

# Digital Coriolis Mass Flowmeters Installation Guidelines and Quick Start - HART

CFT50  
TRANSMITTER



CFS10 OR CFS20  
MASS FLOWTUBE



## FLOWMETER FEATURES AT A GLANCE

- Precise mass, density, and temperature measurement
- Accurate 2-phase flow measurement with no interruption or stalls
- Gas measurements
- Empty-tube startup capability
- HART communications
- Three analog outputs
- Scalable pulse/frequency
- FM, CSA, ATEX, CE approvals, NEMA 4X and flameproof, 3A authorization
- Remote mounting to 305 m (1000 ft)
- Meets International EMC standards

**Foxboro**®

by **Schneider** Electric

- Suitable for applications including:
  - Tanker unloading
  - Centrifuge bottoms
  - Ethylene oxide
  - Sanitary Batching
  - Pharmaceuticals batching
  - Food, dairy, beverage
  - Small volume proving

## INSTRUCTIONS

This installation guide is not intended to replace our instruction books. Your Mass Flow Transmitter and Flowtube were shipped with our complete instruction books MI 019-132 and MI 019-120, respectively. Please refer to these two in-depth manuals for electrical safety specifications, standard specifications, installation and wiring details, troubleshooting guidelines, and maintenance instructions.

## PRE-INSTALLATION CONFERENCE

You probably have had an in-depth sizing and selection analysis and discussion with a sales application specialist or applications engineer. If not, and would like one, call 1-866-746-6477 or 1-508-549-2424.

## INSTALLATION

### FLOWTUBE MOUNTING

**NOTE:** Do not lift or support your flowtube by its junction box or cable.

Your flowtube and cable should be mounted no closer than 3 m (10 ft) from any motor, speed controller, large transformer or power contactor. Vertical mounting is recommended, especially when self-draining is required

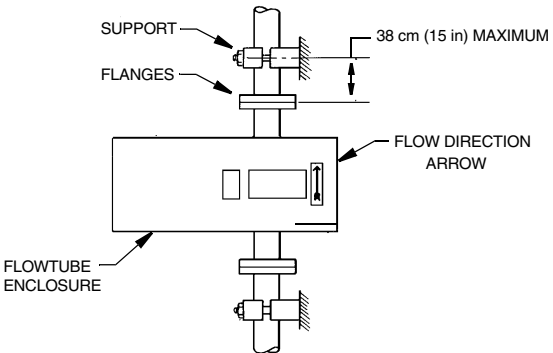
or gas bubbles are present. Horizontal mounting is acceptable for single-phase applications. When mounted vertically, the direction of flow must be upward to minimize the potential of trapped air.

To isolate the flowtube from external vibration, the flowtube case should not contact piping or any other supports. Also, do not fasten anything rigid to your flowtube, including rigid insulation or rigid heat-tracing.

### *Flanged End Connections*

**NOTE:**

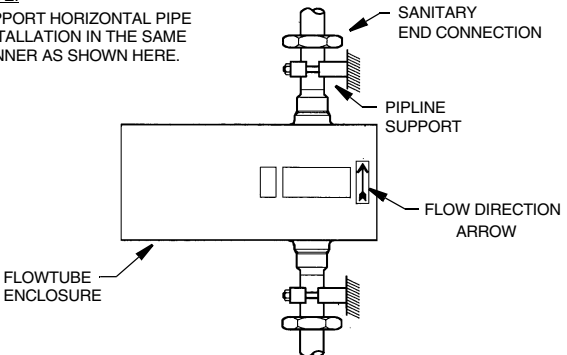
SUPPORT HORIZONTAL PIPE INSTALLATION IN THE SAME MANNER AS SHOWN HERE.



### *Threaded or Sanitary End Connections*

**NOTE:**

SUPPORT HORIZONTAL PIPE INSTALLATION IN THE SAME MANNER AS SHOWN HERE.

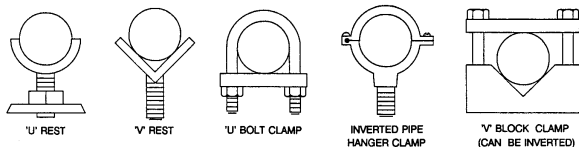


## **FLOWTUBE MOUNTING PROCEDURE**

1. Determine the face-to-face dimension between your flowtube end connections. Refer to 'Reference Documents' in MI 019-120 for appropriate dimensional print.
2. Fabricate the end connections to the pipe.

3. Provide upstream and downstream pipeline supports. Supports can extend from the floor, ceiling, or wall. The type of support is dictated by process connection type and flowtube size.

#### *Recommended Pipeline Supports*



**NOTE:** All supports must provide a minimum of 25 mm (1 in) of axial length of surface contact.

4. Move your flowtube into position with the arrow on the flowtube pointing in the direction of flow. Properly align the flowtube and secure it to the pipeline.

**NOTE:** A flowtube should never be used to support or align the piping. When a spool piece, that was fabricated and placed where the flowtube is intended to be used, is removed, the upstream and downstream piping should not move.

## TRANSMITTER INSTALLATION

Your CFT50 transmitter housing is supported by a mounting bracket which can be attached to a surface or to a nominal DN80 or 3 inch vertical pipe. Either mount the bracket to a surface with user-supplied 0.375 inch bolts or to a pipe using the two (included) U-bolts. The housing can be positioned at almost any angle by loosening the bracket bolt and turning the housing with respect to the bracket.

## SIGNAL CABLE PREPARATION

The cable (Model KFS1 for PVC insulated cable or Model KFS2 for FEP insulated cable) from the flowtube is dressed at the transmitter end and ready for connection to the transmitter.

If conduit is used, run the unprepared end of the cable through the conduit from the transmitter.

1. Cut the flowtube end of the cable to length and strip back the jacket approximately 127 mm (4 in).
- NOTE:** The maximum distance between the flowtube and the transmitter is 300 m (1000 ft).
2. Separate the twisted pair conductors from their wrappers, shields, and drain wires. The wires should remain twisted for ease of identification.
  3. Trim the shields, wrappers, and drain wires back to the jacket interface. The shield is not connected at the flowtube end.
  4. Strip the ends of the conductors 6 mm (1/4 in).

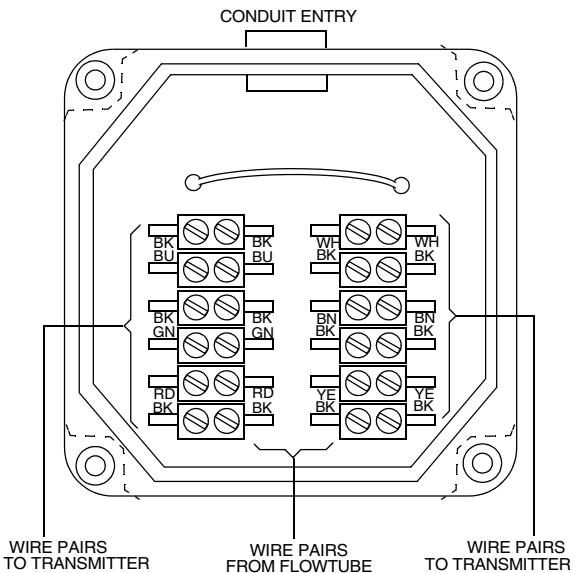
## WIRING TO THE FLOWTUBE

1. Remove the junction box cover and insert the cable end through either a cable grip or conduit connector.
2. Route the wire pairs to the proper terminal block.

**NOTE:** To facilitate wire identification, ensure that the proper wire pairs remain twisted as the black wires are not common.

3. Insert the ends of the individual wires into the appropriate terminal block openings carefully matching the wire color pairs of the cable to the wire color pairs of the flowtube.

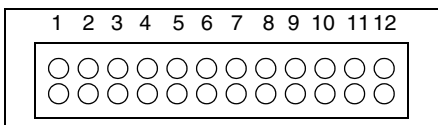
*Flowtube Junction Box Wire Color Orientation*



- Tighten the screws. No bare wire should be visible. Secure any excess wiring and re-install the cover to the junction box.

## WIRING TO THE TRANSMITTER

Connect the factory prepared wiring end to the transmitter junction box as follows:



Terminal	Wire Color	Signal
1	Black	RTD
2	Blue	
3	Black	RTD
4	Green	
5	Red	Sensor B
6	Black	
7	Black, Shield	Sensor A
8	Yellow	
9	Black	Driver 2
10	Brown	
11	Black	Driver 1
12	White	

At this point, your flowtube and transmitter should be mounted properly and your cable ends prepared and terminated at both the flowtube and transmitter end.

## FIELD WIRING

To access the transmitter field terminals, remove the field terminal compartment cover by rotating it counter-clockwise using the cover tool provided. The field terminal cover is located closest to the conduit openings.

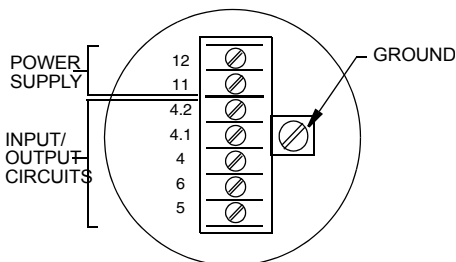
Wire entrance is per two PG20 threaded conduit openings. The top entrance is for power wiring, the bottom entrance, for signal input and output wiring.

### Power Wiring

- Look at the transmitter data plate to determine if you have an ac or dc powered transmitter.

2. If ac, connect line power to Terminal 12, neutral power to Terminal 11, and the ground wire to the separate ground terminal. Voltage range is 108-132 V ac or 216-264 V ac.
3. If dc, connect the + side of the power supply to Terminal 12 and the – side to Terminal 11. Ground the negative side (optional). Supply limits are 10-36 V dc.

*Field Wiring Terminal Board*



## Input Output Wiring

Input/Output connections depend on the output signals specified for your particular transmitter. The output signals for your transmitter can be determined from the Output Signal Code noted in the model number on your transmitter data plate. See 'Input/Output Wiring Connections' table in MI 019-132.

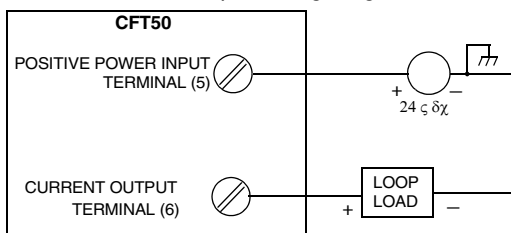
Example: CFT50-B1EA # BK  
 └─ Output Signal Code

**NOTE:** The CFT50 Transmitter output circuits are externally powered. The most common supply voltage is 24 V dc.

## Input/Output Wiring Diagrams

Current Output is included in all the output signal selections. Therefore, its wiring diagram is shown below:

### Current Output Wiring Diagram



For Contact Input, Contact Output, Pulse Output, and Multidrop Network diagrams refer to 'Input/Output Wiring' in MI 019-132.

## WIRING VERIFICATION

Go to Status mode and check the following:

Tube mode is normal

Tube Frequency is between 65 and 85 Hz

Sensor Amplitude is approximately 0.3 V<sub>P/P</sub>

Drive Current is between 0.010 and 0.015 A

## CONFIGURATION AND ZEROING

### CONFIGURATION

At this point, your flowtube and transmitter have been mounted and wired properly. You can now begin to configure your transmitter with either a HART Communicator or with the Keypad/Display option. With either method, two configuration menus exist, Quick start and Setup.

### Quick Start

Quick Start can be used for applications requiring:

- Mass Flow Measurement in current units (factory default is mass flow in lb/min)
- Current Output
- Positive Flow Direction.

The Quick Start menu is located on Page 9 of this brochure.

**NOTE:** The Quick Start also includes Zeroing which is described on Page 10.



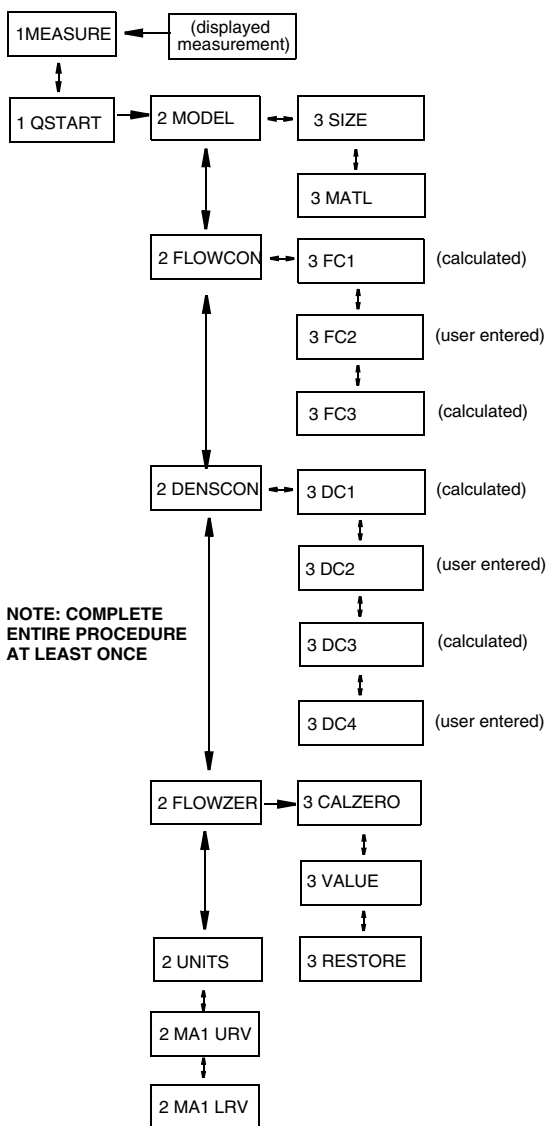
## Setup

Use Setup for applications requiring:

- Volume Flow or Density Measurement
- Mass Flow Units other than the current units
- Pulse or Contact Output
- Alarm or Totalizer Functions
- Reverse or BiDirectional Flow.

Setup is fully described in 'Setup' in MI 019-132.

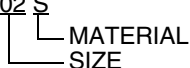
## QUICK START MENU



**NOTE:** Flow and density constants are found on the calibration sheet shipped with your flowtube. They are also on your flowtube data plate.

Flowtube size and material are part of the model code.

For example: CFS10-02 S



## ZEROING

After you have properly installed both components of your flowmeter and configured your transmitter, a brief but essential Zeroing must be performed before you begin actual operations.

Even when there is no flow through the flowtube, the transmitter may register small, fluctuating amounts of phase shift between the sensor pickoffs. The source of this nonzero signal may be mechanical noise or signal processing electronics, or most likely, a combination of these. Zero Calibration compensates for this effect.

**NOTE:** Zero Calibration is required at initial startup only and should not need to be repeated unless you replace the flowtube or transmitter.

The steps required to perform a Zeroing are:

1. Check that all safety covers are secured.
2. Run process fluid through the flowtube for at least five minutes. This is to remove all the air from the flowtube and also to develop temperature and pressure that are normal to the process.
3. Close block valves completely to halt process flow through the flowtube but leaving the flowtube filled with process fluid.
4. Using the Quick Start menu or Calibration menu in Setup, go to CALZERO.
5. Press the Enter key to start the zeroing process. The display reads 'BUSY' until the calibration is finished and then it reads 'DONE'. If the calibration fails, repeat the procedure. If a second failure occurs, call Global Customer Support at 1-866-746-6477 for guidance.

You have now successfully installed, configured and calibrated your flowmeter. Your Digital Coriolis Mass Flowmeter is ready for process control operation.

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