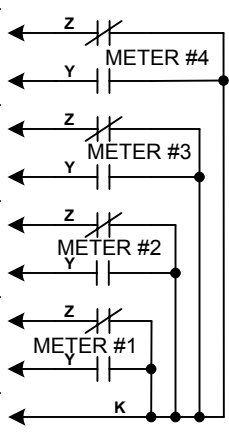
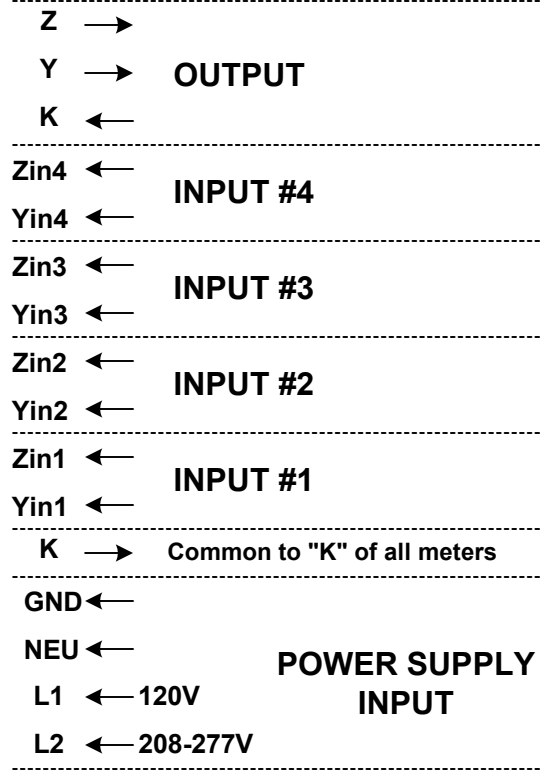
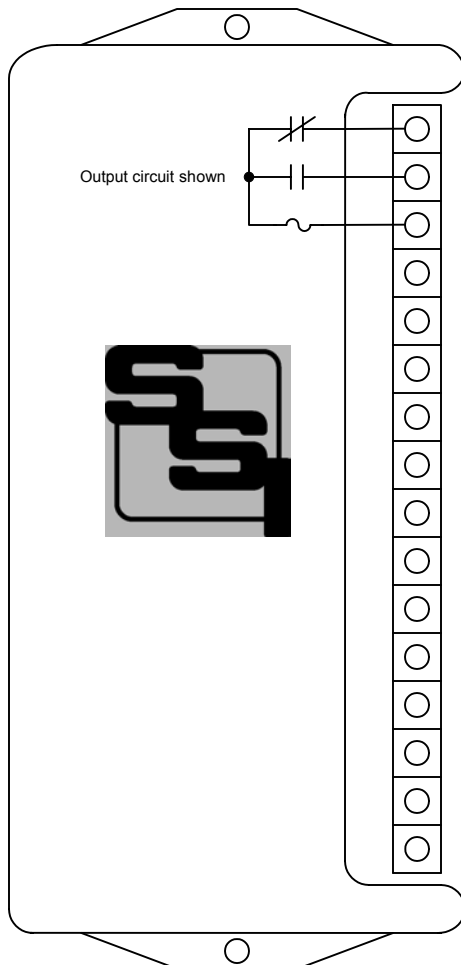


# MPT-4SB

S2 Standard Plus

# PULSE TOTALIZING RELAY INSTRUCTION SHEET



**MOUNTING POSITION** - The MPT-4SB may be mounted in any position.

**POWER INPUT** - To power the MPT-4SB with a 120VAC power supply, use the **NEU** and the **L1** power supply input terminals. For 208, 240 or 277 VAC operation, use the **NEU** and **L2** power supply input terminals. Connect the **GND** terminal to the electrical system ground.

**METER CONNECTIONS** - The MPT-4SB's **K** terminal provides the common return for all of the meters' K terminals. The MPT-4SB accepts only 3-Wire inputs. Connect each meter's Y and Z terminals to the Y and Z terminals of the desired input channel of the MPT-4SB. Each Y and Z input provide its own wetting (sense) voltage to the meter's Y and Z terminals. Meter's pulse output can be dry-contact, solid state or mechanical.

**OUTPUTS** - One three-wire isolated output is provided on the MPT-4SB. Arc suppression for the contacts of the solid-state relay are provided internally. The output loads should be limited to 1/4 Amp by fuse F1. A 1/4 Amp fuse is supplied standard with the unit unless otherwise specified. The fuse is a 3AG (AGC) fast blow type.



## SOLID STATE INSTRUMENTS

a division of Brayden Automation Corp.  
6230 Aviation Circle, Loveland Colorado 80538  
Phone: (970)461-9600 Fax: (970)461-9605  
E-mail: support@solidstateinstruments.com

# PROGRAMMING THE MPT-4SB TOTALIZER

## Version 2.0 Software

The MPT-4SB Pulse Totalizer is programmed by using the three small pushbutton switches (keys) located just above the LCD display. The left key with the yellow cap is the "Move Back" or previous screen key. The middle key with the orange cap is the "Move Forward" key and moves the cursor (the dash under a number on the LCD display) forward from display item to item. The right pushbutton switch (key) with the black cap is used to change the value in the column above the cursor. If the value above the cursor were 5, pressing the black key three times would change the display above the cursor to 8. Continued pressing of the black key would advance the number to the value 9 and then 0, then 1...2...3...4...5...6...7...8...9...0...and so on. When the correct value to be entered is reached, press the orange key to move to the next display item. If the value at the previous display item has changed, the new value will be saved into memory. If no change is desired, just press the orange key again. Pressing the yellow key will move you to the previous screen. All functions of the totalizer are accessible by repeatedly pressing the yellow or orange key. Upon reaching the last screen, and pressing the orange key again, the display will loop back and start again at the first display. Consequently, all the inputs can be changed and saved with a combination of pushes of the yellow, orange and black keys, as the instructions that follow will illustrate.

### START-UP DISPLAY:                      DISPLAYS SOFTWARE VERSION

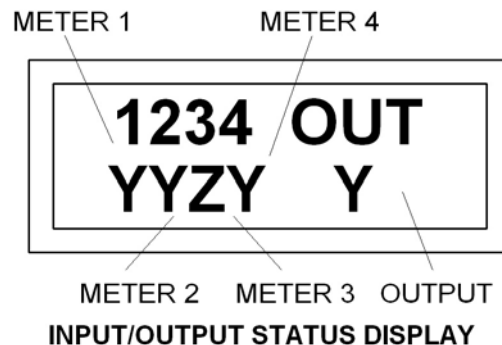
When the MPT-4SB is powered up, the start-up screen will be displayed. This screen displays the Model Number on the top line and software version number of the totalizer on the bottom line. **PRESS THE ORANGE KEY TO GO TO NEXT DISPLAY.**



START-UP DISPLAY

### FIRST DISPLAY:                      STATUS OF INPUTS/OUTPUT

If you (or the meter) cause the "Z2" input terminal to be connected to the MPT-4B's "K" common terminal, meter #2's status shown here on the display will change to a "Z". Each input shows the last transmitted status to the MPT-4SB. Any input which is not used will have a "-" displayed in its position. The "Z" displayed as an output status shows that the contacts between

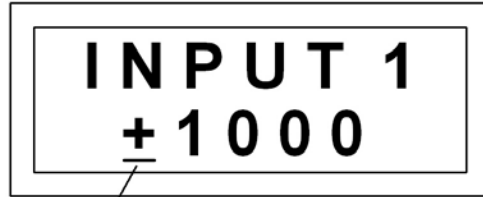


INPUT/OUTPUT STATUS DISPLAY

“K” and “Z” on the output are closed or “made up”. The “K” to “Y” output contacts are open. **PRESS THE ORANGE KEY TO GO TO NEXT DISPLAY.**

**SECOND DISPLAY: METER #1 KWH/PULSE VALUE**

The second display is the KWH/PULSE value programmed in for METER #1. The value of each digit may be changed by first moving the cursor to the digit desired using the **ORANGE KEY**. To change the digit's value press the **BLACK KEY**. In the first position, pressing the **BLACK KEY** will toggle the plus sign to a negative sign and back again. Set the correct sign of the number. Press the **ORANGE KEY** to advance the cursor to the first number position. Press the **BLACK KEY** any number of times until the desired number is displayed. Press the **ORANGE KEY** once to move to the second number's position. Press the **BLACK KEY** any number of times until the desired number in the second number position is reached. Press the **ORANGE KEY** once. Enter the third number with the **BLACK KEY**. Press the **ORANGE KEY** again and enter the fourth number with the **BLACK KEY**. This time when you press the **ORANGE KEY**, you will advance to the third display.

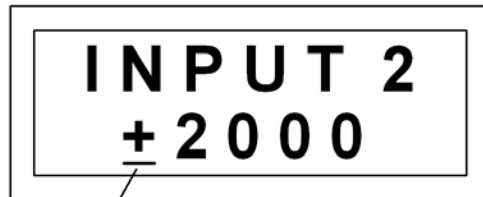


CURSOR

METER #1 KWH/P VALUE DISPLAY

**THIRD DISPLAY: METER #2 KWH/PULSE VALUE**

The third display works to input KWH/PULSE values for METER #2 in the same manner as display #2 worked for METER #1.

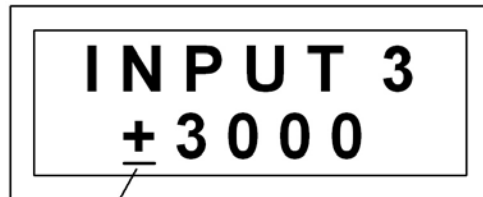


CURSOR

METER #2 KWH/P VALUE DISPLAY

**FOURTH DISPLAY: METER #3 KWH/PULSE VALUE**

The fourth display works to input KWH/PULSE values for METER #3 in the same manner as display #2 worked for METER #1.

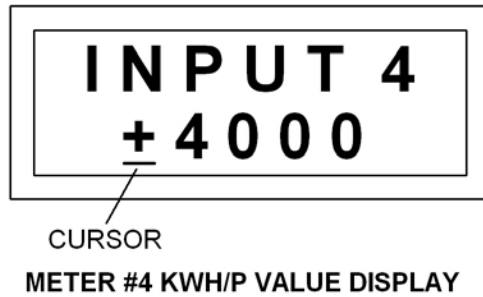


CURSOR

METER #3 KWH/P VALUE DISPLAY

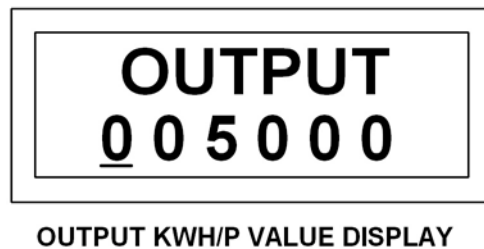
**FIFTH DISPLAY: METER #4 KWH/PULSE VALUE**

The fifth display works to input KWH/PULSE values for METER #4 in the same manner as display #2 worked for METER #1.



**SIXTH DISPLAY: TOTALIZER OUTPUT KWH/PULSE VALUE**

The sixth display, unlike the preceding meter value displays, has 6 digits that may be set. It is set in the same manner as the meter displays. When the PV Total is equals or exceeds this value, the output pulse value is subtracted from the PV Total, and causes an output pulse (a change of state of the output relay) to occur. This value must be greater than or equal to 1 (one). If the user inadvertently puts zero (0) in this field, a one (1) will be automatically placed on the LCD in the furthest right position. The desired output value may then be entered.



**SEVENTH DISPLAY: TIME BETWEEN OUTPUT PULSES**

The seventh display allows you to set a minimum time between output pulses to accommodate differences in required recording equipment and relay minimal make-up times. The time is set in 10-millisecond increments. The minimum time is 20 milliseconds. The maximum time is 1000 milliseconds (1 second). The entry method is the same as that used to set the meter input values.



**EIGHTH DISPLAY: PULSE VALUE REGISTER CONFIGURATION**

The eighth display allows you to configure the PULSE VALUE TOTAL register to allow both a positive or negative balance, OR a



positive balance only. The default setting is “Y” (for “yes”) - to allow the register balance to go negative. Press the **ORANGE** key to move to the next setting.

If you desire to set the MPT-4SB so that the pulse value register will be positive (or zero) ONLY, press the **BLACK** key to change the “Y” to an “N”. If you select the “N” (or “no”) value to this setting, the register will count down to zero but will not go negative. It will remain at zero until such time that enough positive pulses occur to make the pulse value register increment upwards. Press the **ORANGE** key to move to the next setting. If the MPT-4SB has been running and has accumulated a negative value in the PV TOTAL register, AND the user changes the ALLW NEG value from “Y” to “N”, the PV TOTAL value is reset to zero(0).



**DO NOT ALLOW NEGATIVE  
ACCUMULATOR DISPLAY**

**NINTH DISPLAY: PULSE VALUE TOTAL DISPLAY**

The ninth display shows the accumulated numerical value contained within the processor’s memory at any given time. For example, assume that you have set METER #1’s input pulse value to +2000, all other METER inputs to 0000, an OUTPUT pulse value of 005000 and a TIME BETWEEN PULSES value of 500 mS. Upon entering three (3) pulses into METER #1’s input, several things happen. First, the pulse accumulator registers a value of 6000 (3 pulses X 2000/pulse). Since the accumulator is greater than the Output Pulse Value setting (5000), an output pulse occurs. Next, 5000 (the output value) is subtracted, leaving a display of 1000 in the PV TOTAL display. Finally, if the total in the PV had still exceeded 5000, then after 500mS, another output pulse would have occurred. The remainder will usually be smaller than the output pulse value and is only awaiting sufficient pulses at the meter inputs before a new output pulse is generated and a new smaller remainder calculated. The contents of the PV TOTAL register is stored in the totalizer’s non-volatile memory upon loss of power.



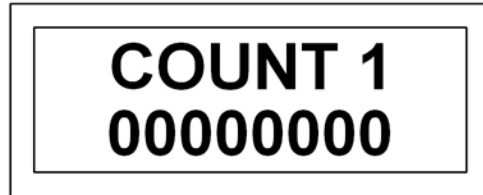
**PULSE VALUE DISPLAY**

In general, the PV TOTAL display will show the result of mathematical operations. After an output pulse, the remainder will usually be smaller than the output pulse value and is only awaiting sufficient pulses at the meter inputs before a new output pulse is generated and a new small remainder calculated. If the Pulse Value Total register is configured to go positive or negative, and more negative pulses are received than positive pulses, the PV TOTAL value will go negative, as indicated by the change of sign from “+” to “-“. Once more positive

pulses occur than negative pulses, the negative balance in the PV TOTAL register must be made up, AND the Pulse Output Value must be reached, before any output pulses will occur. If the PV TOTAL register is set for a *positive balance only*, once the register reaches zero, it will remain at zero until such time as positive pulses are again received. In this configuration, once the PV TOTAL register reaches zero, all negative pulses are ignored.

**TENTH DISPLAY: INPUT PULSE COUNT – METER #1**

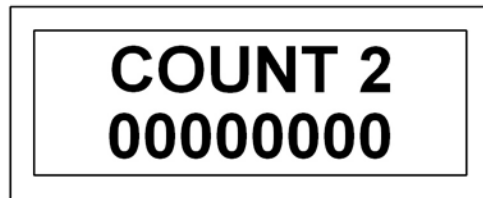
The tenth display allows you to see the total number of pulses that have been counted by meter input #1 since the last reset. This number is simply a counter that increments by one (1) count each time a pulse is recorded by meter input #1. This value is non-weighted and represents the number of counts only. This count is saved in non-volatile memory upon loss of power. Press the **ORANGE KEY** to advance to the next display.



**METER #1 PULSE COUNT DISPLAY**

**ELEVENTH DISPLAY: INPUT PULSE COUNT – METER #2**

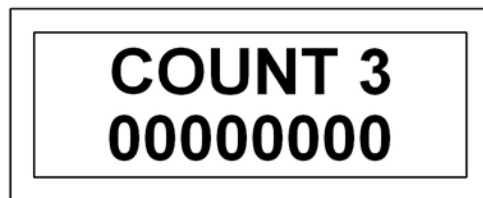
The eleventh display allows you to see the total number of pulses that have been counted by meter input #2 since the last reset. This number is simply a counter that increments by one (1) count each time a pulse is recorded on meter input #2. This value is non-weighted and represents the number of counts only. This count is saved in non-volatile memory upon loss of power. Press the **ORANGE KEY** to advance to the next display.



**METER #2 PULSE COUNT DISPLAY**

**TWELFTH DISPLAY: INPUT PULSE COUNT – METER #3**

The twelfth display allows you to see the total number of pulses that have been counted by meter input #3 since the last the reset. This number is simply a counter that increments by one (1) count each time a pulse is recorded on meter input #3. This

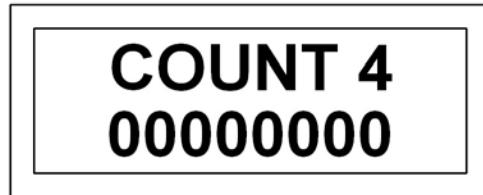


**METER #3 PULSE COUNT DISPLAY**

value is non-weighted and represents the number of counts only. This count is saved in non-volatile memory upon loss of power. Press the **ORANGE KEY** to advance to the next display.

**THIRTEENTH DISPLAY: INPUT PULSE COUNT – METER #4**

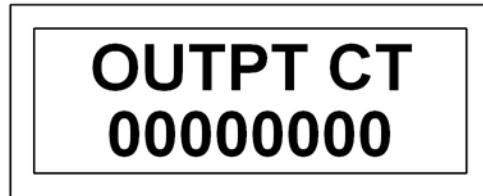
The thirteenth display allows you to see the accumulated total number of pulses that have been counted by meter input #4 since the last reset. This number is simply a counter that increments by one (1) count each time a pulse is recorded on meter input #4. This value is non-weighted and represents the number of counts only. This count is saved in non-volatile memory upon loss of power. Press the **ORANGE KEY** to advance to the next display.



**METER #4 PULSE COUNT DISPLAY**

**FOURTEENTH DISPLAY: OUTPUT PULSE COUNT**

The fourteenth display allows you to see the total number of output pulses that have been outputted since the last reset. This number is a counter that increments by one (1) count each time an output pulse occurs (the output relay's state is changed to the opposite state). This value is non-weighted and represents the number of counts only. This count is saved in non-volatile memory upon loss of power. Press the **ORANGE KEY** to advance to the next display.



**OUTPUT PULSE COUNT DISPLAY**

**FIFTEENTH DISPLAY: RESET COUNTERS**

The fifteenth display allows you to reset the four INPUT counters, the OUTPUT counter, and the PV TOTAL register, all at one time. The default of this display is "N" for no. To go back to the status display and not reset the totals, press the **ORANGE KEY**.



**RESET COUNT DISPLAY**

To reset all counters to zero, press and hold down the **BLACK KEY** for 3 seconds. A “Y” will be displayed, indicating that you are correctly pressing the key.



RESET COUNT DISPLAY

Once the MPT-4SB has correctly reset all counters to zero, the display will indicate DONE. Let off the **BLACK KEY**. Upon releasing the **BLACK KEY**, the display will automatically jump back to the first display, the Status display.



RESET COUNT DISPLAY

**INFORMATION ON SCALING OF VALUES FOR DATA ENTRY**

Most totalizers are ratio devices, and the MPT-4SB is no different. By a “ratio device” we mean that if the number in the right most column of the value for meter #1 is the “ones” value for KWH/PULSE, then all other values in the right-hand most column will also represent “ones”. The second column to the left of the right column will represent “tens” values. The third column will represent the “hundreds” values, etc. This means that the decimal point, when used, can be located between any two columns or to the left or right of the first or last digit. However, once the decimal point is placed in a column, it must run top to bottom in that position only.

**EXAMPLES**

**CORRECT**

METER #1	+1.1000
METER #2	+1.1234
METER #3	+1.2345
METER #4	+1.3456
OUTPUT	05.0000

**CORRECT**

METER #1	+1.000
METER #2	+1.234
METER #3	+2.345
METER #4	+3.456
OUTPUT	05.000

**INCORRECT**

METER #1	+1.1000
METER #2	+1.1234
METER #3	+1.2345
METER #4	+345.6
OUTPUT	05.0000

**INCORRECT**

METER #1	+1000.
METER #2	+123.4
METER #3	+23.45
METER #4	+3.456
OUTPUT	00.5000

While we have used KWH/PULSE for the pulse values throughout this document, the values could be watts, megawatts, gallons or any other common unit of measure.

**TECHNICAL SUPPORT**

For additional information or technical help, call Brayden Automation Corp./Solid State Instruments division at (970) 461-9600 or toll free at (888)BRAYDEN.

**INSTALLATION RECORD**

METER

NAME/NUMBER.....

METER LOCATION.....

DATE INSTALLED.....

TOTALIZER TYPE..... **MPT-4SB**

SOFTWARE VERSION .... **VERSION 2.0**

MANUFACTURER..... **SOLID STATE INSTRUMENTS**

A division of Brayden Automation Corp.

6230 Aviation Circle

Loveland, CO 80538

HELP ..... (970) 461-9600

**FILL OUT BEFORE PROGRAMMING TOTALIZER**

METER # 1 CIRCUIT NAME ..... KWH/PULSE

METER # 2 CIRCUIT NAME ..... KWH/PULSE

METER # 3 CIRCUIT NAME ..... KWH/PULSE

METER # 4 CIRCUIT NAME ..... KWH/PULSE

OUTPUT VALUE ..... KWH/PULSE

NOTE: The MPT-4SB does not actually display a decimal point. Simply decide where you want the decimal point to be and enter all numbers accordingly. When entering your values on the above record/worksheet, all decimals for data entries **must** be in a vertical straight line for the math to work correctly. The decimal point may be between, before or after any column.