



# FDT 350 Isolated Frequency Transmitter Instruction Manual

## 1.0 INTRODUCTION

These instructions refer to the above model. Supplementary sheets are attached if the unit has special options or features. For detailed specifications, see page 4 or refer to the Data Bulletin. All ADTECH instruments are factory calibrated and supplied with a label detailing the calibration. Adjustments are normally not necessary. A simple check should be performed to verify calibration before installation to ensure that it matches the field requirement.

## 2.0 GENERAL DESCRIPTION

The ADTECH MODEL FDT 350 Frequency to DC Transmitter provides a high accuracy conversion of frequency or pulse rate inputs to any standard process signal such as 4-20 ma dc, 1-5 vdc or zero based outputs. The transmitter accepts inputs from a wide variety of primary sensors such as turbine meters for flow and magnetic pick ups for speed.

The input waveform may be sinusoidal, triangular or any pulse shape that is periodic. The input signal may be between 10 mv to 100 VRMS voltage or a dry contact rated at 2 ma, 24 vdc. For a contact input a jumper is installed between terminals 2 & 3.

This instrument is powered by 15-42 vdc supply. The negative of the power and the output share a common connection. This is the reason it is called a three wire transmitter.

The input is electrically isolated from the output and the power supply by 600 volts ac or 1000 volts dc peak.

The output is a true current source and provides process signals such as 4-20 ma, 0-1 ma, 1-5 ma and 0-20 ma dc or alternatively, a voltage signal of 1-5 vdc full scale. Other current and voltage Inputs/Outputs (I/O) are available as specified on page 4.

Standard features include both hysteresis and sensitivity adjustments for noise rejection; built in adaptive digital filtering for improved contact bounce and signal noise immunity.

ZERO, SPAN, SENSITIVITY and HYSTERESIS controls are provided by infinite resolution potentiometers. Recalibration to other ranges is very convenient. ZERO and SPAN are totally independent of each other, enhancing the calibration process.

## 3.0 INSTALLATION

### Electrical Connections

The wire used to connect the instrument to the control system I/O should be a twisted pair(s) and sized according to normal practice. Shielded cable is not normally necessary (if used, the shield must be grounded at the input negative of the ADTECH instrument and left floating at the sensor).

Six position compression terminal blocks are provided for I/O and power connection. A housing ground terminal is not required due to non-metallic housing.

## Controls

Instrument controls consists of the following:

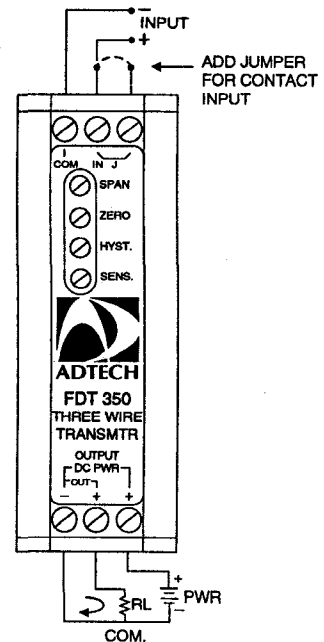
- One 16 position rotary switch for Major Range.
- One 2 position jumper for Output Zero Type.
- Two 4 position jumpers for Output Type.
- Four multiturn potentiometers for Zero, Span, Hysteresis and Sensitivity.

## 4.0 MAINTENANCE

These instruments are electronic and require no maintenance except periodic cleaning and calibration verification. If the unit appears to be mis-operating it should be checked as installed per section 6.0 or removed for a bench check per sections 6.0 and 7.0. MOST problems are traced to field wiring and / or associated circuits. If the problem appears to be with the instrument, proceed to sections 6.0 and 7.0.

## 5.0 CONNECTIONS

Standard connections are shown below and on the instrument face plate, Data Bulletin or on attached supplementary sheets.



NOTE: For contact input install jumper from terminals 2 to 3.

## 6.0 CONFIGURATION OF INPUT AND OUTPUT

All ADTECH units are factory calibrated per P.O. instructions. Usually, a complete recalibration is not required unless you want to change input type, output type, or the range of the unit. A calibration sticker located on the unit identifies the model, calibration and options present.

NOTE: For recalibration to the existing range proceed to section 6.1; for new input or output range proceed as follows.

- A. Open the case to gain access to the pc boards. The larger pc board is the input pcb and the smaller pc board is the output/power pcb.
- B. FDT 350 is capable of both zero based and 20% elevated output zeroes. Follow Table 2 for the correct Output Zero Jumper. For example, a 1 to 5 volt output would be considered a 20% elevated output, while a 0 to 5 volt output would be a zero based output.
- C. From Input Table 1, adjust the 16 position switch(SWI) so that the frequency range is equal to just higher than the maximum input frequency signal.
- D. To select the desired output type, follow Output Table 3. Note, the jumpers for Output are located on the smaller pc board.
- E. Close the case and calibrate per 6.1.

## 6.1 CALIBRATION

- A. Make sure the unit I/O wiring is properly connected and that the correct power source per label is connected. The unit must be powered for a minimum of 2 minutes prior to proceeding.
- B. The input source must be adjustable from 0 to 100% in steps of 10% or at least 25%. The source should either be precalibrated or an accurate meter must be used to monitor the input.
- C. The output may be monitored as a current that can be represented as a voltage across a resistor shunt.
- D. Under normal condition only one input control (Hysteresis or Sensitivity) are required for proper operation of the unit. Follow below for the correct setting of the two controls for proper input threshold:
  1. If the minimum input signal level is 1 volt or less, turn the SENSITIVITY control fully clockwise. You need adjust the HYSTERESIS for proper operation.
  2. If the minimum input signal is greater than 1 volt, turn the HYSTERESIS control fully clockwise. Only the SENSITIVITY control is required for proper operation.
- E. Adjust the signal to the minimum input voltage, and set the frequency at about midscale. Adjust the HYSTERESIS control if the minimum input signal is less than 1 volt or less (SENSITIVITY control if the input signal is greater than 1 volt) to the point where the unit just starts operating. (The output will be about midscale.) Give the adjustment an additional 1/4 to 1/2 turn to allow for input signal variations.
- F. With 0% input (or input shorted) adjust the ZERO control for zero output (4.00 mA, for 4-20 mA out) and the desired accuracy.
- G. With a 100% input signal at the operating voltage level, adjust the SPAN control for full scale output (20 mA, for

4-20 mA out) and the desired accuracy.

- H. Repeat steps E and F until the readings remain within the desired calibration accuracy.
- I. Check the instrument at the 25-50-75% input settings.

## 7.0 FIELD TROUBLE SHOOTING GUIDE

This section offers a simple, first level trouble-shooting aid for an apparent instrument malfunction.

### SYMPTOM      CORRECTIVE ACTION

- |           |  |
|-----------|--|
| No output | <ol style="list-style-type: none"><li>1. Check the input and output connections carefully.</li><li>2. Check that the power supply polarity is correct and that the output loop power is present on the indicated terminals.</li><li>3. Check that the input source(s) is correct and that it changes magnitude between zero and full scale values when so adjusted.</li><li>4. Make sure the output loop is complete and that the correct meter range is selected.</li></ol> |
|-----------|--|

All external checks are complete. Problem seems to be internal.

The instrument is made of small components. Troubleshooting beyond the above may be difficult without special equipment. We do not recommend attempting repair of the unit in the field. ADTECH offers a very responsive repair policy. Contact the ADTECH factory for information on repair and return at 716-383-8280 or 716-3883-8386 (FAX).

## 8.0 TABLES, PCB LAYOUT

### INPUT TABLE 1

Major Range	
Rotary Switch Position	Frequency Range Hz
F	30,000
E	15,000
D	7,500
C	3,750
B	1,875
A	937.5
9	468.8
8	234.4
7	117.2
6	58.59
5	29.30

Switch located on input pcb.

### OUTPUT ZERO TABLE 2 ZERO ELEVATION

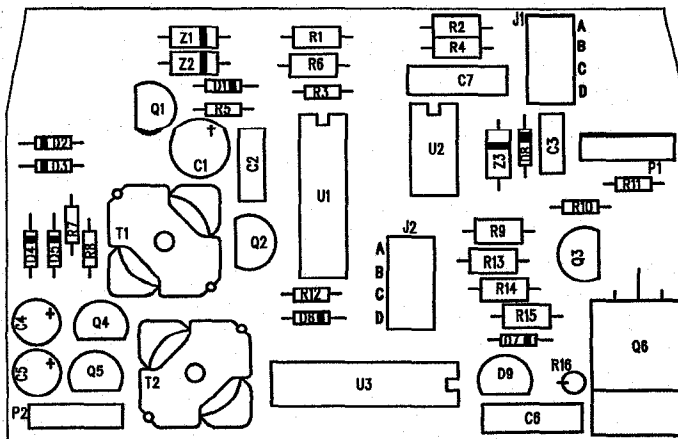
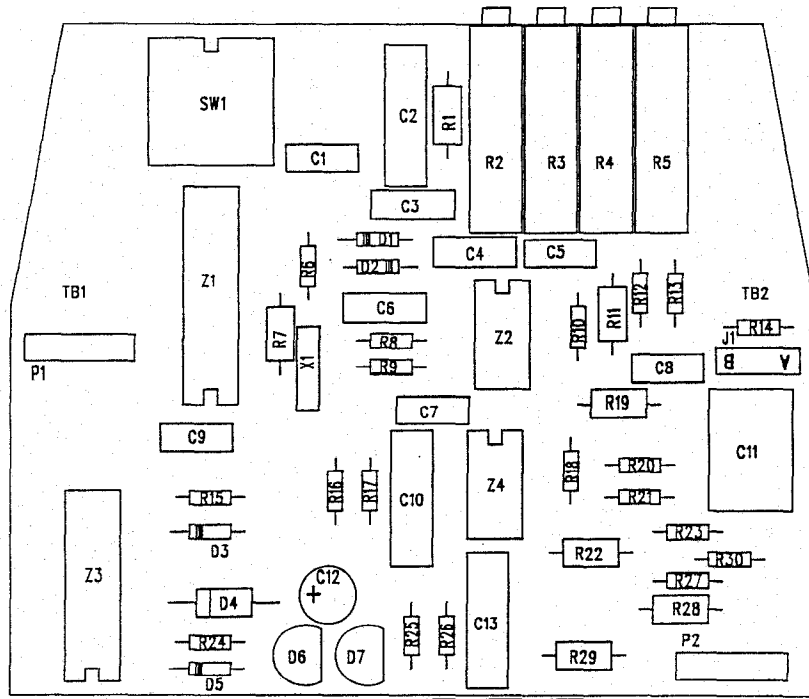
Elevated 20%	J1-A
Zero Based	J1-B

Note: J1 located on larger pcb.

### OUTPUT TABLE 3

Output Type		
Output	J1	J2
4-20mA	A	A
0-20mA	A	A
0-10mA	A	B
0-1mA	A	C
1-5V	B	A
0-5V	B	A
0-10V	C	A

Note: Jumpers located on smaller pcb.



NOTE: All components shown may not be required by this model.

## 9.0 SPECIFICATIONS

### INPUT/OUTPUT

#### INPUT SIGNALS

- Voltage (Amplitude): 10 mv to 100 vrms (0-5 KHz)  
50 mv to 50 vrms (5 KHz to 30 KHz)
- Contact: Dry, 2 ma @ 24 vac rating
- Frequency Range: 0-30 Hz to 0-30 KHz Full Scale
- Major Range Switch provides 11 discrete ranges with the ZERO control adjustable  $\pm 10\%$  of output and the SPAN control adjustable from 50% to 100% of the major range selected

#### OUTPUT SIGNALS

4-20 ma dc, 0-20 ma, 0-10 ma, 0-1 ma dc,  
0-5 vdc, 1-5 vdc, 0-10 vdc

#### OUTPUT LOOP DRIVE CAPABILITY

$$R(\text{ohm}) = \left[ \frac{(V \text{ supply} - 5) 1000}{I \text{ out max. ma}} \right]$$

I out	0-20 ma or 4-20 ma			
V supply	15	24	36	42
R (ohm)	500	950	1550	1850

#### PERFORMANCE

- Calibrated Accuracy:  $\pm 0.1\%$
- Independent Linearity:  $\pm 0.02\%$  maximum,  
 $\pm 0.01\%$  typical

- Repeatability:  $\pm 0.005\%$  maximum;  $\pm 0.002\%$  typical
- Zero TC:  $\pm 0.01\%$  of span max/ $^{\circ}\text{C}$
- Span TC:  $\pm 0.01\%$  of span max/ $^{\circ}\text{C}$
- Load Effect:  $\pm 0.005\%$  zero to full load
- Output Ripple: 10 mv P/P maximum
- Response Time: 350 milliseconds (10 to 90% step response)
- Bandwidth: (-3 db): 1 Hz
- Temperature Range:  $-25^{\circ}$  to  $185^{\circ}\text{F}$  ( $-31^{\circ}$  to  $85^{\circ}\text{C}$ ) operating  
 $-40^{\circ}$  to  $200^{\circ}\text{F}$  ( $-40^{\circ}$  to  $93^{\circ}\text{C}$ ) storage
- Power Supply Effect:  $\pm 0.005\%$  over operating range
- Isolation: Input/output/case: 600 VAC, 1000 VDC

Note: All accuracies are given as a percentage of span

#### POWER

- 15 to 42 vdc—standard, 28 mA typical, 33 mA max

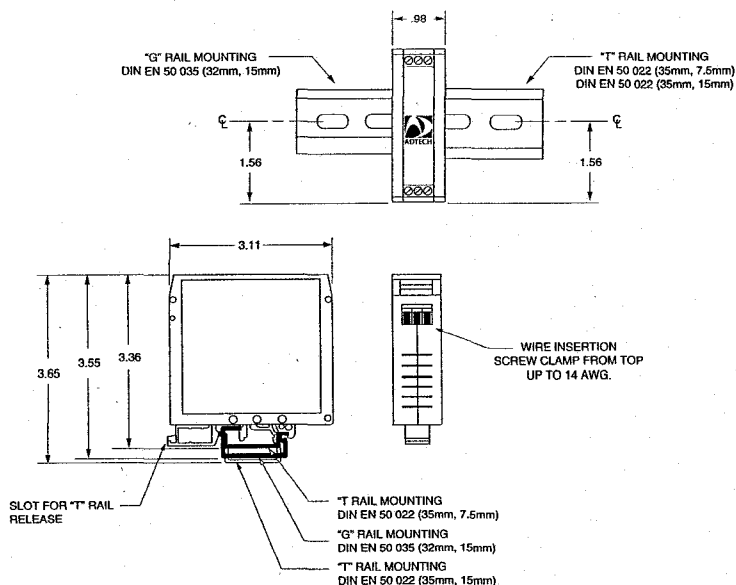
#### MECHANICAL

- Electrical Classification: general purpose
- Connection: Screw, compression type, accepts up to 14 AWG
- Controls: One 16 position rotary switches for range control  
Four multiturn potentiometers for ZERO, SPAN, SENSITIVITY, and HYSTERESIS control
- Mounting: Surface, Snap-Track, DIN or NEMA 4 & 7
- Weight: Net Unit: 4 oz. (115 grams)  
Shipping: Nominal 7 oz. (200 grams)

#### OPTIONS

Option Number	Description
H 15D through H 30	Mounting

## 10.0 OUTLINE & MOUNTING



#### OPTIONAL MOUNTINGS – see separate drawings provided or request from the factory

- |        |       |  |
|--------|-------|--|
| Option | H-15D | Explosion Proof, Class 1, Group B, C & D |
| Option | H-25  | Snap Track Mounting (N/C (Specify)       |
| Option | H-26  | Surface Mounting N/C (Specify)           |
| Option | H-27  | NEMA 4 Enclosure                         |
| Option | H-28  | T35 DIN T rail 2 Ft. Long                |
| Option | H-28  | T32 DIN G rail 2 Ft. Long                |