

Manual No. 900286
June 10, 1996

**Metretek
Power Interrupter
Module**

**Installation & User's
Guide**

Introduction

The Metrotek Power Interrupter Module(PIM) provides a permanently wired, highly reliable and cost effective means to interrupt direct current flow of a cathodic protection rectifier. When coupled with a CPM-II remote unit and the Cathodic Protection Monitoring system software, the PIM can produce on or off durations as short as 100 milliseconds. These interruptions can be scheduled to occur simultaneously (synchronized) with the interruption of other rectifiers using the same system.

Specifications:

Ratings: Model 2005-0023D-001 is a 100 volt / 16 ampere switch.
Model 2005-0023D-002 is a 100 volt / 25 ampere switch.

Control Power:
120Vac (provides power to open mercury relay)
Solid State Relay is directly driven from the CPM-II (using opto-bypass option)

Control Timing:
provided by CPM-II

Compatible Conductors:
Rectifier +, Anode, Structure: 1 cond Copper #18 to #4
120Vac: 3 cond Copper#14(Romex)
CPM-II TB5 connections: 4 cond #20 jacketed
(Belden 9444 or equiv)

Relay Load Connection		
On State Resistance:	Mercury Displacement:	.003ohms for 16 amp unit .002ohms for 25 amp unit
	Solid State Relay:	.05 ohms

Detailed Product Description:

The switching system detailed in **figure 1**, utilizes two families of relays: solid state and mercury displacement. Each is utilized in a manner that takes advantage of each device's best characteristics.

A Mercury Displacement mechanical relay with a SPNC (single pole, normally closed) type contact provides the primary path for rectifier output current during periods when switching is not taking place.

- By utilizing a normally closed contact, the default (unpowered) condition of this relay is on, providing protection to the structure in this state.

- The contacts within this device are hermetically sealed.
- The internal mercury displacement feature, within the device, provides renewal of the surface of the contacts every time the relay is operated.

To provide high speed, arc-free switching, a MOSFET output solid state relay is utilized. This relay has an on-state resistance of only 0.05 ohms. Switching time for this relay is 100 microseconds to switch on and 1 millisecond to switch off. Heat sinking for the device is provided by its mounting plate.

The solid state relay can be directly driven by the CPM-II's Relay 1 output by implementing the opto bypass option as described in the CPM-II installation manual (900266). The Mercury Displacement relay is controlled via the CPM-II Relay 2 opto output.*

* Special technical note: Check the type of the opto relay mounted within the CPM-II unit for Relay 2 position, it should be type PM1204 to implement the circuit shown in this application note. Earlier units may contain type LCA110; contact Metretek customer service for upgrade information.

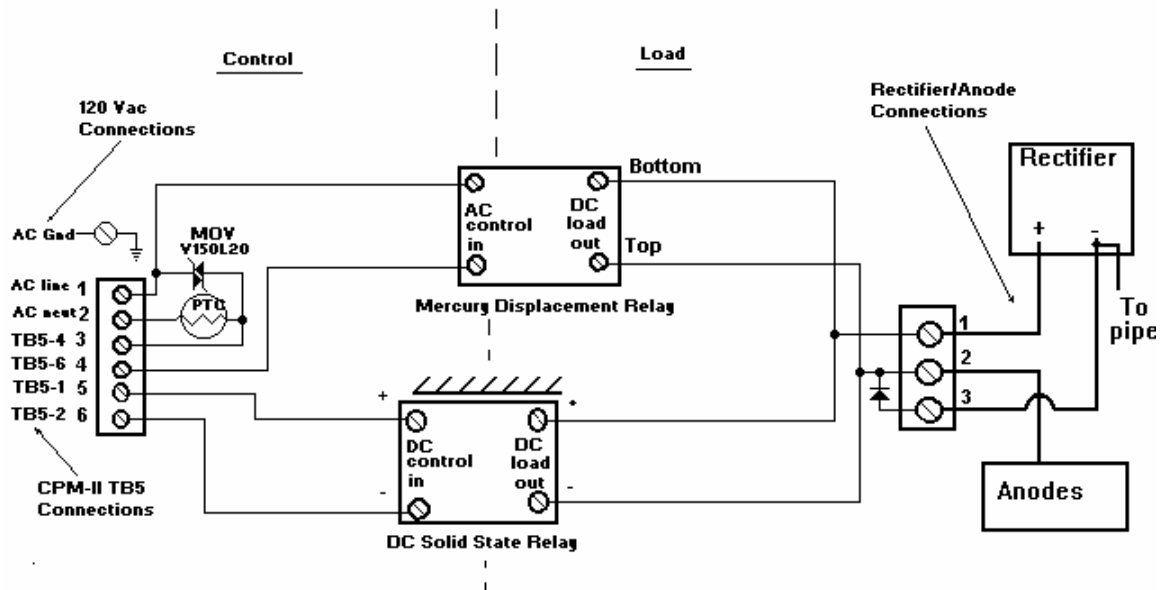


Figure 1 Power interrupter wiring diagram

Mounting the Power Interrupter Module

The mounting dimensions for the Power Interrupter Module are shown in figure 2. The unit must be mounted vertically.

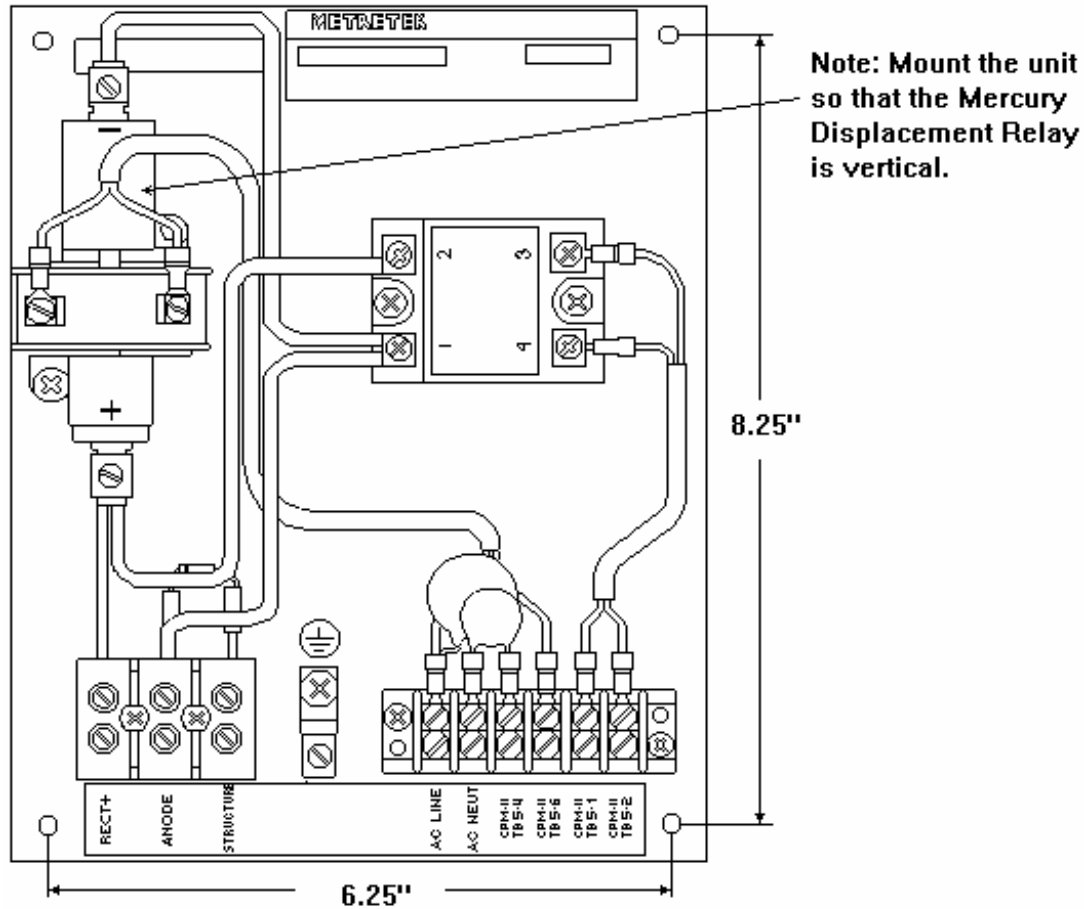


Figure 2. Power Interrupter Module Mounting Dimensions

Connecting the Power Interrupter Module



Connect the Power Interrupter Module as shown in the wiring diagram of figure 1 using wire/cable as listed in the specifications section. **Caution! Always power the rectifier off before making or changing any connections.**

Using the Power Interrupter Module

The following section details how to control the Power Interrupter Module from the Remote Unit Manager Software. For optimum life of the Power Interrupter Module, proper sequencing of the 'Relay 1' and 'Relay 2' outputs of the CPM-II remote unit is important. The proper order for these outputs to activate is as follows:

- **Relay 1 and Relay 2 should be set to activate (turn on) at the same time.** Because it switches faster, the Solid State Relay will activate first, to provide a parallel current path to the mercury displacement relays load connection. Milliseconds later, the mercury displacement relay will activate to open the path through its load contacts.
- The actual rectifier switching is performed by toggling relay 1 on then off at the duty cycle desired.
- Once structure survey work is completed, the relay schedules end with the relays final state as off.

These steps can easily be accomplished by setting up the **Metrotek Remote Unit Manager** software as follows:

- Select the **Preferences** button  and select **Relay Sync Mode**.
- Select the group (lower right hand section of main screen) of remote units you wish to synchronously switch and then select the Relay button  (it should have a **red** background if in Relay Sync Mode).
- On the **Relay Configuration** screen, set up the Configuration 1 tab to close the solid state relay, and open the mercury displacement relay. For example, **figures 2 & 3** detail a Configuration 1 tab that sets up Relay 1 (the solid state relay) to activate (close) and Relay 2 (the mercury displacement relay) to activate (open) at 8:00:00am. This schedule will be transmitted to all the CPM-II units within the group "ALL CPM's" beginning at 7:45am. Normally the time required between when the schedules begin to transmit and the time when relay switching is to occur is 30 seconds per remote unit plus 5 minutes. The 15-minute period allocated in the example (7:45am till 8:00 am) could support contacting up to as many as 20 remote units.


Group: ALL CPM'S


Relay Configuration Relay Sync Mode

Configuration 1 | Configuration 2 | Configuration 3 | Configuration 4 | Configuration 5

Relay 1
 Relay 2

Allow Config. Transmit
 Yes

Initial State
 Set State On Next Call
 Set State On: 01/23/1996 08:00:00  Off
 Use Computer's Current Date On

Final State
 Continue Off
 Set State On: 01/23/1996 17:00:00  On
 Use Computer's Current Date On

Toggle Mode
 On
 Off

Initial State Duration: 10ths seconds
 Opposite State Duration: 10ths seconds

Configuration Transmit Schedule: Relay 1 and 2
 Disabled
 On: 01/23/1996 07:45:00
 Use Computer's Current Date

Transmit:
 Consecutive Days Then Disable

Figure 2) Relay Configuration screen for Relay #1


Group: ALL CPM'S


Relay Configuration Relay Sync Mode

Configuration 1 | Configuration 2 | Configuration 3 | Configuration 4 | Configuration 5

Relay 1
 Relay 2

Allow Config. Transmit
 Yes

Initial State
 Set State On Next Call
 Set State On: 01/23/1996 08:00:00  Off
 Use Computer's Current Date On

Final State
 Continue Off
 Set State On: 01/23/1996 17:00:00  On
 Use Computer's Current Date On

Toggle Mode
 On
 Off


Initial State Duration: 10ths seconds
 Opposite State Duration: 10ths seconds

Transmit schedule for Relay 2
 is the same as Relay 1.


Figure 3) Relay Configuration Screen for Relay 2

- The **Relay Sync Mode** setting under the **Preferences** button can be deselected (unchecked) to restore normal data call / time updating functionality to the system once the relay scheduling calls to the remotes have completed and scheduled relay toggling has begun.

Another note: The time tagged data intervals normally collected by the CPM-II unit are suspended during the operation of an active relay schedule. Instead, data can be collected after a short delay period past each on and off transition of Relay 1. The delay period used depends upon the **Interval Resolution** setting under the **Data**

Configuration button  of Remote Unit Manager at the time the relay schedule calls are made as follows:

Interval Resolution	Delay before Relay based reading
24 hour	approx 500 milliseconds
4 hour	approx 100 milliseconds
1 hour	approx 50 milliseconds
all others	no relay based readings taken

To utilize this feature, simply select the Interval Resolution to yield the delay time desired for the CPM-II group being switched. This should be done before the calling the units with a relay schedule. The original Interval Resolution for the remotes can be restored simply by restoring this field back to its original value and calling out to the group of units via the **Call Now** selection under the **Call Schedule** button . These calls will restore the original interval size and collect the data records gathered during the relay schedule for the remotes within this group.