

Transmit Totalization from a PLC/RTU to an AMR/AMI System Using the SCADAmetrics Encodalizer™



In many water treatment plants, pumping stations, and custody-transfer nodes, the flow metering equipment is oriented toward SCADA interface, as opposed to AMI/AMR connectivity.

In one example, a PLC may be calculating totalization based on the time integral of rate-of-flow signal from a Venturi flow meter.

In another example, a PLC may be reading the totalization via fieldbus from a magnetic flow meter, such as the Endress+Hauser ProMag W400 via EtherNet/IP.

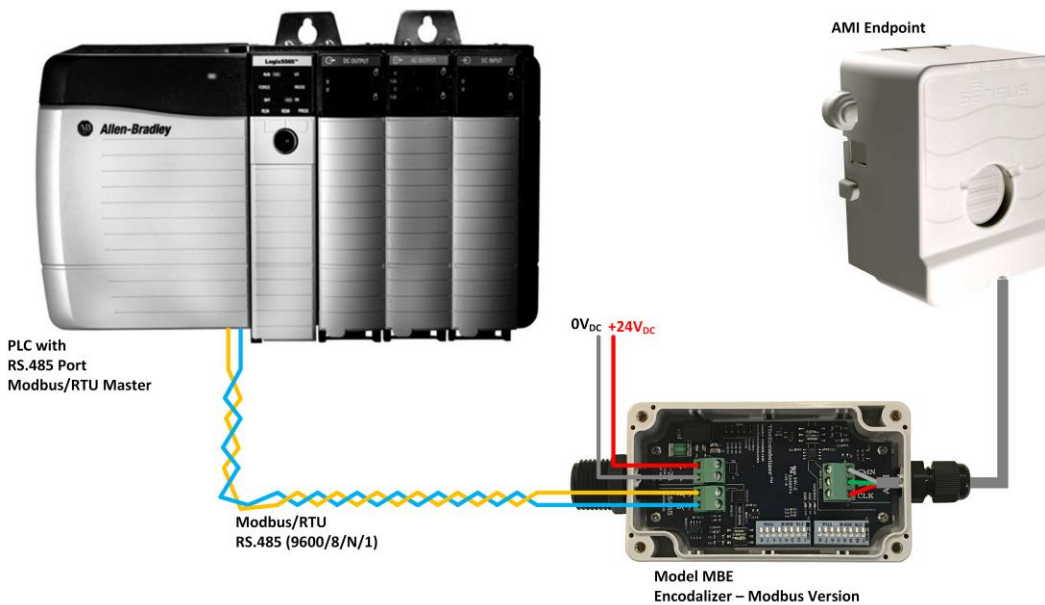
In either case, concurrent AMI connectivity may be achieved by the addition of a SCADAmetrics model MBE Encodalizer (Modbus Version) to the PLC system.

In such situations, the model MBE Encodalizer is set for Modbus/RTU (Slave mode), and the PLC performs a write of the METER READING (32-Bit Unsigned Integer, Big-Endian Format (3-2-1-0)) to the Encodalizer.

PLC-to-Encodalizer messaging is performed using:

- a) one WRITE_MULTIPLE_REGISTER command (Function 16, "Write Multiple Holding Registers") ← **PREFERRED**
 ...or...
- b) two Modbus WRITE_SINGLE_REGISTER commands (Function 6 "Write Single Holding Register")

If using two Modbus WRITE_SINGLE_REGISTER commands (Function 6), the 40001 register (high word) should be written first, and the 40002 register (low word) should be written second. The two write commands should be separated by a delay of at least 100ms, but no more separation than 500ms.



Modbus Register Map:

Holding Register (4x0000-Based)	Holding Register (0x-Based)	Contents
40001	0	High Word (Unsigned Int16)
40002	1	Low Word (Unsigned Int16)

Instructions:

- The PLC should be set up as a Modbus/RTU master. 9600/8/N/1
- Up to eight (8) uniquely-addressed MBE Encodalizers May be Wired to a single PLC Master RS.485 bus.
- One (1) Termination Resistor should be installed on the RS.485 Master PLC (across its A and B terminals), and one (1) Termination Resistor should be installed on the last MBE Encodalizer RS.485 Slave (across its A and B terminals). The Termination Resistor value is 120 Ω.
- Write the Meter Reading to the target MBE Encodalizer's Modbus registry.
- The MBE Encodalizer should be written to at least once per 900s (15 minutes). If the Encodalizer does not receive a valid write for a time period exceeding 900s, then the Encodalizer shall not respond to the connected AMI endpoint (emulates a cut cable). The Encodalizer will be in a STALE state.
- If the Encodalizer is in a STALE state, then it shall blink the RED LED at a fast rate (5 Hz). If the Encodalizer is NOT in a STALE state, then its RED LED will be steady OFF.
- Meter Reading = [High Word] x 65,536 + [Low Word]
- The PLC should not write a totalizer value that exceeds 999,999,999.

For example, if the totalizer reaches 1,000,000,000, then the PLC program should revert back to zero (0) and resume counting up again.

- The MBE Encodalizer will NOT re-scale the Totalizer Units per DIP Switches 9,10. DIP Switches 9,10 will be ignored. If the user wishes to perform a unit conversion, then that function should be performed in the master PLC.
- The MBE Encodalizer will report the totalizer value exactly as received from the PLC, while masked against the Encodalizer Setting for "Number of AMI Digits" (DIP Switches 11,12):

Example:

PLC Writes to Encodalizer:	"Number of AMI Digits" (DIP Switches 11,12)	AMI Totalization:
123,456,789	6	456,789
123,456,789	7	3,456,789
123,456,789	8	23,456,789
123,456,789	9	123,456,789

Troubleshooting:

- The use of a SCADAmetrics model TMD TheMeterDisplay™ can be a useful tool for validating the encoded output of the model MBE Encodalizer.
- Successful PLC-Encodalizer communications will be evident by a fast double-blink of the Encodalizer's "MODBUS" LED (green).
- The MBE Encodalizer's "ERROR" LED (red) will blink fast and continuously until the Encodalizer detects the PLC's first successful Modbus Write command from the connected PLC.
- Malformed Modbus writes may be evidenced by the absence of GREEN LED activity.
- If successful communications are not established, check the following:
 1. RS.485 Polarity – Try swapping the A and B wires.
 2. Serial Port Parameters – Make sure 9600 baud / 8 data bits / 1 stop bit / no parity
 3. Make sure Modbus Address(es) are correct.