

INSTRUCTION MANUAL
REVISION 1.0

RAIN GAUGE ANALOG INTERFACE
For Measuring Rainfall.



Manufactured by
RainWise, Inc.

4. WIRING CONNECTIONS



Figure 1: The front of the device, showing the terminal numbers labeled.

6. DIP SWITCH

A 6-pin DIP switch controls the functionality of the RGAI-1.

| DIP Switch | Function | ON Position | OFF Position |
|------------|-------------------|-------------|--------------|
| 6 | N/C | - | - |
| 5 | Mode of Operation | 0-5V | 4-20mA |
| 4 | Test Mode | ON | OFF |
| 3 | 10" Range | ON | OFF |
| 2 | 5" Range | ON | OFF |
| 1 | 1" Range | ON | OFF |

Modes of Operation (DIP Switch #5): Depending on the position of the DIP switch, the device can be either in an output mode of 4-20mA or 0-5 V

Test Mode (DIP Switch #4): When the test mode DIP switch is placed in the ON position, the output will switch between 0%, 50% and 100% of its range, in either 4-20mA or 0-5V mode. The switching of the percentages will occur every 20 seconds.

For normal operation, test mode must be turned off.

Rainfall Ranges (DIP Switches #1-3): The pre-programmed rainfall ranges are 1.00", 5.00" and 10.00". Only one switch should be in the ON position. If no range is selected or more than one range is selected, the device will default to the 10" range.

1. INTRODUCTION

The RainWise model RGAI-1 provides an interface between a tipping bucket rain gauge and a data acquisition device (DAQ). It is intended for use in industrial applications, where a 4-20mA or a 0-5V analog input is required by a DAQ to accurately record rainfall accumulation. This product is intended for use with RainWise tipping bucket rain gauges.

The enclosure is constructed from glass filled polycarbonate, which will provide years of protection to the internal circuitry. The enclosure is DIN rail compatible and can be mounted to any flat surface.

2. OPERATION

The RGAI-1 is designed to be used in conjunction with a tipping bucket rain gauge. The rain gauge calibration assures that each tip or contact closure equates to 0.01" of rainfall. The RGAI-1 will accumulate rainfall amounts and scale the output accordingly. Should the accumulation exceed the selected range, the output will reset to its minimum value and resume.

A reset input is provided as way of resetting the rainfall remotely. The 24V digital input requires a short pulse from an external controller. By resetting daily the risk of rollover can be eliminated.

5. WIRING CONNECTIONS (Continued)

| Pin Number | Function |
|------------|---------------------|
| 1 | 24 VDC Supply |
| 2 | RESET Signal |
| 3 | RESET GND |
| 4 | Rain Gauge Input #1 |
| 5 | Rain Gauge Input #2 |
| 6 | GND Supply |
| 7 | 4-20mA Output |
| 8 | 4-20mA Return |
| 9 | 0-5V Signal |
| 10 | 0-5V GND |

Terminals: The terminals accommodate one or two wires of equal or different sizes up to 2.5mm² (14 AWG). RainWise suggests 18 AWG for all connecting wires. The terminal screws should be tightened using a flat tip or a #2 Phillips screwdriver and torqued to 0.8Nm.

Note: The 4-20mA current return should be run separately from the supply ground. For cable runs of less than 30 feet and in electrically quiet environments, shielded twisted pair cable is usually not necessary. At lengths greater than 30 feet or in an electrically noisy environment, individual twisted pair shielded cable is highly recommended. When using twisted pair shielded cable, the shielded pair drain wire is connected to the circuit board return terminal along with the current return wire. This drain wire is floating at the users

7. THE LEDS

There are three LED's mounted on the cover of the enclosure. The LEDs indicate device status.

Reset LED (Red): While the device is in normal operation this LED will turn red when the Reset input is activated.

Rain Gauge Input LED (Yellow): The LED will blink once each output (0.01") of the tipping bucket rain gauge.

Power LED (Green): This LED indicates that the device is powered.

When the device is powered up. All three LEDs will blink for 3 seconds. This indicates that the device has rebooted. This device does not have a non-volatile memory. The rainfall count is reset when the device boots. While in test mode, the power LED (green) will blink.

3. INSTALLATION

The RGAI-1 can be mounted in several ways:

DIN Rail:

The RGAI-1 is engineered to easily snap into a standard 35mm DIN Rail.

Panel Mounted:

The RGAI-1 may be panel mounted using the corner mounted holes on the enclosure. The mounting holes accept two M4 or M5 (#6 or #10 screws).

WIRING CONNECTIONS (Continued)

end device. If the cable is supplied with a whole cable shield drain wire, connect the whole cable shield drain wire to the RainWise power GND terminal and to the users computer end chassis ground only. Do not connect the whole cable shield drain to signal ground.

The rain gauge inputs are designed to be connected to the two wire single output of the rain gauge. The rain gauge inputs are not polarity sensitive.

8. FORMULAS

4-20mA Formula

$$Rainfall = \frac{[(mA Output) - 4mA] (Rainfall Range)}{16mA}$$

For 0-5V Formula

$$Rainfall = \frac{[(V Output)] (Rainfall Range)}{5V}$$

Rainfall: The accumulated rainfall.

mA Output: The measured current of the 4-20mA loop.

V Output: The measured voltage of the 0-5V terminals.

Rainfall Range: The selected range of the rainfall, either 1", 5" or 10".

Quick Reference

| Range | mA per 0.01" | V per 0.01" |
|--------|--------------|-------------|
| 1.00" | 0.16mA | 0.05V |
| 5.00" | 0.032mA | 0.01V |
| 10.00" | 0.016mA | 0.005V |

9. USER CALIBRATION

Rainwise recommends that this device be returned for precise calibration.

The device is factory calibrated for either 4-20mA or 0-5V. The initial calibration is selected by the customer for the desired analog output. To check calibration or to perform a manual calibration of the 4-20mA or 0-5V analog output follow the instructions below.

1. Take the device out of the enclosure but do not disconnect from its cover.
2. Apply power to the device via the enclosure terminals, 1 and 6.
3. Select the desired output mode using DIP switch #5.
4. Connect a Digital Multimeter (DMM) to the correct terminals to measure the desired output either current or voltage.
5. Turn DIP switch #4 to the "ON" position. The device is now in test mode. In test mode the selected output should toggle between 4mA (0V), 12mA (2.5V), and 20mA (5V) when the device is calibrated correctly. The output will remain on each of these values for 20 seconds to allow for calibration.

USER CALIBRATION (Continued)

6. The calibration is an iterative algorithm

A. Read the output of DMM and wait until it displays its lowest value. When the DMM displays this value the device is at the 4mA (0V) section of test mode. This might take up to 40 seconds to differentiate between the three test mode sections. Adjust the potentiometer labeled "U2" as close to 4mA (0V) as possible at this low level before the test mode switches to the next test section, 12mA(5V).

B. When the output, read by the DMM, is at its highest value the test mode is in the 20mA (5V) section. Adjust the potentiometer labeled "U3" as close to 20mA(5V) as possible within the 20 second window.

C. Return to "A." until a convergence is obtained

10. TROUBLESHOOTING

Please contact RainWise at (207) - 288 - 5169

11. MAINTENANCE

The RGAI-1 requires periodic maintenance. Once a year, the unit should be calibrated. The unit leaves the factory pre-calibrated to either 4-20mA or 0-5V.

Rainwise offers a calibration service. Please contact Rainwise for details.

12. WARRANTY

RainWise, Inc. warrants RainWise, Inc. manufactured Weather-Log® products against defects in materials and/or workmanship for a period of five years from the date of purchase and agrees to repair or replace any defective product without charge. Equipment supplied by RainWise but not manufactured by RainWise is covered by the particular warranty of that manufacturer.

IMPORTANT: This warranty does not cover damages resulting from accident, misuse or abuse, lack of reasonable care, the fixing of any attachment not provided with the product or damage due to a lightning strike. RainWise, Inc. will not reimburse for take-down or installation charges. RainWise, Inc. will not pay for warranty service performed by a non-authorized repair service and will not reimburse the consumer for damage resulting from warranty service performed by a non-authorized repair service. No responsibility is assumed for any special, incidental or consequential damages.

WARRANTY (Continued)

To return a unit under this warranty, call (800)762-5723 within the continental US or (207)288-5169. The service department will document the need for repair/replacement and arrange such. Shipping costs from the customer to RainWise are borne by the customer, RainWise will cover return shipment. It is the customer's responsibility to see that the unit is properly packed, preferably in the original box, because damage occurring during return shipment is not covered by this warranty.

NOTE: No other warranty, written or oral, is authorized by RainWise, Inc. This warranty gives you specific legal rights, and you may also have other rights, which vary from state to state. Some states do not allow the exclusion of limitation of incidental or consequential damages, so the above exclusion and limitations may not apply to you.

13. SPECIFICATIONS

| | |
|-------------------------------|--------------------------------|
| Supply Voltage: | 24VDC |
| Reset Voltage: | 24VDC |
| Reset Pulse Duration: | Greater than 100ms |
| 4-20mA Loop Impedance: | Less than 1000 ohms |
| Overall size: | 4.567in. X 2.756in. X 1.772in. |
| Temperature Range: | -40C° - 60C° |



RainWise Inc.
23 Creek Circle, Boothwyn, PA 19061

Service Department
Ph: 1-800-762-5723
Fax: 207-288-3477
Email: service@rainwise.com

Visit the RainWise website www.rainwise.com for the latest information and updates