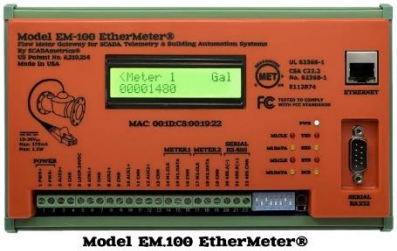
Application Note 034
Version 001 – EtherMeter with 4-20mA Flow Meters
30 Nov 2023

EtherMeter® for Flow Meters Equipped Only with 4-20mA Flow Output

1. Meter Totalization from Flow Rate Data



Model EM.100 EtherMeter®

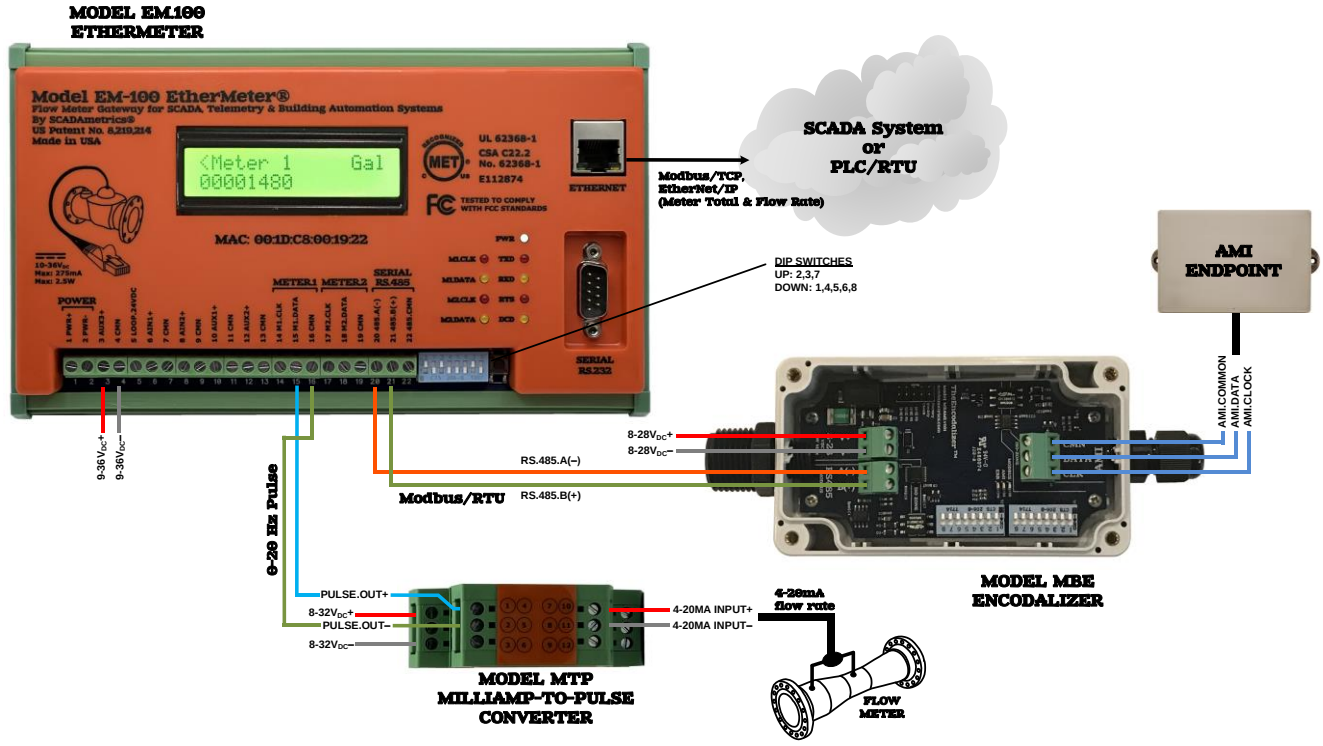
Certain flow meters are only equipped with a 4-20mA flow rate signal, where 4mA denotes zero flow, and 20mA denotes an assigned maximum rate (example: 1000 gallons per minute).

In these instances, it is often desired to continuously monitor the rate-of-flow (eg: gpm) and derive a totalization (gallons).

This can be accomplished using SCADAmetrics' model MTP "Milliamp-to-Pulse Converter", which converts an input 4-20mA signal into a pulse-output signal. This pulse output is then fed into an EM.100 EtherMeter, which counts the pulses and makes both total and rate information available to a connected SCADA system, AMI system, or both[(1)].

This application note describes the wiring and setup procedures required to accomplish this goal.

Wiring Illustration:



[(1)] The illustration above shows <u>both</u> a connected SCADA system and AMI system. If AMI connectivity is not needed, then disregard the model MBE Encodalizer, AMI Endpoint, and associated wiring.

2. 20 Milliamp Span Selection

The 20 milliamp (maximum) rate-of-flow (**F_{MAX}**) should be judiciously selected. At full flow (20mA), the MTP will emit 20 Hz, which will translate to 1200 pulses per minute. For application simplicity, it is recommended that F_{MAX} should be selected such that either $F_{MAX}/1200$ is equal to a whole integer, or $1200/F_{MAX}$ is equal to a whole integer. Examples are: 600 gpm (1200/600 = 2)… or 3600 gpm (3600/1200 = 3).

3. Pulse Weight Calculation

W_P, the Pulse Weight (Gallons per Pulse, or M^3 per pulse, etc…), should be calculated as follows:

$$W_P = F_{MAX} \text{ (units/minute)} \ / \ 1200 \text{ (pulses/minute)}$$

For example, if **F_{MAX}** = 600, then **W_P** = 1 / 2.

4. EtherMeter Setting: PS_1 (Pulse Scalar) and PD_1 (Pulse Divisor) Calculation

PS_1 and **PD_1** describe the pulse weight, as a ratio: **PS_1 / PD_1 = Totalizer Unit / Pulse**
… where Totalizer Unit = Gallons, FT^3, M^3, etc…

PS_1 and **PD_1** should be selected, as follows, such that each is a whole integer, and that their ratio is equal to **WP**:

$$PS_1 / PD_1 = W_P$$

For example, if **W_P = 1 / 2**, then **PS_1 = 1** and **PD_1 = 2**.

Within the EtherMeter Setup Menu, Meter Input Channel #1 should then be set for PULSE, as follows:

```
SET   TYPE1   PULSE   <enter>
SET   PS1     ###     <enter>
SET   PD1     ###     <enter>
```

5. Suppression of Near-Zero-Flow Pulses.

If the flow range is highly variable and very low flows can occur, then the 4-20mA rate signal from the flow meter should be "always ON" and always connected directly into the MTP module.

However, in many instances, the flow range may be more tightly defined to be either substantial-flow or zero-flow, and with long time periods of zero-flow. Examples might include well pump stations, booster pump stations, or water filtration plants. In these situations, any slight flow reading interpreted as greater than zero will cause the totalizer to advance, introducing error into the calculated total. An example could include a situation where the meter output is interpreted as 4.001 mA while the flow is actually zero.

In such cases, it may be beneficial to disconnect the 4-20mA rate signal from the MTP module altogether during periods of known zero flow, using an automated relay contact. For loop-powered flow meters, the circuit illustrated in the second figure would be applicable, as it does not interrupt the loop: