



# ***Air Quality Solutions***

**Installation & Maintenance Manual**



## **Model: DART**

### **Flow Meter – Airflow and Temperature**

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### **! WARNING**

**READ THESE INSTRUCTIONS CAREFULLY BEFORE ATTEMPTING TO INSTALL, OPERATE OR SERVICE THIS DEVICE.**

THIS ACCESSORY IS TO BE INSTALLED BY A QUALIFIED SERVICE TECHNICIAN. TO AVOID UNSATISFACTORY OPERATION OR DAMAGE TO THE PRODUCT AND POSSIBLE UNSAFE CONDITIONS, INCLUDING ELECTRICAL SHOCK AND FIRE, THE INSTALLATION INSTRUCTIONS PROVIDED WITH THIS ACCESSORY MUST BE STRICTLY FOLLOWED AND THE PARTS SUPPLIED USED WITHOUT SUBSTITUTION. DAMAGE TO THE PRODUCT RESULTING FROM NOT FOLLOWING THE INSTRUCTIONS OR USING UNAUTHORIZED PARTS MAY BE EXCLUDED FROM THE MANUFACTURER'S WARRANTY COVERAGE.

### **! WARNING**

DISCONNECT ELECTRICAL POWER PRIOR TO SERVICING THIS UNIT. FAILURE TO DO SO CAN RESULT IN ELECTRICAL SHOCK RESULTING IN PERSONAL INJURY OR DEATH. TO AVOID POTENTIAL FIRE AND/OR EXPLOSION DO NOT USE IN POTENTIALLY FLAMMABLE OR EXPLOSIVE ATMOSPHERES.

## Primary Application

Ruskin DART was specifically engineered for low flow HVAC and VAV applications in small round and rectangular duct. The Dart display indicates velocity (fpm) and temperature (°F). The field selectable range and output options ensure you have the right solution every time. Scalable, linear output can be either Voltage or mA signal.

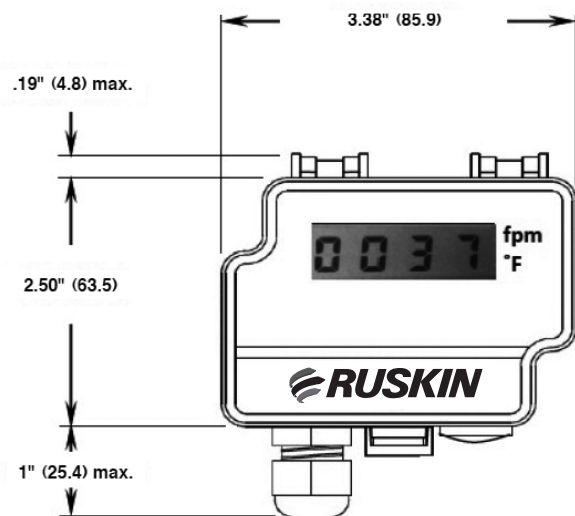
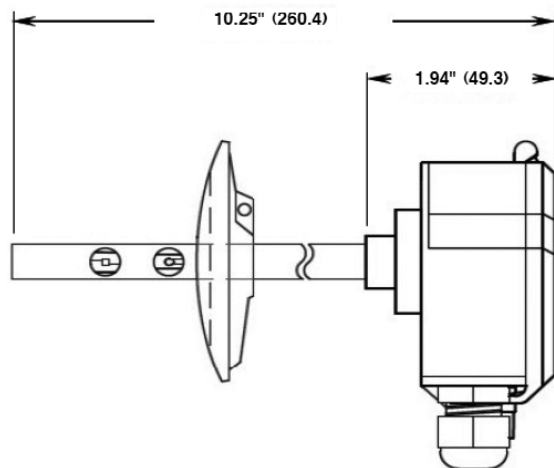
### Key Features

- LCD display for velocity (fpm) and temperature (°F)
- Integrated probe shaft seal for low-leak installation
- Low flow measurement for VAV and AHU applications
- Three field selectable velocity ranges (jumper settings)
- Two field selectable output signal options (jumper settings)
- Standard 3-year warranty
- OPTIONAL – Field adjustable relay for LEED required low flow alarm.

### Key Benefits

- Contributes to earning required Indoor Environmental Quality (EQ) and Energy and Atmosphere (EA) LEED prerequisites.
- Save energy dollars by measuring the minimum ventilation airflow. Control the amount of air into the space.
- Meet International Building Code (IBC) and International Energy Conservation Code (IECC) requirements.
- Maintain proper ventilation to dissipate dangerous indoor contaminants such as mold spores, bacteria and chemicals.
- Create a healthy indoor environment to reduce absenteeism, increase productivity, improve comfort and reduce the risk of litigation

## DIMENSIONAL DATA



## INSTALLATION INSTRUCTIONS

Refer to page 4 for acceptable specific air measuring product placement options.

Consult your local representative with questions about placement.

- 1) Mount the device in desired location (see step 1)
- 2) Open the lid and route cable through strain relief and connect the wires to terminal block (see step 2). Use separate strain relief for each cable.
- 3) The device is now ready for configuration

**WARNING!** Apply power after the device is properly wired.

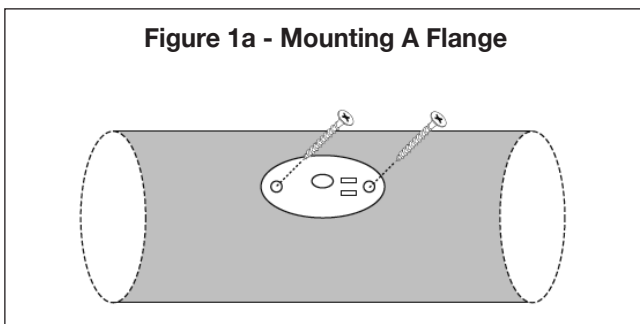
### STEP 1 MOUNTING THE DEVICE

- 1) Select mounting location (in a duct)
- 2) Use the mounting flange of the device as a template (Figure 1a), mark the screw holes, then drill holes.
- 3) Center the flange on the duct over the hole and secure with screws (not included) (Figure 1b).
- 4) Adjust the probe to desired depth. Ensure the two sensing points of the probe reach near the center of the duct (Figure 1c). The probe can be adjusted in or out to match Test & Balance.

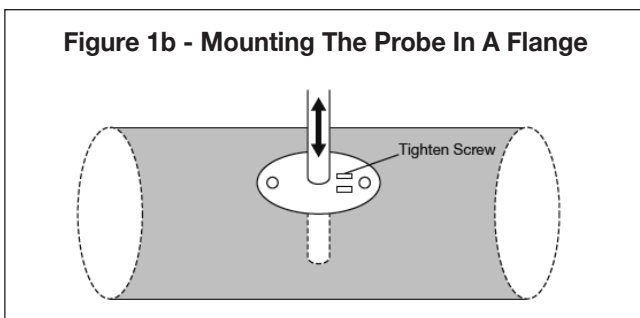
**NOTE:** On smaller duct, the probe may not need to be all the way in.

- 5) Tighten the screw on the flange, to hold the probe in position.

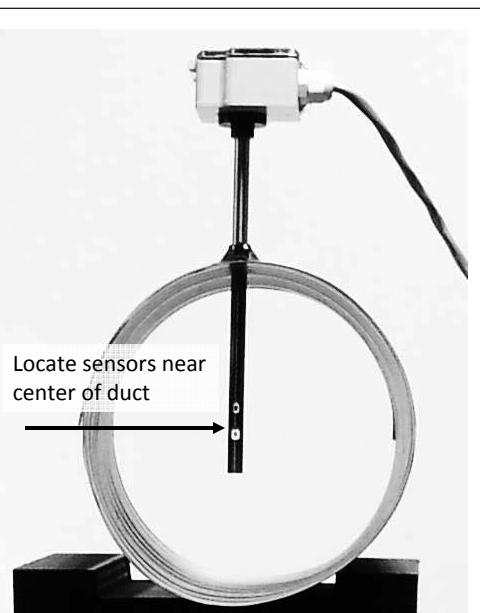
**Figure 1a - Mounting A Flange**



**Figure 1b - Mounting The Probe In A Flange**



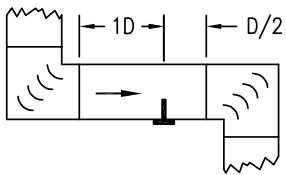
Locate sensors near  
center of duct



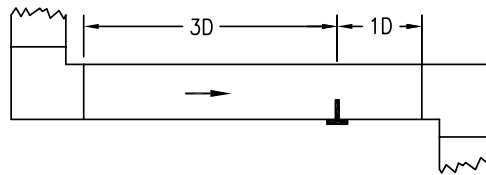
**Figure 1c**

## Air Measurement Station Placements for Acceptable Installations

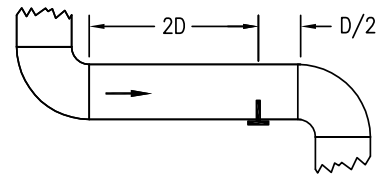
### ELBOWS



90° VANED ELBOW  
E1

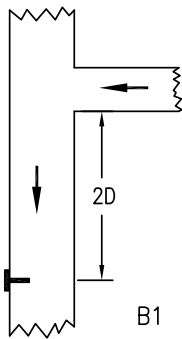


90° UNVANED ELBOW  
E2

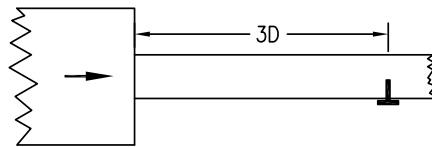


SWEEP ELBOW  
E3

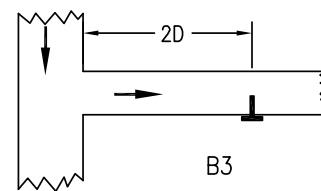
### BRANCH TAKEOFF



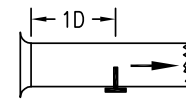
B1



B2B

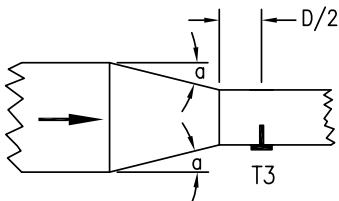


B3

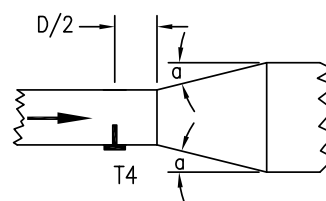


B4

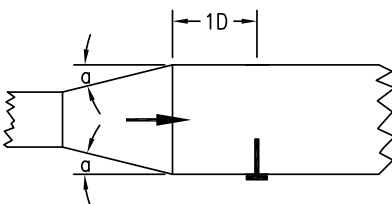
### TRANSITIONS



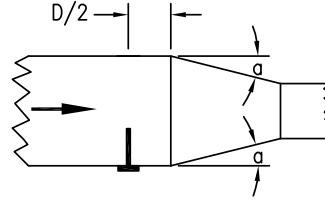
T3



T4

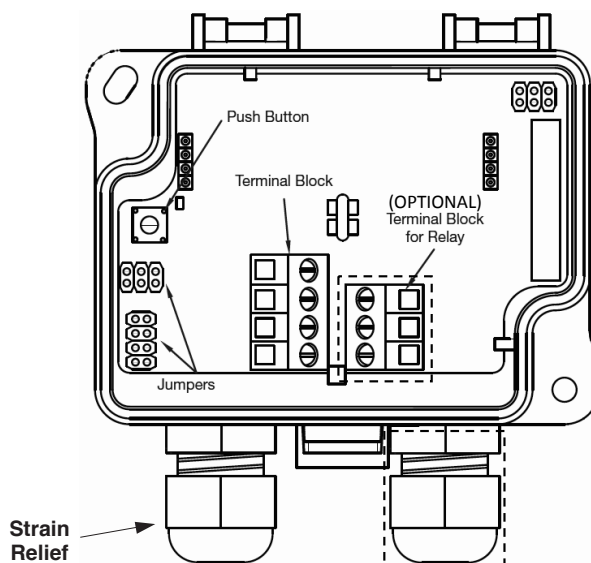


T1



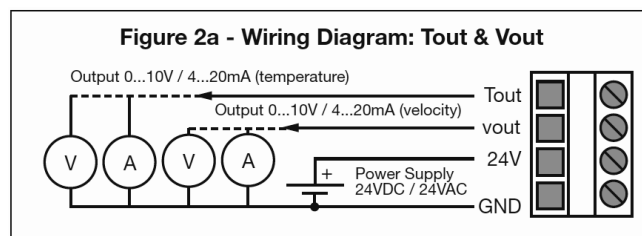
T2

## STEP 2 WIRING DIAGRAMS



For CE compliance, a properly grounded shielding cable is required.

- 1) Unscrew strain relief and route cable(s). Use the strain relief on left for power in and signal out (Tout/Vout) and the strain relief on right for optional relay equipped devices.
- 2) Connect the wires as shown in figure 2a (right) and 5b (next page, for optional relay).
- 3) Tighten the strain relief(s).

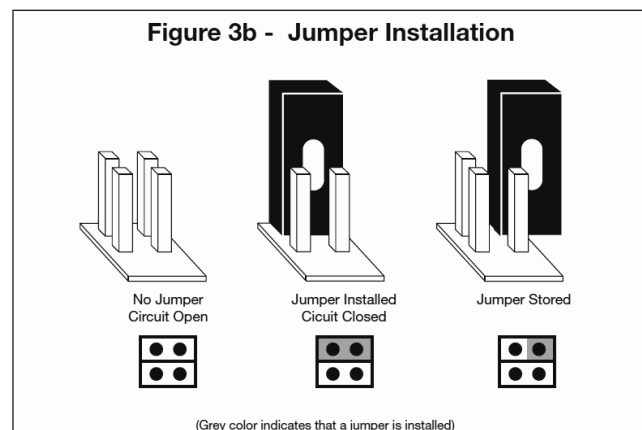
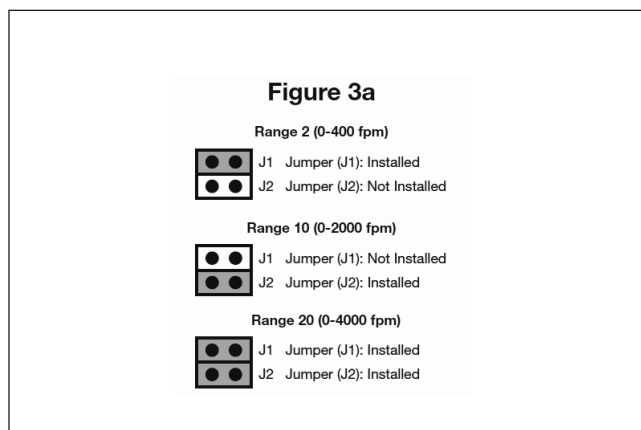


## CONFIGURATION

- 1) Select the desired measurement range (see step 3)
  - 2) Select the desired measurement mode (see step 4)
  - 3) Configure the relay (optional) (see step 5, next page)
- The device is now ready to use.

## STEP 3 SELECT THE MEASUREMENT RANGE

Select the measurement range by installing jumpers as shown. (See Figure 3a-3b – Jumper settings)



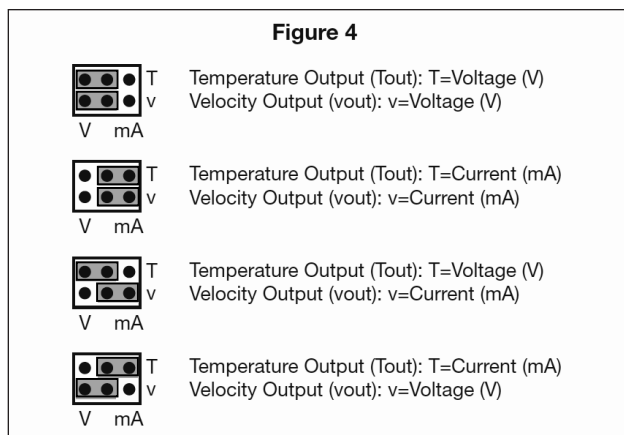
## STEP 4 SELECT THE MEASUREMENT MODE

Configure the outputs:

- Temperature output (Tout)
- Velocity output (Vout)

Select the output mode, Current (mA) or Voltage (V), by installing jumpers as shown in Figure 4.

Both outputs, Temperature (T) and Velocity (v), are configured separately.



## STEP 5 CONFIGURING THE OPTIONAL RELAY RELAY MODE ONLY

Application: for High-Low flow alarm

Setpoint = Required airflow

Hysteresis = Acceptable percentage high or low.

Hysteresis is equal to 1/2 of total deadband, centered or anchored at the switching point (sw.p).

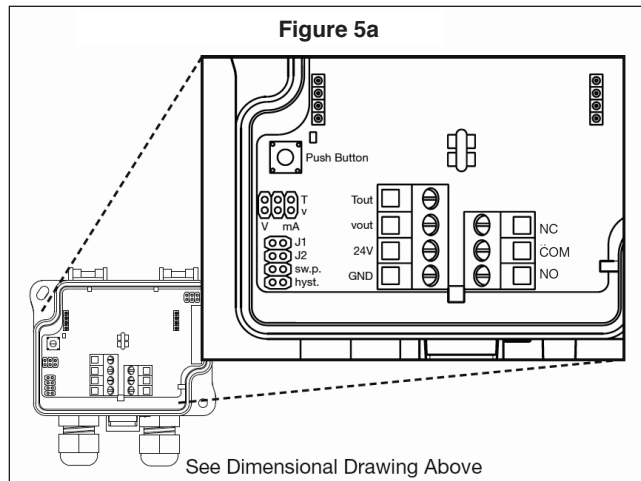
Increase hysteresis in turbulent airflow conditions to prevent relay chatter.

### 1) Switching point (set point)

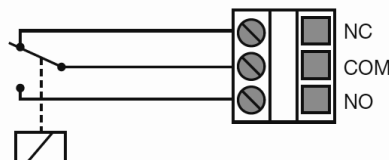
- Install jumper to pins labeled sw.p. (center switching point). (See Figure 5a)
- Press down on the pushbutton (joystick) to select the switching point of the relay. The chosen value (fpm) is shown on the display.
- Remove and store the jumper after the configuration is completed.

### 2) Hysteresis

- Install jumper to pins labeled hyst. (hysteresis). (See Figure 5a)
- Press down on the pushbutton (joystick) to select the hysteresis (dead band) of the relay switching point. The chosen value (fpm above & fpm below switching point) is shown on the display.
- Remove and store the jumper after the configuration is completed.



**Figure 5b - Wiring Diagram Relay Output**



## Operation

- 1) The device requires 24VDC/VAC power at terminals 24V & GND.
- 2) With no air flowing through the AMS and power applied to the controller, the DART will generate a Vout 0V or 0mA signal between Vout and GND.

## SPECIFICATIONS

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### OUTPUTS

FPM and Temperature °F 0-10V or 4-20mA linear signal

### INSTALLATION

Supply Voltage 24VDC/VAC  $\pm$  10%  
Current Consumption 35mA (50mA with relay) + 40mA if both mA-outs are used

### DISPLAY

3<sup>1</sup>/<sub>2</sub> Digit LCD 1.8" x 0.5" (45.7 x 12.7mm)

### ENCLOSURE

ABS (UL94 V-0) NEMA 3 3.54" x 3.74" x 1.4"  
(90.0 x 95.0 x 36.0 mm)

### PROBE

OD: 0.394 in (10mm)  
Length: 8.26 in (210mm) from bottom of the cover  
Insertion Length Adjustable 2" - 7.08" (50 - 180 with mm)  
with Flange:

### CONFORMANCE

Meets requirements for CE marking:  
EMC Directive 2004/108/EY  
RoHS Directive 2002/95/EY

### MEDIA COMPATIBILITY

Dry air or non-aggressive gases

### OPERATING RANGE

Air temperature Range of 32° F to 122° F (0 to 50°C)  
Storage Temperature -4° F to 158° F (-20 to 70C)  
Humidity 0-95% relative humidity (non-condensing)



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