



AMR PERMALOG®



Leak monitoring via an AMR/AMI system.



When combined with the AMR Permalog® leak noise logger, both the R900® and R450™ Radio Frequency Meter Interface Units can transmit leak status data from water distribution mains and service connections. The R900 in combination with Neptune's ARB® N_SIGHT™ AMR software will provide leak detection data coincident with meter reading cycles. The R450 in combination with Neptune's ARB N_SIGHT AMI software will provide leak detection data daily. Both approaches will generate leak reports that assist utilities to prioritize leak surveys and correlation efforts.

The Permalog leak noise loggers are deployed throughout the water distribution network. They are typically installed on water valve nuts in the water main distribution system. The larger-diameter pipes found in the water main distribution system are generally better able to transmit sound vibrations than smaller-diameter service lines, making the valve nut an ideal sensing point for leak monitoring.

Every night each Permalog leak noise logger "listens" for leak sounds that travel along water pipes. If no leak is detected, a signal is transmitted to indicate a normal or "no-leak" condition. However, when a

possible leak is detected, the Permalog unit enters an alarm state which is communicated by either the R900 or R450. This leak alert is a discrete "yes or no" indication of a leak calculated by the Permalog installed on the pipe. In addition to RF transmission of the leak alert information, the Permalog unit has an integrated LED for manual inspection which flashes red to indicate a leak and flashes green to indicate a "no leak" status.

This leak alert plus other information is collected and transmitted by either the R900 or R450 MIU for collection using walk-by handheld, mobile or fixed network data collectors and is passed seamlessly into Neptune's ARB N_SIGHT host meter reading software. Data can also be downloaded manually with the Permalog Patroller two-way radio frequency communications unit. The results can be displayed using the latest Permalog software to show the historical leak and no-leak states, and the histogram of the previous night's logging data.

The integration of these two field-proven technologies provides utilities an advanced year-round leak monitoring and AMR/AMI system.

KEY FEATURES

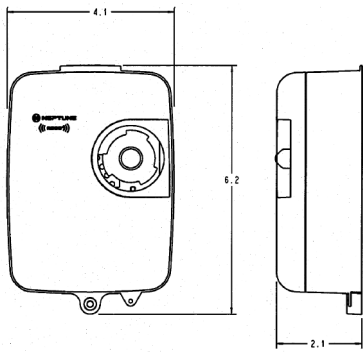
- Field-proven RF and acoustic leak noise logger in a single system
- Enhanced high-power RF transmissions
- Faster collection of data
- Visual indication of leak alert
- Leak noise graphs
- Both the R900 and R450 pit versions and Permalog are fully submersible (potted electronics)
- Extended battery life (both R900/R450 and AMR Permalog)
- Customized configuration depending on site being surveyed

KEY BENEFITS

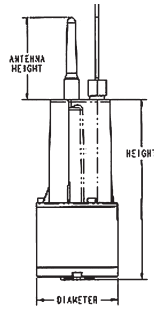
- Year-round leak monitoring system
- Operational efficiencies result from reading meters and leak loggers with a single system
- E-Coder® data such as service leaks or reverse flow events can be correlated to distribution system events such as main breaks to expedite problem identification and resolution
- High output power allows for collection of leak noise data from greater distances
- Enhanced range from R900 increases Mobile RF operational efficiencies
- Use as a traditional noise logger and/or mobile leak monitoring system
- Enhanced Battery life: 10-12 years

TECHNICAL SPECIFICATIONS

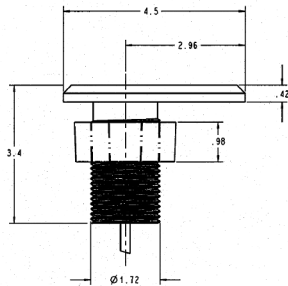
- R900 TRANSMITTER SPECIFICATIONS**
- Electrical Specifications:
 - Power: D-size lithium battery w/Capacitor (20-year life)
 - Transmitter Specifications:
 - Transmit period: Every 14 seconds
 - Transmitter channels: 50
 - Channel frequency: 910 to 920 MHz spread spectrum
 - Output power: Meets FCC Part 15.247
 - 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: 0 to 95% non-condensing



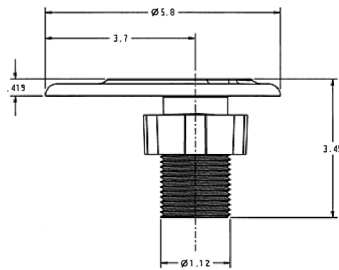
R900 AND R450 PIT MIU DIMENSIONS



PERMALOG DIMENSIONS

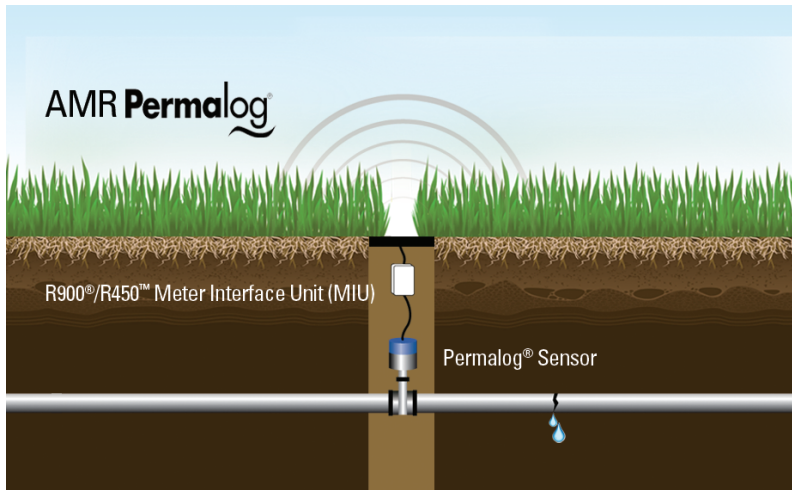


R900 PIT ANTENNA DIMENSIONS



R450 PIT ANTENNA DIMENSIONS

TYPICAL INSTALLATION



R900 and R450 are registered trademarks of Neptune.
Permalog is a registered trademark of Palmer Environmental.

TECHNICAL SPECIFICATIONS

- Environmental Protection:
 - Fully potted electronics to prevent water ingress
- Construction Materials:
 - High-impact plastic polycarbonate housing
- Warranty:
 - See R900 published warranty

R450 TRANSMITTER SPECIFICATIONS

- Electrical Specifications:
 - Lithium battery w/capacitor
- Transmitter specifications:
 - Transmit period: Standard configuration is up to 4 times a day
 - Operational Frequency: Licensed 450 – 470 MHz band
 - Output Power: Meets FCC Part 90
- 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: 0 to 95% non-condensing

PERMALOG NOISE LOGGER SPECIFICATIONS

- Electrical Specifications:
 - Power: A-size lithium battery (up to 10 years life)
- Environmental Protection:
 - IP68 to 1.5m (5 feet) in depth
 - Fully potted electronics to prevent water ingress
- Construction Materials:
 - Hostaform yellow case
 - Stainless steel sensor assembly
- Data Communications:
 - Signal – Leak/No leak
 - Leak Confidence Number
 - Visible green LED for no-leak and red LED for leak status
- Warranty:
 - See Permalog published warranty
- Optional Accessories:
 - Patroller (uses 2-way radio frequency communications to download leak noise history)
 - Hook-to-lift logger

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