

## DPM Active Harmonic Filter Quick Start Instructions

These instructions will guide you through installing, testing your installation, and starting up your DPM. For additional information please refer to the owner manual provided with your DPM.

### WARNING

Installation of a DPM should only be performed by qualified personnel.

### WARNING

Refer to the sections of the Owner's Manual referenced in the early steps of this procedure to install the DPM. The safety precautions of Section 2 in the manual should be read and understood prior to attempting an installation or prior to opening a DPM enclosure anytime after installation.

### WARNING

All wiring should meet the National Electric Code and any applicable local standards.

### WARNING

The circuit from which the power leads to the DPM originate should be off and locked out during installation.

### WARNING

The power source powering the wires monitored by the external current transformers (CTs) should also be off and locked out during installation of the CTs. Only after CTs are properly terminated to the DPM (or to all DPMs in a paralleled arrangement) should the power source powering the wires monitored by the CTs be re-energized.

### WARNING

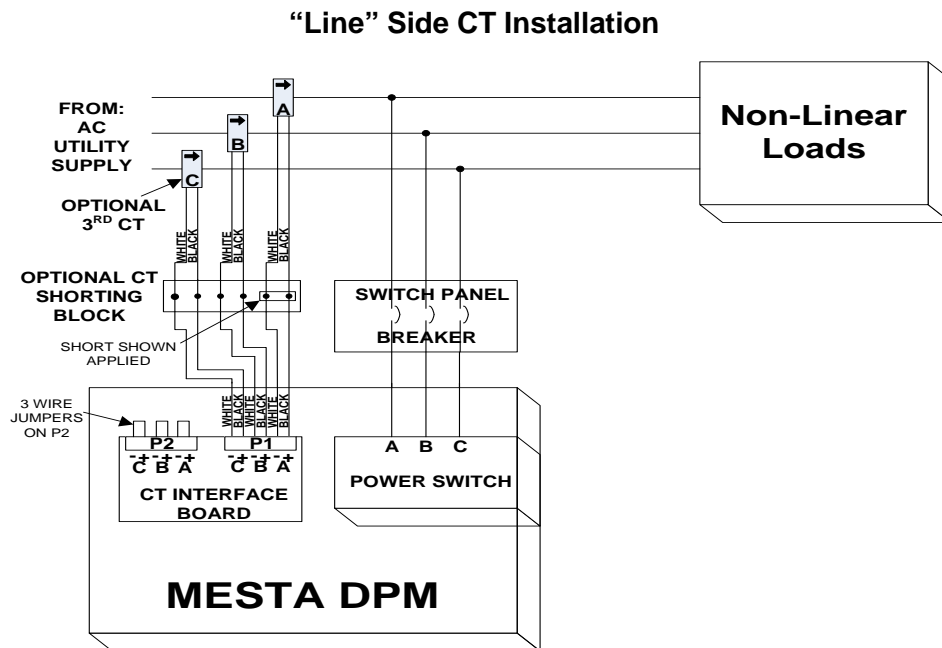
Do not open the output circuit of a current transformer (CT) unless the circuit the CT monitoring is de-energized or the CT has been physically removed from the circuit. This includes not removing any connections from, or the connectors themselves from P1 or P2 of the CT Interface boards inside the DPMs. Opening the output circuit of a CT could result in very high voltage that can cause the CT to fail and represents an extremely dangerous condition to personnel. Exception: If CTs are first connected to a shorting terminal block prior to being wired to a DPM, and shorts are applied across each CT's pair of output wires on that block, then CT related wiring continuing from the block to the DPM may be opened without harm.

1. Read Section 1 in the manual to familiarize yourself with how the DPM filters harmonic currents and power saving features of the Mesta DPM.
2. Read Section 2 in the manual to see the safety precautions to follow when working on a DPM.
3. Section 3 in the manual covers the installation of the system. Within this section, subsection 3.2 covers the installation of a NEMA1 enclosed unit and subsection 3.3 covers the installation of a panel within a site-specified enclosure, such as an MCC cabinet.
4. Subsection 3.4 covers how to wire a DPM. All systems will need 3-phase power brought into the unit. Also, either 2 or 3 Current transformers (CTs) are needed to externally monitor either the “Line” side current or “Load” side current. Examples are shown below.

Refer to section 3.4 of the manual if CT wires need to be lengthened or for additional wiring arrangements, especially arrangements that use paralleled DPMs.

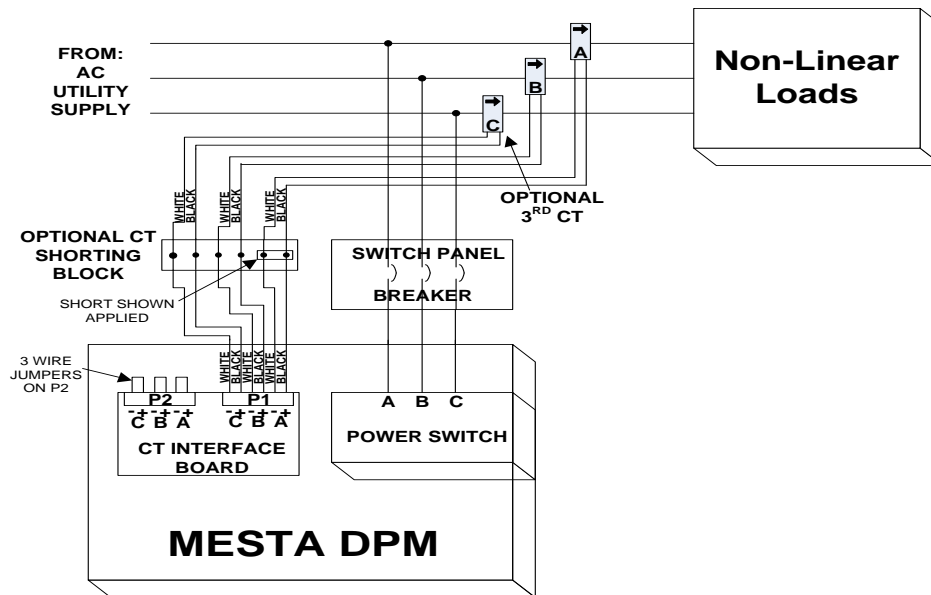
You may use these Quick Start Instructions for a paralleled system; however, you will need to also read subsection 3.4.3 in the manual for wiring instructions. Each system in the paralleled arrangement should be checked individually with the other DPM(s) powered off.

An example of a “Line” side wired installation follows:



An example of a “Load” side wired installation follows:

### “Load” Side CT Installation



It is important to note that the CTs are in the correct direction and on the correct phases. The direction of the arrows on the CTs should agree with the direction of the arrows in the previous Installation drawings. If using CTs supplied from Mesta, the output wires of the CTs are black and white twisted wires, and must be wired to the CT Interface Board inside the DPM as shown.

The designation of phase A, B, and C is arbitrary, and phase rotation does not affect the DPM, however, the phase “A” CT must be on the same phase that is connected to the left terminal of the DPM’s power switch (of a NEMA1 enclosed unit) or left power fuse block (of a panel unit). The phase “B” CT must be on the same phase that is connected to the middle terminal of the power switch or middle power fuse block. The phase “C” CT, if used, must be on the remaining phase.

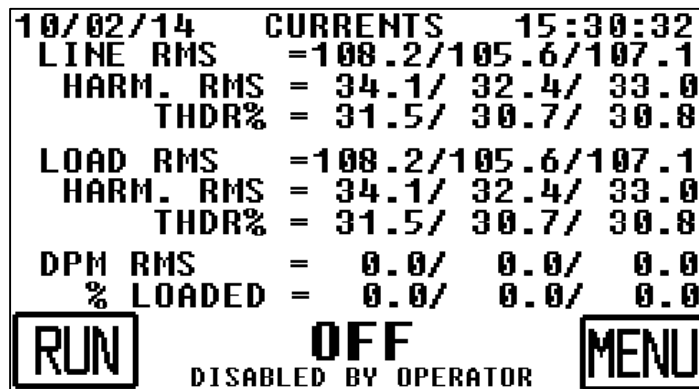
5. If status feedback relays are desired to be monitored by external hardware and/or the unit is to be externally disabled by external hardware, subsection 3.5 covers wiring to these optional features within the DPM.
6. Once your DPM is correctly installed and wired, the unit can be powered on. The unit will arrive from the factory in the “disabled” state. This means that the controls will power up, but the internal power circuitry will not yet operate.

7. When power is applied to the system by turning on the power switch, you should observe the following power-up “splash” display:

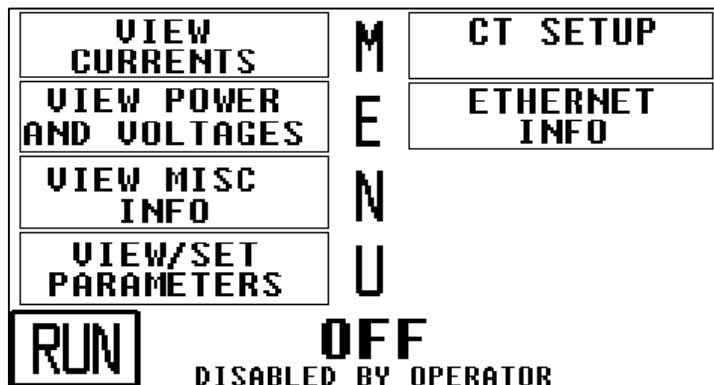


If you get the full display, you may either wait 5 seconds until the display changes to the “CURRENTS” display or press the “STOP” button on the display to go to the “CURRENTS” display immediately. DO NOT press the “RUN” button on the display at this time. If the display does not show anything, check to make sure 3-phase going to the DPM, or if is different than what is indicated above, contact the factory.

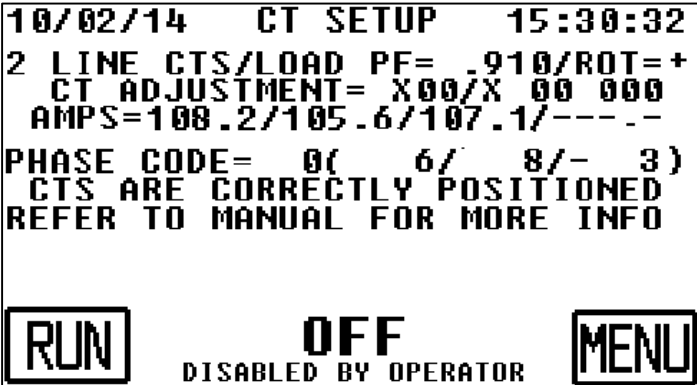
8. Once in the “CURRENTS” display, press the “MENU” button to display the main menu on the LCD display:



9. The boxes around the words indicate that those items are buttons that can be pressed to activate that function. On the MENU display, press the “CT SETUP” button to go to the current transformer (CT) setup display. For more detailed information on the CT SETUP display, refer to section 4 in the manual.



10. On the CT SETUP display, the first character of the 2<sup>nd</sup> line indicates how many phases the system is set up to monitor with CTs (2 or 3). This is followed by the word “LINE” or “LOAD”, indicating if DPM is set up for “line” or load side CT placement. Verify that the number of CTs wired and the position (Line or Load side) of these CTs agrees with the 2<sup>nd</sup> line of the CT SETUP display. If not, you will need to either correct your physical wiring to match the DPM configuration shown, or change the DPM setup parameters. To change these parameters, press the “MENU” button on the display, followed by pressing the “VIEW/SET PARAMETERS” button on the MENU display. Then refer to sections 5.6, 5.6.2, and 5.6.7 to change the number of CTs and/or position (Line or Load) of those CTs.



Your DPM has the capability to automatically determine if your CTs are placed on the correct phases and in the correct direction. However, to do so, there must be some load operating. This load cannot be too inductive or capacitive in nature – one or more AC motor drives operating at 20% or higher power is an excellent load. Most loads will not present a problem during this setup procedure. If the message on the 6<sup>th</sup> line is “CTS ARE CORRECTLY POSITIONED” or “CTS ARE CORRECTLY ADJUSTED”, your CTs are on the correct phases for proper operation and you can proceed to the next step.

If you observe any of the other messages in the following table, refer to section 4 of the manual for information on how to correct the situation, and specifically go to the subsection of section 4 shown in the following table for the particular CT SETUP message displayed.

CT SETUP Message	Explanation and Action to Take
LOAD CURRENT TOO LOW	Insufficient load current to determine if CTs are placed correctly. Go to subsection 4.1 to correct.
LOAD TOO CAPACITIVE/INDUCTIVE	Load current is high enough; however, load is either too capacitive or inductive to correctly determine if CTs are placed correctly. Go to subsection 4.1 to correct.
ERRONEOUS PHASE CODE	Should not see this message. Stop and contact factory if you do see it.
2 CTS ON A&C. MUST BE ON A&B	When using 2 CTs, they must be located on phases A and B. Go to subsection 4.2 to correct.
2 CTS ON B&C. MUST BE ON A&B	When using 2 CTs, they must be located on phases A and B. Go to subsection 4.2 to correct.
FIX CTS OR ADJUST HERE	CTs are not on the correct phases and/or are in the wrong direction. Go to subsection 4.2 to correct.

Your DPM also has the capability to automatically correct for certain incorrect CT placements, without rewiring or moving CTs. Refer to section 4.2.3. of the manual in order to use this feature.

- If the message "CTS ARE CORRECTLY POSITIONED" or "CTS ARE CORRECTLY ADJUSTED" is shown on the CT SETUP display, it is now time to enable the DPM to start correcting harmonics. Exit the CT SETUP display by pressing the MENU button in the bottom right corner of the display. Then press the VIEW CURRENTS button on the MENU display to bring up the CURRENTS display:

```

10/02/14  CURRENTS  15:30:32
LINE RMS    =108.2/105.6/107.1
HARM. RMS   = 34.1/ 32.4/ 33.0
THDR%       = 31.5/ 30.7/ 30.8

LOAD RMS    =108.2/105.6/107.1
HARM. RMS   = 34.1/ 32.4/ 33.0
THDR%       = 31.5/ 30.7/ 30.8

DPM RMS     =  0.0/  0.0/  0.0
% LOADED    =  0.0/  0.0/  0.0

[ RUN ]      OFF      [ MENU ]
          DISABLED BY OPERATOR

```

To enable the system, press the "RUN" button in the bottom left corner of the CURRENTS LCD display page. This will result in the following display:

- This screen allows the operator to confirm the "RUN" command, or exit without enabling the system in case the "RUN" button was pressed accidentally. Pressing the "EXIT" button will bring up the previous display page without enabling the system. If the "RUN" button is not pressed within 10 seconds, the effect will be the same as pressing the "EXIT" button. If the "RUN" button is pressed within 10 seconds, the DPM system will be enabled and begin to operate.

```

[ RUN ]      [ EXIT ]

YOU HAVE PRESSED [RUN]. THIS
WILL ENABLE THE SYSTEM TO
OPERATE. PRESS [RUN] WITHIN
9 SECONDS TO CONFIRM THIS
ACTION OR [EXIT] TO ABORT.

```

- The DPM will begin charging the internal DC bus, which takes 1 to 10 seconds depending on DPM size. This is indicated by a "PRECHARGING" message on the display. The pre-charging voltage and current are displayed at the bottom of the screen. This can be seen in the sample screen that follows.

```

10/02/14  CURRENTS  15:30:32
LINE RMS    =108.2/105.6/107.1
HARM. RMS   = 34.1/ 32.4/ 33.0
THDR%       = 31.5/ 30.7/ 30.8

LOAD RMS    =108.2/105.6/107.1
HARM. RMS   = 34.1/ 32.4/ 33.0
THDR%       = 31.5/ 30.7/ 30.8

DPM RMS     =  5.2/  5.2/  0.0
% LOADED    =  5.2/  5.2/  0.0

[ STOP ]    PRECHARGING    [ MENU ]
          UDC= 754.2  IPRE=  5.2

```

Note that once the DPM is told to RUN, the place where the RUN button was previously located, is now a STOP button.

14. When the DC voltage bus has been completely pre-charged and the control determines it is OK to proceed, the DPM begins correcting the harmonics and power factor of the line, and the display will indicate that the unit is operating. This is indicated by the “ON”/“FULLY OPERATIONAL” or “ON”/“REDUCED LINEAR PF MODE” status.

```

10/02/14  CURRENTS  15:30:32
LINE RMS    =102.8/100.6/102.0
HARM. RMS   = 3.5/ 3.3/ 3.6
THDR%       = 3.4/ 3.3/ 3.5

LOAD RMS     =108.2/105.6/107.1
HARM. RMS    = 34.1/ 32.4/ 33.0
THDR%        = 31.5/ 30.7/ 30.8

DPM RMS      = 33.1/ 30.9/ 31.8
% LOADED     = 33.1/ 30.9/ 31.8

[STOP]      ON      [MENU]
             FULLY OPERATIONAL

```

If the system is working correctly, the LOAD THDR% (total harmonic current distortion of the current fed to the loads) will still be relatively high (30.7 – 31.5% in this example); however, the LINE THDR% (total harmonic current distortion of the current drawn from the line) will be low (3.3 – 3.5% in this example). For most loads and line conditions, as long as the DPM is loaded to at least 25% (30.9 – 33.1% in this 100 Amp DPM example as seen in the DPM % LOADED line), you should be able to achieve less than 5% THDR% on the LINE. The load requiring more harmonic current correction than the unit can deliver, very high THDR loads, highly distorted line voltage, or high impedance in the line feeds could result in a higher THDR% from the line.

If substantially lower THDR% is not observed in the LINE THDR% displayed compared with the LOAD THDR% and the DPM is loaded to at least 10%, you probably have an installation problem. Disable the DPM by pressing the STOP button. When the next display asks you to confirm the STOP command, press the STOP button on that display as well.

If the unit detects that it is not correcting harmonics satisfactorily, it may shut itself down. It will then attempt to reset (indicated by the splash screen being displayed). It could perform this cycle a few times before “giving up”. If it reaches this point, the CURRENTS display will indicate a status of OFF and the reason for the problem underneath this OFF status.

Even if your CTs are placed on the correct lines and in the correct direction, if you have them placed on the LOAD side, but have told the DPM they are on the LINE side, or vice-versa, the system will not operate correctly. This is the most likely reason for your DPM to not be operating correctly at this time. Recheck your CT locations. If all CTs and settings seem to be correct, consult the factory for additional assistance.

15. Once you have confirmed that your CTs are correctly placed, and the unit is operating properly, the DPM should give you years of trouble-free, harmonic-correcting operation, requiring minimal maintenance. To insure a long life for your unit, regularly inspect the air filter(s) on the front and/or bottom of the unit and clean or change when dirty.

**For Parallel DPM Installation Only:**

After each DPM has been tested, they may now be powered and enabled to run. Once running, the THDR% of the line should again be substantially lower than the THDR% of the load for all DPMs in the paralleled setup. It should be noted that actual THDR% of the line will only be equal to the line THDR% shown on any of the paralleled DPMs if all DPMs are operating and %LOAD values (see subsection 3.4.3 of the manual) for all paralleled operating DPMs add up to 100%.