



# VM2iQ™ Energy Management System

## Installation and Service Instructions

This guide provides you with the information needed to install a VM2iQ into a refrigerated vending machine. Note: This product is intended for use ONLY in non-perishable beverage venders with maximum compressor size of one (1) horsepower and evaporator fans with a maximum three (3) Amp load. The VM2iQ control system is only to be used with machines that either have the mechanical cold control connections residing in the machine cold box or the electronic compressor relays located in the compressor deck compartment. The VM2iQ should not be used when it is necessary to route the wiring thru the vendor door.

## Theory of Operation

The VM2iQ is an energy management system that intelligently controls and optimizes the vending machine cooling system. The VM2iQ operates in four modes (*Initial Power-On, Normal, Energy Savings and Recovery*) to control the cooling system within the machine for optimized energy savings. It monitors the ambient air temperature using a temperature probe and utilizes internal timers to track compressor durations and vend detections. This information is used to control compressor cycles and evaporator fan operation to reduce machine energy consumption while maintaining product temperatures. The VM2iQ works in tandem with the existing electronic or mechanical cold control.

The control performs fault diagnostics to ensure machine reliability and reduced maintenance calls. It detects machine faults such as evaporator coil freeze-ups; condensor/evaporator fan failures; and prevents high head pressure compressor starts. The VM2iQ system displays these failures on its LED and can often resolve them.

### VM2iQ Red LED States

- Flashes twice then On solid at power up to indicate processor and temperature probe operational.
- Flashes quickly for several seconds to indicate a vend has been detected.
- On solid – Power-up mode, vending machine operates normally for the first 12 hours.
- 90% On - normal mode, evaporator fan on, vend detected within last 15 minutes.
- 50% On - normal mode, evaporator fan on, no vend detected within last 15 minutes.
- 10% On - energy savings mode, compressor off, evaporator fan off.
- LED off – Recovery mode, evaporator fan on.

## Parts List

- 1 - 50120 VM2iQ Controller Assembly
- 1 - 51500 Vend Detector Assembly
- 1 - 50346 Machine schematic label
- 1 - 70200 Installation Kit (Including)
  - 4 - 11811 Wire Nuts
  - 2 - 17300 Nylon Tie Wraps
  - 4 - 17620 Screw 8-18 x 3/4"
  - 1 - 17621 Green, Self-Drilling Screw
  - 1 - 60311 VM2iQ Cable Assembly
  - 1 - 60313 Cable, Female adapter
  - 1 - 60314 Cable, Male adapter
- 1 - 70202 Additional Hardware Package

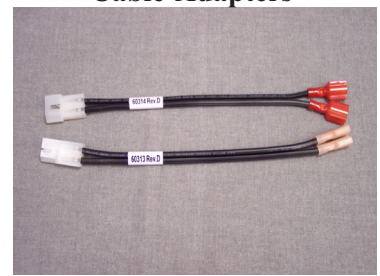
## Tools Required

- #2 Phillips Head Screwdriver
- Electric Drill w/ Phillips head bit
- Nut Drivers as needed for access

VM2iQ Controller



Evaporator Fan Cable Adapters



Vend Detector



VM2iQ Cable Assembly

## Scope of Use

The VM2iQ is acceptable for use in vending machines which use either mechanical or electronic cold controls. Installation should not be attempted if it is necessary to cut any of the existing wiring. The following is a list of acceptable models of machines for field installation of the VM2iQ.

**Dixie Narco** - DN168, 180, 276, 300, 348, 360, 368, 414, 432, 440, 501, 522, or 600 cabinets under Series II and Magnum trade names.

**Royal Vendors** - 480, 550, 640, 650, 654, 660, 768, 780, or 804 cabinets under Merlin IV, GIII, 20Plus, and EZ trade names.

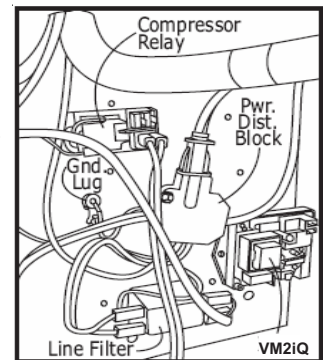
**Vendo** - 511, 540, 576, 601, 621, 630, 720, 721, or 840 cabinets under Univendor, V21, and VMAX trade names.

## Installation

Please follow these instructions carefully to insure proper operation of the VM2iQ. Note: This product is intended for use ONLY in UL listed self-contained non-perishable beverage venders with maximum compressor size of one (1) horsepower and evaporator fans with a maximum three (3) Amp load. The VM2iQ control system is only to be used with machines that either have the mechanical cold control connections residing in the machine cold box or the electronic compressor relays located in the compressor deck compartment. In addition the existing electrical/mechanical cold control connections must not reside within the vendor door.

**Note: These instructions are intended only for qualified service personnel. Improper installation may result in damage to the machine and/or injury to service personnel. Consult the machine service manual and schematics as necessary for machine component locations and wiring information.**

1. Unplug the vending machine from the wall outlet. NEVER attempt to service the vending machine while power is applied to it.
2. Open the door to the machine and gain access to the compressor deck area.
3. Using the self-drilling screws supplied, mount the VM2iQ system in an area of the compressor deck compartment near the machine wiring. Ensure the screws are drilled in areas free of raceways or wire routing to prevent damage to existing wiring. Ensure there is sufficient clearance to plug in the vend detector cable.
4. Using the supplied self-drilling green ground screw connect the VM2iQ wire harness green wire to the side/rear compressor deck wall inside the machine. Ensure the screw is drilled into an area free of raceways or wire routing to prevent damage to existing wiring.



Electronic cold control machine shown as an example

**Note:** If any wire connection cannot be made with the existing connectors, utilize the enclosed adapter assemblies (60313/60314) or the supplied wire nuts to make the wire connections as applicable. Installation of the VM2iQ is not recommended for machines where it is necessary to cut any wiring in the existing wire harnesses. Use existing machine wire routing paths when routing any wires. Avoid wire routing near moving parts or sharp edges.

**CAUTION!** Ensure the ribbed (neutral) wires are connected together on all wire pairs to maintain the polarity of the hot and neutral wires!

5. Locate the cold control system in your machine (electronic relay in the compressor deck compartment or mechanical cold control in the cold box). Note the location of the compressor deck load wires on the cold control or relay and disconnect them from this device. Connect the compressor deck load wire pair to the VM2iQ relay on the top of the VM2iQ controller and connect the VM2iQ wire harness (60311) "Control" pair to the system cold control disconnected earlier in this step. Note - For machines with mechanical cold controls it will be necessary to remove the compressor deck wiring from the cold box and route it directly to the VM2iQ Controller located in the compressor deck compartment. The "Control" wires in the VM2iQ wiring harness will need to be routed with the evaporator fan wiring to the cold box, as described in step 6.
6. Route Vend Detector wire and the VM2iQ wire harness pairs labeled "To Evaporator Fan" and "Power In" from the VM2iQ controller in the compressor deck compartment into the cold box using the existing evaporator fan power wire routing path. The "Control" wire pair will also use the same routing in machines with mechanical cold controls. Do not route any harness/machine wires into the vender door.

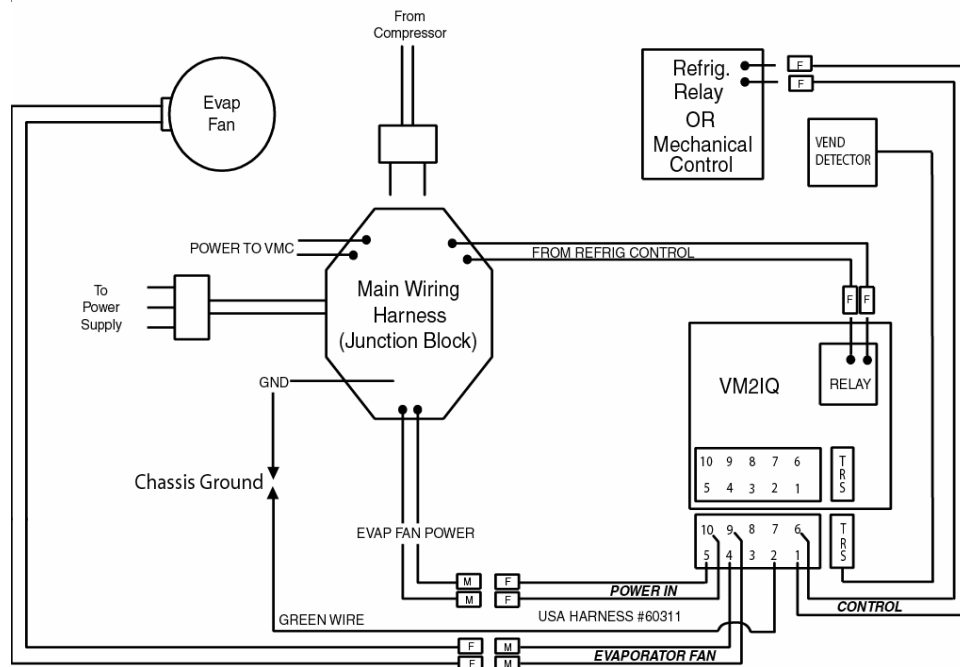
7. Using the supplied screws, either mount the Vend Detector to the floor or side wall of the cold box near the product vend chute or to the lip of the product vend chute (ensure mounting screws do not interfere with product vending or damage existing wiring). Note, it may be necessary to remove the vend chute during this step. Connect the Vend Detector cable to the miniature phone connector on the VM2iQ controller.
8. Locate and disconnect the evaporator fan load wire pair and reconnect them to the VM2iQ wire harness "To Evaporator Fan" pair. *Ensure ribbed (neutral) wires are connected to maintain polarity.*
9. Connect the evaporator fan line wire pair disconnected in step 8 to the VM2iQ wire harness "Power In" pair. *Ensure ribbed (neutral) wires are connected together to maintain polarity.*
10. Connect and lock the VM2iQ wire harness to the VM2iQ Controller.

**CAUTION!** *Ensure that wiring is clear of any moving parts or sharp edges before applying power.*

11. While wiring is accessible, apply power to the machine and test the items below:
  - Ensure the VM2iQ LED blinks twice and then stays ON to indicate the microcontroller and temperature probe are operating normally.
  - Ensure the evaporator fans start immediately after above LED indication.
  - Tap the vend detector and ensure the VM2iQ LED blinks. Note VM2iQ only detects one vend every 15 seconds.
  - Close the machine door open switch and wait five minutes. Ensure the machine compressor starts.
  - If each item passes, disconnect power to machine and proceed with step 12, otherwise follow the Troubleshooting Guide at the end of this manual to correct any problem.
12. Secure wiring with supplied cable ties, reassemble and close wiring access. Apply the machine schematic label (50346) on the cold box door near the existing vendor schematic diagrams. Ensure all wiring is secured clear of moving parts and sharp edges.
13. Ensure air tight seal is maintained in cold box
14. Close the door to the vending machine and apply machine power.

The vending machine should operate normally for the first 12 hours of operation. After this initial 12 hour cool down period, the vending machine will enter energy savings mode if no vends have been detected for more than 15 minutes and the compressor is not on.

### Wiring Diagram (After Installation)



## Troubleshooting Guide

Ensure all installation steps have been performed correctly and the vendors main power cord is disconnected before proceeding with any of the Corrective Actions described in this VM2iQ system troubleshooting guide.

Symptom	Possible Root Cause	Corrective Action
VM2iQ LED is OFF when machine is initially powered ON	<ol style="list-style-type: none"> <li>VM2iQ harness “power in” not wired correctly</li> <li>VM2iQ wire harness not connected</li> </ol>	<ol style="list-style-type: none"> <li>Connect VM2iQ harness “Power in” wire pair to machine AC power wire pair as noted</li> <li>Ensure harness wire integrity and that harness is locked into VM2iQ connector</li> </ol>
Evaporator fans do not start immediately when machine is powered	<ol style="list-style-type: none"> <li>VM2iQ harness “Evaporator fan” load wires not wired correctly</li> <li>Evaporator fan is non operational</li> </ol>	<ol style="list-style-type: none"> <li>Connect VM2iQ harness “Evaporator fan” wire pair to machine evaporator fan load wire pair</li> <li>Ensure evaporator fan wire integrity and replace evaporator fan if necessary</li> </ol>
VM2iQ LED doesn’t blink when vend detector is tapped	<ol style="list-style-type: none"> <li>Vend detector is installed incorrectly</li> <li>Vend detector is not operational</li> <li>Vend detected in last 15 seconds</li> </ol>	<ol style="list-style-type: none"> <li>Connect vend detector cable to VM2iQ miniature phone connector</li> <li>Replace vend detector if necessary</li> <li>Wait 15 seconds and repeat</li> </ol>
VM2iQ LED blinks every 15 seconds	<ol style="list-style-type: none"> <li>Vend detector is installed incorrectly</li> <li>Vend detector is not operational</li> </ol>	<ol style="list-style-type: none"> <li>Connect vend detector cable to VM2iQ miniature phone connector</li> <li>Replace vend detector if necessary</li> </ol>
Machine compressor doesn’t start when: Machine is powered and door switch is closed for 5	<ol style="list-style-type: none"> <li>Machine door switch is not closed</li> <li>Compressor control wires not wired correctly</li> <li>VM2iQ is non operational</li> <li>Compressor operation not needed</li> </ol>	<ol style="list-style-type: none"> <li>Close machine door switch and wait 5 minutes</li> <li>Connect compressor wire pair to VM2iQ relay connections</li> <li>Replace VM2iQ if necessary</li> <li>Wait for cold box temperatuer to rise</li> </ol>
Compressor starts immediately when power is applied after installation	<ol style="list-style-type: none"> <li>Compressor wires are connected to the incorrect relay contact</li> </ol>	<ol style="list-style-type: none"> <li>Ensure the harness control wires are connected to the proper contacts (NO or NC) that were originally used</li> </ol>

## VM2iQ Technical Specifications

Input Voltage/Frequency:	115VAC / 60 Hz
Maximum Load:	12 Amps(Steady-State)
Power Consumption:	Less than 1 Watt(Standby)
Operating Temperature:	-15 C to 50 C
Storage Temperature:	-40 C to 85 C
Relative Humidity:	95% maximum(Non-condensing)
Safety:	UL/CN classified, Category SOSR7, File #SA13135 UL/C-UL recognized - XAPX2, XAPX8 standard, File #E243565
Compatibility:	Any UL listed self-contained non-perishable beverage vendors with maximum (1) horsepower compressor size and maximum (3) Amp evaporator fans load and having existing cold control connections not residing in the vendor door.