

## Energy Tracking, LLC.

### Web Enabled Meter: WEM - MX

### Installation and Operation Manual

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**WARNING**



The electrical warning symbol is a lightning bolt mark enclosed in a triangle. The electrical warning symbol is used to indicate high voltage locations and conditions which may cause serious injury or death if the proper precautions are not observed.

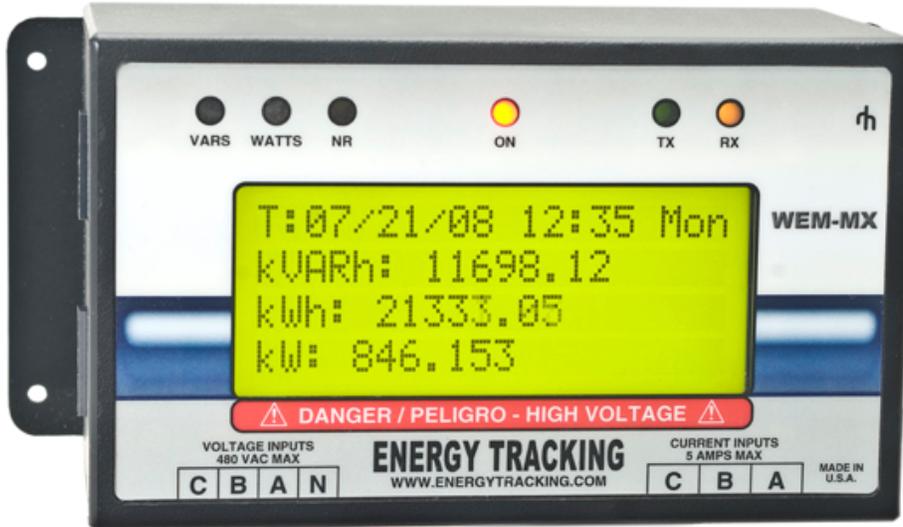
**CAUTION**



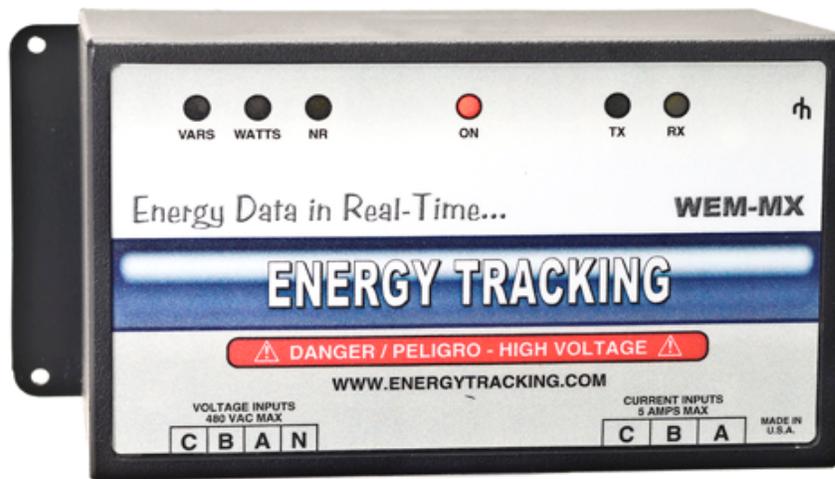
The caution symbol is an exclamation mark enclosed in a triangle. This symbol is used to indicate potentially hazardous situations and conditions that can cause operator injury and / or equipment damage.

# WEM - MX

WEM - MX with LCD Display:



WEM - MX without LCD Display:



## 1. Overview:

Our Web Enabled Meter, WEM-MX is a revenue grade meter capable of precision electric energy measurement to within 0.2%. The WEM-MX is designed to be used for primary or sub metering applications. It has an embedded network module that has a web server and is capable of transmitting reports via email and/or ftp. The WEM-MX can be configured for single, two or three phase metering from 120 VAC to 480 VAC (line-to-line) at frequencies ranging from 47 to 63 Hz.

### **WARNING**

These installation guidelines are for qualified personnel only. Do not perform any servicing other than that contained in the operating / installation instructions unless you are qualified to do so.

The WEM-MX input measurement voltages can be lethal and therefore, installation must be performed by a qualified electrician abiding by local regulations. Ensure all supplies are de-energized before attempting connections.

### **Please follow these guidelines:**

- Install a fused connection block for each voltage phase.
- Ensure that the input voltage does not exceed 480 VAC (line-to-line or 277 V rms Phase to neutral).
- Ensure that the input current does not exceed 5 Amps.
- Ensure that a service disconnect is placed before the connections to the WEM-MX voltage inputs.
- Never connect / modify live connections to the current transformer inputs (CT's). The external primary CT's must be not be energized.
- Maintain polarity of each CT. Ensure that each external CT points toward the load.

- Short any unused CT input with an insulated jumper wire.
- The WEM-MX should only be installed indoors and in an environment that is between -25 deg C and 60 deg C for units without an LCD display. Meters with a LCD display should only be installed in an environment that is between 0 C and 50 deg C. Avoid areas that are dust prone and have excessive moisture.
- Un-used Voltage inputs on the meter must be tied to Neutral.
- Un-used Current inputs on the meter must be shorted.

### **1.1. Mounting:**

The WEM-MX has exposed screw terminals for Voltage and Current Inputs. Therefore, it should always be installed with the supplied cover.

The WEM-MX enclosure is designed to be wall mounted or placed inside another enclosure. The WEM-MX has two flanges on either side each with two holes on each side for mounting. For wall mounting, it is recommended that the WEM-MX be installed on a plywood panel at least ½” thick.

#### **Mounting Screws:**

Please use #6 X 3/8" self-tapping screws. Phillips / Pan Head / Type A / 18-8 Stainless Steel.

#### **Fuse Holder and Fuse Details:**

The recommended fuse holder is: Manufacturer Ferraz-Shawmut Part No. 30323 (600V-30A)

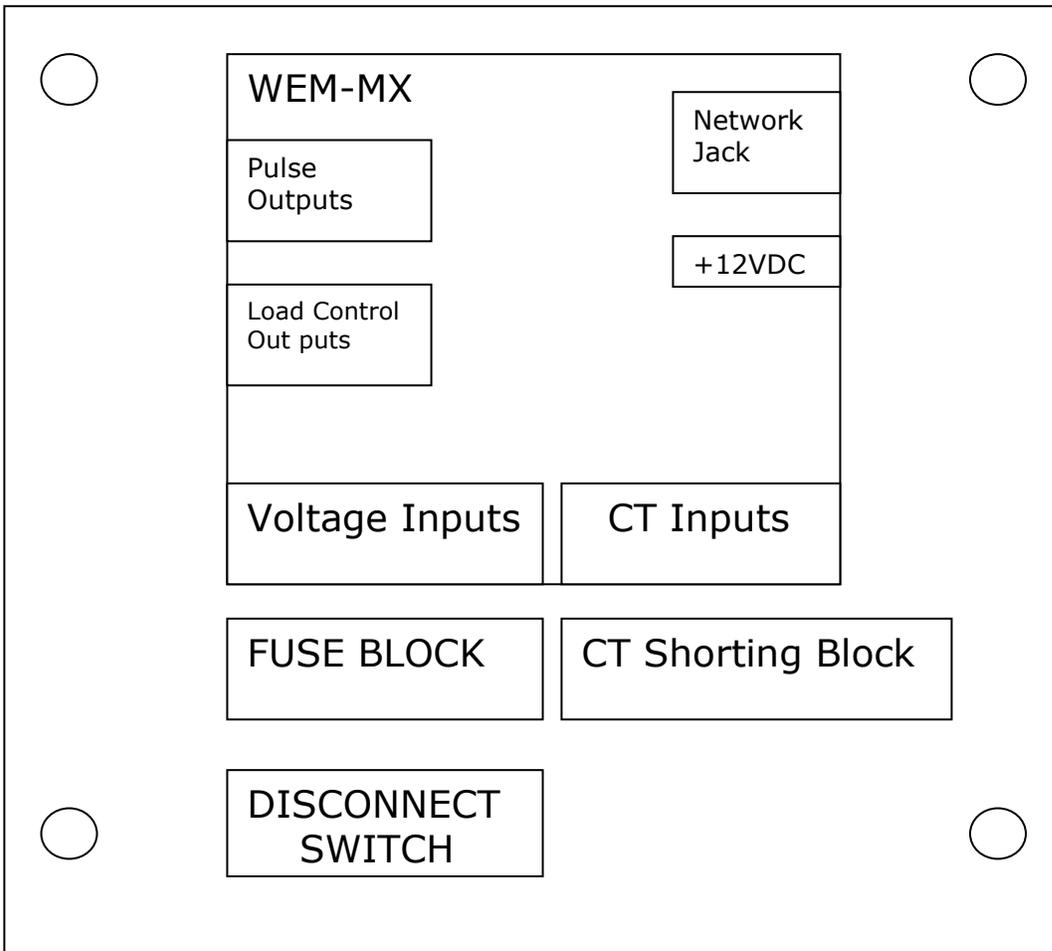
The recommended fuses: Manufacturer – Littlefuse Model KLK 1 (midget fuse 600V)

High Voltage Wiring:

Recommended hookup wire is 12 GA Stranded 600V THHN Rated 105 deg C (TWN75 or T90 Nylon)

The following figure provides generic positioning of the meter.

Figure 1:



**Important:** The protection provided by the meter may be impaired if it is not installed and used as specified by manufacturer guidelines.

**WARNING! DO NOT REMOVE COVER WHEN DEVICE IS ENERGIZED.**

## 1.2. Installation:

### Network Connection:

Connect the RJ-45 network connector to your local area network. This is to ensure that upon power up, the network connection is available. Upon boot, the WEM-MX will request an IP address using its DHCP client. You may change this to a fixed IP address later. The WEM-MX will try to access the Internet to acquire the local time from public SNTP time servers. Therefore, it is critical that the meter be connected to a network that has Internet access. Please Note: This is not critical during installation, but necessary for standard operation. There is one exception to this setup. Certain types of projects do not require reporting. An example is Tenant metering where end of month kW and kWh are the only values required. In such cases the meter can be setup with a static IP Address, email / ftp reporting can be disabled and SNTP can also be disabled.

### Power Connection:

The WEM-MX comes with an external power supply that has a 12V DC output. Please use a surge suppressor for the external power supply. Before connecting the measurement voltage source or power inputs, please connect the power supply to the meter. Make sure that the network connector input (RJ-45) is connected to a network that has Internet access.

### Voltage Inputs



- Disconnect the measurement power source before connecting these inputs.
- Ensure that each phase A, B, and C are correctly wired.
- Use a 1 amp size fuse for each phase. Fuse holders and fuses can be purchased from Littlefuse or Bussman. Example: Littlefuse Model KLK 1 (midget fuse 600V).
- **Warning! Never make changes to the Voltage connector plug when the load is energized. Lethal Voltages can be present on the wires.**

## **Current Transformers**

- The WEM-MX will accept current transformers which provide a secondary output of 5 Amps.
- Only utilize CT's that are UL approved.
- Ensure that each CT connects to the appropriate phase input.
- Review the Diagram 2 as shown below before energizing the connection to the load.
- Short un-used CT inputs.
- **Warning! Never make changes to the CT connector plug when the external CT's are energized. Lethal Voltages can be present on the wires.**

## **Power Supply Details:**

Manufacturer: CUI INC.

Model No: EPAS-101W-12

Part No: DPS120100UPS-P5P-SZ

Input: AC 100 – 240V, 50 Hz – 60 Hz, 0.3A

Output: DC 12V

## **Device Category and Pollution Degree:**

Installation Category: III, for measurements performed in the building installation.

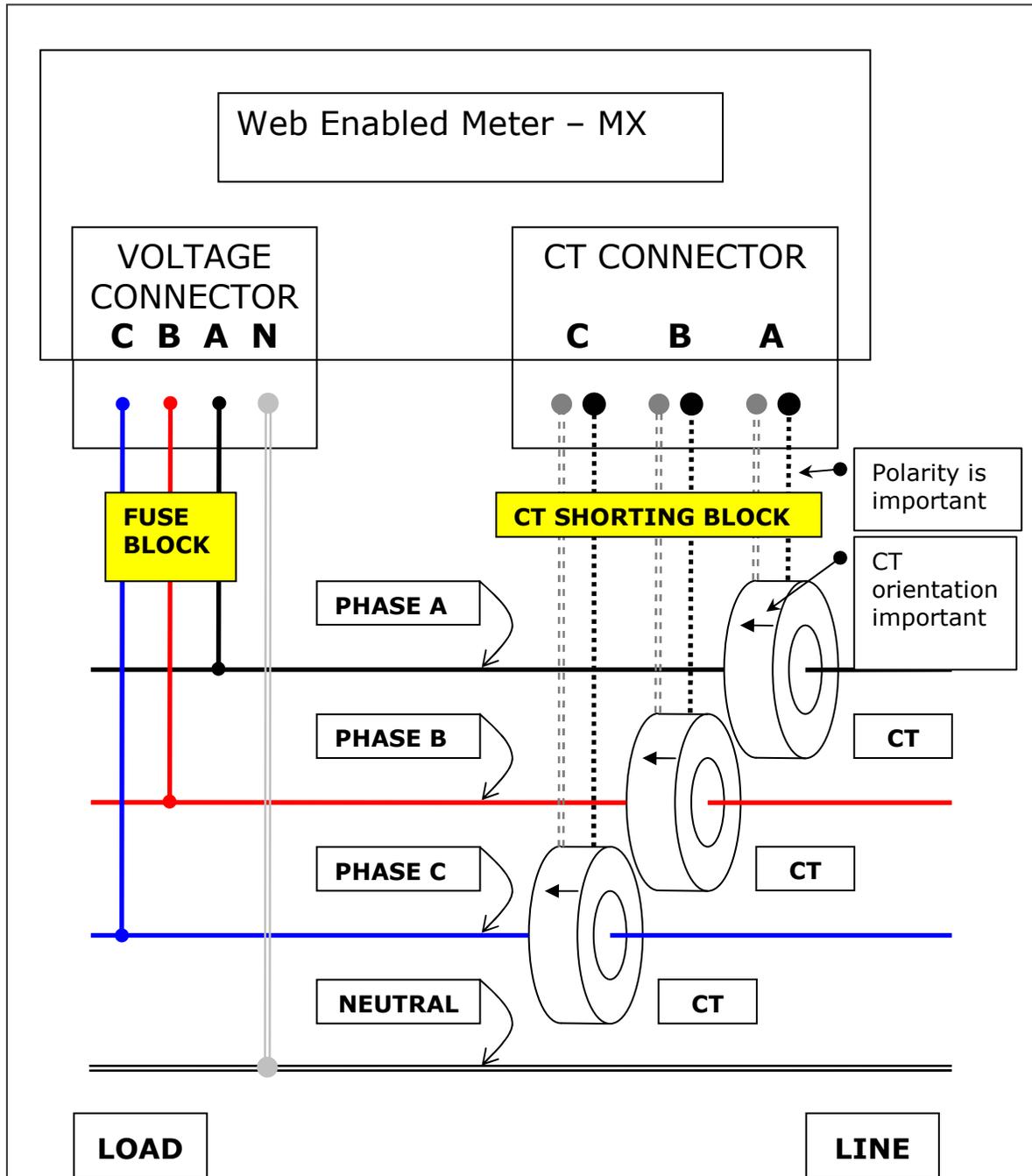
Pollution Degree: II

## **Cleaning and Maintenance:**

The meter may accumulate dust over time. Use a soft cloth to clean the external enclosure. If the meter has an LCD display, gently wipe off the dirt as the faceplate can be easily scratched.

## Typical Three Phase – 4 Wire WYE Connection:

Figure 2:



The 'H1' marking (if present) on the CT always faces the LINE.

### **1.3. Watt and Var Pulse Outputs (Optional):**

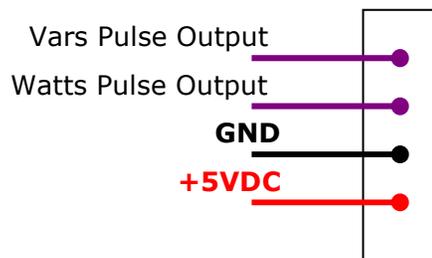
This is sometimes necessary to feed information to an Energy Management System (EMS) or another pulse logging device.

The WEM-MX has two outputs. One for WATTS and another for VARS and will generate a pulse output on both outputs for Watts and Vars. The multiplier is 1.8 (watts and vars) per pulse X the CT Ratio. For example, if you installed a 200:5 Amp CT, the CT Ratio is  $200/5 = 40$ . The multiplier in this case will be  $1.8 \times 40 = 72$ .

In order to acquire this pulse output, you may need an external power supply with a 5V DC output. If the EMS or data logger has an existing internal pull-up resistor, then the power supply is not required. To ensure your safety, the opto isolator provides an isolation of 2.5 kV.

Connect the power supply as shown below to get a pulse output.

Figure 3:



**Warning!** The external power supply and ground connection are unique for the 'Pulse Output' and 'Load Control' Connector input blocks. Please take precautions not to interchange them.

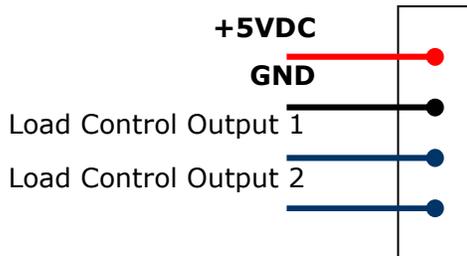
#### 1.4. Load Control Outputs (Optional):

The WEM-MX can control two separate outputs based on a user defined threshold. To connect these outputs to a solid state relay or an Energy Management System, you may need to provide an external power supply.

In order to acquire this pulse output, you may need an external power supply with a **5V** DC output. If the EMS or data logger has an existing internal pull-up resistor, then the power supply is not required. To ensure your safety, the on board opto isolator provides an isolation of 2.5kV.

Connect the power supply as shown below for Load Control.

Figure 4:



**Warning!** The external power supply and ground connection are unique for the 'Pulse Output' and 'Load Control' Connector input blocks. Please take precautions not to interchange them.

## 2. Common Installation Start up Questions / Issues:

1. A negative value for the power factor on one of the Phase is being reported.
  - The CT is reversed for this phase. Reverse the CT orientation. Do not simply reverse the wires on the CT's output as this may lead to confusion in the future. Please make sure that the external load on the CT's is de-energized before attempting any wiring changes.
2. All power factor values are negative.
  - See response above. The CT's have not been oriented towards the load.
3. How do I know the IP Address of the meter?
  - If you ordered a meter with a LCD display it will be shown on line 2.
  - You should be able to log into your DHCP server and identify the leased IP Address from the MAC Address identified on the WEM-MX face plate. The Client Host Name will be identified as "ET\_WEM".
  - Alternatively, you can download our Discover IP / Debugger application from our web site that will hail the meter(s) on the network (port 12345) and will provide you with an IP address.
4. Is there a way to see the boot up or real time operation of the WEM-MX?
  - Download the Discover IP application from our web or ftp site. This application will provide all the feedback to view the WEM-MX's operation in real time including current kW, kWh and kVarh.

5. My email is not working.

- See response above. The Discover IP application is an ideal tool to help identify issues. If necessary, select the checkbox “Log Data Upon Receipt” and send the results to [support@energytracking.com](mailto:support@energytracking.com)
- Make sure that this is not due to a firewall issue.
- The most common mistake is to not enter the ISP that is providing the Internet network connection. Your setting for [SMTP] **MUST** be for the mail server that provides the Internet access to your network. Check your outgoing mail SMTP settings.
- In cases where a static IP Address is being used, a wrong gateway and or subnet mask entry can prevent email / ftp from working.

6. The readings are less than expected.

Go to the “[Main Configuration](#)” menu on the web server and enter the CT ratio. If, for example; you are using 400 Amp: 5 Amp CT then your ratio is  $(400 / 5) = 80$ .

Meter Setup:	
CT RATIO	<input type="text" value="80"/> (<=9999)
PT RATIO	<input type="text" value="1"/> (<=9999)

### **3. Operation:**

The WEM-MX is a versatile meter with 10/100 Base-T Ethernet support.

#### **3.1. Firmware Applications:**

- DHCP or Fixed IP
- DNS client
- FTP client
- FTP server
- Email client
- Web Server
- SNTP client
- Day Time client
- Time Zone Support

#### **3.2. Standard Ports:**

- Web Server - Port 80
- FTP Server - Port 21
- Email SMTP - Port 25
- Email POP3 - Port 110
- SNTP Server - Port 123
- Day Time Server - Port 13
- Debug Output - Port 12345

#### **3.3. Inbound / Outbound Services:**

1. Simple Network Time Protocol (SNTP) is used to acquire / synchronize the time on the WEM-MX. Day Time Servers are accessed only if SNTP fails to acquire time. The time synchronization periodicity is hourly - based on user defined setting of 1 to 23 hours. SNTP can be disabled for a stand alone operation.

2. Email Client: Can be setup to send periodic emails immediately following the interval log or at a later time. This is described later on in this manual.

3. FTP Client: (if enabled) will behave similar to the email client. Files are uploaded to a user defined FTP server at the same instant that the email is being sent.

4. Debug Output: Is a means to retrieve certain real time and ongoing operations of the meter on the local network.

5. FTP Server: Is used to upload new firmware version updates to the WEM-MX.

6. Internet Connection Check: The WEM-MX tries to connect to a user defined web server to confirm Internet availability before executing operations such as email or ftp. This functionality is disabled by default and should be kept disabled.

7. Web Server: Provides html pages for preview and user setup / configuration.

### **3.4. Load Profile Data Channels:**

These are fixed and cannot be changed by the user. The Load Profile interval logging can be disabled if it is not required. The default (factory) settings have the load profile functionality disabled.

- kWh Delivered (import), kWh Received (export) – Load Profile
- kVarh Delivered (import), kVarh Received (export) – Load Profile

### **3.5. Memory:**

- 4 MB Flash
- 8 MB SDRAM

### **3.6. LED Display on Network Module:**

- Yellow: Provides indication of Ethernet link.
- Green: Blinks on Ethernet activity.
- Faceplate: TX / RX - Serial port activity
- Faceplate: ON – Indicates power to meter.
- Faceplate: NR – Flashes when power measurement is not occurring.
- Faceplate: VARS / WATTS: Factory use for meter calibration.

### **3.7. Environmental:**

- Ambient Temperature: - 25 C to + 60 C without LCD.
- Ambient Temperature: 0 C to + 50 C with LCD.
- Humidity: 5% to 90%
- Altitude: 12,000 feet (3657.60 meters)

### **3.8. Network interface:**

- RJ-45 connector (8-pin)
- 10/100 BASE-T

### **3.9. DC Electrical Characteristics:**

- Supply Voltage: +12 Volts DC. Power Supply provides 12VDC
- Supply Current: 350 mA (typical). Backlit LCD modules will draw higher current 750 mA (typical) at full brightness.

### **3.10. Network Module International EMC Standards:**

The embedded network module meets the following electromagnetic emissions (EMC) standards:

- EN55022: 1998
- EN55024: 1998
- VCCI
- AS 3548

### **3.11. Network Module Safety Standards:**

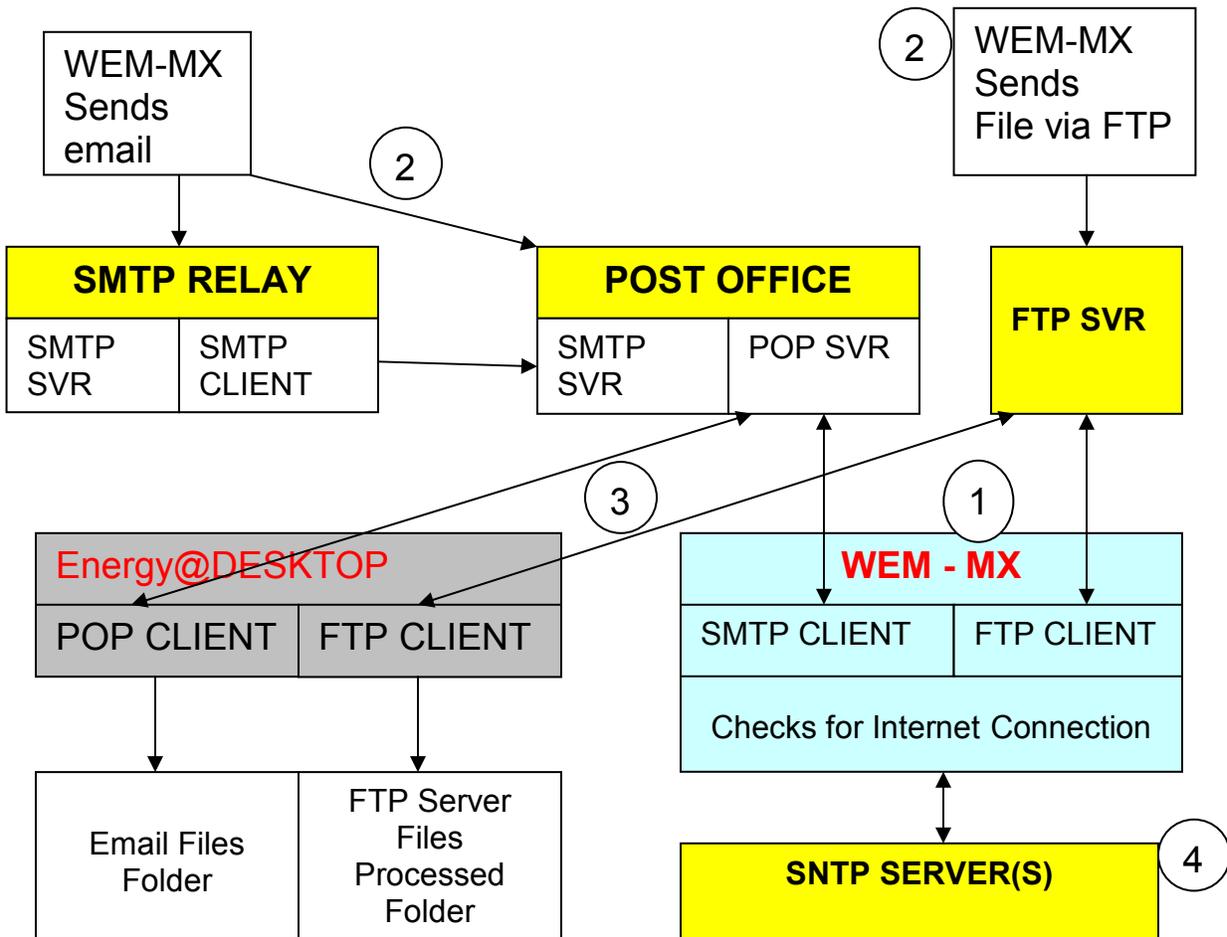
The embedded network module meets the following electromagnetic emissions (EMI) standards:

- UL 60950
- CSA 22.2 No. 60950
- EN60950

### **3.12. Mechanical:**

- Enclosure Type: ABS plastic and conforms to UL 94 V0
- Flame Resistance Rating: 94
- Connectors: Euro style. Rated at 600V @ 5 Amp. 22-12 AWG.
- Size: 7.75" X 3.8" X 3.5"

#### 4. Email, FTP and SNTP Operations Overview:



#### 4.1. Sequence of Operations:

1. The WEM-MX initiates an email and / or FTP process based on settings in '[Schedule Reporting Setup](#)'.
2. WEM-MX sends email and data via FTP.
3. Energy@Desktop software application periodically polls the POP and FTP Servers for data, processes and saves the data to a local MS Access Database.
4. SNTP Server is polled periodically for Time Synchronization.

End User **MUST** have the following information prior to setup: (ALL fields under 31 characters). If the FTP is not used, disable the ftp access.

Example:

1. Outgoing mail server [SMTP]: smtp.1and1.com
2. email domain name: mydomain.com (enter your domain)
3. FTP Address: <ftp.mydomain.com>
4. FTP user name: logger
5. FTP password: your password
6. FTP Directory: Directory / Folder name or leave blank if not required.

#### **4.2. Default Operation:**

The default setting on the WEM-MX has DHCP enabled. So, upon power up it will acquire an IP address.

#### **4.3. Web Server:**

Logging In: Please note that the username and password **are** case sensitive.

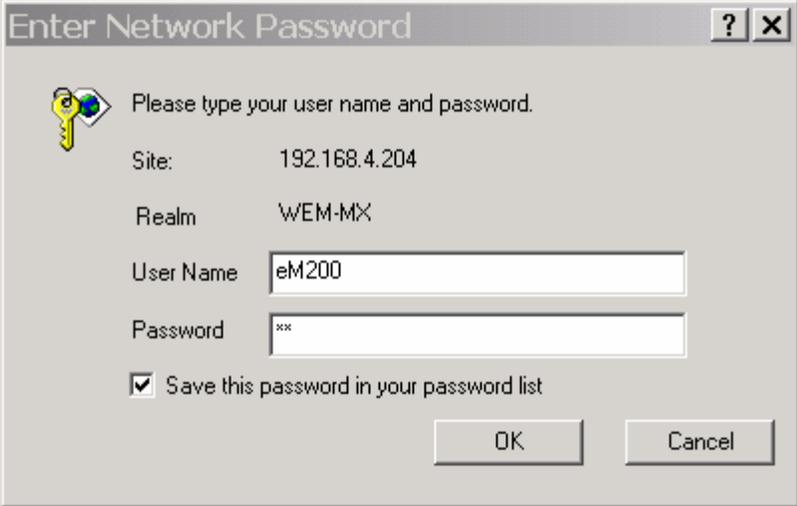
The username is: eM200

The password is: PW

# Energy Tracking

## Web Enabled Meter (WEM-MX)

### Log-In



Enter Network Password

Please type your user name and password.

Site: 192.168.4.204

Realm: WEM-MX

User Name: eM200

Password: xxx

Save this password in your password list

OK Cancel

Navigation: Upon login you should see on the left frame:

[Home](#)

[Real Time Data 1](#)

[Real Time Data 2](#)

[Load Profile 24 Hrs.](#)

[Load Profile Flash](#)

[Current Month](#)

[Last Month](#)

[Setup](#)

Clicking on 'Setup' you should see on the right frame:

# Energy Tracking

WEM-MX

[Main Configuration](#)

[Meter Configuration](#)

[Schedule Reporting Setup](#)

[Setup TOU](#)

[Test FTP](#)

[Test Email](#)

[Execute Demand Reset](#)

[Delete Load Profile Data](#)

[Reset \(immediate\)](#)

[Power Off Shutdown \(immediate\)](#)

[Change \(Read-Only\) Password](#)

[Change \(Admin\) Password](#)

[Set Time](#)

[Setup Display](#)

[XML View CB Last 24 Hour LP Data](#)

[HTML View CB Last 24 Hour LP Data](#)

## 4.4. Saving Setup:

**Note: Upon Clicking the 'Save' Button after modifying / entering information may take up to 30 seconds. Please be patient for the page to refresh.**

## 4.5. Setting Up Reporting:

Setup the interval logging and reporting fields.

Click on: [Schedule Reporting Setup](#)

**Note:** Please do **NOT** enable the email or ftp client until you have setup the proper information in '[Main Configuration](#)' and tested the configuration using 'Test Email' / 'Test FTP' options. These fields are duplicated in the [Main Configuration](#) web page. The main reason that these fields are provided in the 'Email Schedule Setup' web page is to enable the end user to enable / disable email / ftp operation(s) without causing a meter reset which does occur when parameters are saved in '[Main Configuration](#)'.

**Note:** Email and FTP reporting can be concurrently scheduled down to a periodic reporting interval of 5 minutes. Please contact technical support at Energy Tracking for more details on setting lower reporting intervals.

Disable FTP Client	<input checked="" type="checkbox"/> Uncheck to Enable.	<div style="border: 1px solid black; padding: 5px;"> <p>Do NOT enable until setup in <a href="#">Main Configuration</a> is complete.</p> <p>Recipient(s) who will receive email reports.</p> </div>
Disable eMail Client	<input checked="" type="checkbox"/> Uncheck to Enable.	
Email to:	<input type="text" value="data@imetering.com"/>	
Alarms   CC: Email to:	<input type="text"/>	
CC: Option	<input type="checkbox"/> Check to Enable CC Option.	
Select the day(s) on which you would like to receive the reports via email:		<div style="border: 1px solid black; padding: 5px;"> <p>Select Reporting schedule</p> </div>
<input type="checkbox"/> Sunday <input type="checkbox"/> Monday <input type="checkbox"/> Tuesday <input type="checkbox"/> Wednesday <input type="checkbox"/> Thursday <input type="checkbox"/> Friday <input type="checkbox"/> Saturday <input checked="" type="checkbox"/> Every Day <input type="checkbox"/> Monthly		
Include in daily email:		
<input checked="" type="checkbox"/> Current Month's Energy Data <input checked="" type="checkbox"/> Last Month's Energy Data		
Enter the time of day at which the report should be emailed: <input type="text" value="00:00"/> HH:MM		
Report Periodicity: <input type="text" value="15"/> minutes ( $\geq 1$ )		
Send report upon end of interval: <input type="checkbox"/>		
Disable Load Profile: <input type="checkbox"/>		
Do not save to file: <input type="checkbox"/>		
Logging Interval: <input type="text" value="5"/> minutes ( $\geq 1$ )		
Overwrite File Counter: <input type="text" value="2"/> ( $\geq 1$ )		
<input type="button" value="Submit"/> <input type="button" value="Cancel"/>		
<a href="#">Email/FTP Account Setup</a>		

Note: [a]. If a carbon copy (cc) is being sent, enable the checkbox.  
 [b]. Upon 'Submit', a meter reset is not required.

'Report Periodicity' field is how often the emails should be sent. This value typically is the same as 'Logging Interval' so that an email is dispatched

immediately after the interval log. Example: setting this field to 60 with Logging Interval at 5 will log the energy usage data every 5 minutes and send the report every 60 minutes.

'Send report upon end of interval' field should be checked if you want the meter to immediately dispatch an email and or ftp file immediately after the log interval. The 'Report Periodicity' field value is disregarded if checked.

'Disable Load Profile' checkbox if enabled will disable the periodic load profile data storage and periodic reporting of interval data.

'Do not save to file' checkbox should only be enabled if reporting via email / ftp is disabled.

'Logging Interval' field defines how often the kWh load profile data is logged (in minutes) to the file. Typically this is set to 15 or 30.

Overwrite File Counter defines when to delete the load profile data log file after successful email and ftp update. Recommended values are between 1 to 2.

Note: When the value is set to 2, it means that 2 reports must be successfully sent in succession before the file is erased.

#### **4.6. Setting Up Reporting via Mail and FTP:**

Now, let's setup the mail and ftp client parameters.

Click on:

[Main Configuration](#)

<b>Outgoing Mail Setup: (Reqd. to Send email)</b>	
Outgoing mail [SMTP]	<input type="text" value="mail.optonline.net"/>
Domain Name	<input type="text" value="imetering.com"/>

**Note:** A very common startup question is about setting the SMTP server. You must use the SMTP mail server that is provided by your ISP. This is of course, if you do not have your own mail server.

#### **4.7. Setting Up FTP:**

Click on:

[Main Configuration](#)

FTP Setup:	
Ftp Server IP	<input type="text" value="ftp.imetering.com"/>
FTP Account Name	<input type="text" value="logger"/>
FTP Password	<input type="password" value="*****"/>
FTP Directory	<input type="text" value="data"/>

#### **4.8. DNS Client:**

If you are going to use the WEM-MX with a fixed IP address, then you must enter DNS1 and / or DNS2 fields. If DHCP is used, then disregard unless you wish to enter your specific DNS servers.

DNS Setup:	
DNS 1	<input type="text"/>
DNS 2	<input type="text"/>

#### 4.9. Disabling email or ftp:

Application Setup	
Disable FTP Client	<input checked="" type="checkbox"/> Uncheck to Enable.
Disable eMail Client	<input checked="" type="checkbox"/> Uncheck to Enable.

If the check box is checked, then the feature is disabled. These options are found in:

[Main Configuration](#)

[Schedule Reporting Setup](#)

#### 4.10. SNTP and Time Zone:

SNTP And Time Zone Setup:	
Enable SNTP	<input checked="" type="checkbox"/> Uncheck to Disable.
Server 1	<input type="text" value="0.pool.ntp.org"/>
Server 2	<input type="text" value="1.pool.ntp.org"/>
SNTP Periodicity	<input type="text" value="8"/> Hours
DST Zone Offset:	<input type="text" value="21"/> 21 for East Coast USA
STD Zone Offset:	<input type="text" value="20"/> 20 for East Coast USA
DST START:	Mth: <input type="text" value="3"/> wk: <input type="text" value="2"/> Day: <input type="text" value="0"/> Hr: <input type="text" value="2"/>
DST END:	Mth: <input type="text" value="11"/> wk: <input type="text" value="1"/> Day: <input type="text" value="0"/> Hr: <input type="text" value="2"/>
<input type="button" value="Submit"/> <input type="button" value="Cancel"/>	

Note: For UK, the DST Zone offset is: 1 STD Zone Offset is: 0

[DST Zone Offset:](#)

This selection is for Daylight Savings Time.

[STD Zone Offset:](#)

This selection is for Standard Time.

Based on the values selected for DST / STD Zone, the Time Clock on the meter will automatically get adjusted.

Values 1 to 12 represent **positive** hour offsets from UTC (Universal Coordinated Time) where a selected value of 1 means 1+ hour from UTC.

Values 13 to 24 represent **negative** hour offsets from UTC where a selected value of 13 means, '-12' hours from UTC and a selected value of 24 means, '-1' hour from UTC.

#### **4.11. Saving Setup:**

**Note: Click 'Save' (at the bottom of page) after modifying / entering information. This may take up to 30 seconds. Please be patient for the page to refresh.**

#### **4.12. Confirming the FTP or email Setup:**

Click on:

[Test FTP](#)

[Test Email](#)

'Test FTP' will provide an immediate response if a test file was placed on the ftp server.

To confirm 'Test Email' response, click on the link that appears '[Wait 5 secs And Click](#)' or check the emails' mailbox for confirmation.

Alternatively, use the Discover IP application to check the meter's operation.

#### **4.13. How and When to Reset the WEM-MX:**

Click:

[Reset \(immediate\)](#)

This will result in an immediate reset of the WEM-MX and the Web Server page will not respond until the meter comes back on-line. This should typically not take more than 1 minute if an Internet connection is available else, it may take as much as 3 minutes. Close your browser and re-launch it and try to access the meter after 2 minutes.

A reset should be done when key information is modified such as email setup, SNTP server configuration, changes in fixed IP address, etc.

Note: When you click on the '[Main Configuration](#)' web page's 'Submit' button, the meter will save all the information and reboot automatically.

#### **4.14. Deleting the Load Profile Data in the WEM-MX:**

Click:

[Delete Load Profile Data](#)

This should only be done if you want to delete all historical logs.

#### **4.15. View Load Profile / Interval Data on the Web Server:**

Click:

[Load Profile 24 Hrs.](#)

[Load Profile Flash](#)

If data does exist, you should see the time stamp followed by 4 values.  
Note: The default timestamp format is: dd/mm/yyyy. It can be modified to US or European format. See 4.18

The '[Load Profile 24 Hrs](#)' link will display the last 24 hours interval data provided it has not been already reported to the FTP server.

The '[Load Profile Flash](#)' link will display interval data that is resident in the WEM's internal flash memory. Under normal operation, this file will be blank.

Format: Time Stamp, kWh Delivered, kWh Received, kVARh Delivered, kVARh Received

Time (dd.mm.yyyy)	kWh_Del	kWh_Rec	kVarh_Del	kVarh_Rec
29/10/2005 22:15:00	0.00	0.00	0.00	0.00
29/10/2005 22:30:00	0.00	0.00	0.00	0.00
29/10/2005 22:45:00	0.00	0.00	0.00	0.00
29/10/2005 23:00:00	0.00	0.00	0.00	0.00

a. If communications via email and ftp are disabled, then the WEM will only log interval data to the circular buffer (CB). The CB can vary in size depending on the load profile interval from 1 minute to 60 minutes. The CB will have 1440 entries if the load profile interval is 1 minute. The CB will have 24 entries if the load profile interval is 60 minutes.

b. If communications are enabled via email and/or ftp and a loss in communications occurs for an extended period; the CB will fill up. In such a case, the load profile data is then written to the on board flash memory. When communications resume, the entire contents of the CB and flash memory will be reported via ftp.

Note: The flash memory is 400kB and when this gets filled, no load profile data is stored. This leads to the question of the amount of storage space in the WEM.

On an average, the 15 minute load profile logging will consume around 75 bytes. 1440 minutes per day / 15 = 96 entries. One Day memory usage is: 96 X 75 = 7200 bytes.

Capacity: 400000 / 7200 = **55 days**

Note: Please contact our support department for more details. The storage capacity has been purposely limited and can be further increased if required. Typical operation does not utilize the flash storage memory. The device will directly save the load profile data to RAM and generate reports from it. In the event of a power failure, the CB and summation registers are saved to flash memory.

#### **4.16. Setting Meter for Fixed IP Address:**

It is possible to set the meter to use a fixed IP Address. Please thoroughly check the settings, document them before clicking on the '**Submit**' button.

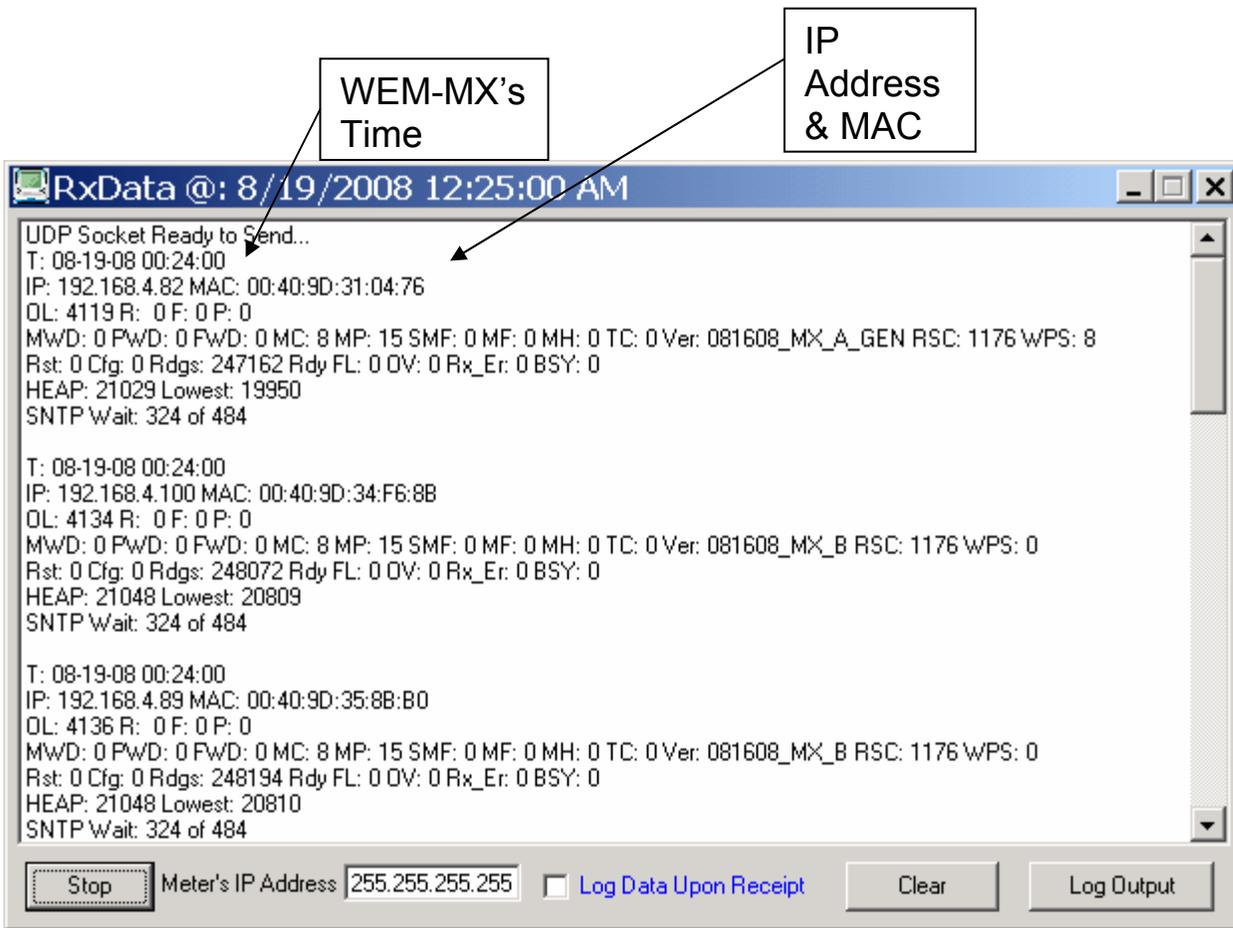
Static Network Setup:	
Disable DHCP	<input checked="" type="checkbox"/> <b>Use Extreme Care!!!</b>
IP Address	<input type="text" value="192.168.4.101"/>
Subnet	<input type="text" value="255.255.255.0"/>
Gateway	<input type="text" value="192.168.4.80"/>

#### **4.17. Debugging and Setting Up:**

Download and install the Discover IP application from our corporate web site <http://www.energytracking.com>



Under the Menu command, you will have a sub menu option 'Debug'. Click on the 'Start' button on the lower left hand corner. Within a minute you will see responses as shown.



The goal of this application is to help identify the WEM-MX's IP address; setup and test email / ftp as well as display start up operation. The IP Address will be displayed on meters with a display.

Information from multiple meters can be seen using this application using a global hail IP Address of 255.255.255.255. You can change this address to a specific address to view only a single meter's operation.

#### **4.18. Date – Time Format:**



You can set this feature via [Setup >> Main Configuration](#)

#### **4.19. Set Time Manually:**

Metering requirements that simply require a stand alone meter without network connectivity can be achieved using the WEM-MX. The meter can be configured for stand alone operation using a fixed / static IP Address and the SNTP access can be disabled. In such instances, the meter's time can be setup via [Setup >> Set Time](#)

Meter ID	111111111111111110119
Meter Address	WEM Location
Meter Time	06/21/07 22:55 Thu
Enter New Time	<input type="text" value="22:55 06/21/07"/> HH:MM MM/DD/YY <input type="text" value="Thu"/> <input type="button" value="Update"/>
<input type="button" value="Submit"/>	

The 'Update' button reacquires the latest time from the PC and the 'Submit' button updates the time on the meter.

#### **4.20. Power Off Shutdown:**

Click:

[Power Off Shutdown \(immediate\)](#)

The WEM-MX utilizes its internal Lithium Ion battery during loss off external power. By default it will wait 2 minutes awaiting power to return, and then save its data and shuts down following the power failure. An alternative means is provided to force the meter to immediately save all its registers and go into a standby state awaiting power termination. This occurs in 60 seconds but the meter will reboot if the power supply to the meter is not terminated within 15 minutes.

### **5. Meter Setup:**

#### **5.1. CT, PT Ratios:**

You will need to enter the appropriate CT and or PT ratio to get the actual measurement values. If you are using a CT with a 200 Amp primary to 5 Amp secondary, then your CT Ratio is  $200 / 5 = 40$ .

### **5.2. Demand Threshold Alarm Value:**

Threshold Value	<input type="text" value="75"/> kW (<=999)
-----------------	--

The meter can automatically initiate an email when the current demand exceeds a user defined threshold. If you want the meter to send an email, enter a threshold value else leave it 0.

This Alarm Threshold has a hysteresis of 4 to 5 minutes (4 minutes typical). Specifically, the load must stay below the set limit for at least 4 minutes before the meter will reinitiate another email. This prevents / limits the number of emails sent when the kW is around the set threshold.

### **5.3. Demand Interval:**

Demand Interval	<input type="text" value="15"/>
-----------------	---------------------------------

The meter will accept a setting of 15, 30, 45 or 60 minutes.

### **5.4. Demand Reset Date:**

At some point within a given month, you will want the meter to perform a Demand Reset. This action will occur at midnight on the specified day and save the prior month's consumption and demand data. These data can be accessed by clicking on the link '[Last Month](#)'.

Demand Reset Day	1 Zero -> No Reset
---------------------	--------------------

Immediately following a Demand Reset, you will notice the following:

- The field 'Number of Demand Resets' has incremented by 1.
- The field 'Max. kW Delivered' has been cleared along with the timestamp.
- The field 'Max. kVAR Delivered' has been cleared along with the timestamp.
- The field 'Cumulative kW Delivered' has been incremented by the value that was in Max. kW Delivered.
- The field 'Cumulative kVAR Delivered' has been incremented by the value that was in Max. kVAR Delivered.
- The kWh Delivered field is never cleared. The usage for a given month or time period is the difference between the two numbers.
- The kVAR Delivered field is never cleared. The usage for a given month or time period is the difference between the two numbers.
- The same (as defined above) applies to each Time of Use tier.

Reset Report	<input checked="" type="checkbox"/> Send Report After Demand Reset
-----------------	--

This checkbox enables the consumption and demand values to be reported via email upon a 'Demand Reset'. This is typically used for monthly billing.

### **5.5. Load Control Outputs (Optional):**

The meter has two outputs that can be triggered by user defined kW values. Each Output has a hysteresis of 1 to 2 minutes (1 minute typical) before the load is disengaged. This prevents the I/O from toggling when the kW is around the set threshold. The delay can be immediately bypassed by accessing the controls via the web page link '[Load Control](#)'.

The external load(s) can be manually controlled. In such cases keep the Load Control 1 & 2 thresholds at 0.

Load Control 1 Threshold	<input type="text" value="40"/> kW (<=999)
Load Control 2 Threshold	<input type="text" value="85"/> kW (<=999)

**Warning!** These load control outputs must be interfaced with time delay relays so that no harm occurs to critical equipment such as on-site generators due to cycling at set threshold levels or other factors.

In addition, either of these loads can be controlled manually via the web server.

<b>Load Control</b>	
Enable check box to activate load	
Load Control #1	<input type="checkbox"/> 1
Load Control #2	<input type="checkbox"/> 2
<input type="button" value="Submit"/> <input type="button" value="Cancel"/>	

### 5.6. Setup Meter ID & Serial Number:

The user can setup alpha numeric Meter ID and Serial number for the meter. Click 'Setup' and then click 'Meter Configuration'. Here you can also setup a field that defines the meter's location.

**Meter Configuration**

Meter Serial Number:  (Must be 16 digits)

Meter ID:  (Must be 20 digits)

Meter Site:

Do not start the Serial number or Meter ID with 0.

### 5.7. Load Profile Data Access on Local Network:

Load Profile data can be viewed via the Web Server by clicking on 'Load Profile' link.

Also, the meter can be setup to periodically dispatch load profile reports via email / ftp based on user settings.

The Energy@DeskTop is designed to acquire and process this data automatically. However, there may be a requirement to automatically access load profile data on the local network. This is mainly designed for third party developers.

Load profile data in XML can be accessed by navigating to

["http://xxx.xxx.xxx/ShowLPData.htm"](http://xxx.xxx.xxx/ShowLPData.htm)

Where xxx.xxx.xxx.xxx is the meter's IP address.

The content of this web page can easily be extracted using XML parsers freely available ActiveX controls from Microsoft Corporation.

```
<XML id="meter">
  <DATA>
    <REC id="840">
      <TS>08/18/2008 14:00:00</TS>
      <C0>0.000</C0>
      <C1>0.000</C1>
      <C2>0.000</C2>
      <C3>0.000</C3>
    </REC>
    <REC id="825">
      <TS>08/18/2008 13:45:00</TS>
      <C0>0.000</C0>
      <C1>0.000</C1>
      <C2>0.000</C2>
      <C3>0.000</C3>
    </REC>
    <REC id="810">
      <TS>08/18/2008 13:30:00</TS>
      <C0>0.000</C0>
      <C1>0.000</C1>
      <C2>0.000</C2>
      <C3>0.000</C3>
    </REC>
  </DATA>
</XML>
```

## 6. Battery Backup Power Settings:

The meter has a self contained Lithium rechargeable battery. The meter will smoothly transfer to the battery power in the event of a power loss.

Following a power loss, the meter will initiate an email that will alert you of the power loss. This functionality can only occur if the facility has a back up generator or other means that will ensure that the network connection to the Internet is feasible.

If you do not want the meter to send an email upon power loss, disable the 'eMail on Power Loss' checkbox.

Power Loss Email Option:	
eMail on Power Loss	<input type="checkbox"/> Check to Enable.

## 7. Trouble Shooting:

### 7.1. Real Time Data:

From the web server, you can view two pages, Real Time Data 1 and Real Time Data 2. There are differences in the two to help you trouble shoot.

Phase	VOLTAGE	CURRENT	POWER FACTOR
PH_A:	119.231	0.910	1.000
PH_B:	118.406	0.959	1.000
PH_C:	118.957	0.962	1.000
Phase	Wh	VARh	VA
PH_A:	107.280	0.000	107.280
PH_B:	112.320	0.000	112.320
PH_C:	113.040	0.000	113.040
TOTALS:	332.640	0.000	332.640
DELIVERED:	332.640	0.000	
RECEIVED:	0.000	2.520	
SUM:	332.640	2.520	
NET:	332.640	2.520	
FREQUENCY:	60.00		

This is a partial snapshot from Real Time Data 1. Data presented on this page is a snap shot of the current energy readings being acquired by the meter. The CT / PT Ratio(s) have **NOT** been applied to these numbers. In [Real Time Data 2](#) the CT / PT Ratios **ARE** applied and display the energy / power for each second. Specifically, the data is divided by 3600 seconds. In this example the CT Ratio applied is 10. You can see that the Phase current shown above are multiplied and shown below.

Furthermore, if you take the Total Wh (above) and apply the CT Ratio, we get:  $332.64 \times 10 = 3326.4$ . Now, divide this by 3600, we get:  $3326.4 / 3600 = 0.924$  (Watt-second). This matches the data shown below.

Real Time Data	
Demand Interval	15
Num. of Sub-Intervals	0
Present Demands	
kW Delivered	3.322
Time Remaining	00:00:37
kVAR Delivered	0.000
Time Remaining	00:00:37
Present Values (1 Second Data)	
kW Delivered	0.924
kW Received	0.000
kVAR Delivered	0.000
kVAR Received	0.007
kVA	0.924
kW Sum	0.924
kVAR Sum	0.007
kW Net	0.924
kVAR Net	0.007
Ph1 Voltage	119.240
Ph2 Voltage	118.420
Ph3 Voltage	118.970
Ph1 Current	9.100
Ph2 Current	9.500
Ph3 Current	9.600
PF	1.000
Frequency	60.000

## 8. LCD Display:

WEM-MX can be ordered with a LCD Display. This LCD is a 4 line display where the following data will be displayed.

Line 1: Date and Time

Line 3: kWh

Line 4: kW. Note this line is also used to display critical messages such 'Ethernet Link Lost'.

Line 2: Will display the following values in sequence with a 4 second wait.

- kW: Current instantaneous demand measured by the meter.
- kWh: Total kilo-watt hours.
- kVARh: Total kilo-watt reactive hours.
- Pk kW: The highest peak demand recorded in the current month.
- Pk T: Time and date at which the peak demand occurred.
- IP: Meter's IP Address.
- Snet: Meter's subnet mask.
- Gway: Meter's gateway.
- V Phase A: Phase A voltage.
- V Phase B: Phase B voltage.
- V Phase C: Phase C voltage.
- I Phase A: Phase A current.
- I Phase B: Phase B current.
- I Phase C: Phase C current.
- Avg. PF: Average power factor of all 3 phases.
- PF Phase A: Phase A power factor.
- PF Phase B: Phase B power factor.
- PF Phase C: Phase C power factor.
- Meter ID:
- MC: Meter's MAC Address.

### **8.1. LCD Display with back light:**

The WEM-MX can be ordered with a LCD having a back light. The intensity value of the back light can be set from 1 - 99 where a value of 99 is the brightest.

Click on the link: [Setup Display](#)

LCD Setup	
LCD Present	<input checked="" type="checkbox"/> Check if LCD Present.
Contrast %	<input type="text" value="60"/>
Backlight %	<input type="text" value="50"/>
Reboot LCD	<input type="checkbox"/>
<input type="checkbox"/> Save Setup	
<input type="button" value="Submit"/>	

Click on the 'Save Setup' checkbox to save the settings.

## **9. Firmware Updates:**

Whenever our company releases updated firmware, you have the capability to upgrade the meter. This is done using the 'Debugging / Programming Software'.

This is done via FTP. The meter has an embedded FTP Server to facilitate this process.

## **10. Product Warranty / Service:**

### **A. Limited Warranty Statement**

**1. Energy Tracking, LLC (“ET”) warrants to the end-user customer, who provides adequate proof of purchase that ET hardware products purchased from ET or its authorized dealers will be free from defects in materials and workmanship for a period of one (1) year from the date of purchase. This warranty applies only to the original end-user purchaser and is non-transferable. Conditions and limitations of ET’s warranty are stated below.**

**2. ET’s limited warranty covers only those defects which arise as a result of normal use of the hardware and does not apply to any:**

- a. improper or inadequate maintenance;**
- b. incompatibilities due to the user’s hardware or software applications with or in which the ET product interfaces;**
- c. product of a special or custom-made nature;**
- d. unauthorized modification or misuse;**
- e. improper installation, misapplication or negligence;**
- f. operation outside the product’s environmental specifications;**
- g. improper site preparation or maintenance;**
- h. software;**
- i. other causes that do not relate to a product defect;**
- j. defects or damage suffered as a result of force majeure (including theft);**
- k. defects or damage suffered as a result of normal wear and tear; and/or**
- l. stolen goods.**

**3. If ET receives, during the applicable warranty period, notice of a defect in a warranted hardware product and the defective ET product in question, ET shall at its sole option, either repair or replace the product, and shall return the repaired product or a replacement product within a reasonable time. The replacement product may not be new, provided that it has functionality at least equal to that of the product being replaced.**

**4. This warranty is valid in any country where ET hardware products are distributed by ET or its authorized dealers.**

**5. This Limited Warranty Statement gives the customer specific legal rights. The customer may also have other rights which vary from state to state in the United States, from province to province in Canada, and from country to country elsewhere in the world.**

## **B. Limitations of Warranty**

**1. NEITHER ET NOR ANY OF ITS THIRD PARTY SUPPLIERS MAKES ANY OTHER WARRANTY OF ANY KIND, WHETHER EXPRESSED OR IMPLIED, WITH RESPECT TO ET PRODUCTS. ET SPECIFICALLY DISCLAIMS (and the customer, by accepting the ET product, specifically accepts such disclaimer and waives) ALL OTHER WARRANTIES, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR OR INTENDED PURPOSE OR USE AND THE WARRANTY AGAINST LATENT DEFECTS, WITH RESPECT TO THE HARDWARE AND/OR SOFTWARE. ET FURTHER DISCLAIMS ANY WARRANTY THAT ET PRODUCTS, IN WHOLE OR IN PART, WILL BE FREE FROM INFRINGEMENT OF ANY THIRD PARTY INTELLECTUAL PROPERTY OR PROPRIETARY RIGHTS.**

**2. To the extent that this Limited Warranty Statement is inconsistent with the law of the locality where the customer purchases the ET product, this Limited Warranty Statement shall be deemed modified to be consistent with such local law. Under such local law, certain limitations of this Limited Warranty Statement may not apply to the consumer.**

**3. To the extent allowed by local law, the remedies provided in this Limited Warranty Statement are the customer's sole and exclusive remedies.**

## **C. Limitations of Liability**

**1. EXCEPT FOR THE OBLIGATIONS SPECIFICALLY SET FORTH IN THE LIMITED WARRANTY STATEMENT, IN NO EVENT SHALL ET BE LIABLE FOR:**

**a. any direct, indirect, special, incidental, consequential, foreseeable or unforeseeable, or punitive damages, whether based on contract, tort, delict or any other legal theory and whether advised of the possibility of such damages; and/or**

**b. damages arising from the loss of use, data, production revenue and/or profit of in connection with the ET product or any business interruption.**

**2. Without prejudice to the foregoing, any liability of ET for any breach of warranty shall be limited to the amount paid by the customer for the defective hardware in question.**

**3. To the extent allowed by local law, ET's entire liability and the customer's exclusive remedy shall be the repair or replacement of any defective product during the warranty period. ET does not offer any other warranty with respect to ET hardware or software or any other hardware or software.**

**4. Customer shall be responsible for all applicable taxes, duties and customs fees on any replacement unit, as well as all transport, insurance, storage and other charges incurred on all returned products.**

#### **D. Obtaining Service**

**1. Verify that your ET product was installed and configured according to the information in its accompanying documentation.**

**2. Read the "Support / FAQ" information included with the ET product to see if you can solve the problem yourself.**

**3. If you are still experiencing difficulties, please contact your dealer where you purchased your ET product. Email support: [support@energytracking.com](mailto:support@energytracking.com)**

**4. If you must return a ET product, leave the configuration as it was when you were using it, and leave all identification stickers on the product. Pack the product in its original box and return to ET or your ET dealer where the product was purchased, together with your proof of purchase. Your ET dealer will return the product for you. Alternatively, if this first option is unavailable to you, you may contact the ET Technical Support group (support@energytracking.com) who will issue an Return Merchandise Authorization (RMA) number, upon receipt of adequate proof of purchase, and inform you of shipping instructions.**

**DO NOT RETURN THE PRODUCT TO ET WITHOUT ET'S RMA NUMBER AND EXPRESS AUTHORIZATION.**

#### **E. General**

**This limited warranty shall be governed by the laws of the New Jersey, USA and the federal laws of the United States applicable therein and the courts of New Jersey shall have exclusive jurisdiction to hear and decide any dispute instituted by the customer in connection with this limited warranty; the customer waives, by accepting the product, its rights to institute proceedings in connection with this warranty against ET in any jurisdiction other than New Jersey.**