



TRICON<sup>®</sup> /E/E2/E3 Transmitter  
Installation and Maintenance Guide





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Installation and Maintenance Guide

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- TRICON

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## FCC Notice

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

**NOTE:** This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio / TV technician for help.

### **RF Exposure Information**

This equipment complies with the FCC RF radiation requirements for uncontrolled environments. To maintain compliance with these requirements, the antenna and any radiating elements should be installed to ensure that a minimum separation distance of 20 cm is maintained from the general population.

### **Professional Installation**

In accordance with section 15.203 of the FCC rules and regulations, the MIU must be professionally installed by trained meter installers.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

### **Industry Canada (IC) Statements**

Section 8.4 of RSS-GEN

This device complies with Industry Canada License-exempt RSS standard(s). Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

Cet appareil est conforme aux normes RSS exonérées de licence d'Industrie Canada. L'opération est soumise aux deux conditions suivantes: 1) cet appareil ne doit pas provoquer d'interférence, et 2) cet appareil doit accepter toute interférence, y compris les interférences pouvant entraîner un fonctionnement indésirable de l'appareil.

Section 8.3 of RSS-GEN

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

This radio transmitter IC: 4171B-L900M has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible

gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

- Maximum permissible gain of +1 dBi and required impedance of 75 ohm.
- Approved Antenna types:
  - R900<sup>®</sup> Pit Antenna, part number 12527-XXX.
  - High Gain R900<sup>®</sup> Pit Antenna, part number 13586-XXX.
  - R900<sup>®</sup> Wall Antenna, part number 13717-000.
  - Wire monopole, part number 12641-XXX.

En vertu de la réglementation d'Industrie Canada, cet émetteur radio ne peut fonctionner qu'avec une antenne d'un type et un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Pour réduire les interférences radio potentielles avec d'autres utilisateurs, le type d'antenne et son gain devraient être choisis de manière à ce que la puissance rayonnée isotropiquement équivalente (e.i.r.p.) ne soit pas supérieure à celle nécessaire à une communication.

Cet émetteur radio IC: 4171B-L900M a été approuvé par Industrie Canada pour fonctionner avec les types d'antennes énumérés ci-dessous avec le gain maximal admissible et l'impédance d'antenne requise pour chaque type d'antenne indiqué. Les types d'antenne non inclus dans cette liste, ayant un gain supérieur au gain maximal indiqué pour ce type, sont strictement interdits pour être utilisés avec ce périphérique.

- Gain maximal admissible de +1 dBi et impédance requise de 75 ohms.
- Types d'antenne approuvé
  - Antenne de puits R900<sup>®</sup>, numéro de pièce 12527-XXX
  - Antenne de puits à gain élevé R900<sup>®</sup>, référence 13586-XXX
  - Antenne murale R900<sup>®</sup>, numéro d'article 13717-00
  - Fil monopôle, numéro d'article 12641-XXX

TRICON<sup>®</sup> /E/E2/E3 Transmitter  
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The TRICON<sup>®</sup>/E/E2/E3 Transmitter provides an electronic interface to Neptune<sup>®</sup> water meters, enabling customers to monitor their water usage and control various processes based on that usage.

The TRICON transmitter is available in two styles:

- Digital Pulse.
- Analog 4-20mA.

The TRICON/E3 Transmitter is not intended for pit applications.

### Transmitter Styles

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This section describes the two different TRICON transmitter styles.

#### Digital Pulse

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The original Digital Pulse model is a three-terminal transmitter that outputs electrical pulses at a rate corresponding to the rate of flow through the meter. It requires 12-24VDC operating power and is intended for use in applications requiring only a digital signal.

The TRICON/E2 and TRICON/E3 Digital Pulse models are five-terminal transmitters that have the same features as the original Digital Pulse model, plus two additional terminals (High Resolution Output and Count Direction) for connection to a high-speed, bi-directional counter. It requires 12-24VDC operating power, and is intended for use in applications requiring a high resolution digital signal.

Neptune produces the Digital Pulse model TRICON/E transmitters in only two styles for use with ALL Neptune disc meters or ALL Neptune turbine meters, respectively:

- Disc.
- Turbine.

However, the Analog 4-20mA model TRICON/E transmitters are manufactured specifically for the size and type of meter with which they should be used. For this reason, take special care to ensure that you have the proper Analog 4-20mA model TRICON/E required for your application. Contact Neptune for technical assistance.

#### Analog 4-20mA

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The Analog 4-20mA model is a five-terminal transmitter that has the same features as the original Digital Pulse model, plus two additional terminals for a 4-20mA output that is proportional to the rate of flow through the meter. It requires 24VDC operating power, and is intended for use in applications requiring analog and digital signals.

## Usage

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All TRICON transmitter models are designed to be mounted between the meter maincase and a totalizing register, and they do not affect the normal operation of either the meter or the register. When used with a SmartTrol<sup>®</sup> controller or other third-party instrumentation equipment, both the Digital Pulse and Analog models allow monitoring and controlling complex metering systems.

This chapter provides the electrical specifications and the performance data for all models of the TRICON<sup>®</sup> transmitter.



The TRICON/E3 is not submersible. Neptune does not recommend installing the TRICON/E3 in a pit environment.

### Environmental Conditions

- Operating Temperature: 32° to +158° F (0° to +70° C)
- Storage Temperature: -40° to +185° F (-40° to +85° C)
- Operating Humidity: 0 to 95% RH, non-condensing

### Electrical Specifications (TRICON<sup>®</sup>/E3 Model)

The following tables define the electrical specifications for the TRICON/E3 model.

**Table 1 – Pulse Outputs (over 0-70° C Operating Temperature)**

Parameter	Description	Minimum	Typical	Maximum	Units
V <sub>ol</sub>	Low Digital Pulse Output Voltage	N/A	0.4	N/A	V
V <sub>oh</sub>	High Digital Pulse Output Voltage	8.5	V <sub>DCIN</sub> -1.0V	12	V
I <sub>ol</sub>	Current @ V <sub>ol</sub>	N/A	-10	N/A	mA
I <sub>oh</sub>	Current @ V <sub>oh</sub>	N/A	+10	N/A	mA
*t <sub>r</sub> l-h	Output Rise Time	N/A	N/A	2	uS
*t <sub>f</sub> h-l	Output Fall Time	N/A	N/A	2	uS

\*Measured with R<sub>L</sub>=2.4KΩ and C<sub>L</sub>=50pF.

Table 2 – 4-20mA Model (Over 0-50° C Operating Temperature)

Parameter	Description	Minimum	Typical	Maximum	Units
Vcc	Power Supply Voltage	22.5	N/A	26.5	V
IS	Power Supply Current	20	N/A	80	mA
RL	Loop Resistance	0	N/A	600	Ω
Gain	Scaling Accuracy	N/A	N/A	0.5	%FS
Zero	Offset Accuracy	N/A	N/A	0.2	%FS
Vol	Low Digital Pulse Output Voltage	N/A	0.4	N/A	V
Voh	High Digital Pulse Output Voltage	8.5	N/A	12	V
Iol	Current @ Vol	N/A	-10	N/A	mA
Ioh	Current @ Voh	N/A	10	N/A	mA
*tr l-h	Output Rise Time	N/A	N/A	2	uS
*tf h-l	Output Fall Time	N/A	N/A	2	uS

\*Measured with RL=2.4KΩ and CL=50pF

Table 3 – HF and UP / DN Models (Over 0-70° C Operating Temperature)

Parameter	Description	Minimum	Typical	Maximum	Units
Vcc	Power Supply Voltage	11.5	N/A	26.5	V
IS	Power Supply Current	20	N/A	50	mA
Vol	Low Digital Pulse Output Voltage	0	N/A	N/A	V
Voh	High Digital Pulse Output Voltage	N/A	24	26.5	V
Iol	Current @ Vol	-1.0	N/A	N/A	A
Ioh	Current @ Voh	N/A	0.04	+1.0 W/Voh	A
*tr l-h	Output Rise Time	N/A	N/A	2	uS
*tf h-l	Output Fall Time	N/A	N/A	2	uS

\*Measured with RL=2.4KΩ and CL=50pF



Table 4 – All Models Absolute Limits\*

Parameter	Description	Minimum	Maximum	Units
T (op)	Operating Temperature	0	85	°C
T (stg)	Storage Temperature	-40	85	°C
Vcc	Power Supply Voltage	-30	30	V
RL	Output Load (pulse output)	1200	N/A	KΩ
Iout	Output Current (pulse output)	N/A	10	mA

\*These limits cannot be exceeded without possible damage.

## Performance Data

The following tables define the performance data for all TRICON models.

Table 5 – T-10® Disc Meters

Meter Size (In)	Maximum Flow Rate (gpm)	Maximum Continuous Flow Rate (gpm)	Minimum Flow Rate (gpm)	Number of Pulses per Gallon*	Pulse Output @ Maximum Flow Rate (Hz)*	Flow Range of 4-20MA Output (gpm)
5/8	20	10	1/4	578.10	192.70	0-20
3/4	30	15	1/2	322.60	161.30	0-30
1	50	25	3/4	150.80	125.67	0-50
1 1/2	100	50	1 1/2	67.57	112.62	0-100
2	160	80	2	37.30	100.00	0-160

\*For the High Resolution Output of TRICON/E2 transmitters, multiply these values by 36, and for the TRICON/E3, multiply by 40.

Table 6 – T-8 Disc Meters

Meter Size (In)	Maximum Flow Rate (gpm)	Maximum Continuous Flow Rate (gpm)	Minimum Flow Rate (gpm)	Number of Pulses per Gallon*	Pulse Output @ Maximum Flow Rate (Hz)*	Flow Range of 4-20MA Output (gpm)
5/8	20	10	1/4	473.60	157.87	0–24.41 <sup>1</sup>
3/4	30	15	1/2	329.14	164.57	0–29.40
1	50	25	3/4	126.55	105.46	0–59.58 <sup>1</sup>
1 1/2	100	50	1 1/2	47.86	79.77	0–141.18 <sup>1</sup>
2	160	80	2	25.60	68.27	0–234.37 <sup>1</sup>

\*For the High Resolution Output of TRICON/E2 transmitters, multiply these values by 36, and for the TRICON/E3, multiply by 40.

<sup>1</sup>T-8 disc meters are no longer manufactured, so all TRICON/E transmitters manufactured for disc meters are the T-10 type. In most cases, the newer T-10 meter chamber is smaller than its corresponding T-8 meter chamber, which results in the TRICON/E having a theoretical “Flow Rate at 20mA Output” that is greater than the Maximum Flow Rate allowed for the meter. This means that the T-10 type TRICON/E running on a T-8 meter will never actually reach the 20mA output level during normal operation. The calculated flow rate required to produce a 20mA output is a reference for calibrating the 4-20mA receiving instrument.

Table 7 – Trident® Turbine (TT) Meters

Meter Size (In)	Maximum Continuous Flow Rate (gpm)	Minimum Flow Rate (gpm)	Number of Pulses per Gallon*	Pulse Output @ Maximum Flow Rate (Hz)*	Flow Range of 4-20MA Output (gpm)
2	200	3	4.6080	15.36	0–200
3	450	5	2.8900	21.68	0–450
4	1,000	10	1.5900	26.50	0–1,000
6	2,000	20	0.4640	15.47	0–2,000
8 (through S/N 31918014)	3,500	35	0.2493	14.54	0–3,500
8 (from S/N 31918274)	3,500	35	0.2253	13.14	0–3,873
10 (through S/N 31919282)	5,500	50	0.1600	14.67	0–5,500
10 (from S/N 31919300)	5,500	50	0.1472	13.49	0–5,981

\*For the High Resolution Output of the TRICON/E2 transmitters, multiply these values by 9 and for the TRICON/E3, multiply these values by 10.

Table 8 – High Performance Turbine (HPT) Meters

Meter Size (In)	Maximum Continuous Flow Rate (gpm)	Minimum Flow Rate (gpm)	Number of Pulses per Gallon*	Pulse Output @ Maximum Flow Rate (Hz)*	Flow Range of 4-20MA Output (gpm)
1½	160	4	6.09500	16.25	0–160
2	200	4	6.09500	20.32	0–200
3	450	5	11.20000	84.00	0–450
4	1,200	10	7.55600	151.1	0–1,200
6	2,500	20	0.72730	30.30	0–3,000
8	4,000	35	0.75560	50.37	0–4,000
10	6,500	50	0.75560	81.86	0–6,500
12	8,000	120	0.75560	100.75	0–8,000
16	13,500	200	0.07556	17.00	0–13,500
20	22,000	300	0.07556	27.71	0–22,000

\*For the High Resolution Output of the TRICON/E2 transmitters, multiply these values by 9 and for the TRICON/E3, multiply these values by 10.

Table 9 – Compound Meters

Compound Meter* Size and Type	Turbine Element	Disc Element
3" TRU/FLO	3" TT	5/8" T-10
4" TRU/FLO	4" TT	3/4" T-10
6" TRU/FLO	6" TT	T-10
2" HP TRU/FLO	2" HPT	5/8" T-10
4" PROTECTUS III	4" TT	1" T-10
6" PROTECTUS III	6" TT	1 1/2" T-10
8" PROTECTUS III	8" TT	2" T-10
10" PROTECTUS III	10" TT	2" T-10
4" HP PROTECTUS III	1	1" T-10
6" HP PROTECTUS III	1	1 1/2" T-10
8" HP PROTECTUS III	1	2" T-10
10" HP PROTECTUS III	1	2" T-10

\*For TRICON/E Performance Specifications of Compound Meters, refer to the specification information of each respective meter element.

<sup>1</sup>Refer to the following table for the performance specifications of the 4", 6", 8", and 10" HP PROTECTUS III Turbine Elements.

Table 10 – 4", 6", 8", and 10" HP PROTECTUS® III Turbine Elements Performance Specifications

Meter Size (In)	Maximum Continuous Flow Rate (gpm)	Number of Pulses per Gallon*	Pulse Output @ Maximum Flow Rate (Hz) <sup>1</sup>	Flow Range of 4-20MA Output (gpm)
4	1,200	7.5560	151.2	0–1,200
6	2,500	0.7556	37.78	0–2,888
8	4,000	0.6095	40.63	0–4,959
10	6,500	0.5333	57.78	0–9,209

\*For the High Resolution Output of the TRICON/E2 transmitters, multiply these values by 9 and for the TRICON/E3, multiply these values by 10.

<sup>1</sup>Note: This table is based on mounting the HPT TRICON/E3 on the same size HP PROTECTUS III Turbine Element.

## Chapter 3: Installing the Transmitter

This chapter is designed to take you through the installation process for the TRICON<sup>®</sup> transmitter.

### Tools and Materials

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The following equipment is required for the installation:

- Medium, flat-head screwdriver.
- Wire stripper.
- Hammer.
- Small (1/8") diameter punch, or similar tool.
- Multi-conductor, solid, #22 American Wire Gauge (AWG), copper cable.
- Dow Corning<sup>®</sup> #4, or equivalent compound (optional).



Some items may not apply to your specific installation, or the list may not contain all required tools or materials.

### Preparation

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Be sure to review the following sections before beginning the installation.

### Inspection and Storage

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Remove the assembly parts from the parts bag and inspect them for any damage. The transmitter arrives partially assembled, with the terminal cover and mounting ring being the only separate parts. After the inspection is complete, store the cartons in a clean, dry environment. The temperature should remain between -40° F and +185° F (-40° C and +85° C).

### Safety and Preliminary Checks

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Always follow your local electrical and safety codes and observe the following guidelines for running wire between your TRICON/E transmitter and the receiving device.

Avoid installing your TRICON E/E2/E3 instrumentation wiring near sources of electrical noise, such as:

- Contactors, motor starters, and relays.
- Radio transmitters and antennas.
- High-voltage power wiring and transformers.

- Whenever possible, separate your instrumentation wiring from other wiring by using a separate metal conduit or metal wire tray.
- Use the minimum length of cable required for the installation and cut off any excess. Do not coil excess wire.



For longer runs (maximum 1,000 feet) use #22 AWG shielded twisted pair cable for signal connections, and tie the shield to the ground at the receiving device, not at the TRICON/E transmitter.

- When forced to cross other wiring, cross at right angles to minimize noise coupling between wiring.
- Use a dedicated power source, such as a separate circuit breaker or isolation transformer, for all instrumentation equipment to reduce the effects of electrical noise from other equipment on the line.
- Ensure proper earth ground is available and installed in compliance with local electrical codes.

## Installation

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This section defines the procedures to install the TRICON transmitter.

### Wiring the Transmitter

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Follow this procedure to wire the transmitter.

1. Locate the terminal cover and remove the cover screw.
2. Lift the terminal cover from the transmitter.

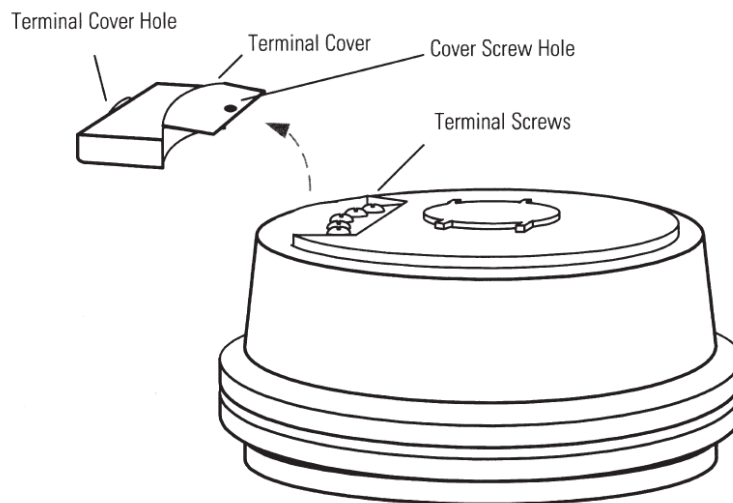


Figure 1 – Transmitter Elements

3. Insert the end of the multi-conductor cable through the hole in the terminal cover as shown in the previous figure. Move the cover far enough down the cable to allow you to work with the end that you just inserted.

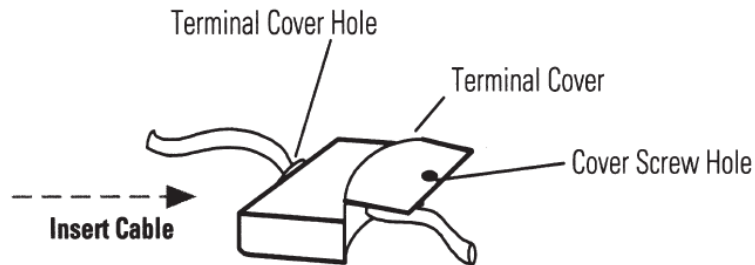


Figure 2 – Elements of the Transmitter

4. Strip the outer covering of the cable back approximately 1½" from the inserted end.
5. Separate the individual conductors and strip the insulation back approximately ½" from the end of each conductor.
6. Using the rounded shaft of the screwdriver, form a hook in the end of each bare copper wire.

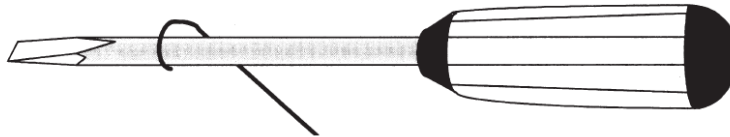


Figure 3 – Creating a Hook in the Wire

7. Loosen the terminal screws.

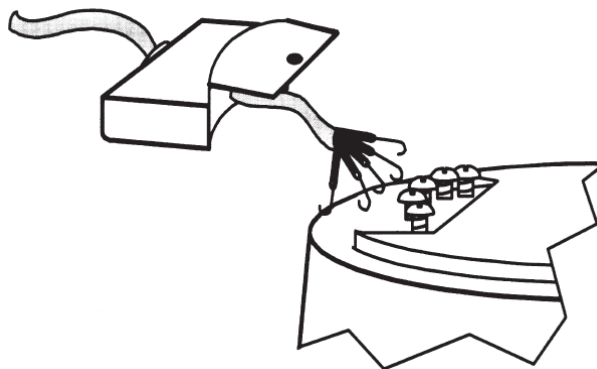


Figure 4 – Connecting the Conductors

8. Position the wire hook of each conductor under the proper terminal screw according to the wiring diagram.

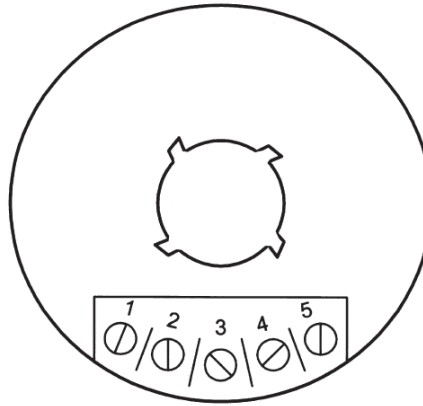


Figure 5 – TRICON®/E/E2/E3 Wiring

Table 11 – TRICON®E/E2/E3 Wiring Codes

PIN #	TRICON®/E Digital Pulse (Prior to 1/96)	TRICON®/E2 and E3 Model Digital Pulse Model (after 1/96)	TRICON® /E, E2 and TRICON® /E3 4-20MA Models
1	No Connection	High Resolution Output	4-20mA Source (+)*
2	No Connection	Count Direction <sup>1</sup>	4-20mA Return (-)
3	12-24VDC Power In (+)	12-24VDC Power In	24VDC Power In (+)
4	Common Ground (- side)	Common Ground (- side)	Common Ground (- side)
5	Pulse Output	Pulse Output	Pulse Output

\*The (+) indicates conventional current exiting the TRICON.

<sup>1</sup>This connection is a contact closure to ground and requires DC power supplied through a pull-up resistor. Typical pull-up resistor values are 2K per 5 volts of the DC voltage.

9. Place each wire hook so that it runs in a clockwise direction around the screw terminal, with no insulation under the screw head.
10. Use the tip of the screwdriver to close the hooks around the terminal screws and tighten the screws until snug.



Take care not to overtighten the terminal screws when completing the wiring.



## Testing the Wires

After wiring the transmitter, double-check to ensure it is wired correctly.

1. Apply power to the TRICON transmitter and check the output signals as follows:
  - At No Flow – there should be no pulses out of the digital output terminal, and a 4mA direct current should be present in the 4-20mA loop.
  - At ½ Flow – the pulse rate out of the digital output terminal should be ½ the maximum pulse rate, and a 12mA direct current should be present in the 4-20mA loop.
  - At Maximum Flow – the pulse rate out of the digital output terminal should be equal to the maximum pulse rate, and a 20mA direct current should be present in the 4-20mA loop.

## Final Assembly

After testing is complete, the transmitter is ready for the final steps of the assembly process.

1. Shut off all power to the TRICON.
2. Place a generous amount of Dow Corning #4 compound on all exposed wire and terminals.
3. Fill the inside of the terminal cover with the moisture compound.
4. Slide the terminal cover in place over the terminal screws.
5. Fasten the terminal cover with the cover screw and tighten until snug.



**Take care not to overtighten the cover screw when securing the terminal cover.**

6. Snap the strain relief fitting over the cable and push it into place in the cable entry hole.
7. Wipe away any excess compound.

## Mounting the Transmitter

After you assemble the transmitter, it is ready to be mounted. If you are installing a TRICON transmitter on a meter that does not already have a register mounted on it, skip to step 4. If the meter does have a register mounted, begin at step 1.

1. Position the small end of the punch on the center of the seal pin at the base of the register.
2. Using the hammer, drive the punch through the center of the seal pin. The head of the pin should shear off.

3. Twist the register approximately  $\frac{1}{4}$  turn counter-clockwise and remove it from the meter.

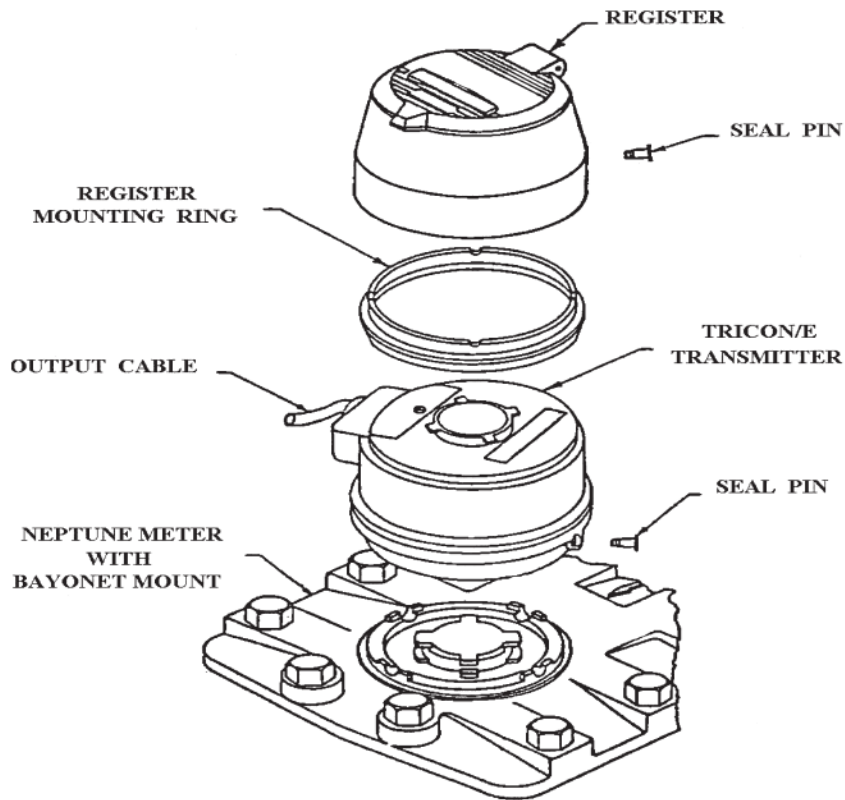


Figure 6 – Mounting the TRICON® Transmitter

4. Position the TRICON transmitter on the meter and twist it clockwise until it locks into place.
5. Place the register mounting ring on top of the TRICON transmitter with the four rounded grooves facing upward.
6. Align the notch in the base of the register mounting ring with the terminal cover of the TRICON and snap the ring into place. When properly oriented, the register mounting ring should sit flush on top of the TRICON transmitter.
7. Position the register on top of the TRICON transmitter and register mounting ring, and twist it clockwise until it locks into place.
8. Drive the new seal pins into the register base and TRICON base to secure the installation and prevent tampering.

## Chapter 4: Maintaining the TRICON® System

If you find that your TRICON® system is not operating as expected when installed, use the following guidelines to try to determine the source of the problem.

### Troubleshooting

If the TRICON appears to be operating, but electronic flow indication does not agree with mechanical register indication, try the troubleshooting steps in the following table.

Table 12 – Troubleshooting the TRICON®

Verify that the...	If not, then...
TRICON and register match the meter size and type.	Replace the TRICON or the register with the appropriate type to match the meter.
Register turns smoothly when installed on the TRICON.	Replace the register or have it repaired to correct problems with excessive torque.
TRICON is wired and powered properly.	Correct the wiring or power problem.
Compatibility and proper calibration of equipment to which the TRICON is connected.	Adjust and calibrate the equipment as required.

### Contact Information

Within North America, Neptune Customer Support is available Monday through Friday, 7:00 A.M. to 5:00 P.M. Central Standard Time, by telephone or email.

#### By Phone

To contact Neptune Customer Support by phone, complete the following steps.

1. Call **(800) 647-4832**.
2. Select one of the following options:
  - **1** if you have a Technical Support Personal Identification Number (PIN).
  - **2** if you do not have a Technical Support PIN.
3. Enter the six-digit PIN and press #.
4. Select one of the following options.
  - **2** for Technical Support.
  - **3** for maintenance contracts or renewals.
  - **4** for Return Material Authorization (RMA) for Canadian Accounts.

You are directed to the appropriate team of Customer Support Specialists. The specialists are dedicated to you until the issue is resolved to your satisfaction. When you call, give the following information:

- Your name and utility or company name.
- A description of what occurred and what you were doing at the time.
- A description of any actions taken to correct the issue.

### By Email

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To contact Neptune Support by email, send your message to [support@neptunetg.com](mailto:support@neptunetg.com).

### A

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#### AWWA

American Water Works Association.

### F

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#### FCC

Federal Communications Commission.

#### flange

Ring or collar, usually provided with holes for bolts.

### G

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#### gasket

Piece of rubber or some other material that is used to make a tight seal between two parts that are joined together.

### H

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#### HP

High Performance.

### I

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#### Imperial Gallon

Unit for measuring a volume of liquid or the capacity of a container for storing liquid, not the mass of a liquid. One imperial gallon is equivalent to approximately 1.2 U.S. liquid gallons.

## P

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### PIN

Personal Identification Number.

### PSI

Pounds per square inch.

## R

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### RMA

Return Material Authorization.

## S

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### strainer

Mesh barrier protecting the meter from debris in the line and corrects the velocity profile of the flow to the meter.

## U

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### U.S Gallon

U.S. liquid gallon is defined as 231 cubic inches and equates to approximately 3.785 litres.

### UL

Underwriters Laboratory.

### UME

Unitized Measuring Element.

## A

---

absolute limits 5  
Analog 4-20mA 1  
assembly, final 13

## C

---

calibration issues 15  
compound meters 8  
conditions, environmental 3  
conductors 11  
Customer Support 15

## D

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data, performance 5  
Disc 1

## E

---

electrical noise 9

## F

---

five-terminal transmitters 1

## H

---

HF and UP / DN models 4

## M

---

meters, compound 8

mismatched meter and register 15

model

Analog 4-20mA 1  
digital pulse 1  
HF and UP / DN 4

models, absolute limits 5

## P

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performance

disc meters 5  
High Performance Turbine (HPT) 7  
HP PROTECTUS® III 8  
turbine meters 6

pulse outputs 3

## S

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SmartTrol® 2

specifications, electrical 3  
specifications, environmental 3  
styles, TRICON® 1

## T

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terminals, five-terminal 1

torque 15

transmitter

mounting 13

transmitter elements 10

TRICON® styles 1

## W

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wires, testing 13







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