ADS RAINALERT ®III Rainfall Monitor
Technical Specification



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Part 1 - Overview

This specification provides technical, functional, and performance specifications for the ADS RAINALERT® III Rainfall Monitor (rainfall monitor). The rainfall monitor measures rainfall through a connected tipping bucket rain gauge (TBRG) for use in municipal, industrial, water resources, and environmental applications.

Part 2 - Specifications

A. Sensor Interface

The rainfall monitor connects to an ADS-supplied or customer-supplied TBRG.

1. The rainfall monitor is compatible with TBRGs calibrated to U.S. customary units with a resolution of 0.01 inch/tip (in/tip).
2. The rainfall monitor is compatible with TBRGs calibrated to metric units with a resolution of 0.1, 0.2, 0.5, or 1.0 millimeter/tip (mm/tip).
3. The rainfall monitor supports contact closure rates sufficient to measure maximum rainfall intensities up to 80 inches/hour (in/hr) or 2000 millimeters/hour (mm/hr).
4. The TBRG is connected to the rainfall monitor via a minimum 2-conductor, 22 American Wire Gauge (AWG) wire.

B. Measurement and Data Processing

The rainfall monitor includes a processor to convert contact closures from a reed switch on a TBRG into rainfall measurements as rainfall totals and/or rainfall intensities.

1. The rainfall monitor reports rainfall total and can be configured to provide rainfall total in inches (in) in U.S. customary units or in millimeters (mm) in metric units.
2. The rainfall monitor reports rainfall intensity and can be configured to provide rainfall intensity in inches/hour (in/hr) in U.S. customary units or in millimeters/hour (mm/hr) in metric units.
3. The rainfall monitor records the date/time for each rainfall total measurement and each rainfall intensity measurement, based on a configured sample rate.
4. The rainfall monitor sample rate is configurable to 2, 5, 15, or 30 minutes, or 1, 2, 12, or 24 hours.
5. The rainfall monitor stores rainfall total and rainfall intensity data in synchronous or asynchronous mode. The synchronous mode stores rainfall total and rainfall intensity at a date/time determined by the configured sample rate, while the asynchronous mode stores the date/time of each contact closure of the reed switch on the TBRG.
6. The rainfall monitor measures internal monitor temperature and reports temperature on demand in diagnostics mode, in daily log files, or optionally as a data entity logged at the rainfall monitor sample rate.

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C. Rainfall Data Storage

The rainfall monitor includes memory to store rainfall total and/or rainfall intensity measurements.

1. The rainfall monitor includes sufficient memory to store over 18 months of rainfall total and rainfall intensity data recorded at a sample rate of 5 minutes.
2. The rainfall monitor includes non-volatile memory to retain recorded measurements in the event of power loss.
3. The rainfall monitor overwrites stored data when the memory is full, overwriting the oldest data first.

D. Electronics and Processing

The rainfall monitor includes an embedded microprocessor-based control system for rainfall measurement, data logging, communications management, and alarm processing.

1. The rainfall monitor incorporates an ARM Cortex-M4 microprocessor.
2. The rainfall monitor includes volatile and non-volatile memory for operation, configuration storage, firmware storage, and measurement data retention.
3. The rainfall monitor includes flash memory that retains configuration settings and recorded data during battery replacement or power loss.
4. The rainfall monitor includes a battery-backed, real-time clock module synchronized with the wireless carrier with an accuracy of ± 1 minute/month. Clock synchronization is configured by default but can be disabled, if desired.
5. The rainfall monitor is compatible with Standard Time and Daylight Saving Time.

E. Communication Interfaces

1. Direct

The rainfall monitor includes a local communication interface to transmit information to and from a computer running the Microsoft Windows Operating System.

   a. A direct connection cable is provided to communicate with the rainfall monitor via a computer running the Microsoft Windows Operating System and an installed driver.

   b. The direct connection cable connects to a computer via a Universal Serial Bus (USB) and to the rainfall monitor via a serial interface.

2. Wireless

The rainfall monitor includes an integrated wireless modem to transmit data and to communicate remotely with the rainfall monitor.

   a. The rainfall monitor includes a cellular modem compatible with LTE-M and NB-IoT.

   b. The rainfall monitor includes a cellular modem with fallback to 2G where available.

   c. The rainfall monitor includes a cellular modem with an insertable Subscriber Identify Module (SIM) card.

   d. The rainfall monitor includes a cellular modem that supports over-the-air (OTA) firmware updates.

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e. The rainfall monitor includes an internal ultra-wide band antenna, connected via a Sub Miniature Version A (SMA) connector on the board.

f. The rainfall monitor includes a cable gland on the outer enclosure to connect an optional external antenna via an SMA connector on the board.

g. The rainfall monitor measures communications signal strength and reports signal strength on demand in diagnostics mode, in daily log files, or optionally as a data entity logged at the rainfall monitor sample rate.

h. The rainfall monitor includes modem power management capability where the modem can be configured to be always on, always off, or on for a user-specified time span configured independently for each day of the week.

i. A SIM card with a static IP cellular configuration is required for direct remote communication.

j. A SIM card with a dynamic IP cellular configuration supports scheduled data delivery and remote monitoring functions.

F. Modbus

The rainfall monitor supports Modbus communications for integration with Supervisory Control and Data Acquisition (SCADA), distributed control systems (DCS), programmable logic controllers (PLC), and other industrial automation systems. The rainfall monitor functions as a Modbus slave and provides rainfall and diagnostic data through Modbus holding registers.

1. The rainfall monitor supports Modbus Transmission Control Protocol / Internet Protocol (TCP/IP) communications.

2. The rainfall monitor supports communication over a wireless cellular connection.

3. The Modbus slave address is user-configurable from 2 to 247, excluding 58.

4. The rainfall monitor supports a configurable response delay for compatibility with third-party host systems.

5. The rainfall monitor uses Modbus holding registers beginning at Register 40001.

6. Floating-point values are stored using two Modbus holding registers per value.

7. Register values not configured or not available are reported as 0.

8. The rainfall monitor provides the following data through Modbus registers: rainfall tip count, rainfall intensity, rainfall alarm status, total rainfall for the current day, total rainfall for the previous day, internal monitor temperature, battery voltage, and wireless cellular signal strength.

9. The rainfall monitor uses TCP Port 2100 for Modbus communications.

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G. Data Delivery

The rainfall monitor delivers data to the ADS PRISM™ Cloud software application or a user-configured File Transfer Protocol (FTP) or Secure File Transfer Protocol (SFTP) location.

1. The rainfall monitor includes a normal communication rate and a fast communication rate.
2. The rainfall monitor normal communication rate is configurable at 5 or 15 minutes or 1, 2, 3, 4, 6, 8, 12, or 24 hours.
3. The rainfall monitor fast communication rate is triggered during alarm conditions and is configurable at 5 or 15 minutes or 1, 2, 3, 4, 6, 8, 12, or 24 hours.
4. The rainfall monitor data may be exported from the ADS PRISM Cloud software application in comma separated value (.csv) format.
5. The rainfall monitor data are also available programmatically via an Application Programming Interface (API) or delivered to external systems via webhooks.

H. Alarms and Events

The rainfall monitor includes configurable alarms for rainfall exceeded in a specified time period.

1. The rainfall monitor includes a Rainfall Alarm. When enabled, this alarm is triggered when the rainfall monitor detects a rainfall total greater than or equal to the configured Rainfall Threshold in the configured Rainfall Interval.
2. The rainfall monitor includes a Battery Alarm. When enabled, this alarm is triggered when the rainfall monitor detects a battery voltage less than or equal to the configured Battery Threshold.
3. Notifications, alerts, and alarms are delivered via Cloud notifications, email, and/or Short Message Service (SMS).
4. Notifications, alerts, and alarms are also available programmatically via an Application Programming Interface (API) or delivered to external systems via webhooks.

I. Configuration and Activation

The rainfall monitor is configured and enabled using the ADS PRISM™ Cloud software application or the ADS Qstart™ desktop application. Initial configuration and activation must occur locally via a serial connection using the ADS Qstart™ desktop application.

J. Diagnostics

The rainfall monitor enables the user to perform general diagnostics and troubleshooting to prevent, detect, isolate, and correct problems.

1. The rainfall monitor reports the battery voltage in diagnostics mode and in daily log files.
2. The rainfall monitor reports the wireless signal strength in diagnostics mode and in daily log files.
3. The rainfall monitor supports firmware upgrades and modem firmware upgrades.

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K. Power

The rainfall monitor is designed for low-power operation, supporting long-term deployment using battery or external power.

1. The rainfall monitor includes a 9-volt (V), 60 amp-hour (Ah) alkaline battery pack as the primary power source. The battery has an estimated 5-year service life when configured with a 5-minute sample rate, a 4-hour communication rate, and a 1 hour per day modem-on-demand period.

2. The rainfall monitor includes an option to connect a user-provided 9 to 24-volt (V) direct current (DC) 2.5 amp (A) external power supply.

3. The rainfall monitor measures battery voltage and reports battery voltage on demand in diagnostics mode, in daily log files, or optionally as a data entity logged at the rainfall monitor sample rate.

L. Environmental and Mechanical

The rainfall monitor is housed in a durable enclosure designed for outdoor applications.

1. The rainfall monitor has a length of 10.63 inches (270 mm), a width of 7.09 inches (180 mm) and a depth of 4.53 inches (115 mm).

2. The rainfall monitor has a weight of 10 lb (4.54 kg), including battery, excluding TBRG and mounting hardware.

3. The rainfall monitor outer enclosure is constructed of polycarbonate reinforced with 10% glass fiber resin.

4. The rainfall monitor outer enclosure includes a pressure equalization vent.

5. The rainfall monitor outer enclosure includes two stainless steel latches and a continuous gasket for dust-tight and water-tight protection.

6. The rainfall monitor outer enclosure provides dust-tight and water-tight protection in accordance with the National Electrical Manufacturers Association (NEMA) Type 4X and dust and ingress protection in accordance with the International Electrotechnical Commission (IEC) IP67.

7. The rainfall monitor is designed to operate in a temperature range of -4 °F to +140 °F (-20 °C to +60 °C).

RAINALERT® III Dimensions



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Part 3 - Accessories

Optional mounting hardware is available to mount an ADS-supplied TBRG together with the rainfall monitor.

1. The mounting hardware allows the tipping rain gauge and rainfall monitor to be installed on the ground, on a pole, or on a rooftop.
2. The mounting hardware is constructed of powder-coated aluminum suitable for use in outdoor applications.
3. The mounting hardware has a length of 12 inches (304.8 mm), a width of 10.65 inches (270.5 mm), and a height of 5.20 inches (132.1 mm).
4. The mounting hardware has a weight of 5.36 lb (2.43 kg).

Mounting Hardware Solutions



Ground Mount | Pole Mount | Rooftop Mount

Part 4 - Quality Assurance

The rainfall monitor is manufactured under a Quality Management System certified to ISO 9001:2015 by an accredited certification body.

Part 5 - Documentation

A product datasheet and product manual are available in digital format.

Part 6 - Support and Warranty

ADS provides technical support via telephone, email, or website inquiries during standard business hours. Warranty details are provided at www.adsenv.com.

Call: 800.633.7246
Email: adssales@idexcorp.com

Part 7 - Compliance & Standards

The rainfall monitor complies with applicable regulatory requirements for radio-enabled equipment. At a minimum, the rainfall monitor meets the following certifications and conformity assessment standards for the following geographic areas:

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1. United States. The rainfall monitor complies with all applicable Federal Communications Commission (FCC) regulations for intentional radiators under FCC Part 15 and bears a valid FCC Identification (ID).

2. European Union. The rainfall monitor complies with the Radio Equipment Directive (RED) 2014/53/EU, the Electromagnetic Compatibility (EMC) Directive, and the Restriction of Hazardous Substances (RoHS) Directive. The level monitor bears the CE mark.

All markings are permanently affixed and legible. The product manual includes appropriate compliance documentation.

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