



# OPERATING INSTRUCTIONS

## PDFLO™ PDTX2 POSITIVE DISPLACEMENT FLOW METER



## INTRODUCTION

The PDFlo™ PDTX2 is a two-wire, meter mounted flow transmitter that is compatible with most PDFlo flow meters. The PDTX2 is used in a wide variety of applications where ease of operation and flexibility are required. A NEMA 4X enclosure houses a large 6-digit LCD display screen where either flow rate or total is continuously displayed in the customers selected and programmed engineering units. The selection of rate, total, reset of the total, programmable sleep mode and the real-time clock can be done via magnet - without opening the enclosure. A long life field replaceable battery provides power for a period of 4 years - depending on the units configuration.

## SAFETY INFORMATION

Do not attempt to install or use your PDFlo Gear Meters product until you have read the safety instructions in this section. Save this manual and keep it in an easily accessible place.

WARNING means that failure to follow this safety statement may result in extensive product damage, serious personal injury, or death.

CAUTION means that failure to follow this safety statement may result in minor or moderate personal injury, property or equipment damage.

NOTICE is a statement that informs about installation, operation, maintenance, performance issues, or general tips that are important but do not create a hazard or safety concern.

### UNPACKING

Separate the Flow Transmitter from packaging materials and check for any visual signs of damage. If you determine there are damages caused by shipping, file a claim with the shipping company. If the flow transmitter appears to have been improperly assembled or does not operate properly, return it for replacement or repair.

CAUTION: Before connecting, programming, or operating the PDFlo Flow Transmitter, read this manual.

# MODEL NUMBER BUILDER

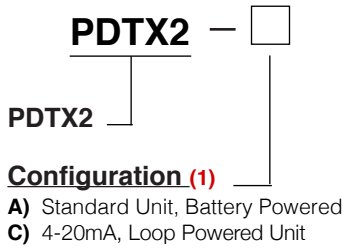
## FLO-CORP MODEL NUMBER BUILDER

For Assistance Call **877.356.5463**

Use the diagram below, working from left to right to construct your FLO-CORP Model Number.  
Simply match the category number to the corresponding box number.

**Example: PDX2-A**

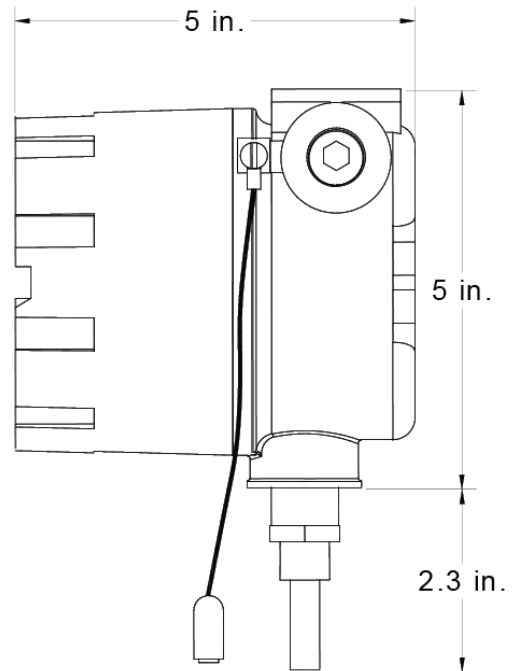
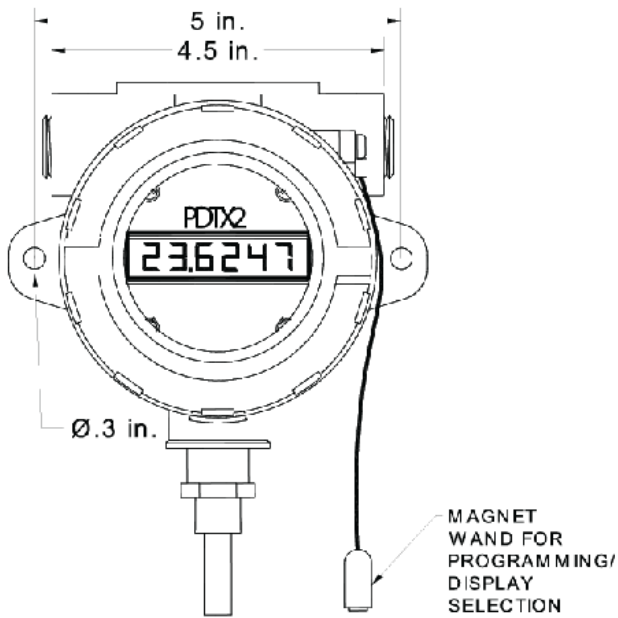
*PDFlo PDX2 Two-Wire meter mounted flow transmitter with standard unit 4-20mA configuration, loop powered*



**Ordering Notes:**

(1) Select the best configuration based on your requirements.

## DIMENSIONS



## CONNECTIONS

Two types of connections are available, depending on your need and the model you choose.  
Loop-Powered Analog Output (loop-powered analog output models only)

A two-wire loop powered 4-20 mA output option with an analog Rate output has 16-bit resolution. Supply voltage is between 12 and 24VDC, with maximum loads from 250Ω at 12VDC to 500Ω at 24VDC.

The PDX2 utilizes the AD421 output device manufactured by Analog Devices. The minimum output is trimmed to 4.00mA by the device manufacturer. Consult the manufacturer's data sheet for complete specifications regarding offset tolerance.

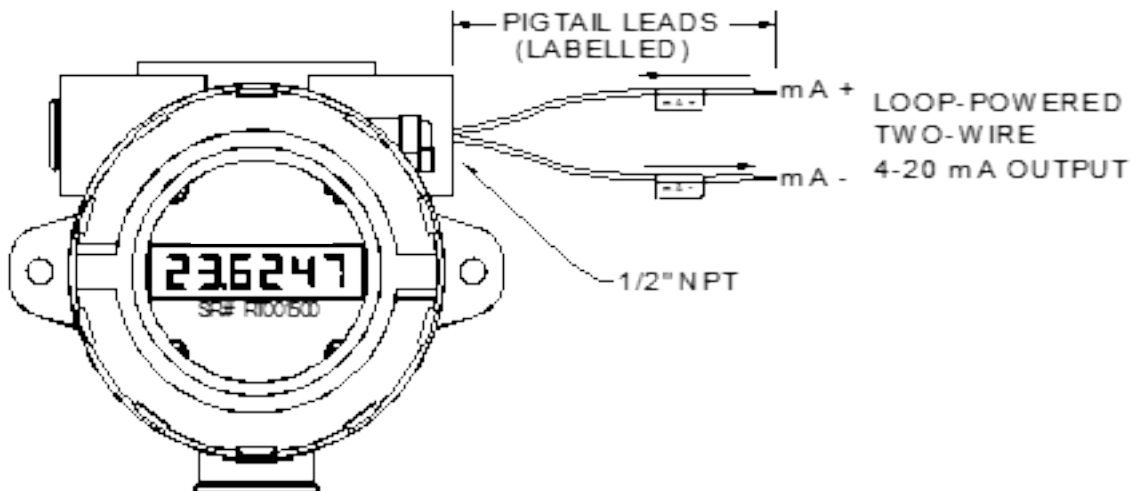
Program the scaling value for the mA output from the Rate display screen. (See ANALOG Scaling for instructions on scaling of the analog output.)

Wiring for the loop powered output option is via pig-tail leads with a 3/4" NPT wire exit for conduit connection. See illustration next page.

**NOTICE:** Connection to conduit is required to maintain the enclosure's hazardous location rating. Make all connections in accordance with local and national electrical codes.

**CAUTION:** Make certain circuits are not live while wiring the PDX2 in a hazardous area. Keep cover tightly closed while circuits are alive.

### Loop-Powered Analog Output



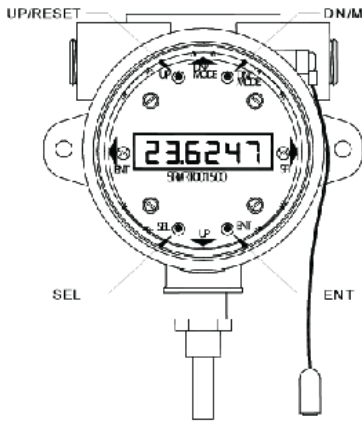
# OPERATION

Use the buttons on the face plate when the cover is off, or the magnet wand when the cover is on, to affect mode and program changes and to reset total.

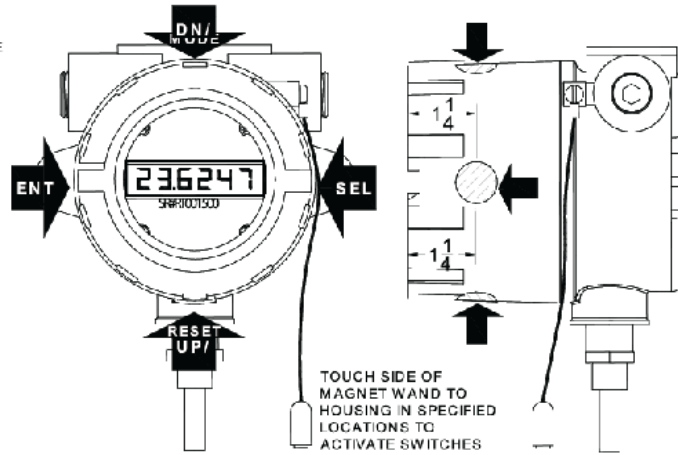
The magnetic switches are located at the 3, 6, 9 and 12 o'clock positions on the side of the housing. Markers on the faceplate of the device indicate the function of each position. Touch the side of the magnet wand to the appropriate location to activate a magnetic switch.

## Button and Magnetic Switch Locations

### BUTTON LOCATIONS



### MAGNETIC SWITCH LOCATIONS



The PDX2 has three main display modes:

- RATE
- TOTAL
- CLOCK

Change the Display Mode by using the DN/MODE button when the cover is open or by using the external magnetic switch. The PDX2 automatically generates two additional displays: SLEEP and LO BATTERY. See below.

### Sleep Mode

In order to conserve the battery, the PDX2 reverts to “sleep” mode after a specific period of inactivity where the device receives no pulses and activates no switches.



### Low Battery

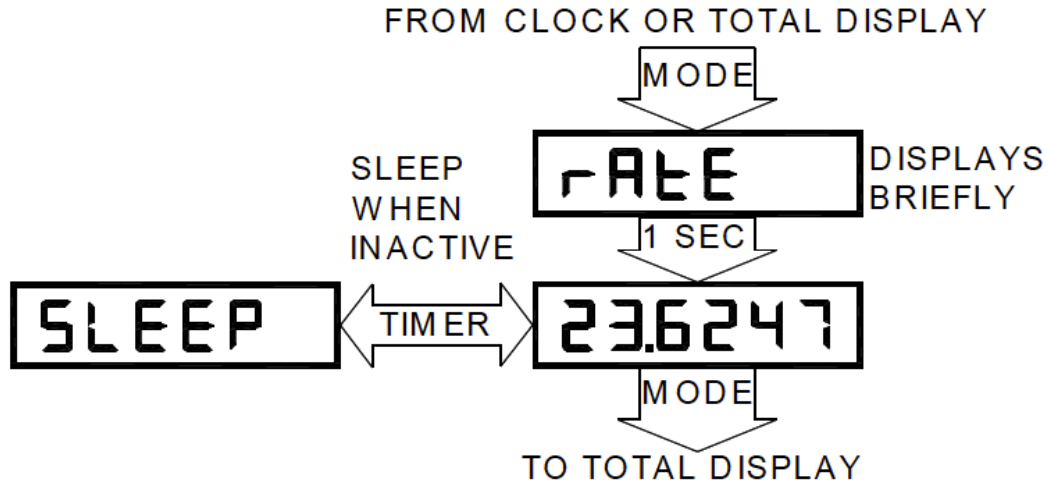
The PDX2 has an ON-time battery timer with a factory-specified limit of 700 to 1400 days, depending on options. After the time limit expires, “Lo Bat” appears briefly on the display whenever you change modes. This means you should change the battery. The device continues to display “Lo Bat” until you change the battery and reset the timer.



## Rate Display Mode

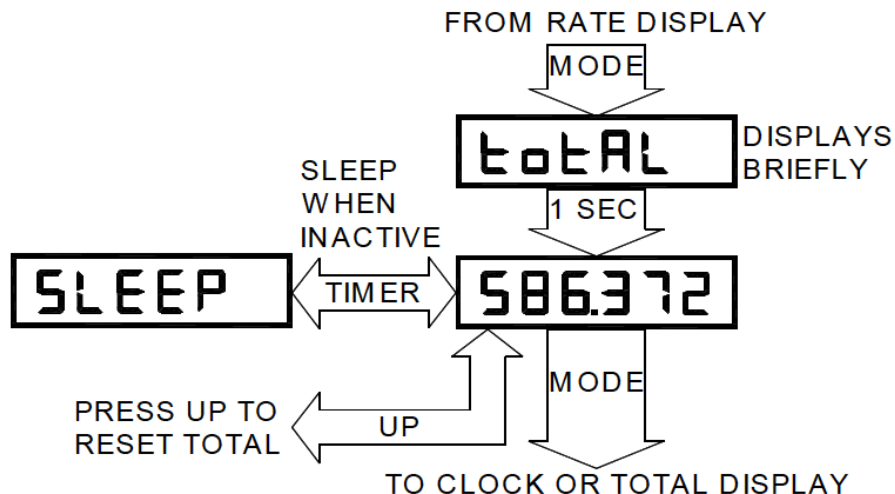
View the Rate using the DN/MODE button when the cover is open, or by using the magnet switch when the cover is closed. As the MODE is changed, “rate” displays briefly. The rate displays initially with five decimal places. The decimal point “floats” to the right as the rate increases. The rate displays based on the number of pulses the PDX2 counts during a “gate time” period.

“Gate time” is programmable. Increasing the gate time interval produces a filtering or averaging effect useful for stable display of uneven or intermittent flows. The Rate display reverts to “sleep” mode after a programmed period of inactivity where the device receives no pulses and activates no switches.



## Total Display

View the Job Total using the DN/MODE button when cover is open, or externally using the magnet switch. As the MODE changes, “total” displays briefly. The total initially displays with five decimal places. The decimal point “floats” to the right as the total increases. The Job Total rolls over to zero when the value reaches 999999. The PDX2 reverts to “sleep” mode after a specific period of inactivity where the device receives no pulses and activates no switches.



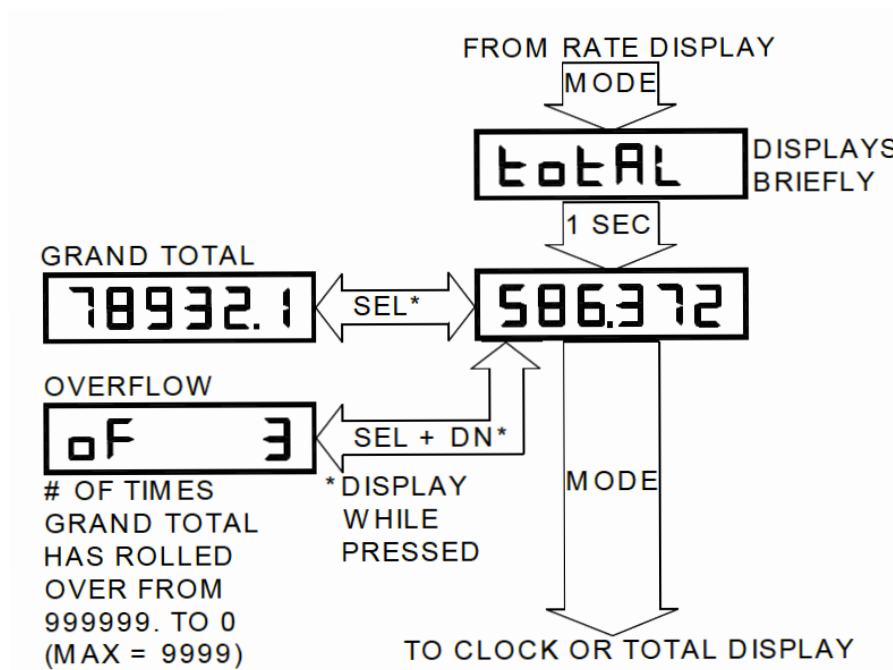
## Total Reset

Reset the Job Total while it is displayed by using the UP/RESET button when cover is open, or the magnet wand when cover is closed.

NOTICE: Total values are maintained and backed-up in non-volatile memory every 24 hours. Backup occurs when the clock reaches 12:00 A.M. A total value accumulated since midnight is lost if you remove or change the battery.

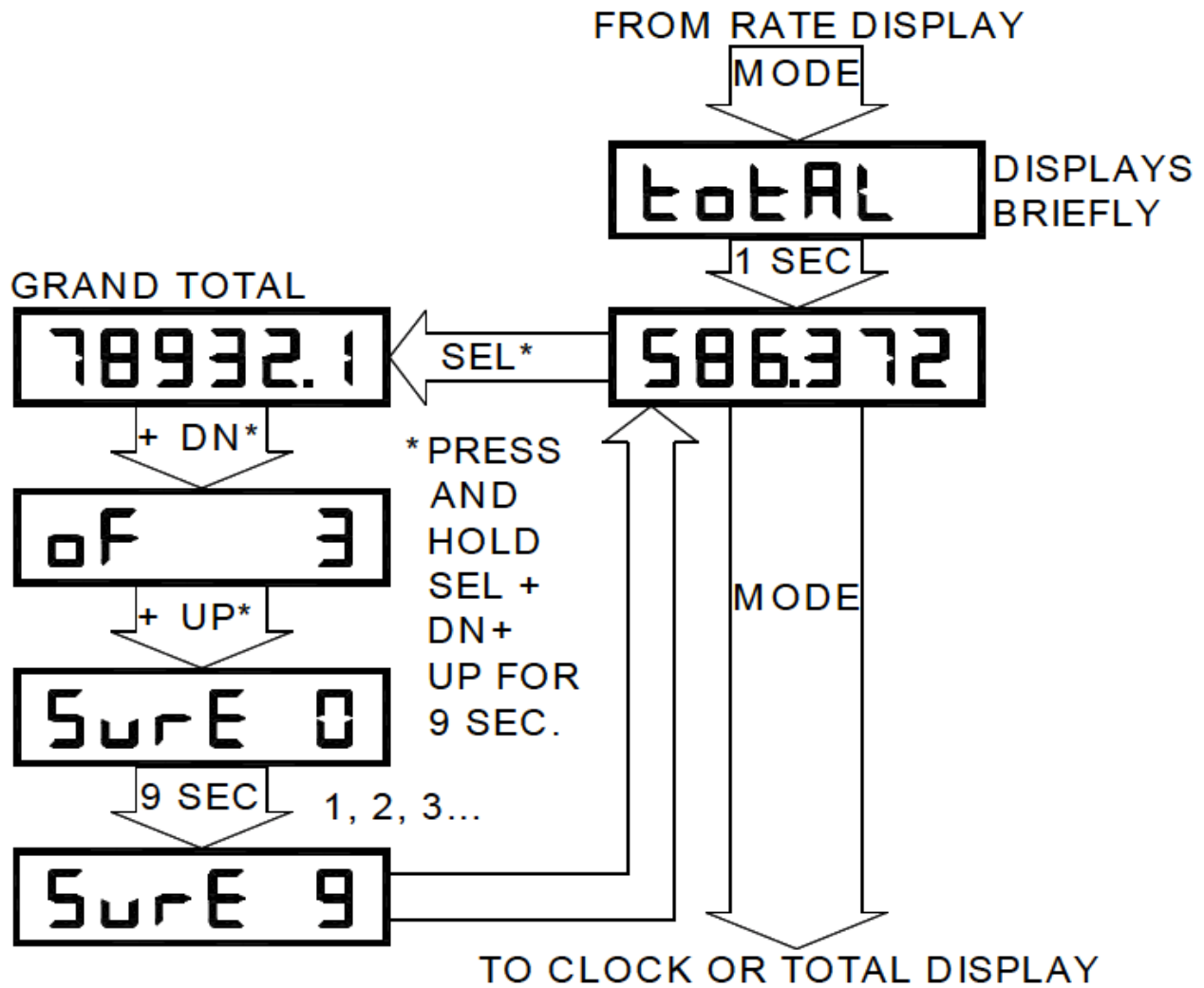
## Grand Total Display

The Grand Total is a second totalizer. It has protection from accidental reset and an overflow counter for a larger capacity. Press and hold the SEL button when the cover is open to view the Grand Total while the Job Total is displayed; externally, use the magnetic switch. The Grand Total only displays as long as you hold the button or activate the magnetic switch. The Grand Total rolls over to zero when the value reaches 999999. An overflow counter keeps track of the number of times the Grand Total has rolled over. You can only view the overflow counter with the cover off by pressing and holding the SEL and DN buttons. See flow chart next page.



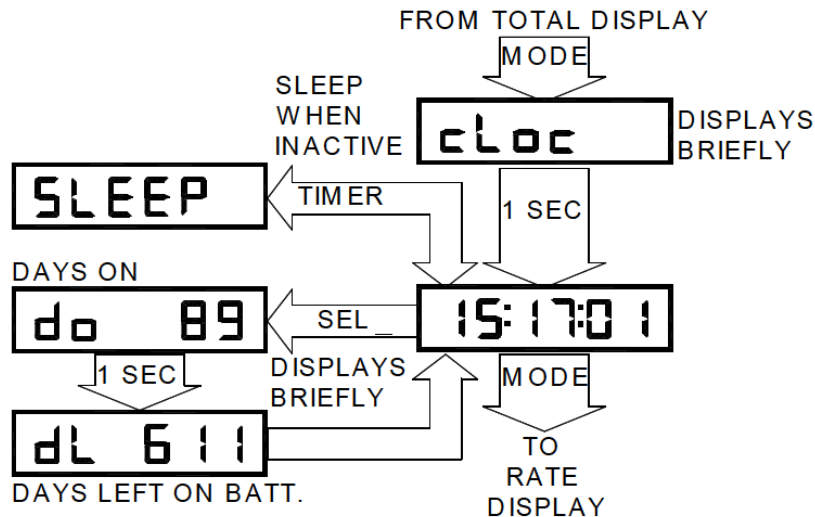
## Grand Total Reset

As security against losing the Grand Total and overflow values, you must hold three keys simultaneously for nine seconds to reset. You can only do this with the cover off. While viewing the Total display, press and hold the SEL and DN and UP buttons for the full nine seconds. The display asks you if you are "SURE" and counts down to reset.



### Clock Display Mode

The real-time clock has a 24-hour format. View it using the DN/MODE button when cover is open or by externally using the magnetic switch. As the MODE changes, “cloc” displays briefly. The PDX2 uses the real-time clock for the Sleep Timer (to conserve energy) and the Battery Timer (for indicating battery life). Use the SEL button or magnetic switch to view the number of days of battery use and the remaining days on the timer. The Clock display reverts to “sleep” mode after a programmed period of inactivity where the device receives no pulses and activates no switches.





## PROGRAMMING THE PDTX2

You can program the PDTX2 in the hazardous area with the cover on using the magnetic switches, or outside the hazardous area with the cover removed using the programming buttons.

**WARNING:** If you remove the cover for programming, you must do this outside the hazardous area. To scale the rate and total displays and the optional analog output, the PDTX2 requires programming of the K-factor, Rate time-base, Gate Time, and Analog Output or Fiber-optic Output Scaling (if applicable). Use the PDTX2's three main display modes to access programming. With their respective variables, these are:

RATE Display	TOTAL Display	CLOCK Display
Time-base for Rate	K-factor (pulses/engineering unit)	Set Time
Gate Time		Sleep Timer
Analog Scaling (loop power option only)		
Frequency Scaling (fiber optic option only)		

Since the Rate Scaling and optional Analog Scaling variables are based on the K-factor, it is best to start by programming the K-factor.

### Total Mode Programming

#### K-Factor in Pulses per Engineering Unit

You will use the Total Display Mode to enter this scaling factor, which is used to display both Rate and Total in an engineering unit such as gallons, ounces, liters or cc's. The K-factor is the number of impulses per engineering unit established by the transducer manufacturer or by a calibration test. An average K-factor is provided for several basic engineering units with each meter on the flow meter calibration sheets.

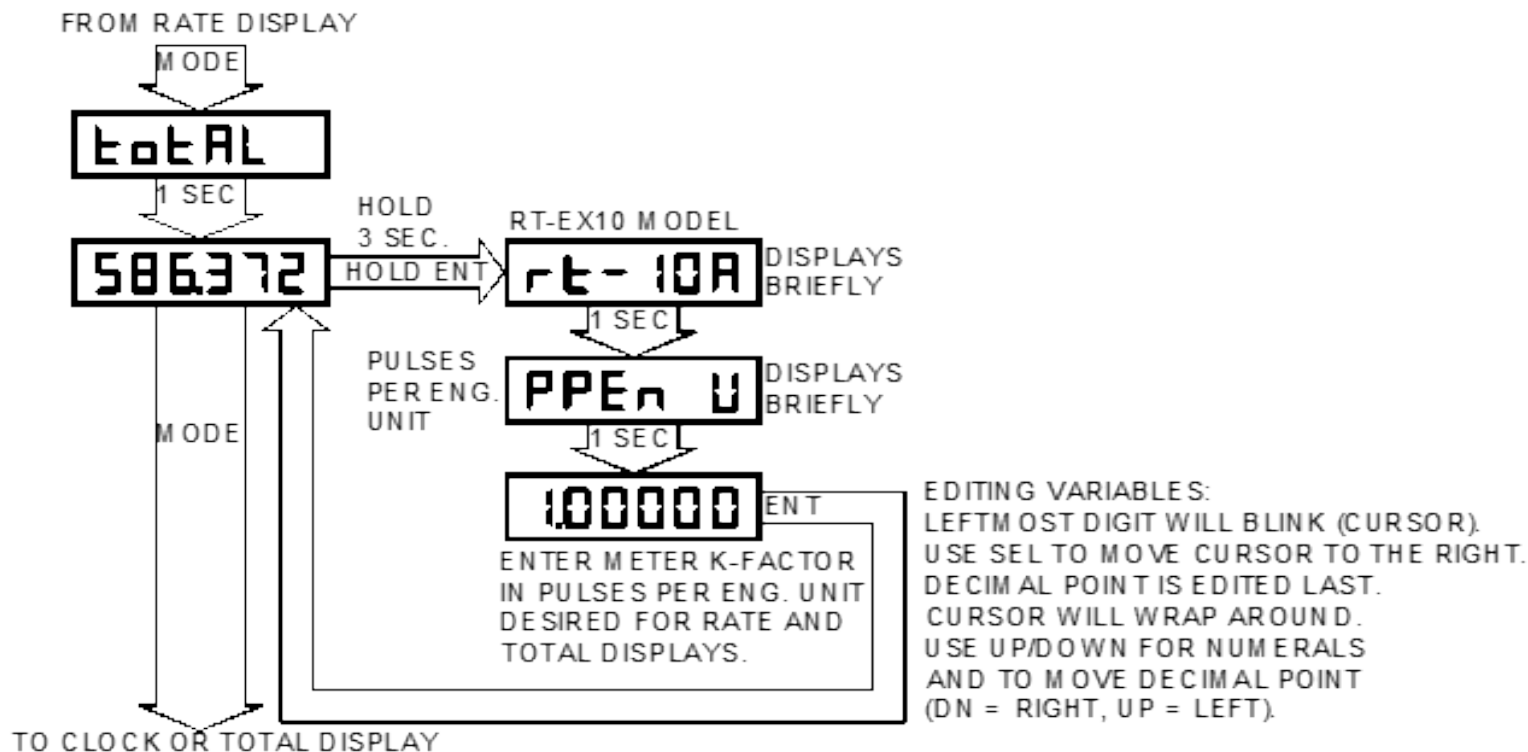
Initial default K-factor is 1.00000 (default displays are: total in pulses and rate in Hz.)

Enter the average K-factor in pulses per desired unit of display directly as it is given on the calibration sheet (up to six digits with a decimal point). You can enter the K-factor with either leading or trailing zeroes.

Use the DN/MODE button or magnetic switch to view the Total Display Mode. Press and hold the ENT button or activate and maintain the ENT magnetic switch for three seconds until the display indicates:



The display then briefly indicates “PPen U” (pulses per engineering unit) followed by the K-factor. When editing the K-factor, the leftmost digit will blink (cursor). Use SEL to move the cursor to the right. The cursor will wrap around. Use UP/DN to increment or decrement numerals. Edit the decimal point last. Use DN to move the decimal point to the right, UP to move it to the left. When the desired value displays, use ENT to store it and exit K-factor programming. See the flowchart below.



### Rate Mode Programming

Program the Rate parameters from the RATE display screen. To view the RATE Display Mode, use the DN/MODE button or magnetic switch.

### Time Base for Rate

Press and hold ENT button or activate and maintain the ENT magnetic switch for three seconds until the display indicates T-base (briefly) followed by the currently programmed time-base. The default is 1 SEC.

Use SEL to select whether the rate is displayed in engineering units per:

1 SEC 60 SEC 1 HOUR 1 DAY

When desired Time Base appears, use ENT to record selection. The display (briefly) shows G-TIME followed by the currently programmed Gate Time value.

## Gate Time

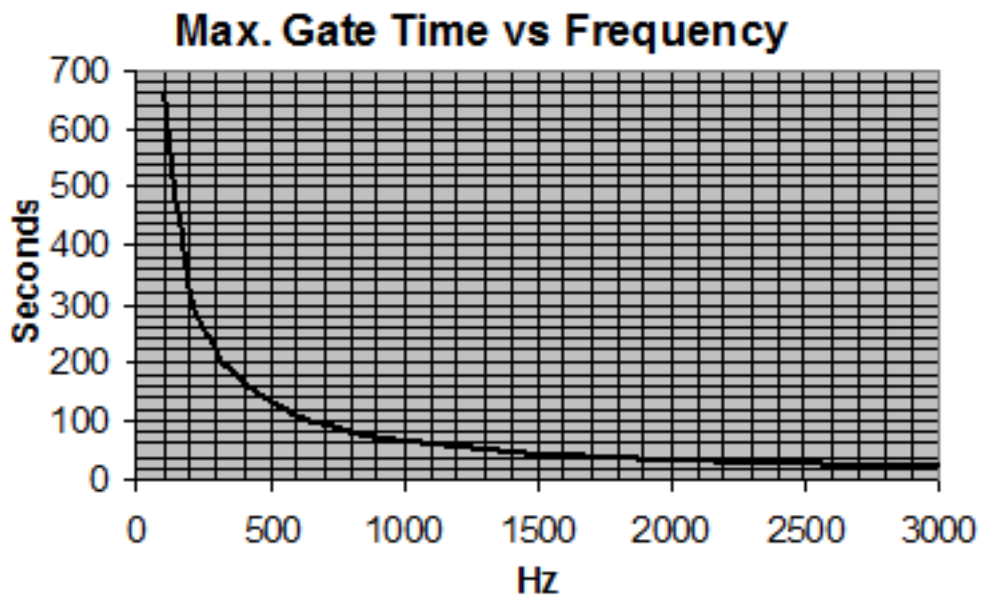
This variable sets the sample time on the incoming frequency for the RATE display and analog output. The Rate display and analog output is based on the number of pulses counted during a prescribed “gate time” period and updates at the programmed “gate time” interval. Increasing the gate time interval produces a filtering or averaging effect useful for stable display and output of uneven or intermittent flows. Gate Time is always programmed in seconds and the minimum Gate Time is 1 second. The default value is 3 seconds. The maximum allowable Gate time depends on the expected maximum input frequency and is determined by the formula:

$$\text{Maximum gate time (seconds)} = 65,535 \text{ counts}/\text{maximum frequency in Hz}$$

To calculate the maximum frequency, use the formula:

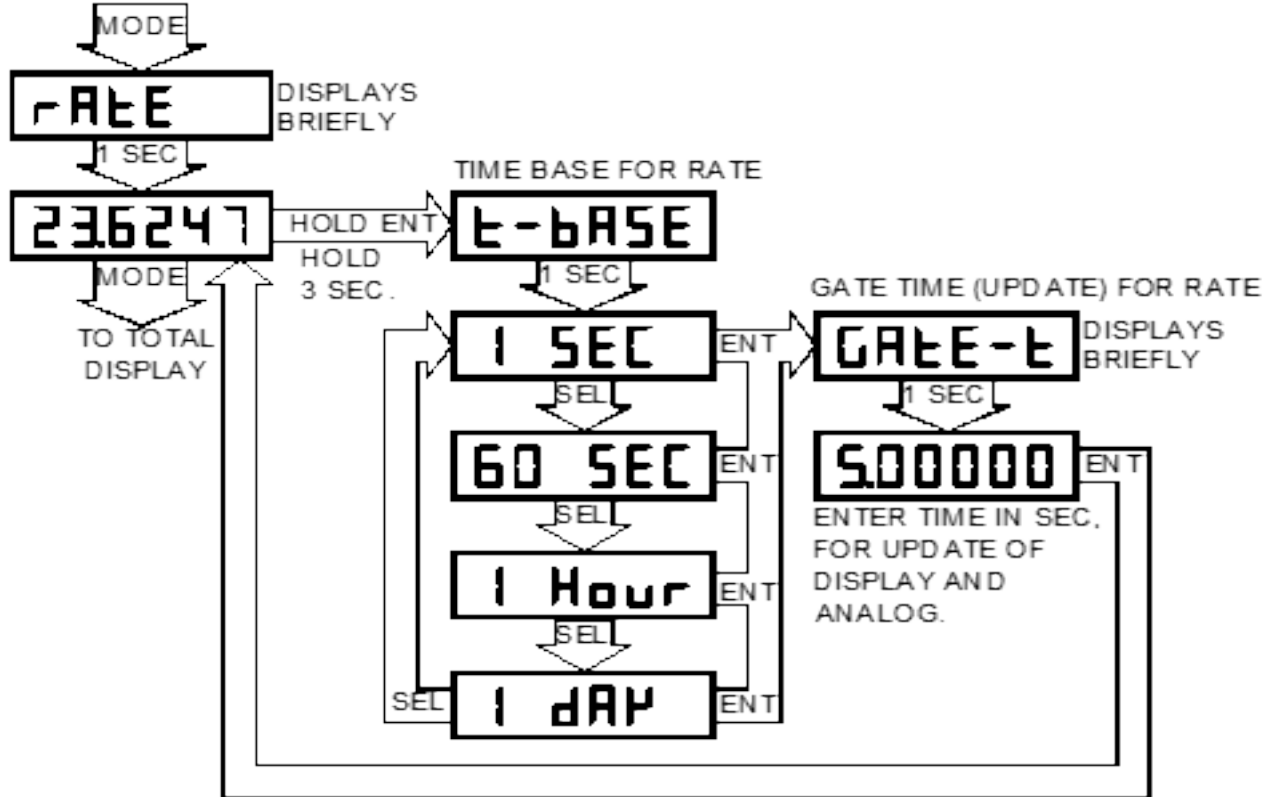
$$\text{Maximum flow rate (engineering unit/sec)} \times \text{K-factor (pulses/engineering unit)} = \text{frequency in Hz}$$

The maximum gate time value versus frequency is represented in the following graph.



When editing the Gate Time variable, the leftmost digit will blink (cursor). Use SEL to move the cursor to the right; the cursor wraps around. Use UP or DN to increment or decrement numerals. Edit the decimal point last. Use DN to move the decimal point to the right, UP to move it to the left. When the desired value displays, use ENT to store the value and exit or advance to the next variable.

FROM CLOCK OR TOTAL DISPLAY



### Analog Scaling (option)

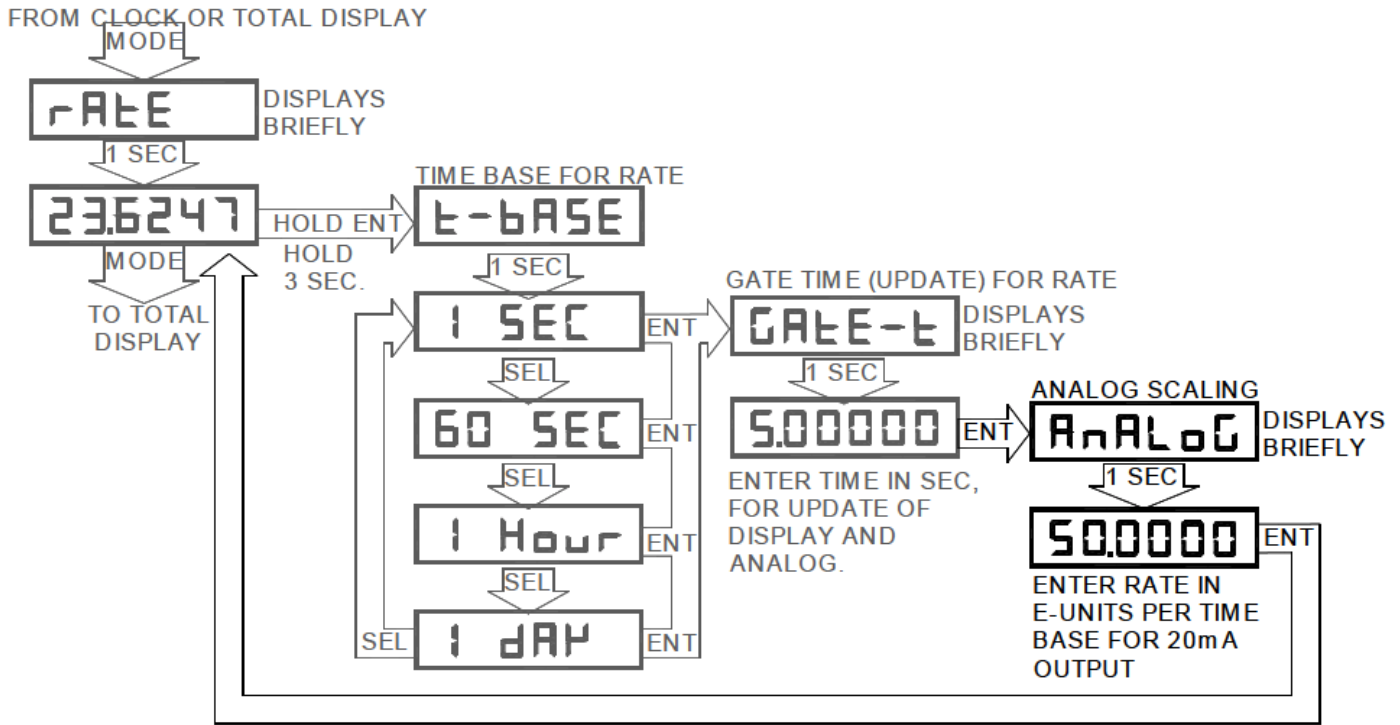
NOTICE: Will not display if model does not include analog output.

The display (briefly) shows ANALOG followed by the currently programmed Analog Scaling value. This scaling variable is used to set the maximum output of 20 mA to a corresponding rate value, which produces an output ranging from 4 mA for a zero value to 20 mA for the programmed flow rate. The default initial value is 50.000 (Hz by default K-factor). Enter the variable directly in the engineering units dictated by the K-factor and Rate Time Base.

Example:

- K-factor entered in pulses per gallon
- Time base programmed for 60 Sec
- Enter 20.000 for 20mA = 20 GPM

When editing the Analog Scaling variable, the leftmost digit will blink (cursor). Use SEL to move the cursor to the right; the cursor wraps around. Use UP/DN to increment or decrement numerals. Edit the decimal point last. Use DN to move the decimal point to the right, UP to move it to the left. When the value displays, use ENT to store the value, exit programming, and return to the RATE display.



**Clock Mode Programming**

Use the Clock Display Mode to set the time on the real-time clock (if necessary), and to program the “Sleep Time.” The Sleep Time determines the length of the period of inactivity (no pulse or switch activity) before the PDX2 “sleeps” to conserve energy.

**Setting the Time**

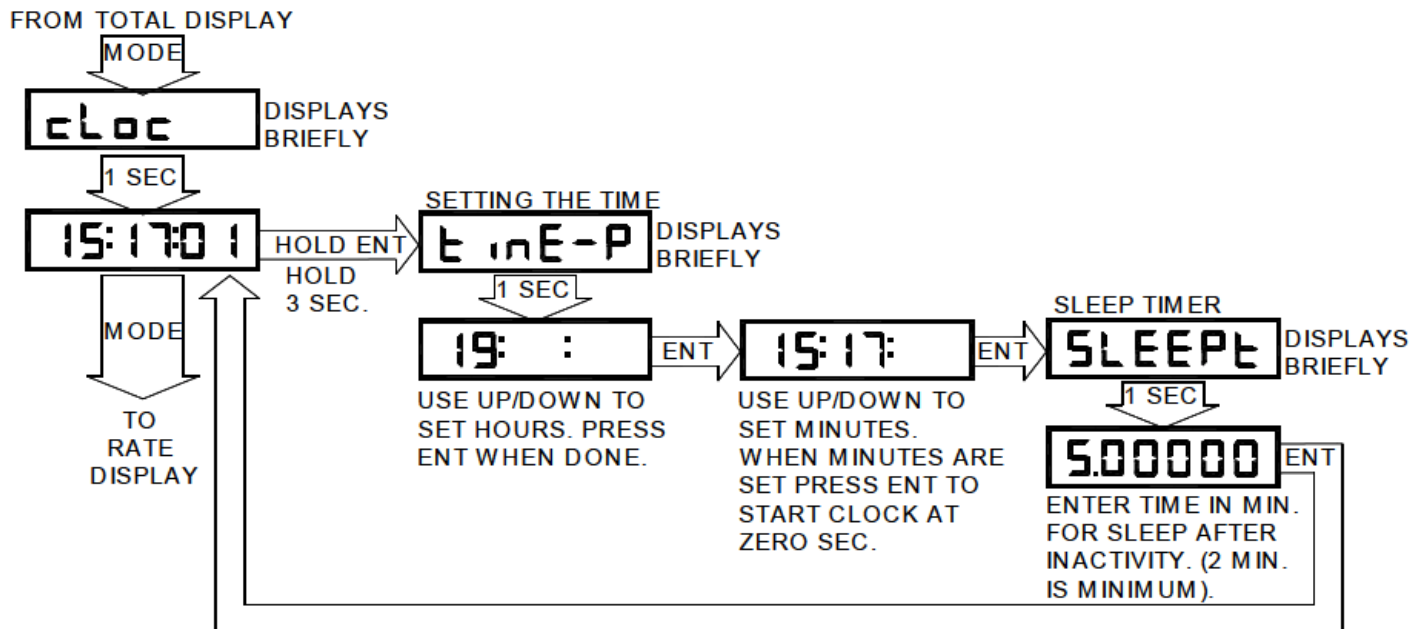
To view the Clock Display Mode, use the DN/MODE button or magnetic switch. Press and hold the ENT button or activate, and maintain the ENT magnetic switch, for 3 seconds until the display (briefly) indicates “tinE-P” (time programming) followed by the current hour (HH: : ), which blinks. Use UP/DN to set the hours and then ENT to continue.

The current minutes (HH:MM: ) become visible and blink. Use UP/DN to set the minutes and then ENT to continue.

NOTICE: Seconds begin at zero the instant you press ENT.

**Sleep Timer**

The display (briefly) indicates “SLEEPt” (Sleep Time) followed by the current Sleep Time value. Program the Sleep Time in minutes; default value is 5 minutes. The minimum value allowed is 2 minutes and the maximum 254 minutes. If you enter a value less than 2 or greater than 254, the display reverts to the minimum or maximum value. When you edit Sleep Time, the leftmost digit blinks (cursor). Use SEL to move the cursor to the right. The cursor wraps around. Use UP or DN to increment or decrement numerals. Edit the decimal point last. Use DN to move the decimal point to the right, UP to move it to the left. When the desired value appears, use ENT to store the value and exit Clock programming.

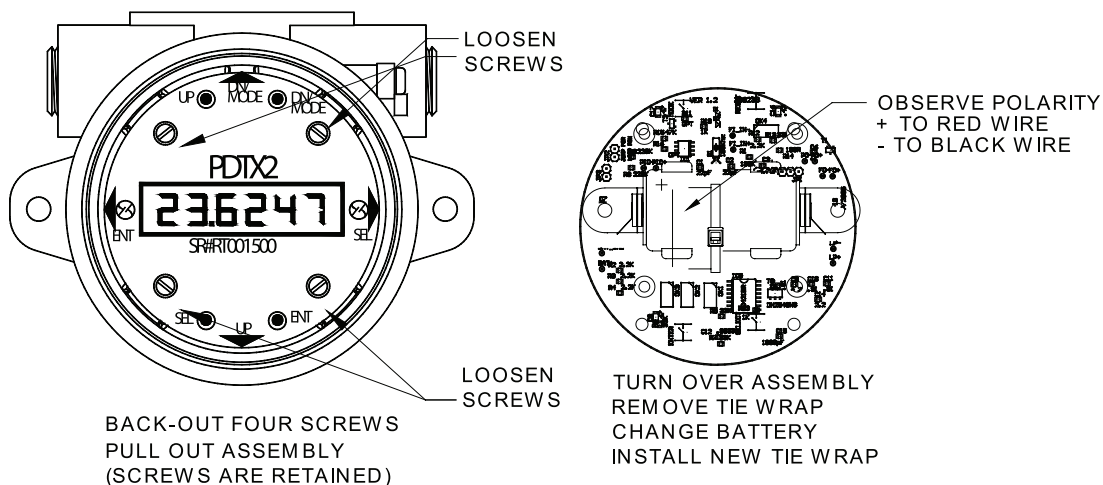


### Changing the Battery

Remove the enclosure cover.

**WARNING:** You must remove the cover outside the hazardous area if dangerous conditions are present.

When the battery timer has expired, LO BAT displays briefly every time you change the display mode to indicate that the expected battery life has been reached. The battery is a 3.6 volt Lithium "C" cell available from FLO-CORP.



## Battery Replacement

To change the battery, follow the steps:

- 1) Locate the four screws recessed behind the faceplate.
- 2) Back these screws out (screws are retained and do not come out completely).
- 3) Carefully remove the faceplate/circuit board assembly and turn it over.
- 4) A tie-wrap secures the battery in the battery holder. Cut the tie-wrap.
- 5) Install new battery making certain the install it in the proper orientation (positive [+] end to the contact with the red wire, the negative [-] end to the contact with the black wire).
- 6) Immediately turn over the assembly and follow the procedure for resetting the battery timer (see below).
- 7) When finished with the reset procedure, install new tie-wrap around battery.
- 8) Reinstall faceplate assembly into housing.

## Resetting the Battery Timer

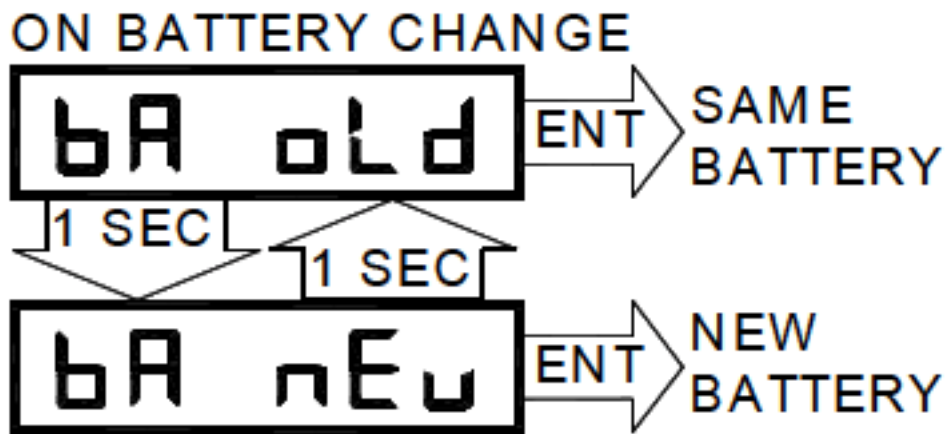
As soon as you place a battery in the holder, the PDX2 alternately displays “bA old” (battery old) and “bA neu” (battery new) several times for approximately one second each. If you have replaced the battery with a new battery, press ENT when “bA neu” appears to reset this battery timer to zero days.

If you re-installed the same battery, press ENT while “bA old” appears; the battery timer will not reset.

Notice: If you do not press ENT before this procedure exits, the timer will not reset.

To return to the reset procedure, briefly remove battery again.

NOTICE: If you do not perform a battery timer reset, the PDX2 continues to display LO BAT briefly whenever the mode changes.



IF BATT. IS REMOVED/REPLACED DISPLAY WILL BLINK OLD/NEW.PRESS ENT WHILE NEW IS VISIBLE TO RESET BATT. TIMER FOR NEW BATTERY. PRESS ENT WHILE OLD IS VISIBLE IF BATTERY WAS NOT CHANGED.

NOTICE: The device maintains total values in memory by battery power. These total values are backed-up in non-volatile memory every 24 hours when the clock reaches 12:00 A.M. The total value accumulated since midnight is lost if you change or remove the battery.