485 Serial Channel

Pin	Connection
1	3.3 Vdc (not used)
2	Pulse/Pulse A/Input 1
3	GND (4-20 mA Common)
4	Enable/Pulse B/Direction/Input 3
5	Reset/Input 2
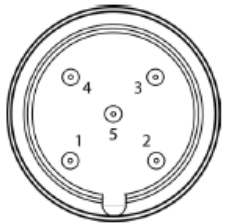
Pin	Connection
1	Bus Power (5-36 Vdc)
2	RS485 Data + (A')
3	GND
4	RS485 Data – (B')
5	SHIELD

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Digital Pulse Signals - Scaling

- External digital signals conveys information in terms of pulses, counts, pulse width or pulse delays, all of which represent some other 'unit of measure'

  Flow Sensor Example: 75.7 pulses/sec == 1 gal/second, 0 pulses/sec = 0 gal/second

- Smart Sensor allows linear *scaling* of measurement for *unit* conversion using simple $y = Mx + B$ formula, where M is the 'gain' and B is an offset.
  - Determine **Gain**: (Actual_Hi – Actual_Lo)/(Reading_Hi – Reading_Lo) == (1 – 0) / (75.4 - 0) == **0.0132626**
  - Determine **Offset**: use calculated Gain, with 0 as Actual == 0 - 0.0132626 * 0 == **0**
  - Change the 'units' string to 'g/s'

Sensor Input0	
Sensor	
Name	Water Flow
Measurement Type	PUSLE_RATE
Advanced Scaling	☑
Unit	g/s
Lock	☑
▲ Scaling	Gain:0.0132626, Offset:0
Apply Scaling	☑
Gain	0.0132626
Offset	0
Device Range/Type	
Range	RATE

Advanced Scaling option opens the scaling options
Change *unit* to any string (maximum 4 characters)
Ensure *lock* option is set (retains across power reset)

Enter calculated *Gain* and **Offset** values

Water Flow
1.3 g/s

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