



CALIBRATION MANUAL

FT SERIES FREQUENCY TRANSDUCERS

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NARROW SPAN FREQUENCY TRANSDUCERS

THE FT SERIES

SUBJECT

Calibrating the FT series of frequency transducers.

DESCRIPTION

These frequency transducers measure the frequency of standard electric power distribution frequencies of 50, 60, or 400 Hertz.

The analog output signal is directly proportional to a narrow range of frequency centered on the standard distribution frequency.



FT-060D

The type of analog output is specified by the suffix B, D, X5, E or EA.

- **Option "B"** **0 to 1 mADC**
- **Option "D"** **0 to 10 volts DC**
- **Option "X5"** **0 to 5 volts DC**
- **Option "E"** **4 to 20 mADC**
- **Option "EA"** **0 to 20 mADC**

All standard models of the FT frequency transducers are powered from the line voltage being monitored.

SPECIFICATIONS

Model	Frequency Range
FT-050*	45 to 55 Hertz
FT-060*	55 to 65 Hertz
FT-400*	375 to 425 Hertz
FT-058*	58 to 62 Hertz

* Output option B, D, X5, E, or EA as described in the left column on this page.

Input

Frequency: see the table above.
 Voltage range: 95 to 135 volts AC
 Burden: 4 VA
 Overload: 150 volts AC
 Dielectric test: 1500 volts AC
 (Input/output/case)

Output

See output options in the left column.

Loading on output:

Output	Load
0 to 1 mADC	0 to 10,000 ohms
0 to 10 volts DC	Greater than 2000 ohms
0 to 5 volts DC	Greater than 2000 ohms
4 to 20 mADC	0 to 500 ohms
0 to 20 mADC	0 to 500 ohms

Output Continued.

Ripple: Less than $\pm 1\%$ of full scale
Response time: 400 milliseconds to 90%
Temperature effect: $\pm 0.005\%/^{\circ}\text{C}$ from -20°C to $+60^{\circ}\text{C}$
Accuracy: 50 & 60 Hertz models - $\pm 0.05\text{ Hz}$
400 Hertz models - $\pm 0.2\text{ Hz}$

CALIBRATION

The FT series frequency transducers are calibrated at the factory to the published specifications listed for that model and are tagged with a calibration sticker.

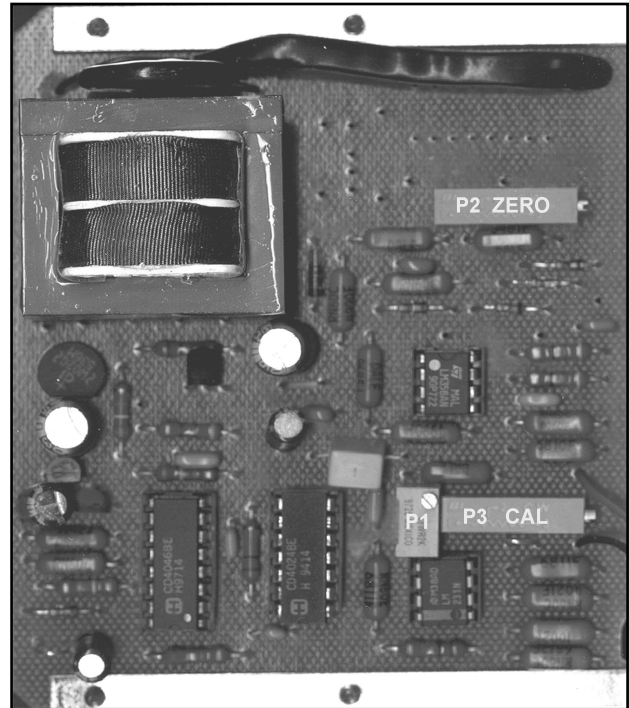
Periodic checks every 12 months are suggested.

TEST EQUIPMENT

- 1) AC voltage source capable of supplying the desired voltage and frequency over the range specified for the model under test.
- 2) Frequency counter
- 3) DC milliamper meter or voltmeter to measure to output with an accuracy of $\pm 0.05\%$ or better. A precision resistor may be substituted to measure the transducers which have a milliamper output.
 - For 0 to 1 mADC use a $1000\Omega \pm 0.01\%$, $\frac{1}{4}$ -watt resistor.
 - For 0 to 20 mADC or 4 to 20 mADC use a $250\Omega \pm 0.01\%$ $\frac{1}{2}$ watt resistor.

CONNECTIONS AND ADJUSTMENTS

Make the connections as shown on page 4.
The zero (P2) and cal (P3) adjustments are made through the lid. Remove the plastic caps and use a $\frac{1}{8}$ inch wide screwdriver to make the adjustments the trim pots.



The frequency adjust P1 trimpot is on the circuit board and not accessible through the lid. P1 does not need adjustment unless major repairs have been made to the transducer. Do not adjust P1.

Zero Adjust P2

All options

Apply 115 volts AC to the input terminals 5 and 6. Allow the transducer to warm up for 15 minutes before calibration.

Adjust the frequency of the voltage source for the low frequency of the frequency range for the model being calibrated as shown in the chart on page 3.

MODEL	ZERO FREQ	FULL SCALE FREQ
FT-050B	0 mA @ 45 Hz	1 mA @ 55 Hz
FT-050D	0 V @ 45 Hz	10 V @ 55 Hz
FT-050X5	0 V @ 45 Hz	5 V @ 55 Hz
FT-050E	4 mA @ 45 Hz	20 mA @ 55 Hz
FT-050EA	0 mA @ 45 Hz	20 mA @ 55 Hz
FT-058B	0 mA @ 58 Hz	1 mA @ 62 Hz
FT-058D	0 V @ 58 Hz	10 V @ 62 Hz
FT-058X5	0 V @ 58 Hz	5 V @ 58 Hz
FT-058E	4 mA @ 58 Hz	20 mA @ 62 Hz
FT-058EA	0 mA @ 58 Hz	20 mA @ 62 Hz
FT-060B	0 mA @ 55 Hz	1 mA @ 65 Hz
FT-060D	0 V @ 55 Hz	10 V @ 65 Hz
FT-060X5	0 V @ 55 Hz	5 V @ 65 Hz
FT-060E	4 mA @ 55 Hz	20 mA @ 65 Hz
FT-060EA	0 mA @ 55 Hz	20 mA @ 65 Hz
FT-400B	0 mA @ 375 Hz	1 mA @ 425 Hz
FT-400D	0 V @ 375 Hz	10 V @ 425 Hz
FT-400X5	0 V @ 375 Hz	5 V @ 425 Hz
FT-400E	4 mA @ 375 Hz	20 mA @ 425 Hz
FT-400EA	0 mA @ 375 Hz	20 mA @ 425 Hz

Adjust the zero trimpot P2 for the value given in the above table for the model that you are testing.

If you are using a 1000Ω resistor on the models with output option B, set the zero for 0 volts.

If you are using a 250Ω resistor on the models with output option E, set the zero for 1 volt.

If you are using a 250Ω resistor on the models with output option EA, set the zero for 0 volts.

Full Scale Adjust P3

All Options

Adjust the frequency of the voltage source for the high end of the frequency range for the model being tested as shown in the table on this page.

Adjust the full-scale trimpot P3 for the value given in the above table for the model that you are testing.

If you are using a 1000Ω resistor on the models with output option B, set the full scale trimpot for 1 volt.

If you are using a 250Ω resistor on the models with output option E, set the full scale trimpot for 5 volts.

If you are using a 250Ω resistor on the models with output option EA, set the full scale trimpot for 5 volts.

Check for linearity

Adjust the frequency of the voltage source for the center frequency -- 50, 60 or 400 Hertz.

The outputs should be as follows:

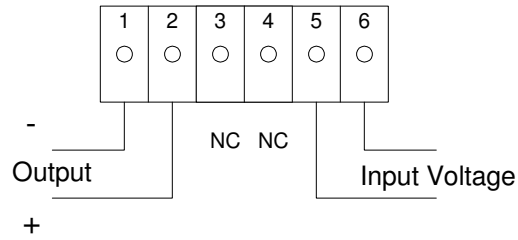
Option	Output
B	0.5mA or 0.5 V with the resistor.
D	5.0 V
X5	2.5 V
E	12 mA or 3 V with the resistor.
EA	10 mA or 2.5 V with the resistor.

If this checks OK within ±0.05 Hertz for the 50 or 60 Hertz models or within ±0.2 Hertz for the 400 Hertz models, you are done.

If at the center frequency the output is outside of ±0.05 Hertz for the 50 or 60 Hertz models or ±0.2 Hertz for the 400 Hertz models, try adjusting the P3 cal trimpot up or down to bring the center frequency within specification.

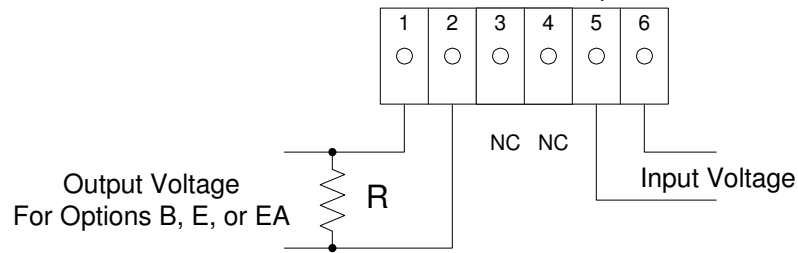
If you cannot bring the transducer within specification, please contact the factory.

CONNECTIONS



CONNECTIONS

When using a resistor
across the output



$R = 1000$ ohms for option B
 $R = 250$ ohms for options E or EA

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