

## Connect a Flow-Tronic Torpee Mag to an AMI/AMR System Using the SCADAmetrics Encodalizer™



The Flow-Tronic Torpee Mag (pictured left) is a popular, insertion-type magnetic flow meter that is suitable for a broad range of water flow metering applications. It is manufactured in a range of sizes so as to support flow metering within 4- thru 60-inch diameter pipes.

The Torpee Mag features traditional 4-20 milliamp, HART, and pulse SCADA signals, as well as the Modbus/RTU serial protocol. Like most mains-powered process magnetic flow meters, the Torpee Mag does not offer native AMI/AMR-compatibility.

However, today, the latest firmware release for the SCADAmetrics Model MBE Encodalizer now adds Sensus and Neptune encoder protocols to this important flow meter, so that it may now be easily integrated into today’s modern AMI/AMR systems.

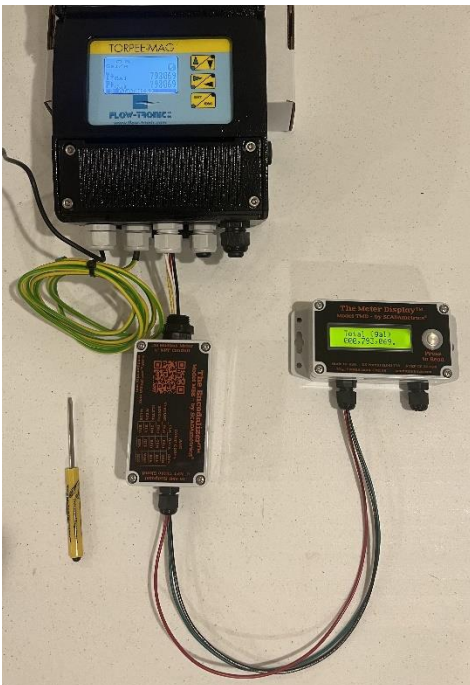
The purpose of this Application Note is to provide technical assistance to the Torpee Mag User who wishes to connect his meter to an AMI/AMR system.

The operational convenience of the MBE Encodalizer is based upon the principle that the User sets the Meter Type (Make & Model) via Encodalizer DIP switches, connects the Encodalizer to the meter via Modbus/RTU (2-Wire RS.485), and the Encodalizer interacts with the target flow meter using the meter’s factory default Modbus/RTU settings. No special setup of the meter should be required beyond normal initialization procedures. When ordering a Torpee Mag, please note that the meter must be outfitted with the Modbus/RTU (RS.485) option, in addition to any other application-specific I/O options. 24V<sub>DC</sub> Mains Power option is also recommended, but not required.



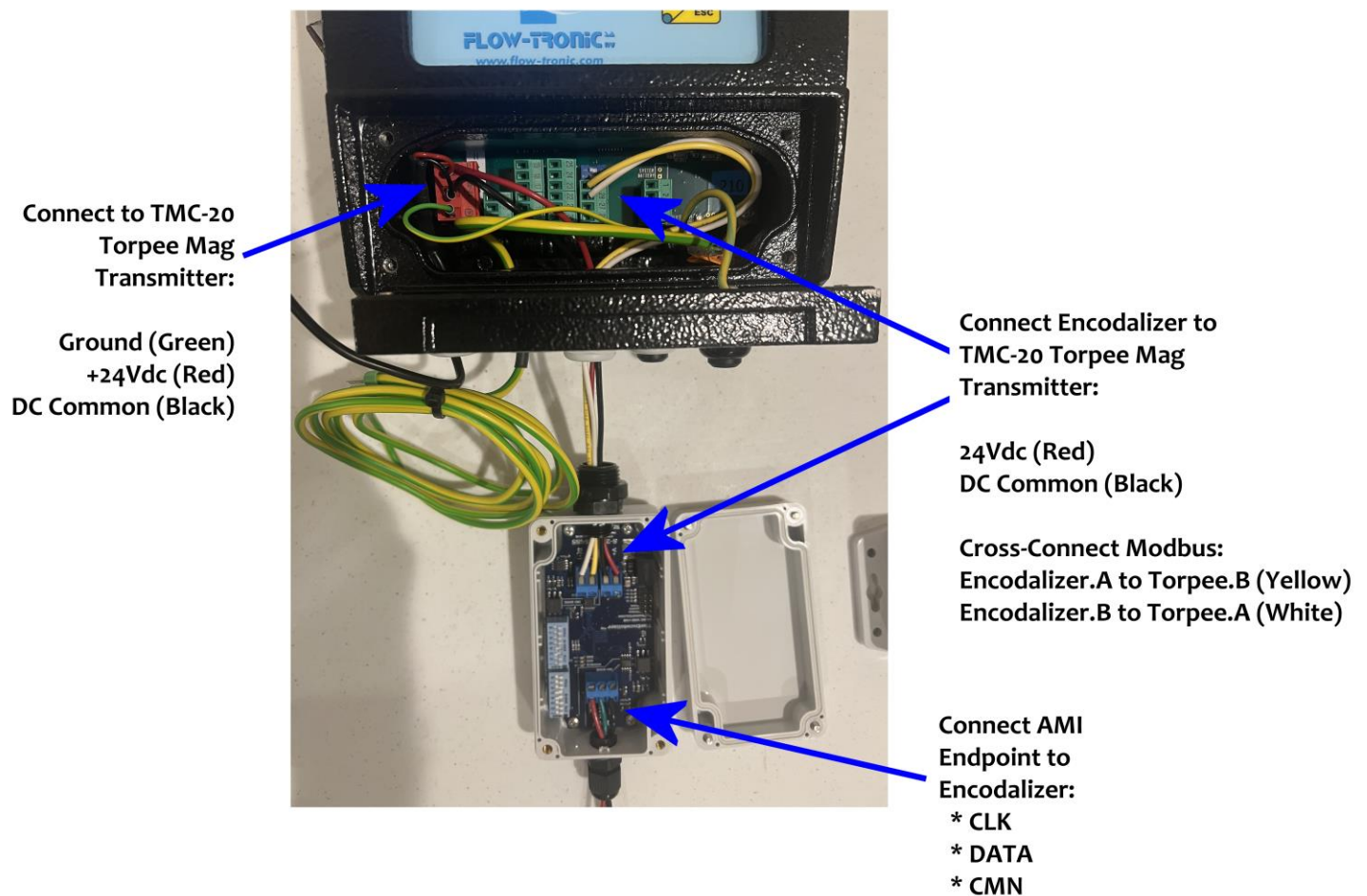
*Jim 'Slim' Mimplitz, SCADAmetrics*

### SCADAmetrics / Torpee Mag Demo:



Flow-Tronic Torpee Mag TMC-20 Transmitter  
 SCADAmetrics Model MBE Encodalizer™  
 SCADAmetrics Model TMD TheMeterDisplay™ – For Troubleshooting

## Encodalizer / Torpee Mag Integration:



## Acknowledgements:

Firmware development and validation was performed using a **Flow-Tronic TMC-20 Torpee Mag Transmitter**.

This flow instrument was generously provided on loan to SCADAmetrics, courtesy of **Vincent Favre**, North American Sales Manager @ Flow-Tronic S.A. (London, Ontario, CA), and **Josh Dickert**, Technical Sales Consultant @ 540 Technologies (Ebensburg, PA).

## Encodalizer DIP Switch Settings:

- Set DIP Switches 1-6 Per Meter Type “Flow-Tronic Torpee Mag”, T<sup>+</sup> or T<sup>-</sup> or Net (T<sup>+</sup> – T<sup>-</sup>).  
(For example... Torpee Mag Net: DIP Switches 4,5=ON. DIP Switches 1,2,3,6=OFF)
  - Set DIP Switch 8 Per Desired AMI Protocol: Sensus or Neptune: OFF=Sensus, ON=Neptune.
  - DIP Switches 9 and 10 Have No Effect Upon the AMI Units (Gal, FT<sup>3</sup>, M<sup>3</sup>...), and Therefore May Be Ignored. AMI Units for The Torpee Mag Always Follow the Torpee Mag Totalizer Units for T<sup>+</sup> and T<sup>-</sup>.
  - Set DIP Switches 11,12 Per Number of Desired AMI Digits: 6, 7, 8, or 9.  
If AMI Protocol is Set to Neptune, Then Setting Number of AMI Digits to 6 Will Force 6-Digit Neptune Protocol. Otherwise, Neptune Protocol Returns 8 or 6 Digits – Depending Upon Interrogation Device Protocol.
  - Set DIP Switches 13,14,15,16 Per Desired Totalizer Multiplier (x1, x10, x100, etc...).
- (FOR SIMPLICITY – SEE DIP SWITCH TABLES AT THE END OF THIS DOCUMENT!!)**

## Torpee Mag Transmitter (TMC-20) and Encodalizer Wiring

- Connect Ground to Promag grounding lug. Connect Power (Preferably 24V<sub>DC</sub>) to the Torpee Mag TMC-20 Transmitter. The Torpee Mag bootup process completes in approximately 5 seconds.
- If SCADA Connection is Required, Then Connect SCADA System to the Torpee Mag: 4-20mA, or Pulse
- Connect Encodalizer Modbus Terminals to Torpee Mag Modbus Terminals.  
Cross-Connect! : Encodalizer.A-to-Torpee.B ... Encodalizer.B-to-Torpee.A
- Connect DC Power to Encodalizer (8-28V<sub>DC</sub>).
- The Encodalizer LED should NOT blink RED. Red Blinks Denote a Configuration and/or Read Error.

## Torpee Mag Setup:

- Totalizer Setup:

Set Totalizer T<sup>+</sup> and T<sup>-</sup> Units and Decimal Places in Menu Section 2:

Imperial (US) Volume: **Gal (US Gal), KGal (US KGal), ft<sup>3</sup> (Cubic Foot), kf<sup>3</sup> (K Cubic Foot)**

US – Gallons & KGallons Recommendations:			
Diameter (Inches)	Volume Units	Decimal Places	Max AMI Resolution
4"	Gal	0 (#.)	Gal x 1
6" – 12"	KGal	2 (###)	Gal x 10
16" – 32"	KGal	1 (##)	Gal x 100
34" +	KGal	0 (#.)	Gal x 1000

US – Cubic Foot Recommendations:			
Diameter (Inches)	Volume Units	Decimal Places	Max AMI Resolution
4"	ft <sup>3</sup>	1 (##)	ft <sup>3</sup> x 0.1
6" – 12"	ft <sup>3</sup>	0 (#.)	ft <sup>3</sup> x 1
16" – 32"	kf <sup>3</sup>	2 (###)	ft <sup>3</sup> x 10
34" +	kf <sup>3</sup>	1 (##)	ft <sup>3</sup> x 100

Metric (Canadian) Volume: **m<sup>3</sup> (cubic meter)**

Canada – Cubic Meter Recommendations:			
Diameter (Inches)	Volume Units	Decimal Places	Max AMI Resolution
4"	m <sup>3</sup>	3 (####)	m <sup>3</sup> x 0.001
6" – 12"	m <sup>3</sup>	2 (###)	m <sup>3</sup> x 0.01
16" – 32"	m <sup>3</sup>	1 (##)	m <sup>3</sup> x 0.1
34" +	m <sup>3</sup>	0 (#.)	m <sup>3</sup> x 1

- Do NOT Modify Torpee Mag Modbus/RTU Default Settings.  
(Device ID: 1, Baud: 19200, Stop Bits: 1, Parity: None)

## Connecting AMI Endpoint:

Function	Sensus Meter Color (Badger, Metron-Farnier, Master Meter, Kamstrup, Mueller, Zenner, RG3, Nicor Cable)	Neptune Color	Itron ERT Cable
CLK	Red	Black	Black
DATA	Green White	Red	Red
CMN	Black	Green	White Shield

## Testing:



If you experience any problems, use of a SCADAmetrics model TMD TheMeterDisplay™ is highly recommended. The TMD can be used to display the AMI totalizer reading and/or AMI Serial Number:

### Connections:

TMD.Terminal.1 to → Encodalizer.Terminal.CLK  
TMD.Terminal.2 to → Encodalizer.Terminal.DATA  
TMD.Terminal.3 to → Encodalizer.Terminal.CMN





**MAX AMI RESOLUTION = GAL x 1000**

Transmitted AMI Resolution	Sensus 6	Sensus 7	Sensus 8	Sensus 9	Neptune ECODER	Neptune PROREAD
<b>Gallons x1000</b>	DipSw.1= DipSw.2= DipSw.3= DipSw.4=ON DipSw.5=ON DipSw.6= DipSw.7= DipSw.8= DipSw.9= DipSw.10= DipSw.11= DipSw.12= DipSw.13= DipSw.14= DipSw.15= DipSw.16=	DipSw.1= DipSw.2= DipSw.3= DipSw.4=ON DipSw.5=ON DipSw.6= DipSw.7= DipSw.8= DipSw.9= DipSw.10= DipSw.11=ON DipSw.12= DipSw.13= DipSw.14= DipSw.15= DipSw.16=	DipSw.1= DipSw.2= DipSw.3= DipSw.4=ON DipSw.5=ON DipSw.6= DipSw.7= DipSw.8= DipSw.9= DipSw.10= DipSw.11= DipSw.12=ON DipSw.13= DipSw.14= DipSw.15= DipSw.16=	DipSw.1= DipSw.2= DipSw.3= DipSw.4=ON DipSw.5=ON DipSw.6= DipSw.7= DipSw.8= DipSw.9= DipSw.10= DipSw.11=ON DipSw.12=ON DipSw.13= DipSw.14= DipSw.15= DipSw.16=	DipSw.1= DipSw.2= DipSw.3= DipSw.4=ON DipSw.5=ON DipSw.6= DipSw.7= DipSw.8=ON DipSw.9= DipSw.10= DipSw.11= DipSw.12=ON DipSw.13= DipSw.14= DipSw.15= DipSw.16=	DipSw.1= DipSw.2= DipSw.3= DipSw.4=ON DipSw.5=ON DipSw.6= DipSw.7= DipSw.8=ON DipSw.9= DipSw.10= DipSw.11= DipSw.12=ON DipSw.13= DipSw.14= DipSw.15= DipSw.16=







**MAX AMI RESOLUTION = FT<sup>3</sup> x 100**

Transmitted AMI Resolution	Sensus 6	Sensus 7	Sensus 8	Sensus 9	Neptune ECODER	Neptune PROREAD
FT <sup>3</sup> x100	DipSw.1= DipSw.2= DipSw.3= DipSw.4=ON DipSw.5=ON DipSw.6= DipSw.7= DipSw.8= DipSw.9=ON DipSw.10= DipSw.11= DipSw.12= DipSw.13= DipSw.14= DipSw.15= DipSw.16=	DipSw.1= DipSw.2= DipSw.3= DipSw.4=ON DipSw.5=ON DipSw.6= DipSw.7= DipSw.8= DipSw.9=ON DipSw.10= DipSw.11=ON DipSw.12= DipSw.13= DipSw.14= DipSw.15= DipSw.16=	DipSw.1= DipSw.2= DipSw.3= DipSw.4=ON DipSw.5=ON DipSw.6= DipSw.7= DipSw.8= DipSw.9=ON DipSw.10= DipSw.11= DipSw.12=ON DipSw.13= DipSw.14= DipSw.15= DipSw.16=	DipSw.1= DipSw.2= DipSw.3= DipSw.4=ON DipSw.5=ON DipSw.6= DipSw.7= DipSw.8= DipSw.9=ON DipSw.10= DipSw.11=ON DipSw.12=ON DipSw.13= DipSw.14= DipSw.15= DipSw.16=	DipSw.1= DipSw.2= DipSw.3= DipSw.4=ON DipSw.5=ON DipSw.6= DipSw.7= DipSw.8=ON DipSw.9=ON DipSw.10= DipSw.11= DipSw.12=ON DipSw.13= DipSw.14= DipSw.15= DipSw.16=	DipSw.1= DipSw.2= DipSw.3= DipSw.4=ON DipSw.5=ON DipSw.6= DipSw.7= DipSw.8=ON DipSw.9=ON DipSw.10= DipSw.11= DipSw.12=ON DipSw.13= DipSw.14= DipSw.15= DipSw.16=





**MAX AMI RESOLUTION = M<sup>3</sup> x 1**

Transmitted AMI Resolution	Sensus 6	Sensus 7	Sensus 8	Sensus 9	Neptune ECODER	Neptune PROREAD
M <sup>3</sup> x1	DipSw.1= DipSw.2= DipSw.3= DipSw.4=ON DipSw.5=ON DipSw.6= DipSw.7= DipSw.8= DipSw.9= DipSw.10=ON DipSw.11= DipSw.12= DipSw.13= DipSw.14= DipSw.15= DipSw.16=	DipSw.1= DipSw.2= DipSw.3= DipSw.4=ON DipSw.5=ON DipSw.6= DipSw.7= DipSw.8= DipSw.9= DipSw.10=ON DipSw.11=ON DipSw.12= DipSw.13= DipSw.14= DipSw.15= DipSw.16=	DipSw.1= DipSw.2= DipSw.3= DipSw.4=ON DipSw.5=ON DipSw.6= DipSw.7= DipSw.8= DipSw.9= DipSw.10=ON DipSw.11= DipSw.12=ON DipSw.13= DipSw.14= DipSw.15= DipSw.16=	DipSw.1= DipSw.2= DipSw.3= DipSw.4=ON DipSw.5=ON DipSw.6= DipSw.7= DipSw.8= DipSw.9= DipSw.10=ON DipSw.11=ON DipSw.12=ON DipSw.13= DipSw.14= DipSw.15= DipSw.16=	DipSw.1= DipSw.2= DipSw.3= DipSw.4=ON DipSw.5=ON DipSw.6= DipSw.7= DipSw.8=ON DipSw.9= DipSw.10=ON DipSw.11= DipSw.12=ON DipSw.13= DipSw.14= DipSw.15= DipSw.16=	DipSw.1= DipSw.2= DipSw.3= DipSw.4=ON DipSw.5=ON DipSw.6= DipSw.7= DipSw.8=ON DipSw.9= DipSw.10=ON DipSw.11= DipSw.12=ON DipSw.13= DipSw.14= DipSw.15= DipSw.16=