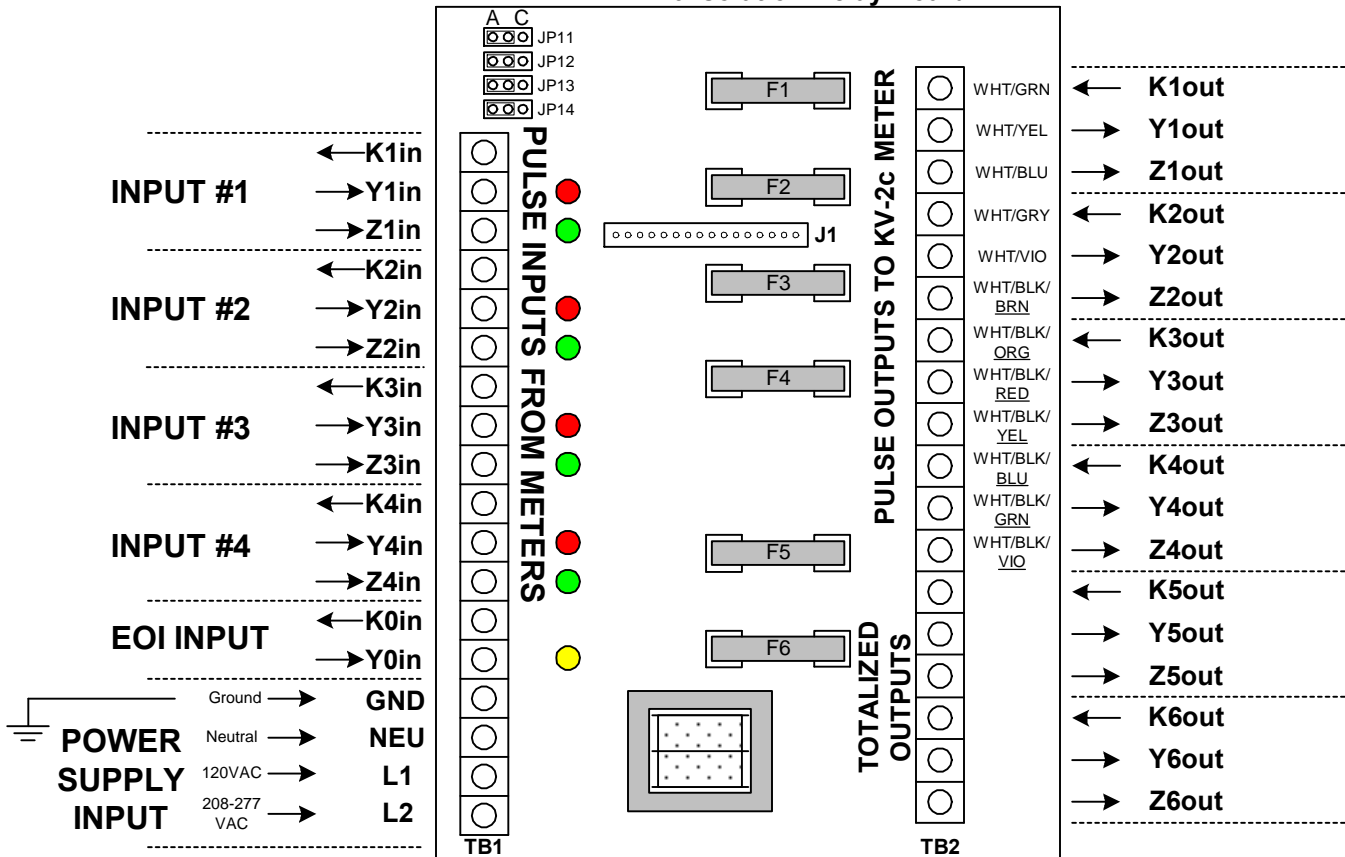




INSTRUCTION SHEET

MPT-440 ISOLATION RELAY/TOTALIZER

MPT-440 Isolation Relay Board

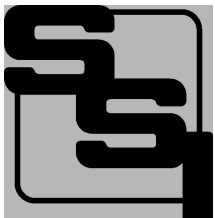


MOUNTING POSITION - The MPT-440 may be mounted in any position.

POWER INPUT - The MPT-440 can be powered by 120VAC or 208 to 277VAC. Connect the Neutral lead to the **NEU** terminal. For 120VAC operation, connect the 120VAC "Hot" lead to the **L1** terminal. For 277VAC operation, connect the 277VAC "Hot" lead to the **L2** terminal. **Do not use both L1 and L2.** If true Neutral does not exist at the meter, (or at the location that the MPT-440 is mounted), connect both **NEU** and **GND** to Ground.

GROUND - The **GND** terminal on the **left** side of the board (Terminal #4) is the electrical system ground. Connect this terminal to the electrical system ground. For proper handling of noise and transients, this **MUST** be connected to Ground and should not be left unconnected.

KYZ INPUTS TO MPT-440 - The MPT-440 has four 2-wire (Form A) or 3-wire (Form C) inputs which receive pulses on TB1 from four meters' pulse outputs. The MPT-440's supplies a +13VDC wetting voltage from the Y and Z terminals to "wet" the meter's output contacts. As the pulse output of the meter toggles, the Y and Z inputs are alternately switched with continuity to the K terminal, thus activating the MPT-440's isolated outputs. When the Y input of each channel receives a pulse from the meter, the corresponding Red LED will light and the corresponding Yout will close. When the Z input receives a pulse the channel's Green LED will light and its corresponding Zout will close. Input pulses from the meter are "echoed" on the corresponding "straight-thru" outputs of the MPT-440. The straight-thru inputs can be set independently of the totalizer software. Each outputs' corresponding input can be set for 2-wire (Form A) or 3-Wire mode. Jumpers JP11-14 should be kept in the normal Form C mode unless the special Form A mode is required on the inputs and Form C mode is required on the straight-thru isolation relay outputs. In this case, use the Form A jumper position.



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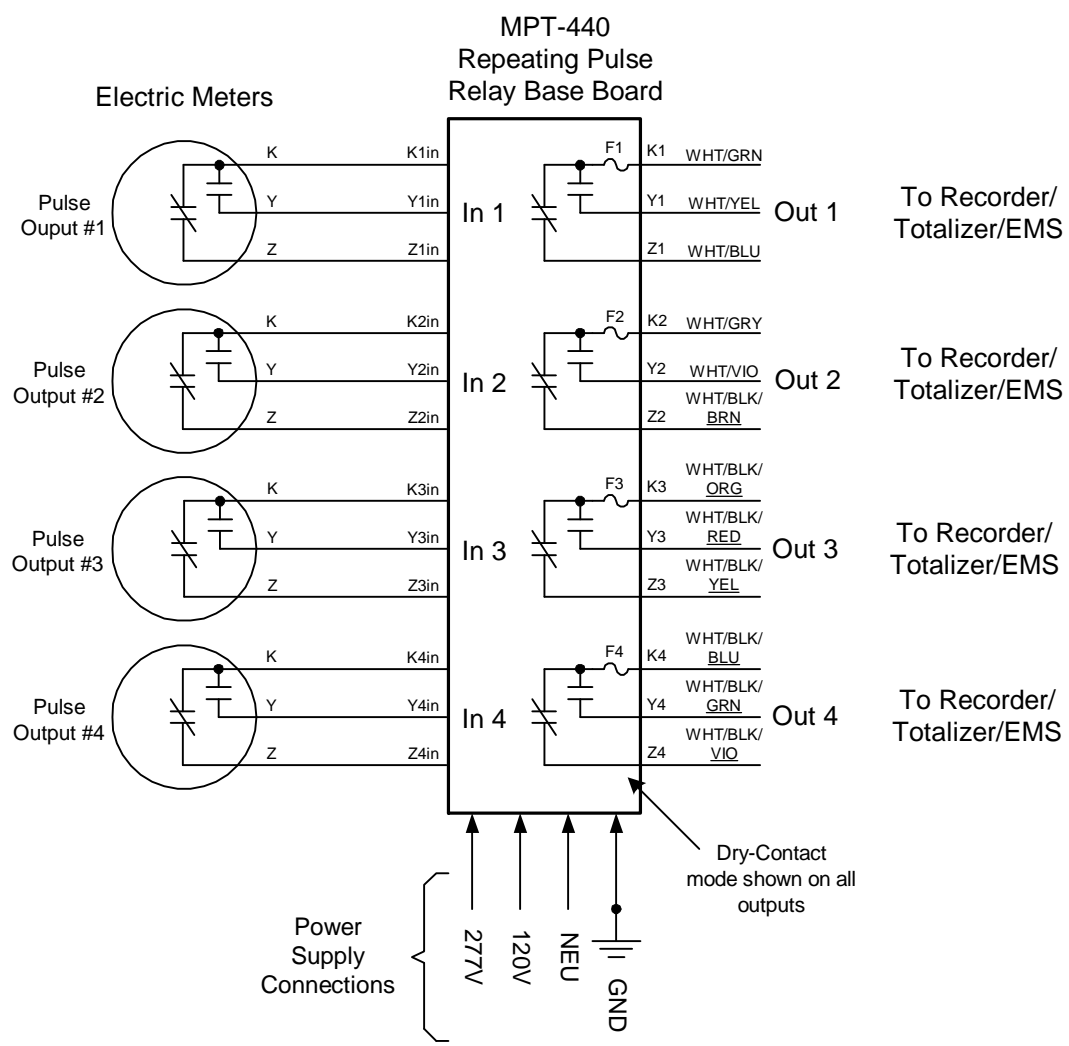
Phone: (970)461-9600 Fax: (970)461-9605

E-mail: support@solidstateinstruments.com

RELAY OUTPUTS - Each of the MPT-440's four inputs have a 3-wire isolated, dry-contact solid state output for repeating the pulses received from the meter's output. Outputs are K1,Y1, & Z1 for channel #1, K2,Y2, & Z2 for channel #2, etc. In addition, there are two totalized relay outputs labeled K5,Y5, & Z5 for totalized output channel #1, and K6,Y6, & Z6 for totalized channel #2. All six output relay contacts can be used in either dry contact("D") or sourced voltage("S") modes. "Dry" contacts have no voltage present. A wetting voltage must be supplied from the destination (receiving) device to each output. In the Sourced Voltage (S) mode, +12VDC is supplied by the MPT-440's power supply and routed to the MPT-440's switching device. It is alternately switched to that output's Y and Z output terminals. In this mode, the K terminal is ground for a common reference to the downstream receiving device. (See Page 3) Transient suppression for the solid state contacts is provided internally by metal oxide varistor (MOV) surge suppression devices. Outputs are rated at 250VAC/VDC @ .1 Amp. Maximum on-state power dissipation is 800mW.

FUSES - The fuses are type 3AG or AGC and may be up to 1/10th Amp in size. Six 1/10 Amp fuses (F1-F6) are supplied standard with the unit unless otherwise specified. Care should be taken to insure that the input burden of the destination device will not exceed the rating of the fuse.

MPT-440 Wiring Diagram



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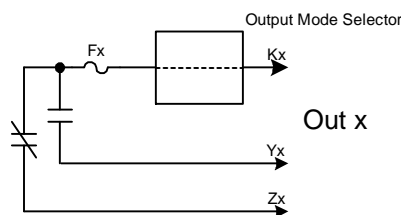
SOURCED VOLTAGE OUTPUT MODE - Each output can be independently set to be in the "sourced voltage output mode". This means that instead of the pulse receiving (or "downstream") device supplying the wetting voltage to the MPT-440's dry contact output, the MPT-440 will supply +12V to the receiving device's voltage input from its internal power supply.

To put an output into the Sourced Voltage mode, first TURN POWER OFF to the MPT-440. Locate the 6-pin (2 X 3) header on the base board next to each output's fuse. The double jumper shun is plugged into the header. The positions are labeled D or S for Dry contact or Sourced Voltage modes, respectively.

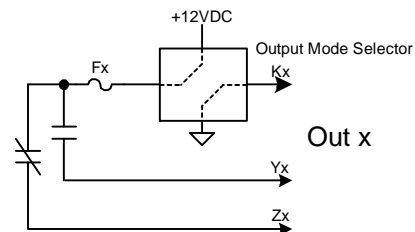


Dry Contact output mode

Sourced Voltage output mode



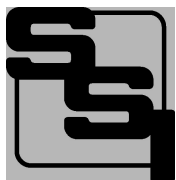
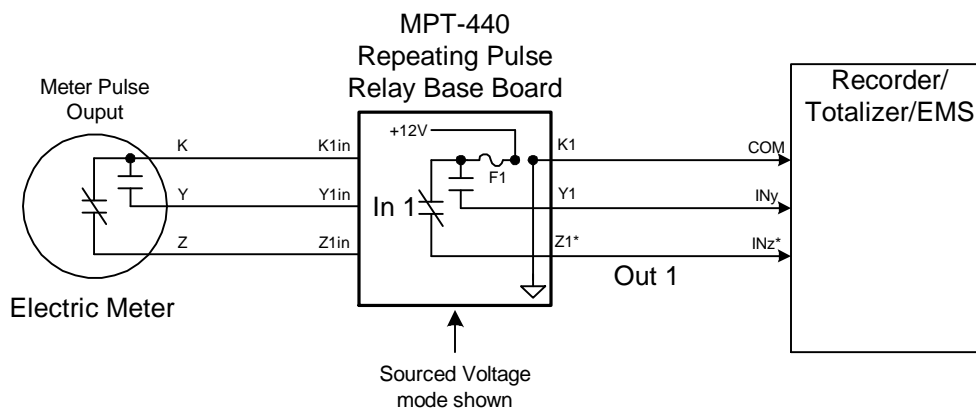
Dry Contact output schematic



Sourced Voltage output schematic

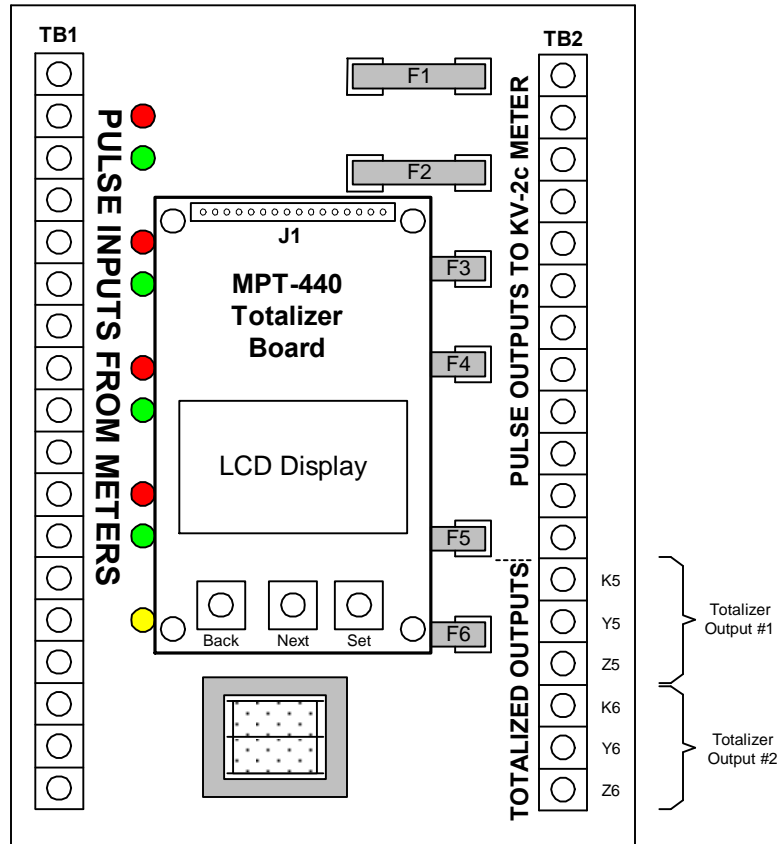
Once you have placed the double shunt jumpers in the correct position for sourced voltage mode, wire the Y or Z output terminals (or both if 3-wire interface is used) to the receiving equipment's voltage input. Connect the K output terminal to the receiving equipment's common or ground terminal. Exact configurations vary from device to device so check the manufacturer's instruction manual before powering the device.

Using the Sourced Voltage mode



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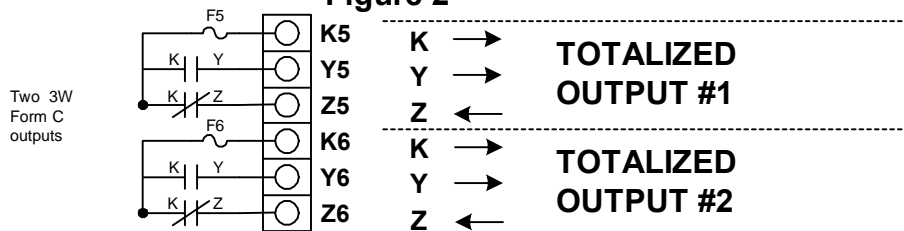
USING THE MPT-440's TOTALIZER - The MPT-440 has a built in totalizer and receives its inputs from the MPT-440's base board. Input channel #1 is also input #1 to the totalizer. The same is true of inputs #2 through #4 on the MPT-440's base board. They are routed to inputs #2-#4 on the totalizer board.

TOTALIZED OUTPUT CONFIGURATION - Each of the two totalized output channels of the MPT-440 may be configured as one Form C (3-Wire) output or two independent Form A (2-Wire) outputs. The outputs' configuration is configured in the OUT MODE display of the programming loop. If the Form C output mode is selected, Outputs 1 and 2 operate in tandem, that is, both operate in Form C mode and use a "toggle" pulse operation. In this mode, K1-Y1 and K2-Y2, for example, are both closed at the same time and K1-Z1 and K2-Z2 are open.

USING THE OUTPUT IN 3-WIRE MODE - When the MPT-440 is operated in the Form C (3-Wire) mode, each output channel "toggles" to the opposite state --back and forth like a single-pole, double throw switch -- upon each pulse being outputted. For one pulse there is continuity between K and Y (a closure) while there is no continuity between K and Z (an open). Upon the next pulse being received from the meter they reverse positions-K-Z closes and K-Y opens. In Form C mode, Y and Z are always opposite of each other. When one is closed, the other is open. There is logic in the MPT-440's software that disallows two FORM C pulses of the same type in a row. They MUST alternate KY, KZ, KY, KZ, KY etc.

The outputs are solid state and are non-polarized. They may be used for AC or DC voltages. The output is limited to 100mA@ 250VAC, 800mW maximum. Fuses are sized at 1/10th amp (100mA). Do not exceed this rating as the solid state MOS-FET switching device may be destroyed. Internal current limiting of the solid state devices is also employed to protect them from over current or high dissipation situations. In the Form C mode, it is perfectly acceptable to use only two wires on the MPT-440's output to the downstream device. Remember to double the Form C pulse constant(VALUE) if your receiving device does not automatically adjust the pulse value. Most energy management systems actually prefer a "toggle" pulse because it is generally a symmetrical (50/50) duty cycle.

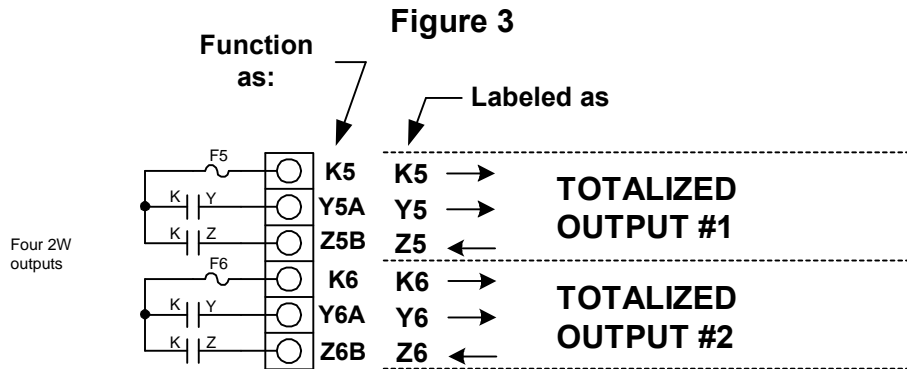
Figure 2



(Continued from Page 4)

USING THE OUTPUT IN 2-WIRE MODE. - The MPT-440's two KYZ totalized outputs contain four solid state Form A dry-contacts and may be used independently as four Form A outputs in two KY and KZ pairs. In this case instead of Y and Z of each output being opposite of each other, they are independently used. (See Figure 3). These outputs operate in the momentary mode, meaning they close for a fixed period of time then reset to an open state. Even though the devices are operated independently in Form A mode, each set (Y1A-Z1A and Y2A-Z2B) must be operated at the same voltage, from the same voltage source since they have a shared common.

When the Output Mode display is set to "A", the two output channels each have a unique Output Pulse Value that can be individually set so different pulse output values are possible. To use the two output mode a clear understanding is necessary by the installer or user. There is a difference between the Hardware Outputs and the Software Channels. Output #1 (Hardware) consists of a 3-Wire pulse output consisting of K1, Y1 and Z1 output terminals. (Continued on next page)



Totalized Output #2 consists of a second 3-Wire pulse output consisting of K6, Y6 and Z6 output terminals (See Figure 3) In the Form A (2-Wire) output mode, the MPT-440 has two software output "Channels" that operate the hardware outputs individually. Software Channel 1, denoted by the suffix "A" operates the two outputs designated as Y5A and Y6A. Software Channel 2 is denoted by the suffix "B" and operates the two outputs designated as Z5B and Z6B. Each software output operates its two hardware outputs in tandem, meaning that both hardware outputs close and open together. For example, whenever a pulse is outputted on Software output Channel #1, both Y5A and Y6A close (connect to) to their respective K terminals. In other words, upon a closure of this channel, K5 and Y5A have continuity; K6 and Y6A have continuity. Likewise, when a pulse is outputted on Software output Channel #2, K5 and Z5B have continuity; K6 and Z6B will have continuity.

Note: YxB and ZxA do not exist as physical points in this numbering scheme. The second digit (numerical) denotes the Hardware output, either 5 or 6. The third digit (alpha) denotes the software channel, either A or B.

In the Form A output mode, there are several other differences.

Output Pulse Width Setting: The outputs' dwell or closure time is controlled by the AOUT1_TMS and AOUT2_TMS settings. See the MPT-440 programming manual for more information on this setting. These settings range from 100mS to 1000mS in 100mS increments. It is important to know the minimum pulse width specification of the receiving equipment. The output pulse width time must be set so that pulses will be reliably "seen" by the pulse receiving equipment. If pulses are too short, they will either not be counted at all or may be intermittently received. Most equipment will see pulses down to 50 mS, so 100 mS is a good default value. This value should be kept as short as possible (so as not to skew demand information in the event that pulses are outputted rapidly) but long enough to be reliable.

End-of-Interval (EOI) pulse Input: If the demand function of the MPT-440 is used, an end-of-interval signal must be provided by one of the meters supplying energy pulses to the MPT-440. A Form A (2-Wire) dry-contact relay output can be directly connected to the EOI and K0 terminals. The MPT-440 provides its own +13VDC wetting voltage to this dry-contact so no other voltage source is needed for the End-Of-Interval Signal.

PROGRAMMING THE MPT-440 TOTALIZER

Version 4.1 Software

The MPT-440 Pulse Totalizer is programmed by using the three small pushbutton switches (keys) located just below the LCD display. The left key with the yellow cap is the "Back" or Previous screen key. The middle key with the orange cap is the "Forward" key or Next 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 the Change Setting ("Set") key and 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, then the decimal point, and back to 0, then 1...2...3...4...5...6...7...8...9...dp and so on. When the desired value is reached, press the orange key to move to the next display item. If the value at the present display position has been changed, the new value will be saved into memory as soon as you move the cursor to the next position. 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

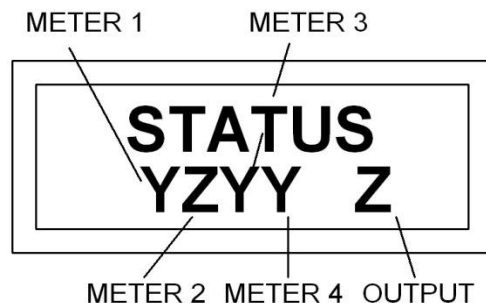
When the MPT-440 is powered up, the start-up screen will be displayed. This screen displays the Model Number on the top line and software version number of the totalizer on the bottom line. **THE DISPLAY WILL AUTOMATICALLY GO TO THE FIRST DISPLAY SCREEN AFTER 5 SECONDS.**



START-UP DISPLAY

FIRST DISPLAY: STATUS OF INPUTS/OUTPUT

The Status display shows the current state of all inputs and the two totalized output(s). Upon a closure (input pulse) of the "Z2" input, meter #2's status shown here on the display will change to a "Z". Each input shows the last transmitted status to the



INPUT/OUTPUT STATUS DISPLAY

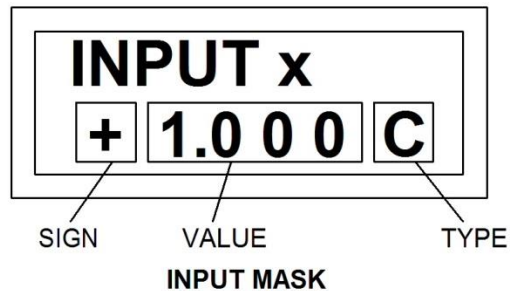
MPT-440. Any input which is not used will have a “-“ displayed in its position. In Form C output mode, a one-digit output character will be displayed (as shown above), and either a Y or a Z will be visible at all times. The “Z” displayed as an output status shows that the contacts between “K” and “Z” on the output are closed or “made up”. The “K” to “Y” output contacts are open. When the next pulse is outputted, the output character will change to “Y”. Upon power-up of the MPT-440, both outputs are set in the K-Y position. Therefore, the next valid pulse outputted will be a K-Z closure.

In Form A output mode, two output characters will be displayed. A “Y” will be displayed upon a pulse output for the time duration specified in the AOUT TMS settings. When the outputs are open (no pulse output occurring) the display will show a “-“. Upon power-up, the outputs are set in the open position and a “-“ will be displayed in both output character positions. **PRESS THE ORANGE KEY TO GO TO NEXT DISPLAY.**

PULSE INPUTS

The MPT-440 has four pulse inputs and each input screen consists of three pieces of information that must be programmed. These are the pulse sign, the pulse value and the pulse input type. The pulse sign determines if the pulse is positive or negative. The pulse value is the numerical value that represents what a pulse is worth. The pulse type is either Form A (2-Wire) or Form C (3-wire). If Form A pulses are used, then only the K and Y inputs are used. If Form C pulses are used, then all three pulse input wires, K, Y and Z, must be used.

The Pulse Sign is used for adding or subtracting the pulse value from the pulse value (“PV”) register. It can be used to “net out” energy used where some values are positive and negative, like energy delivered and received, for example. If all inputs are positive then the totalizer will simply add all input pulse values. At least one input must always be a positive sign. Four negative inputs are not allowed for obvious reasons.

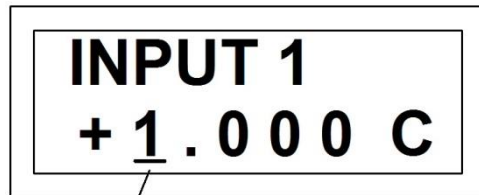


The Pulse Value is the actual numerical value that a pulse is worth, or the “pulse weight”. This can be expressed in kilowatt-hours, watt-hours, or var-hours or any other appropriate unit of measure. All inputs must have the same units. The mask for the pulse value consists of 5 digits with four numerical digits and one decimal point. In the Input Mask figure above, the decimal point is in the second position. Note: Once the decimal point has been placed in a position in the display, it will not appear in the 0-9 numerical sequence for the remaining positions, so that two decimal points cannot be programmed into a Pulse Value.

The Pulse Type setting specifies whether or not the MPT-440 will be watching both the Y and Z inputs when set for Form C, or whether only the Y input will be watched for a pulse when the input is set for Form A. Each input may have unique settings so signs and types may be mixed and matched as required.

SECOND DISPLAY: **METER #1 INPUT VALUES**

The second display is the pulse sign, value and type programmed in for METER #1. The value or setting of each digit may be changed by first moving the cursor to the desired digit position using the **ORANGE KEY**. To change the digit's value, press the **BLACK KEY**. Press this key any number of times until the desired number or the decimal point is displayed. Press the **ORANGE KEY**

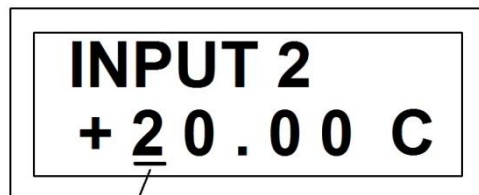


CURSOR
METER #1 KWH/P VALUE DISPLAY

once to advance the cursor to the next position to the right. In this example, we are putting the decimal point in the second digit. Press the **BLACK KEY** until the decimal point appears. Press the **ORANGE KEY** once to advance the cursor to the next position to the right (3rd value digit). Enter the correct number with the **BLACK KEY**. Press the **ORANGE KEY** once. Enter the third number (in the fourth value digit) with the **BLACK KEY**. Press the **ORANGE KEY** once and enter the fourth number (in the fifth value digit) with the **BLACK KEY**. Press the **ORANGE KEY** once and enter the type with the **BLACK KEY**. This time when you press the **ORANGE KEY**, you will advance to the third display.

THIRD DISPLAY: **METER #2 INPUT VALUES**

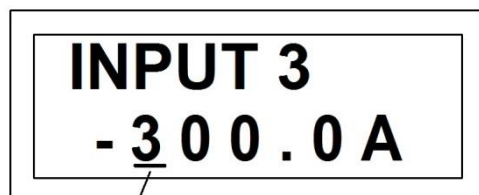
The third display works to input values for METER #2 in the same manner as the second display worked for METER #1. Note in this example the decimal point is in the third value digit.



CURSOR
METER #2 KWH/P VALUE DISPLAY

FOURTH DISPLAY: **METER #3 INPUT VALUES**

The fourth display works to input values for METER #3 in the same manner as the second display worked for METER #1. Note

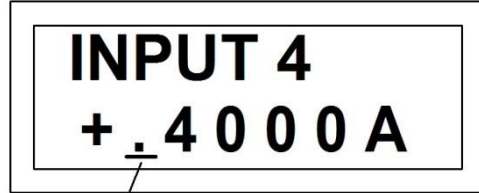


CURSOR
METER #3 KWH/P VALUE DISPLAY

in this example the decimal point is in the fourth value digit.

FIFTH DISPLAY: **METER #4 INPUT VALUES**

The fifth display works to input values for METER #4 in the same manner as the second display worked for METER #1. Note in this example the decimal point is in the first value digit.

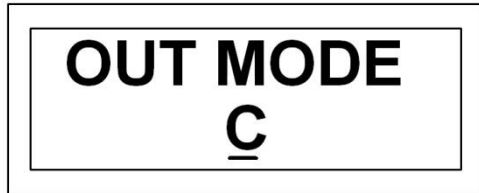


CURSOR

METER #4 KWH/P VALUE DISPLAY

SIXTH DISPLAY: **TOTALIZER OUTPUT MODE**

The sixth display shows the output mode selection screen. You can select either the Form C (3-Wire) output or Form A (2-Wire) output mode. Form C is a “toggle” output since each output pulse toggles back and forth from K-Y to K-Z continuity or from K-Z to K-Y continuity, like a single pole, double throw (SPDT) switch when each pulse is received. Form A is a momentary type of switch closure and closes for the input pulse duration specified in the display called “AOUT1_mS” and “AOUT2_mS”. Press the **BLACK** key to toggle back and forth between the Form A or Form C mode selection. Press the **ORANGE** key to move to the next display.



OUTPUT MODE DISPLAY

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

If you selected the Form C output mode in the sixth display, you will land here. The output value setting, unlike the preceding meter input value displays, has 6 digits that can be set in one of two formats: an integer value (whole number) up to 6 digits, or up to 5 numerical values plus a decimal point. The value of the Form C output is set in the same manner as the meter input displays.



CURSOR

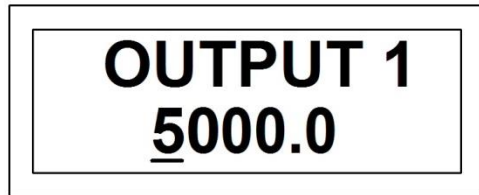
OUTPUT KWH/P VALUE DISPLAY

When the PV Total equals or exceeds the set value set in this display, 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) in 6-digit integer format or .1 (“point one”) in 5-digit decimal format. If the user inadvertently puts zero (0) in this field, a 1.0000 will be automatically placed on the LCD. The decimal point may be placed in any location by entering the decimal point in the same manner that a numerical value is entered. The desired output value between .00001 and 99999 may be entered. (See the note at the end of the manual on setting this value.)

EIGHTH DISPLAY: TOTALIZER OUTPUT#1 KWH/PULSE VALUE

If you selected Form A in the sixth display, you will arrive here. (The seventh display is skipped.) The eighth display, unlike the input meter value displays, has 6 digits that may be set. The value (or weight) of Output #1 is set in the same manner as the meter input displays by moving the cursor across the display using the Orange button. When the Pulse Value Total register equals or exceeds the set value, the output pulse value is subtracted from the PV Total, and causes an output pulse to occur. The outputted pulse has a closure time specified by the output time display AOUT1_mS. This value must be greater than or equal to 1 (one). If the user inadvertently puts zero (0) in this field such that all six digits are zeros, a 1.0000 will be automatically placed in the LCD. The desired output value may then be entered.



OUTPUT KWH/P VALUE DISPLAY

NINTH DISPLAY: TOTALIZER OUTPUT#2 KWH/PULSE VALUE

The ninth display, like the eighth display, has 6 digits that may be set. The value (or weight) of Output #2 is set in the same manner as the meter input displays. When the Pulse Value Total register 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. The outputted pulse has a closure time specified by the output time display AOUT2_mS. This value must be greater than or equal to 1 (one). If the user inadvertently puts zero (0) in this field such that all six digits are zeros, a 1.0000 will be automatically placed in the LCD. The desired output value may then be entered.

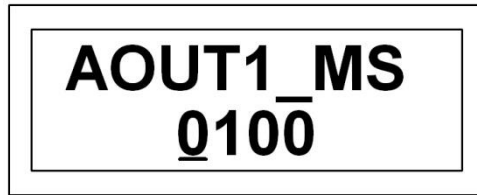


OUTPUT KWH/P VALUE DISPLAY

TENTH DISPLAY:

PULSE OUTPUT #1 TIME

The tenth display allows you to set the time of a FORM A output on Output #1. The time may be set in 100-millisecond increments. The minimum time is 100 milliseconds. The maximum time is 1000 milliseconds (1 second). Thus only digits 1 and 2 of this display are programmable. The entry method is the same as that used to set the meter input values. Note the Form A output channel #1 appears on the Y5A and Y6A totalized outputs. See page 5 of the MPT-440 Installation Manual for details.

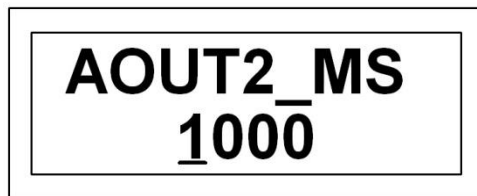


PULSE OUTPUT #1TIME DISPLAY

ELEVENTH DISPLAY:

PULSE OUTPUT #2 TIME

The eleventh display allows you to set the time of a FORM A output on Output #2. The time may be set in 100-millisecond increments. The minimum time is 100 milliseconds. The maximum time is 1000 milliseconds (1 second). Thus only digits 1 and 2 of this display are programmable. The entry method is the same as that used to set the meter input values. Note the Form A output channel #2 appears on the Z5B and Z6B totalized outputs. See page 5 of the MPT-440 Installation Manual for details.



PULSE OUTPUT #2TIME DISPLAY

WARNING: Care should be taken not to make FORM A output pulses any longer than necessary since it may cause problems in periods of high demand if pulse values are too small.

TWELFTH DISPLAY:

TIME BETWEEN OUTPUT PULSES

The twelfth 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. This value



TIME BETWEEN PULSES DISPLAY

also, should be kept as short as possible, but long enough to ensure that the receiving equipment will “see” each pulse. In Form C mode, this is the minimum time between toggle transitions. In Form A mode, this is the time between output closures.

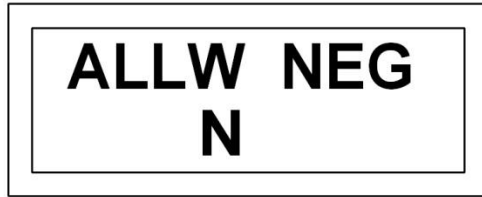
THIRTEENTH DISPLAY: PULSE VALUE REGISTER CONFIGURATION

If inputs #1-4 are all positive (+), skip to the fourteenth display. The thirteenth 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.



ALLOW NEGATIVE
ACCUMULATOR DISPLAY

If you desire to set the MPT-440 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 a positive pulse occurs to make the pulse value register increment upwards. Press the **ORANGE** key to move to the next setting. If the MPT-440 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). Note: This display will not show up in the display sequence if all inputs are a positive value.



DO NOT ALLOW NEGATIVE
ACCUMULATOR DISPLAY

FOURTEENTH DISPLAY: PULSE VALUE REGISTER DISPLAY

The fourteenth display shows the accumulated Form C 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 200.0, an OUTPUT pulse value of 500.0 and a TIME BETWEEN PULSES value of 500 mS. Upon entering three (3) pulses into METER #1’s inputs, several things happen. First, the pulse accumulator registers a value of 600.0 (3 pulses X 200.0/pulse). Since the accumulator is greater than the Output Pulse Value



PULSE VALUE DISPLAY

setting (500.0), an output pulse occurs. Next, 500.0 (the output value) is subtracted, leaving a remaining balance of 100.0 in the PV TOTAL register. Finally, if the total in the PV had still exceeded 500.0, 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. This setting is stored in non-volatile memory upon loss of power. The decimal point will move to accommodate larger numbers as pulses occur and add to the Pulse Value Register. When this register is at zero, the format will default to 0.00000

FIFTEENTH DISPLAY: **PULSE VALUE DISPLAY**
FORM A OUTPUT MODE, OUTPUT #1

The fifteenth display shows Output #1's accumulated Form A numerical pulse 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, an OUTPUT pulse value of 005000 and a TIME BETWEEN PULSES value of 500 mS. Upon receiving three (3) pulses at 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 PV1TOTAL 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. This setting is stored in non-volatile memory upon loss of power. The decimal point will move to accommodate larger numbers as pulses occur and add to the Pulse Value Register. When this register is at zero, the format will default to 0.00000



PULSE VALUE DISPLAY

SIXTEENTH DISPLAY: **PULSE VALUE DISPLAY**
FORM A OUTPUT MODE, OUTPUT #2

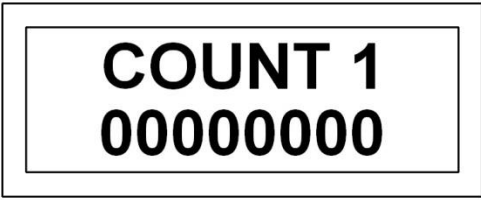
The sixteenth display shows Output #2's accumulated Form A numerical pulse value contained within the processor's memory at any given time. This setting is stored in non-volatile memory upon loss of power.



PULSE VALUE DISPLAY

SEVENTEENTH DISPLAY: INPUT PULSE COUNT – METER #1

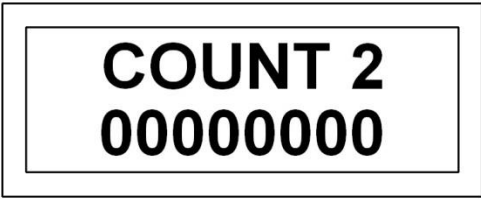
The seventeenth display allows you to see the total number of pulses that have been counted by meter input #1 since the last reset. This number is simply a counter that increments by one (1) count each time a pulse is recorded by meter input #1. This value is non-weighted and represents the number of 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

EIGHTEENTH DISPLAY: INPUT PULSE COUNT – METER #2

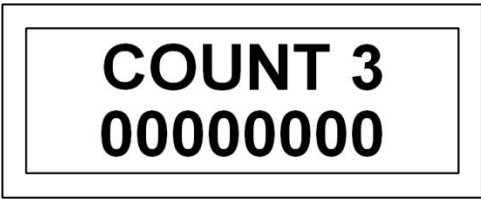
The eighteenth display allows you to see the total number of pulses that have been counted by meter input #2 since the last reset. This number is simply a counter that increments by one (1) count each time a pulse is recorded by meter input #2. This value is non-weighted and represents the number of 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

NINETEENTH DISPLAY: INPUT PULSE COUNT – METER #3

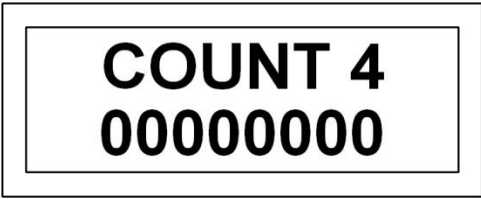
The nineteenth display allows you to see the total number of pulses that have been counted by meter input #3 since the last reset. This number is simply a counter that increments by one (1) count each time a pulse is recorded by meter input #3. This value is non-weighted and represents the number of 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 #3 PULSE COUNT DISPLAY

TWENTIETH DISPLAY: INPUT PULSE COUNT – METER #4

The twentieth display allows you to see the total number of pulses that have been counted by meter input #4 since the last



METER #4 PULSE COUNT DISPLAY

reset. This number is simply a counter that increments by one (1) count each time a pulse is recorded by 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.

TWENTY-FIRST DISPLAY: OUTPUT PULSE COUNT

The twenty-first display allows you to see the total number of Form C output pulses that have been outputted since the last reset. This number is a counter that increments by one (1) count each time a pulse is sent to the output relay. This value is non-weighted and represents the raw pulse count 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

TWENTY-SECOND DISPLAY: OUTPUT PULSE COUNT-OUTPUT #1

If you selected the A output mode in the fourth display, the twenty-second display allows you to see the total number of Form A output pulses on Output #1 that have been outputted since the last reset. This number represents a pulse counter that increments by one (1) count each time a pulse is sent to the output relay #1. This value is non-weighted and represents the output #1's raw pulse count only. This count is saved in non-volatile memory upon loss of power. Press the **ORANGE KEY** to advance to the next display.



OUTPUT 1 PULSE COUNT DISPLAY

TWENTY-THIRD DISPLAY: OUTPUT PULSE COUNT-OUTPUT #2

If you selected the A output mode in the fourth display, the twenty-third display allows you to see the total number of Form A output pulses on Output #2 that have been outputted since the last reset. This number represents a pulse counter that increments by one (1) count each time a pulse is sent to the output relay #2. This value is non-weighted and represents output #2's raw pulse count only. This count is saved in non-volatile memory upon loss of power. Press the **ORANGE KEY** to advance to the next display.



OUTPUT 2 PULSE COUNT DISPLAY

Capturing Totalized Peak Demand

In some totalizing applications it may be desirable to capture the peak demand of all of the meters being totalized. The MPT-440 has the capability to do this using the “net” value of kWh’s from positive and negative pulse values. Peak demand is measured in kW and represents the one interval that has the highest kWh usage in it. For the peak demand feature of the MPT-440 to work correctly, the Pulse Input values must be accurate, in kWh’s, and cannot be a ratio of their value.

TWENTY-FOURTH DISPLAY: DEMAND ENABLE

To use the Peak Demand capability, an End-of-Interval signal is required from one of the four meters supplying pulses to the MPT-440. A 2-wire Form A dry-contact switch is connected to the EOI input. To use this capability, turn the Demand Enable display to “ON”. If demand will not be used, turn the Demand Enable screen to “OFF”. If demand is disabled the next five displays will not appear in the display sequence.



DEMAND ENABLE DISPLAY

TWENTY-FIFTH DISPLAY: DEMAND INTERVAL LENGTH

Enter the length of the demand interval. Although the start and stop of each interval is controlled by the EOI input, the MPT-440 must have the same interval time as the meter stored in it to correctly calculate the peak demand. The options are 1, 2, 5, 10, 15, 30, and 60 minutes. The default setting is 15 minutes.



DEMAND INTERVAL LENGTH DISPLAY

TWENTY-SIXTH DISPLAY: INTERVAL kWh

This display shows the net number of kilowatt-hours (kWh) received by the totalizer in the current interval.



DEMAND INTERVAL ENERGY DISPLAY

TWENTY-SEVENTH DISPLAY: LAST INTERVAL'S DEMAND - KW

This display shows the peak kW demand for the last interval for which an end-of-interval (EOI) pulse was received. This is the number of kWh received during the interval, divided by the interval's length in hours. For example, if 12 kWh were accumulated in a 15 minute (.25 hours) interval, the demand for that interval would be $12/.25 = 48\text{kW}$.

**LAST kW
00000000**

LAST INTERVAL DEMAND DISPLAY

TWENTY-EIGHTH DISPLAY: TOTALIZED PEAK DEMAND - KW

This display shows the highest interval kW that has been measured since last reset of the Demand Register. Over a typical 30 day billing period, there are about 2900 15-minute intervals. This captures the highest interval's totalized peak demand.

**PEAK kW
00000000**

TOTALIZED PEAK DEMAND DISPLAY

TWENTY-NINTH DISPLAY: RESET PEAK DEMAND REGISTER

The twenty-ninth display allows the Int kWh, the Last kW and Peak kW Registers all to be reset. The default of this display is "N" for no. To move forward and not reset the totals, press the ORANGE KEY.

**RST DMD?
N**

RESET PEAK DEMAND DISPLAY

To reset the Peak Demand Register 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.

**RST DMD?
Y**

RESET PEAK DEMAND DISPLAY

Once the MPT-440 has correctly reset all demand registers to zero, the display will indicate **DONE!** Let off the **BLACK KEY**.

**RST DMD?
DONE!**

RESET PEAK DEMAND DISPLAY

Upon releasing the **BLACK KEY**, the display will automatically move to the Status Display.

THIRTIETH DISPLAY: RESET COUNTERS

The thirtieth display allows you to reset the four INPUT counters, the OUTPUT counter(s), and the PV TOTAL register(s), 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-440 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 Status Display.



RESET COUNT DISPLAY

INFORMATION ON SCALING OF VALUES FOR DATA ENTRY

The MPT-440 is a ratio device. All inputs have a value and add or subtract that value to the Pulse Value Register. Each input may have a unique value from .0001 to 99999. If the decimal point does not appear in the input display, that means that it is in the far right position, and is assumed to be an integer number (whole number). When entering the input and output values, make sure that the decimal point is in the correct position. Most importantly, make sure that your units of value are consistent. For example, all numbers must be in kilowatt-hours.

The decimal point in the Pulse Value (PV) Register(s) floats with the size of the numbers and should accommodate numbers down to five places to the right of the decimal point. To the greatest extent possible use integer numbers for

inputs and outputs, and use units that are appropriate in the order of magnitude selected.

EXAMPLES

CORRECT

METER #1	144.0
METER #2	072.0
METER #3	288.0
METER #4	36.00
OUTPUT	00500.0

CORRECT

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

In the above examples the output value is greater than the largest input value.

INCORRECT

METER #1	.1000
METER #2	1.234
METER #3	.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

In the two incorrect examples, the output value is smaller than the largest input and will cause the totalizer to rapidly output pulses.

While we have used KWH/PULSE for the pulse values throughout this document, the values could be watt-hours, megawatt-hours, gallons or any other common unit of measure. The key is that all inputs and output must have the same units.

NOTE ON OUTPUT PULSE VALUES

In general, it is a bad practice to make the output pulse value(s) smaller than the largest input value. Too many pulses out with erratic timing will cause peak demand management systems to incorrectly register the instantaneous or current demand. It is recommended that the output pulse value(s) be larger or equal to the largest input pulse value.

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-440

SOFTWARE VERSION VERSION 4.1

MANUFACTURER..... SOLID STATE INSTRUMENTS

A division of Brayden Automation Corp.

6230 Aviation Circle

Loveland, CO 80538

TECH SUPPORT (970) 461-9600

FILL OUT BEFORE PROGRAMMING TOTALIZER

METER # 1 AREA OR NAME KWH/PULSE

METER # 2 AREA OR NAME KWH/PULSE

METER # 3 AREA OR NAME KWH/PULSE

METER # 4 AREA OR NAME KWH/PULSE

OUTPUT #1 VALUE KWH/PULSE

OUTPUT #2 VALUE KWH/PULSE

NOTE: The MPT-440's decimal point actually takes up a digit position. Enter all numbers with a decimal point accordingly. When entering your values on the above record/worksheet, all decimal points for data entries **must** take up one of the positions.