GUIDANT

Meter Mounted Rate Totalizer

Model 4200

Installation/Operation Manual

October 2005

Bulletin MNIT055

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Introduction

The Model 4200 Rate/Totalizer is designed to accept frequency or pulse inputs from a wide range of flowmeters and to display flowrate and a re-settable total directly in engineering units. Scaled pulse output is standard. The Model 4200 is fully programmable with K-Factors, linearization of multiple K-Factors, decimal point positions, and timebase being programmed via the front panel switches. The instrument is housed in a durable weatherproof polycarbonate enclosure that can be mounted directly on a flowmeter, panel mounted or wall mounted using a pivoting bracket.

Model Number Designation

Field Mounted Base Unit	
4200 - x0	Battery (Lithium) Powered Version - Pulse Output
4200 - x1	Loop Powered Version w/4-20mA Rate Output
Mounting Options	
1x	Standard Weatherproof Wall Mount/Panel Mount
3x	Standard Weatherproof Swivel Meter Mount Stem 1" FNPT

Quick Setup

The steps below are to be used only if you do not require pulse or analog output.

1. Press and hold the [Program] to enter the programming mode.
2. Press [Program] to skip "Linear".
3. In "Factor" mode.
   a. Press [+] to increase number.
   b. Press [-] to decrease number.
4. Press [Enter/Next] to move cursor left, press [K Factor] to move cursor right.
5. Repeat steps 4 and 5 until entire K Factor is entered.
6. Press [Program] once to show F.dEc (Flow Rate Decimal Point) mode.
   a. Press [+] to increase number.
   b. Press [-] to decrease number.
7. Press [Program] once to show t.dEc (Total Decimal Point).
   a. Press [+] to increase number.
   b. Press [-] to decrease number.
8. Press [Program] once to show tScale (Time Scale) mode.
   a. Press [+] or [-] to change time scale shown.
   b. Sec = rate per second
   c. 60 Sec = rate per minute
   d. Per hr = rate per hour
   e. 24 hr = rate per day.
9. Press [Program] once to "SPULSE" mode.
10. Press [Program] once to "ANALOG" mode.
11. Press [Program] once to "PASS" mode.
12. Press [Program] once to "ACCEPT" mode.
13. Press [Enter/Next] to exit programming mode.

Specifications

Display

Continuously powered LCD

Total

6 digits, 0.5" (12.7mm) high, resettable from the front panel

Rate

6 digits, 0.5" (12.7mm) high

Resolution

16 bits (0.05% of span)

Accuracy

.01% of Total, +/- 1 count

K-Factor

Programmable, pulses per unit of measure, .001 to 999.999

Timebase

Rate displayed in units per second, minute, hour or day

Frequency Range

0.00 Hz to 4250 Hz

Input Signal

Sine wave (20mV P/P min), Pulse, Reed Switch, others

Operating Temperature

-40°F to 158°F (-40°C to 70°C)

Mounting

Meter mount or panel/wall mount

Enclosure

Weatherproof and corrosion resistant

Battery Operated Version

Approvals

Intrinsically safe to Class 1, Div. 1 Grp A,B,C&D; CUL/UL pending

Battery Type

3.6 volt Lithium Battery pack

Battery Life

5 years typical (Without utilizing the Scaled Pulse Output)

Activating pulse out requires additional processing resources that will increase battery drain and shorten battery life.

Connection

Two wire connection to probe

Output Type

Open drain transistor to ground (Resistive closure to ground)

Operating Mode

The Model 4200 Rate Totalizer will display:

Total

Rate

Totals greater than 999,999 are viewable by pressing the "Enter/Next" button. The roll over total screen displays a "r" in the left most position and then any digits in excess of the six that are normally viewable.

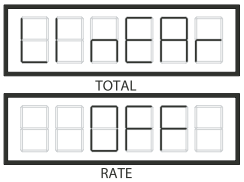
K-factor is viewable by pressing the k-factor button on the keypad, and pressing the k-factor button again will return to the Totalizing display.

Software Version is viewable by pressing the "+" button on the keypad

Program Steps

1. Hold the "Program" button for 5 seconds. This will put the 4200 into programming mode.

2. The first time that the 4200 is setup, the program will take you directly to the K-factor entry screen. The 4200 will now prompt for using a single K-factor or to linearize using multiple K-factors. Selecting "oFF" will use a single K-factor (go to Step 3). Selecting "on" will allow the input of multiple K-factors (go to Step 4).



Button operation:

"Program" = progress to next screen regardless of where cursor is positioned

"Enter/Next" = move cursor left one position

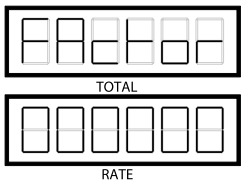
"K-factor" = move cursor right one position

"+" = increments number where cursor is positioned

"-" = decrements number where cursor is positioned

"Reset" = replaces numbers with default and returns the cursor to the right most position

3. Input the appropriate K-factor. Insertion of the decimal position is the last step required to input a new k-factor. After the last numerical position is entered, the "+" and "-" buttons will move the decimal position through the 3 positions. After placing the decimal in the correct position, the "Enter/Next" button will progress the screen. If linearization is required proceed to Step 4. If linearization is not required proceed to Step 7.



Note: *For applications requiring 7-digit K-Factors, please see the following instructions.*

The 4200 requires that you enter only the upper six digits of the seven digit K-Factor and drop the digit that represents the ones position. After entering the last digit, press the "Enter/Next" key. The unit should be displaying just the entered K-Factor with none of the digits flashing. Use the "+" key or "-" key to select the screen that has five decimal points activated such as this ? [0.0.0.0.0.0] . This tells the 4200 that the entered K-factor is a 7-digit factor.

For example: A K-factor of 1222333 would be entered as 122233. With no digits flashing use the "+" and "-" keys to turn on the five decimal points so that the K-factor now appears like this 1.2.2.2.3.3.

To minimize inaccuracy, K-factors with a least significant number greater than five should be rounded up. A K-factor like 1222336 can be entered as 122234.

Button operation:

"Program" = progress to next screen regardless of where cursor is positioned

"Enter/Next" = move cursor left one position

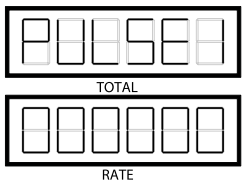
"K-factor" = move cursor right one position

"+" = increments number where cursor is positioned

"-" = decrements number where cursor is positioned

"Reset" = replaces numbers with default and returns the cursor to the right most position

4. Input the 1st pulse rate (Hz) starting with the lowest.



Button operation:

"Program" = progress to next screen regardless of where cursor is positioned

"Enter/Next" = move cursor left one position

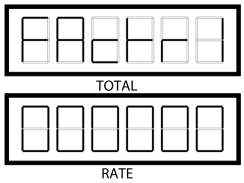
"K-factor" = move cursor right one position

"+" = increments number where cursor is positioned

"-" = decrements number where cursor is positioned

"Reset" = replaces numbers with default and returns the cursor to the right most position

5. Input the 1st k-factor matching the 1st pulse rate entered in the previous step. Insertion of the decimal position is the last step required to input a new k-factor. The decimal position is limited to 3 positions. After the last numerical position is entered, the "+" and "-" buttons will move the decimal position through the 3 positions. After placing the decimal in the correct position, the "Enter/Next" button will progress the screen.



Button operation:

"Program" = progress to next screen regardless of where cursor is positioned

"Enter/Next" = move cursor left one position

"K-factor" = move cursor right one position

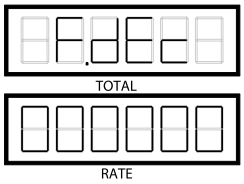
"+" = increments number where cursor is positioned

"-" = decrements number where cursor is positioned

"Reset" = replaces numbers with default and returns the cursor to the right most position

6. Repeat step 4 and 5 for as many different pulse rate and k-factor combinations up to 10 entries. If you have less than 10 combinations to enter, enter "000000" in the next pulse rate prompt to finish combination entry. If you have 10 combinations, after you enter the last k-factor the 4200 will go to the next screen.

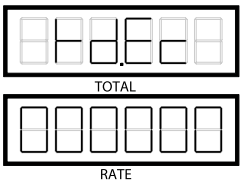
7. Set how many decimal positions you want in the flow rate display.



000000 = no decimal positions
00000.1 = one decimal position
0000.02 = two decimal positions
000.003 = three decimal positions
0000-.1 = flow rate x 10
0000.-2 = flow rate x 100

Button operation:
"Program" = progress to next screen
"Enter/Next" = progress to next screen
"K-factor" = no action
"+" = increments amount of decimal positions
"-" = decrements amount of decimal positions
"Reset" = replaces default

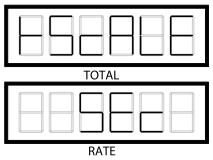
8. Set how many decimal positions you want in the total display.



000000 = no decimal positions
00000.1 = one decimal position
0000.02 = two decimal positions
000.003 = three decimal positions

Button operation:
"Program" = progress to next screen
"Enter/Next" = progress to next screen
"K-factor" = no action
"+" = increments amount of decimal positions
"-" = decrements amount of decimal positions
"Reset" = replaces default

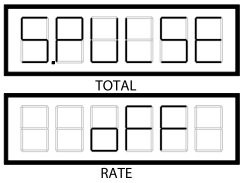
9. Set the time scale in which that the flow rate will be displayed on the display.



SEc = unit of volume per second
60 SEc = unit of volume per minute
PEr hr = unit of volume per hour
24 hr. = unit of volume per day

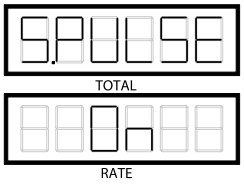
Button operation:
"Program" = progress to next screen
"Enter/Next" = progress to next screen
"K-factor" = no action
"+" = increments unit of time scale
"-" = decrements unit of time scale
"Reset" = replaces default

10. Select "on" for a scaled pulse output. Select "oFF" if a scaled pulse output is not desired (go to Step 13).



Button action:
"Program" = progress to next screen
"Enter/Next" = progress to next screen
"K-factor" = no action
"+" = toggle between "oFF" and "on"
"-" = toggle between "oFF" and "on"
"Reset" = replaces default

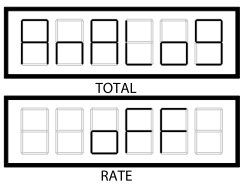
11. Set the scale of the scaled pulse output.



____1 = 1 pulse per 1 increment of least significant digit in total LCD
___10 = 1 pulse per 10 increment of least significant digit on total LCD
__100 = 1 pulse per 100 increment of least significant digit on total LCD
_1000 = 1 pulse per 1000 increment of least significant digit on total LCD
10000 = 1 pulse per 10000 increment of least significant digit on total LCD
100000 = 1 pulse per 100000 increment of least significant digit on total LCD

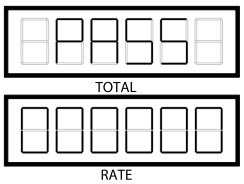
Button operation:
"Program" = progress to next screen
"Enter/Next" = progress to next screen
"K-factor" = no action
"+" = increments scale of pulse output
"-" = decrements scale of pulse output
"Reset" = replaces default

12. This option is not operable or available for the battery powered 4200. Verify that "oFF" is displayed. To select "oFF" push the "+" or "-" key and go to Step 13.



Button operation:
"Program" = progress to next screen
"Enter/Next" = progress to next screen
"K-factor" = no action
"+" = toggle between "oFF" and "on"
"-" = toggle between "oFF" and "on"
"Reset" = replaces default

13. At this point the user has the option to establish a password. Once a password has been set, the 4200 will always prompt the user for a password, before program changes can be made. When no password or the wrong password is entered, the 4200 will go back to the normal display. THE ESTABLISHMENT OF A PASSWORD IS OPTIONAL. If locking the 4200 with a password is not needed, enter "000000" and the 4200 will operate unlocked. **



Button operation:

"Program" = progress to next screen regardless of where cursor is positioned

"Enter/Next" = move cursor left one position

"K-factor" = move cursor right one position

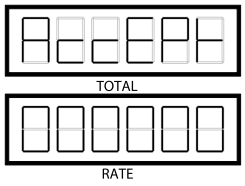
"+" = increments number where cursor is positioned

"-" = decrements number where cursor is positioned

"Reset" = replaces numbers with default and returns the cursor to the right most position

** It is highly recommended that the password function not be used unless it is required. If a password is required write down the password in the manual and keep in a secure location. If you forget the password you must consult the factory for procedures on how to reset the current password.

14. Now the 4200 will prompt for user to accept the password. Display should read 000000 in RATE area of LCD if no password is required



Button operation:

"Program" = return to password screen (step 14)

"Enter/Next" = accepts password and exits program mode

"K-factor" = return to beginning of setup

"+" = return to password screen (step 14)

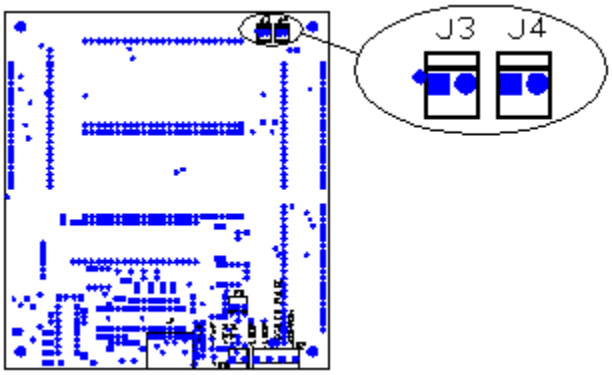
"-" = return to password screen (step 14)

"Reset" = return to password screen (step 14)

Calculation of Rate and Total

Gallons (US) to Barrels (oil).....42.00
Liters to Kiloliters 1000.00
mL to Liters 1000.00
Mgallons to Acre-feet 0.32587

Changing Batteries



New batteries can be purchased through INVALCO or our distributors and replaced in the field.

WARNING - To prevent ignition of flammable or combustible atmospheres, read, understand, and adhere to the manufacturer's live maintenance procedures.

Replace battery with an INVALCO battery assembly ONLY. Battery assembly part number is P524017. The model 4200 is designed to operate on one battery. NEVER attempt to power the unit with two battery assemblies or with a non-INVALCO battery assembly.

There is one Lithium battery pack in each instrument and care must be taken to replace so that there is always power connected to the memory. Connect the new battery pack into J3 or J4 before disconnecting the old battery. Failure to not supply the board with continuous power will result in loss of setup parameters and totals. Please dispose of old batteries by sending them to an Approved Battery Recycle Location.

Typical Connections

Flowmeter Input

The Model 4200 input circuit which will accept signals from most pulse or frequency producing flowmeters. The input will interface directly to:
Turbine Flowmeters
For flow meters with coils, the minimum input voltage is 20mV P-P. See the drawing below and sketches on the next two pages for hook-up information.
1. Squarewave, CMOS or Pulse
2. Reed or Switch
5. Coils (Magnetic Pick-up)

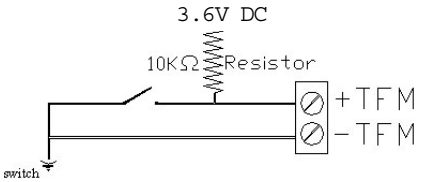
Wiring

When connecting the 4200 it is good practice to use a shielded cable. The shield should be connected to earth at one end of the cable. The other end of the shield should not be connected.

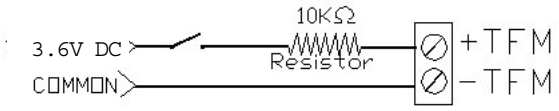
Input Signal Wiring Options

Two-wire coil pickup

Grounded Switch Closure or Reed

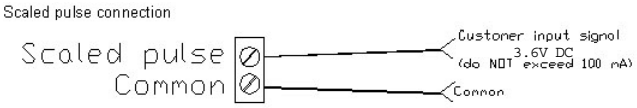


Powered Switch Closure or Reed Switch



Output Wiring Options

Scaled Pulse Connection



The 4200 enclosure is equipped with a “knockout” hole. This “knock-out” is to be used for installation of the cable gland when wiring the unit for scaled pulse output and/ or 4-20mA loop power. (see “Dimensions Page” for knock-out location)

The cable gland is sized for use with multi-conductor cable such as Belden cable size 8771 or 8722.

Installation

Wall Mounting

A wall mounting bracket is supplied with each instrument. The instrument is then attached to the bracket at the bottom with knobs.

Removing the Front Panel:

The front panel of the instrument is removed as follows:

1. Loosen knobs and tilt unit down.
2. Undo the eight screws retaining the front panel.
3. Pull the front panel free from the housing.

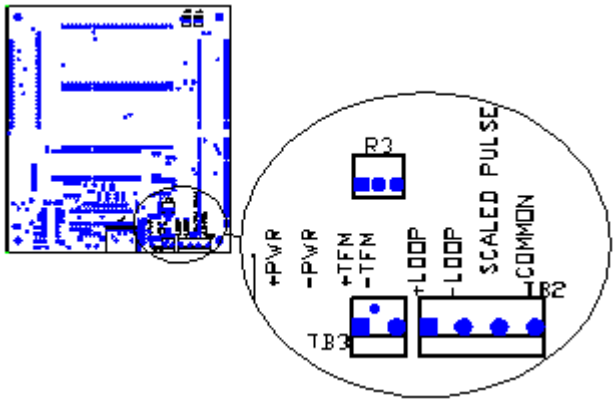
Unit can then be tilted up to access internal components.

The Circuit Board

Terminal Designations

Input - (+TFM)

Input - (-TFM)



Warnings

The 4200s are affected by EMF (Electric Magnetic Fields); due to this the unit needs to be located in an area with little affects from externally omitting EMF devices. The turbine and pickup uses EMF in pulses to calculate rate. Interference in this field by other devices will cause inaccuracies with the meter. Electric motors, spark driven engines, transformers, and other high current or high voltage devices create EMF and should be kept as far away as feasible to lessen their chances of effecting the meter.

Vibration can cause false readings or counted rate when not in use. Portable units should be reset after transport to re-zero the meter. Place meter in a location where it is well grounded, free of vibration and stable when metering.

Intrinsic Safety Connections

When installing the Model 4200 in hazardous areas, the wiring and installation must comply with appropriate installation standards. The Model 4200 will connect directly to turbine or paddlewheel flowmeters with a certified IS coil or other certified IS sensors which produce a pulse output, provided they do not exceed the following input parameters:

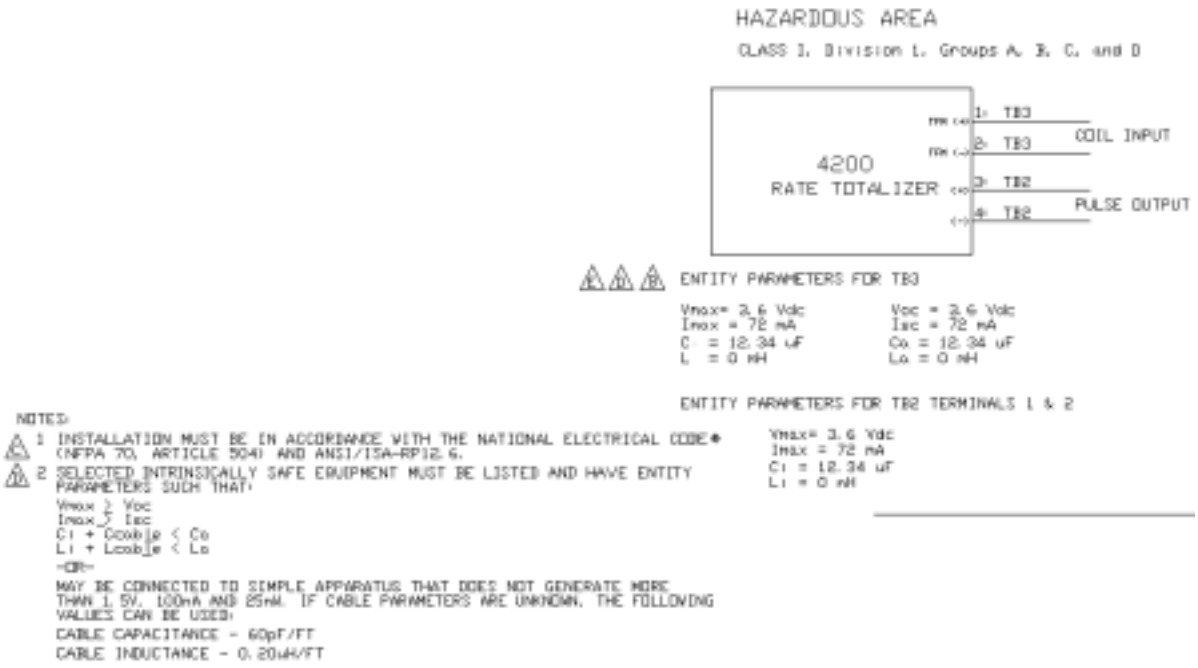
Entity Parameters for TB3

Vmax = 3.6 Vdc	Voc = 3.6
Imax = 72 mA	Isc = 72 mA
Ci = 12.34 uF	Ca = 12.34 uF
Li = 0 mH	La = 0 mH

Entity Parameters for TB2 Terminals 1 & 2

Vmax = 3.6 Vdc
Imax = 72 mA
Ci = 12.34 uF
Li = 0 mH

Control Drawing



Installation must be in accordance with the National Electric Code (NFPA 70, Article 504) and ANSI/ISA-RP12.6.

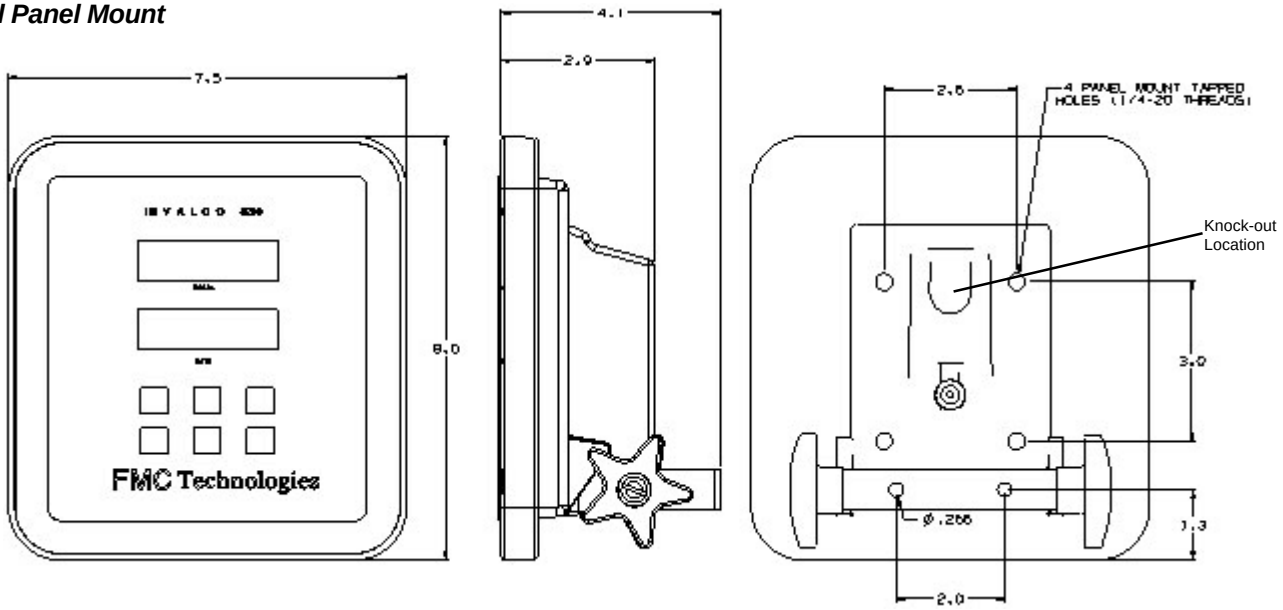
Selected intrinsically safe equipment must be listed and have entity parameters such that:
Vmax * Voc
Imax * Isc
Ci + Ccable * Ca
Li + Lcable * La

-or-

May be connected to simple apparatus that does not generate more than 1.5V, 100mA and 25mW. If cable parameters are unknown, the following values can be used:
Cable Capacitance - 60pF/ft
Cable Inductance - 0.20uH/ft

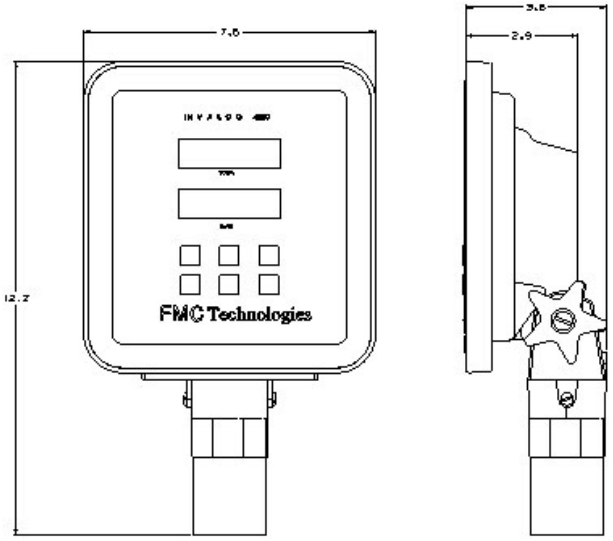
Dimensions

Wall Panel Mount



The 4200 Wall/Panel mounted version can be mounted with an offset utilizing the supplied bracket, or it can be mounted directly to a panel or wall using the 4 tapped holes located on the back of the unit.

Direct Mount



The 4200-30 and 4200-31 are direct mounted. Care must be taken the follow these steps during installation:

1. Screw Pickup into TFM body, hand tight (do not over tighten).
2. Attach wires to Pickup.
3. Loosen screws on swivel (do not remove).
4. Hold totalizer body steady and screw swivel-neck onto TFM threaded adapter. Hand tighten (do not over tighten)
5. Adjust totalizer for required viewing position.
6. Retighten swivel neck screws.

Note: Dimensions - Inches to the nearest tenth (millimeters to the nearest whole mm), each independently dimensioned from respective engineering drawings.

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