

SECTION J

PULSE FLOW METERS

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PULSE FLOW METER - PFM1

The Pulse Flow Meter PFM1 provides all the necessary logic and parameters to take the incoming pulses from a Flow Meter and process them for display of the Flow Rate in gallons / minute and the Flow Totalizer in gallons.

The Pulse Flow Meter PFM1 monitors the Discrete Pulse Capture Input DPC1 for incoming pulses from the field device that measures the Flow Rate (Flow Meter).

The Discrete Pulse Capture Input DPC1 is a module designed specifically to capture and report each incoming pulse from the Flow Meter. The DPC1 module is required for the PFM1 and must be ordered with the SC5000.

The Input Pulse Sample Window (Parameter P.534) sets the period of time required for the displayed Flow Rate (Parameter Fd.61) to fully reflect a change in the incoming pulse rate.

The logic in the Pulse Flow Meter PFM1 counts the number of incoming pulses during the time set on the Input Pulse Sample Window (Parameter P.534). It then takes the number of pulses that came in during the sample window and calculates the number of pulses per minute. Next it takes the number of pulses per minute and multiplies it by the Multiply By Conversion Factor (Parameter P.532). Then the value is divided by the Divide By Conversion Factor (Parameter P.533). The Flow Rate, scaled into gallons / minute is then made available to be viewed from Parameter Fd.61.

The Pulse Flow Meter PFM1 also keeps a running total of the flow and displays it on the Flow Totalizer. The flow total is stored in an EEPROM, so that no data is lost during a power outage. The Flow Totalizer value should be read and recorded at some consistent interval (daily, weekly, monthly) and then reset back to zero. The Flow Totalizer value is in gallons and may be viewed from Parameter Fd.63.

Please see page J-4 for instructions on how to determine the Multiply and Divide By Conversion Factors.

For Pulse Flow Meter - PFM1 to function, the SC5000 must be ordered with Discrete Pulse Capture Input DPC1.

| User / Operator Info. | | SCADA | Description of Parameters and SCADA Notes | |
|---|---------------|---------------|---|--|
| Parameter | Default Value | Current Value | | |
| Pulse Flow Meter PFM1 - Setup | | | | |
| P.531 | 0 | | 40531 | Pulse Flow Meter PFM1 - Flow Meter Mode 0 = Flow Meter Disabled 1 = Flow Meter Enabled |
| P.532 | 1 | | 40532 | Pulse Flow Meter PFM1 - Multiply By Conversion Factor Range: 1 - 1,000 Note: Input Pulse Number will be multiplied by this number. |
| P.533 | 1 | | 40533 | Pulse Flow Meter PFM1 - Divide By Conversion Factor Range: 1 - 1,000 Note: Input Pulse Number will be divided by this number. |
| P.534 | 0.40 minutes | | 40534 | Pulse Flow Meter PFM1 - Input Pulse Sample Window Range: 0.10 - 1.00 min. |
| The Pulse Input used for PFM1 is fixed as the Pulse Capture Input DPC1. | | | | |
| Pulse Flow Meter PFM1 - Data | | | | |
| Fd.61 | - | - | 42161 | Least Significant of 32-Bit Number |
| | | | 42162 | Most Significant of 32-Bit Number |
| Pulse Flow Meter PFM1 - Flow Rate - gallons / minute Display Range: 0 - 4,294,967,295 | | | | |
| Fd.63 | - | - | 42163 | Least Significant of 32-Bit Number |
| | | | 42164 | Most Significant of 32-Bit Number |
| Pulse Flow Meter PFM1 - Flow Totalizer - gallons Display Range: 0 - 4,294,967,295 | | | | |
| To reset PFM1 Flow Total to zero momentarily set Modbus Coil 219 (Register 40014 Bit 10). | | | | |

PULSE FLOW METER - PFM2

The Pulse Flow Meter PFM2 provides all the necessary logic and parameters to take the incoming pulses from a Flow Meter and process them for display of the Flow Rate in gallons / minute and the Flow Totalizer in gallons.

The Pulse Flow Meter PFM2 monitors the Discrete Pulse Capture Input DPC2 for incoming pulses from the field device that measures the Flow Rate (Flow Meter).

The Discrete Pulse Capture Input DPC2 is a module designed specifically to capture and report each incoming pulse from the Flow Meter. The DPC2 module is required for the PFM2 and must be ordered with the SC5000.

The Input Pulse Sample Window (Parameter P.539) sets the period of time required for the displayed Flow Rate (Parameter Fd.71) to fully reflect a change in the incoming pulse rate.

The logic in the Pulse Flow Meter PFM2 counts the number of incoming pulses during the time set on the Input Pulse Sample Window (Parameter P.539). It then takes the number of pulses that came in during the sample window and calculates the number of pulses per minute. Next it takes the number of pulses per minute and multiplies it by the Multiply By Conversion Factor (Parameter P.537). Then the value is divided by the Divide By Conversion Factor (Parameter P.538). The Flow Rate, scaled into gallons / minute is then made available to be viewed from Parameter Fd.71.

The Pulse Flow Meter PFM2 also keeps a running total of the flow and displays it on the Flow Totalizer. The flow total is stored in an EEPROM, so that no data is lost during a power outage. The Flow Totalizer value should be read and recorded at some consistent interval (daily, weekly, monthly) and then reset back to zero. The Flow Totalizer value is in gallons and may be viewed from Parameter Fd.73.

Please see page J-4 for instructions on how to determine the Multiply and Divide By Conversion Factors.

For Pulse Flow Meter - PFM2 to function, the SC5000 must be ordered with Discrete Pulse Capture Input DPC2.

| User / Operator Info. | | | SCADA | Description of Parameters and SCADA Notes |
|---|---------------|---------------|------------------|--|
| Parameter | Default Value | Current Value | Register Address | |
| Pulse Flow Meter PFM2 - Setup | | | | |
| P.536 | 0 | | 40536 | Pulse Flow Meter PFM2 - Flow Meter Mode 0 = Flow Meter Disabled 1 = Flow Meter Enabled |
| P.537 | 1 | | 40537 | Pulse Flow Meter PFM2 - Multiply By Conversion Factor Range: 1 - 1,000 Note: Input Pulse Number will be multiplied by this number. |
| P.538 | 1 | | 40538 | Pulse Flow Meter PFM2 - Divide By Conversion Factor Range: 1 - 1,000 Note: Input Pulse Number will be divided by this number. |
| P.539 | 0.40 minutes | | 40539 | Pulse Flow Meter PFM2 - Input Pulse Sample Window Range: 0.10 - 1.00 minutes |
| The Pulse Input used for PFM2 is fixed as the Pulse Capture Input DPC2. | | | | |
| Pulse Flow Meter PFM2 - Data | | | | |
| Fd.71 | - | - | 42171 | Least Significant of 32-Bit Number |
| | | | 42172 | Most Significant of 32-Bit Number |
| Pulse Flow Meter PFM2 - Flow Rate - gallons / minute Display Range: 0 - 4,294,967,295 | | | | |
| Fd.73 | - | - | 42173 | Least Significant of 32-Bit Number |
| | | | 42174 | Most Significant of 32-Bit Number |
| Pulse Flow Meter PFM2 - Flow Totalizer - gallons Display Range: 0 - 4,294,967,295 | | | | |
| To reset PFM2 Flow Total to zero momentarily set Modbus Coil 220 (Register 40014 Bit 11). | | | | |

PULSE FLOW METER - PFM3

The Pulse Flow Meter PFM3 provides all the necessary logic and parameters to take the incoming pulses from a Flow Meter and process them for display of the Flow Rate in gallons / minute and the Flow Totalizer in gallons.

The Pulse Flow Meter PFM3 monitors the Discrete Pulse Capture Input DPC3 for incoming pulses from the field device that measures the Flow Rate (Flow Meter).

The Discrete Pulse Capture Input DPC3 is a module designed specifically to capture and report each incoming pulse from the Flow Meter. The DPC3 module is required for the PFM3 and must be ordered with the SC5000.

The Input Pulse Sample Window (Parameter P.544) sets the period of time required for the displayed Flow Rate (Parameter Fd.81) to fully reflect a change in the incoming pulse rate.

The logic in the Pulse Flow Meter PFM3 counts the number of incoming pulses during the time set on the Input Pulse Sample Window (Parameter P.544). It then takes the number of pulses that came in during the sample window and calculates the number of pulses per minute. Next it takes the number of pulses per minute and multiplies it by the Multiply By Conversion Factor (Parameter P.542). Then the value is divided by the Divide By Conversion Factor (Parameter P.543). The Flow Rate, scaled into gallons / minute is then made available to be viewed from Parameter Fd.81.

The Pulse Flow Meter PFM3 also keeps a running total of the flow and displays it on the Flow Totalizer. The flow total is stored in an EEPROM, so that no data is lost during a power outage. The Flow Totalizer value should be read and recorded at some consistent interval (daily, weekly, monthly) and then reset back to zero. The Flow Totalizer value is in gallons and may be viewed from Parameter Fd.83.

Please see page J-4 for instructions on how to determine the Multiply and Divide By Conversion Factors.

For Pulse Flow Meter - PFM3 to function, the SC5000 must be ordered with Discrete Pulse Capture Input DPC3.

| User / Operator Info. | | SCADA | | Description of Parameters and SCADA Notes |
|---|---------------|---------------|------------------|--|
| Parameter | Default Value | Current Value | Register Address | |
| Pulse Flow Meter PFM3 - Setup | | | | |
| P.541 | 0 | | 40541 | Pulse Flow Meter PFM3 - Flow Meter Mode 0 = Flow Meter Disabled 1 = Flow Meter Enabled |
| P.542 | 1 | | 40542 | Pulse Flow Meter PFM3 - Multiply By Conversion Factor Range: 1 - 1,000 Note: Input Pulse Number will be multiplied by this number. |
| P.543 | 1 | | 40543 | Pulse Flow Meter PFM3 - Divide By Conversion Factor Range: 1 - 1,000 Note: Input Pulse Number will be divided by this number. |
| P.544 | 0.40 minutes | | 40544 | Pulse Flow Meter PFM3 - Input Pulse Sample Window Range: 0.10 - 1.00 minutes |
| The Pulse Input used for PFM3 is fixed as the Pulse Capture Input DPC3. | | | | |
| Pulse Flow Meter PFM3 - Data | | | | |
| Fd.81 | - | - | 42181 | Least Significant of 32-Bit Number |
| | | | 42182 | Most Significant of 32-Bit Number |
| Pulse Flow Meter PFM3 - Flow Rate - gallons / minute Display Range: 0 - 4,294,967,295 | | | | |
| Fd.83 | - | - | 42183 | Least Significant of 32-Bit Number |
| | | | 42184 | Most Significant of 32-Bit Number |
| Pulse Flow Meter PFM3 - Flow Totalizer - gallons Display Range: 0 - 4,294,967,295 | | | | |
| To reset PFM3 Flow Total to zero momentarily set Modbus Coil 221 (Register 40014 Bit 12). | | | | |

PULSE FLOW METERS - PFM1, PFM2 & PFM3

The Controller determines the Flow Rate scaled into gallons / minute by the following procedure:

- Step 1: First the number of incoming Pulses per minute is determined and recorded.
- Step 2: Next the number of pulses per minute is multiplied by the Multiply By Conversion Factor.
- Step 3: The last step is to divide by value determined in step 2 by the Divide By Conversion Factor.

Flow Rate Equation:

$$\text{Flow Rate (gallons / minute)} = (\text{Pulses per minute}) \times \frac{\text{Multiply By Conversion Factor}}{\text{Divide By Conversion Factor}}$$

The Multiply By and Divide By Conversion Factors are defined in the Flow Meter's Manual and come from the Pulse per Gallon setting that the operator has programmed into the Flow Meter.

Determining the Multiply By and Divide By Conversion Factors

Example 1

The pulse output of the Flow Meter connected to Pulse Flow Meter PFM1 is setup for:

$$1 \text{ pulse} = 5 \text{ gallons} \quad \text{or} \quad 5 \text{ gallons / pulse}$$

What should the Multiply and Divide By Conversion Factor be set on?

Flow Rate Equation:

$$\text{Flow Rate (gallons / minute)} = (\text{Pulses per minute}) \times \frac{5 \text{ gallons}}{1 \text{ pulse}}$$

$$\text{Multiply By Conversion Factor} = 5$$

$$\text{Divide By Conversion Factor} = 1$$

Example 2

The pulse output of the Flow Meter connected to Pulse Flow Meter PFM1 is setup for:

$$1 \text{ pulse} = 0.005 \text{ gallons}$$

What should the Multiply and Divide By Conversion Factor be set on?

Flow Rate Equation:

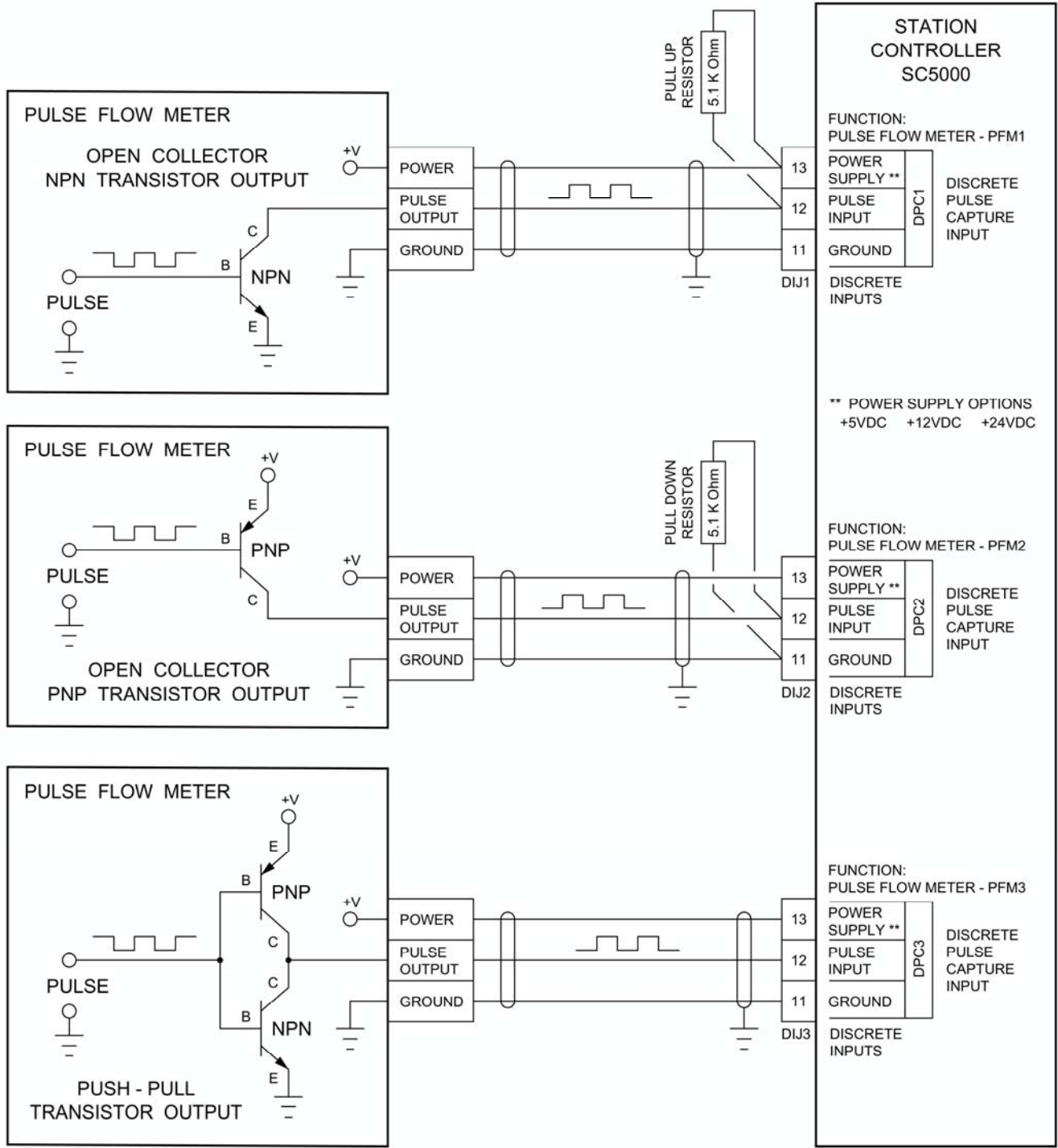
$$\text{Flow Rate (gallons / minute)} = (\text{Pulses per minute}) \times \frac{0.005 \text{ gallons}}{1 \text{ pulse}}$$

The number 0.005 can not be entered into a parameter, because it is a decimal number. Therefore, both Conversion Factors must be divided by 0.005, giving the following values:

Revised Flow Rate Equation:

$$\text{Flow Rate (gallons / minute)} = (\text{Pulses per minute}) \times \frac{1 \text{ gallon}}{200 \text{ pulses}}$$

PULSE FLOW METER EXAMPLES



Pulse Counter Inputs Specifications

Isolated, Transient Protected

Maximum Pulse Frequency: 60kHz (with Duty Cycle Between 40% - 60%)

Power Supply Output Voltage Options (See "Ordering Information"): +5VDC, +12VDC or +24VDC

Pull Up or Pull Down Resistor Supplied with Controller: 5.1 KΩ

PULSE FLOW METER - Touchscreen HMI SCREENS

Pulse Flow Meter Data Display - Typical of Pulse Flow Meter PFM1 - PFM3

PULSE FLOW METER DATA DISPLAY - PFM1 Previous Screen

FLOW RATE (gallons / minute) 1,234,512,345
Parameter: Fd.61

FLOW TOTALIZER (gallons) 1,234,512,345
Parameter: Fd.63

Flow Totalizer rolls over to zero at:
4,294,967,295 gallons

Flow Meter Setup FLOW TOTALIZER RESET

Pulse Flow Meter Setup - Typical of Pulse Flow Meter PFM1 - PFM3

PULSE FLOW METER SETUP - PFM1 Previous Screen

Flow Meter Mode 1
Parameter: P.531

Multiply by Conversion Factor 1234
Parameter: P.532

Divide by Conversion Factor 1234
Parameter: P.533

Input Pulse Sample Window (minutes) 1.23
Parameter: P.534

0 = Flow Meter Disabled
1 = Flow Meter Enabled

Discrete Pulse Capture Input DPC1 provides the Flow Rate Input for PFM1.