

**CME306 and
CME456**

Technical Training

- Introduction to the Product
- Installation & Application
- How it Works
- Service Diagnosis



- CME306 and CME456
 - Modular Cubers
 - 115/60/1
 - 230/50/1
 - 22 Inch Wide Platform
 - Air Cooled has Cleanable Air Filter in Left Side Panel
 - CM³ Technology
 - AutoIQ Controller
 - Adaptive Harvest
 - Insulated Freezing Compartment



- Similar to the CME256 System
 - Single Evaporator
 - Air Cooled
 - One Fan
- Major Differences:
 - Smaller Cabinet - 22" wide x 28" high x 24" deep
 - Purge Valve Reservoir Drain System
 - Smaller Fan Motor & Blade
 - Compressor (RS43C2E)

- Similar to CME506 System
 - Two evaporators
- Major Differences
 - Smaller Cabinet - same as CME306
 - Purge Valve
 - Has 2 TXVs and 2 Check Valves
 - One for each evaporator
 - Compressor (RS55C2E)
 - Air Cooled
 - Two fan motors and blades

Benefit: Lower Parts Inventory

- Inlet Water Valve
 - Same as on SCE275 through CME806
- Fan Motors
 - CME306, CME456 same as SCE275
- TXVs
 - CME306, CME456 same as CME256
- Water Pump
 - CME306 same as CME256
- Same PTCR

- On Modular Bin
 - BH375 or SLB375
 - BH260 or SLB260 w/new mounting bracket
 - HTB555 or HTB350 with KBT27
- On Motel Dispenser
 - HD150
 - SD150 with KDT22 kit
- On Ice and Beverage Dispensers
 - Scotsman & Booth
 - Lancer & Others

Benefit: Wide Range of Applications

- Air Cooled
 - Air flows in the front and out the back.
 - All ship with air baffle for tight corner installations
 - Designed to prevent air recirculation from the condenser outlet to the air inlet

Install Vent on Reservoir Drain

Baffle

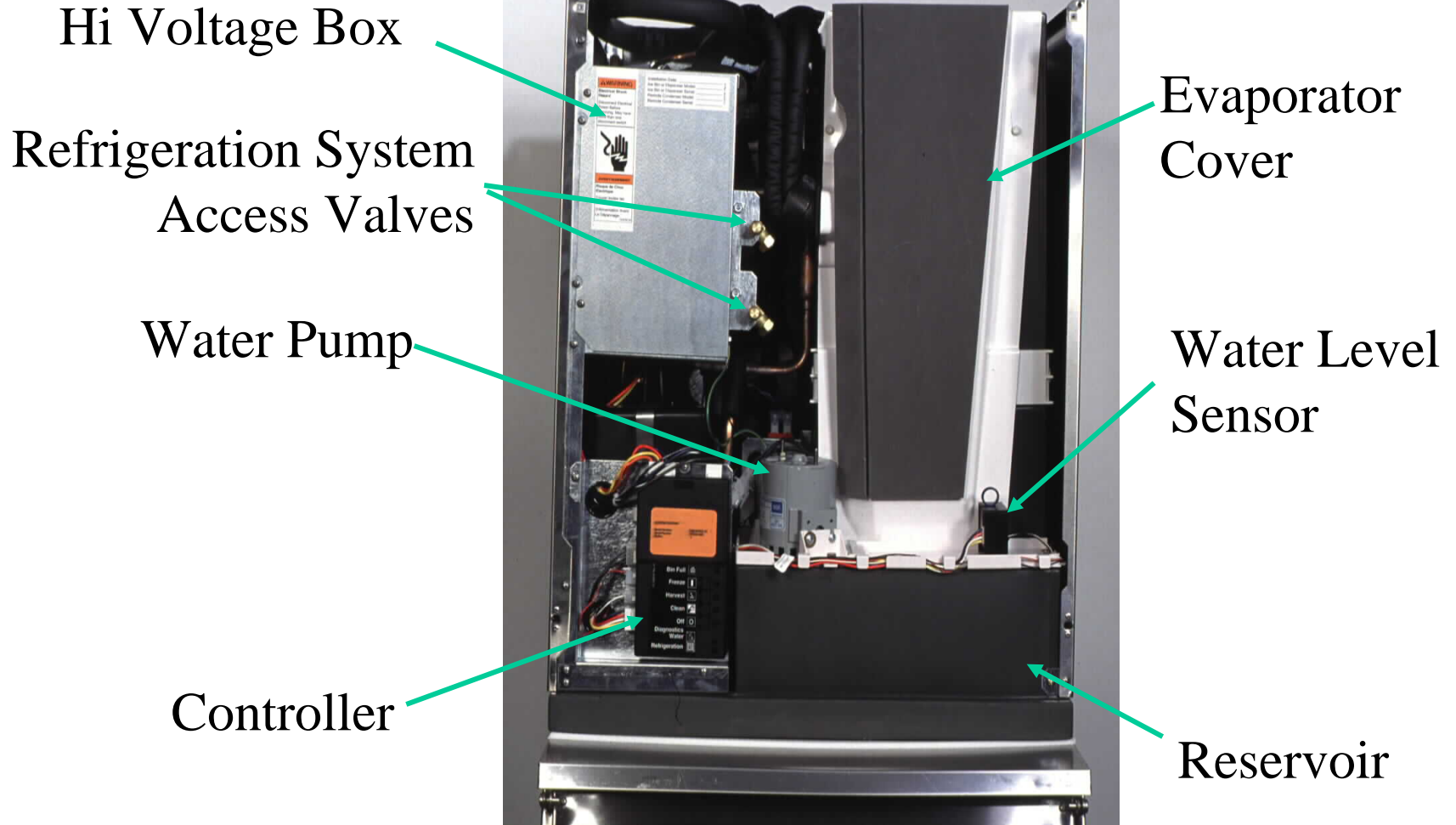


Scotsman® Optional Bin Thermostat Kit

- Normal Ice Level Control is the Ice Sensor System
 - Fills Bin Very Full
 - Bins Without Baffles May Overflow
 - Add the Optional Thermostat Kit - KSTAT-22



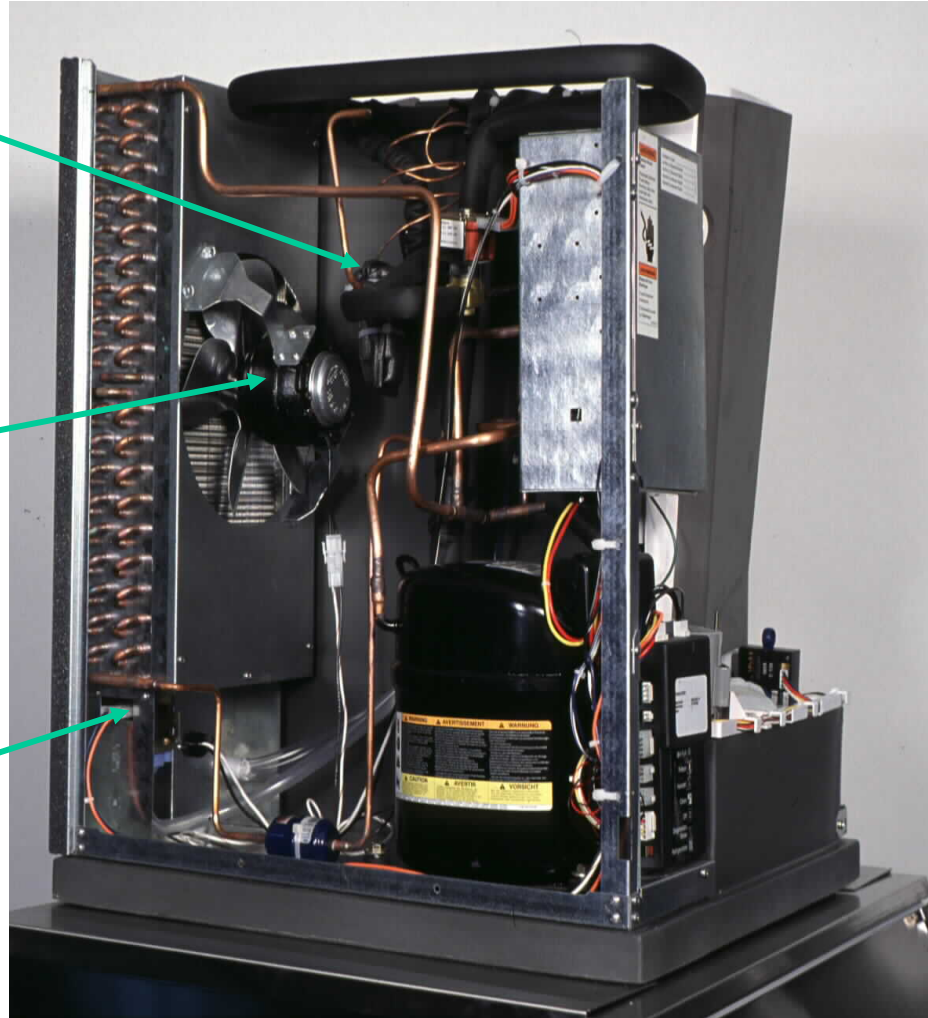
Scotsman® Component Location: Front View



Internally Equalized
Thermostatic
Expansion Valve

16 Watt Fan Motor

1.25 GPM Inlet
Water Valve

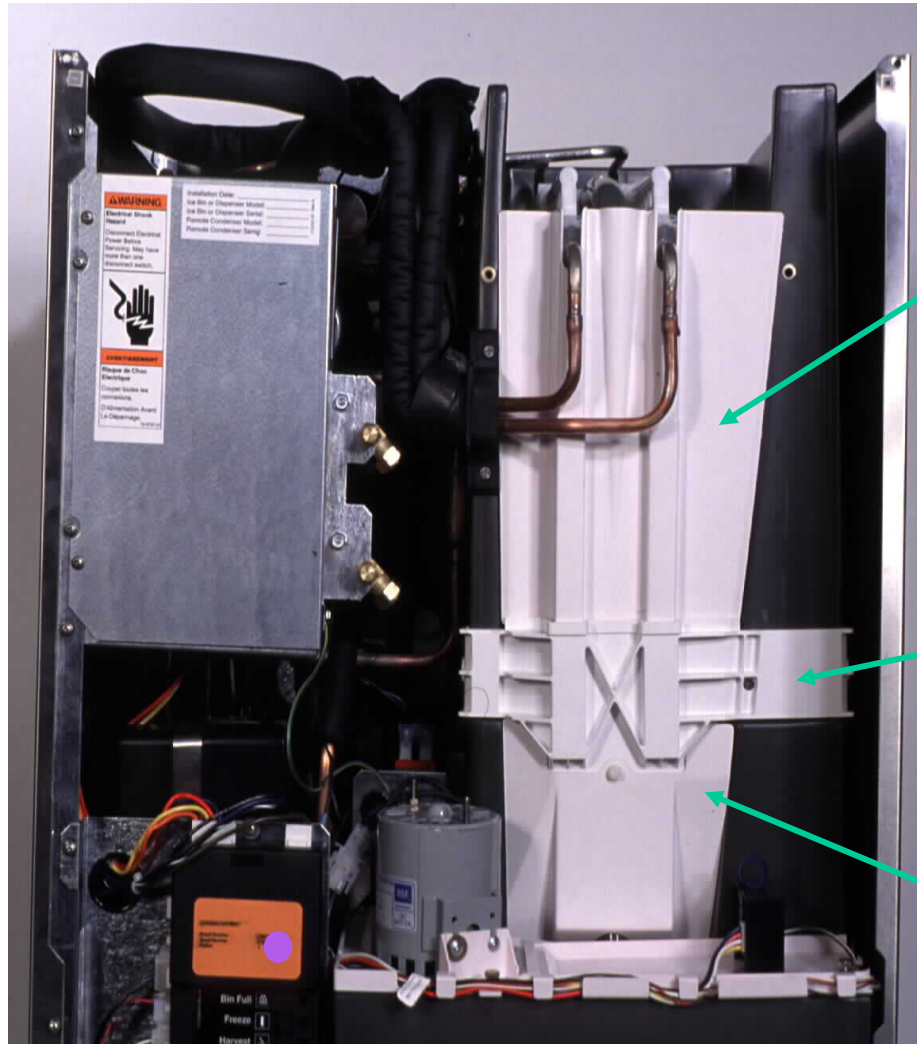


Two 16 Watt
Fan Motors

Two Internally
Equalized TXVs and
Two Check Valves



Scotsman® Under the Evaporator Cover



Upper Splash Panel

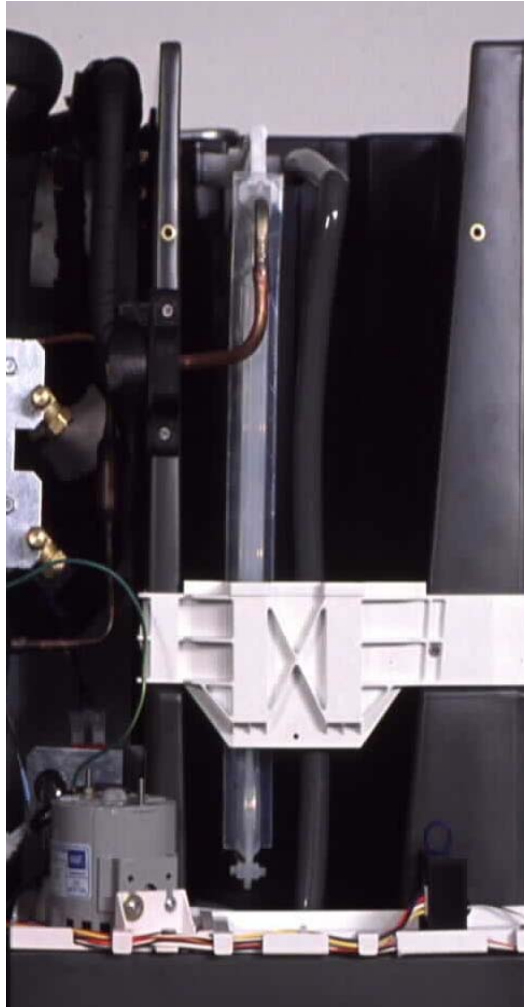
Evaporator Bracket

Lower Splash Panel

Scotsman®

Under the Splash Panels

CME306
with
Upper and
Lower
Splash
Panels
Removed



CME456
with
Upper
Splash
Panel
Removed



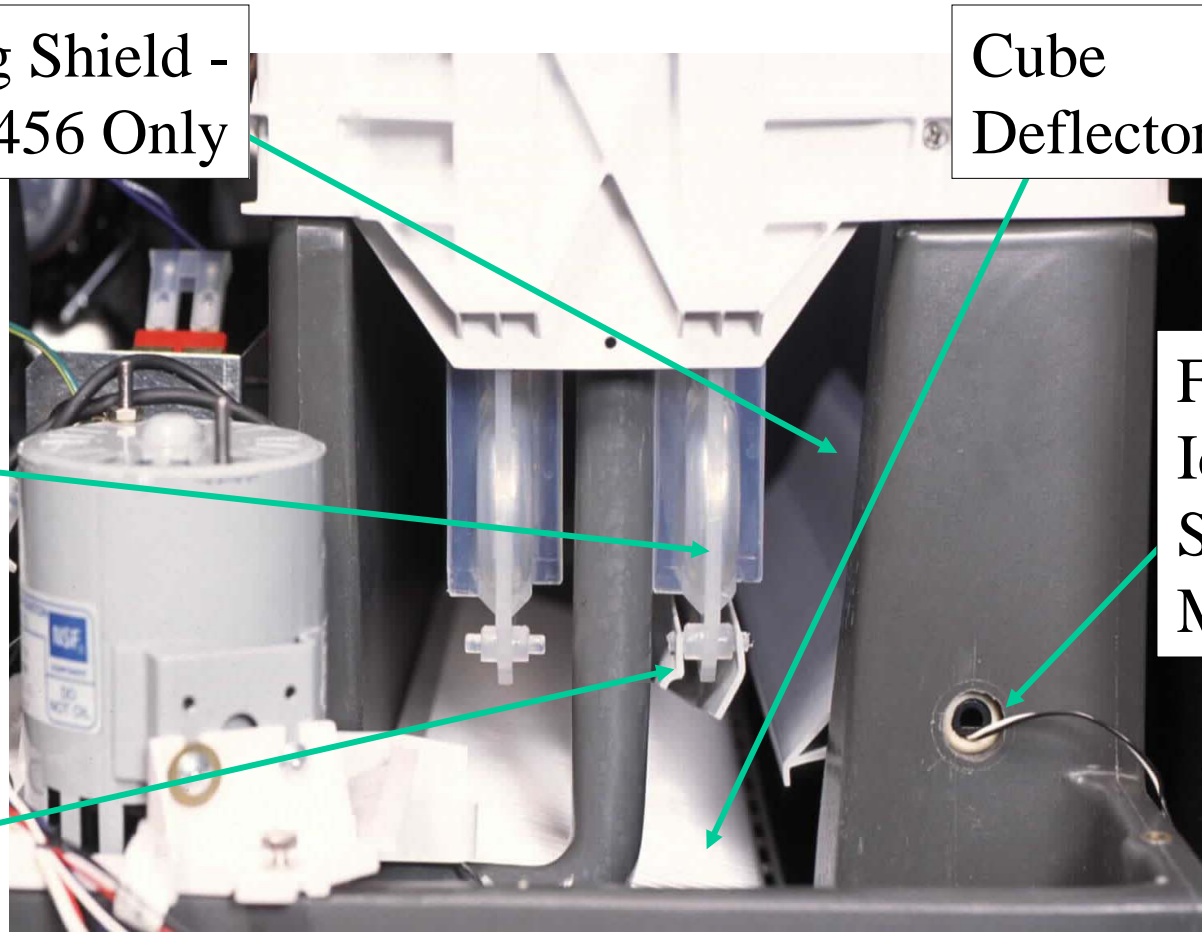
Cascading Shield -
CME456 Only

Cube
Deflector

Right
Evaporator
- CME456
Only

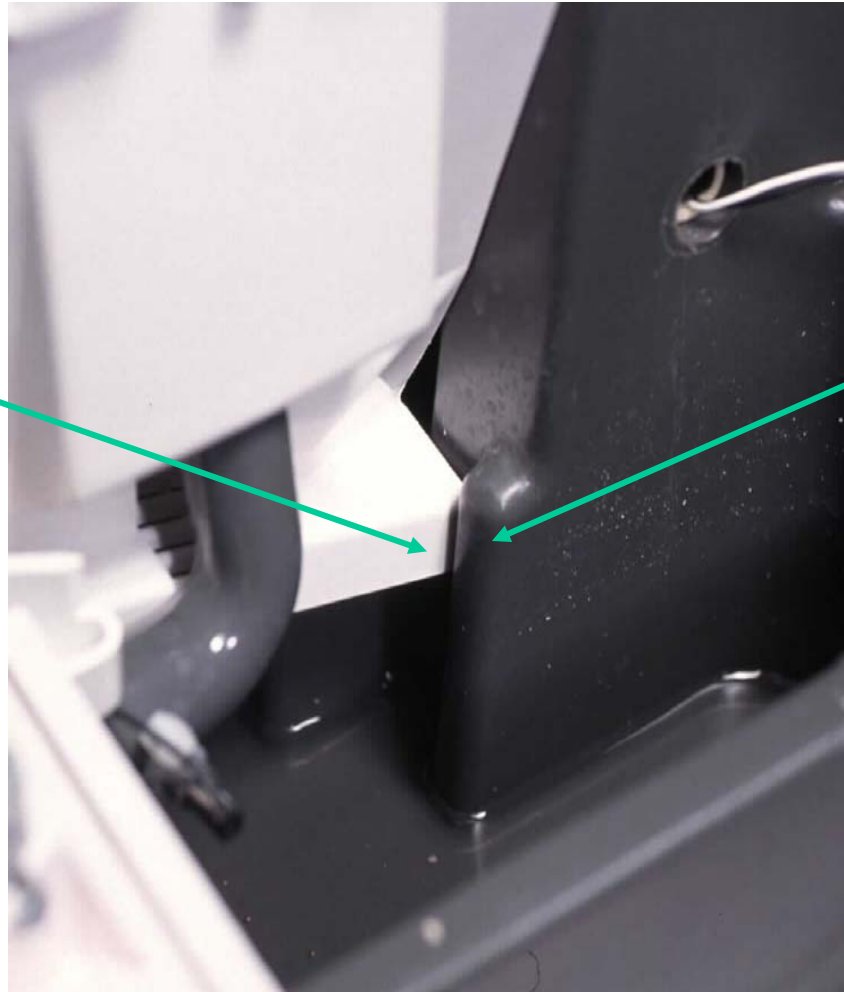
Front
Ice
Sensor
Mount

Water Trough
- CME456
Only

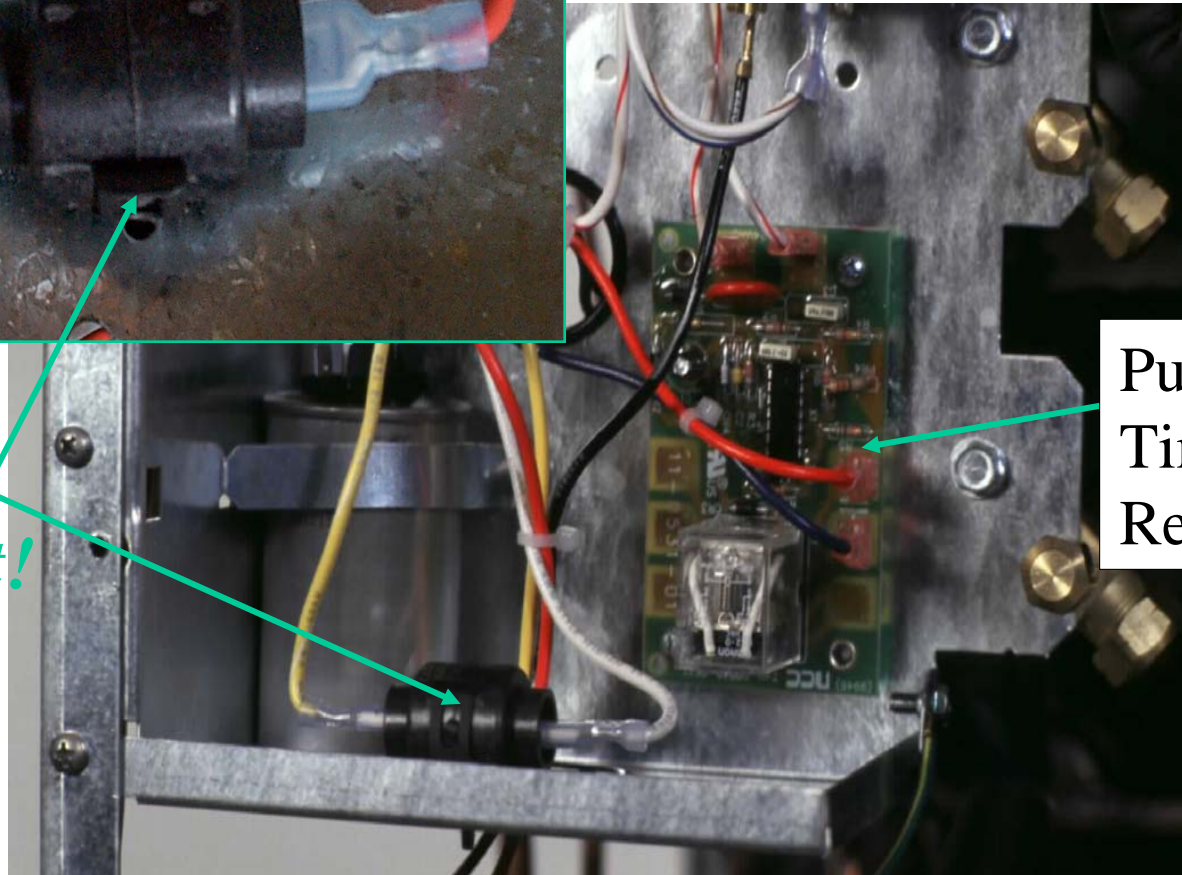
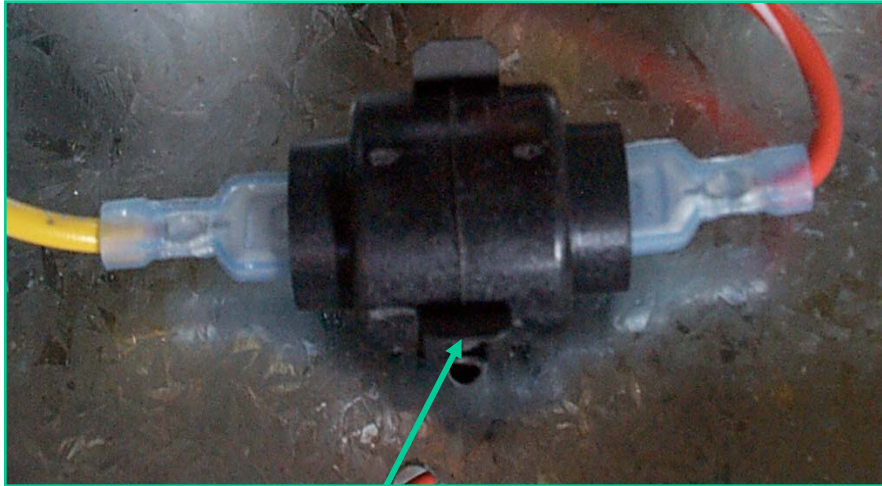


Scotsman® Lower Splash Panel Position

Lower Splash
Panel Flange
Must Be As
Shown -
Behind
Molded
Bump



Molded
Bump

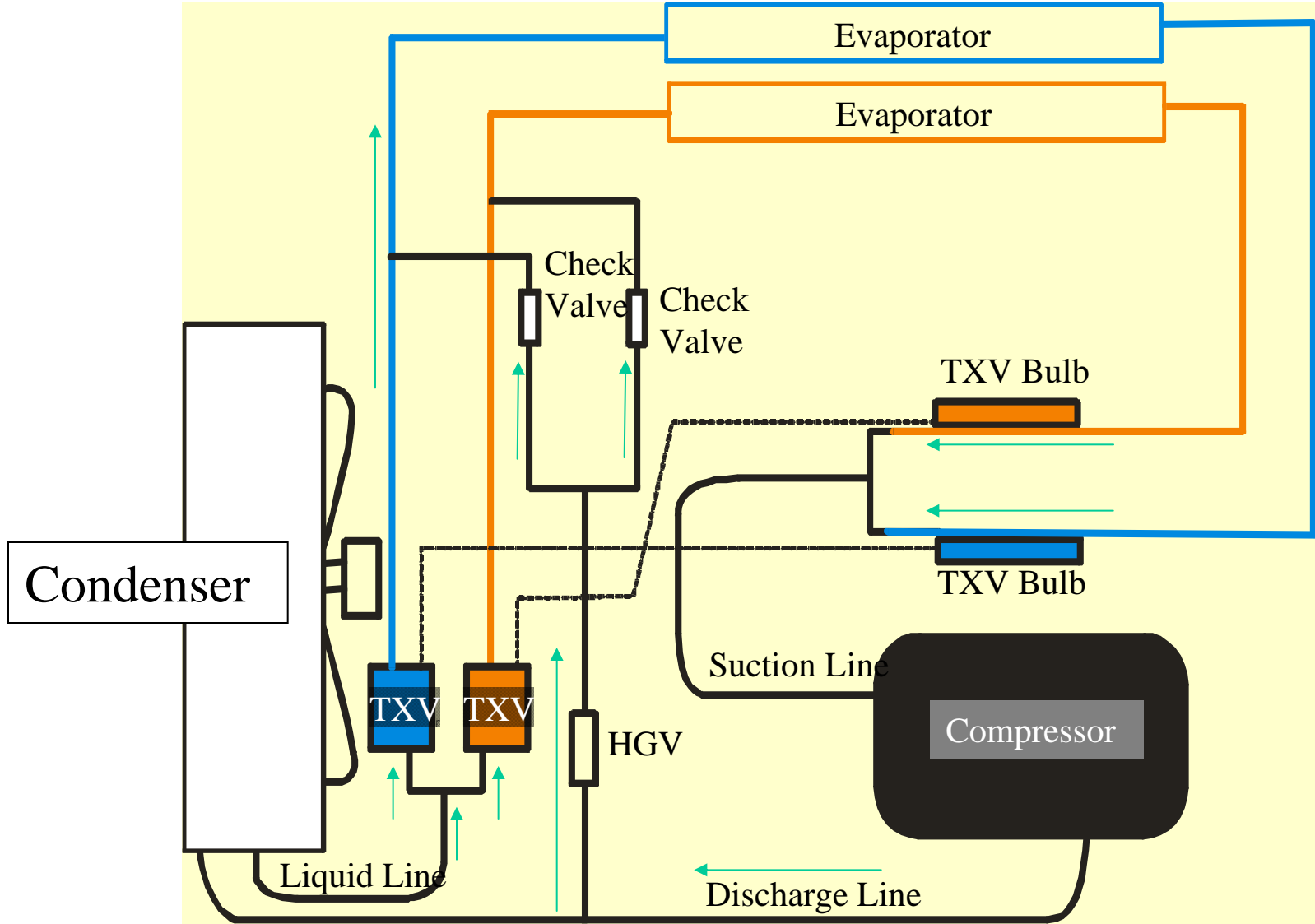


PTCR
It's Hot!

Purge Valve
Timer &
Relay

- Positive Temperature Coefficient Resistor
 - Replaces Start Relay
 - Eliminates Start Capacitor
 - In Series with the Compressor Start Winding
 - Flows Full Current at Lower Temperature
 - Blocks Current Flow at Higher Temperature
 - Changes Temperature with Current Flow
 - Normal Operating Temperature is 180°F.
 - Must Cool Down to be able to Restart Compressor
 - About 4 - 5 minutes of Off time

Scotsman® CME456 Refrigeration Schematic

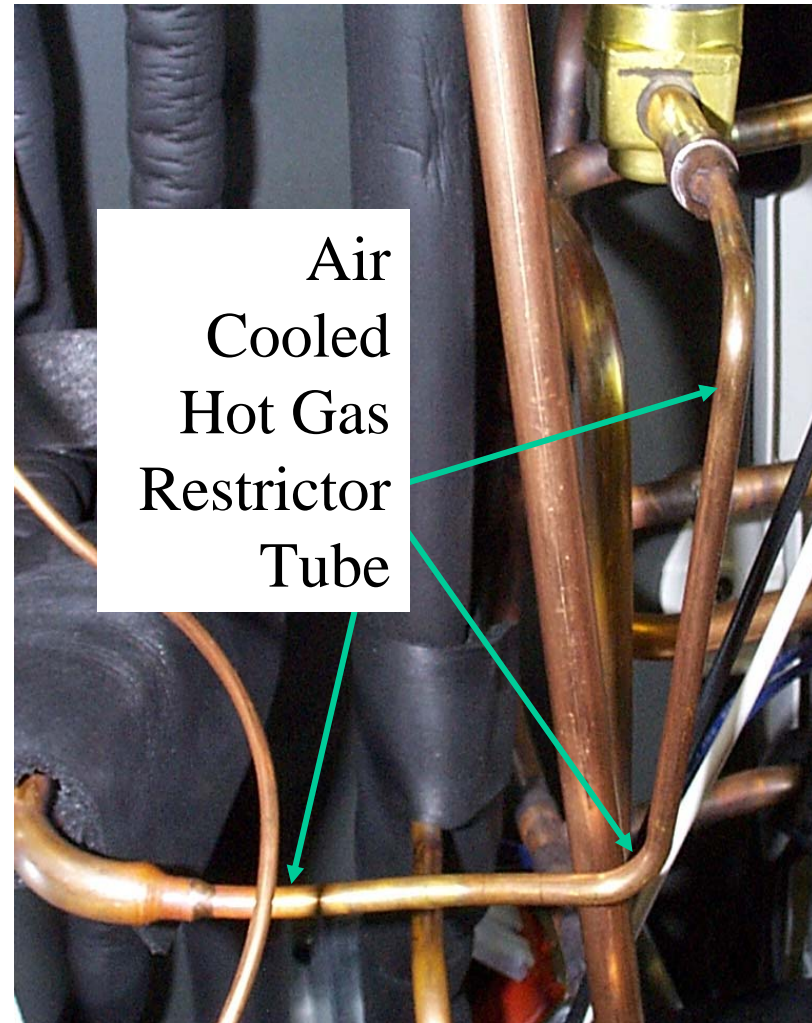


Scotsman® CME456 Refrigeration System

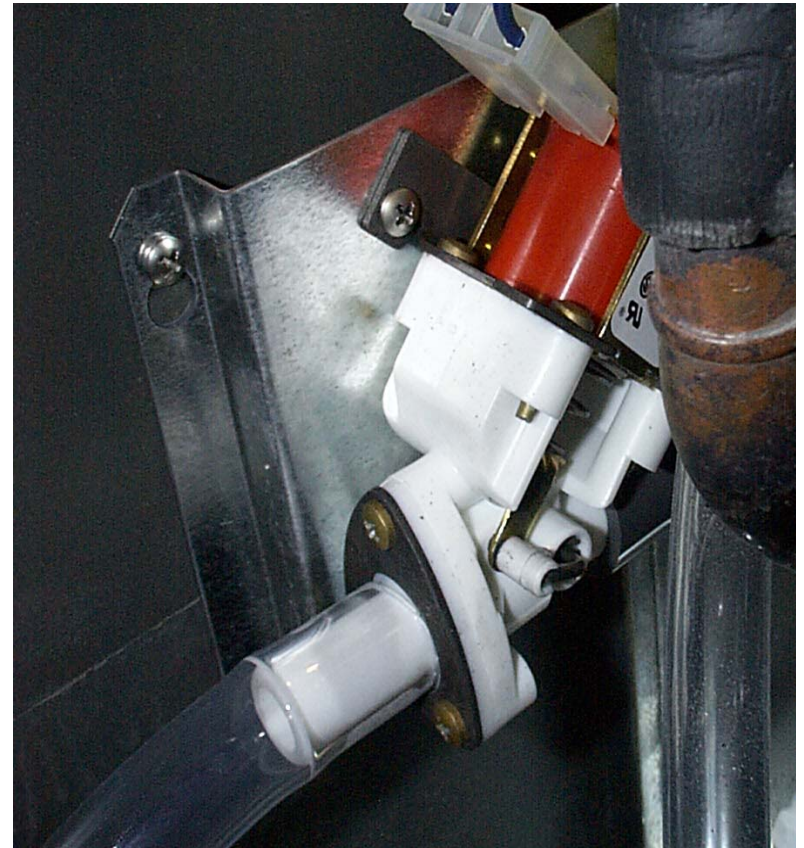
- Two TXVs Eliminates Distributor
 - Both Internally Equalized
 - Eliminates Low Side Connection
 - Check Valves Prevent Cross-Feeding During Freeze
 - If a TXV Bulb is on the Wrong Evaporator Outlet
 - One Evaporator Does Not Make Ice
 - Why?

Scotsman® CME456 Refrigeration System

- Hot Gas Valve
 - Restrictor Tube used to Control Volume of Refrigerant Gas
 - Use allows common HGV between air and water cooled while still having different flow rates
 - Air Cooled CME456 has a longer tube with 2 bends
 - Water Cooled CME456s use a shorter tube with 1 bend



- Similar to CME1056 and Up
 - Purge Valve Drain
 - 115 Volt Coil (red)
 - Inlet Water Valve Fill
 - 1.25 GPM valve
 - Same as SCE275, CME256, CME506, CME656, CME806



- AutoIQ Controllers
- Water Level Sensor
 - Common to All CM³
- Ice Sensor
- Water Temp Sensor
- Discharge Temp Sensor
- Optional Bin Thermostat
 - For Specific Dispensers
 - For Bins Without Baffles (KSTAT-22)

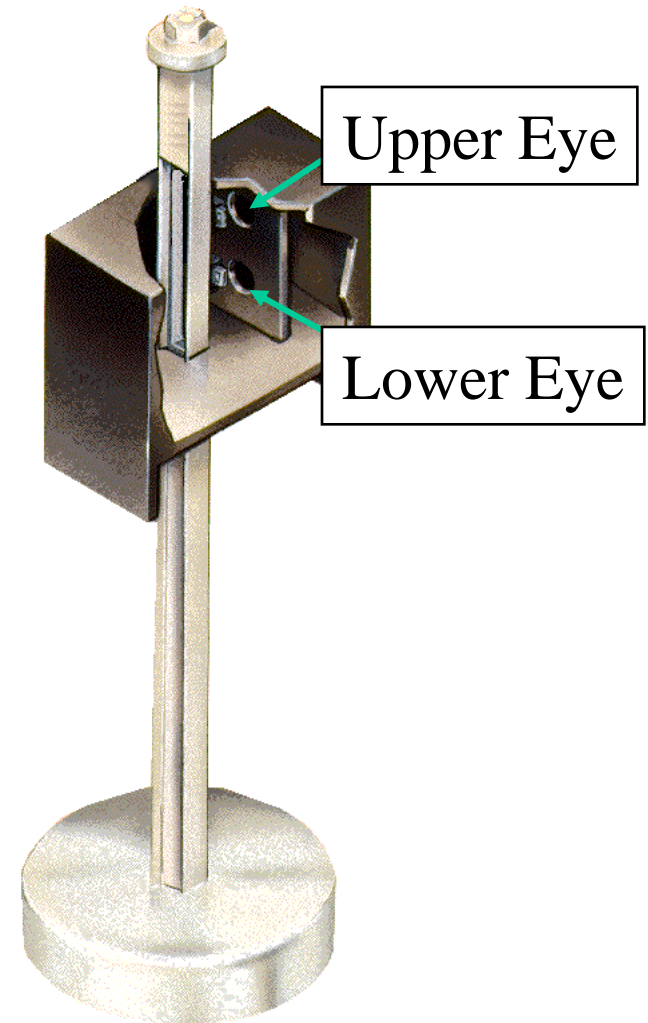
- Last Error Recall
 - Shut unit off
 - Hold Off button until Green lights appear
 - Push and release Harvest button to show last error code
 - Push and release Harvest button again to show second to last error code



- Single Service Controller
 - For all existing CM³ models
 - Model selection table on back and in the instructions
 - Model selected by rotary switch



- The controller uses the water level sensor to sense changes in water quantity
 - Upper electric eye indicates when water falls
 - Lower electric eye indicates when water rises



- Pushing Freeze Starts the Unit
 - Purge Valve Opens
 - Pump Starts
 - Hot Gas Valve is Open
 - Purge Valve Closes
 - Inlet Water Valve Opens and Fills the Reservoir
 - When Reservoir is Full the Compressor Starts
 - Hot Gas Valve Closes

- CME306 - Single Evaporator
 - Freezing Continues Until Water Level Drops
 - Starts Harvest
- CME456 - Two Evaporators
 - Freezing Continues Until Water Level Drops
 - Refills Reservoir
 - Second Drop of Water Level Starts Harvest Cycle
- Both Models
 - Anti-Slush Stops Pump for 30 Seconds Every Cycle

- Fan(s) cycle On and Off if Discharge Temperature at 3 minutes into Freeze is below
 - CME306: 142°F.
 - On 12 seconds
 - Off 45 seconds
 - CME456: 125°F.
 - On 12 seconds
 - Off 20 seconds
- Fan(s) shut off at the end of Freeze

- Hot Gas Valve Opens
 - Purge Valve Relay is Triggered
 - Purge Valve Opens for 40 Seconds
- Pump Stops
- Fans Stop
- Pump Restarts Depending Upon Purge Setting
- Purge Valve Closes
- Inlet Water Valve Opens - 22 Second Fill
 - Overlaps a Few Seconds with Purge Valve Open

- Long Harvest Times at First Cycle and Shut Down
- Plus Every 15th Cycle, Harvest Time is Extended
 - May be extended to any of 4 time periods, depending upon Discharge Temperature (at 3 minutes into the freeze cycle)
 - 5 minutes, when less than 158°F.
 - 4 minutes, when more than 158, but less than 170
 - 2 minutes, when more than 170, but less than 187
 - 100 seconds, when more than 187°F.

Harvest Begins

Harvest Ends

Total Current Harvest Cycle Time
(prior cycle actual + a % of actual)

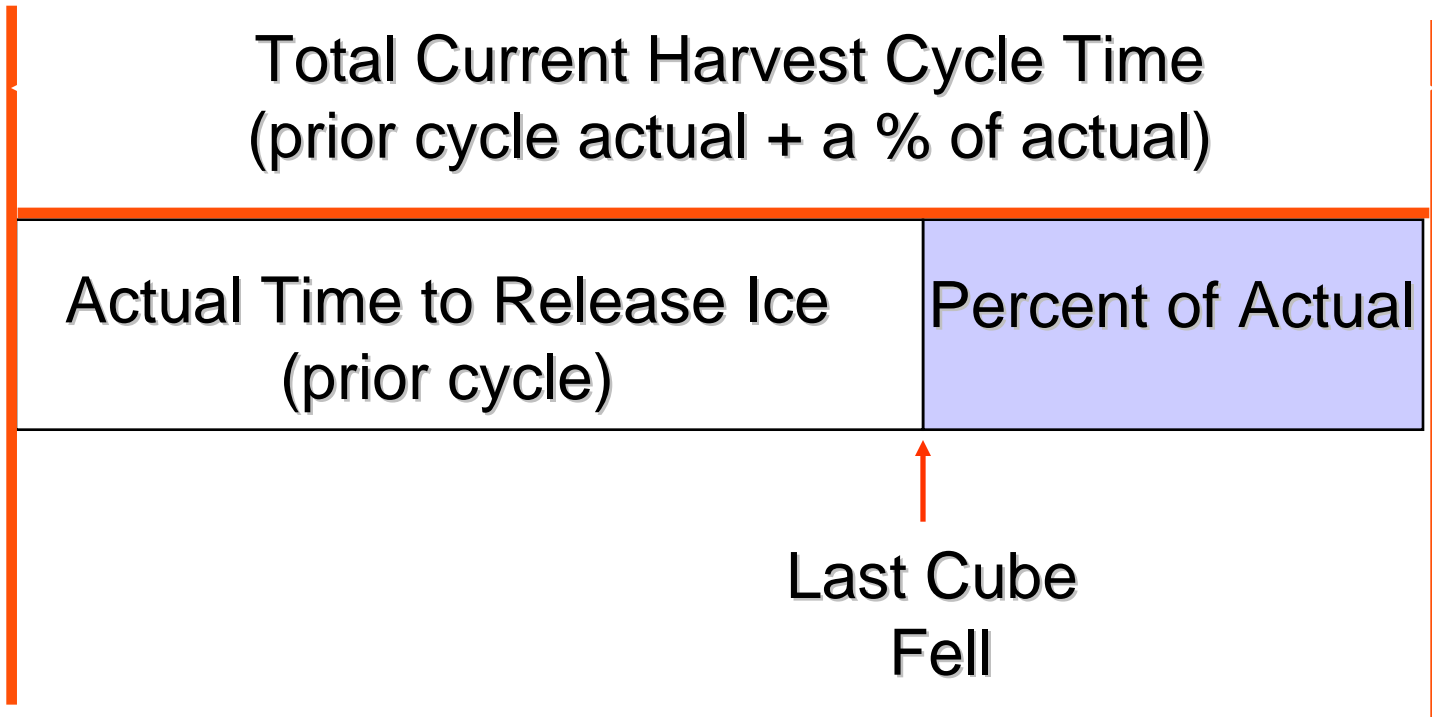
Actual Time to Release Ice
(prior cycle)

Percent of Actual

Last Cube
Fell

Harvest
Began

Harvest
Ended



- There are 5 levels
 - Maximum
 - Heavy
 - Standard - the factory setting
 - Moderate
 - Minimum
- Number of green lights indicates purge level

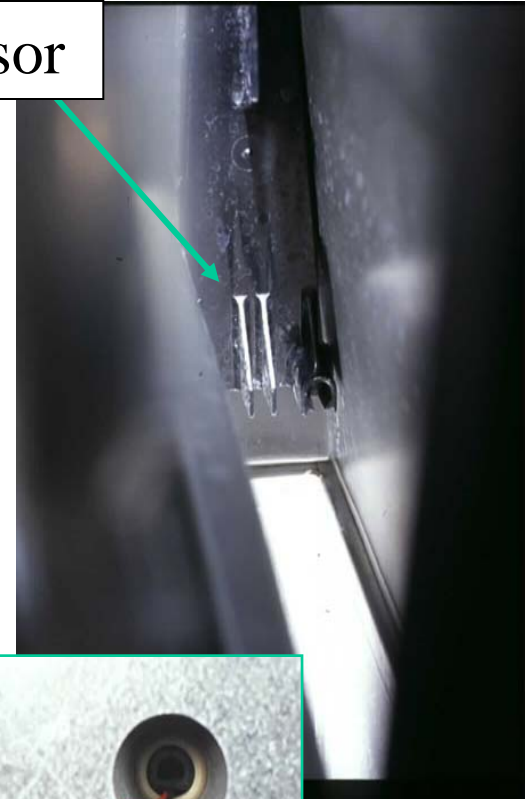


- Front Sensor
 - Remove Lower Splash Panel
 - CME306 -
 - Push Sensor Out
 - CME456 -
 - Remove Water Trough
 - Remove Cascading Shield
 - Push Sensor Out



- Back Sensor
 - Remove Front Sensor First
 - Three Methods for the Back One
 - From The Front Only
 - Remove Cube Deflector
 - From The Front and Top
 - Remove Top Panel, Reach Down
 - From The Front and Back
 - Push Back Sensor in From the
 - Access Hole in Back Panel

Back Sensor



Back View

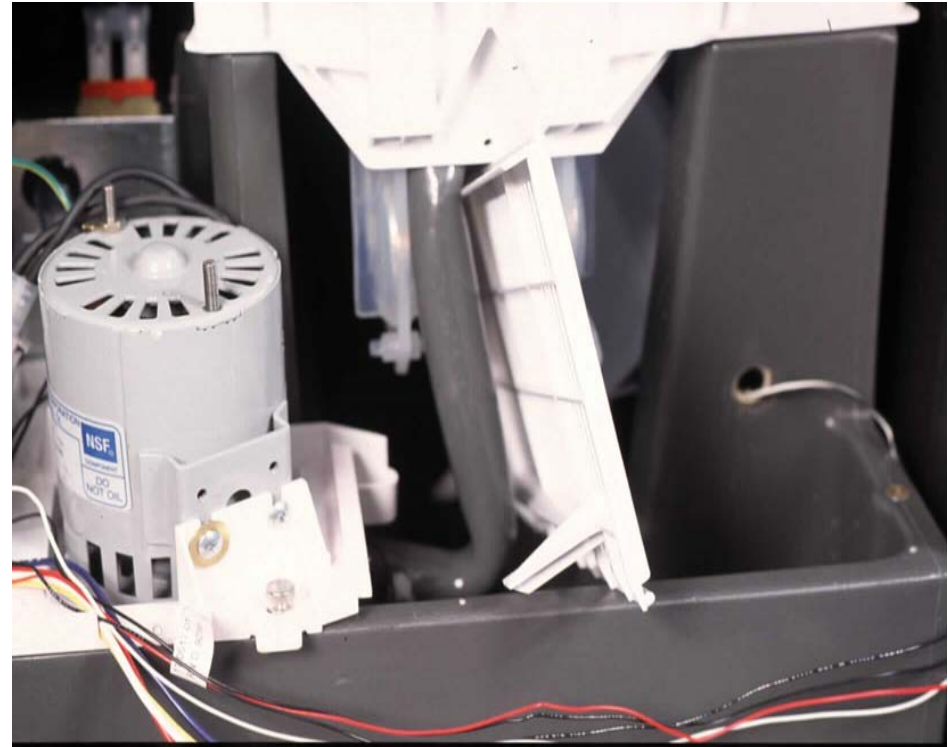


- Wire to Back Sensor Has Quick Connect in it
 - Can Unplug Back Sensor Without Unplugging it From the Controller
- Wire Routes Under Right Side Panel
 - Excess Wire Tied Up by Compressor



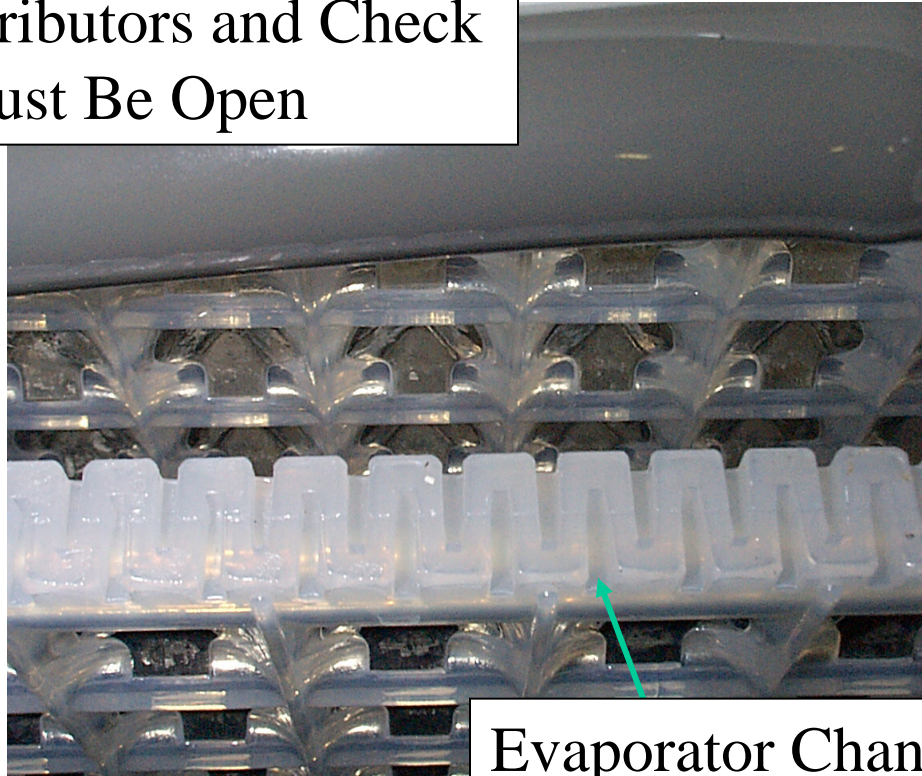
Scotsman® Sanitation and Maintenance

- Cube Deflector
 - Removal on CME456
 - Remove Reservoir Cover
 - Rotate Deflector CW Until it Fits Between Evaporator Plates
 - Pull It Out



- Push Harvest to release any ice and warm up the evaporators
- Push Clean and add 24 ounces of Scotsman Ice Machine Cleaner
- After 10 minutes push Clean again to flush out the Cleaner
- After 20 minutes push Off to stop

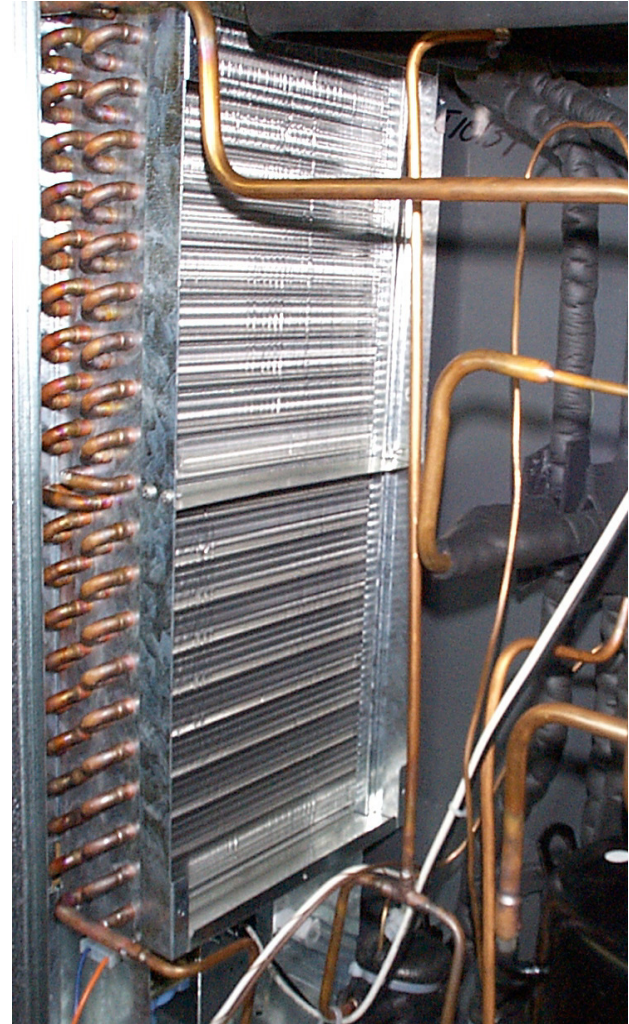
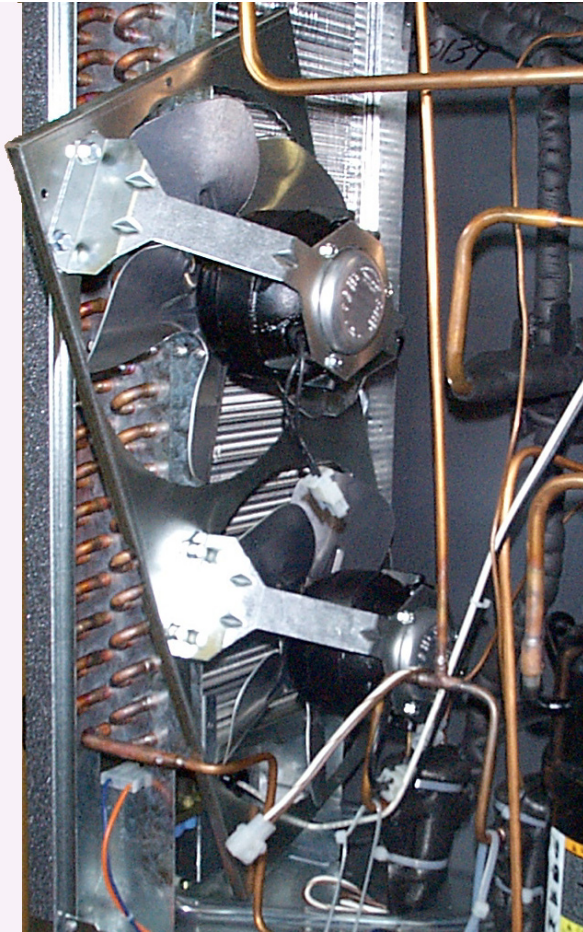
Remove Water Distributors and Check
Them - All Ports Must Be Open



Evaporator Channels
Must Be Open

Scotsman® Air Cooled Condenser Service

- Fan Shroud Is Removable

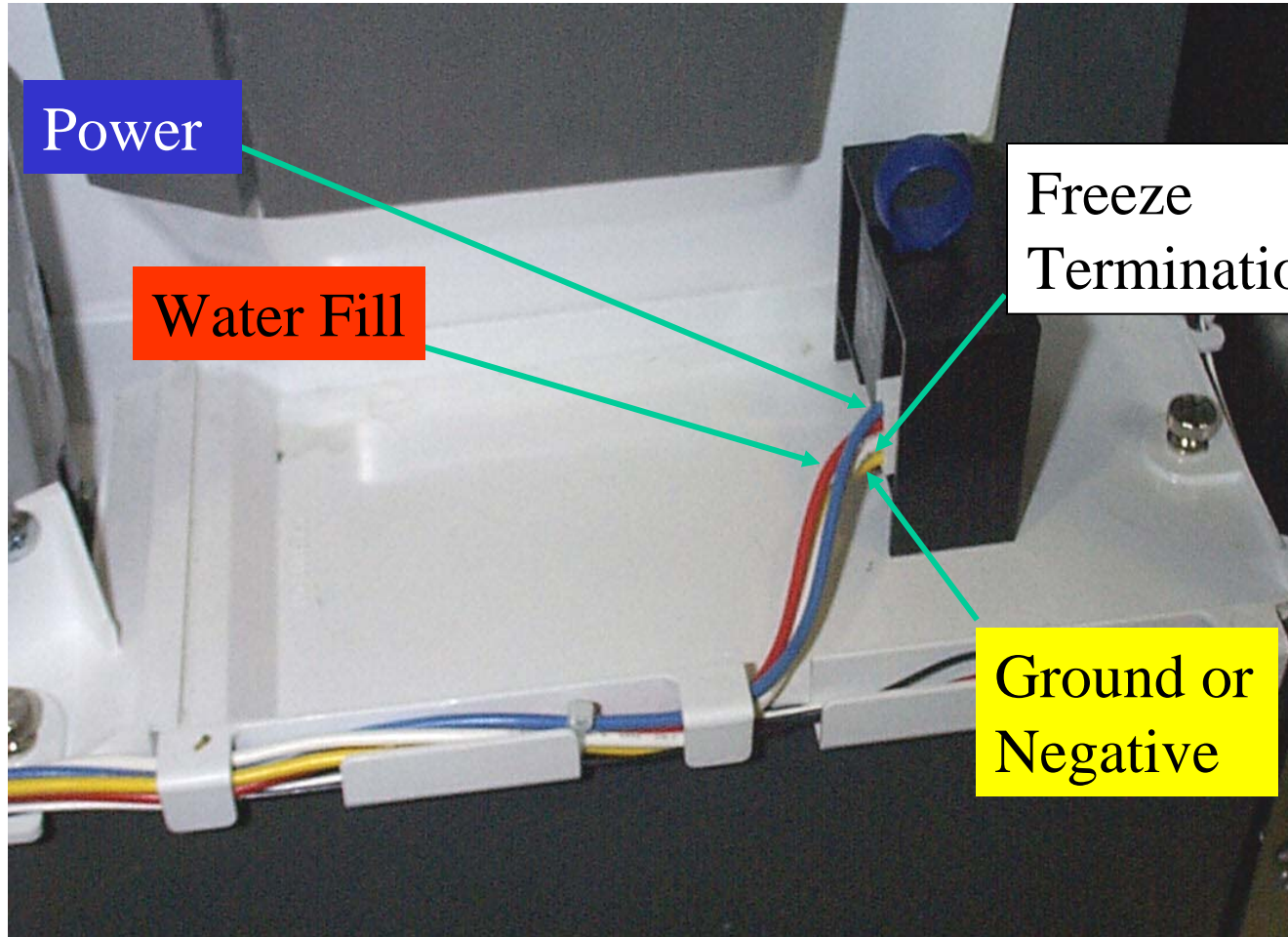


- No ice, machine is off
 - Check the controller for lights
 - No lights = no power to controller
 - Check for power to machine
 - Check for transformer output



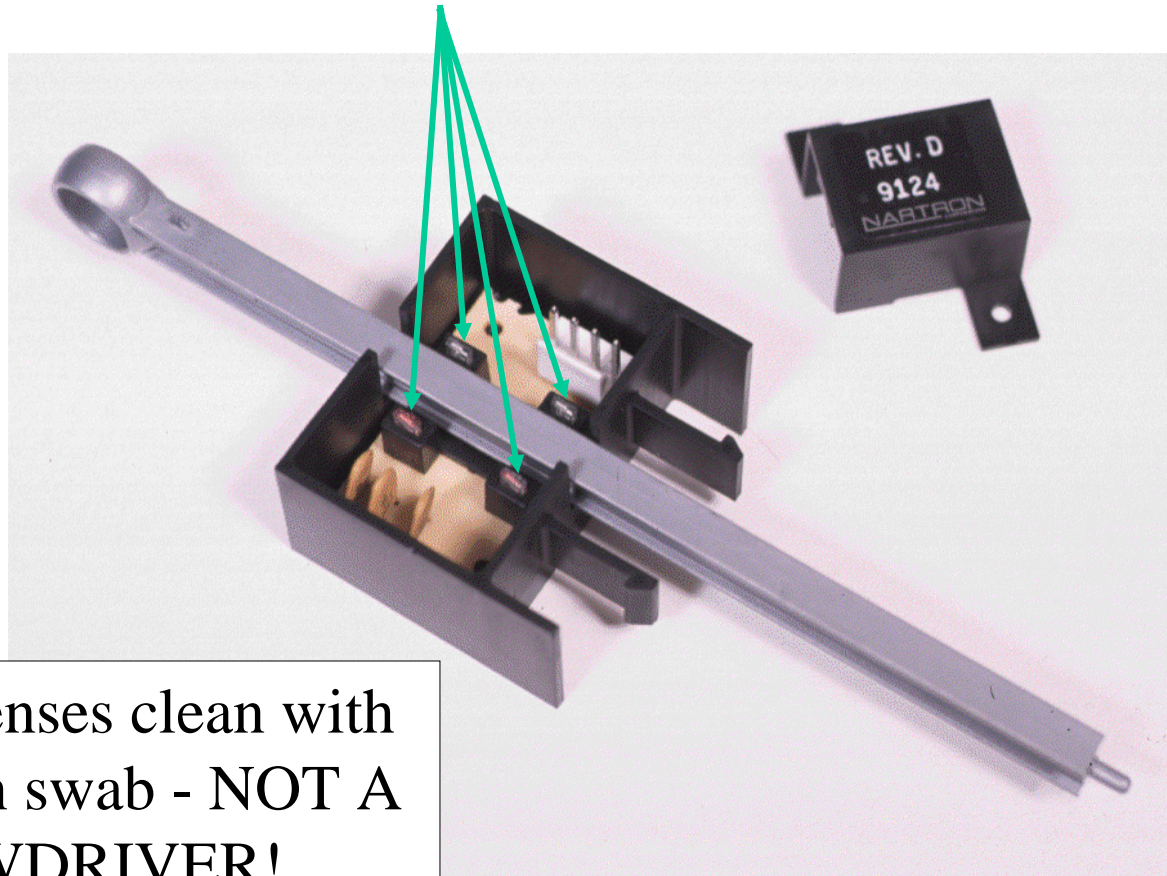
- If there are lights - which ones are on?
 - Off light means the machine was switched off by someone
 - A Diagnostic light means a machine malfunction
 - Bin Full light means something has triggered either
 - the bin thermostat (closed) or
 - the ice sensors are blocked

Scotsman® Water Sensor Diagnostics



Scotsman® Clean Water Sensor Lenses

Lenses



Wipe lenses clean with
a cotton swab - NOT A
SCREWDRIVER!

- Refrigeration Light
 - Blinks once and repeats
 - Ice release very slow, took maximum length harvest
 - Blinks twice and repeats
 - No ice sensed during maximum length harvest
 - Blinks three times and repeats
 - High discharge temperature

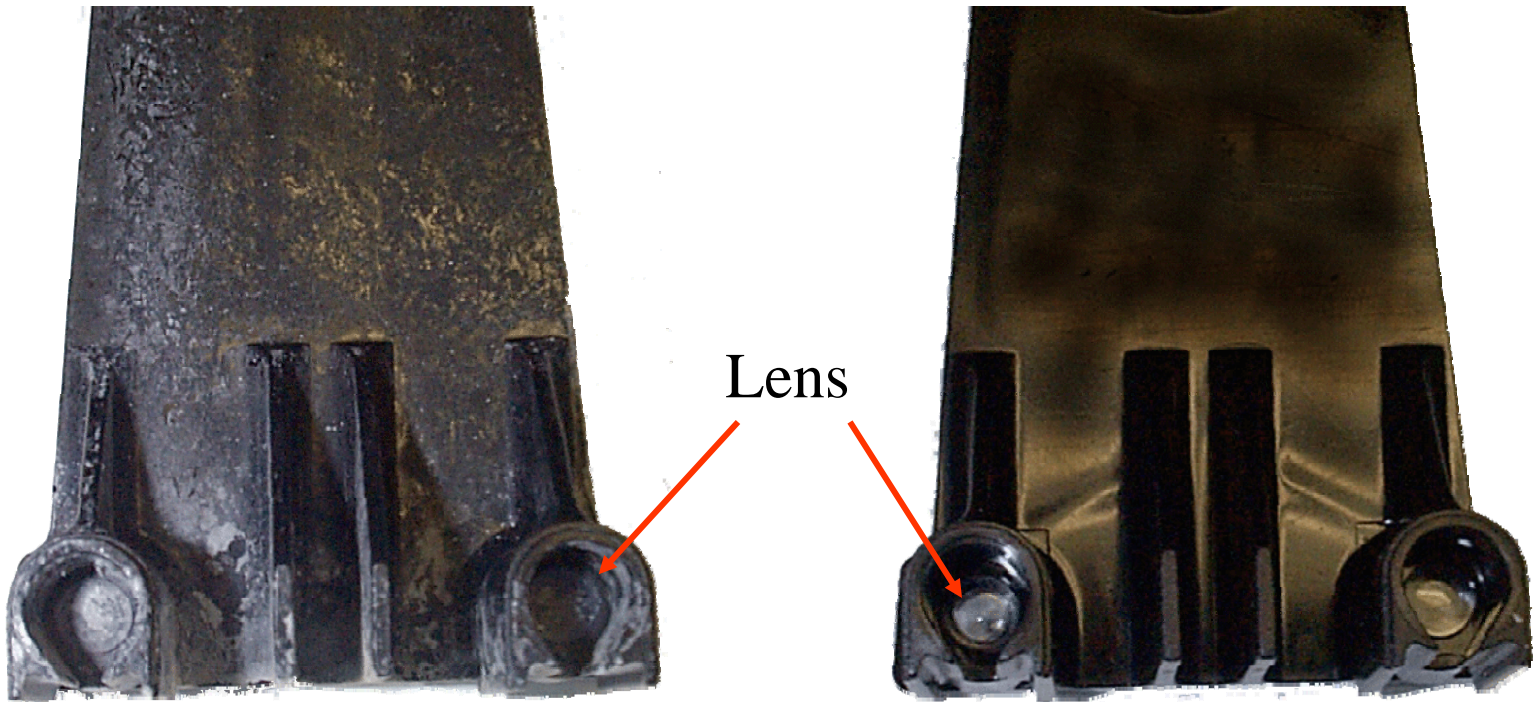


- Refrigeration Light
 - Is ON without blinking
 - Low discharge temperature OR
 - Maximum length freeze cycle OR
 - Water cooled or remote may have cut out on high discharge pressure
 - Control resets automatically, but the controller may have timed out, depending upon when in the freeze cycle the control reset

- Bin Full light is ON
 - Bin may be full
 - 4 minute delay
 - Optional Thermostat may be closed - is bin very cold?
 - Ice sensors may be blocked
 - Could need cleaning



Clean Sensor Lenses with old soft toothbrush,
NOT A SCREWDRIVER!

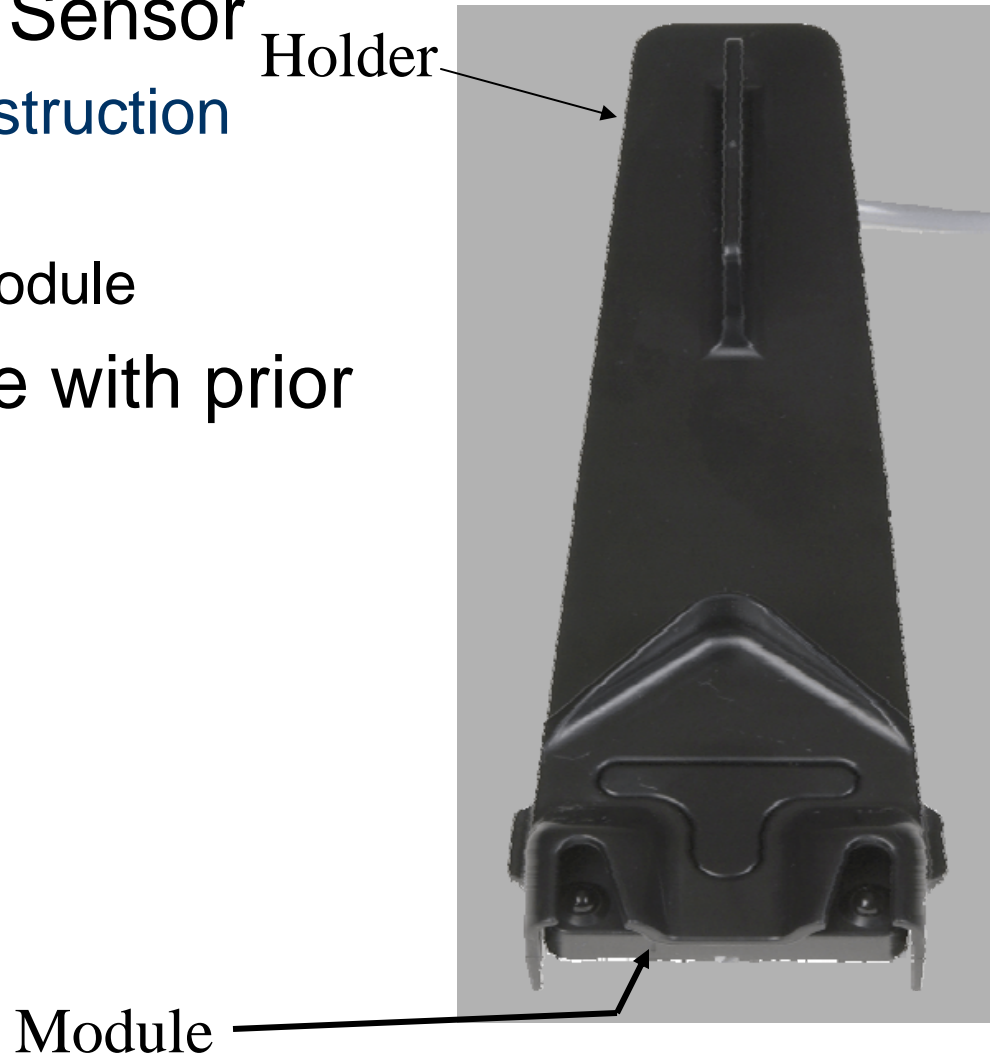


Ugly and Dirty! Clean Me!

Good to Go!

Note: Wet parts may appear clean, dry them to check.

- Modular Cuber Sensor
 - Two piece construction
 - Holder
 - Photo-eye module
- Interchangeable with prior sensors



- Push in on front of sensor module to release it from the holder



- When sensor module is released, it can be easily cleaned with a soft cloth or swab

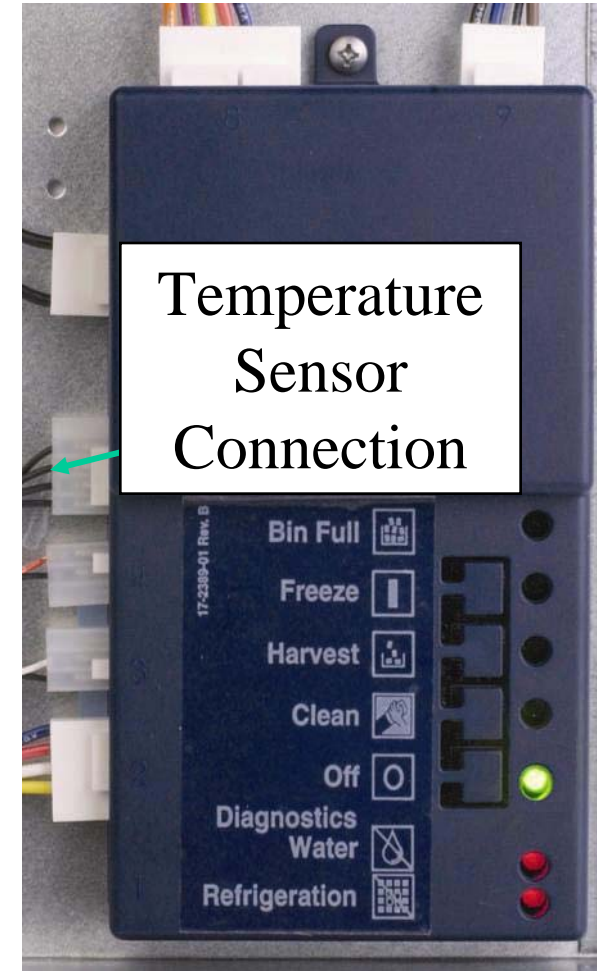
Photo Eye Lens



- Re-assemble the sensor
 - Tuck wire under the clip
 - Push module into place
 - Be sure wire doesn't stick out past edge of holder



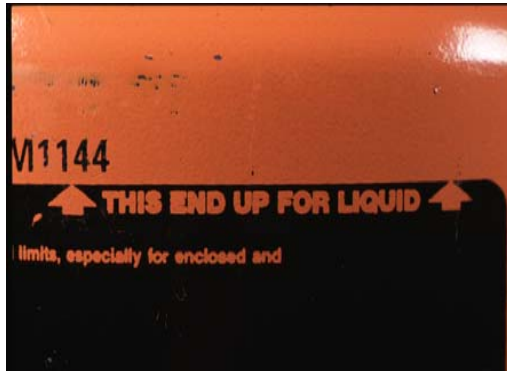
- Unit is running but both Diagnostic lights are ON
 - Check if temperature sensor (thermistor) set is plugged into the controller
 - If it is, replace the temperature sensor set
 - Thermistors can also be checked by putting either probe in ice water
 - 32,649 ohms @ 32°F.



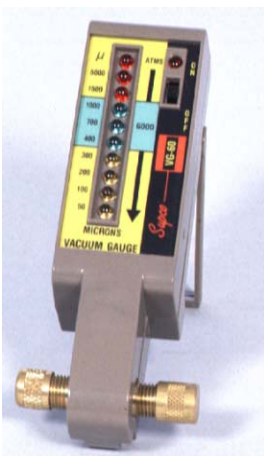
- CME306:
 - 12 to 13 minutes at 70/50
 - 15 to 16 minutes at 90/70
- CME456
 - 19 to 20 minutes at 70/50
 - 24 to 25 minutes at 90/70
- Longer than normal times can be caused by
 - Dirty condenser
 - Low charge
 - Leaky inlet water valve
 - Inefficient compressor

- Electrical
 - Starting
 - Check starting components & windings
 - Check PTCR - but wait for it to cool!
 - HGV must be OPEN during start up or compressor will not start. Open HGV coil symptom may be compressor not starting
 - Overheating
 - TXV Superheat
 - Low Refrigerant Charge
 - Compressor Bearings

- Confirm inefficient compressor
 - Process of elimination
 - TXV, Charge, Valves (water, hot gas) more likely to be at fault
 - Amp draw may be low if cannot pump to capacity
 - Normal amps:
 - CME306 - 10
 - CME456 - 13



Liquid Charge



Evacuate to 300
Microns

R-404A



Weigh In Charge



HFC Leak Detectors



Use Nitrogen Purge

- The CME306 is a single plate, 22" wide modular cuber
- The CME456 is a two plate, 22" wide modular cuber
- Both feature Scotsman's CM³ Technology, which on these machines also includes
 - Purge Valve drain system
 - PTCR compressor start relay