Application Note Neptune.1
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SCADA Signaling from Neptune Flow Meters

Neptune Flow Meters Include the Mach-10 Ultrasonic (pictured left), the T-10, High-Performance Turbine, and the Tru-Flo Compound.

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Neptune Technology Group (Tallassee, AL) manufactures a broad line of flow meters and AMI/AMR systems, serving the municipal water utility industry. Here at **SCADAmetrics (Wildwood, MO)** we manufacture flow metering instrumentation in support of this industry, with the stated mission of helping users extend such meters for enhanced SCADA interoperability and functionality.

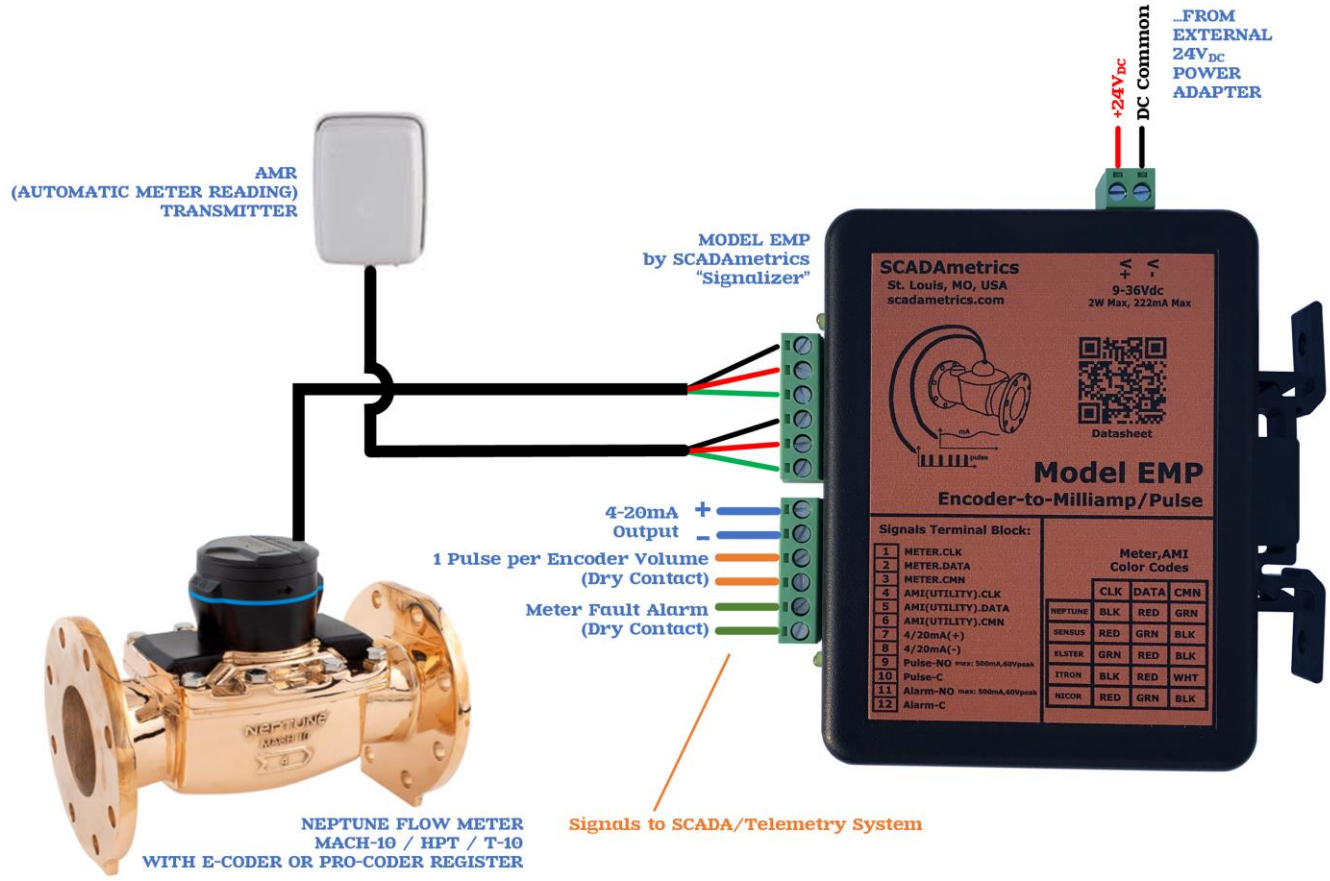
Like many manufacturers of AWWA-style flow meters, Neptune's signaling options are focused upon their 3-wire, encoded protocol for interfacing with AMI/AMR endpoints. Neptune's encoded protocol is unique in that it transmits **8-digit, fine-resolution totalization** information — which SCADAmetrics instrumentation leverages to generate **additional** industrial signal and display options — thereby bridging the gap to solve the unique challenges facing the **SCADA, Telemetry, and Building Automation spheres**.

The purpose of this document is to provide a summary of several of the main SCADAmetrics devices and methods that we offer to extend the broad line of Neptune flow meters.

Note: It is important to note that standard, cabled versions of the Neptune registers are utilized in all of the illustrated examples below, as the integrated radio registers (R900i series) do not provide the encoded signal cable required by SCADAmetrics instrumentation. However, all illustrated solutions are compatible with **Neptune's standalone R900 MIU**.

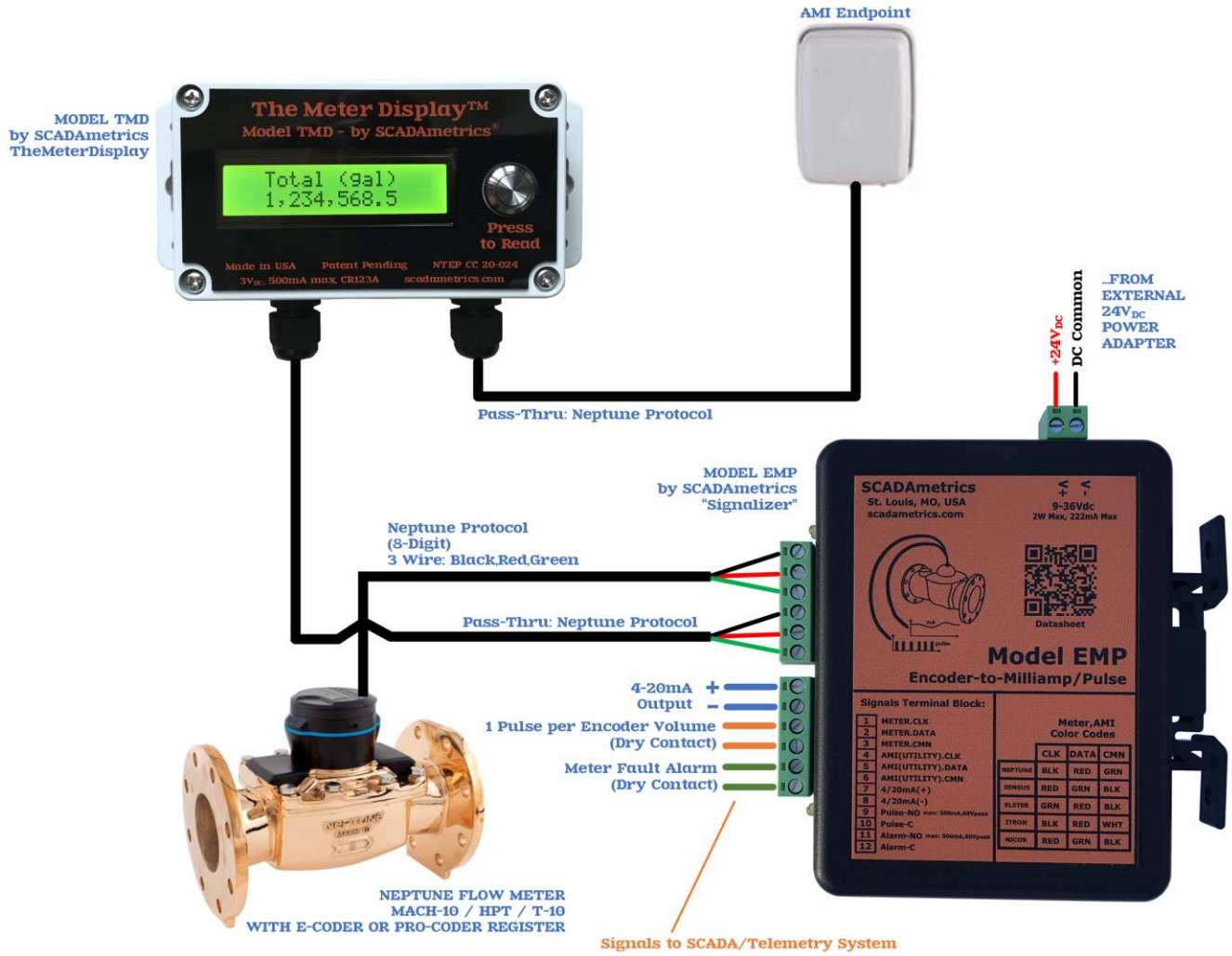
1. Basic SCADA Connectivity to AMI-Connected Meter

The following illustrates how a model EMP Signalizer display can be applied to a Neptune flow meter that is outfitted with an encoded output register to provide basic SCADA signaling, while preserving the existing AMI signaling to the water utility. The SCADA signaling is in the form of a 4-20 milliamp rate-of-flow output, a pulse-per-volume output, and a meter fault output. Please note that the 4-20 milliamp SCADA output requires an 8-digit encoded signal from the meter, such as provided by the Neptune Pro-Coder, E-Coder, or Mach-10 register. Excellent for custody-transfer stations. Also excellent for utility-owned water meters at commercial and industrial buildings, where the building owner desires a meter reading into its BMS system, without requiring the installation of a new water meter, or without interfering with the utility's AMI system. Design Basis: SCADAmetrics **Model EMP Signalizer**:



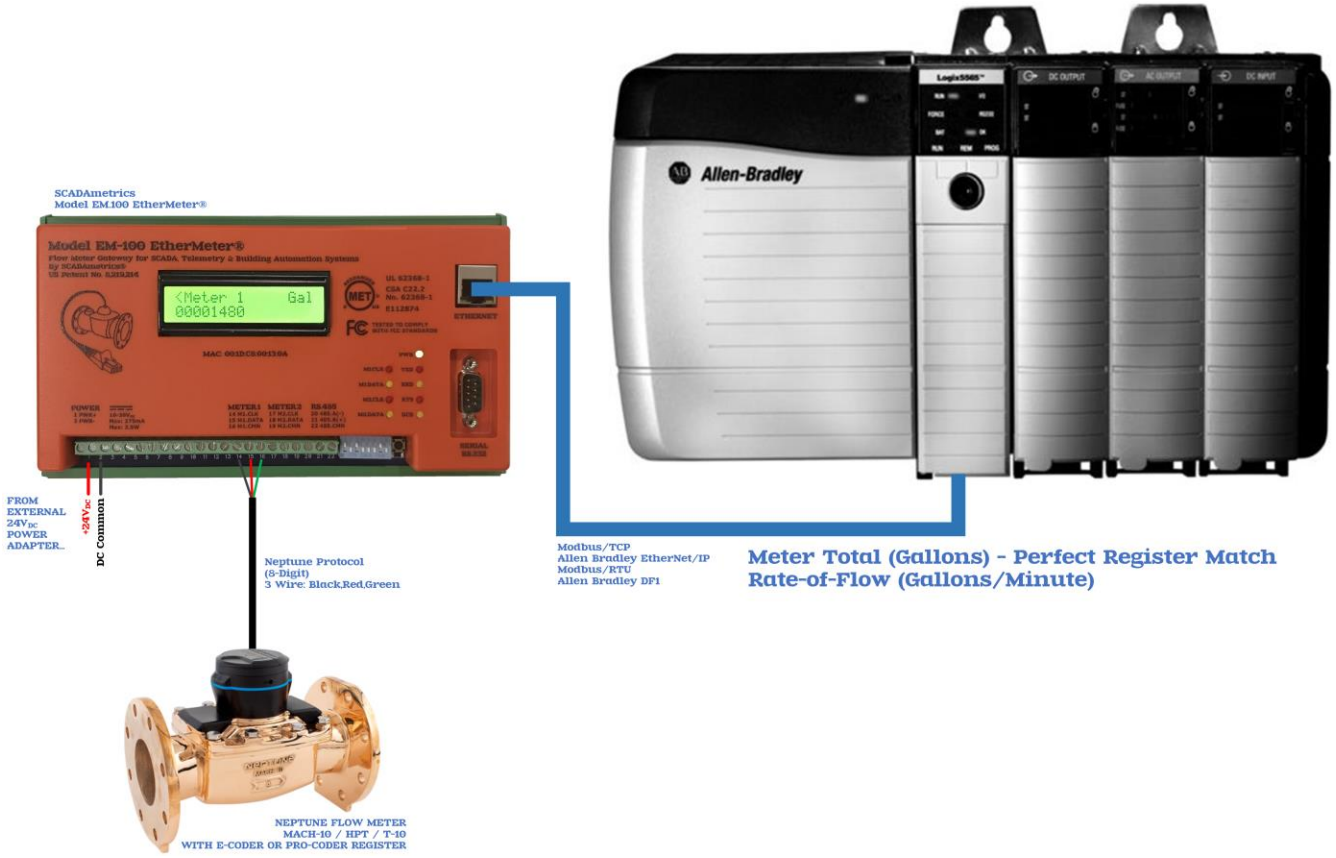
2. Concurrent Basic SCADA, AMI, and Remote Display

The following illustrates how a Neptune flow meter can provide basic SCADA signaling (4-20 milliamp, pulse-per-volume, meter fault alarm), AMI signaling (Neptune protocol), and a Remote Wall Display. Excellent for custody-transfer stations and commercial buildings. Design Basis: **Model EMP Signalizer** and **Model TMD TheMeterDisplay**:



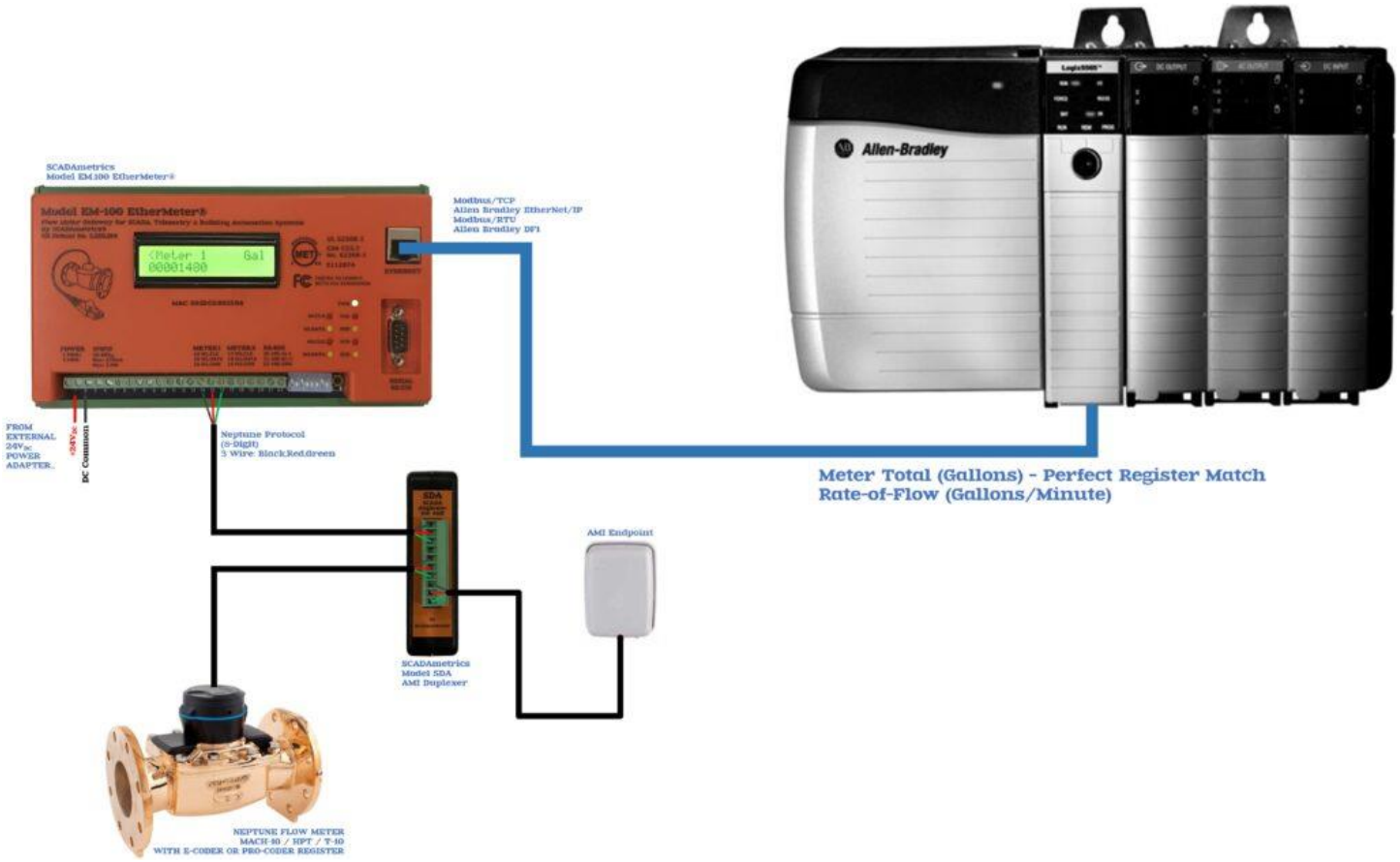
3. Advanced SCADA

The following illustrates how a Neptune flow meter can provide advanced SCADA signaling (Modbus, Allen-Bradley EtherNet/IP). Excellent for custody-transfer pumping and valve stations where revenue-grade accuracy is of paramount importance. Also excellent for military bases and educational facilities. Design Basis: **Model EM.100 EtherMeter**:



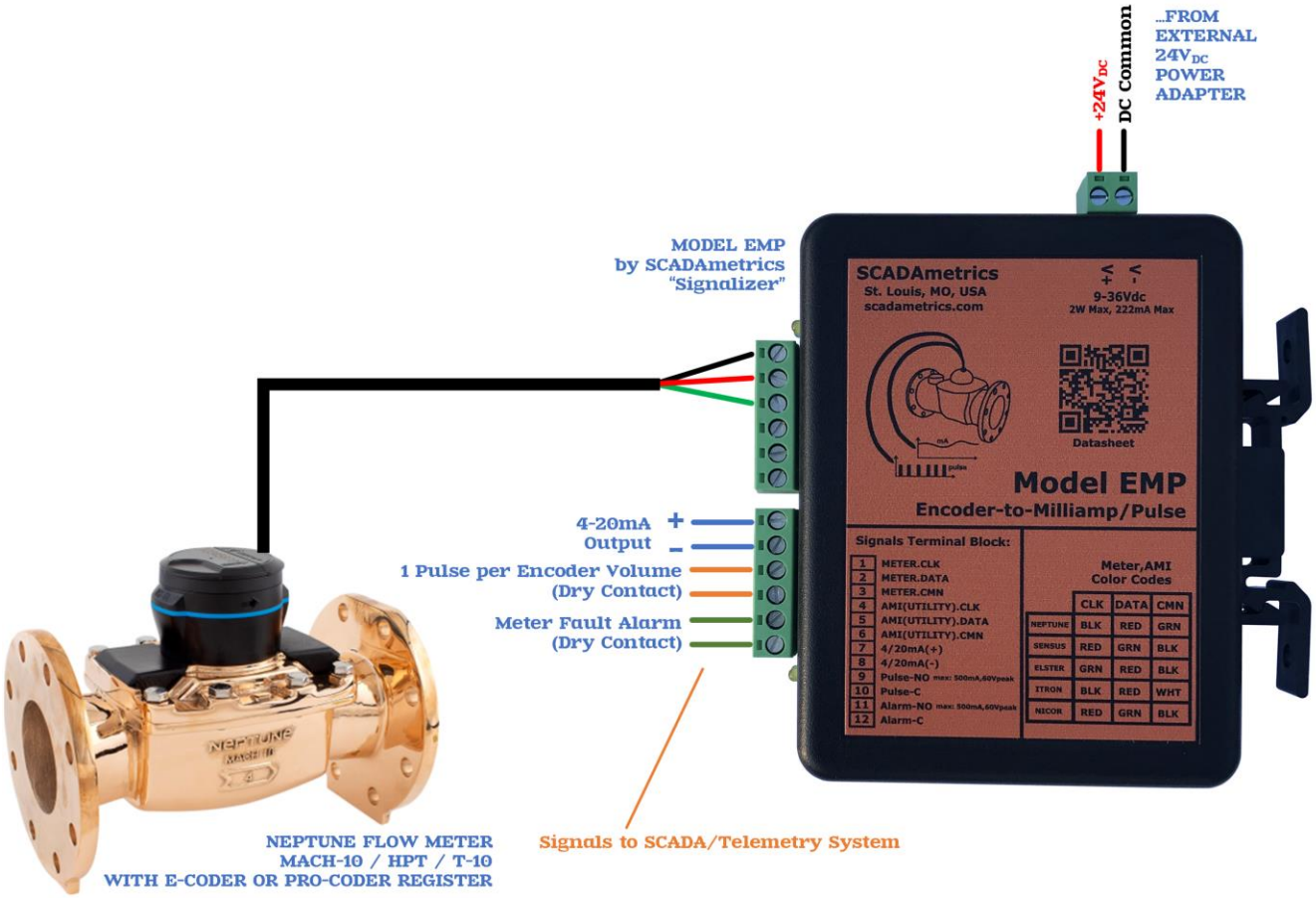
4. Concurrent Advanced SCADA and AMI

The following illustrates how a Neptune flow meter can provide advanced SCADA signaling (Modbus, Allen-Bradley EtherNet/IP), while at the same time provide signaling to a connected AMI System. Excellent for custody-transfer metering, pumping, and valve stations where revenue-grade accuracy is of paramount importance for both the SCADA system and AMI system. Also excellent for commercial and industrial facilities who wish to internally track the utility-owned water meter. The inclusion of a model SDA or SDAW Duplexer (illustrated below) ensures concurrent AMI connectivity. Design Basis: **Model EM.100 EtherMeter** and **Model SDA SCADA Duplexer for AMI**:



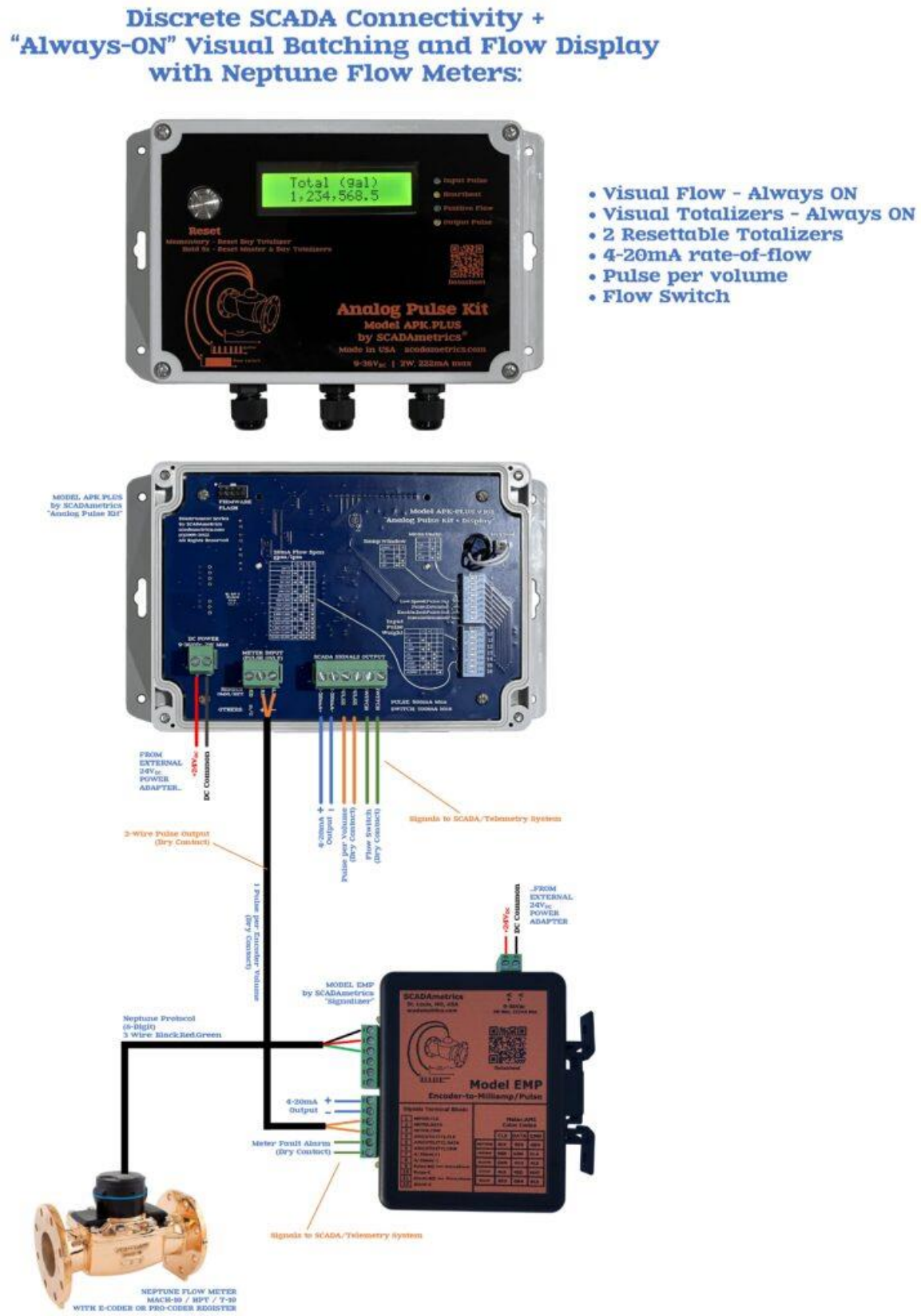
5. Basic SCADA

The following illustrates how a Neptune flow meter can provide basic SCADA signaling (4-20 milliamp, pulse-per-volume, meter fault alarm). Excellent for well and pumping stations, as well as commercial buildings. Design Basis: **Model EMP Signalizer**:



6. Visual Batching, Visual Rate-of-Flow, plus SCADA Outputs

The following illustrates how a Neptune flow meter can provide basic SCADA signaling (4-20 milliamp, pulse-per-volume, flow switch, meter fault alarm), along with an always-ON operator flow and batch display. Excellent for well and pumping stations. Design Basis: SCADAmetrics **Model APK.PLUS Analog-Pulse Kit, Plus**: and **Model EMP Signalizer**



7. Dual-AMI Connectivity

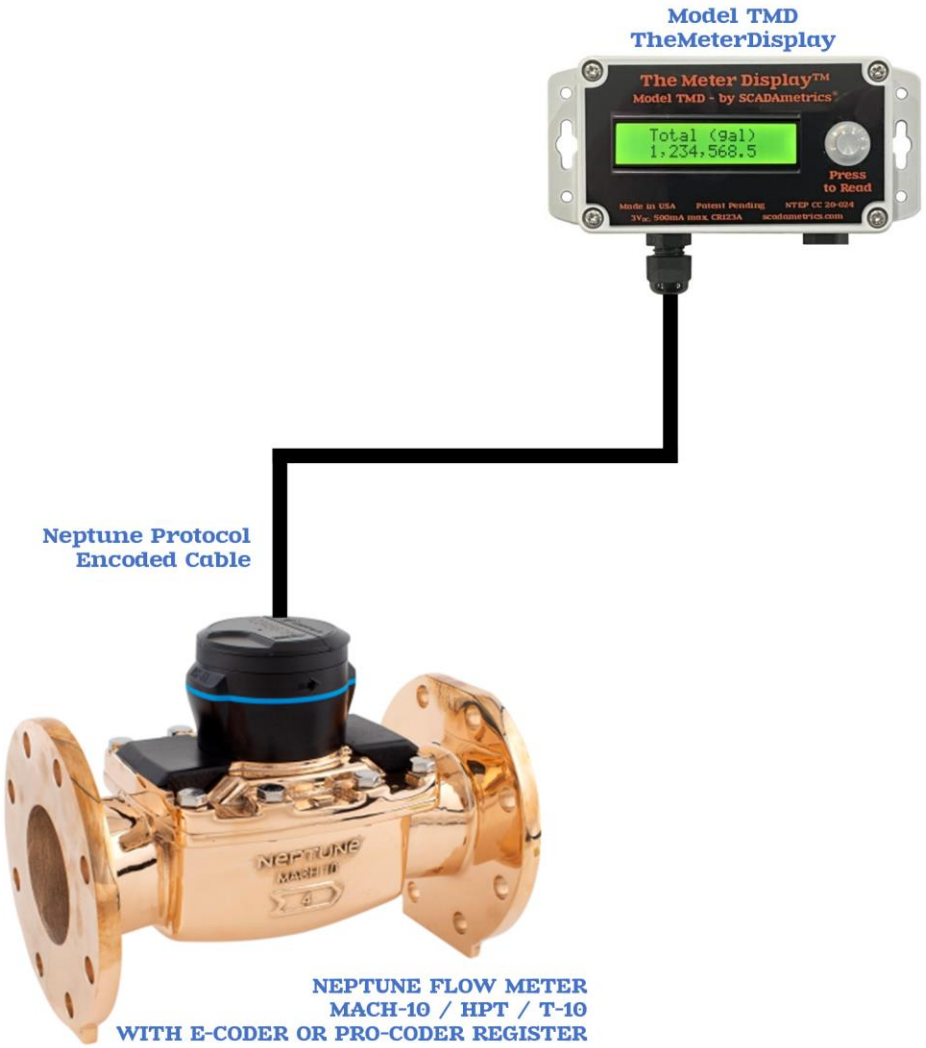
The following illustrates how a Neptune flow meter can provide AMI signaling to two separate systems. Excellent for custody-transfer stations, where both the water buyer and seller desire meter connectivity to their separate respective AMI systems. Design Basis: SCADAmetrics **Model UDA Universal Duplexer for AMI**:

8. Concurrent AMI Connectivity and Remote Visual Display

The following illustrates how a model TMD display can work with a Neptune flow meter to provide AMI signaling to the water utility, while concurrently providing a visual remote display whose reading is a perfect match to the Neptune register total. Furthermore, if a Pro-Coder, E-Coder, or Mach-10 register is used, then the 8-digit resolution will enable the display of rate-of-flow (gpm,lpm), as well. Excellent for utility-owned water meters at commercial and industrial buildings, where the building owner desires a meter reading without requiring entry to a vault or confined-space. Design Basis: SCADAmetrics **Model TMD TheMeterDisplay**:

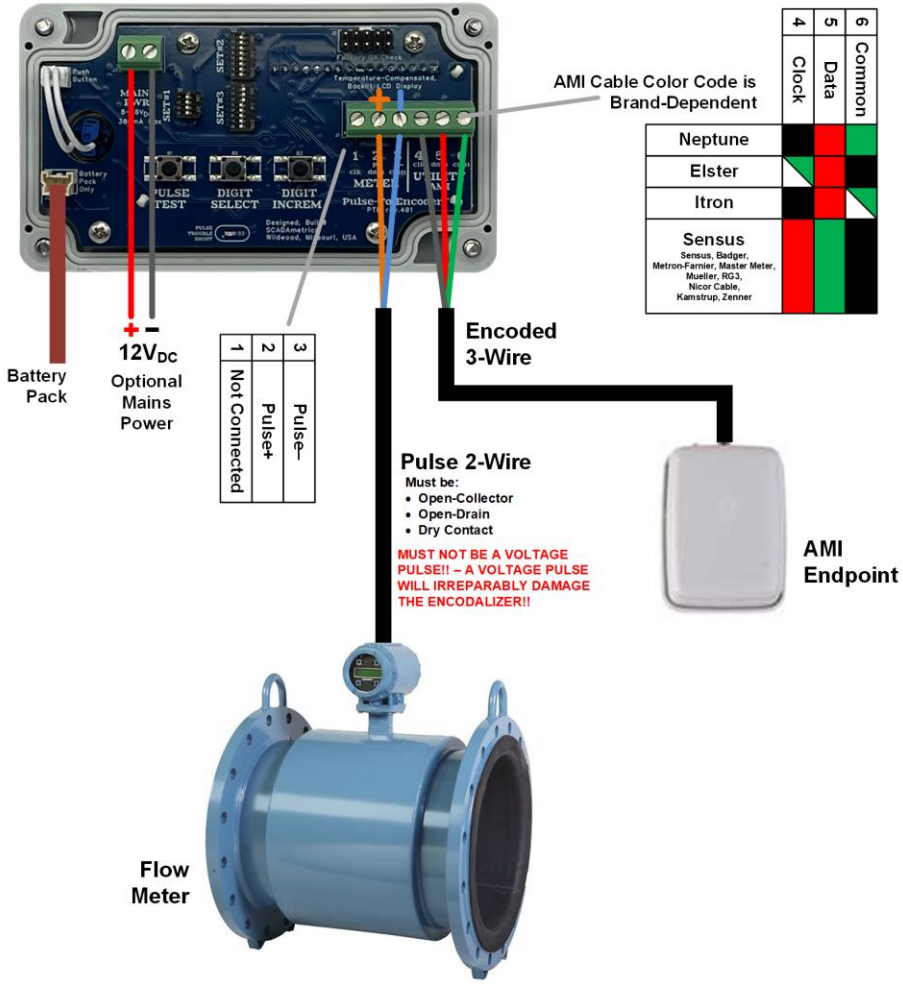
9. Remote Visual Display

The following illustrates how a model TMD display can work with a Neptune flow meter to provide a remote visual display to an otherwise not-easily-accessible water meter. The remote display provides a perfect match to the reading displayed on the Neptune register. Furthermore, if a Pro-Coder, E-Coder, or Mach-10 register is used, then the meter's 8-digit resolution will enable the display of rate-of-flow (GPM, lpm), as well. Excellent for customer-owned sub-meters at commercial and industrial buildings, where the building owner desires a meter reading without requiring entry to a vault or confined-space. Design Basis: SCADAmetrics **Model TMD TheMeterDisplay**:



10. Connect Pulse Flow Meters to AMI

The following illustrates how a model PTE Pulse Encodalizer™ can transform a pulse-type flow meter into an encoder-type flow meter. The Pulse Encodalizer is a battery-powered signal converter with integral 9-digit display. It counts pulses from most 2-wire, pulse-type flow meters (magmeters, wastewater meters, gas meters, steam meters, reclaimed water meters, irrigation meters, etc...) — and converts to Neptune and Sensus 3-wire encoder protocols. The battery pack offers a life up to 10 years and is user-replaceable. Excellent for wastewater lift stations, irrigation points-of-sale, sewer deduct meters, natural gas meters. Design Basis: SCADAmetrics **Model PTE Pulse Encodalizer**:



Want to Learn More?...

Are you interested in learning more about how SCADAmetrics flow instrumentation, when paired with Neptune flow meters, can provide a wealth of value-added SCADA and visual display options? Give us a call!... We'll be glad to discuss the details!