Rain Bird® ClimateMinder™ System

RF Card (Node-RF) V3.0 User Manual

Version 1.1 / August 12, 2013

1. Operation Description

Rain Bird® ClimateMinder™ is a wireless climate monitoring and control system for agriculture. It uses mobile network technology to transmit key data from the field directly to growers' mobile phones, computers and control systems.

Rain Bird® ClimateMinder™ helps growers optimize growth patterns, increase their productivity and product quality, shorten time-to-market, save water, reduce cost for nutrients and pest control, and lower operating costs.

Rain Bird® ClimateMinder™ puts growers in control of the environmental and climate variables that affect the ultimate success of their production. By monitoring and controlling to measured conditions, Rain Bird® ClimateMinder™ quickly alerts growers to conditions that threaten their crops, such as extremes in temperature or moisture, and the need to take corrective action.

2. How it works?

ClimateMinder's battery/solar operated wireless sensors collect real-time soil and environmental data and transmit this data to back-end servers through a cellular network. Users receive text messages or email alerts on their cell phone and/or use the web site to browse measurements and control alert and control conditions.

3. Products

Rain Bird® ClimateMinder™ System has the following type of products:

- Wireless gateway station: Used to collect sensor readings and transmit the data it receives from stations in the network to the server software.
- Wireless sensor station: Used to collect sensor readings and share with the server software through the gateway station.
- Wireless repeater: Used to repeat wireless signal over long distances.
- Wireless controller: Used to control irrigation pumps and or valves.

All of these products include one or more of the RF card described below.

3.1. Sensor Connectivity

Sensors are attached to the interface board as follows:

- **TH (J1):** Brown (left), Green, White, Black (right)
- **SDI12 (J10):** Excitation (#1/left), Data (#2), Ground (#5/right)
    - Set Jumper JP6 (2-3) for all SDI12 Sensors
    - **AquaCheck (SDI12) (J10):** Red (#1/left), Blue (#2), Yellow (#5/right)
    - **MPS2, 5TE (SDI12) (J10):** White (#1/left), Red (#2), Copper (#5/right)
    - **Sentek (SDI12) (J10):** Orange (#1/left), Blue (#2), White (#5/right)
- **5TE, GS3 (J11):** White (left), Red, Copper (right)
- **EC5 (J2):** White (left), Red, Copper (right)
- **LWS (J3):** White (left), Red, Copper (right) -- *Set Jumper to 5V*
- **10HS (J2-J5):** White (left), Red, Copper (right) -- *Set Jumper to 5V*
- **Analog Inputs (J2-6):** Excitation (left), Data, Ground (right)
- **Solar Power (J8):** + (left), - (right)
- **Battery (J12):** + (bottom), - (top)
- **12V Power Out (e.g. for repeater) (J15):** - (left), + (right)
- **Valve (J9):** valve 1/A (#1/left), 2/B (#2)
- **Flow (J9):** Flow Pulse (#3), Ground (#4/right)
- **Pressure Switch (J9):** Terminal-1 (#3), Terminal-2 (#4/right)
- **Weather:**
    - **Pyranometer (J6):** Clear (left), Red, Black (right) -- JP5 (9-10)
    - **Quantum (J5):** Clear (left), Red, Black (right) -- JP4 (9-10)
    - **Wind (J18) | Rain (J16)**
- **Relay (J7):** NO (left), Common, NC (right) -- JP5 (11-12)
- **Jumpers:**
    - **JP1-2:** 2.5V Excitation for J2-3 (3-5),
    - **JP3-4:** 5V Excitation for J4-5 (3-5) | 12V Excitation for J4-5 (5-7),
    - **4-20 mA:** JP1-4 (1-2) | **5V Input:** JP1-4 (4-6) | **12V Input:** JP1-4 (6-8)
    - **JP6:** GSM/RS232 (4-5), 5TE (5-6), SDI12 (2-3)

Below is the block diagram showing the port and jumper numbering.
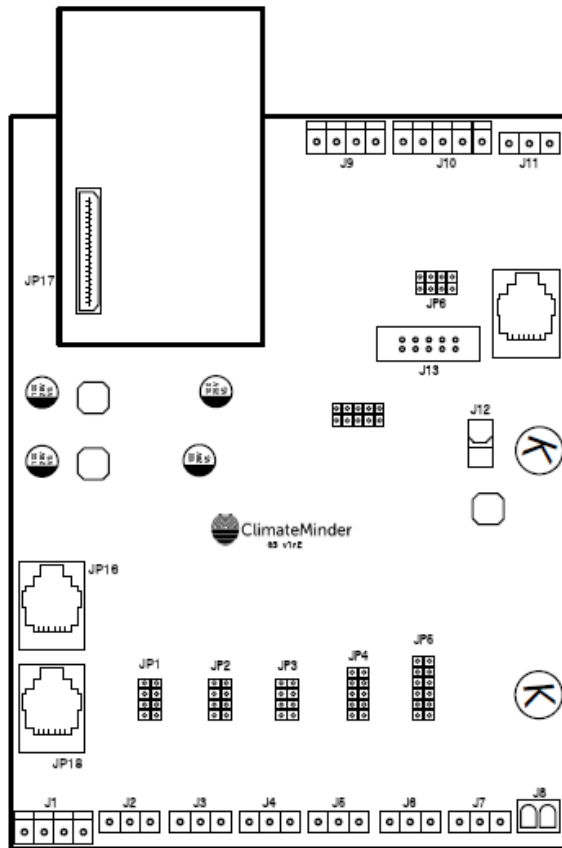
ClimateMinder
G3 v1r2

4. RF Card Specifications

The radio module used in wireless sensor station and the gateway equipment has the following features and specifications.

4.1. Key Features

- 250kbps 2.4GHz IEEE 802.15.4 Wireless Transceiver
- 8MHz microcontroller (10k RAM, 48k Flash)
- Integrated ADC, DAC, Supply Voltage Supervisor, and DMA Controller
- PCB type Inverted F antenna
- Ultra low current consumption
- Fast wakeup from sleep (<6µs)
- Hardware link-layer encryption and authentication

4.2. Technical Specifications

Processor Specifications		Electromechanical Specifications	
Program Flash Memory	48 kB on chip	Battery	12V Lead Acid Battery
Data RAM	10 kB on chip	External Power	2.4 – 3.6 V
		Human Interface	3 LEDs
Serial Communications	2 × USART	Size	67 × 39 × 42 mm
Analog to Digital Conv	8 channel 12 bit ADC	Expansion Connector	41 pin directional bus
Other Interfaces	I2C / JTAG / 2×DAC		
Current Consumption	Sleep: 0.1 uA		
Radio Specifications			
Center Frequency	2.4 GHz		
Data Rate	250 kbps		
Output Power	+ 8 dBm		
Input Power	10 dBm		
Receive Sensitivity	-95 dBm (-101 dBm with AMP)		
Current Consumption	TX 120 mA | RX 23.1 mA		

5. FCC User's Information

Wireless Sensor Stations, Wireless Gateways, Wireless Repeaters and Wireless Controllers each contain FCC ID: 2AAP5-NODERFV30.

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

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this

equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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

5.1. OEM Responsibilities to comply with FCC

The Rain Bird ClimateMinder RF Card (Node-RF) V3.0 Module has been certified for integration into products only by OEM integrators under the following conditions:

1. The antenna(s) must be installed such that a minimum separation distance of 20cm is maintained between the radiator (antenna) and all persons at all times.

2. The transmitter module must not be co-located or operating in conjunction with any other antenna or transmitter.

As long as the two conditions above are met, further transmitter testing will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc.).

IMPORTANT NOTE: In the event that these conditions cannot be met (for certain configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID Number cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

5.2. End Product Labeling

The Rain Bird ClimateMinder RF Card (Node-RF) V3.0 Module is labeled with its own FCC ID Number. If the FCC ID Number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. In that case, the final end product must be labeled in a visible area with the following:

"Contains Transmitter Module FCC ID: 2AAP5-NODERFV30"

or

"Contains FCC ID: 2AAP5-NODERFV30"

The OEM of the Rain Bird ClimateMinder RF Card (Node-RF) V3.0 Module must only use the approved antenna(s) listed above, which have been certified with this module.

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module or change RF related parameters in the user manual of the end product.

6. Contact Us

For any additional question please contact us. Rain Bird® ClimateMinder™ address and other contact information is as follows:

Rain Bird Corporation
970 W. Sierra Madre Ave
Azusa, CA 91702

Phone: 1-800-435-5624

IMPORTANT INFORMATION:

To comply with FCC RF radiation exposure limits for general population, the antenna(s) used for this transmitter must be installed such that a minimum separation distance of 20cm is maintained between the radiator (antenna) and all persons at all times and must not be co-located or operating in conjunction with any other antenna or transmitter."