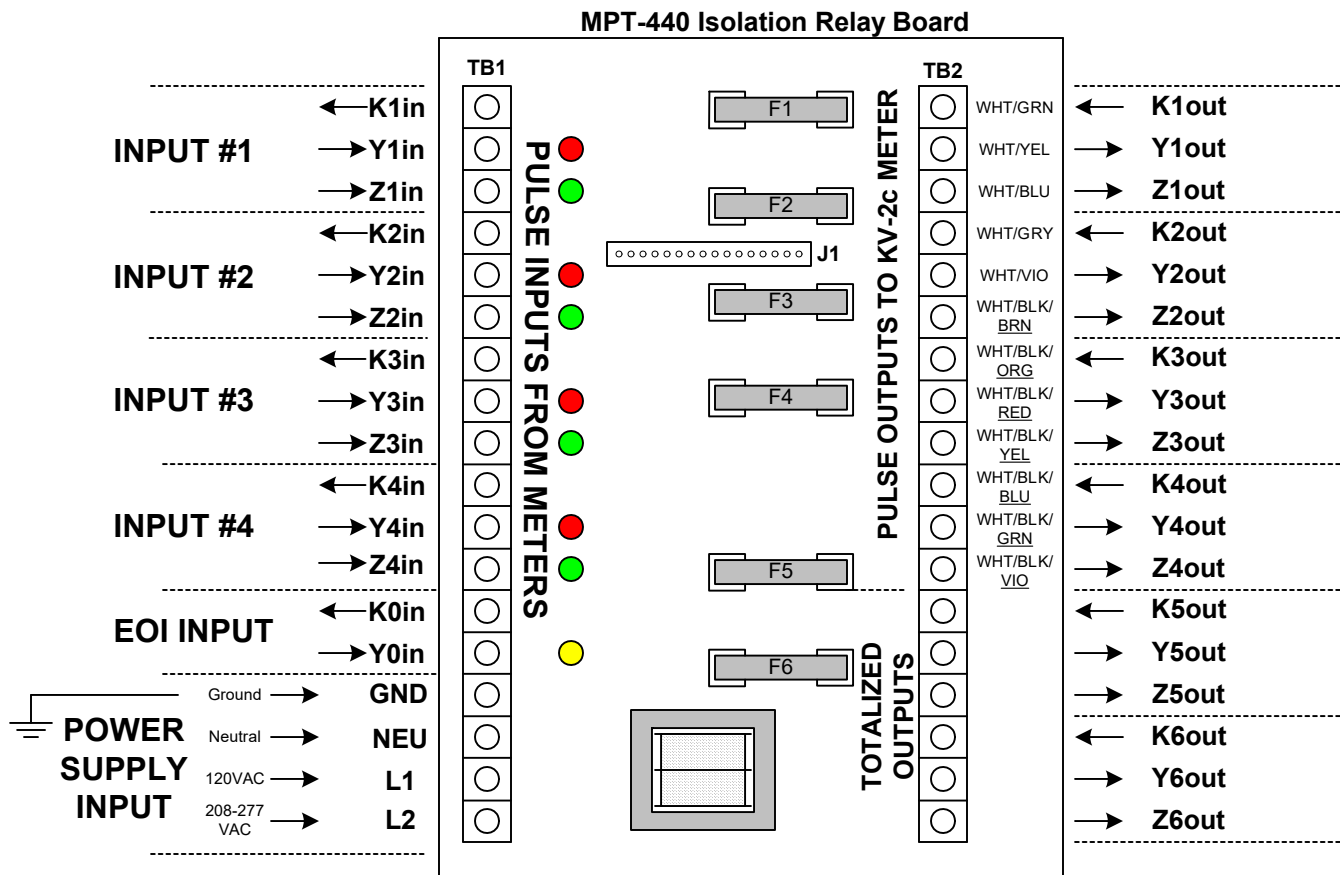




# INSTRUCTION SHEET

## MPT-440 ISOLATION RELAY/TOTALIZER

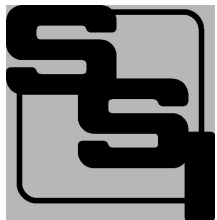


**MOUNTING POSITION** - The MPT-440 may be mounted in any position.

**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 outputs of the MPT-440.



## SOLID STATE INSTRUMENTS

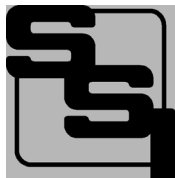
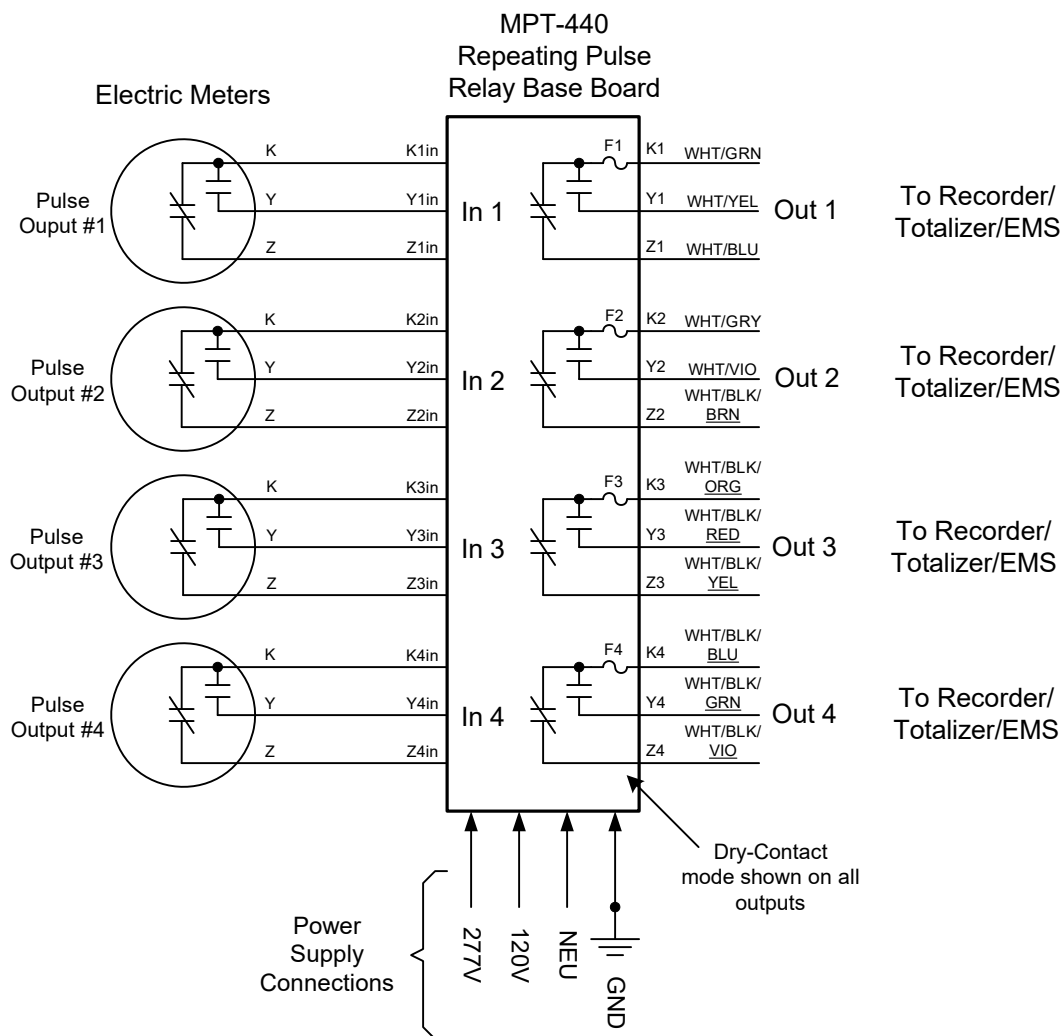
by Radian Research, Inc  
3852 Fortune Dr, Lafayette, IN 47905  
Phone: (765) 449-5576

Mail: [technicalsupport@radianresearch.com](mailto:technicalsupport@radianresearch.com)

**RELAY OUTPUTS** - Each of the MPT-440's four inputs has 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. Four 1/10 Amp fuses (F1-F4) 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



# SOLID STATE INSTRUMENTS

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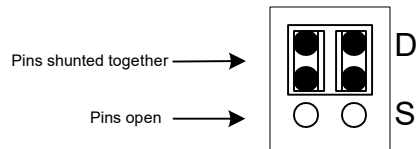
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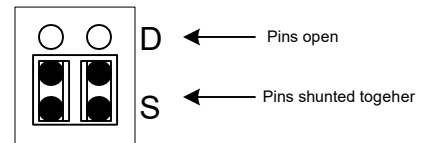
Mail: [technicalsupport@radianresearch.com](mailto:technicalsupport@radianresearch.com)

**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.

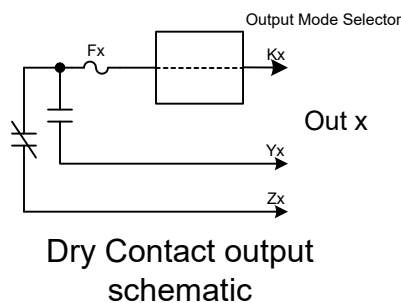
To put an output into the Sourced Voltage mode, first TURN POWER OFF to the MPT-440. Locate the 6-pin (2 X 3) header on the base board next to each output's fuse. The double jumper shun is plugged into the header. The positions are labeled D or S for Dry contact or Sourced Voltage modes, respectively.



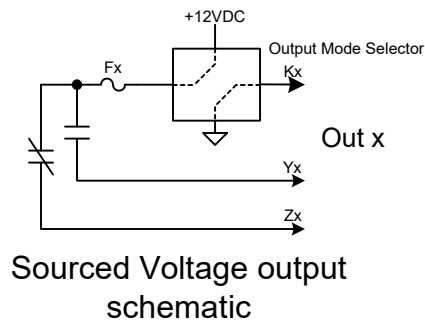
Dry Contact output mode



Sourced Voltage output mode



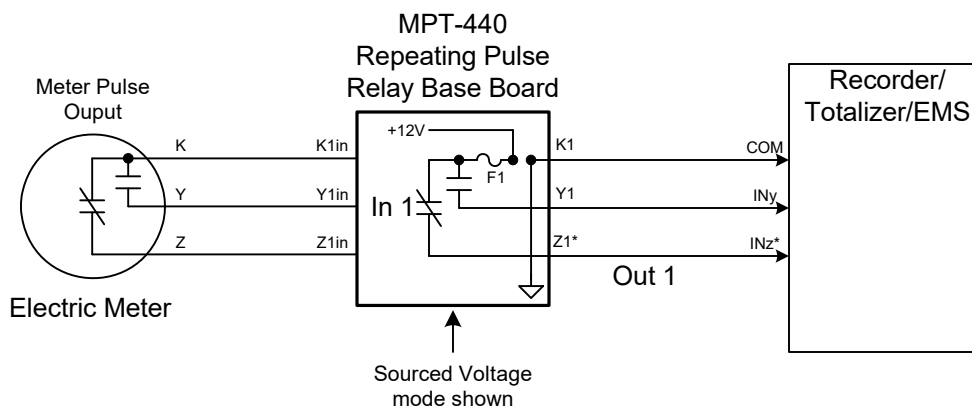
Dry Contact output schematic



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 configuration varied from device to device so check the manufacturer's instruction manual before powering the device.

## Using the Sourced Voltage mode



\*Z not used for 2-wire interface



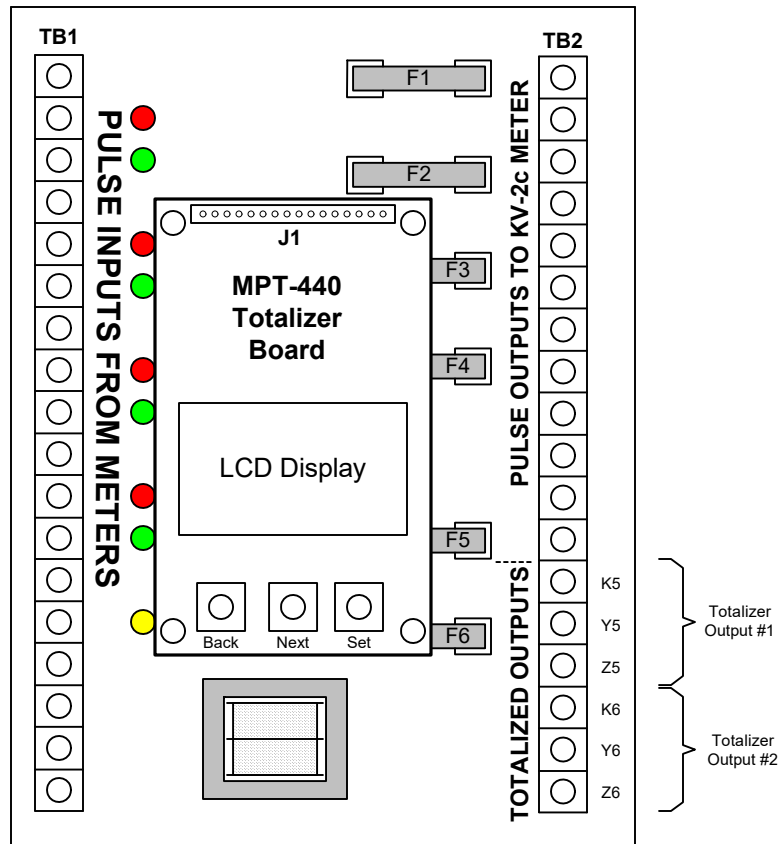
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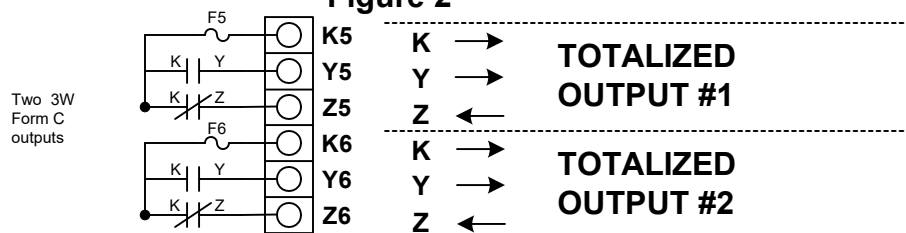
**USING THE MPT-440's TOTALIZER** - The MPT-440 has a built in totalizer and receives its inputs from the MPT-440's base board. Input channel #1 is also input #1 to the totalizer. The same is true of inputs #2 through #4 on the MPT-440's base board. They are routed to inputs #2-#4 on the totalizer board.

**OUTPUT CONFIGURATION** - Each output channel 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. 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 and 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.

**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 and 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.

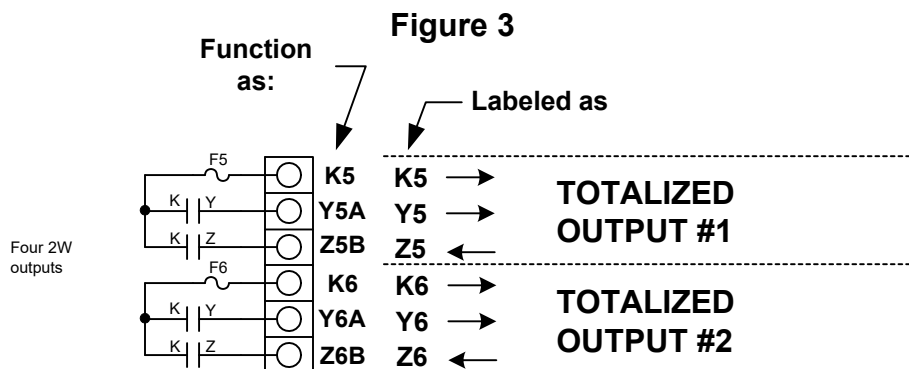
**Figure 2**



(Continued from Page 4)

**USING THE OUTPUT IN 2-WIRE MODE** - The MPT-440's two KYZ 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.

**MPT-440 FIRMWARE** - The MPT-440 uses the same totalizer firmware as the SSI MPT-4C Totalizer. Therefore all programming and settings are identical in the MPT-440 as they are in the MPT-4C.