



**MASTER CONTROLLER
REVERSE CYCLE DEFROST SYSTEM**

COLD CONTROLLED

Interested in a system that prevents product loss and saves significantly on your energy bill?



Maintaining proper, consistent temperature in a walk-in is vital for protecting perishable items. However, when evaporator coils are blocked due to ice build-up, they lose the ability to transfer heat properly. Temperatures in a refrigerated space can then rise, resulting in spoilage.

The Master Controller Reverse Cycle Defrost (MCRCD) system is an electronic controller for Master-Bilt® walk-in cooler and freezer refrigeration systems. It completely removes frost build-up in coils and works much faster than electric defrost heaters. **Its patented design also saves up to 27% more energy than an all-mechanical system.**

MCRCD is part of a Master-Bilt® refrigeration system that also includes a remote condensing unit and one or more evaporator coils. A reverse cycle valve is mounted to a condensing unit as well. Other components are listed on page 6.

The MCRCD system is highly efficient since it regulates an electric expansion valve in response to evaporator superheat

and return air temperature. MCRCD systems use a floating head control which greatly reduces energy usage in cold ambient areas. **Standard Demand Defrost technology initiates reverse cycle defrosts only as needed, allowing further energy savings.**

In addition to energy savings, the MCRCD system is designed to reduce installation labor and material costs:

- All electrical components are factory pre-wired and tested
- No line voltage is required between evaporator coils and condensing units (two pairs of low voltage wires, typically thermostat cables, are required to operate the Reverse Cycle Defrost valve and the compressor relay at the condensing unit)
- The walk-in doesn't have to be at operating temperature to confirm or set superheat (pre-programmed)
- No need to install a thermostat and solenoid or set a defrost schedule
- In some cases, the savings on wiring installation alone covers the cost of the MCRCD.

WEB2WALK-IN: COMPLETE CONTROL AT YOUR FINGERTIPS... FROM ANYWHERE.

Because each Master Controller is accessible through any web browser, you have complete 24/7 control from anywhere on the globe. The Web2Walk-In software loaded on each controller allows you to remotely monitor and program all data and setpoints using any device with a wireless internet or

cabled (cat 5) connection*. With Web2Walk-In, there's no need for a service tech to climb onto a roof or enter the walk-in to monitor or adjust the refrigeration system. Plus, constant access to data allows users to improve refrigeration system performance and avoid service issues.

*Internet connection not required for controller operation.

DEMAND DEFROST

Eliminate unnecessary defrosts and wasted electricity.

Eliminate unnecessary defrosts with Master-Bilt's revolutionary Demand Defrost technology featured in the MCRCD system.

Demand defrost offers a more efficient alternative to mechanical defrost timers. With most mechanically-based low temp refrigeration systems, electric heaters installed on evaporator coils are used to melt accumulated frost. The heaters are pre-set to engage at certain times of the day regardless of the amount of frost build-up on the coil.

Frost accumulation, however, is not always consistent. It is influenced by changeable conditions like ambient

temperature, humidity and product load. If a defrost is initiated before a significant amount of frost accumulates, energy is wasted.

Conversely, demand defrost constantly checks for the buildup of ice on an evaporator coil to determine if defrosting is required. If a defrost is needed, the standard Reverse Cycle Defrost method is initiated. For more on Reverse Cycle Defrost, see page 4.

Our extensive laboratory tests indicate Demand Defrost eliminates many unnecessary defrosts and reduces energy consumption.



Web2Walk-In gives users constant access to refrigeration system performance data. This software can be accessed from any device with an internet connection, including PC, Mac, smartphone, or tablet.



REVERSE CYCLE DEFROST

By the time you read this page, your evaporator coil could be defrosted.



Increase defrost efficiency with the Master-Bilt patented* Reverse Cycle Defrost method. When the Master Controller's Demand Defrost determines a defrost is necessary, a reverse cycle valve installed on the refrigeration system's condensing unit is activated and high temperature refrigerant flow is reversed. The refrigerant flows back through the evaporator coil, heating it along its entire length, totally eliminating frost build-up.

In comparison, only a certain amount of the coil is heated by electric defrost heaters, leaving ice deposits which weaken the evaporator's performance.

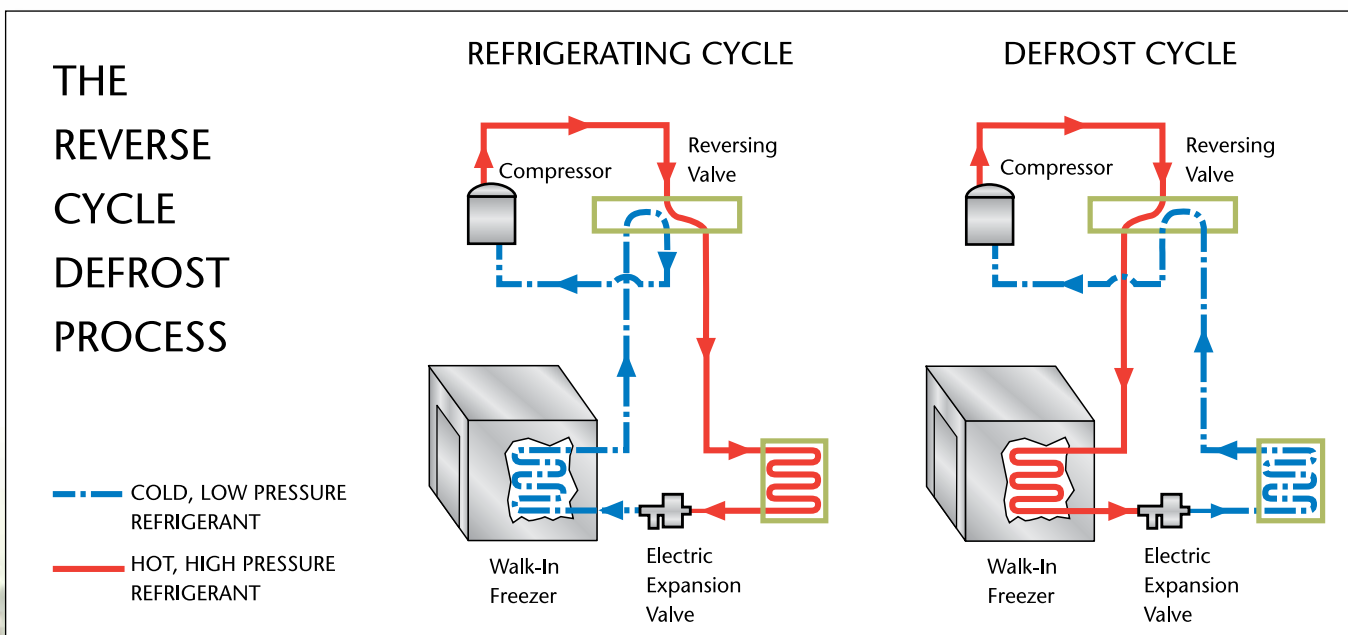
Reverse cycle technology offers several significant advantages. First of all, the process uses less energy than electric defrost heaters. **Reverse cycle reduces defrost energy usage by up to 80%.** This savings plus that gained from the demand defrost feature and elimination of head

pressure control valves dramatically reduces electrical bills.

Reverse cycle eliminates not only the need for defrost heaters and head pressure control valves, but also check valves and expansion valves at the condenser. With reverse cycle, liquid receivers are also unneeded on most condensing units. Removing these components decreases the cost of the evaporator itself and saves on installation and wiring.

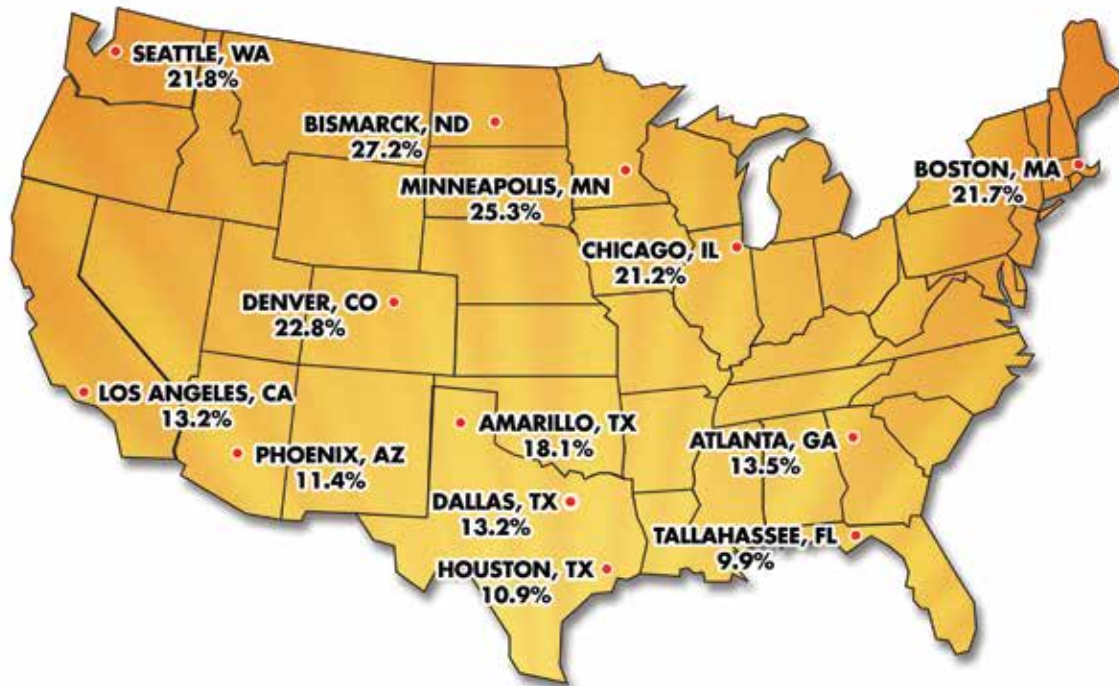
Defrost time is also greatly shortened. The average defrost time for a freezer with electric heaters is 20-30 minutes. Reverse cycle can perform a completely "clean" defrost in as little as 3-5 minutes in a freezer or 1½-2 minutes in a cooler. Because the defrost is so rapid, there's no noticeable increase in freezer temperature and product temperature rise is also significantly less.

*U.S. patent no. 7,073,344



ENERGY SAVINGS POTENTIAL

Master Controller Reverse Cycle Defrost provides up to 27% energy savings over an all-mechanical refrigeration system.



Reverse cycle defrost can help gain LEED points since it meets the U.S. Green Building Council's LEED prescriptive of "no electric defrosting" as outlined in "LEED 2009 for Retail: New Construction and Major Renovations."

(Online at <http://www.usgbc.org/resources/leed-retail-new-construction-v2009-current-version>)

SAVE EVEN MORE ENERGY WITH FAN CYCLING OPTION



Save 2-4% more energy by choosing the fan cycle option for the Master Controller.

This option saves electricity by cycling the evaporator fans during the compressor's off cycle. When the compressor is off, fan energy consumption is up to 60% less than if the fans were constantly running. In addition to the actual energy savings, cycling fan motors

expel 60% less heat into the walk-in which lowers the compressor's run time. A proprietary fan control algorithm protects stored products by keeping fans running sufficiently to maintain the desired temperature in the walk-in. Overall system energy savings vary depending on factors such as the size of the system, design temperature and run time, location of the walk-in and type of defrost used.

EFFICIENT DESIGN

Mechanical Parts Eliminated



1. Defrost termination and fan delay controls
2. Defrost timer
3. Head pressure control valve or condenser fan cycling control

4. Liquid receiver
5. Defrost heater contactor
6. Thermostatic expansion valve
7. Room thermostat

Parts Added (Factory-Mounted)

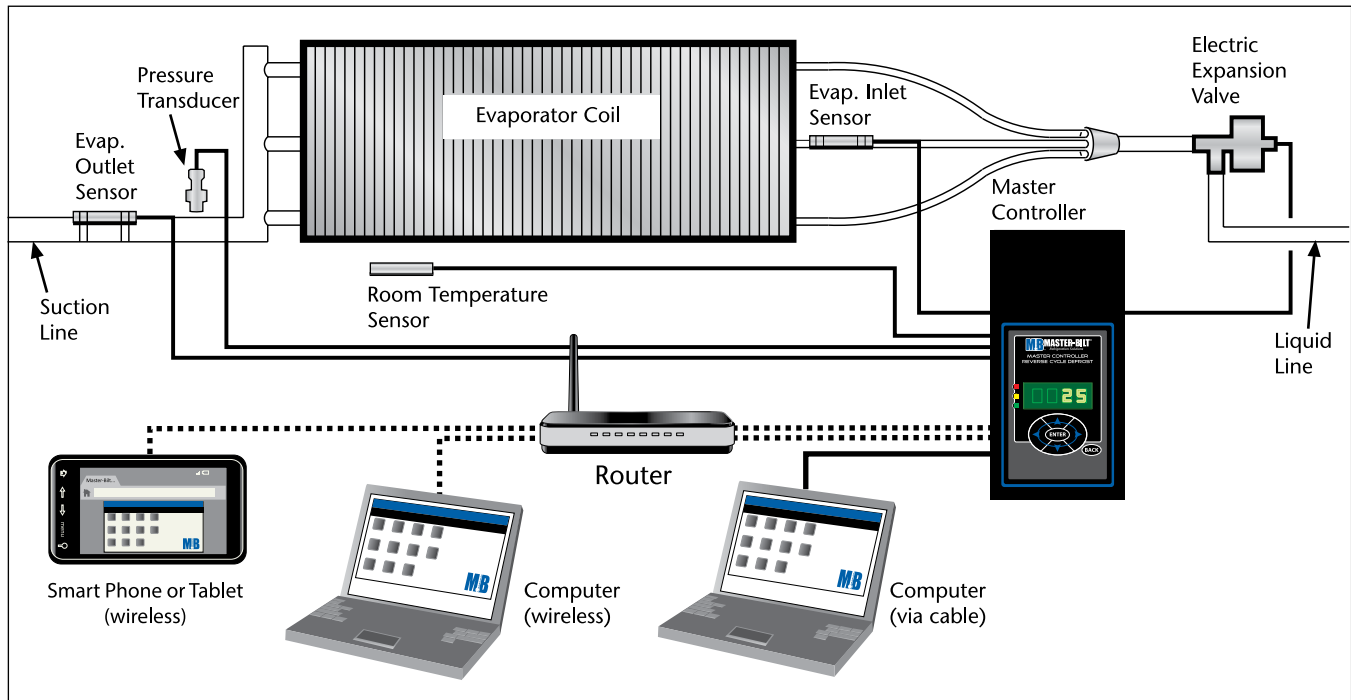


1. Digital control board
2. Electric expansion valve
3. Reverse cycle valve
4. 24VAC transformer

5. Three solid state temperature sensors
6. External relay to control liquid line solenoid valve or compressor contactor
7. Pressure transducer

SYSTEM LAYOUT

Typical Walk-In Refrigeration System Layout



MCRCD's "LITTLE BROTHER:" THE SUPER CONTROLLER OPTION

As an economical complement to Master-Bilt®'s Master Controller system, the Super Controller is ideal for applications requiring added efficiency but not the Master Controller's full feature set.

The Super Controller provides significant advantages:

- Its ability to float the head pressure of condensing units results in impressive energy savings. Simply put, floating the pressure allows a condensing unit to use cold ambient air to reduce compressor energy usage.
- The Super Controller's electric expansion valve, installed in an evaporator coil, is more accurate than mechanical valves and responds to evaporator superheat for precisely regulated refrigerant flow. Efficient flow ensures optimum system performance and lower energy use.
- Because the superheat is factory pre-set, the installer doesn't have to return after the cabinet is down to temperature and set it, allowing significant savings on installation costs.



SUPER CONTROLLER KIT CONTENTS
(All Parts Factory-Mounted)

- | | |
|-----------------------------------|----------------------|
| 1. Superheat control board | 5. 24VAC transformer |
| 2. Electric expansion valve | 6. Terminal board |
| 3. Pressure transducer | 7. Terminal block |
| 4. Solid state temperature sensor | 8. Mounting spacer |



For the latest product information and specifications go to www.master-bilt.com/products/products.htm.



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Due to continuous product enhancements, we reserve the right to change specifications without notice.

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