

Installation Guide

GF-A1000-DI Series

Analog Output Airflow/Temperature Measurement Station

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IG_GF-A1000-DI_R1A

LIST OF EFFECTIVE AND CHANGED PAGES

Insert latest changed pages (in bold text); remove and dispose of superseded pages.
Total number of pages in this manual is **12**.

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1 through 12	R1A	Initial Document Release.....	7/1/2020

*R1A indicates an original page without change

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1 INTRODUCTION AND SCOPE

This Quick Installation Guide provides basic installation information for the instrument installer. Information includes physical instrument installation, power and output cable connections as well as initial setup of the instrument.

Models covered in this document are include all GF-A100X options as follows:

- Single (GF-A1000) or Dual (GF-A1001) analog output
- With or without flow integration
- Aluminum or stainless-steel probe material
- Probe length (4 through 10, 12, 14, 16-inch lengths)
- 0-10/2-10VDC or 0-5/1-5VDC analog output range

2 GF-A1000-DI, GF-A1001-DI INSTALLATION

The GF-A1000-DI instruments are designed for use in small ducts and in VAV terminal box applications in an environment between -20°F to 120°F (-28.9°C to 48.9°C) where it will not be exposed to rain or snow. The GF-A1000-DI/GF-A1001-DI airflow measurement station sensor probes are designed for insertion mounting through one side of the duct or VAV box sidewall. Mount the instrument in an accessible location to permit set up. Locate the instrument so that the attached instrument cable will reach the customer provided BAS control interface.

CAUTION



The installed location of the GF-A1000-DI/GF-A1001-DI is critical for proper performance.

The installed accuracy of the GF-A1000-DI/GF-A1001-DI is ensured in applications where the maximum inside duct dimension is 16 inches or less. Applications in larger duct sizes may degrade accuracy. Consult factory for these applications.

Ensure that adequate clearance exists around the duct to permit insertion of the probe, and to allow clearance for the instrument enclosure.

Insulation that interferes with probe mounting should be temporarily removed prior to installation. Mounting requires a 0.875 inches (22.2 mm) hole on the insertion side of the duct or VAV terminal box.

1. Determine where the GF-A1000-DI/GF-A1001-DI airflow measuring station is to be located as indicated on the engineer's plans.
2. Carefully open the GF-A1000-DI/GF-A1001-DI package and inspect for damage. If damage is noted, immediately file a claim with carrier.
3. Locate and mark the point on the duct or VAV box where the probe will be inserted, using the GteenTrol Minimum Placement Guidelines. Figures 1 and 2 show GF-A1000-DI installation detail, probe orientation and dimensions.
4. Using a 0.875 inches (22.2 mm) hole saw, drill the insertion side hole where marked.
5. Place the probe through the mounting hole, making sure that the gasket is seated firmly against the integral mounting bracket. Ensure that the edge of the GF-A1000-DI/GF-A1001-DI mounting bracket is parallel to the edge of the duct or VAV terminal box, and that the airflow arrow printed on it is oriented in the direction of actual airflow. Ensure that the gasket is firmly seated against the bracket, and then fasten the mounting bracket at the four mounting holes using appropriate sheet metal screws.
6. Route the GF-A1000-DI/GF-A1001-DI instrument cable to the customer provided BAS interface. The following sections of this document describe instrument set up and operation.

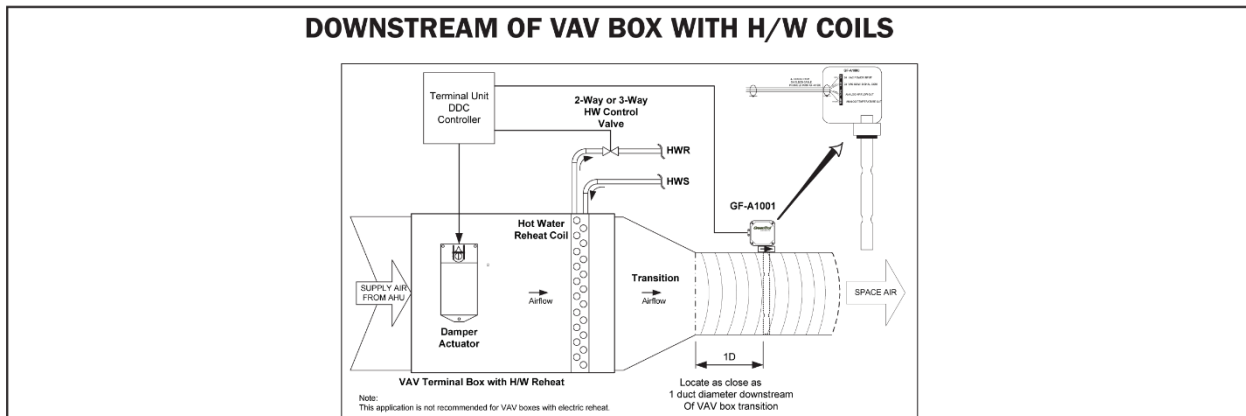
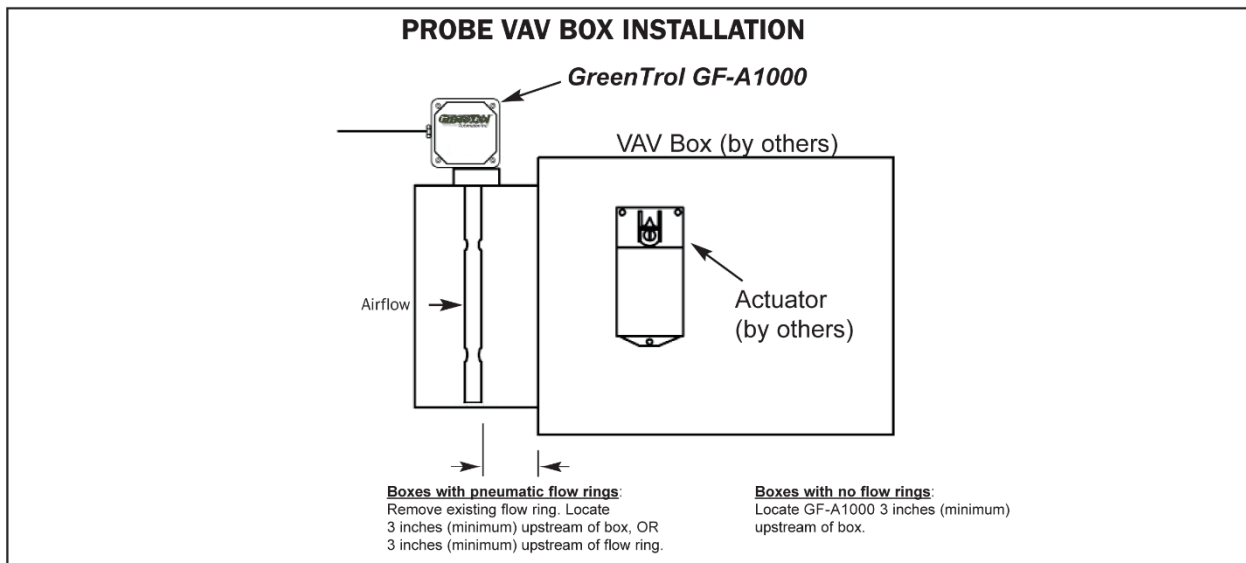
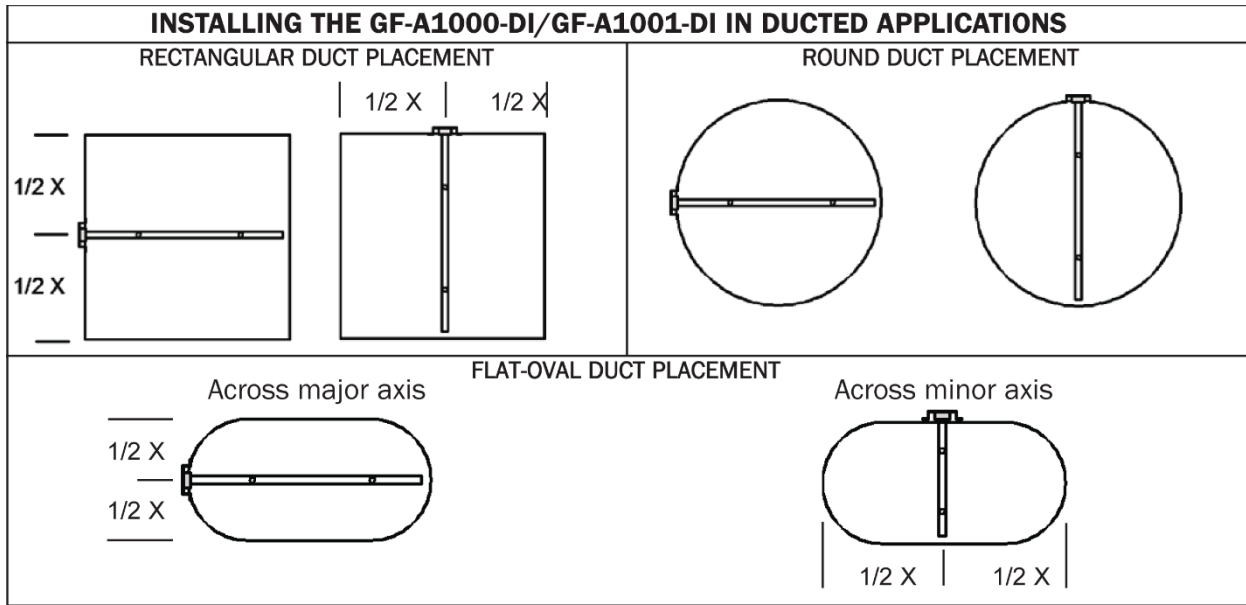


Figure 1. GF-A1000-DI Installation Applications and Orientation

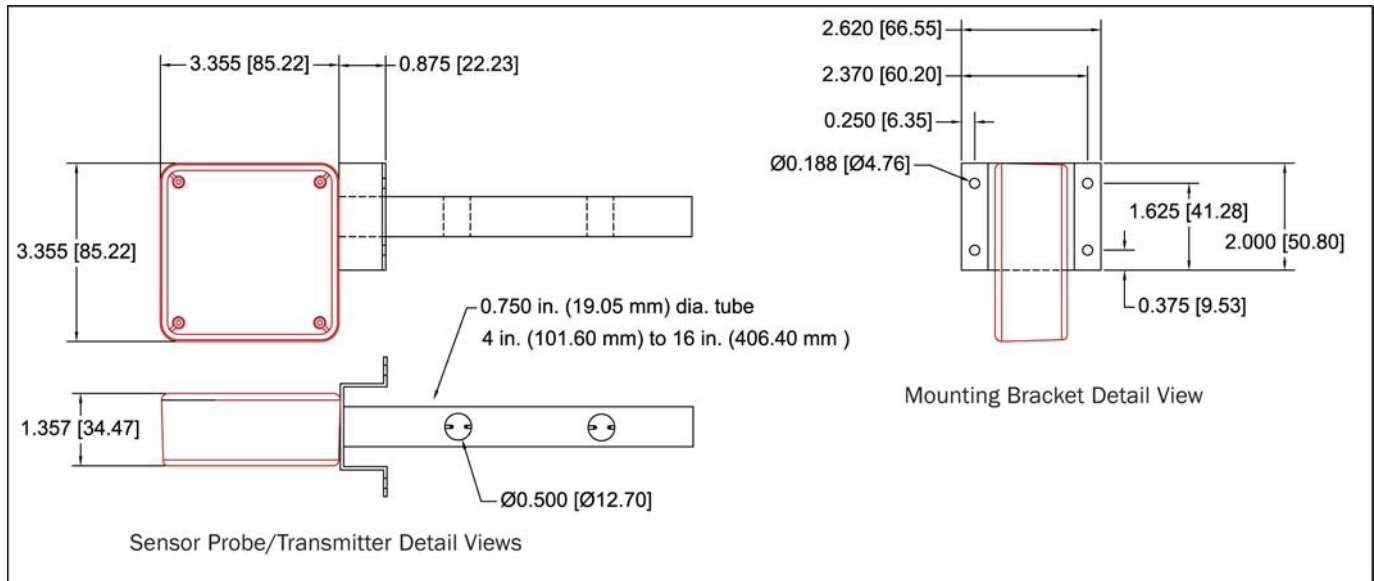


Figure 2. GF-A1000-DI/GF-A1001-DI Installation Dimensions

3 GF-A1000-DI/GF-A1001-DI PREPARATION FOR USE

Dual output GF-A1001-DI models provide two separate linear analog outputs with one for measured airflow (or equivalent velocity pressure) and the other for measured temperature. Single output GF-A1000-DI models provide a single analog output for airflow. The airflow analog output can be set for either air flow or equivalent velocity pressure measurement with four field selectable full scale range options. On the dual output GF-A1001-DI, the temperature output is set for a full scale range of -20 to 120 °F (-28.9 to 48.9 °C).

Preparation for use consists of connecting 24VAC input power and analog output signal wires from the GF-A1000-DI/GF-A1001-DI to the BAS interface, and if required, setting the GF-A1000-DI/GF-A1001-DI analog output CONFIG switch options (measurement mode, analog output signal type and full scale measurement range options).

4 GF-A1000-DI/GF-A1001-DI INTERCONNECTIONS

The GF-A1000-DI/GF-A1001-DI is equipped with plenum rated 18 AWG interconnecting cable for power and analog output connections with customer equipment. Connect 24 VAC power and analog output to customer interface as outlined in the following paragraphs. Refer to Figures 3 to 5 and the following GF-A1000-DI/GF-A1001-DI cable color code descriptions:

- Red** 24 VAC power
- Black*** Common GF-A1000-DI/GF-A1001-DI Power/Signal Ground (for 24 VAC and for analog output)
- White** Airflow Analog output signal
- Green** (on GF-A1001-DI dual analog output models only) Temperature Analog output signal

***CAUTION**



The GF-A1000-DI/GF-A1001-DI is equipped with a common 24VAC ground and analog output signal return. EBTRON strongly recommends that the BAS control interface be connected to the GF-A1000-DI/GF-A1001-DI analog output using TWO separate wires (twisted shielded pair) in order to eliminate any potential voltage drop on the common (from the 24VAC return) that would otherwise cause inaccurate readings.

CAUTION

To prevent damage to the GF-A1000-DI/GF-A1001-DI, deactivate 24 VAC power source until all connections to the instrument are completed.

NOTE

The 24 VAC input ground (GND) connection is shared with the analog output signal ground. If an isolated output is desired, a dedicated transformer is required to power the GF-A1000-DI/GF-A1001-DI.

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4.1 GF-A1000-DI/GF-A1001-DI 24 VAC Power Connections

The GF-A1000-DI/GF-A1001-DI requires a power source capable of providing 22.8 to 26.4 VAC at 5 VA.



CAUTION

24 VAC power must be deactivated before making connections to the instrument.

Connect 24VAC power between the red wire and black wire as shown in Figures 4 and 5.

4.2 GF-A1000-DI/GF-A1001-DI Analog Output Connections

The GF-A1000-DI/GF-A1001-DI provides separate 0-10VDC (or 2-10VDC) analog outputs corresponding to airflow (or equivalent velocity pressure) and temperature. The outputs are capable of driving 20mA loads. The analog outputs are not isolated from the input power. The 24VAC input ground connection is shared with the analog signal ground (black wire - GND). If isolated outputs are required, the GF-A1000-DI/GF-A1001-DI must be powered by a dedicated transformer.

Connect the analog airflow output (white wire), temperature output (green wire on GF-A1001-DI only) and the signal common (black wire) to the BAS monitor/control interface using shielded twisted pair cable as shown in Figures 4 and 5.

4.2.1 Converting the GF-A1000-DI/GF-A1001-DI Analog Output for 4-wire Current Loops

The VDC output circuit of the GF-A1000-DI/GF-A1001-DI transmitter can drive the input circuit of devices designed to measure 4-wire current loops with a resistive load ≥ 250 ohms.

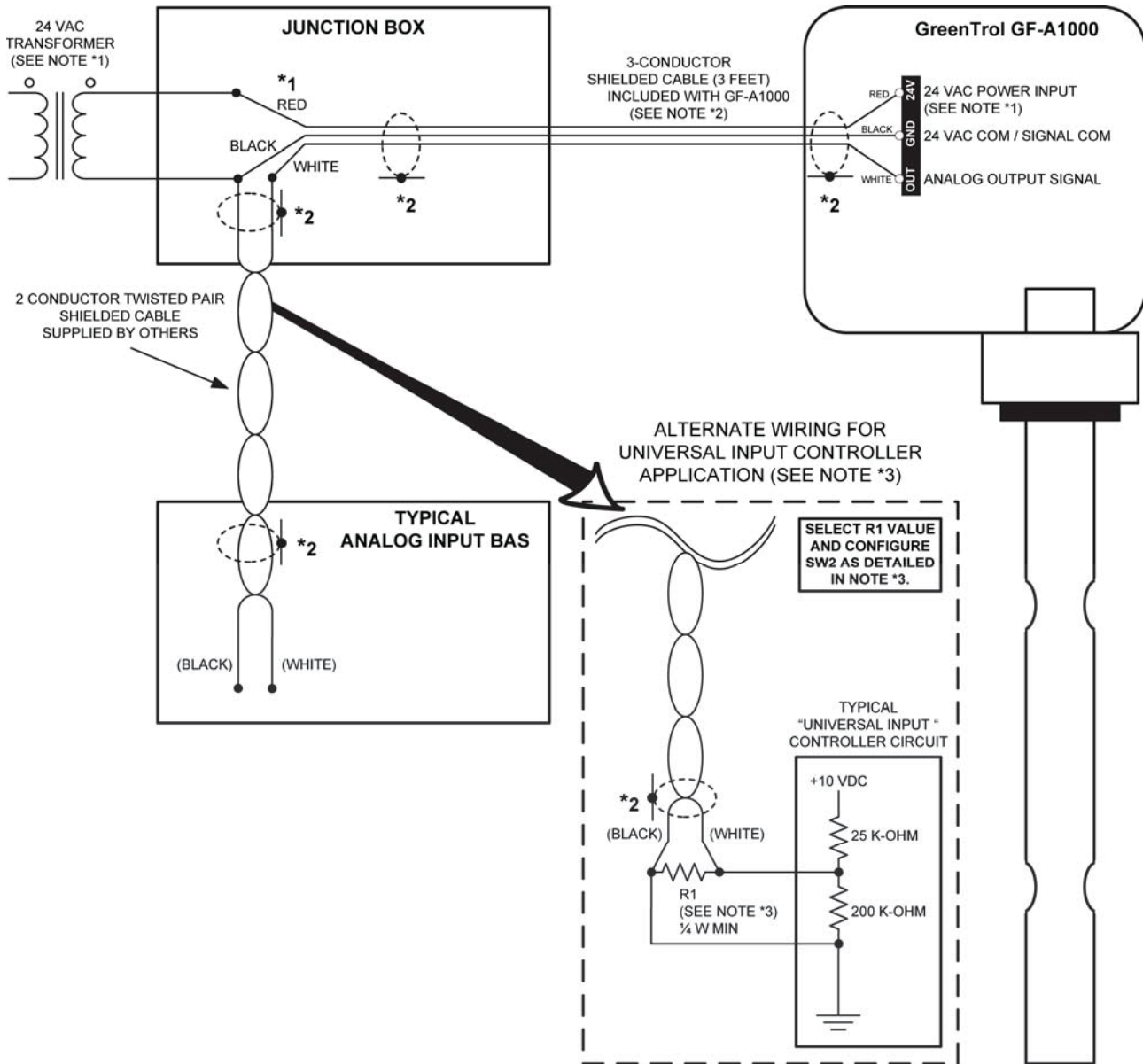
5 GF-A1000-DI/GF-A1001-DI ANALOG OUTPUT CONFIGURATION OPTIONS (CONFIG SW1 - SW4)

To access the field selectable analog output configuration switches, remove the four retaining screws at each corner of the GF-A1000-DI/GF-A1001-DI enclosure cover. Configuration selector switches SW1 through SW4 are part of a four-switch DIP package labeled CONFIG. Figure 3 shows the GF-A1000-DI/GF-A1001-DI main circuit board and the individual switches for setting the output measurement mode, analog output voltage range and output full scale values. Factory default switch settings are all OFF. The table below shows the CONFIG switch settings and resulting operation for each of the GF-A1000-DI/GF-A1001-DI model versions.

Table 1. CONFIG Switch Settings

SW POSITION -----> ↓OUTPUT OPTION	SW1 POSITION MEASUREMENT MODE		SW2 POSITION ANALOG OUT SELECT		SW3/SW4 POSITION AIR FLOW MEASUREMENT RANGE SELECT			
	OFF	ON	OFF	ON	OFF/OFF	ON/OFF	OFF/ON	ON/ON
STANDARD (NO /A1 SUFFIX)	AIRFLOW	VEL PRESSURE	0-10VDC	2-10VDC	3000 FPM 0.5 lwc	2000 FPM 0.25 lwc	1000 FPM 0.15 lwc	500 FPM 0.05 lwc
/A1 MODEL SUFFIX	AIRFLOW	VEL PRESSURE	0-5VDC	1-5VDC	3000 FPM 0.5 lwc	2000 FPM 0.25 lwc	1000 FPM 0.15 lwc	500 FPM 0.05 lwc

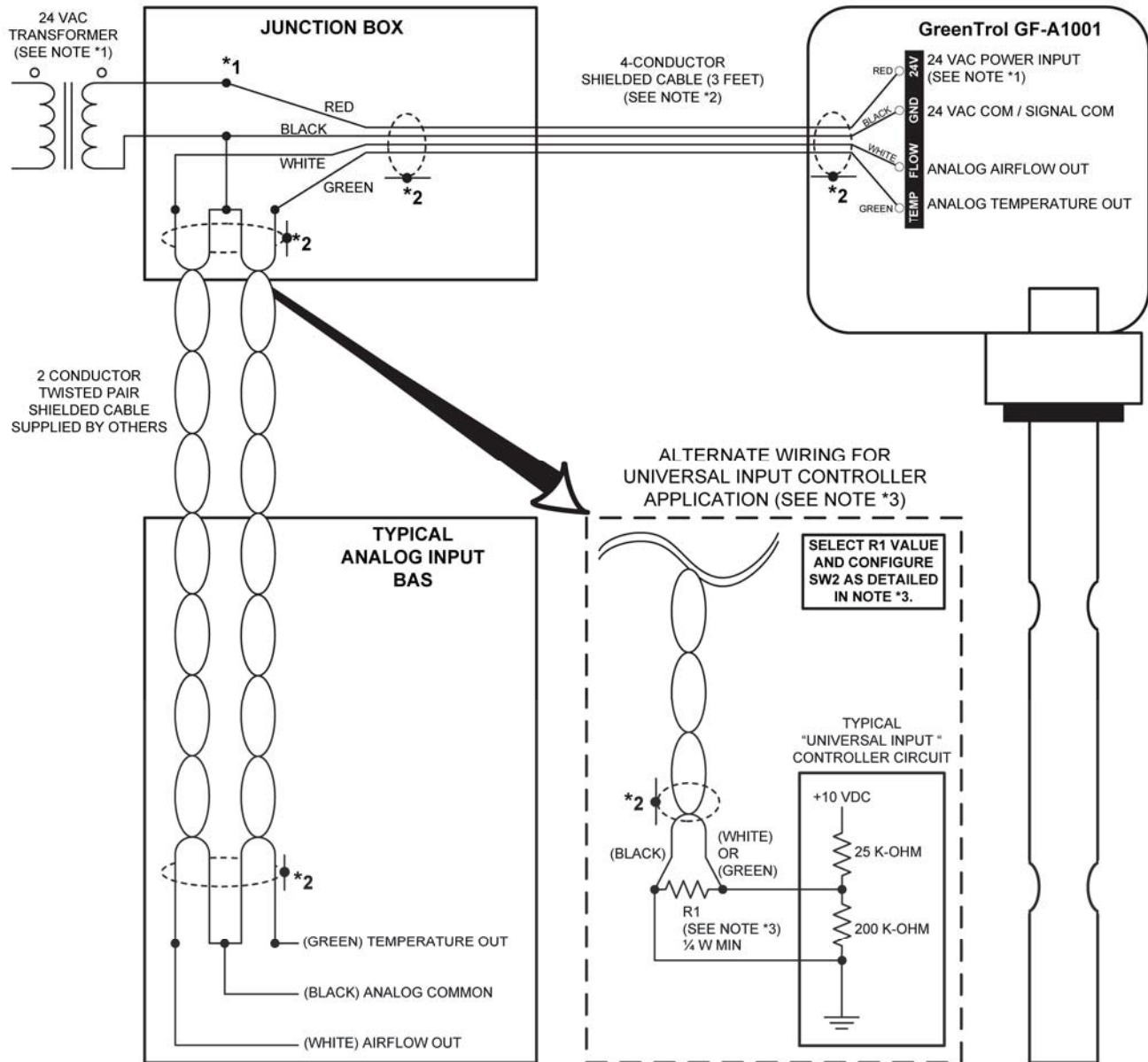
BOLD TYPEFACE INDICATES FACTORY DEFAULT SWITCH SETTINGS



- * NOTES:**
- *1: THE 24 VAC COMMON AND GF-A1000 ANALOG OUTPUT SIGNAL COMMON ARE SHARED. THEREFORE, ON MULTIPLE INSTALLATIONS ENSURE THAT ALL TRANSMITTERS ARE WIRED TO THE SAME TERMINALS ON THE 24 VAC POWER SOURCE.
 - *2: CONNECT CABLE DRAINS TO EARTH GROUND AT ONE END OF EACH CABLE ONLY.
 - *3: FOR UNIVERSAL INPUT CONTROLLER APPLICATIONS WITH PULL-UP RESISTORS ON GF-A1000 STANDARD AND MODELS WITH /A1 SUFFIX, RESISTOR R1 MUST BE CONNECTED ACROSS THE CONTROLLER'S ANALOG INPUTS AS SHOWN. SELECT R1 VALUE AS FOLLOWS: **FOR STANDARD GF-A1000, SET SW2 ON (FOR 2-10VDC OUTPUT), AND SELECT R1=500 OHMS. FOR GF-A1000 /A1 VERSION, SET SW2 ON (FOR 1-5VDC OUTPUT) AND SELECT R1=250 OHMS.**

Figure 4. GF-A1000-DI Single Output Power and Signal Wiring Interconnections

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*** NOTES:**

- *1: THE 24 VAC COMMON AND GF-A1001 ANALOG OUTPUT SIGNAL COMMON ARE SHARED. THEREFORE, ON MULTIPLE INSTALLATIONS ENSURE THAT ALL TRANSMITTERS ARE WIRED TO THE SAME TERMINALS ON THE 24 VAC POWER SOURCE.
- *2: CONNECT CABLE DRAINS TO EARTH GROUND AT ONE END OF EACH CABLE ONLY.
- *3: FOR UNIVERSAL INPUT CONTROLLER APPLICATIONS USING PULL-UP RESISTORS, R1 MUST BE CONNECTED ACROSS THE CONTROLLER'S ANALOG INPUTS AS SHOWN. R1 VALUE AS FOLLOWS: FOR STD GF-A1001 VERSIONS, SET SW2 ON (FOR 2-10VDC OUTPUT), AND SELECT R1=500 OHMS. FOR A1 VERSIONS, SET SW2 ON (FOR 1-5VDC OUTPUT), AND SELECT R1=250 OHMS.

Figure 5. GF-A1001-DI GF-A1000-DI Dual Output Power and Signal Wiring Interconnections

6 GF-A1000-DI/GF-A1001-DI INITIAL START UP / NORMAL OPERATION

The following procedure is intended for initial startup of the instrument. Following the initial set up, no further user activity is required during normal operation.

1. Remove the cover to the electronics enclosure by removing the four screws on the cover.
2. Make sure that the 24VAC circuit breaker used to power the GF-A1000-DI/GF-A1001-DI is turned OFF until all wiring is complete!
3. Confirm 24VAC connection from the power source to the GF-A1000-DI/GF-A1001-DI 24VAC wire (red wire) as outlined in the GF-A1000-DI 24VAC Power Connections section of this document.
4. Confirm common ground 24VAC and signal ground connection from the power source to the GF-A1000-DI at the black wire.
5. Confirm GF-A1000-DI/GF-A1001-DI analog airflow (and temperature for GF-A1001-DI) signal output connections at the white wire (and green wire for GF-A1001-DI), to the analog input of the BAS as outlined in GF-A1000-DI/GF-A1001-DI Analog Output Connections section of this document. Note that the ground of the BAS must be at the same voltage reference as the ground of the GF-A1000-DI/GF-A1001-DI and the power source.
6. Set the desired analog output options using CONFIG switches SW1 to SW4 as outlined in the GF-A1000-DI/GF-A1001-DI Analog Output Option Switch Settings section of this document.
7. Activate the 24VAC power source to power on the GF-A1000-DI/GF-A1001-DI.
8. Following a brief instrument initialization, the green Activity LED will continuously flash ON for 1 second, then OFF for 1 second. This indicates normal operation. In the event of a sensor fault, the LED will produce longer continuous flashes ON for 2 seconds, and OFF for 2 seconds.
9. Confirm that the BAS is receiving the analog output signals that indicate instrument airflow (or equivalent velocity pressure) and temperature.
10. Replace the GF-A1000-DI/GF-A1001-DI electronics enclosure cover and secure with the four screws removed in step 1.

6.1 Converting the Analog Airflow Output Signal from Linear to Volumetric flow - FPM to CFM

The analog airflow output can be converted from velocity (FPM) to an equivalent volumetric flow (CFM) by multiplying the indicated flow velocity by the free area of the sensor installed location (in square feet). For example, with the GF-A1000-DI/GF-A1001-DI installed in a 12 inch round duct, using the 0-10VDC scale and 3,000 FPM full scale output range options; an airflow output of 5VDC indicates a flow velocity of 1,500 FPM (5VDC is one-half of the 0-10VDC output, corresponding to half of the 0-3,000 FPM scale; and equals 1,500 FPM). The GF-A1000-DI/GF-A1001-DI installed duct location area in this example is calculated at 0.785 ft² (using $\text{Pi} \times \text{duct radius}^2$, or $3.14 \times 0.5\text{ft}^2$). Multiplying the indicated instrument output of 1,500 FPM by the duct free area of 0.785 ft² yields an equivalent volumetric flow of 1,177.5 CFM.

7 GF-A1000-DI ADDITIONAL INFORMATION

For additional information, contact your local *Greentrol* representative or our Technical Support Team at 877.4GNTROL (1.877.446.8765).

