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1. Product Description

1.1 General Description

The IMS EM Pro Energy Allocation System (EM Pro) measures operating time for a wide variety of HVAC system appliances to enable proportional allocation of HVAC energy usage in multi-tenant buildings. The EM Pro is designed for FHA furnaces, baseboard heating systems, and central heating/cooling systems employing fan coil units. The EM Pro works in both time-only and time and temperature installations and performs diagnosis of multiple error conditions to maximize accuracy and ease of maintenance.

1.2 Device Features

- One design for both heating and cooling applications
- Selectable pulse frequency of 36, 60, or 360 seconds
- Error condition diagnostics including:
  - Valve disconnect/cut wire
  - Temperature sensor disconnect/cut wire
  - Zone valve stuck open/sensor off pipe
  - Zone valve stuck closed
- Compatible with most wireless AMR systems configured to receive pulse counts
- Customizable temperature threshold
- Two status indicator LEDs
- Test button for field diagnostics
- 10 year warranty (excluding battery)

1.3 Physical Dimensions

![Figure 1: EM Pro enclosure dimensions](image)
2. Technical Specifications

2.1 Electrical Specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Voltage Range</td>
<td>9-30 VDC</td>
</tr>
<tr>
<td>Meter Operating Temperature</td>
<td>-20 to +125 degrees C</td>
</tr>
<tr>
<td>Temperature Sensor Tolerance</td>
<td>±5%</td>
</tr>
<tr>
<td>Quiescent current</td>
<td>5 µA</td>
</tr>
<tr>
<td>Typical Battery Life¹</td>
<td>4 years</td>
</tr>
<tr>
<td>Rated Pollution Degree²</td>
<td>2</td>
</tr>
<tr>
<td>Rated Relative Humidity</td>
<td>80%</td>
</tr>
</tbody>
</table>

| Terminal Blocks:              | Torque: 1.8 in-lb maximum              |
| Automation Systems Interconnect, Inc. | Wire range: 14-26 AWG                |
| CHF5-2 or equiv.              |                                        |

Table 1: EM Pro electrical specifications

¹See section 2.4 for more information regarding battery life

2.2 Component Description

The various components for the EM Pro device are shown below in Figure 2.
<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage Terminal</td>
<td>24 V input for connection to zone valve</td>
</tr>
<tr>
<td>Temperature Sensor</td>
<td>Temperature sensor input terminal</td>
</tr>
<tr>
<td>Pulse Outputs</td>
<td>Pulse output terminal for connection to external transmitter</td>
</tr>
<tr>
<td>High Temp Selection Jumper</td>
<td>Jumper for changing the temperature threshold in heating mode. For more information see Section 2.3.2</td>
</tr>
<tr>
<td>Low Temp Selection Jumper</td>
<td>Jumper for changing the temperature threshold in cooling mode. For more information see Section 2.3.2</td>
</tr>
<tr>
<td>Pulse Rate Selection Jumper</td>
<td>Jumper for selecting between pulse rates. For more information see Section 2.3.1</td>
</tr>
<tr>
<td>Power LED (Green)</td>
<td>Power On LED. Illuminates when proper voltage is applied to the voltage terminal</td>
</tr>
<tr>
<td>Error LED (Red)</td>
<td>Illuminates when the EM Pro finds an error condition. For more information see Section 4.</td>
</tr>
<tr>
<td>Test Button</td>
<td>Field test button to indicate error conditions on-site.</td>
</tr>
</tbody>
</table>

2.3 Pulse Output and Temperature Control

Note: Jumper settings are determined when the EM Pro is initially powered. When jumper settings are changed, the EM Pro must be disconnected from the power terminal and any other external power source, such as transmitter battery. The new settings will be initiated when the power is returned to the EM Pro.

2.3.1 Pulse output specifications

The EM Pro can be set to pulse every 36, 60, or 360 seconds that the tenant thermostat is calling for energy (and past the temperature threshold for time and temperature meters). The pulse rate is set in the factory before products are shipped, but can also be changed by altering the jumper position on the pulse rate header as shown below in Figure 3. The pulse is logic high for 20 ms and logic low for the remainder of the period.
2.3.2 Temperature control settings

The temperature threshold for time and temperature devices is set in the factory before products are shipped. There are two temperature thresholds, one for heating and one for cooling. The thresholds must be defined by the customer when products are ordered. Once programmed, the thresholds can be moved up or down 10% by altering the jumper position on the temperature control header as shown below in Figure 4. Thresholds can be very application specific. For best results, a site survey to determine operating temperature is highly recommended.

2.4 Battery Life

The EM Pro can be configured to connect to an external battery for power when control voltage (from thermostat) is not present. Battery life is estimated at an operating temperature of 68 °F to 86 °F. Higher temperatures will reduce battery life.
2.4.1 Affect of Quiescent Current and Error Monitoring

While the majority of the EM Pro circuitry shuts off in the absence of control voltage, there is a small current draw that is used to monitor error conditions (approx. 5 uA). For a 3 V, 1550 mAh battery, the EM Pro reduces battery life by approximately 1 year maximum (based on an average transmitter battery life of 4-5 years).

2.4.2 Affect of Higher Pulse Rates

Most transmitters transmit once every hour and once every 10 pulse counts. When the pulse rate of the EM Pro is set to 36 or 60 seconds, a pulse count of 10 will frequently occur before the hourly transmission. Since transmitter battery life is based on one transmission per hour, higher pulse rates can significantly reduce battery life. The amount of reduction depends on how often a tenant uses their heating/cooling. Table 2 below gives a summary of battery life estimates for a variety of pulse rates and on-times.

<table>
<thead>
<tr>
<th>Pulse Rate (seconds/pulse)</th>
<th>% On-time</th>
<th>Pulses/Hour</th>
<th>Estimated Battery Life (Years: Low End)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0-10%</td>
<td>0-10</td>
<td>3-4</td>
</tr>
<tr>
<td></td>
<td>10-20%</td>
<td>10-20</td>
<td>2-3</td>
</tr>
<tr>
<td></td>
<td>20-30%</td>
<td>20-30</td>
<td>1-2</td>
</tr>
<tr>
<td></td>
<td>30-40%</td>
<td>30-40</td>
<td>1-2</td>
</tr>
<tr>
<td></td>
<td>40-50%</td>
<td>40-50</td>
<td>1</td>
</tr>
<tr>
<td>36</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0-10%</td>
<td>0-6</td>
<td>3-4</td>
</tr>
<tr>
<td></td>
<td>10-20%</td>
<td>6-12</td>
<td>3-4</td>
</tr>
<tr>
<td></td>
<td>20-30%</td>
<td>12-18</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>30-40%</td>
<td>18-24</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>40-50%</td>
<td>24-30</td>
<td>1-2</td>
</tr>
<tr>
<td>60</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0-10%</td>
<td>&lt;10</td>
<td>3-4</td>
</tr>
</tbody>
</table>

Table 2: Estimated battery life
3. Functional Overview

The following section describes the typical working conditions for the EM Pro. For more information on the error codes mentioned in this section, please refer to Section 4.

3.1 Time-Only

Once installed, the EM Pro will begin monitoring the HVAC system control voltage. When control voltage is present (thermostat calling for energy) the green LED will illuminate and EM Pro begins counting. Pulses are sent to the pulse output based on the selected pulse rate. When control voltage is not present (thermostat not calling for energy) the green LED is off and the EM Pro will not send pulses.

Regardless of the presence of control voltage, the EM Pro will check the impedance on the voltage terminal every 6 minutes for a possible valve-disconnect error (Error 1).

3.2 Time and Temperature

Once installed, the EM Pro will monitor the tenant’s HVAC system control signal and the temperature of the pipe that supplies conditioned water to the baseboard heating system or fan coil unit. When the thermostat calls for heated/chilled water (zone valve opens) the green LED will illuminate. After the pipe temperature reaches the designated temperature threshold (see Section 2.3), the EM Pro begins counting. Pulses are sent to the pulse output based on the selected pulse rate. If the thermostat calls for energy for one hour without reaching the temperature threshold, the EM Pro will report a zone valve stuck closed/temperature sensor off pipe error condition (Error 4). When thermostat is not calling for energy (zone valve closed) the green LED is off and the EM Pro will not send pulses.

In the absence of control voltage, the EM Pro checks the temperature on the pipe every 6 minutes. If the temperature is beyond the programmed threshold for one hour, the EM Pro reports a valve stuck open error (Error 3).

Regardless of the presence of control voltage, the EM Pro will check the impedance on the voltage and temperature sensor terminals every 6 minutes for a possible valve-disconnect error (Error 1) or temperature sensor-disconnect error (Error 2). These errors are reported immediately when detected.
4. Error Conditions

Error conditions are provided by the red LED on the EM Pro and through exception reports over Inovonics. In the event of complete power loss (including battery backup) the red LED will illuminate briefly when voltage is reapplied to the power terminal. In this situation, pressing the test button will force clear the LED.

On the first appearance of an error condition, the red LED will automatically cycle the appropriate number of times as shown in Table 4. Once the initial cycle is completed, the red LED will remain constantly illuminated unless the test button is pressed.

The following section describes the types of error messages for the EM Pro. Remote availability of error conditions is limited by the type of transmitter selected. Table 3 summarizes this information.

<table>
<thead>
<tr>
<th>Error Condition</th>
<th>Inovonics</th>
<th>Hexagram</th>
<th>SpeedRead</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valve Disconnect</td>
<td>Y</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Temperature Sensor Disconnect</td>
<td>Y</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Zone Valve Stuck Open</td>
<td>Y</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Zone Valve Stuck Closed</td>
<td>Y</td>
<td>N</td>
<td>N</td>
</tr>
</tbody>
</table>

Table 3: Remote availability of error conditions

4.1 Types of Error Conditions

4.1.1 Valve Disconnect/Cut Wire (Error 1)

Diagnosis

The valve-disconnect error condition occurs when the EM Pro recognizes a disconnection of the wires intended to supply voltage to the voltage terminal. This condition is monitored on a continuous basis, provided the EM Pro can draw power from an alternate source (such as transmitter battery).

Corrective Action

1. Confirm a valve-disconnect exists. If everything is connected properly, contact IMS technical support (see Section 7).
2. Reconnect or replace the wire (see Figure 2) and/or valve and wait 6 minutes.
3. Turn on the zone valve and verify that the red LED is off.

4.1.2 Temperature Sensor Disconnect (Error 2)

Diagnosis
The temperature sensor-disconnect error condition occurs when the EM Pro recognizes a disconnection of the temperature sensor. This error is only reported on time and temperature devices. The temperature sensor disconnect is monitored on a continuous basis provided the EM Pro can draw power from an alternate source (such as transmitter battery).

**Corrective Action**

1. Confirm a temperature sensor disconnect exists. If the temperature sensor is connected properly, contact IMS technical support (see section 8).
2. Reconnect the temperature sensor (see Figure 2) and wait 6 minutes.
3. Turn on the zone valve and verify that the red LED is off.

**4.1.3 Zone Valve Stuck Open (Error 3)**

**Diagnosis**

The zone valve stuck open condition is only available on time and temperature devices. A zone valve stuck open error condition occurs when the thermostat has not been calling for heat for at least one hour and the pipe is past the temperature threshold. In addition to a stuck zone valve, this error can be caused by a temperature threshold being set too low (heating) or too high (cooling).

**Corrective Action**

1. Turn off the zone valve and wait a few minutes. If the temperature on the pipe noticeably decreases (heating) or increases (cooling), the zone valve is working properly and the problem is an inaccurate temperature threshold. If there is no change in the temperature on the pipe, replace the zone valve.
2. Change the temperature threshold as described in 2.3.2 if needed. The EM Pro must run for an hour before it can be determined if the new temperature threshold is the correct level.
3. After an hour, if the red LED is off and no error is reported remotely, the problem is fixed. If the red LED is still on or an error is reported remotely, the temperature threshold is still too low (heating) or high (cooling) and the EM Pro will need to be returned to IMS for reprogramming.

**4.1.4 Zone Valve Stuck Closed/Temperature Sensor off Pipe (Error 4)**

**Diagnosis**

The zone valve stuck closed condition is only available on time and temperature devices. A zone valve stuck closed error condition occurs when the thermostat has been calling for energy for more than one hour and the measured temperature has not reached the
temperature threshold. In addition to a stuck zone valve, there are two other possible causes for this error:

1. Temperature sensor has fallen off the pipe
2. Temperature threshold set too high (heating) or too low (cooling)
3. Bad temperature sensor

The zone valve stuck closed condition is only monitored when the EM Pro is receiving power from the voltage terminal.

**Corrective Action**

1. Make sure the temperature sensor is installed securely on the pipe. If installed correctly, go to step 2. If installed incorrectly, secure the sensor and go to step 4.
2. Turn on the zone valve and wait a few minutes. If the temperature on the pipe noticeably increases (heating) or decreases (cooling), the zone valve is working properly and the problem is an inaccurate temperature threshold. If there is no change in the temperature of the pipe, replace the zone valve.
3. Change the temperature threshold as described in 2.3.2 if needed.
4. The EM Pro must run for an hour before it can be determined if the new temperature threshold or reinstalled sensor fixed the issue.
5. After an hour, if the red LED is off and no error is reported remotely, the problem is fixed. If the red LED is still on or an error is reported remotely, the temperature threshold is still too high (heating) or low (cooling) and the EM Pro will need to be returned to IMS for reprogramming.

**4.2 Remote Reporting of Error Conditions**

4.2.1 Error Conditions with Inovonics Transmitters

Error conditions are transmitted over the Inovonics system by manipulation of the tamper control signal. When an error condition is found, the Pro-E device will toggle the tamper signal a number of times depending on the type of error present. One toggle will appear in the Inovonics error report file as one TX Test/TX Test Restoral cycle. The number of toggles and corresponding error condition are given below in Table 4.

<table>
<thead>
<tr>
<th>Tamper Toggles</th>
<th>Error Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Valve Disconnect (Error 1)</td>
</tr>
<tr>
<td>4</td>
<td>Temperature Sensor Disconnect (Error 2)</td>
</tr>
<tr>
<td>5</td>
<td>Zone Valve Stuck Open (Error 3)</td>
</tr>
<tr>
<td>6</td>
<td>Zone Valve Stuck Closed (Error 4)</td>
</tr>
</tbody>
</table>

Table 4: Error conditions with Inovonics
The time between toggles is one minute. Figure 5 below shows an example of a Zone Valve Stuck Closed condition as it would appear in the Inovonics error report file.

![Figure 5: Inovonics error report file interpretation](image)

The error signal code is sent on initial recognition and then once every 5 days. On the days in between, a single tamper signal will be sent once per day.

4.2.2 Error Condition with Other Transmitters

Most third party transmitters do not provide a method for transmission of error conditions. For transmitters other than Inovonics, on-site error evaluation is recommended as described in Section 4.3.

4.3 On-site Reporting of Error Conditions

Error condition information is always available on-site using the provided test button (shown in Figure 2). When an error condition exists, the red LED will illuminate. Pressing the test button will cause the red LED to blink 2-6 times. The number of blinks indicates the type of error (see Section 4.1 and Table 5).

<table>
<thead>
<tr>
<th>LED Blinks</th>
<th>Error Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Voltage Disconnect</td>
</tr>
<tr>
<td>4</td>
<td>Temperature Sensor Disconnect</td>
</tr>
<tr>
<td>5</td>
<td>Zone Valve Stuck Closed</td>
</tr>
<tr>
<td>6</td>
<td>Zone Valve Stuck Open</td>
</tr>
</tbody>
</table>

Table 5: Error conditions using the test button
5. Installation Instructions

Note: On initial power up, the red LED on the EM Pro will illuminate. The LED will self clear after a 6 minutes or it can be force cleared by pressing the test button.

The EM Pro comes with 6’ wire pre-connected to the terminal blocks for easy installation. The wire colors and their corresponding connections are given in Table 6 below. For enclosure dimensions, see section 1.4.

<table>
<thead>
<tr>
<th>Wire Color</th>
<th>Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>Voltage Input, Positive</td>
</tr>
<tr>
<td>Brown</td>
<td>Voltage Input, Ground</td>
</tr>
<tr>
<td>Light Blue</td>
<td>Temperature Sensor (+)</td>
</tr>
<tr>
<td>Green</td>
<td>Temperature Sensor (-)</td>
</tr>
<tr>
<td>Purple</td>
<td>Pulse Output (+)</td>
</tr>
<tr>
<td>Green</td>
<td>Pulse Output (-)</td>
</tr>
</tbody>
</table>

Table 6: Pre-attached wire colors

5.1 Installing New Units

This section provides installation instructions for the most common installation types. General information for all installations is listed first, and then more detailed instructions for specific types of heating and cooling systems follows.

Required Materials

- EM Pro device
- Screwdriver and mounting screws
- Thermal paste and tie wrap
- Wire Strippers
- Pliers

Selecting an Installation Location

The EM Pro should be installed in a location where the device is easy to mount and access. In order to increase battery lifetime, select a location that will provide the lowest ambient temperature.

Making Voltage Connections

The Pro-E is installed in parallel with control valve. For connections to either an FHA gas valve or FHW zone valve on a fan coil or baseboard system, IMS recommends using a 3M Scotchlok IDC Connector or similar parallel connector. If the application calls for an in line splice or tap connection to the line voltage
supply wires to a fan motor (continuous flow systems only-line voltage to 24 volt transformer) then it is more appropriate to use wire nut connection.

**Installation Steps**

Note: All instructions referring to the temperature sensor are only pertinent for time and temperature devices.

1. Pre-wire the Pro-E with the 24V wire and temperature sensor if not already done.

**FHA Furnace (Figure 6)**

2. Using an inline splice, connect the 24V wires from the Pro-E to the voltage wires of the gas valve. The splice should be made upstream of the gas valve terminals.
3. Mount the Pro-E using the provided screws. Locations that allow cool air flow will help extend transmitter battery life.
4. Turn the thermostat to a temperature that will cause the zone valve to activate. The green LED on the Pro-E will turn on. If the green LED does not come on, there is a problem with the connection to the zone valve.
5. Set the thermostat back to a temperature that causes the zone valve to shut off. Verify that the green LED on the Pro-E turns off.

**Baseboard Heating (Figure 7)**

![Baseboard Heating Wiring Diagram](image)

**Notes**

1. Connect the temperature sensor to bare copper pipe. Use thermal paste to assure good thermal connection.
2. Install temperature sensor at a minimum of 8’ from the zone valve.

*Figure 7: Baseboard heating wiring diagram*

2. Apply thermal paste to the inwardly curved side of the temperature sensor.
3. Find a suitable location for attaching the temperature sensor to the pipe. The sensor must be installed **downstream** from the zone valve, at an absolute **minimum** distance of 8”. If needed, remove a few baseboard fins to make room for the sensor. They can typically be removed with a pair of pliers.
4. If the pipe is painted, scrape the paint away from the temperature sensor installation location to ensure a solid thermal connection.
5. Using the tie wrap, secure the temperature sensor to the pipe.
6. Using an inline splice, connect the 24V wires from the Pro-E to the voltage wires of the zone valve. The splice should be made upstream of the zone valve terminals.
7. Mount the Pro-E using the provided screws. Locations that allow cool air flow will help extend transmitter battery life.
8. Turn the thermostat to a temperature that will cause the zone valve to activate. The green LED on the Pro-E will turn on. If the green LED does not come on, there is a problem with the connection to the zone valve.
9. Set the thermostat back to a temperature that causes the zone valve to shut off. Verify that the green LED on the Pro-E turns off.

Constant Flow Fan Coil (Figure 8)

IMS EM Pro Wiring Diagram
Time Only - Fancoil/Continuous Flow System

Notes
1. In most cases, disable the medium and low fan speeds and tap into the high speed circuit for the 'on' signal
2. House 120/24V transformer required.

Figure 8: Continuous flow system wiring diagram

2. For 120V fan motor supplies, a 120/24V transformer is required to power the power the Pro-E.
3. For most fan controls with multiple speeds, disable the low and medium fan speed and use the high speed circuit for the on signal.
4. Using an inline splice, connect the 120V side of the transformer to the high speed circuit from the fan speed control.
5. Connect the 24V side of the transformer to the voltage terminal on the Pro-E.
6. Mount the Pro-E using the provided screws. Locations that allow cool air flow will help extend transmitter battery life.
7. Turn the thermostat to a temperature that will cause the zone valve to activate. The green LED on the Pro-E will turn on. If the green LED does not come on, there is a problem with the connection to the zone valve.
8. Set the thermostat back to a temperature that causes the zone valve to shut off. Verify that the green LED on the Pro-E turns off.

**Fan Coil with Zone Valve (Figure 9)**

![Fan Coil with Zone Valve Wiring Diagram](Image)

**Notes**

1. Connect the temperature sensor to bare copper pipe. Use thermal paste to assure good thermal connection. Install temperature sensor at a minimum of 8’ from the zone valve.
2. In Fan Coil applications, avoid direct air flow over sensor. Temperature sensor should be insulated to prevent airflow from affecting sensor accuracy.

**Figure 9:** Fan coil with zone valve wiring diagram
2. Apply thermal paste to the inwardly curved side of the temperature sensor.
3. Find a suitable location for attaching the temperature sensor to the pipe. The sensor must be installed downstream from the zone valve, at an absolute minimum distance of 8”.
4. If the pipe is painted, scrape the paint away from the temperature sensor installation location to ensure a solid thermal connection.
5. Using the tie wrap, secure the temperature sensor to the pipe.
6. Using an inline splice, connect the 24V wires from the Pro-E to the voltage wires of the zone valve. The splice should be made upstream of the zone valve terminals.
7. Mount the Pro-E using the provided screws. Locations that allow cool air flow will help extend transmitter battery life.
8. Turn the thermostat to a temperature that will cause the zone valve to activate. The green LED on the Pro-E will turn on. If the green LED does not come on, there is a problem with the connection to the zone valve.
9. Set the thermostat back to a temperature that causes the zone valve to shut off. Verify that the green LED on the Pro-E turns off.

![Figure 10: EMP Pro mounting holes](image)

5.2 Replacing Units

To replace an EM Pro already in service, follow the steps below.

1. Turn off the control voltage or adjust the thermostat so that the valve is off.
2. Open the cover to the EM Pro.
3. Detach the terminal blocks from the EM Pro circuit board by pulling upward away from the board (see Figure 11).
4. Unscrew the meter and remove from the case.
5. Detach the Inovonics transmitter (Figure 12), if present, and attach to the new board.
6. Place the new EM Pro in the case and screw into place.
7. Attach the terminal blocks to the new meter and close the cover.
5.3 Verifying the installation

1. Turn on the control valve and verify the green LED from the EM Pro illuminates. If the green LED does not come on, double-check the wiring to the control valve.
2. Turn off the control valve and verify the green LED goes off. If the green LED stays on, double-check the wiring to the control valve.
3. Verify that the red LED is off. If the red LED is on, let the system run for 6 minutes. If the LED is still on after 6 minutes, follow the error procedures from 4.1.

6. Maintenance

The only required maintenance for the EM Pro is replacement of the transmitter battery. For information regarding battery life, see section 2.4.

7. Troubleshooting/FAQ

<table>
<thead>
<tr>
<th>Problem</th>
<th>Solution</th>
</tr>
</thead>
</table>
| 1. Consumption for a time only device registering as 0. | • Verify that the unit in question is using heating/cooling  
• Double-check connections to the valve |
2. Consumption for a time and temperature device registering as 0.

- Turn on the heating/cooling in the unit and verify the green LED turns on.
- If the LED does not illuminate, replace the valve and retest

- Verify that the unit in question is using heating/cooling
- Follow the steps in #1
- Verify the temperature sensor is installed in a location to accurately register the temperature change when the heating/cooling system activates.
- Measure the temperature on the temperature when the system is on. If the temperature does not reach the programmed threshold, adjust the jumpers as described in 2.3.2
- If adjusting the jumpers doesn’t lower (heating) or raise (cooling) the EM Pro threshold enough to reach the actual temperature, the device will need to be returned to IMS for reprogramming

3. Consumption for a time only device is abnormally high.

- Follow the steps in #1
- Turn off the heating/cooling in the unit and verify that the green LED is off
- If the LED remains on when the HVAC system is off, the connections from the valve to the EM Pro are not correct

FAQ

Q: I still have a problem with my device, what now?
A: Contact technical support via phone or on our website given in the following section.

8. Contact Information

Integrated Metering Systems
11701 S. Belcher Rd., Suite 123
Largo, FL 33773
Phone: 727-539-1813
Toll Free: 800-488-3594
On the web: http://www.imsmeters.com/
9. Returned Material Policy

After acceptance, all sales of meters are final. IMS, in its sole discretion, authorizes product returns in appropriate circumstances, subject to such conditions as IMS may specify. Any such return is subject to the express prior authorization and approval of IMS. Buyer must notify IMS at 800-488-3594 (telephone) or 727-539-1984 (fax) and request a Returned Material Authorization Number (RMA Number) and state the specific reason for return. Unauthorized returns will not be accepted.

When requesting an RMA Number please supply the following information:
1. Distributors name and address
2. Model number of meter
3. Original purchase order number
4. Reason for return

All paperwork and boxes must be marked with an RMA number issued by IMS. All authorized returned materials must be shipped freight prepaid to IMS to the address specified below. IMS is not responsible for uninsured packages or packages lost by your carrier.

Integrated Metering Systems (IMS)
11701 S Belcher Rd., Suite 123
Largo, FL 33773

All returns are subject to a handling/restocking charge, except for product shipped in error or products under warranty. All charges (modification, repair, restock etc) related to returned products will be determined by IMS upon evaluation. All shipping costs are the responsibility of the buyer.

METERS RETURNED FOR CREDIT*

Replacement meter ordered
0% Restock Charge

* RMA Number requested by stocking distributor for credit must be accompanied by a purchase order for material of equal or greater value.

NO replacement meter ordered
25% Restock Charge

METERS RETURNED FOR REPAIR (STILL UNDER WARRANTY)*

No defects found
$75.00 evaluation charge
Defects not covered under warranty
Charges upon evaluation
Defects found covered under warranty
No Charge

METERS RETURNED FOR EVALUATION (NO LONGER UNDER WARRANTY)*

Evaluation charge of $75.00 applies
Other charges will apply depending on evaluation by IMS

*Prices as of May 01, 2009 and subject to change.
## 10. Revision History

<table>
<thead>
<tr>
<th>Revision</th>
<th>Date</th>
<th>Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>21 May 2009</td>
<td>Initial Draft</td>
</tr>
<tr>
<td>0.2</td>
<td>02 July 2009</td>
<td>Changes from design review</td>
</tr>
<tr>
<td>0.3</td>
<td>14 Aug 2009</td>
<td>Added installation instructions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Updated from most recent design review</td>
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<tr>
<td></td>
<td></td>
<td>Added images of new design</td>
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<tr>
<td></td>
<td></td>
<td>Expanded troubleshooting section</td>
</tr>
<tr>
<td>0.6</td>
<td>07 Jan 2010</td>
<td>Added red LED condition after complete power loss</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Revised installation instructions and wiring diagrams</td>
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<tr>
<td></td>
<td></td>
<td>Added physical dimensions picture</td>
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<tr>
<td>0.7</td>
<td>08 Jun 2010</td>
<td>Revised error conditions from firmware changes. ZV closed</td>
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<tr>
<td></td>
<td></td>
<td>and open now only trigger after 1 hour, and the time between tamper</td>
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<tr>
<td></td>
<td></td>
<td>restoration in the error code reporting reduced to 1 minute</td>
</tr>
<tr>
<td>0.8</td>
<td>12 Jun 2010</td>
<td>Changed EM Pro picture to reflect new board layout</td>
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