AN-117: Encoded Meter FAQ

AKA an Encoded meter Decoder guide

We have encountered many questions over the years since we introduced our encoder MDTs. There is some misunderstanding as to how these meters output data and what products like the Tehama Encoder MDT are able to read from these devices. This app note will cover this and other questions about encoded meters.

Q: How do I wire the encoded meter to the MDT?

A: Please see our Application Note AN-102-E: Encoder MDT Wiring Guide on the Resources page of the Tehama Wireless website.

Q: What MDT model will work with which encoded meter?

A: All our MDT products whose part number suffix has an "E" in it will work with both Sensus and Neptune meters. For example, MDT model numbers TW-140B-E, TW-160B-EP, or TW-175B-EE. Almost universally, encoded meters from vendors other then Neptune and some from GWF use the Sensus UI-1203 protocol and are therefore compatible. Note that an early version of our MDT with model number TW-140B-N will only work with Neptune meters.

Our recently introduced TW-160B-G and TW-170B-G AllRead Encoder MDTs are designed to read GWF Unico2coder® MP water meters. This modified M-bus interface transfers data about the meter's unit of measure (gallons, cubic feet, etc.), the count factor, and the hot or cold designation of the meter, in addition to the meter read and the serial number. The greatly simplifies the MDT setup and guarantees an error free

Q: How do I determine the Count Factor for an encoded meter?

A: The count factor might be printed on the meter's register face (x10 or x100). For many mechanical meters it can be determined by the number of fixed zeros to the right of the moving dials. For other registers there may be a graphic that indicates only the top X digits that are available to the reading device. Electronic meters with LCD displays can vary. Neptune for example can only provide the upper six digits regardless of actual display width, so the remaining digits should be treated like fixed zeros. On the other hand, a Kamstrup meter will provide every digit shown on the display. It is best to consult with the meter manufacturer.

Q: How do the encoded meter and the MDT communicate?

A: The interface between encoded meters and the MDT is based on a digital handshake between the devices. The MDT is the reader and sends a query command to the meter which will respond with the current reading as displayed on the meter face along with the serial number of the meter. This data is in a specific format (i.e. Sensus UI-1203 or Neptune formats) and the MDT will interpret the

response from either format and transmit the reading value. For our GWF AllRead compatible MDTs, the information about the meter's units of measure, count factor, and Hot/Cold meter type is also read by the MDT.

Q: Will an Encoded meter turn on an MDT, like Pulse meters do?

A: Yes. An MDT that is in the Off state will still wake up once every 24 hours to check if it is connected to a meter. If it receives a valid response from a meter, the MDT will turn on and begin to transmit reads.

Q: What's the resolution on a Neptune ProRead Mechanical meter?

A: On 1 inch and smaller meters there are six moving dials plus a fixed (painted) 0 for the single gallon position, so the count factor is 10. On 1.5 and 2 inch meters there are six moving dials and two fixed (painted) 0's for the 1 and 10 gallon positions, so the count factor is 100.

However, Neptune further reduces the effective count factor by *only* reporting a 0 or a 5 for the lowest moving dial. *While the count factor is still 10 for this meter (because of the one fixed zero), any reader such as our MDT will only detect a change in reading every 50 gallons! For the larger meters with two fixed zeros the MDT can only detect a change every 500 gallons (and the count factor is 100).*

For the register shown above, the moving dials show 4138. Apply a 10X count factor to the 4138 to get 41,380 gallons. However the MDT will report 41350. Why? Because the of the 50 gallon resolution available to the MDT. Once the register shows 41400, the MDT will report 41400.

This explains why in CIT-generated graphs of some Neptune meter data, you will always see the value jump by 50 or 500 gallons (assuming you have applied the proper count factor in the CIT).

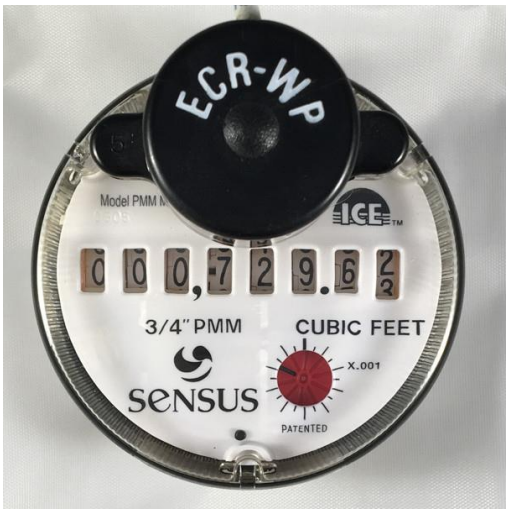
Q: What's the resolution on a Neptune ProCoder Mechanical meter?

A: On 1 inch and smaller meters there are six moving dials plus a fixed (painted) 0 for the single gallon position, so the count factor is 10. On 1.5 and 2 inch meters there are six moving dials and two fixed (painted) 0's for the 1 and 10 gallon positions, so the count factor is 100.

The Neptune ProCoder register does not suffer from the limited resolution of their ProRead register. The MDT will report the reads with a 10 gallon resolulution.

Q: What's the resolution on a Sensus mechanical meter?

A: This depends on how the meter was manufactured or programmed at the factory. Some Sensus meters have dials going down to the 1/100 of a unit (gallon or cubit feet) but it may only supply some of the dials through the electronic interface.



The meter above has eight rotating dials. However the factory sticker shown on the right says only 4 digits are available to an external reader. So the MDT in this case will report the value 7. Apply a 100X count factor to get 700 cubic feet, *even though the register shows 729.62 cubic feet*. Once the register shows 800.00, the MDT will report 8 (or 800 with the proper count factor applied).

Note the serial number printed on the label. That is the serial number that is transmitted by MDTs manufactured after July 2015. Not all registers have the serial number printed on them.

Q: What is the resolution on newer electronic encoded registers?

A: Newer solid state meters, easily identifiable with an LCD display and often a solar panel, generally provide better resolutions compared to the mechanical meters. In the case of Neptune, their public protocol will only supply six digits of data regardless of the number of digits displayed.

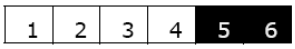
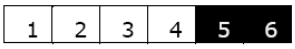
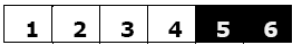
The picture here shows a 5/8” E-Coder register with nine digits total, two digits of which are to the right of the decimal (1/100 of a gallon resolution). But since only the upper six digits are available to the MDT, it will report 466. Apply a 10X count factor to get 4,660 gallons when displayed in the CIT or a daily report, *even though the register shows 4,664.46 gallons*.

Q: How do the encoded meters generate the reads data?

A: For mechanical meters there is either a magnetic or optical mechanism that interprets the physical dial position. Here is a YouTube video that demonstrates the optical solution. The MDT (or touchpad reader) energizes the circuit in the meter, which in turn sends the reads data to the reader. To simplify the circuit, the meter manufacturers often don’t output the value of every spinning dial, or sometimes they reduce the resolution of the rightmost spinning dial. Note that a higher resolution sweep hand is never available to an external reader as it is usually associated with the rightmost fixed zero(s).

Q: How do I read the register on the meter face?

A: Please consult with the meter manufacture on how to read their specific meter. In general, here are a couple examples to help illustrate:

Register or Totalizer shows:	Readings (Gallons)
 0 Gallons	1,234,560
 Gallons X 100	123,456 x 100 or 12,345,600
 X 100 Gallons	123,456 x 100 or 12,345,600

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