



A PRODUCT SHEET OF NEPTUNE TECHNOLOGY GROUP

High Performance Turbine Meter



Neptune® High Performance (HP) Turbine water meters offer some of the widest flow ranges of any turbine meters on the market.

All HP Turbine water meters meet or exceed the latest performance and accuracy requirements of AWWA C701 and maximum continuous flow rates may be exceeded by as much as 25% for intermittent periods.

Construction

Each HP Turbine consists of a rugged, lead free, high-copper alloy maincase, an AWWA Class II turbine measuring element, and a roll-sealed register. The maincase is corrosion-resistant, lightweight, and compact. Inlet and outlet connections are flanged. Strainers are available to prevent debris from entering the meter and to reduce the effects of uneven water flow due to upstream piping variations.

The unitized measuring element (UME) allows for quick, easy, in-line interchangeability. Water volume is measured accurately at all flows by a specially-designed assembly. The hydrodynamically-balanced, thrust-compensated rotor relieves pressure on the thrust bearings to minimize wear and provide sustained accuracy over an extended operating life. Direct coupling of the rotor to the gear train eliminates revenue loss due to slippage during fast starts and line surges. A calibration vane allows in-field calibration of the UME to lengthen service life and to ensure accurate registration.

The roll-sealed register eliminates leaking and fogging. A magnetic drive couples the register with the measuring element.

Application

The HP Turbine water meter is designed for applications where flow rates are consistently moderate to high.

Systems Compatibility

Adaptability to all present and future systems for flexibility.

Warranty

Neptune provides a limited warranty with respect to its HP Turbine water meters for performance, materials, and workmanship.

When desired, owner maintenance is easily accomplished by in-line replacement of major components.

KEY FEATURES

Roll-Sealed Register

- Magnetic-driven, low-torque registration ensures accuracy
- Impact-resistant register design with flat glass for readability
- 1:1 ratio, low-flow indicator identifies leaks
- Bayonet mount allows in-line serviceability
- Tamperproof seal pin deters theft
- Date of manufacture, size, and model stamped on dial face

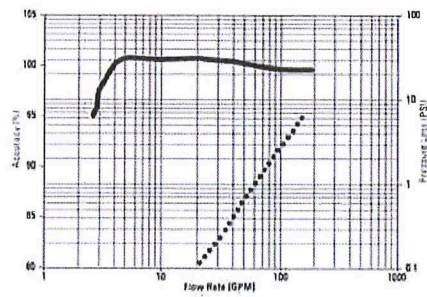
Lead Free Maincase

- Made from lead free, high-copper alloy
- NSF/ANSI 61 and 372 certified
- Compact design is lightweight and easy to handle
- Sturdy, durable, corrosion-resistant
- Resists internal pressure stresses and external damage
- Residual value

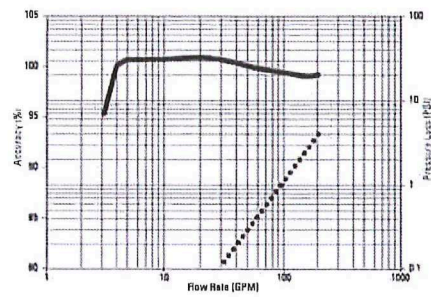
Turbine Measuring Element

- Excellent low-flow sensitivity and wide flow ranges available at 98.5% - 101.5% accuracy
- Direct coupling of rotor to gear train prevents slippage and ensures accurate registration
- Interchangeable measuring element allows for in-line service
- Hydrodynamically-balanced rotor
- Reusable O-ring gasket on 3" - 10" sizes

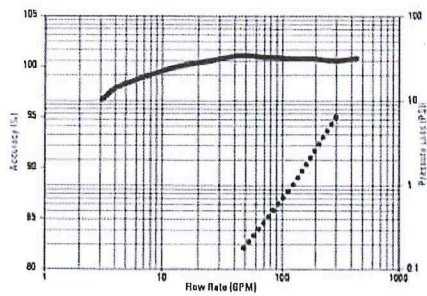
1½" Accuracy



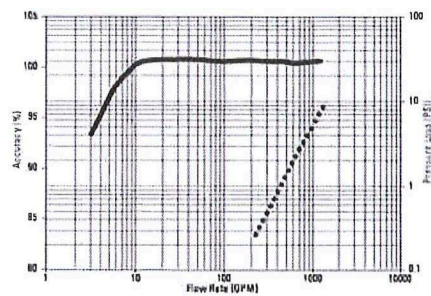
2" Accuracy



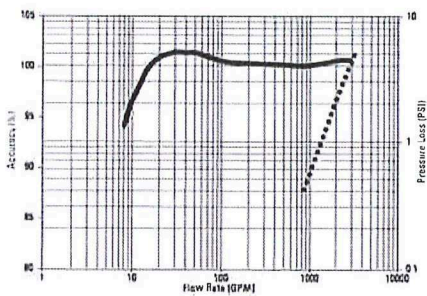
3" Accuracy



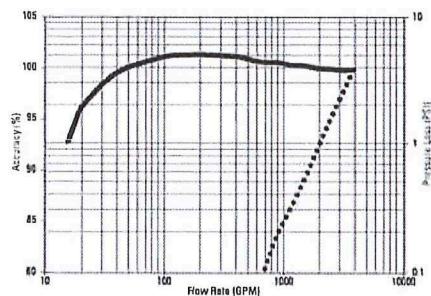
4" Accuracy



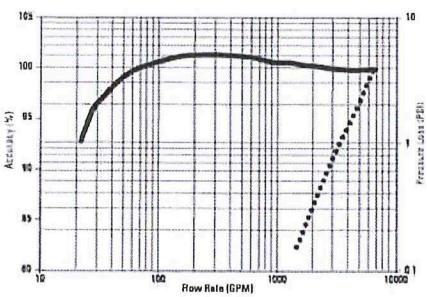
6" Accuracy





8" Accuracy



10" Accuracy



 Accuracy
 Head Loss

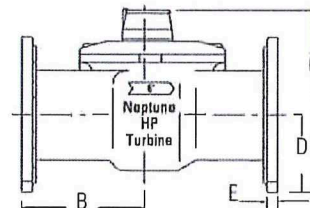
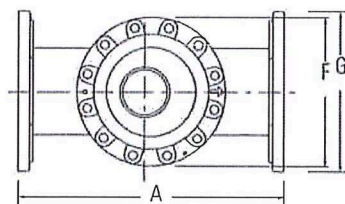
These charts show typical meter performance. Individual results may vary.

Operating Characteristics

Meter Size	Normal Operating Range @100% Accuracy ($\pm 1.5\%$)	Maximum Intermittent Flow	AWWA Standard
1½"	4 to 160 US gpm 0.91 to 36.3 m³/h	200 US gpm 45.4 m³/h	4 to 120 US gpm 0.91 to 27.3 m³/h
2"	4 to 200 US gpm 0.91 to 45.4 m³/h	250 US gpm 56.8 m³/h	4 to 190 US gpm 0.91 to 43.2 m³/h
3"	5 to 450 US gpm 1.14 to 102.2 m³/h	560 US gpm 127.2 m³/h	8 to 435 US gpm 1.8 to 98.8 m³/h
4"	10 to 1200 US gpm 2.27 to 272.5 m³/h	1500 US gpm 340.7 m³/h	15 to 750 US gpm 3.4 to 170.3 m³/h
6"	20 to 2500 US gpm 4.55 to 567.8 m³/h	3100 US gpm 704.1 m³/h	30 to 1350 US gpm 6.8 to 306.6 m³/h
8"	35 to 4000 US gpm 7.95 to 908.5 m³/h	5000 US gpm 1135.6 m³/h	50 to 2800 US gpm 11.4 to 635.9 m³/h
10"	50 to 6500 US gpm 11.36 to 1476.3 m³/h	8000 US gpm 1817 m³/h	75 to 4200 US gpm 17.0 to 953.9 m³/h

Dimensions

Meter Size	A	B	C-STD	C-ProRead™	C-E-CODER®)R900i™ and E-CODER®)R450i™	D	E	F	G	Weight
	in (mm)	in (mm)	in (mm)	in (mm)	in (mm)	in (mm)	in (mm)	in (mm)	in (mm)	lbs (kg)
1½"	10 (254)	6 ½ (165)	7 ½ (181)	7 ⅞ (192)	7 ¾ (197)	1 ¾ (44)	¾ (19)	4 ½ (114)	5 ⅜ (137)	19 (8.6)
2"	10 (254)	6 ½ (165)	7 ⅝ (194)	8 ⅞ (204.8)	8 ¼ (210)	2 ⅞ (54)	⅞ (21)	4 ½ (114)	5 ⅜ (137)	20 (9.1)
3"	12 (305)	6 (152)	10 (254)	10 ⅞ (265.1)	10 ⅝ (270)	3 ¾ (95)	⅝ (16)	6 ¼ (159)	7 ½ (191)	40 (18.1)
4"	14 (356)	6 ½ (165)	10 ⅞ (276)	11 ⅝ (287.3)	11 ½ (292)	4 ½ (114)	¾ (19)	8 ⅞ (206)	9 (229)	52 (23.6)
6"	18 (457)	8 ⅝ (219)	13 (330)	13 ⅞ (341.3)	13 ⅝ (346)	5 ½ (140)	1 (25)	10 ¼ (260)	11 (279)	115 (52.2)
8"	20 (508)	9 ⅝ (244)	15 ½ (394)	15 ⅝ (404.8)	16 ⅞ (409)	6 ¾ (171)	1 ⅞ (29)	10 ¼ (260)	13 ½ (343)	195 (88.4)
10"	26 (660)	12 ⅝ (321)	15 ½ (394)	15 ⅝ (404.8)	16 ⅞ (409)	8 (203)	1 ¼ (32)	10 ¼ (260)	16 (406)	275 (124.7)



Specifications

Application:

- Cold water measurement of flow in one direction

Maximum operating pressure:

- 175 psi (1206 kPa)

Maximum operating temperature:

- 80°F

Register:

- Direct reading, center-sweep, roll-sealed, magnetic drive with low-flow indicator

Measuring element:

- AWWA Class II Turbine, hydrodynamically-balanced rotor

Options

Sizes:

- 1½", 2", 3", 4", 6", 8", 10"

Units of measure:

- U.S. gallons, imperial gallons, cubic feet, cubic metres

Register Types:

- Remote reading systems*: ARB V, ProRead, ProCoder, E-CODER, E-CODER)R900i, E-CODER)R450i, E-CODER)L900i, TRICON/S, TRICON/E3

* Consult factory for meter performance specifications when fitted with ARB.

- Reclaim

Companion Flanges:

- 1½" and 2" (oval): bronze
- 3", 4", 6": bronze or cast iron
- 8" and 10": cast iron

Strainer:

- 1½"- 6" NSF/ANSI 61 lead free high copper alloy
- 1½"-10" NSF/ANSI 61 lead free Rilsan® nylon-coated ductile iron

Guaranteed Systems Compatibility

All HP Turbine water meters are guaranteed adaptable to our ARB® V, ProRead™ (ARB VI), ProCoder™, E-CODER®, E-CODER®)R900i™, E-CODER®)R450i™, E-CODER®)L900i™, TRICON®/S, TRICON/E®3, and Neptune meter reading systems without removing the meter from service.

Registration

Registration (per sweep hand revolution)		
	1½", 2", 3", 4"	6", 8", 10"
1,000 US Gallons		✓
1,000 Imperial Gallons		✓
100 US Gallons	✓	
100 Imperial Gallons	✓	
100 Cubic Feet		✓
10 Cubic Feet	✓	
10 Cubic Metres		✓
1 Cubic Metre	✓	

Register Capacity (6-wheel odometer)		
	1½", 2", 3", 4"	6", 8", 10"
1,000,000,000 US Gallons		✓
1,000,000,000 Imperial Gallons		✓
100,000,000 US Gallons	✓	
100,000,000 Imperial Gallons	✓	
100,000,000 Cubic Feet		✓
10,000,000 Cubic Feet	✓	
10,000,000 Cubic Metres		✓
1,000,000 Cubic Metres	✓	



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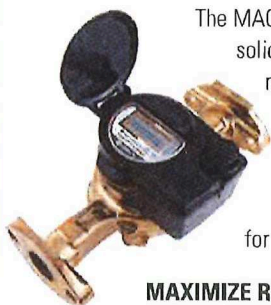
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ARB® UTILITY MANAGEMENT SYSTEMS™

NEPTUNE
TECHNOLOGY GROUP

MACH 10® ULTRASONIC METER

Sizes: 1 1/2" and 2"



The MACH 10® is Neptune's newest water meter that offers solid state metrology with a rugged, lead free bronze maincase. The MACH 10 was designed to have the look and feel of a traditional water meter to help eliminate new technology concerns of your customers. Engineered to fit into even the smallest residential meter boxes, the MACH 10 fits the bill for all meter applications.

MAXIMIZE REVENUE

The extended low-flow accuracy of the MACH 10 allows you to catch virtually every drop used by your customers. Maintaining this level of meter performance over the life of the meter will maximize your utility's revenue stream from your metering program. The MACH 10 features no moving parts. Because there are no internal parts that can wear over time, there is no opportunity for accuracy loss over the life of the meter (flat accuracy curve).

No wear = No accuracy loss = Maximum revenue dollars

NO MAINTENANCE REQUIRED

Imagine having a residential meter with no moving parts and a 20-year battery life. Is that really possible? The answer is Yes, the MACH 10.

No moving parts = No wear + 20 year battery = Maintenance-free for life

SOLID STATE METROLOGY WITH SOLID BRONZE MAINCASE

With the MACH 10, there is no concern over breaking plastic meter spuds or cross-threading of plastic threads. Neptune believes that if a meter is capable of providing sustained accuracy over its life, the maincase should be designed to last the meter's lifetime as well. This is why we designed the MACH 10 solid state meter with a solid bronze maincase. The corrosion-resistant, lead-free, high-copper alloy maincase is built to withstand demanding service conditions; internal water pressure, rough handling during installation, and in-line piping stresses.

Field-proven NSF 61/ANSI bronze maincase = Confidence = No stranded assets

OPERATIONAL EFFICIENCY

The MACH 10®|R900i™ combines all the best features of the MACH 10 with seamless integration of the R900® radio to provide the best in operational efficiency. The MACH 10|R900i makes installation easier, faster, and less costly by eliminating field programming and removing external wires. It also gives you the ability to remove migration barriers without installing new endpoints as you move from walk-by to mobile to fixed network at your own pace. Reduce your non-revenue water with timely, accurate data and detect leaks faster to avoid surprises for you and your customer by deploying the MACH 10|R900i in your system.

KEY BENEFITS

- Extended low-flow range and accuracy
- No maintenance and accuracy sustained over meter life
- Regulatory compliance – peace of mind
- Health and asset protection with the highest lead free legislation compliance
- Supports Water Conservation
 - Provides leak history/diagnostics
 - Enables proactive leak notification
 - On-site customer event troubleshooting tools
- Increased operational efficiencies
 - Work order reduction for high water bill inquiries
 - Drought management
 - Reduction of water loss through proactive notification of water leaks
- Tamper management
 - Identification and prioritization of potential tamper situations

KEY FEATURES

- Advanced ultrasonic technology
- No moving parts
- NSF/ANSI 61 approved meter – lead free bronze maincase
- 20-year battery life
- "Absolute" 9-digit meter reading on display
- 8-digit remote meter reading
- Long-life lithium thionyl-chloride batteries
- Single design for pit and inside set applications
- IP68-certified for moisture protection
- True point-of-use leak detection*
- Tamper detection*
- Reverse flow detection*
- LCD leak indicators
- Directional flow indicator
- Rate of flow on LCD display
- Data logging**
- Optional integrated R900 or R450™ radio

* When connected to Neptune R900® R450™ or CMIU™.

** When connected to R900v4 or newer version.

OPERATING CHARACTERISTICS

Meter Size	Normal Operating Range @ 100% Accuracy (+/- 1.5%)	Safe Maximum Operating Capacity	Extended Low Flow Accuracy (+/- 3.0%)
1½"	0.80 to 125 U.S. gpm	125 U.S. gpm	0.30 U.S. gpm
2"	1.50 to 160 U.S. gpm	160 U.S. gpm	0.50 U.S. gpm

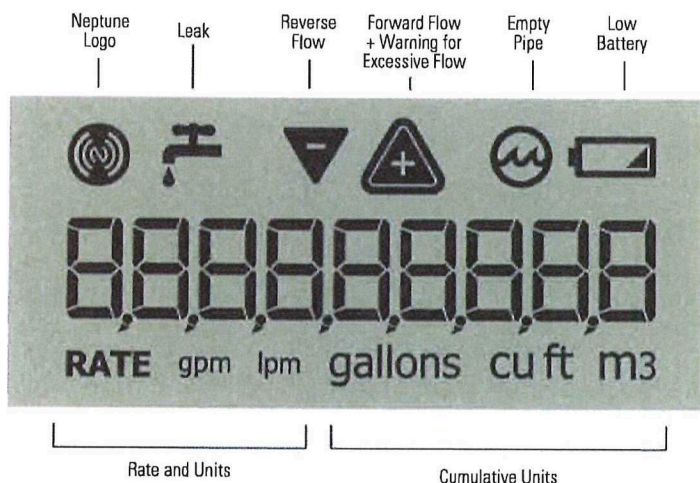
DIMENSIONS

METER SIZE	LENGTH (L)		HEIGHT (H)		FLANGES
	IN	MM	IN	MM	
1½"	10", 13"	254, 330	6½ ₃₂	158	OVAL
2"	10", 15.25", 17"	254, 387, 432	6¼ ₃₂	163.5	OVAL

REGISTRATION

High Resolution (8-digit reading)		1½"	2"
1	U.S. Gallons	✓	✓
1	Imperial Gallons	✓	✓
0.1	Cubic Feet	✓	✓
0.01	Cubic Meters	✓	✓

LCD DISPLAY



SPECIFICATIONS

AWWA C750 compliant
 AWWA C700, C701 performance compliant
 NSF/ANSI 61 certified
 Application: Cold water measurement of flow in potable, combination potable-and-fire service, and reclaim/secondary water applications.
 Maximum operating water pressure: 175 psi
 Operating water temperature range: +33°F to +122°F (+0.5°C to +50°C)

OPTIONS

Sizes:
 • 1½"
 • 2"
 Units of measure: U.S. gallons, Imperial gallons, cubic feet, cubic meters
 Meter options:
 • Potable/fire service (combo or standalone meter service lines)
 • Reclaim water
 Environmental conditions:
 • Operating temperature: +14°F to +149°F (-10°C to +65°C)
 • Storage temperature: -40°F to +158°F (-40°C to +70°C)

WARRANTY

Neptune provides a limited warranty with respect to its MACH 10 line of ultrasonic meters for performance, materials, and workmanship.

AMR/AMI SYSTEM COMPATIBILITY

All MACH 10 ultrasonic meters provide ProRead™, E-CODER® 8-digit, and E-CoderPLUS protocols to interface with Neptune and third-party AMR/AMI meter reading systems.

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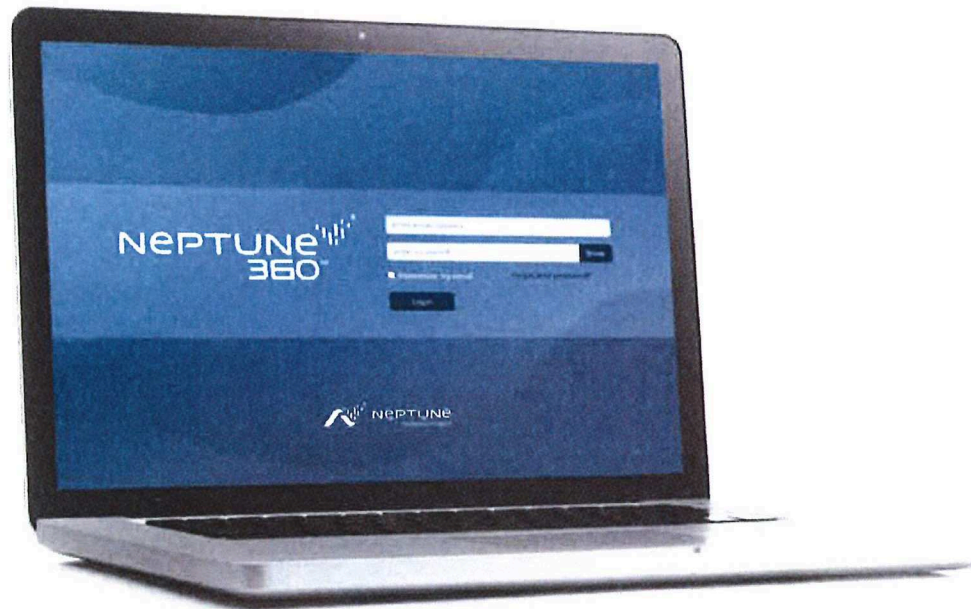
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Neptune® 360™ Data Management Platform

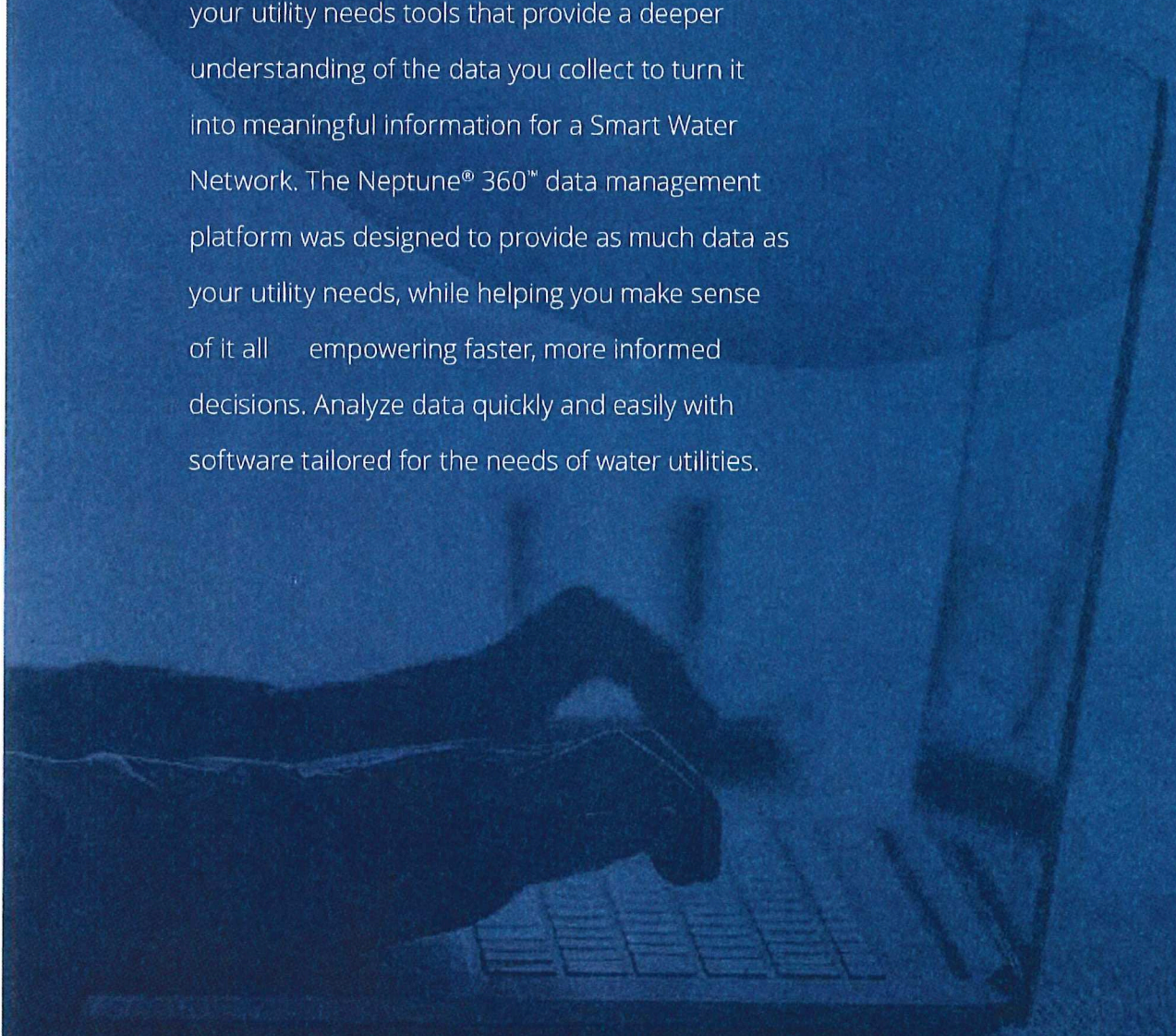
A Product of Neptune Technology Group





Turn Information into Action

Data is just data unless you can use it effectively. To go beyond basic meter reading and billing, your utility needs tools that provide a deeper understanding of the data you collect to turn it into meaningful information for a Smart Water Network. The Neptune® 360™ data management platform was designed to provide as much data as your utility needs, while helping you make sense of it all — empowering faster, more informed decisions. Analyze data quickly and easily with software tailored for the needs of water utilities.



Putting Your Data in View

Having the data is one thing, seeing the data and making sense of it is another. Neptune 360 delivers an intuitive, user-friendly design, making the data clear and easy to interpret. Examining your entire AMI network using system-wide Key Performance Indicators and geographical views assists with identifying areas of concern and finding ways to maximize operational efficiencies.

Quickly access a dashboard view of your largest water consumers, providing you with information needed to take action. Analysis of individual trends and usage patterns helps resolve customer service calls with confidence. Detailed reporting of consumption activity, potential leaks, and reverse flow will keep you ahead of issues that could impact your utility's revenue.



Lift Your IT Burden with a Cloud-Based Solution

Boost utility efficiency with Neptune 360 delivered as a service. No longer install servers or perform upgrades. All that is needed is an Internet browser. Just log on to access anywhere at any time.



A True Sense of Security

Ease your security concerns and stay focused on the business of water. Continuously-monitored Neptune 360 operates from a world-class data center, providing the highest level of security, redundancy, and disaster recovery services.

Share Information Across the Smart Water Network

Your management, maintenance, customer service, water quality, and other departments all need fast, easy access to information. Share and leverage actionable data captured by Neptune 360, empowering

collaboration and helping predict impacts on your utility. The platform seamlessly integrates meter data, event data, and alerts directly with third party work order systems, customer portals, hydraulic modeling applications, and other systems through Application Programming Interfaces (APIs).



An Application that Grows as You Grow

From mobile meter reading today, to moving to an AMI network tomorrow, the same software platform is utilized. Apply trend analysis in rate structure planning and usage initiatives. The modular-based platform makes it easy to turn on new features as your needs evolve, bringing you critical data to proactively plan for tomorrow.



Trust the Data

Data accuracy and dependability matter. By implementing the highest-level architecture, Neptune ensures data integrity with processes and tools to maintain quality from the meter to the platform as part of routine business operation.

NEPTUNE³⁶⁰

Analyze and share meaningful data with a platform that empowers utilities. Actionable insights help you achieve your goals and objectives.

METERS MATTER

Stream critical actionable data right into Neptune³⁶⁰.

WALK-BY DATA

Sync collected data easily.

MOBILE

Incorporate mobile data collection.

FUTURE PROOF AMI

Connect AMI network data.

BRING YOUR OWN DEVICE

Eliminate specialized devices and communicate efficiently.

THIRD PARTY SOFTWARE

Link data with third party applications (such as CIS and ESRI).

CUSTOMER RELATIONSHIPS

Streamline utility data management and provide exceptional customer service.

- + ACT QUICKLY
- + PLAN FOR THE FUTURE
- + MANAGE GROWTH



Neptune® 360™ Benefits

- Neptune-managed system with no installation required
- Cloud-based solution in a world-class data center with the highest level of security and disaster recovery/redundancy
- 24/7 software system monitoring
- Retain data ownership in a system designed exclusively for water utilities
- Integrate and access Data Analytics across departments — helping your utility achieve goals and objectives
- Identify potential leaks, excessive consumption, and reverse flow to proactively resolve issues faster
- Migrate easily from mobile to fixed network
- Aid Non-Revenue Water reduction, conservation, and rate planning
- A single platform across devices that can be accessed anywhere at any time

Specifications

Neptune 360

- Google Chrome and Microsoft Edge web browsers supported
- When using touch screen monitors, Neptune recommends Microsoft Edge web browser for optimal viewing and performance

Neptune 360 Mobile

- Neptune 360 Mobile supports Android, iPhone, and iPad devices running the following operating systems:
 - Android: 5.1.X Lollipop, 6.0.X Marshmallow, 7.0.X Nougat, 7.1.X Nougat, 8.1.X Oreo
- iOS: 10.3.1 and higher, 11

Bring Your Own Device to Field Operations

Save money and time with Neptune 360 Mobile — use your utility's existing Android or iOS cell phones or tablet devices to perform meter reading. Pair with an R900® Belt Clip Transceiver or MRX920™ Mobile Data Collector and expand your field device options when performing re-reads, reading monthly routes or even responding to high water bill complaints.



96

days of hourly
historical
consumption



Neptune 360 Mobile provides direct communication via wireless from the field without the need to bring your mobile device back into the office, yielding data on demand for more efficient customer service. Other application capabilities include RF Test, Off-Cycle Read, and Data Log to capture 96 days of hourly historical consumption — addressing customer issues faster.



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R900® Gateway v4 Fixed Network Data Collector



Streamline Measurement and Boost Efficiency

Maximize the efficiency of your workforce – not only by automating meter reading but also by freeing up time for other tasks. Like the other components of Neptune's R900® System, the R900® Gateway fixed network data collector is designed for quick installation, ease of use, and flexibility. The R900 Gateway collects metering data as well as daily leak, reverse flow, and days of no flow alerts from all E-CODER®-equipped meters. The R900 Gateway's software-defined radio technology can process eight (8) meter readings simultaneously and gather 360 readings per second – optimizing your fixed network with high throughput reading performance; especially in high-density R900® deployments. The data you collect is accurate, timely, and simple to share with other departments – so you can turn it into meaningful information that will help identify hidden causes of loss and optimize efficiency.

Migrate Backward and Forward With Total Confidence

Get the most value from your current assets, both infrastructure and workforce, through Neptune® systems that allow you to migrate at your own pace from mobile automatic meter reading (AMR) to advanced metering infrastructure (AMI). Providing fixed network functionality, the R900 Gateway is easily integrated into the system with mobile methods of reading your existing R900 endpoints, so that you can choose the technology you need, where you need it – without a need for special programming or reprogramming of MIUs. The R900 Gateway supports the R900 System's 1 Watt fixed network message from endpoints, reducing infrastructure costs.

Resolve Customer Issues Proactively with Detailed Data

The R900 Gateway gives your utility simplified access to information that will help you identify and resolve water-related issues quickly and easily. You'll be able to track detailed hourly water consumption for individual accounts and receive alerts that will help you proactively improve service to your customers. Save them – and your utility – time and money, and inform customers of excessive water usage to head off high bill complaints, reduce delinquent payments, and eliminate write-offs.

KEY BENEFITS

Facilitates Migration to AMI

- Supports the 1 Watt fixed network message from R900 endpoints, reducing infrastructure costs
- Migrate at your own pace – your system can be read by any combination of mobile and fixed that you choose
- No reprogramming of endpoints required to migrate to fixed network reading

Simple Access to Powerful Data

- On-demand read capability – obtain a reading whenever you need it
- Daily leak, reverse flow, and days of no flow alerts from E-CODER-equipped meters

Improves Meter Reading Efficiency

- Software-defined radio (SDR) technology capable of processing eight (8) readings simultaneously
- Optimal performance in high-density R900 environments – capable of 360 readings per second

No Stranded Assets

- Maintains compatibility with existing R900s deployed
- Utilizing the power of our software-defined radio technology, all existing R900 Gateway v3 units can be easily updated to obtain R900 Gateway v4 functionality

Specifications

Receiver

- 910-920 MHz
- 50 channels
- Processes 8 readings simultaneously
- Processes 360 readings per second
- Capable of handling up to 25,000 R900s

Installation Options

- Rooftop
- Pole (2" – 16" diameter)
- Wall
- Water towers

Power Supplies

- 100-140 VAC
- 150W Solar
- 220W Solar

Battery Backup

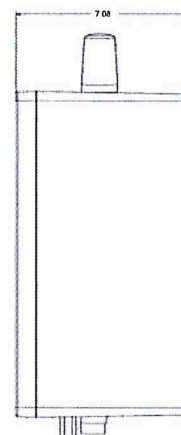
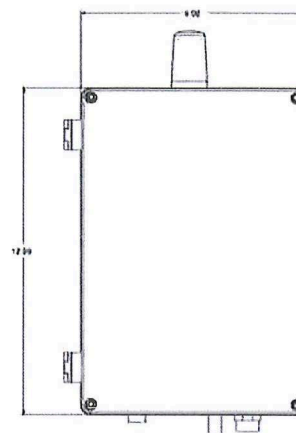
- AC version – UPS provides 8 hours battery backup
- Solar version – 3-day backup battery

Backhaul Options

- Multi-carrier cellular modem
- EVDO Rev A (CDMA)
- 1xEVDO Rev 0 (CDMA)
- 1xRTT (CDMA)
- UMTS/HSPA (GSM)
- EDGE/GPRS (GSM)
- Ethernet
- Private LAN compatibility via Ethernet connection

Environmental

- NEMA 4X enclosure
- Operating temperature: -22°F to +140°F (-30°C to +60°C)
- Storage temperature: -40°F to +158°F (-40°C to +85°C)
- 0-95% non-condensing humidity



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T-10 Meter

SIZES $\frac{5}{8}$ ", $\frac{3}{4}$ ", AND 1"

Every T-10[®] water meter meets or exceeds the latest AWWA C700 Standard. Its nutating disc, positive displacement principle has been time-proven for accuracy and dependability since 1892, ensuring maximum utility revenue.

Construction

The T-10 water meter consists of three major assemblies: a register, a lead free, high-copper alloy maincase, and a nutating disc measuring chamber.

The T-10 meter is available with a variety of register types. For reading convenience, the register can be mounted in one of four positions on the meter.

The corrosion-resistant, lead-free, high-copper alloy maincase will withstand most service conditions; internal water pressure, rough handling, and in-line piping stress.

The innovative floating chamber design of the nutating disc measuring element is unaffected by meter position or in-line piping stresses while the unique chamber seal extends the low-flow accuracy by sealing the chamber outlet port to the maincase outlet port. The nutating disc measuring element utilizes corrosion-resistant materials throughout and a thrust roller to minimize wear.

Warranty

Neptune[®] provides a limited warranty with respect to its T-10 water meters for performance, materials, and workmanship.

When desired, maintenance is easily accomplished either by replacement of major assemblies or individual components.

Guaranteed Systems Compatibility

All T-10 water meters are guaranteed adaptable to our ARB[®]V, ProRead[™] (ARB VI) AutoDetect, ProCoder[™], E-CODER[®] (ARB VII), E-CODER[®]R900i[™], E-CODER[®]R450i[™], E-CODER[®]L900i[™], TRICON[®]/S, TRICON/E[®]3, and Neptune meter reading systems without removing the meter from service.

Systems Compatibility

Adaptability to all present and future systems for flexibility is available only with Neptune's ARB[®] Utility Management Systems[™].



KEY FEATURES

REGISTER

Magnetic-driven, low-torque registration ensures accuracy

Impact-resistant register

High-resolution, low-flow leak detection

Bayonet-style register mount allows in-line serviceability

Tamperproof seal pin deters theft

Date of manufacture, size, and model stamped on dial face

LEAD FREE MAINCASE

Made from lead free, high-copper alloy

NSF/ANSI 372, NSF/ANSI 61

Lifetime guarantee

Resists internal pressure stresses and external damage

Handles in-line piping variations and stresses

Lead free, high-copper alloy provides residual value vs. plastic or composite

Electrical grounding continuity

NUTATING DISC

MEASURING CHAMBER

Positive displacement

Widest effective flow range for maximum revenue

Proprietary polymer materials maximize long-term accuracy

Floating chamber design is unaffected by meter position or in-line piping stresses

Specifications

- NSF/ANSI 372, NSF/ANSI 61
- National Type Evaluation Program (NTEP) certification

Application

- Cold water measurement of flow in one direction in residential service applications

Maximum Operating Water Pressure

- 150 psi (1034 kPa)

Maximum Operating Water Temperature

- 80°F

Measuring Chamber

- Nutating disc technology design made from proprietary synthetic polymer

Options

Sizes

- $\frac{5}{8}$ ", $\frac{3}{8}$ " x $\frac{3}{4}$ "
- $\frac{3}{4}$ ", $\frac{3}{4}$ " SL, $\frac{3}{4}$ " x 1"
- 1", 1" x $1\frac{1}{4}$ "

Units of Measure:

- U.S. gallons, imperial gallons, cubic feet, cubic metres

Register Types

- Direct reading: bronze box and cover (standard)

Remote Reading:

- ProRead, ProCoder, E-CODER, E-CODER)R900i, E-CODER)R450i, E-CODER)L900i, TRICON/S, TRICON/E3

- Reclaim

Bottom Caps

- Synthetic polymer ($\frac{5}{8}$ " only)
- Cast iron
- Lead free, high-copper alloy

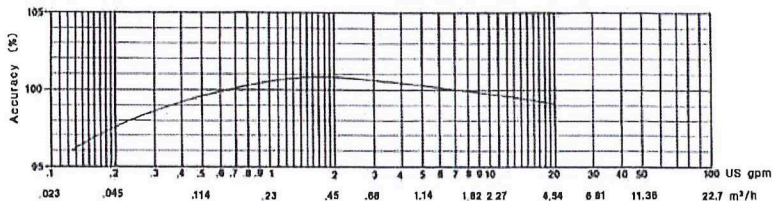
Connections

- Lead free, high-copper alloy, straight or bent

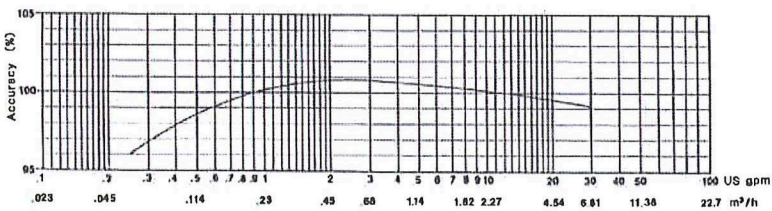
Environmental Conditions

- Operating temperature: +33° F to +149° F (0° C to +65° C)
- Storage temperature: +33° F to +158° F (0° C to +70° C)

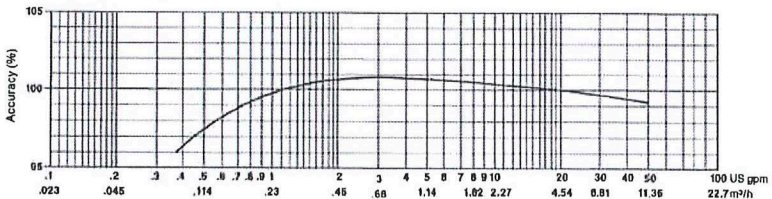
$\frac{5}{8}$ " ACCURACY



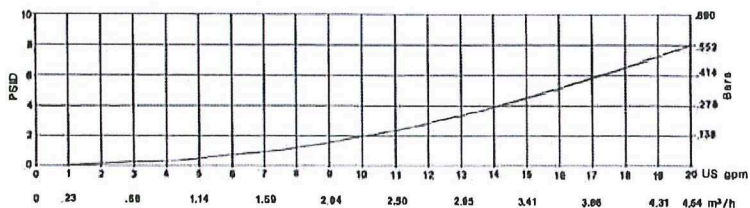
$\frac{3}{4}$ " ACCURACY



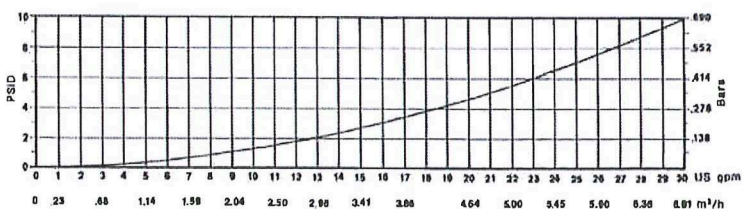
1" ACCURACY



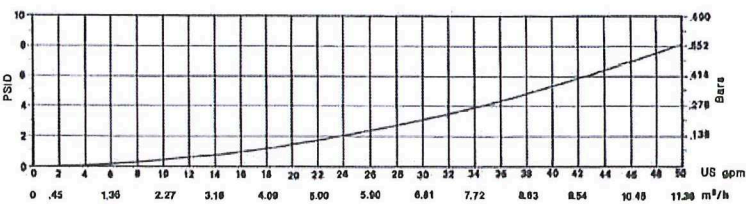
$\frac{5}{8}$ " PRESSURE LOSS



$\frac{3}{4}$ " PRESSURE LOSS

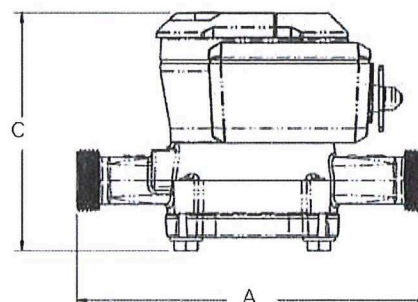
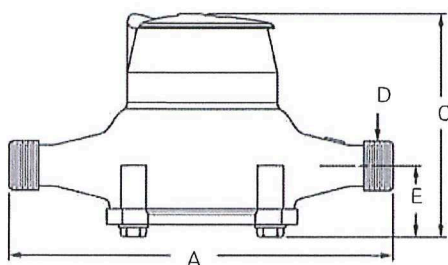
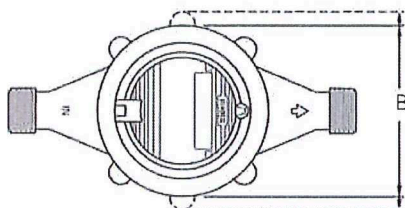


1" PRESSURE LOSS



Dimensions

Meter Size	A	B	C					D-	E-	Weight lbs/kg
	in/ mm	in/ mm	Std. in/mm	ARB in/mm	ProCoder™ or E-CODER®	ProCoder™) R900i™ or ProCoder™) R450i™	E-CODER®) R900i™ or E-CODER®) R450i™	NPSM Thread	in/ mm	
5/8	7½ 191	3¾ 92	4¾ 111	5¼ 133	5¼ 133	5¼ 133	5¼ 133	¾" - 14	1½ 38	3¼ 1.4
5/8 x ¾	7½ 191	3¾ 92	4¾ 111	5¼ 133	5¼ 133	5¼ 133	5¼ 133	1" - 11½	1½ 38	3¾ 1.5
Pre 2011 ¾	7½ 191	3¾ 92	4¾ 124	5½ 146	5½ 139	5½ 139	5½ 139	¾" - 14	1¾ 41	3¾ 1.7
Pre 2011 ¾ x ¾	7½ 191	3¾ 92	4¾ 124	5½ 146	5½ 139	5½ 139	5½ 139	1" - 11½	1¾ 41	4 1.8
¾	9 229	4¾ 111	5½ 140	6¼ 159	6¼ 159	6¼ 159	6¼ 159	1" - 11½	1¾ 48	6 2.7
¾" SL	7½ 911	4¾ 111	5½ 140	6¼ 159	6¼ 159	6¼ 159	6¼ 159	1" - 11½	1¾ 48	5½ 2.5
¾ x 1"	9 229	4¾ 111	5½ 140	6¼ 159	6¼ 159	6¼ 159	6¼ 159	1¼" - 11½	1¾ 48	6½ 2.9
1"	10¾ 273	6½ 165	6¾ 162	7 178	7 178	7 178	7 178	1¼" - 11½	2½ 54	9¾ 4.4
1" x 1¼"	10¾ 273	6½ 165	6¾ 162	7 178	7 178	7 178	7 178	1½" - 11½	2½ 54	10¼ 4.6



Operating Characteristics

Meter Size	Normal Operating Range @ 100% Accuracy (+/- 1.5%)	AWWA Standard	Low Flow @ 95% Accuracy
5/8"	1/2 to 20 US gpm 0.11 to 4.55 m ³ /h	1 to 20 US gpm 0.23 to 4.5 m ³ /h	1/8 US gpm 0.03 m ³ /h
3/4"	3/4 to 30 US gpm 0.17 to 6.82 m ³ /h	2 to 30 US gpm 0.45 to 6.8 m ³ /h	1/4 US gpm 0.06 m ³ /h
1"	1 to 50 US gpm 0.23 to 11.36 m ³ /h	3 to 50 US gpm 0.68 to 11.4 m ³ /h	3/4 US gpm 0.09 m ³ /h

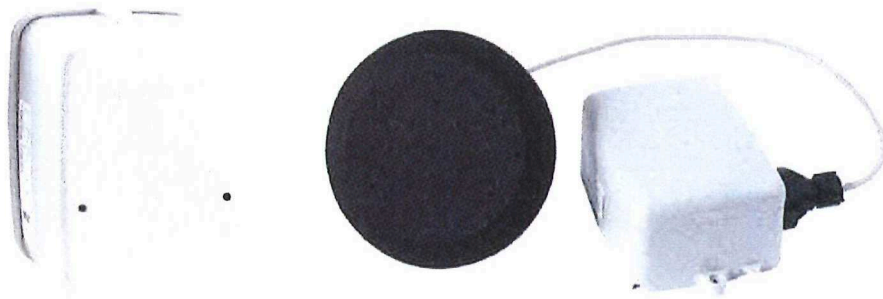
Registration

ProRead Registration (per sweep hand revolution)		5/8"	3/4" & 1"
10	US Gallons	✓	✓
10	Imperial Gallons	✓	✓
1	Cubic Foot	✓	✓
0.1	Cubic Metre	✓	✓
Register Capacity ProRead, ProCoder, and E-CODER		5/8"	3/4" & 1"
10,000,000	US Gallons	✓	✓
10,000,000	Imperial Gallons	✓	✓
1,000,000	Cubic Feet	✓	✓
100,000	Cubic Metres	✓	✓
ProCoder and E-CODER High Resolution (8-digit reading)		5/8"	3/4" & 1"
0.1	US Gallons	✓	✓
0.1	Imperial Gallons	✓	✓
0.01	Cubic Feet	✓	✓
0.001	Cubic Metres	✓	✓



Reap AMI Benefits with an Existing 4G LTE Network

Neptune® Cellular Meter Interface Unit (CMIU™)

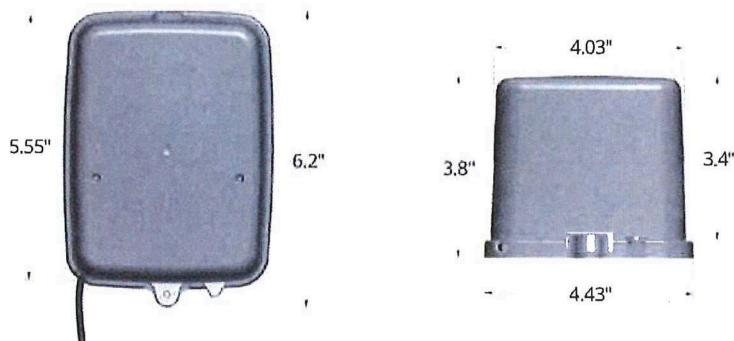


The Neptune® Cellular MIU (CMIU™) securely transmits meter reading data using a 4G LTE cellular network, so your water utility can eliminate the costs and frustrations associated with the installation, maintenance, and troubleshooting of AMI infrastructure. Instead, you can leverage an existing 4G LTE network to provide easy connectivity.

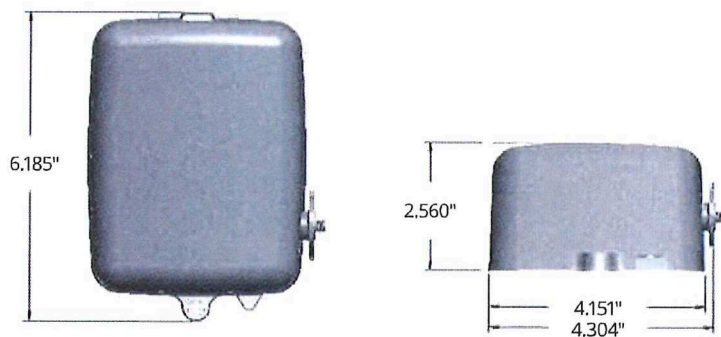
- Network-as-a-Service (NaaS)
- 4G LTE cellular technology using AT&T or Verizon
- Eliminate maintenance, costs associated with AMI deployment
- Operating modes:
 - Basic** – hourly data delivered every 24 hours
 - Advanced** – hourly data delivered every 4 hours
 - Pro** – 15-minute data delivered every hour

Dimensions

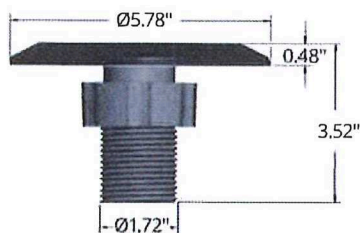
Wall MIU



Pit MIU



CMIU Pit Antenna



Specifications

Environmental Conditions

- Operating temperature:
-22°F to +149°F (-30°C to +65°C)
- Storage temperature:
-40°F to +158°F (-40°C to +70°C)
- Operating humidity:
100% condensing

Antennas

- Wall MIU: Standard internal antenna
- Pit MIU: Standard through-the-lid antenna
 - 18" Coax

Encoded Register Compatibility

- Neptune MACH 10[®], ARB[®]V, ProRead[™], E-CODER[®], and ProCoder[™]
- Sensus ECR II, ICE, iPerl, Electronic Register and OMNI
- Hersey/Mueller Translator
- Badger ADE and HR E|LCD
- Elster/AMCO InVision (Sensus protocol version)

Battery Warranty

- Basic Operating Mode: 10 years*

* Warranty dependent on CMIU mode of operation. Refer to warranty statement.



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Neptune Technology Group

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A PRODUCT SHEET OF NEPTUNE TECHNOLOGY GROUP

High Performance PROTECTUS® III Stainless Steel (S) Fire Service Meter

SIZES: 4", 6", 8", and 10"



The Neptune® HP PROTECTUS® III Stainless Steel (S) fire service meter measures extremely wide flow ranges at $100\% \pm 1.5\%$ accuracy. All HP fire service meters meet or exceed AWWA C703 Standard, are certified to NSF/ANSI 61 and 372 requirements, and are Underwriters Laboratory (UL) Listed and Factory Manual (FM) Approved for fire service use.

Application

The HP PROTECTUS III S fire service meter is designed to measure both domestic and fire service water usage through a single water line. A typical application would be in a warehouse, hotel, or hospital where one water line may supply any number of faucets or bathrooms as well as an automatic sprinkler system.

Operation

At low flow rates, all flow is through the bypass meter. As flow increases, pressure loss through the bypass meter increases and the detector check valve automatically opens. This condition occurs, for example, when a fire sprinkler system goes into operation. This permits flow through the mainline turbine meter. As flow decreases, reduced pressure loss closes the detector check valve and flow is again directed through the bypass meter.

Construction

The combined readings of the mainline turbine and the bypass meter indicate total consumption through the HP PROTECTUS III S meter.

- 300 series stainless steel mainline body
- Integral detector check valve (stainless steel spring-loaded type)
- 300 series stainless steel strainer body with stainless steel basket
- Epoxy-coated steel strainer and valve cover
- HP Turbine measuring element
- Lockable ball valves used on bypass
- Check valve used on bypass
- 1" T-10® meter (on 4" size)
- 1½" T-10 or 1½" HP Turbine meter (on 6" size)
- 2" T-10 or 2" HP Turbine meter (on 8" and 10" sizes)

KEY FEATURES

Compact Size

- Standard laying length fits existing installations

- Lowers new installation and replacement costs

Wide Operating Range

- Measures extremely wide flow ranges at 98.5%–101.5% accuracy
- Combines low-flow sensitivity of disc meter with high-flow capacity of turbine meter

- Registers leaks or unauthorized use of water from fire service lines

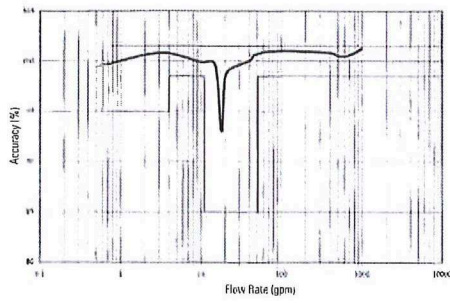
Component Repair and Maintenance

- Owner maintenance easily accomplished by replacement of major components
- Calibration vane allows in-field calibration of unitized measuring element (UME)

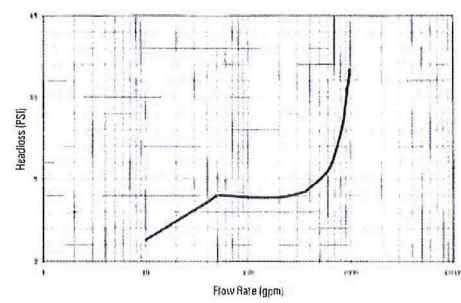
Roll-Sealed Registers

- Eliminates leaking and fogging
- In-line serviceability
- Magnetic driven, low-torque registration
- Tamperproof seal design

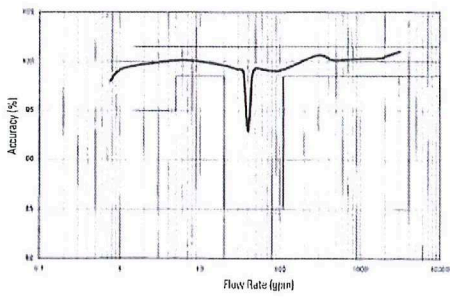
4" Accuracy



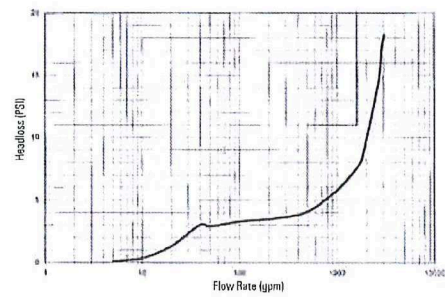
4" Headloss



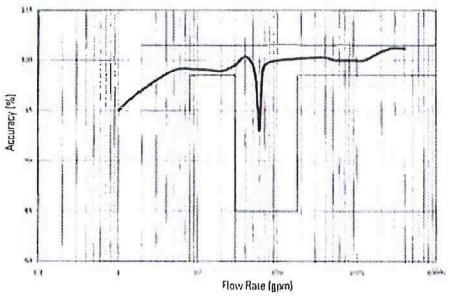
6" Accuracy



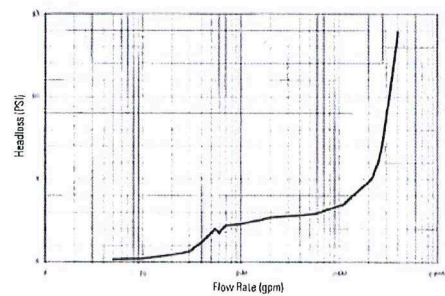
6" Headloss



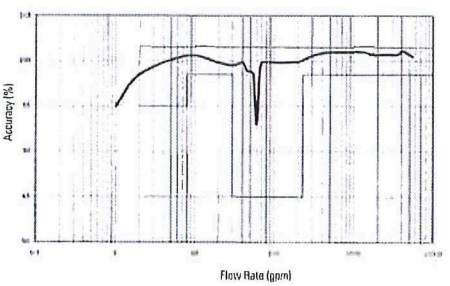
8" Accuracy



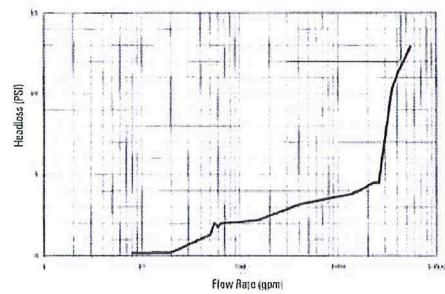
8" Headloss



10" Accuracy



10" Headloss



These charts show typical meter performance. Individual results may vary.

Operating Characteristics

Meter Size	Normal Operating Range @ 100% Accuracy (+/- 1.5%)	AWWA Standard	Low Flow @ 95% - 101% Accuracy	Maximum Intermittent Flow Rate
4"	¾ to 1200 US gpm 0.171 to 272.55 m³/h	4 to 700 US gpm 0.91 to 1.59 m³/h	¾ US gpm 0.09 m³/h	1500 US gpm 340.7 m³/h
6"	1½ to 2500 US gpm 0.34 to 567.81 m³/h	5 to 1600 US gpm 1.14 to 363 m³/h	¾ US gpm 0.17 m³/h	3100 US gpm 704.1 m³/h
8"	2 to 4000 US gpm 0.45 to 908.5 m³/h	8 to 2800 US gpm 1.8 to 636 m³/h	1 US gpm 0.23 m³/h	5000 US gpm 1135.6 m³/h
10"	2 to 6500 US gpm 0.45 to 1476.31 m³/h	8 to 4400 US gpm 1.8 to 999 m³/h	1 US gpm 0.23 m³/h	8000 US gpm 1817 m³/h

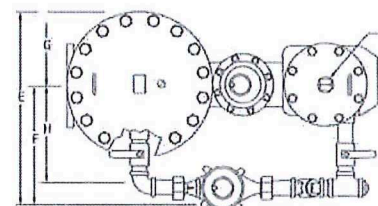
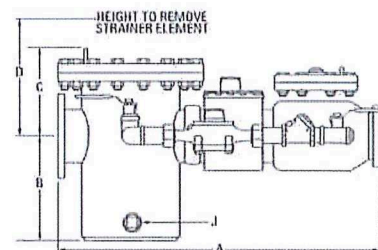
Dimensions

Meter Size	A in/mm	B in/mm	C in/mm	D in/mm	E in/mm	F in/mm	G in/mm	H in/mm	I in/mm	J in/mm	Weight lbs/kg
4"	33 838	10 254	10 ¾ 273	17 ½ 445	22 559	15 ¼ 387	6 ¾ 171	12 305	2 51	2 51	215 98
6"	45 1143	11 ⅞ 281	11 ¾ 289	21 ¼ 540	29 737	19 ½ 495	9 ½ 241	16 406	2 51	3 76	570 258
8"	53 1346	11 13/16 300	13 29/64 342	25 ⅞ 657	34 ¼ 870	21 ¾ 552	12 ½ 318	17 432	3 76	3 76	765 347
10"	68 1727	14 13/16 376	15 381	30 ⅞ 764	36 ¼ 921	22 ½ 572	13 ¾ 349	18 457	3 76	3 76	900 408

Registration

Registration (per sweep hand revolution)	Disc Side			Turbine Side		
	1"	1½"	2"	4"	6"	8" & 10"
1,000 US Gallons					✓	✓
100 Gallons		✓	✓	✓		
100 Cubic Feet					✓	✓
10 US Gallons	✓					
10 Cubic Feet		✓	✓	✓		
1 Cubic Foot	✓					
10 Cubic Metres					✓	✓
1 Cubic Metre			✓	✓		
0.1 Cubic Metre	✓	✓				

Register Capacity (6 active wheel odometer)	Disc Side			Turbine Side		
	1"	1½"	2"	4"	6"	8" & 10"
1,000,000,000 Gallons					✓	✓
100,000,000 Gallons		✓	✓	✓		
100,000,000 Cubic Feet					✓	✓
10,000,000 Gallons	✓					
10,000,000 Cubic Feet		✓	✓	✓		
10,000,000 Cubic Metres					✓	✓
1,000,000 Cubic Metres			✓	✓		
1,000,000 Cubic Feet	✓					
100,000 Cubic Metres	✓	✓				



Specifications

Application

- Cold water measurement of flow in one direction

Maximum Operating Pressure

- 175 psi (1206 kPa)

Register

- Direct reading, center sweep, roll-sealed magnetic drive with low-flow indicator

Measuring Element

- AWWA Class II Turbine, hydrodynamically-balanced rotor, nutating disc

Flanges

- Round flanged ends per AWWA C207, Class D

Approvals

- NSF/ANSI 61
- NSF/ANSI 372
- UL Listed
- FM Approved

Options

Sizes

- 4", 6", 8", and 10"

300 Series Stainless Steel
Strainer Cover and Valve Cover

300 Series Stainless Steel Bolts

Left Side Bypass

Units Of Measure

- U.S. gallons, Imperial gallons, cubic feet, cubic metres

Register types

- Remote reading systems*:
ProRead™, ProCoder™, E-CODER®,
E-CODER®)R900i™, E-CODER®)R450i™,
E-CODER®)L900i™, TRICON®/S,
TRICON/E®3

- Reclaim

Companion Flanges

- Cast iron
- Bronze (4" only)

Special Meter Flanges**

- 12" (for 10" meter size)

**Consult factory for meter performance specifications when fitted with ARB.*

***Non-UL/FM approved.*

Guaranteed Systems Compatibility

All HP PROTECTUS III S fire service meters are guaranteed adaptable to our ProRead, ProCoder, E-CODER, E-CODER)R900i, E-CODER)R450i, E-CODER)L900i, TRICON/S, TRICON/E3, and Neptune meter reading systems without removing the meter from service.

Warranty

Neptune provides a limited warranty with respect to its HP PROTECTUS III S fire service meter for performance, materials, and workmanship.

When desired, owner maintenance is easily accomplished by in-line replacement of the UME.



Be Confident with Sustained Accuracy Over Time

Neptune® MACH 10® Ultrasonic Meter



The MACH 10® ultrasonic water meter features solid state metrology with no degradation of accuracy over time. Combined with a corrosion-resistant, lead-free, high-copper alloy maincase, the MACH 10 is built to withstand demanding service conditions and deliver sustained accuracy over the life of the meter.

- Sizes $\frac{5}{8}$ ", $\frac{3}{4}$ ", and 1"
- Extended low-flow range and accuracy
- No maintenance
- Accuracy sustained over meter life
- Advanced ultrasonic technology
- MACH 10®)R900i™ features interleaved messages to support AMR, AMI, and the open-standards LoRaWAN™ AMI network simultaneously
- Supports Neptune Network-as-a-Service (NaaS) managed AMI service



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Specifications

AWWA C715 Compliant

NSF/ANSI 61 Certified

UL327B Certified (¾", 1")

Application

- Cold water measurement of flow in residential potable, combination potable and fire service, and reclaim/secondary water applications.

Maximum Operating Water Pressure

- 175 psi

Operating Water

Temperature Range

- +33°F to +122°F (+0.5°C to +50°C)

Options

Sizes

- ⅝", ⅝" x ¾"
- ¾", ¾" x 1"
- 1", 1" x 1¼"

Units of Measure

- U.S. gallons, Imperial gallons, cubic feet, cubic metres

Meter Options

- Potable water
- Reclaim water
- Residential fire service (combo or standalone meter service lines)

Environmental Conditions

- Operating temperature: +14°F to +149°F (-10°C to +65°C)
- Storage temperature: -40°F to +158°F (-40°C to +70°C)

Warranty

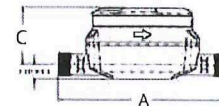
- Neptune provides a limited warranty with respect to its MACH 10 residential line of ultrasonic meters for performance, materials, and workmanship.

System Compatibility

- Available in MACH 10)R900i and MACH 10)TC configurations for an integrated radio solution.

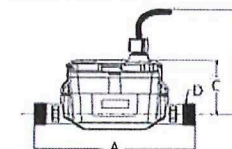
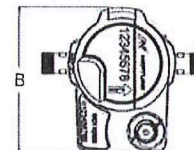
MACH 10® Dimensions

Meter Size	A	B	C	D NPSM
⅝"	7½"	4⅞"	2½"	¾" - 14
⅝" x ¾"	7½"	4⅞"	2½"	1" - 11½"
¾"	9"	4⅞"	2⅞"	1" - 11½"
¾" SL	7½"	4⅞"	2⅞"	1" - 11½"
¾" x 1"	9"	4⅞"	2⅞"	1¼" - 11½"
1"	10¾"	4⅞"	2⅞"	1¼" - 11½"
1" x 1¼"	10¾"	4⅞"	2⅞"	1½" - 11½"



MACH 10®)R900i™ DIMENSIONS

Meter Size	A	B	C	D NPSM	E
⅝"	7½"	6¾"	2½"	¾" - 14	5⅞"
⅝" x ¾"	7½"	6¾"	2½"	1" - 11½"	5⅞"
¾"	9"	6¾"	2⅞"	1" - 11½"	5⅞"
¾" SL	7½"	6¾"	2⅞"	1" - 11½"	5⅞"
¾" x 1"	9"	6¾"	2⅞"	1¼" - 11½"	5⅞"
1"	10¾"	6¾"	2⅞"	1¼" - 11½"	6⅞"
1" x 1¼"	10¾"	6¾"	2⅞"	1½" - 11½"	6⅞"



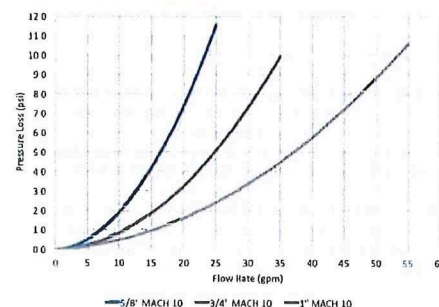
Operating Characteristics

Meter Size	Normal Operating Range @ 100% Accuracy (+/- 1.5%)	AWWA C715 Standard Type 1	Extended Low Flow @ 100% Accuracy (+/- 3%)
⅝"	0.10 to 25 U.S. gpm 0.02 to 4.55 m³/h	0.2 to 20 U.S. gpm 0.23 to 4.5 m³/h	0.05 U.S. gpm 0.01 m³/h
¾"	0.10 to 35 U.S. gpm 0.02 to 6.82 m³/h	0.5 to 30 U.S. gpm 0.45 to 6.8 m³/h	0.05 U.S. gpm 0.01 m³/h
1"	0.40 to 55 U.S. gpm 0.11 to 11.36 m³/h	0.75 to 50 U.S. gpm 0.75 to 11.4 m³/h	0.25 U.S. gpm 0.03 m³/h

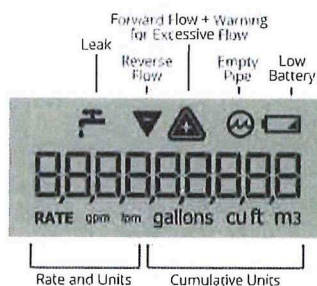
Registration

High Resolution (8-digit reading)
0.1 U.S. Gallons
0.1 Imperial Gallons
0.01 Cubic Feet
0.001 Cubic Metres

Pressure Loss



LCD DISPLAY



LoRa Alliance Certified™



Neptune Technology Group

1600 Alabama Highway 229

Tallassee, AL 36078

800-633-8754 f 334-283-7293

Capture Ultra-Low Flows and Monitor Flow Direction

Neptune® ProCoder™)R900i™



The Neptune® ProCoder™)R900i™ combination absolute encoder register/radio frequency meter interface unit (RF MIU) makes it simple to collect metering data using multiple modes simultaneously and features a high-resolution, mechanical sweep hand to detect ultra-low flows as well as monitor direction of flow. Its interleaved mobile and high-power fixed network messages allow for simple migration from walk-by to mobile to fixed network reading – and back again – without site visits or reprogramming. Your utility can also review an account's consumption by the hour with 96 days of profile information, along with alerts for leak or backflow. Proactively identify and resolve customer issues – heading off high bill complaints, reducing delinquent payments, and eliminating write-offs.

- Easy to install/no programming required
- 96 days of hourly account history
- Interleaved mobile and high-power fixed network messages
- Leak, tamper, reverse flow detection
- Read in walk-by, mobile, fixed modes simultaneously

Specifications

Electrical Specifications

- MIU Power: Lithium battery with capacitor

Transmitter Specifications:

- Two-way MIU
- Transmit Period (interleaved mobile and fixed network messages):
 - Standard mobile message every 14 seconds at 100 mW
 - Standard fixed network message every 7½ minutes at 1 Watt
- FCC Verification: Part 15.247
 - Transmitter Channels: 50 frequency-hopping, spread-spectrum
 - Channel Frequency: 910 to 920 MHz
- Encoder Register Reading Interval:
 - Every 15 minutes
- Data Logging Interval:
 - 96 days of hourly data

Environmental Conditions

- Operating Temperature: -22°F to +149°F (-30°C to +65°C)
- Storage Temperature: -40°F to +158°F (-40°C to +70°C)
- Operating Humidity:
 - Inside Set: 0 to 95%, condensing
 - Pit Set: 100% submersible

Materials

- Register Housing:
 - Inside Set: plastic polycarbonate
 - Pit Set: roll-sealed copper shell
- Lens:
 - Inside Set: plastic
 - Pit Set: glass

Antennas

- Standard internal antenna
- Optional through-the-lid antenna
- 18" coax
- 6' coax
- 20' coax

Resolution

Register Capacity

	Size	G	ft³	m³
T-10®(Includes disc side of TRU/FLO®)	¾", ¾", 1"	10,000,000	1,000,000	100,000
T-10 (Includes disc side of HPPIII)	1.5", 2"	100,000,000	10,000,000	1,000,000
HP Turbine (Includes FS Turbine, HPPIII, Turbine Side of TRU/FLO)	1.5", 2", 3", 4"	100,000,000	10,000,000	1,000,000
HP Turbine (Includes FS Turbine, HPPIII, Turbine Side of TRU/FLO)	6", 8", 10"	1,000,000,000	100,000,000	10,000,000

High Resolution (8-digit reading)

	Size	G	ft³	m³
T-10 (Includes disc side of TRU/FLO)	¾", ¾", 1"	0.1	0.01	0.001
T-10 (Includes disc side of HPPIII)	1.5", 2"	1	0.1	0.01
HP Turbine (Includes FS Turbine, HPPIII, Turbine Side of TRU/FLO)	1.5", 2", 3", 4"	1	0.1	0.01
HP Turbine (Includes FS Turbine, HPPIII, Turbine Side of TRU/FLO)	6", 8", 10"	10	1	0.1

ProCoder Registration (Per Sweep Hand Revolution)

Type	Size	G	ft³	m³
T-10	¾" - 2"	0.1	0.01	0.001
HP Turbine (Includes FS Turbine, HPPIII, Turbine Side of TRU/FLO)	1.5", 2", 3", 4"	10	1	0.1
HP Turbine (Includes FS Turbine, HPPIII, Turbine Side of TRU/FLO)	6", 8", 10"	100	10	1

Options

Compatibility

- Available for ¾"-2" T-10® water meters
- Handhelds with R900® Belt Clip Transceiver - mobile RF
- MRX920™ - mobile RF
- R900® Gateways - fixed network RF

Units of Measure

- U.S. Gallons, Cubic Feet, Imperial Gallons, Cubic Metres

Warranty

- 20 years (10/10); refer to specific Warranty Statement



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Strainers

SIZES: 1½", 2", 3", 4", 6", 8", and 10"

Neptune® strainers are designed and built for long-term, trouble-free performance in water pipeline service. They are specially designed for installation with HP Turbine or TRU/FLO® compound meters and are compatible with all other makes as well.

Neptune recommends that a strainer be installed with each HP Turbine or TRU/FLO Compound meter to prevent meter damage and to ensure accurate registration regardless of the configuration of the meter installation.

Performance

When installed at the inlet of a turbine or compound meter, the strainer performs two very important functions:

- It provides protection against damage to the turbine meter measuring element from debris or foreign material in the pipeline.
- The stainless steel, plate-type strainer element is designed to improve the velocity profile of the flow stream entering the meter. This velocity profile improvement optimizes turbine meter performance. Good metering practice normally requires 8 to 10 diameters of straight pipe at the meter inlet to minimize velocity profile distortion caused by upstream valves or other fittings. The Neptune strainer reduces this long straight-run requirement and simplifies meter installation.

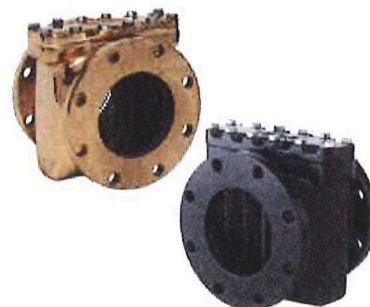
Construction

Neptune strainers are built of the highest-quality, time-proven materials available for water pipeline service. Strainer bodies and covers in 1½" through 10" sizes are made of lead free, high-copper alloy or Rilsan® nylon-coated ductile iron. Strainer elements and cover bolts in all sizes are stainless steel.

Neptune strainers are rated at 150 psi working pressure. Each strainer is hydrostatically tested at 300 psi before shipment to ensure hydraulic integrity.

Warranty

Neptune provides a limited warranty with respect to its strainers for performance, materials, and workmanship. For owner maintenance purposes, Neptune offers a complete inventory of replacement parts. When required, maintenance is easily accomplished without removing the strainer from the service line.



KEY FEATURES

Lead free, high-copper alloy or Rilsan nylon-coated ductile iron body ensures durability; chemical and corrosion resistant

NSF/ANSI 61 certified and NSF/ANSI 372 compliant

Low head loss

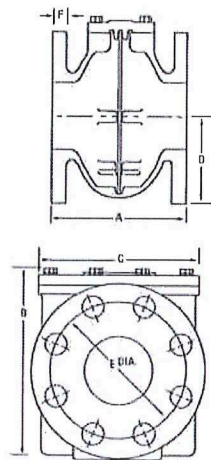
Stainless steel strainer plate and cover bolts

Height to center line matches Neptune HP Turbines for easy installation

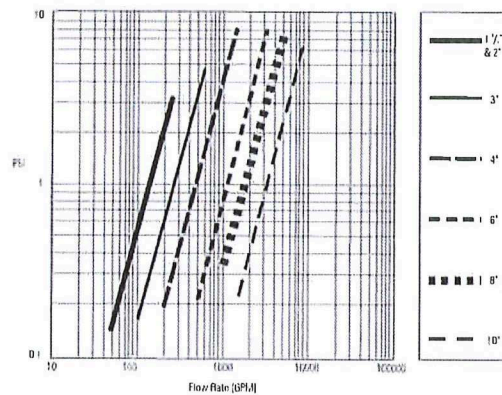
In-line serviceability

Dimensions

Meter Size	A in/mm	B in/mm	C in/mm	D in/mm	E in/mm	F in/mm	No. of Holes	Hole Dia. in/mm	Weight lbs/kg
1 1/2"	7 178	6 152	5 1/4 133	2 1/8 54	4 1/2 114	3/4 19	2	3/4 19	15 6.8
2"	7 178	6 152	5 1/4 133	2 1/8 54	4 1/2 114	3/4 19	2	3/4 19	15 6.8
3"	6 152	8 1/2 216	8 3/4 222	3 3/4 95	6 152	5/8 16	4	3/4 19	30 13.6
4"	7 1/2 191	9 3/4 248	10 1/2 267	4 1/2 114	7 1/2 191	11/16 17	8	3/4 19	42 19.0
6"	9 229	11 3/4 298	11 1/2 292	5 1/2 140	9 1/2 241	7/8 22	8	7/8 22	70 31.8
8"	10 254	14 356	13 1/2 343	6 3/4 171	11 3/4 298	1 1/8 29	8	7/8 22	120 54.5
10"	15 381	18 1/4 464	18 1/4 464	8 203	14 1/4 362	1 3/16 30	12	1 25	160 72.6



Pressure Loss



Options

Rilsan nylon-coated ductile iron

Lead free, high-copper alloy

Maximum Operating Pressure

150 psi

Part Numbers

Lead Free, High-Copper Alloy

- 1 1/2" 53145-000
- 2" 53120-000
- 3" 53107-000
- 4" 53107-100
- 6" 52000-201
- 8" 52000-304
- 10" 52000-402

Lead Free, Rilsan
Nylon-Coated Ductile Iron

- 1 1/2" 53145-100
- 2" 53120-600
- 3" 53107-600
- 4" 53107-700
- 6" 52000-601
- 8" 52000-704
- 10" 52000-802



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Trimble Ranger 3XE Handheld Data Collector

Streamline and Automate Water Measurement

When you work with the Neptune® R900® System, you'll streamline and automate processes to help your workforce be more efficient in their jobs, saving your utility time and money. The Trimble Ranger 3XE's intuitive design reduces training time, and our automated features ensure that the data you collect is accurate and easy to share with other departments. And if you need it, you can count on our support staff to resolve issues quickly and efficiently. Neptune's systems provide the foundation that you can build on, turning data into meaningful information to improve accuracy, identify hidden causes of loss, and streamline operations.

Protect Assets While Adopting New Technologies

Neptune has designed the R900 System to ensure that individual components work easily with past generations of equipment, and will work just as seamlessly with future innovations as your utility's needs evolve. For instance, the Trimble Ranger 3XE maintains support to read R900® MIUs through its internal HR2650i receiver. The Ranger lets you choose manual keyed entry, probed, and walk-by RF data collection methods at any time. The Ranger can also be paired via Bluetooth with the R900® Belt Clip Transceiver (BCT). This enables features such as RF-activated data logging to extract 96 days' worth of hourly consumption data from the new enhanced R900 or E-CODER® R900i™ for an individual account. You can phase in these and other new features and equipment at your own pace, confident that Neptune will support your future needs without leaving stranded assets.

Address Customer Issues And Improve Service

With the Trimble Ranger 3XE and R900 BCT, access to the meter is not an issue, so your meter readers can quickly capture the information they need remotely. Your field personnel can now have AMI functionality in the palm of their hand, with immediate access to detailed interval data as well as flags for leaks, tamper, and reverse flow from E-CODER®-equipped meters. They can generate graphs of a customer's water consumption and show the customer on-screen exactly when excessive water usage occurred or when a probable continuous leak began. Seeing usage patterns and receiving alerts will help your utility proactively improve your customer service, heading off high bill complaints, reducing delinquent payments, and avoiding write-offs in the process.



KEY BENEFITS

Increases Efficiency

- Supports multiple data collection methods – manual keyed entry, probed, and mobile RF
- Integrated HR2650i receiver for easy transition to mobile RF
- Supports two-way communication to R900 when connected to R900 Belt Clip Transceiver (BCT)

Protects your meter reading data

- SD card backup
- Meets MIL-STD-810G for impact, vibration, humidity, altitude, and extreme temperatures
- Meets IP67 for protection against dust and water intrusion

Analyze data at the source

- View data logging graphs in the field to address high bill complaints
- Identify high/low audit status failures
- Receive leak, reverse flow, and days of no flow alerts from E-CODER-equipped meters

Specifications

Operating System

- Windows Mobile 6.5 Professional

Software Application

- N_SIGHT® (version 4.7 or later)

Processor

- TI AM3715 Sitara ARM Cortex-A8 processor at 800 MHz

Memory

- 256 MB RAM

Display

- 4.2 in (10.6 cm), 640 x 480 pixel, VGA TFT with LED backlighting

Keyboard:

- QWERTY full keypad with number pad, directional buttons with 4 programmable buttons

Power Supply

- Rechargeable lithium ion battery pack – 11.1V, 2500 mAh, 27.8 Wh
- Power management system
- Integrated charge status and low battery indicator
- Typical 10+ hour work day

Communication

- Bluetooth 2.0 + EDR
- WiFi (802.11b/g)

WWAN Radios

- HSDPA, Tri-band
- HSDPA/UMTS: 850/1900/2100 MHz, Quad-band
- GSM/GPRS/EDGE
- CDMA

Audio

- Integrated speaker and microphone

AMR RF Receiver

- HR2650i integrated receiver, Also compatible via Bluetooth with R900 BCT

Dimensions

- Height: 1.9" (4.8 cm)
- Width: 5.2" (13.1 cm)
- Length: 10.5" (26.6 cm)
- Weight: 2.3 lbs. (1.04 kg) including rechargeable battery and stylus

Temperature Range

- Operating: -22°F to +140°F (-30°C to +60°C)
- Storage: -40°F to +158°F (-40°C to +70°C)
- Humidity: 90% RH temp cycle -4/+140°F (-20°C/+60°C)

Environmental – Meets or Exceeds:

- Water: IEC-529, IP67
- Sand & Dust: IEC-529, IP67
- Drop: MIL-STD-810G, Method 516.6, Procedure IV
- Vibration: MIL-STD-810G, Method 514.6, Procedure I, II
- Operating and Storage Temperature: MIL-STD-810G, Method 501.5 – Procedure I, II, Method 502.5 – Procedure I, II, III

- Temperature Shock: MIL-STD-810G, Method 503.5, Procedure I

- Humidity: MIL-STD-810G, Method 507.5

- Altitude: MIL-STD-810G, Method 500.5, Procedure I, II, III

Approvals

- FCC, CE, R&TTE, IC (Canada), C-tick, GCF compliant, RoHS compliant, Section 508 compliant, AT&T certified, WiFi Alliance certified, MIL-STD-810G, IP67, MIL-STD-461

Accessories

- Ethernet communications and charging cradle
- Replacement lithium-ion battery
- Hand strap
- AC power adapter
- Anti-glare screen protector
- Stylus

Warranty

- Two year comprehensive warranty
- Hardware and software maintenance contracts available



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A PRODUCT SHEET OF NEPTUNE TECHNOLOGY GROUP

E-CODER®)R900i™

Protect And Expand Your Technology Investments

Neptune® designed the R900® System to make it easy for your utility – installation, everyday use, and expansion for the future without stranded assets. The E-CODER®)R900i™ combination absolute encoder register/radio frequency meter interface unit (RF MIU) is a perfect example of all of the above. Not only does it work with past generations of meters and meter reading systems, but seamless integration is built into this single-unit end-point itself, providing two-way communications of advanced metering data. The E-CODER)R900i's interleaved mobile and high-power fixed network messages allow for simple migration from mobile to fixed network reading without site visits or reprogramming.

Streamline Operations And Manage Resources

In addition to eliminating the need for programming, the E-CODER)R900i has no external wires, making installation easier, faster, and less costly; plus it reduces potential vandalism or tamper. As with the rest of the R900 System, the design of the unit is intuitive and user-friendly so that minimal training is required for operation. It's designed to help manage time, labor, and other resources. The radio frequency transmission of the E-CODER)R900i can save your utility significant amounts of time in terms of both meter reading and billing, and provide flexibility to reallocate personnel to different tasks or departments depending on your changing workforce needs.

Do More With Detailed, Actionable Data

The types of data your utility can generate through the E-CODER)R900i can take you far beyond a simple meter reading for a monthly bill. Hourly consumption profile information over an account's last 96 days, along with alerts for leak or backflow, help to proactively identify and resolve customer issues – heading off high bill complaints, reducing delinquent payments, and eliminating write-offs. Using Neptune® 360™ host software, your utility can leverage detailed data from the E-CODER)R900i to balance water produced versus water consumed, group accounts for District Metered Area analysis, and track and manage Non-Revenue Water. From increasing efficiencies to pinpointing possible tamper or water theft to aiding customer service, the data supplied by the E-CODER)R900i can help your utility make better, more confident decisions.



KEY BENEFITS

Facilitates Migration to AMI

- 1 Watt fixed network message reduces infrastructure costs
- Interleaved mobile and fixed network messages facilitate migration without changing the "modes" in the MIU

Reduces Non-Revenue Water

- Provides leak history/diagnostics
- Enables proactive leak notification
- Provides hourly consumption data
- Improves meter reading accuracy
- Eliminates estimated reads

Identifies Potential Theft

- Tamper detection
- Reverse flow detection
- Identifies significant periods of zero consumption

Simplifies Installation Process

- Easy to install/no programming required
- No external wires
- Reduces labor cost
- Reduces potential wire vandalism and damage

Technical Specifications

Electrical Specifications

- MIU power: Lithium battery with capacitor

Transmitter Specifications

- Two-way MIU
- Transmit period (interleaved mobile and fixed network messages):
 - Standard mobile message every 14 seconds at 100 mW
 - Standard fixed network message every 7½ minutes at 1 Watt
- FCC verification: Part 15.247:
 - Transmitter channels: 50; frequency-hopping, spread-spectrum
 - Channel frequency: 910 to 920 MHz

- Encoder register reading interval:
 - Every 15 minutes
- Data logging interval:
 - 96 days of hourly data

Environmental Conditions

- Operating temperature:
 - 22°F to +149°F (-30°C to +65°C)
- Storage temperature:
 - 40°F to +158°F (-40°C to +70°C)
- Operating humidity:
 - Inside set - 0 to 95%, condensing
 - Pit set - 100% submersible

Materials

- Register housing:
 - Inside set: plastic polycarbonate
 - Pit set: roll-sealed copper shell

- Lens:
 - Inside set: plastic
 - Pit set: glass

Antennas

- Standard internal antenna
- Optional through-the-lid antenna:
 - 18" Coax
 - 6' Coax
 - 20' Coax

Options


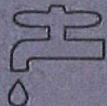

Compatibility

- Available for all sizes and makes of current Neptune meters
- Handhelds with R900® Belt Clip Transceiver - mobile RF
- MRX920™ - mobile RF
- R900® Gateways - fixed network RF

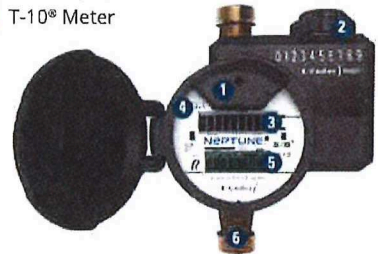
Units of Measure: U.S. Gallons, Cubic Feet, Imperial Gallons, Cubic Metres

Warranty

20 years (10/10); refer to specific Warranty Statement

	FLOW INDICATOR Shows the direction of flow through the meter: ON Water in use. OFF Water not in use. Flashing Water is running slowly. (-) Reverse flow. (+) Forward flow.
	LEAK INDICATOR Displays a possible leak: OFF No leak indicated. Flashing Intermittent leak indicates that water has been used for at least 50 of the 96 15-minute intervals during a 24-hour period. On Continuously Indicates water use for all 96 15-minute intervals during a 24-hour period.
RATE	RATE OF FLOW Average flow rate is displayed every twelve seconds on LCD display.
	LCD DISPLAY Nine-digit LCD displays the meter reading in billing units of measure: U.S. gallons, cubic feet, Imperial gallons, or cubic metres. 1 E-CODER basic reading/customary 6-digit remote reading 2 Customary sweep hand digits 3 E-CoderPLUS reading (8-digit remote reading) 4 Testing units used for diagnostics 5 Extended reading units 6 Customary billing units

- 1 Internal Antenna
- 2 Optional Antenna Port
- 3 Solar Panel
- 4 Date of Manufacture
- 5 LCD Display
- 6 T-10® Meter



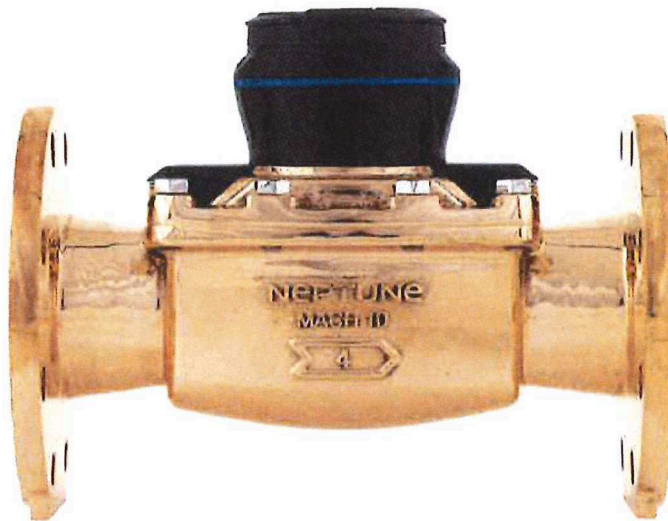
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Superior Accuracy. Zero Maintenance.

Neptune® MACH 10® Ultrasonic Meter



The MACH 10® ultrasonic water meter features solid state ultrasonic technology including a factory-calibrated, replaceable unitized measuring element (UME) with no degradation of accuracy over time. Combined with a corrosion-resistant, lead-free, high-copper alloy maincase, the MACH 10 is built to withstand demanding service conditions and deliver sustained accuracy over the life of the meter.

- Sizes 3", 4", and 6"
- Advanced ultrasonic technology with easily replaceable UME design
- Accuracy sustained over meter life
- Can be installed in both horizontal and vertical applications
- Available in standard turbine and compound lay lengths
- Lead free, high-copper alloy maincase
- Open flow path design with low pressure loss



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Specifications

AWWA C715 Compliant

NSF/ANSI 61 Certified

Cold water measurement of flow in potable water applications

Maximum Operating Water Pressure

- 175 psi

Operating Water Temperature Range

- +33°F to +122°F (+0.5°C to +50°C)

Options

Units of Measure

- U.S. gallons, cubic feet, cubic metres

Environmental Conditions

- Operating temperature: +14°F to +149°F (-10°C to +65°C)
- Storage temperature: -40°F to +158°F (-40°C to +70°C)

Warranty

- Neptune provides a limited warranty with respect to its MACH 10 line of ultrasonic meters for performance, materials, and workmanship.

System Compatibility

- Compatible with Neptune R900® and CMIU. Also available in MACH 10®)R900i™ and MACH 10®)TC configurations for an integrated radio solution.

Operating Characteristics

Meter Size	Extended Low Flow @ 100% Accuracy (+/- 3.0%)	Normal Operating Range @ 100% Accuracy (+/- 1.5%)	Safe Maximum Operating Capacity
3"	0.50 U.S. gpm	0.625 to 500 U.S. gpm	500 U.S. gpm
4"	0.75 U.S. gpm	1.0 to 1200 U.S. gpm	1200 U.S. gpm
6"	1.0 U.S. gpm	1.5 to 2000 U.S. gpm	2000 U.S. gpm

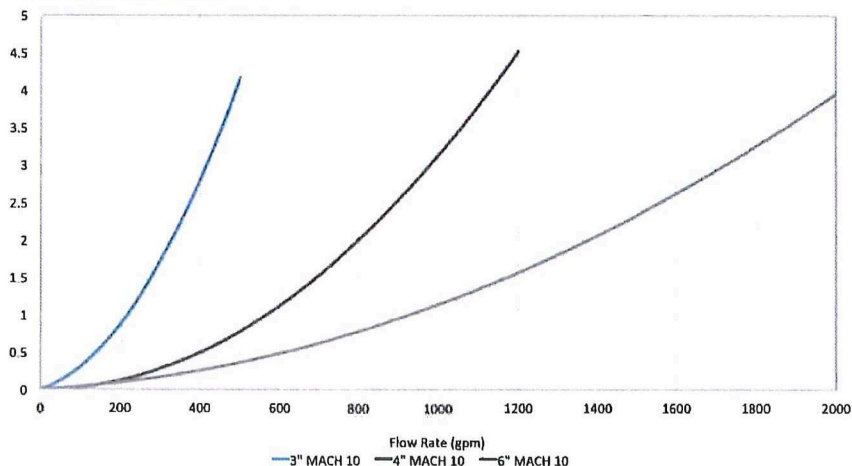
Dimensions

Meter Size	Length	Height
3"	12"	9½"
	17"	9½"
4"	14"	11"
	20"	11"
6"	18"	12¾"
	24"	12¾"

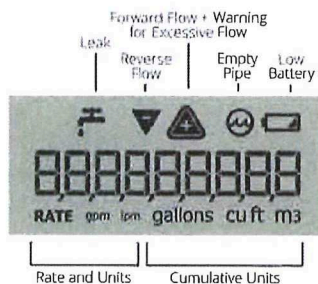
Registration

High Resolution (8-digit reading)	3"	4"	6"
1 U.S. Gallons	✓	✓	
10 U.S. Gallons			✓
0.1 Cubic Feet	✓	✓	
1 Cubic Feet			✓
0.01 Cubic Metres	✓	✓	
0.1 Cubic Metres			✓

Pressure Loss



LCD Display



LoRa Alliance Certified™



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A PRODUCT SHEET OF NEPTUNE TECHNOLOGY GROUP

MRX920™ Mobile Data Collector and MX900™ Software

Make Reading Success and Efficiency Automatic

Reliable, accurate, and field-proven, Neptune's MRX920™ mobile data collector – along with its MX900™ meter routes and mapping software – has helped water utilities across North America streamline, automate, and increase operational efficiencies. As part of Neptune's R900® System, the MRX920 helps transform data into actionable information that helps identify hidden causes of loss and optimize operational efficiency.

Strapped to the seat of your utility vehicle, the MRX920 reads up to fifty (50) meters simultaneously as your meter reader cruises down the streets. And in conjunction with the routes-integrated/Esri®-powered MX900 mapping, meter reading is automatic, fast, and effortless for your meter readers, accurate with less manpower deployed for your utility.

The MRX920 comes with Bluetooth capability, so your meter readers have the option of wirelessly updating routes and uploading the latest readings to the host system remotely and in near real-time without having to return to the office^{1,2}.

Additionally, Neptune has ported its well-established R900 radio frequency (RF) architecture to the latest release of MRX920 using software-defined radio (SDR) technology. This means all Neptune data collection systems have a common, core code base which translates to faster availability of new features and functionalities for your utility.

Make Migration to Other Technology Simple

The R900 System is designed to easily accommodate and support past generations of meters, encoder registers, and data collectors – while at the same time giving your utility the flexibility to incorporate future innovations as needed. The MRX920 is no exception, providing seamless compatibility with all generations of R900 MIUs. Its industry-leading performance can save days or even weeks for your meter reading routes, and new features within its MX900 software, such as Esri-powered mapping and wireless mobility, make valuable data available in real time as you read your system. Feel free to phase in these new features and equipment at your own pace, secure in the knowledge that Neptune will support your future needs without leaving you with stranded assets.



KEY BENEFITS

Reduced Meter Reading Time

- Reads up to fifty (50) meters simultaneously

Simple Access to Actionable Data

- Esri-powered GIS maps¹ show meter reading and flag status
- Wireless mobility – communicate meter reading data back to N_SIGHT® in real time¹
- User-configurable advanced filtering shows you only the information you need
- Data logging and off-cycle reads without physical access to the meters

Analyze Data at the Source

- View data logging graphs in the field and share with homeowner to address high bill complaints
- Identify high/low audit status failures
- Receive leak, reverse flow, and days of no flow alerts from E-CODER®-equipped meters

¹ Optional MX900™ Mapping and Mobility module required. Mobile computing device recommended and not included.

² Cellular or Internet connection required.

Save Your Utility – and Your Customers – Time and Money
While the R900 System always allows your utility to migrate forward to implement fixed network data collectors, or backward to use RF technology for individual off-cycle readings or data logging, using the MRX920 and MX900 software as a part of your system makes for fast and simple access to information that can provide effective resolutions to customers' water-related issues. With detailed consumption data in hand while working in the field, along with proactive alerts of leaks and backflow conditions, you can enhance customer service. In the process, you can even preempt high bill complaints, reduce delinquent payments, and eliminate write-offs.

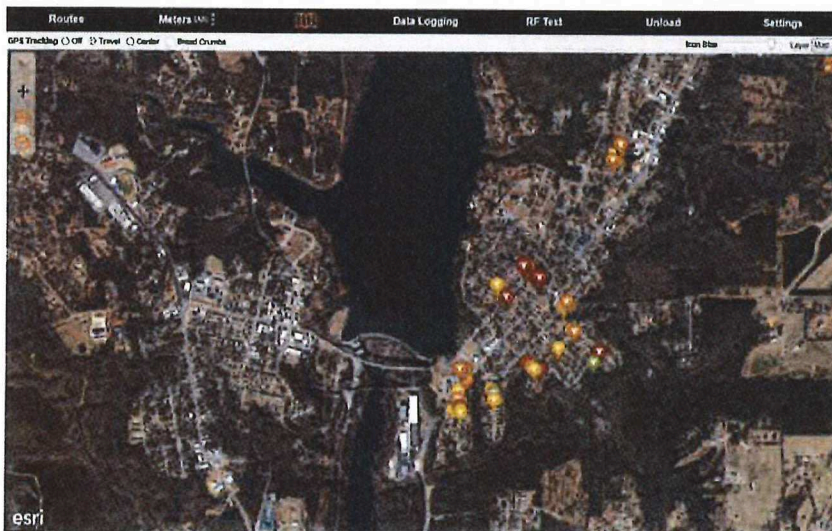
Specifications

Physical Specifications

- Dimensions:
8" (width) x 3.15" (height) x 11" (length excluding connections and handle)
- Weight: ~5 lbs

Electrical Specifications

- Power consumption: < 1A
- Power supply: 12V DC via vehicle power source adapter



Neptune recommends the following mobile computing hardware specifications for optimal performance:

- 12.1" XGA (800 x 600) minimum
- 89-key keyboard
- Operating System:
 - Windows® 7 Professional 32 & 64
 - Windows® 8 Professional 32 & 64
 - Windows® 8.1 Professional 64
 - Windows® 10 Professional 64
- .Net Framework 4.5 or higher
- Processor: Intel Pentium 1.7 Ghz or faster processor
- Memory: 1 GB minimum
- Communication
 - Internal 802.11 b/g wireless LAN
 - Windows Wireless Connection Manager (if Bluetooth connection to the receiver is desired, Bluetooth v2.1 + EDR required)
- USB 2.0
- GPS receiver (required for the mapping and mobility module)
- Minimum of 2 GB of available hard drive space

Environmental Conditions

- Operating temperature:
-4°F to +122°F (-20°C to +50°C)
- Storage temperature:
-40°F to +185°F (-40°C to +85°C)
- Operating humidity: 5 to 95% non-condensing relative humidity



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A PRODUCT SHEET OF NEPTUNE TECHNOLOGY GROUP

R900® Wall or Pit Meter Interface Unit (MIU)



Build Onto Your Existing Technology Investment

As part of Neptune's R900® System, the R900® meter interface unit (MIU) was designed for flexibility. Like its fellow system components, the R900 MIU works seamlessly with prior generations of equipment. At the same time, it allows your utility to incorporate innovations as you need. A single radio frequency unit that can transmit meter reading data using any reading method – mobile or fixed network – the R900 MIU never has to be reprogrammed. That makes migrating to new technologies simple whenever your utility is ready to implement them. When it's time to add new features or functionality, you can do it at your own pace, confident of continual system support without stranded assets.

Conserve Resources, Simplify Operations

With the pressures your utility faces, Neptune® knows you don't have time, personnel, water, or revenue to waste. That's why we designed the R900 MIU and the rest of the system for ease of use. In addition, the R900 MIU's interleaved, high-power, 1 Watt fixed network message reduces infrastructure costs while allowing reading in any mode – without separate reading systems, site visits, or any type of MIU reconfiguration. The R900 MIU provides fixed network transmission capability at all times, while it also transmits readings for walk-by or mobile methods. Making operations even easier, the user-friendly, intuitive R900 System design requires only minimal training, providing you flexibility to adapt to changes in your workforce and reallocate staff to different departments as needed.

Reduce Complaints, Delinquencies, And Write-Offs

Neptune's R900 MIU greatly improves access to meter readings, while delivering detailed consumption profile information as well as alerts for leak or backflow, helping your utility more proactively identify and resolve customers' questions. This accurate, timely data can be used to head off high bill complaints, reduce delinquent payments, and eliminate write-offs.

Because detailed data logging information from the last 96 days is always available, just waiting to be transmitted by the R900 MIU when needed, personnel can take care of a customer's issue then and there, in a single site visit. Not only can the data boost efficiency and customer service, but it will also help your utility make better-informed decisions going forward.

KEY BENEFITS

Facilitates Migration to AMI

- 1 Watt fixed network message reduces infrastructure costs
- Interleaved mobile and fixed network messages facilitate migration without changing the "modes" in the MIU

Reduces Non-Revenue Water

- Provides leak history/diagnostics
- Enables proactive leak notification
- Provides hourly consumption data
- Improves meter reading accuracy
- Eliminates estimated reads

Identifies Potential Theft

- Tamper detection
- Reverse flow detection
- Identifies significant periods of zero consumption

Simplifies Installation Process

- Easy to install/no programming required
- Reduces labor cost

Technical Specifications

Electrical Specifications

- MIU power: Lithium battery with capacitor

Transmitter Specifications

- Two-way MIU
- Transmit period (interleaved mobile and fixed network messages):
 - Standard mobile message every 14 seconds at 100 mW
 - Standard fixed network message every 7½ minutes at 1 Watt
- FCC verification: Part 15.247
 - Transmitter channels: 50; frequency-hopping, spread-spectrum
 - Channel frequency: 910 to 920 MHz
- Encoder register reading interval:
 - Every 15 minutes
- Data logging interval:
 - 96 days of hourly data

Environmental Conditions

- Operating temperature: -22°F to +149°F (-30°C to +65°C)
- Storage temperature: -40°F to +158°F (-40°C to +70°C)
- Operating humidity: 100% condensing

Antennas

- Wall MIU: standard internal antenna
- Pit MIU: standard through-the-lid antenna
 - 18" Coax
 - 6' Coax
 - 20' Coax

Encoded Register Compatibility

- Neptune ARB® V, ProRead™, ProCoder™, and E-CODER®
- Sensus ECR II, ICE, iPerl, Electronic Register and OMNI
- Hersey/Mueller Translator
- Badger ADE and HR E|LCD
- Elster/AMCO InVision (Sensus protocol version)

Options

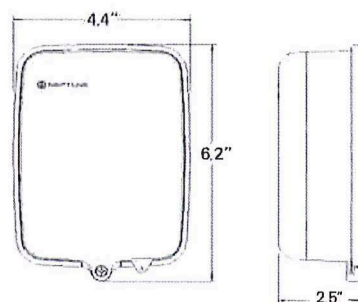
System Compatibility

- Handhelds with R900® Belt Clip Transceiver - mobile RF
- MRX920™ - mobile RF
- R900® Gateways - fixed network RF

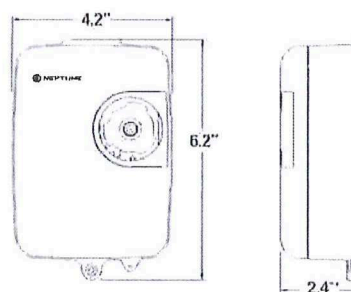
Warranty

20 years (10/10); refer to specific Warranty Statement

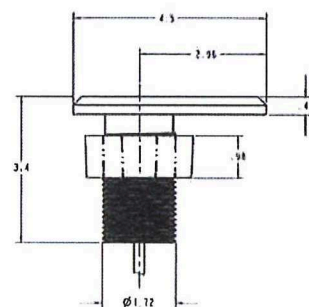
Dimensions



R900 Wall MIU



R900 Pit MIU



R900 Pit Antenna





A PRODUCT SHEET OF NEPTUNE TECHNOLOGY GROUP

T-10[®] METER

SIZES: 1 1/2" and 2"



Construction

Every Neptune[®] T-10[®] water meter meets or exceeds the latest AWWA C700 Standard. Its nutating disc, positive displacement principle has been time-proven for accuracy and dependability since 1892, ensuring maximum utility revenue.

The T-10 water meter consists of three major assemblies: a register, a lead free, high-copper alloy maincase, and a nutating disc measuring chamber.

The T-10 meter is available with a variety of register types. For reading convenience, the register can be mounted in one of four positions on the meter.

The corrosion-resistant, lead-free, high-copper alloy maincase will withstand most service conditions: internal water pressure, rough handling, and in-line piping stress.

The innovative floating chamber design of the nutating disc measuring element protects the chamber from frost damage while the unique chamber seal extends the low-flow accuracy by sealing the chamber outlet port to the maincase outlet port. The nutating disc measuring element utilizes corrosion-resistant materials throughout and a thrust roller to minimize wear.

Warranty

See Neptune Meter Warranty Statement for warranty details.

When desired, maintenance is easily accomplished either by replacement of major assemblies or individual components.

KEY FEATURES

Register

- Magnetic-driven, low-torque registration ensures accuracy
- Impact-resistant register
- High-resolution, low-flow leak detection
- Bayonet-style register mount allows in-line serviceability
- Tamperproof seal pin deters theft
- Date of manufacture, size, and model stamped on dial face

Lead Free Maincase

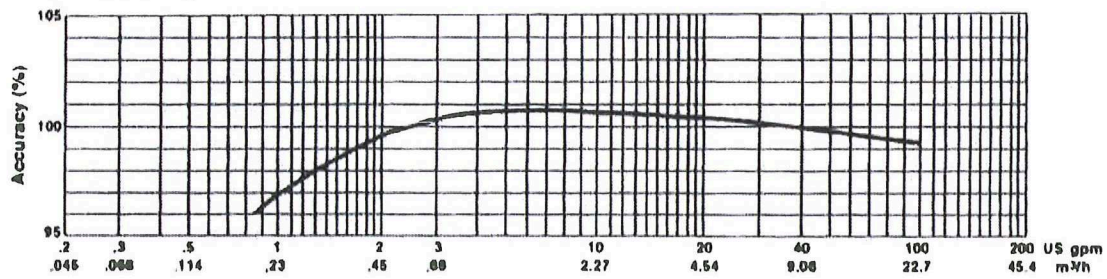
- Made from lead free, high-copper alloy
- NSF/ANSI 61 Certified
- NSF/ANSI 372 Certified
- Lifetime guarantee
- Resists internal pressure stresses and external damage
- Handles in-line piping variations and stresses
- Lead free, high-copper alloy provides residual value vs. plastic

Electrical grounding continuity

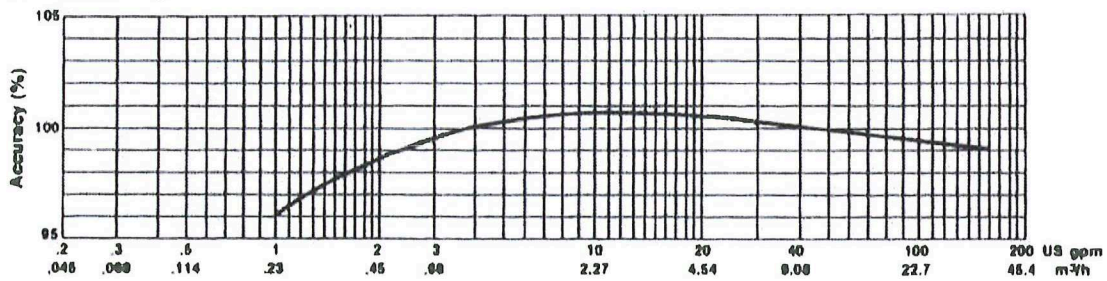
Nutating Disc Measuring Chamber

- Positive displacement
- Widest effective flow range for maximum revenue
- Proprietary polymer materials maximize long-term accuracy
- Floating chamber design is unaffected by meter position or in-line piping stresses

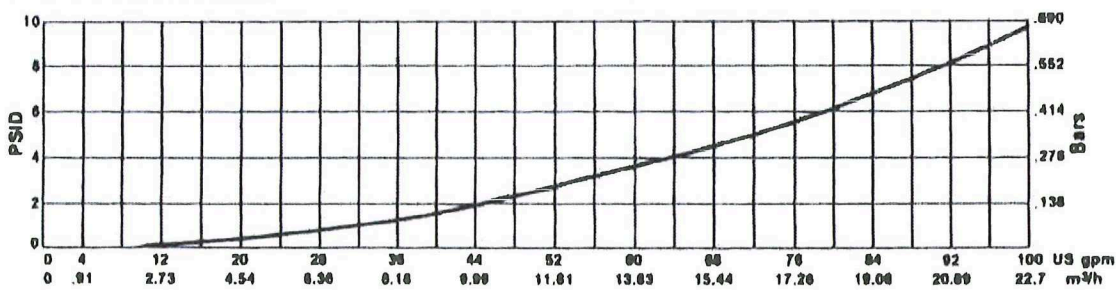
1 1/2" Accuracy



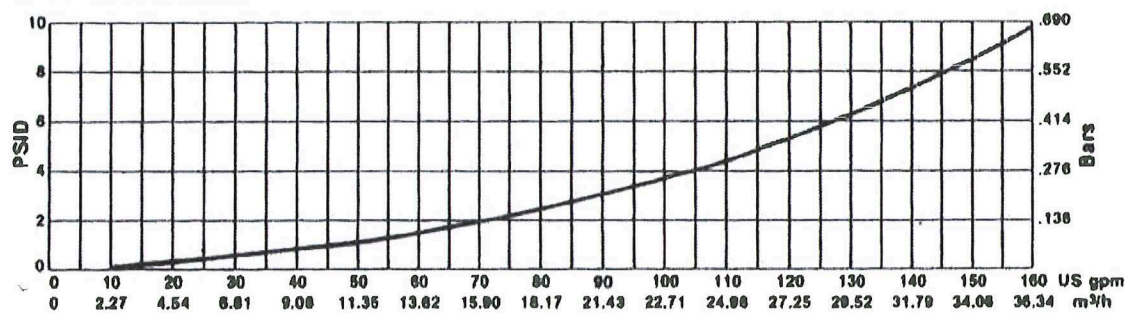
2" Accuracy



1 1/2" Pressure Loss



2" Pressure Loss



These charts show typical meter performance. Individual results may vary.

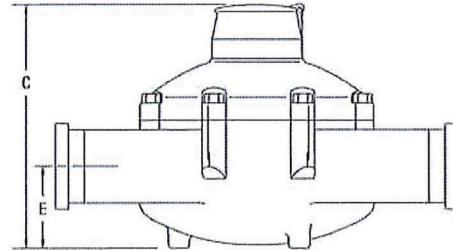
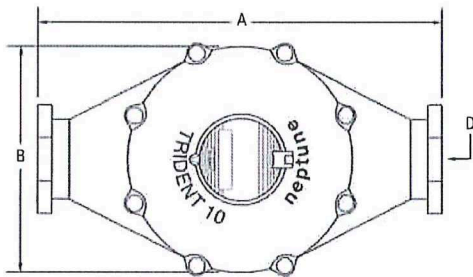
Operating Characteristics

Meter Size	Normal Operating Range @100% Accuracy ($\pm 1.5\%$)	AWWA Standard	Low Flow @ 95% Accuracy
1 1/2"	2 to 100 US gpm 0.46 to 22.73 m ³ /h	5 to 100 US gpm 1.1 to 22.7 m ³ /h	3/4 US gpm 0.17 m ³ /h
2"	2 1/2 to 160 US gpm 0.57 to 36.36 m ³ /h	8 to 160 US gpm 1.8 to 36.3 m ³ /h	1 US gpm 0.23 m ³ /h

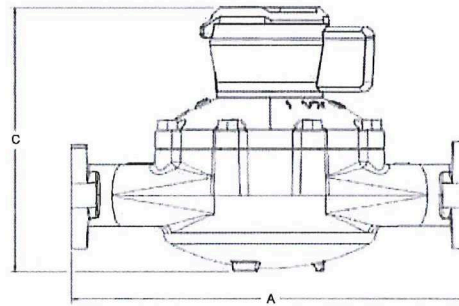
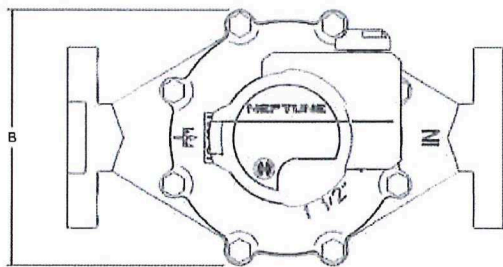
Dimensions

Meter Size	A in/mm	B in/mm	C-Std. in/mm	C-ARB in/mm	C- E-CODER®) R900™ or ProCoder™) R900™	D- Threads per inch	D- Thread Type	E in/mm	Weight lbs/kg
1 1/2" Screw End	12 5/8 321	8 1/16 205	8 1/8 206	8 13/16 220.3	8 3/8 213	11 1/2	1 1/2 NPT	2 9/16 65	31 14.1
1 1/2" Flanged End	13 330	8 1/16 205	8 1/8 206	8 13/16 220.3	8 3/8 213	—	—	2 9/16 65	35 15.9
2" Screw End	15 1/4 387	9 7/16 240	9 5/16 237	9 15/16 248.4	9 1/2 241	11 1/2	2" NPT	3 1/8 79	40 18.1
2" Flanged End	17 432	9 7/16 240	9 5/16 237	9 15/16 248.4	9 1/2 241	—	—	3 1/8 79	44 20.0

T-10 With Standard Register



T-10 With E-CODER®)R900™ or ProCoder™)R900™ Pit Register



Guaranteed Systems Compatibility

All T-10 meters are guaranteed adaptable to our ARB[®]V, ProRead[™] (ARB VI), ProCoder[™], E-CODER[®] (ARB VII), E-CODER[®]R900i[™], E-CODER[®]R450i[™], E-CODER[®]L900i[™], TRICON[®]/S, TRICON/E[®]3, and Neptune ARB[®] Utility Systems[™] without removing the meter from service.

Specifications

Certification

- NSF/ANSI 61, NSF/ANSI 372

Application

- Cold water measurement of flow in one direction

Maximum Operating Water Pressure

- 150 psi (1,034 kPa)

Maximum Operating Water Temperature

- 80°F

Measuring Chamber

- Nutating disc technology design made from proprietary synthetic polymer

Options

Sizes

- 1 1/2" flanged or threaded end
- 2" flanged or threaded end

Units of Measure

- U.S. gallons, imperial gallons, cubic feet, cubic metres

Register Types

- Direct reading: Bronze box and cover
- Remote reading: ProRead Absolute Encoder, ProCoder, E-CODER, E-CODER)R900i, E-CODER)R450i, E-CODER)L900i, TRICON/S, TRICON/E3

- Reclaim

Measuring Chamber

- Synthetic polymer

Companion Flanges

- Lead free, high-copper alloy

Environmental Conditions

- Operating temperature: +33°F to +49°F (0°C to +65°C)
- Storage temperature: +33°F to +158°F (0°C to +70°C)

Test Ports

- 1" (optional)

Registration

ProRead Registration (per sweep hand revolution)		1 1/2"	2"
100	US Gallons	✓	✓
100	Imperial Gallons	✓	✓
10	Cubic Feet	✓	✓
1	Cubic Metre		✓
.01	Cubic Metre	✓	
Register Capacity ProRead, ProCoder, and E-CODER		1 1/2"	2"
100,000,000	US Gallons	✓	✓
100,000,000	Imperial Gallons	✓	✓
10,000,000	Cubic Feet	✓	✓
100,000	Cubic Metres	✓*	
1,000,000	Cubic Metres	✓**	✓
E-CODER High Resolution (8-digit reading)		1 1/2"	2"
1	US Gallons	✓	✓
1	Imperial Gallons	✓	✓
0.1	Cubic Feet	✓	✓
0.01	Cubic Metres		✓
0.001	Cubic Metres	✓	
ProCoder High Resolution (8-digit reading)		1 1/2"	2"
1	US Gallons	✓	✓
1	Imperial Gallons	✓	✓
0.1	Cubic Feet	✓	✓
0.01	Cubic Metres	✓	✓

*ProRead and E-CODER only **ProCoder only



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A PRODUCT SHEET OF NEPTUNE TECHNOLOGY GROUP

R900® Belt Clip Transceiver

Automate Measurement to Activate Operational Efficiency

As part of the Neptune® R900® System, the R900® Belt Clip Transceiver (R900 BCT) is your utility personnel's partner in mobile meter reading and in-field customer support and is now iOS compatible.

The R900 BCT's two-way communications to the R900® MIU eliminate meter access issues and speed up retrieval of valuable data logging information – up to 96 days of historical hourly consumption data from an individual account. In addition, its exceptional radio frequency (RF) throughput reduces meter reading time, especially in high-density environments. Field personnel can even read R900s while performing maintenance or other tasks when taking advantage of the R900 BCT's unattended operations mode. These automated features ensure you collect accurate data that can be turned into meaningful information – to help improve accuracy, identify hidden causes of loss, and optimize the efficiency of your operations.

Move Ahead with Backward Compatibility and Forward Innovation

The R900 BCT, as with the rest of the Neptune R900 System, works with past generations of equipment while remaining flexible to incorporate innovations as needed. The R900 BCT maintains support to read previous generations of R900 MIUs yet introduces powerful software-defined radio (SDR) technology to support the new advanced two-way features of the R900 System. Now, the R900 BCT is capable of reading electric, bubble-up ERT® devices and processing SCM or SCM+ message files that these ERT devices transmit. This gives utilities the freedom of equipping with just the R900 BCT to read both water and electric meters.

So, go ahead and phase in new features and equipment at your own pace with confidence that Neptune will support your future needs without leaving you with stranded assets.

Present Consumption Data in the Field for Proactive Customer Service

Simplified access to critical information means your utility can provide even more proactive customer service. Pairing the R900 BCT with a handheld device or a mobile device running Neptune software, your personnel can maximize their efficiency in the field, with the flexibility to perform impromptu service calls and address customer service issues on-site without a separate truck roll! With the data literally in hand, they can share data logging graph information with homeowners. This on-the-spot, on-site presentment of how much water they used and when, helps head off customer complaints regarding high water bills, reduce delinquencies, and avoid write-offs.



KEY BENEFITS

Increases meter reading efficiency

- Increased RF throughput capabilities which reduce reading time in high-density R900 environments
- Two-way communications to R900 MIU which reduces time required to retrieve data logging information
- Unattended operations mode allows utility personnel to read R900s while performing other non-meter-reading-related job functions

No stranded assets

- Compatible with all generations of R900 MIUs
- Probe compatibility with Advantage and Pocket ProReader
- Connects via Bluetooth to Trimble Nomad or Trimble Ranger for meter reading
- Connects via Bluetooth to Android or iOS mobile devices for in-field customer support
- Software-defined radio technology enables the R900 BCT to be updated for compatibility with future products

KEY BENEFITS CONTINUED

Reads ERT devices

- Compatible with Itron electric ERT technology (bubble-up ERTs only)
- Processes SCM and SCM+ message format

Analyze data at the source with either a smart phone or tablet

- Test-read R900s in the field or before installation to obtain reading and E-CODER® flag events
- Retrieve 96 days of hourly interval data logging information
- View graph of data logging intervals in the field
- Share data logging graph information with homeowner to address high bill complaints

¹Contact Neptune Customer Support for the latest device and operating system compatibilities.

Specifications

Communication: Bluetooth 2.1 or later and USB

Handheld Software Compatibility: N_SIGHT® version 4.7 or later

Power Supply

- Rechargeable lithium-ion battery pack – 5000 mAh capacity
- Field-replaceable, recommended replacement every 2 years

Memory: 4GB SD card

Device Compatibility

- Trimble Nomad 900B/900LE/1050B/1050LE, Trimble Ranger 3, and Android/iOS mobile devices¹

Indicators

- Four LEDs identify Bluetooth communication, RF status, mode status, and battery status

Dimensions

- Height: 3.58" (9.1 cm)
- Width: 1.66" (4.22 cm)
- Length: 5.75" (14.6 cm)

Weight: 1.1 lbs. (499g) including rechargeable battery

Temperature Range

- Operating: -4°F to +122°F (-20°C to +50°C)
- Storage: -40°F to +185°F (-40°C to +85°C)

Accessories

- Spare battery
- Spare battery charger
- Belt clip
- SD card
- 12V USB vehicle power cable

Warranty

- One-year comprehensive warranty
- Hardware maintenance contracts available

Receiver Channels: 50

Number of Simultaneous Channels: 8

Approvals

- FCC Class B
- IC

Mode Overview

	Normal	Unattended Operations	USB Mass Storage
Bluetooth Pairing to Devices	Required	N/A	No. Used for firmware updates and transfer of data via USB from SD card to Neptune software
Trimble Nomad 900B/900LE/ 1050B/1050LE Compatible	Yes	N/A	<i>*Advantage/Pocket ProReader and data logging not supported in Android NGO app.</i>
iOS App Compatible	Yes	N/A	
Android App Compatible	Yes*	N/A	
R900 Compatible	Yes	Yes	
Advantage / Pocket ProReader Compatible	Yes	No	
Data Logging Compatible	Yes	No	
SD Card Data Storage	Yes	Yes	



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A PRODUCT SHEET OF NEPTUNE TECHNOLOGY GROUP

Fire Hydrant Meter

SIZE: 3"

The Neptune® Fire Hydrant water meter is designed for mobile use in metering flows from fire hydrants. The meter measures a wide flow range to maximize revenue. It meets or exceeds the latest performance requirements of AWWA. Maximum flow rates may be exceeded by 25% for intermittent flows.

The Fire Hydrant water meter consists of a lightweight, aluminum maincase fitted with a 2" gate valve, a turbine measuring element, and a roll-sealed register.

Construction

The aluminum maincase is Xylan® coated for corrosion resistance and is lightweight, compact, and easy to handle. This meter features a unique "balanced handle" which makes carrying and installing it easier than any other fire hydrant meter on the market. A 2" gate valve enables the user to regulate the water flow without opening and closing the fire hydrant.

The unitized measuring element (UME) allows for quick and easy interchangeability.

Exclusive dual graphite bearings provide equalized rotor loading for accuracy over a broad flow range. The thrust-compensated rotor configuration relieves pressure on the thrust bearings, which minimizes wear and provides sustained accuracy over an extended operating life. A tamper-resistant stainless steel calibration vane allows recalibration of the UME to lengthen service life and to ensure accurate registration.

The roll-sealed register eliminates leaking and fogging. A magnetic drive couples the register with the measuring element.

Warranty

Neptune provides a limited warranty with respect to its Fire Hydrant meters for performance, materials, and workmanship.

When desired, owner maintenance is easily accomplished by replacement of major components or a factory-calibrated UME.

KEY BENEFITS

Roll-Sealed Register

- Permanently-sealed, magnetic-driven register assembly eliminates leaking and fogging
- Locking register lid secures during transportation, protecting register lens
- Glass lens ensures readability and scratch resistance
- Tamperproof design prevents vandalism and allows in-service replacement of register

Cast Aluminum Maincase

- NSF/ANSI 372
- Xylan coating ensures maximum corrosion resistance
- Lightweight material ensures easy handling
- Single, balanced carrying handle provides for easy, one-person installation
- 2" gate valve allows safe pressurization of measuring element and regulation of water flow

Turbine Measuring Element

- Wide flow ranges at 98.5%-101.5% accuracy ensure maximized revenues
- Direct coupling of rotor to gear train ensures accurate registration
- UME makes maintenance easier and faster
- Stainless steel calibration vane ensures accurate registration and makes calibration easier

Specifications

Application

- Cold water measurement of flow in one direction

Maximum operating pressure

- 150 psi

Normal operation range

- 5-450 gpm (at accuracy of 100 +/- 1.5%)

Register type

- Direct reading, center sweep, roll-sealed magnetic drive with low-flow indicator

- Bronze box with locking cover

Strainer

- Plastic

Registration

- Per sweep hand revolution: 100 ' gallons, 10 cubic feet, 1 cubic metre

Register capacity (six-wheel odometer)

- 100,000,000 gallons
- 10,000,000 cubic feet
- 1,000,000 cubic metres

Measuring element

- AWWA Class II Turbine

Options

Size

- 2½" outlet (with 2½" gate valve)

Strainer

- Stainless steel (internal)

Orifice plate

- Size for application

Units of measure

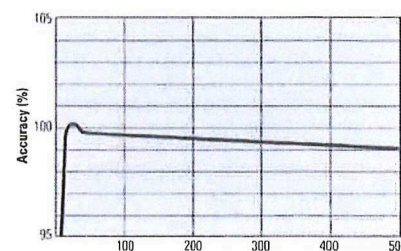
- U.S. gallons, cubic feet, cubic metres

Connections

- Less Coupling: 3" x 2" NPT
- With Coupling: 2½" NH

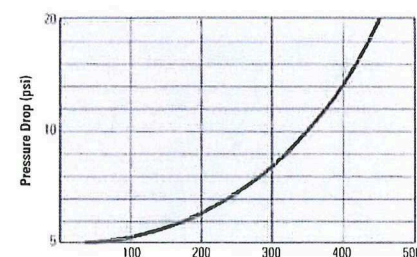
ACCURACY CHART

(Rate of Flow in Gallons per Minute)



PRESSURE LOSS CHART

(Rate of Flow in Gallons per Minute)



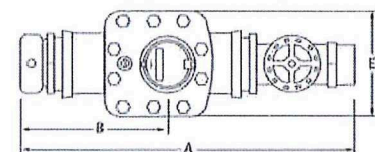
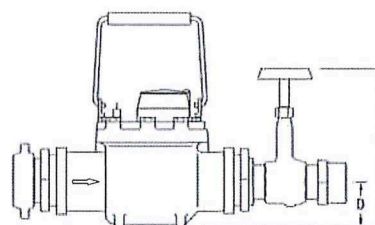
These charts show typical meter performance. Individual results may vary.

Operating Characteristics

Meter Size	Normal Operating Range @ 100% Accuracy (+/- 1.5%)	Maximum Intermittent Flow	AWWA Standard
3"	5 to 450 US gpm 1.14 to 102.2 m³/h	560 US gpm 127.2 m³/h	8 to 435 US gpm 1.8 to 98.8 m³/h

Dimensions

3" Fire Hydrant	A inches	B inches	C inches	D inches	E inches	Weight lbs.
Less Coupling	15 ½	7 ½	11 ½	2 ¾	7 ½	23
With Coupling	19 ¼	10	11 ½	2 ¾	7 ½	29



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