Instruction Manual

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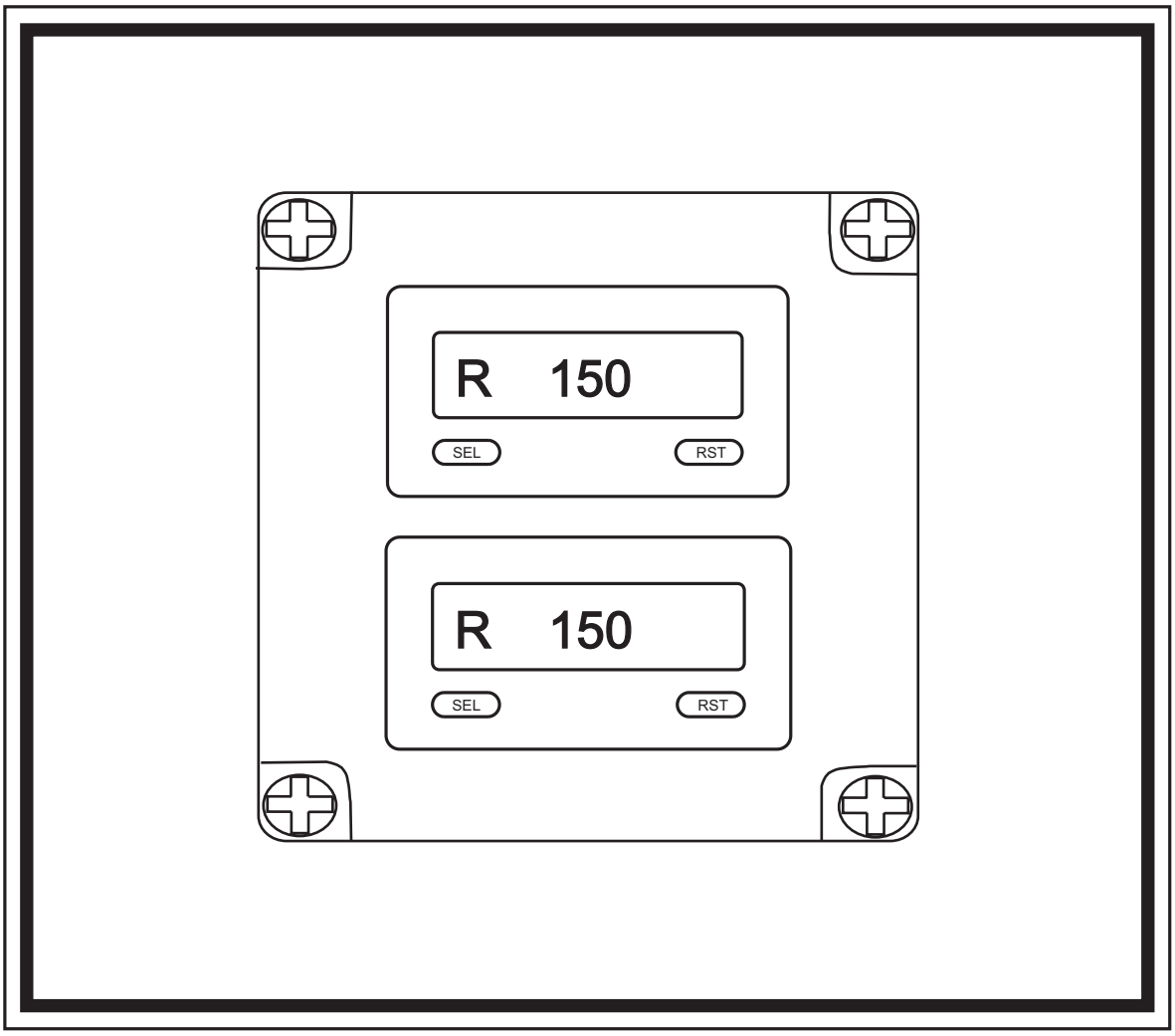
Instrument Model Number _____

Instrument Serial Number _____



FTT-50-2
Rate Total Indicator

accurate

Form Number AIC2049

Revised: September 2006

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DESCRIPTION

The FTT-50-2 provides two displays in a single package. The unit can indicate the count value and then be toggled manually or automatically to display the rate value.

The count and rate display have separate scaling and decimal point placement for read-outs in different engineering units.

Input A accepts a signal for the Count and Rate display. Programmable low (minimum) and high (maximum) update times provide optimal display response at any input frequency.

The unit is constructed of a lightweight, high impact plastic case with a clear viewing window. The sealed front panel meets NEMA 4X/IP65 specifications for wash-down and/or dusty environments, when properly installed.

SPECIFICATIONS

DISPLAY: 8 digit LCD 0.46" (11.7mm) high digits.

POWER REQUIREMENTS: 110VAC @ .25 mA Max.

MEMORY: Non-Volatile E^2PROM memory retains all programming parameters and the count value when power is removed.

USER INPUT: Programmable, connect to common to activate function.
Threshold Levels: V_{IH} = 4.2V min, V_{IL} = 0.5V max. V_{MAX} = 28VDC
Response Time: 50usec for Inhibit function, 100 msec for all others.
Current Sinking: Internal 40KΩ typ. Pull-up to +5V.
Current Sourcing: External pull-down resistor required, 2KΩ max.

INPUTS A and B:
Trigger Levels: V_{IH} = 4.2V min., V_{IL} = 0.5V max, V_{MAX} = 28VDC
Max Input Frequency: 20KHz, 50% duty cycle.
Current Sinking: Internal 40KΩ typ. Pull-up to +5V.
Current Sourcing: External pull-down resistor required, 2KΩ max.
Filter A and B: Limits Input signal to a maximum frequency of 100Hz.
Connect to common to activate.

FRONT PANEL BUTTONS:
SELECT: Toggles display in the normal operating mode if enabled. Advances menu selection in programming mode.
RESET: Resets counter to zero in the normal operating mode if enabled. Changes data in programming mode.

COUNT DISPLAY:
8-digit with positive count, 7-digit with minus "-" sign indication for negative count and the display flashes "tot OVEr" for an overflow condition.

RATE DISPLAY:
6 digits with an annunciator "R" on the left hand side of the LCD. . . . .
Overflow Indication: "R OLOLOL" appears when maximum display digits are exceeded.

RATE ACCURACY: 0.05%

RATE MINIMUM INPUT FREQUENCY: 0.01 Hz.

RATE MAXIMUM FREQUENCY: 10KHz.

SPECIFICATIONS

MAXIMUM COUNT RATES:

COUNTER MODE	RATE ENABLED	RATE DISABLED
CNt Ud	10KHz	20KHz
RTE CNt	*	*
QUAd1	*	*
QUAd2	*	*
QUAd4	*	*
Add Add	*	*
Add Sub	*	*

* Not normally used in flowmeter applications

OPERATING TEMPERATURE RANGE:

0° to 60°C (32° to 140°F)

STORAGE TEMPERATURE:

-30° to 85°C (-22° to 185°F)

CONSTRUCTION:

High impact plastic case with clear viewing window. The front panel meet NEMA 4X/IP65 requirements when properly installed. Panel gasket and mounting clip included.

WEIGHT:

4 pounds 14 ounces

BASIC OPERATION

When power is applied to the FTT-50-2 unit, it performs an internal self-diagnostic test and then displays the current revision level starting with VEr 1.0. If all P's appear in the display, press the select (SEL) button and check all of the data setups.

The FTT-50-2 takes the incoming pulses and multiplies them by the Count Scale Factor. The unit's counter (internal count value) keeps track of the scaled input pulse count which results in the desired reading value for the count display. Input A accepts the signal for the count and Input B is not normally used in flowmeter applications.

The count display resets to zero when a manual reset is performed. At loss of power to the indicator, the contents of the counter are saved. This allows counting over consecutive shifts, days, etc. The total count can accumulate to 99,999,999.

NOTE: The counter value will roll over and flash "tot OVEr" when the count value exceeds 99,999,999, indicating an overflow condition.

The signal at Input A is for the Rate indicator portion, which uses a time interval method (1/tau) to calculate the rate value. The unit counts on the negative edge of the input pulses. After the programmed minimum update time elapses and the next negative edge occurs, the unit counts the number of edges that occurred during the elapsed time. The number of edges is multiplied by the rate scaling value to calculate the rate value. At slower rates, averaging can be accomplished by programming the rate minimum update time for the desired response. Extensive scaling capabilities allow practically any desired reading at very slow count rates.

DISPLAY SELECTION

In the normal operating mode the program terminal is not connected to common. The display indicates either the rate value which is designated by an "R" to the left of the display or the count value (no designator). If the Select button is enabled, the display may be toggled by pressing the select button. If display scroll is enabled, the display will automatically toggle between the rate and count value approximately every four seconds. If both the select button and display scroll are enabled, pressing and holding the select button pauses the automatic toggle (if enabled) as long as the select button is held.

PROGRAMMING GENERAL DESCRIPTION

Programming the FTT-50-2 is done via the front panel buttons. Although the unit has been programmed at the factory, the parameters generally have to be changed to meet the user's requirements. To enter the programming mode, connect the program terminal to the common terminal.

Pressing the select button scrolls through the menus. The display alternately flashes between the menu and the current programmed data selected. Pressing the Reset button stops the display from flashing and enters the unit into the data modification mode.

In the data modification mode, a menu has one of two types of parameters to program.

1. In the selection type, the operator presses the Reset button to scroll through the various parameters available for that menu, alternatively, the reset button is pressed to toggle between a Yes or No selection. Pressing and holding the Select button exits the data modification mode and advances to the next menu.

2. Numerical values use the Reset button to increment the flashing digit, and momentarily pressing the Select button advances to the next digit. Pressing and holding the Select button for more than two seconds exits the data modification mode and advances to the next menu.

   All parameter values are saved when exiting the programming mode. To exit the programming mode, remove the connection between the Program terminal and the Common terminal.

PROGRAMMING MENUS

Count Modes (INP A-b)
There are seven available count modes to select from. The user input terminal programmed for the inhibit function, can be used with any of the count modes. Input A signal is used for the count and rate input. Input B is not normally used in flowmeter applications.

Counting with Direction (CNt Ud)
The unit will add/sub a count on every negative edge of the input signal at Input A. The direction of the count is determined by the logic state of Input B. A high level at Input B will cause the unit to count in a positive direction (normal state, no jumper wire required). A low level will cause the unit to count in a negative direction (jumper wire required). The rate display is NOT affected by the logic state of Input B.

Rate Counter (RTE CNt)
Not normally used in flowmeter applications. Leave at factory default setting (CNt Ud).

Quadrature X 1 (QUAd1)
Not normally used in flowmeter applications. Leave at factory default setting (CNt Ud).

Quadrature X 2 (QUAd2)
Not normally used in flowmeter applications. Leave at factory default setting (CNt Ud).

Quadrature X 4 (QUAd4)
Not normally used in flowmeter applications. Leave at factory default setting (CNt Ud).

Two Input Anti-Coincidence Add/Add (Add/Add)
Not normally used in flowmeter applications. Leave at factory default setting (CNt Ud).

Two Input Anti-Coincidence Add/Subtract (Add/Sub)
Not normally used in flowmeter applications. Leave at factory default setting (CNt Ud).

SELECT ENABLE (dSPSEL)
The front panel Select button can be enabled (YES) OR disabled (NO) during normal operation. If "NO" is selected, the display remains either on the rate or count display depending on which was viewed when programming was entered.

RESET ENABLE (rSt Enb)
The front panel Reset button can be enabled (YES) or disabled (NO) during normal operation. The count may not be reset via the front panel if disabled.

COUNTER DECIMAL POINT (tot dP)
There are six decimal point locations available for the count display and are used for the count display only and independent of the rate display.

0
0.0
0.00
0.000
0.0000
0.00000

COUNT SCALE FACTOR (SCLFAC)
The scale factor is a prescaler, therefore changing the scale factor value does not change the existing internal count, and only affects the incoming pulse count. The Count Scale Factor Value can range from 0.0001 to 99.9999.

NOTE: The precision of a counter application cannot be improved by using a scale factor greater than one. To accomplish greater precision, more pulse information must be generated per measuring unit.

RATE ENABLE (rAtE Enb)
Selecting "YES" enables the rate indicator function. If disabled (NO), the rate programming steps will not appear. This affects the rate only.

Rate Decimal Point (rAtE dP)

Select the desired decimal point position for the rate display, independent of the count display.

0
0.0
0.00
0.000
0.0000
0.00000

Rate Display (rAtE dSP)
Program the desired rate display value which corresponds to the programmed rate input (rate INP) value. The rate display value can be programmed from 000001 to 999999.

Rate Input (rAtE INP)
Program the rate input value that should correspond to the rate display (rate dSP) value. The rate input value can be programmed from 00000.1 to 99999.9 and should correspond to the signal input frequency.

Low Update Time (Lo-Udt)
The low update time is the minimum amount of time between display updates for the rate display. This affects the rate display only. The low update time ranges from 00.1 to 99.9 seconds.

Maximum Update Time (Hi-UDt)
This is the maximum amount of time before the rate display goes to zero. The rate display goes to zero if the time between successive pulses exceeds the high update (Hi-UDt) time. The high update time ranges from 00.1 to 99.9 seconds.

DISPLAY SCROLL (dSPScroL)
The unit can be programmed to automatically toggle between the rate display and count display by selecting "YES". The display time for each display is fixed and is approximately four seconds per display.

USER INPUT (USEr INP)
The user input is activated when the user terminal is connected to common. The function of the user input can be programmed for one of the following.

Reset (rESEt) - A low level resets the count display to zero and as long as the input is low, the unit will not process the input signal.

Store/Reset (Stor-rSt) - A low level freezes the display. The internal count is reset to zero and the unit accumulates counts even when the user input is held low. The count display updates when the user input goes high.

Store (StorE) - A low level freezes the display and the unit continues to accumulate counts. The count display updates when the user input goes high.

Inhibit (INhibit) - A low level freezes the display and the input signal is ignored.

Select Display (dSPSEL) - A low level toggles between the rate display and count display.

FACTORY SETTINGS (FACt SEt)

All of the parameters are restored to the factory default settings when YES is selected and the front panel select button is pressed. The FTT-50-2 displays "LOAd" for several seconds and then returns to programming of INP A-b (Count Mode) parameter. Factory settings for all the programmable values are listed below.

INP A-b	CNt Ud
dSPSEL	YES
rSt Enb	YES
tot dP	0
SCLFAC	01.0000
rAtE Enb	YES
rAtE dP	0
rAtE dSP	001000
rAtE INP	01000.0
Lo-Udt	01.0
Hi-Udt	01.0
dSPScrol	No
USEr INP	RESET

SCALE FACTORS

The FTT-50-2 scale factor is factory set to 1, to provide 1 count on the display for each pulse that is input to the unit. In many applications, there will not be a one to one correspondence between input pulses and display units. Therefore, it is necessary for the FTT-50-2 to scale or multiply the input pulses by a scaling factor to achieve the desired display units (gallons, lbs, etc.)

The incoming pulses are multiplied by the count scale factor value and stored in the internal count register which results in the desired count display value. The scale factor is a prescaler, which means changing the scale factor does not change the existing internal count, but only affects the incoming pulse count.

The Count Scale Factor Value can range from 0.0001 to 99.9999. It is important to note that the precision of a counter application cannot be improved by using a scale factor greater than one. To accomplish greater precision, more pulse information must be generated per measuring unit. The following formula is used to calculate the scale factor.

Typically, flowmeters generate different numbers of pulses for each unit of measurement. This number is usually expressed in pulses per gallon, which we call the K-Factor. Additionally, the number of pulses per unit normally does not correspond to common engineering units. Therefore, the Scale Factor is a number that converts the unscaled pulses of a flowmeter into the desired engineering unit of your choice, such as gallons, tenths of gallons, liters, etc.

$$\text{Scale Factor} = \frac{1\ (\text{Decimal Point Position})}{\text{K Factor}}$$

Decimal Point Position:

0	=	1
0.0	=	10
0.00	=	100

SCALE FACTOR CALCULATION EXAMPLES

EXAMPLE 1:
A flowmeter might produce 788.5 pulses per gallon. If the Counter is to display in "full gallons," calculate as follows:

$$\text{Scale Factor} = \frac{1(1)}{788.5} = 0.00127$$

The Scale Factor number 0.00127 would then be rounded up to 0.0013.

EXAMPLE 2:
If you desire "Tenths of Gallons" display, using 788.5 as the K-Factor, the Scale Factor would be calculated as follows:

$$\text{Scale Factor} = \frac{1(10)}{788.5} = 0.01268$$

The Scale Factor number 0.01268 would then be rounded up to 0.0127.

Note that in this case, the decimal point on the Controller should be placed one place to the left (see Counter Decimal Point (tot dP) for proper location of decimal point).

EXAMPLE 3:
Using the K-Factor of 788.5, calculate for "Full Liter" display.

$$\text{Scale Factor} = \frac{1(1)}{788.5} = 0.00126 \times 3.785 = 0.0048$$

EXAMPLE 4:
Using 788.5 as the K-Factor, calculate a Scale Factor for "Full Pound" display using milk at 8.6 Pounds Per Gallon.

$$\text{Scale Factor} = \frac{1(1)}{788.5} = 0.00126 \times 8.6 = 0.0109$$

FIELD ADJUSTMENT OF THE SCALE FACTOR

Occasionally, it is necessary to field adjust Scaling Factors to account for differing product viscosities or for wear in the meter. The procedure is displayed in the examples below.

EXAMPLE: "METER OVER-READS"
Meter reads 452 gallons. It should have been 450 gallons. The old Scale Factor = 0.0126.

$$\text{New Scale Factor} = \text{Old Scale Factor} \times \frac{\text{Known Amount}}{\text{Amount Read}}$$

$$= 0.0126 \times 450/452$$
$$= 0.0125$$

EXAMPLE: "METER UNDER-READS"
Old Scale Factor = 0.01260; meter reads 98.7 gallons. It should have been 100 gallons.

$$\text{New Scale Factor} = \text{Old Scale Factor} \times \frac{\text{Known Amount}}{\text{Amount Read}}$$

$$= 0.0126 \times 100/98.7$$
$$= 0.0128$$

FIELD CALIBRATIONS USING PERCENTAGE OF ERROR

EXAMPLE:
If meter over-registers by 0.4%, reduce the Scale Factor by *0.4%. Old Scale Factor = 0.0126.*

0.0126 x 0.996 =0.0125

If meter under-registers by 1.3%, increase the Scale Factor by 1.3%. Old Scale Factor = 0.0126.

0.01260 x 1.013 = 0.0127

SCALING FOR RATE INDICATION

Scaling the Rate channel involves programming the FTT-50-2 so that input pulses to the unit will be scaled to the desired display units.

The operator keys-in a display value and a corresponding rate value. The location of the scaling point should be near the process end limit for the best possible accuracy. Once these values are programmed, the indicator calculates the slope and intercept of the rate display automatically and scaling is complete after decimal point selection. Input frequency can be read directly if rate display and rate input values are programmed to "1".

NOTE: The rate display will flash "R OLOLOL" if the display exceeds 999999, which means the unit must be re-scaled.

If the rate application is to display a specific display unit, then to scale the rate display it is only necessary to know the number of pulses per desired display unit(s) (liters, gallons, etc.) and in the desired time format, per second (1), per minute (60), or per hour (3600). Use the following formula to calculate the rate input value:

$$\text{rAtE INP (Hz)} = \text{rAtE dSP} \times \frac{\text{K Factor}}{\text{(desired time format)}}$$

WHERE:

rAtE INP (Hz)	=	Rate input value.
rAtE dSP	=	Maximum expected flow rate.
Pulses per unit	=	Number of actual input pulses.
Desired time format	=	1 if rAtE dSP is to display units per second.
		60 if rAtE dSP is to display units per minute.
		3600 if rAtE dSP is to display units per hour.

EXAMPLE:

Display is to indicate 120 gallons per minute (GPM). Input pulses are 788.5 pulses per gallon.

$$\text{rAtE INP (Hz)} = 120 \times \frac{788.5}{(60)}$$

$$\text{rAtE INP (Hz)} = 1577.0$$

RATE:

The rate value calculation uses the method in which the time measured between the first and last pulse is the measurement period. The measurement period begins when a negative going edge is received at the signal input A. When the Low Update time has expired, the unit will end the measurement period on the next negative going edge and update the display. The unit will count the number of pulses that occurred during the measurement period and update the display, according to the scaling value, at the end of the measurement period. If the unit does not receive a negative edge within the High Update time from the start of the measurement period, the unit will end the time period and the input (rate) display will go to zero. At very low count rates, the update time (measurement period) will be the actual period of one count cycle.

INSTALLATION

The FTT-50-2 is designed to meet NEMA 4X/IP65 requirements, when properly installed. The viewing window and reset button are factory sealed for a washdown environment. A sponge rubber gasket and mounting clip are provided for sealing the unit in the panel cut-out.

The following procedure assures proper installation:

1. Cut panel opening to specified dimensions. Remove burrs and clean around panel opening.

2. Apply adhesive coated gasket to counter bezel.

3. Assemble nut fastener and mounting screw onto both sides of mounting clip. Tip of screw should not project from hole in mounting clip.

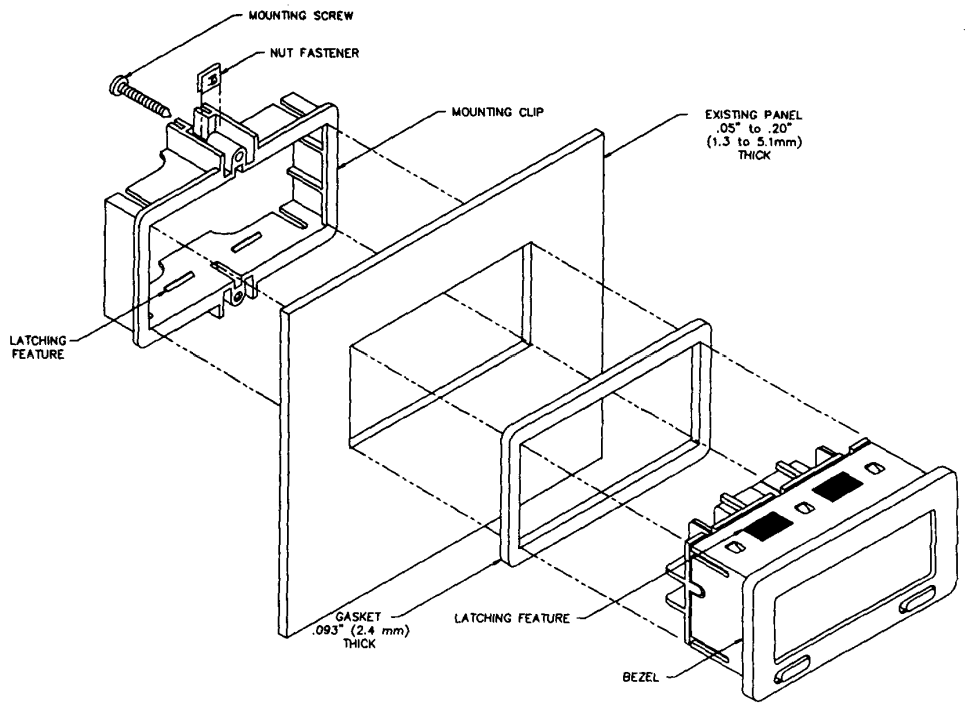
4. Install FTT-50-2 unit through the panel cut-out until front bezel flange contacts the panel mounted gasket.

5. Slide the mounting clip over the rear of the unit until the mounting clip is against the back of the panel The mounting clip has latching features which engage into mating features on the FTT-50-2 housing.

6. Alternately tighten each screw to ensure uniform gasket pressure. Visually inspect the front panel gasket. The gasket should be compressed about 75 to 80% of its original thickness. If not, gradually turn mounting screws to further compress gasket.

7. If gasket is not adequately compressed, and mounting screws can no longer be turned, loosen mounting screws and check that mounting clip is latched as close as possible to panel. Repeat the procedure for tightening mounting screws.

Figure 1 - Installation of FTT-50-2 Panel Mount Unit



POWER REQUIREMENTS

The FTT-50-2 requires 120 VAC, 60 Hz power be wired to an internal 12 VDC regulated power supply. The internal power supply provides 12 VDC power to the FTT-50-2 display(s) in the enclosure door. Terminal blocks are provided for all external wiring connections to the FTT-50-2 enclosures. The internal 12VDC regulated power supply in the enclosure is Accurate Part Number FTT-50-PS. The output of this power supply is 80 mA at 12 VDC.

WIRING CONNECTIONS

The electrical connections to the FTT-50-2 unit are made via screw-clamp terminals located on the back of the unit. When wiring the unit, use the label to identify the wire position with the proper function. Strip the wire, leaving approximately 1/4" bare wire exposed. Insert the wire into the screw-clamp terminal and tighten the screw until the wire is clamped tightly. Each terminal can accept up to two #14 AWG wires.

There are certain considerations that should be observed when running the count and control signal wires. A length of wire can act like an antenna and the closer it is to a source of electrical noise, the more it becomes susceptible to that noise.

There are a few rules that should be followed when running these wires.

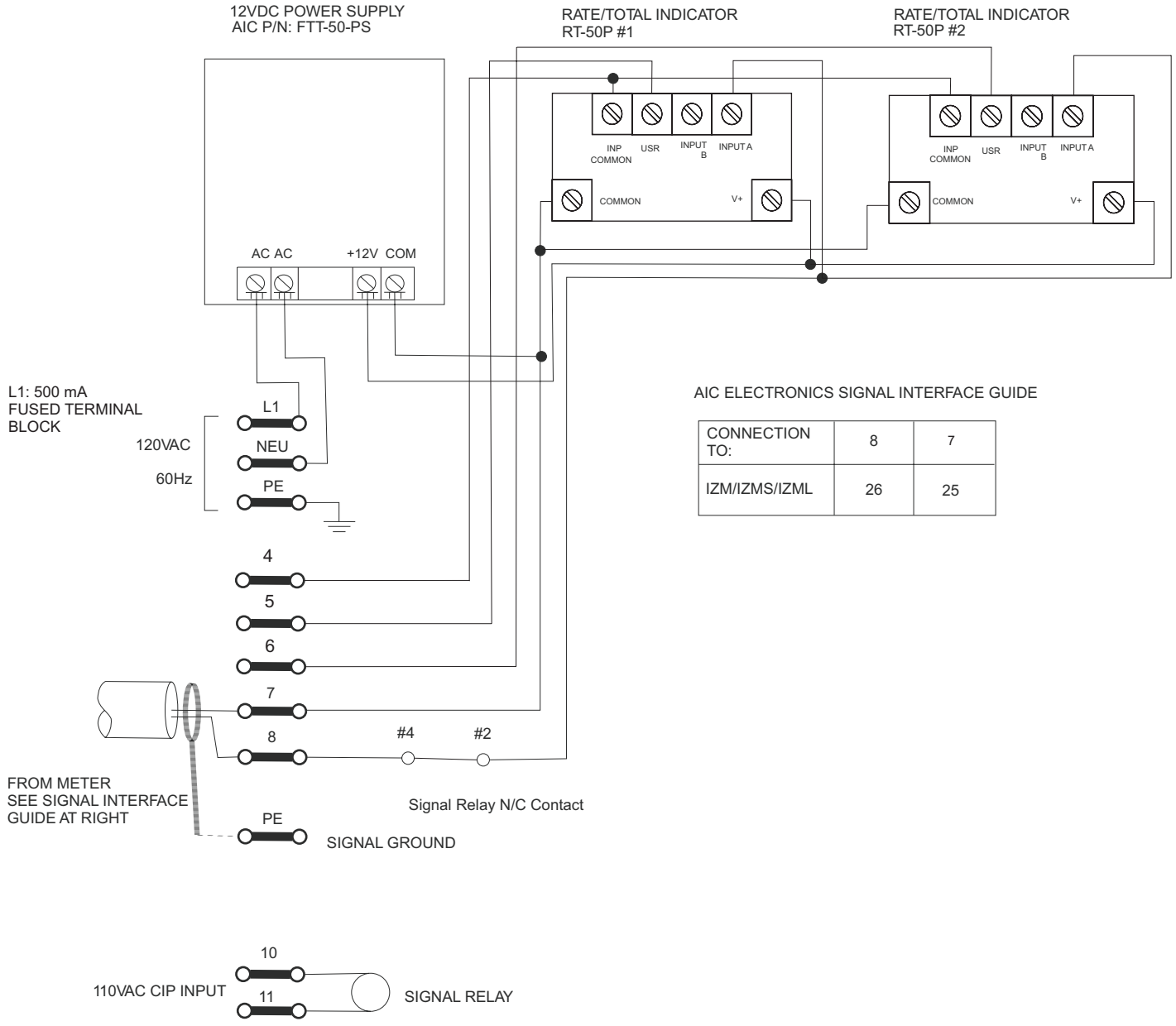
1. Never run count or control signal wires in the same conduit or raceway with A.C. power lines, conductors feed motors, solenoids SCR controls, heaters, etc.

2. Signal wires within enclosures should be routed as far away as possible from contactors, control relays, transformers, and other noisy components.

3. When shielded wire is used, connect the shield to the common of the FTT-50-2 unit, and leave the other end of the shield disconnected from ground.

4. Connect common of the FTT-50-2 unit to ground at only one point.

Figure 2 - Internal Wiring Diagram for FTT-50-2 Enclosure (Dual Display)



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Warranty

These products are warranted to be free from functional defects in materials and workmanship at the time the products leave the Anderson factory and to conform at that time to the specifications set forth in the relevent Anderson instruction manual or manuals, sheet or sheets, for such products for a period of one year.

THERE ARE NO EXPRESSED OR IMPLIED WARRANTIES WHICH EXTEND BEYOND THE WARRANTIES HEREIN AND ABOVE SET FORTH. ANDERSON MAKES NO WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE PRODUCTS.

Limitations

Anderson shall not be liable for any incidental damages, consequential damages, special damages, or any other damages, costs or expenses excepting only the cost or expense of repairs ore replacement as described above.

Products must be installed and maintained in accordance with Anderson instructions. Users are responsible for the suitability of the products to their application. There is no warranty against damage resulting from corrosion, misapplication, improper specifications or other operating condition beyond our control. Claims against carriers for damage in transit must be filed by the buyer.

This warranty is void if the purchaser uses non-factory approved replacement parts and supplies or if the purchaser attempts to repair the product themselves or through a third party without Anderson authorization.

Returns

Anderson's sole and exclusive obligation and buyer's sole and exclusive remedy under the above warranty is limited to repairing or replacing (at Anderson's option), free of charge, the products which are reported in writing to Anderson at its main office indicated below.

Anderson is to be advised of return requests during normal business hours and such returns are to include a statement of the observed deficiency. The buyer shall pre-pay shipping charges for products returned and Anderson or its representative shall pay for the return of the products to the buyer.

An RMA (Return Merchandise Authorization) must be obtained from Anderson Customer Service before returning merchandise.

Approved returns should be sent to:

Anderson Instrument Co., Inc.
156 Auriesville Rd.
Fultonville, NY 12072
ATTN: Repairs
Write RMA number on outside of package