

Installation
& Operation
Manual

REV. 0909

HUSSmann®/CHINO

MZ3-S

**MULTI-ZONE REFRIGERATED, SELF SERVICE,
SELF CONTAINED**



HUSSmann®

MZ3-S

**MULTI-ZONE REFRIGERATED, SELF SERVICE,
SELF CONTAINED**

P/N IGSS-MZ3-S-0909

INSTALLATION & OPERATION GUIDE

General Instructions

Table of Contents

General Instructions	2
Cut and Plan Views	3
Installation	4
Location	4
Uncrating the Stand	4
Exterior Loading.....	4
Leveling	4
Plumbing	4
Self Contained Cases	4
Installing Condensate Drain (When Applicable)	4
Refrigeration	5
Refrigerant Type	5
Control Settings - Remote	5
Access to TX Valves and Drain Lines	5
Electronic Expansion Valve (Optional).....	5
Thermostatic Expansion Valve Location.....	5
Expansion Valve Adjustment	5
Measuring the Operating Superheat.....	5
Omni-STAT Location.....	5
Refrigeration Data.....	6
Defrost Data.....	6
Physical Data.....	6
Glycol Requirements	6
Electrical	7
Wiring Color Code	7
Electrical Circuit Identification.....	7
Electrical Service Receptacles (When Applicable)	7
Attachment Plugs.....	7
Field Wiring and Serial Plate Amperage.....	7
Ballast Location	7
User Information	8
Stocking	8
Important Steps	8
Case Cleaning	8
Cleaning Glass and Mirrors	9
Plexiglass and Acrylic Care	9
Cleaning.....	9
Antistatic Coatings.....	9
Maintenance	9
Replacing Fluorescent Lamps	9
Evaporator Fans	9
Copper Coils	9
Tips and Troubleshooting	9
Stainless Steel Cleaning and Care	10
Wiring Diagram	11
Piping Schematic	13
Appendices	14
Appendix A. - Temperature Guidelines	14
Appendix B. - Application Recommendations.....	14
Appendix C. - Field Recommendations	14
Appendix D. - Recommendations to user	15

This Booklet Contains Information on:

MZ3 Self Contained:

The MZ3 is a multi-zone, self-service, self-contained, refrigerated merchandiser which contains low and medium temperature refrigerated zones and an additional dry shelf zone to accommodate multiple product refrigeration requirements. For low temperature needs, the MZ3 uses Hussmann's FMSS-LT case and for medium Temperature needs, the MZ3 uses Hussmann's RCD case. Both are combined in a convenient single case package.

SHIPPING DAMAGE

All equipment should be thoroughly examined for shipping damage before and during unloading. This equipment has been carefully inspected at our factory and the carrier has assumed responsibility for safe arrival. If damaged, either apparent or concealed, claim must be made to the carrier.

APPARENT LOSS OR DAMAGE

If there is an *obvious loss or damage*, it must be noted on the freight bill or express receipt and signed by the carrier's agent; otherwise, carrier may refuse claim. The carrier will supply necessary claim forms.

CONCEALED LOSS OR DAMAGE

When loss or damage *is not apparent until after equipment is uncrated*, a claim for concealed damage is made. Make request in writing to carrier for inspection within 15 days, and retain all packaging. The carrier will supply inspection report and required claim forms.

SHORTAGES

Check your shipment for any possible shortages of material. If a shortage should exist and is found to be the responsibility of Hussmann Chino, *notify Hussmann Chino*. If such a shortage involves the carrier, *notify the carrier immediately*, and request an inspection. Hussmann Chino will acknowledge shortages within ten days from receipt of equipment.

HUSSMANN CHINO PRODUCT CONTROL

The serial number and shipping date of all equipment has been recorded in Hussmann's files for warranty and replacement part purposes. All correspondence pertaining to warranty or parts ordering must include the serial number of each piece of equipment involved, in order to provide the customer with the correct parts.

The Hussmann warranty is printed on the back of this guide.

Keep this booklet with the case at all times for future reference.

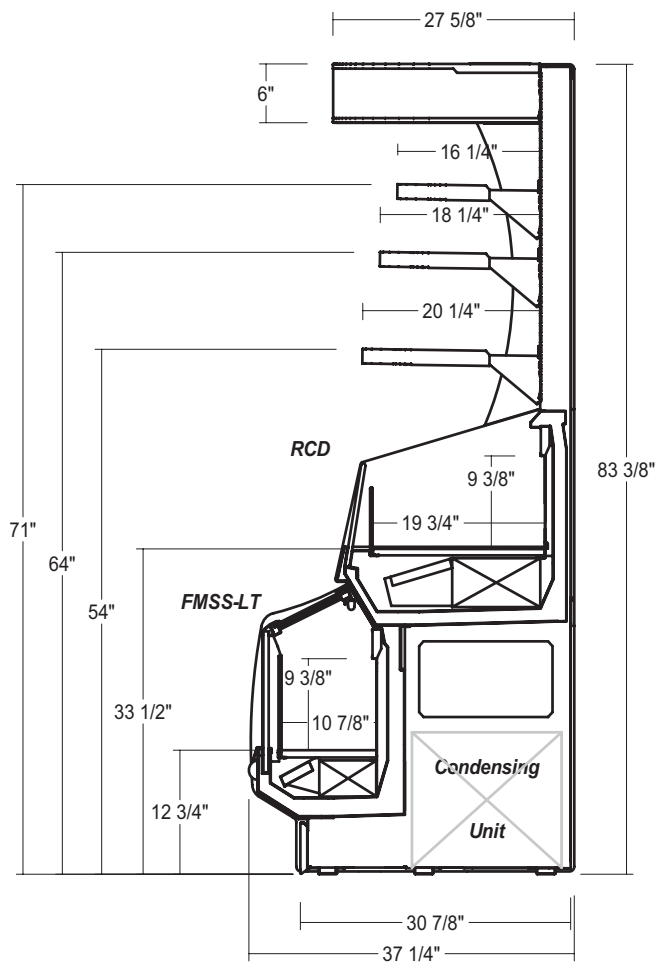
HUSSMANN®/CHINO

A publication of Hussmann® Chino
13770 Ramona Avenue • Chino, California 91710
(909) 628-8942 FAX
(909) 590-4910
(800) 395-9229

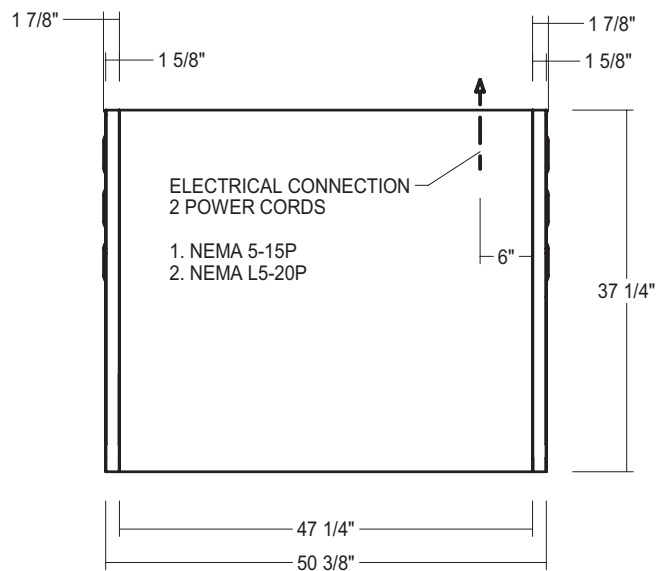


This equipment is to be installed to comply with the applicable NEC, Federal, State, and Local Plumbing and Construction Code having jurisdiction.

Cut and Plan Views



MZ3
SELF SERVICE MERCHANDISER



MZ3-4S
PLAN VIEW

Installation

Location

The refrigerated merchandisers have been designed for use only in air conditioned stores where temperature and humidity are maintained at or below 75°F and 55% relative humidity. DO NOT allow air conditioning, electric fans, ovens, open doors or windows (etc.), to create air currents around the merchandiser, as this will impair its correct operation.

Product temperature should always be maintained at a constant and proper temperature. This means that from the time the product is received, through storage, preparation and display, the temperature of the product must be controlled to maximize life of the product.

Uncrating the Stand

Place the fixture as close to its permanent position as possible. Remove the top of the crate. Detach the walls from each other and remove from the skid. Unbolt the case from the skid. The fixture can now be lifted off the crate skid. **Lift only at base of stand!**

Exterior Loading

These models have not been designed to support excessive external loading. **Do not use the lower surfaces, glass, or shelves as a stepping ladder. Do not stand in Lower cases to gain access to the upper portion of the case. Do not stand on any opening in the side panels.** Failure to observe these warnings could result damage to the case and serious personal injury.

Leveling

IMPORTANT! It is imperative that cases be leveled from front to back and side to side. A level case is necessary to insure proper operation, water drainage, glass alignment, and operation of the hinges supporting the glass. Leveling the case correctly will solve most hinge operation problems.

NOTE: A. To avoid removing concrete flooring, begin lineup leveling from the highest point of the store floor.

B. When wedges are involved in a lineup, set them first.

All cases were leveled and joined prior to shipment to insure the closest possible fit when cases are joined in the field. When joining, use a carpenter's level and shim legs accordingly. **Case must be raised correctly, under legs where support is best, to prevent damage to case.**

1. Check level of floor where cases are to be set. Determine the highest point of the floor; cases will be set off this point.
2. Level and set the case. Case must be raised under legs where support is best to prevent damage to case. Internal bracing may be removed at this time.



**ATTENTION
INSTALLER**

It is the contractor's responsibility to install case(s) according to local construction and health codes.

Plumbing

Self Contained Cases

MZ3 self-contained cases do not require that a condensate drain be connected because all of the condensate is contained by the condensate pan. However it is required that the condensate pan be cleaned on a regular basis. Additionally, the condensing unit should be cleaned at the same time using a light, non-abrasive brush to remove accumulated dust. If a filter is installed, it should be cleaned at this time as well.

Installing Condensate Drain (When Applicable)

Poorly or improperly installed condensate drains can seriously interfere with the operation of this refrigerator, and result in costly maintenance and product losses. Please follow the recommendations listed below when installing condensate drains to insure a proper installation:

1. Never use pipe for condensate drains smaller than the nominal diameter of the pipe or P-TRAP supplied with the case.
2. When connecting condensate drains, the P-TRAP must be used as part of the condensate drain to prevent air leakage or insect entrance. Store plumbing system floor drains should be at least 14" off the center of the case to allow use of the P-TRAP pipe section. Never use two water seals in series in any one line. Double P-TRAPS in series will cause a lock and prevent draining.
3. Always provide as much down hill slope ("fall") as possible; 1/8" per foot is the preferred minimum. PVC pipe, when used, must be supported to maintain the 1/8" pitch and to prevent warping.
4. Avoid long runs of condensate drains. Long runs make it impossible to provide the "fall" necessary for good drainage.
5. Provide a suitable air break between the flood rim of the floor drain and outlet of condensate drain. 1" is ideal.

Plumbing (Cont'd)

6. Prevent condensate drains from freezing:
 - a. Do not install condensate drains in contact with non-insulated suction lines. Suction lines should be insulated with a nonabsorbent insulation material such as Armstrong's Armaflex.
 - b. Where condensate drains are located in dead air spaces (between refrigerators or between a refrigerator and a wall), provide means to prevent freezing. The water seal should be insulated to prevent condensation.

Refrigeration

Refrigerant Type

The standard refrigerant will be R-404 unless otherwise specified on the customer order. Check the serial plate on the case for information.

Piping for more than one case on a condensing unit is run underground with either common suction and liquid lines from the machine room or individual suction and liquid lines joined together in the machine room.

Refrigeration Lines

<u>LIQUID</u>	<u>SUCTION</u>
3/8" O.D.	5/8" O.D.

NOTE: The standard coil is piped at 5/8" (suction); however, the store tie-in may vary depending on the number of coils and the draw the case has. Depending on the case setup, the connecting point in the store may be 5/8", 7/8", or 1 1/8". Refer to the particular case you are hooking up.

Refrigerant lines should be sized as shown on the refrigeration legend furnished by the store.

Install **P-TRAPS** (oil traps) at the base of all suction line vertical risers.

Pressure drop can rob the system of capacity. To keep the pressure drop to a minimum, keep refrigerant line run as short as possible, using the minimum number of elbows. Where elbows are required, use long radius elbows only.

Control Settings - Remote

See the MZ3-S Technical Data Sheet for the appropriate settings for your merchandiser. Maintain these parameters to achieve near constant product temperatures. Product temperature should be measured first thing in the morning, after having been refrigerated overnight. Defrost times should as directed in the MZ3-S Technical Data Sheet. The number of defrosts per day should never change. The duration of the defrost cycle may be adjusted to meet conditions present at your location.

Control Settings-self Contained

All functions are controlled by Omni-Stat Controllers. See MZ3-S Technical Data Sheet for proper temperature and defrost settings.

Access to TX Valves and Drain Lines

MECHANICAL - Remove product from end of case. Remove product racks. Remove refrigeration and drain access panels (labeled). TX valve (mechanical only) and drain are located under each access panel at end of the case.

ELECTRONIC - The Electronic Expansion valve master and slave cylinder(s) are located within the electrical access panel(s).

Electronic Expansion Valve (Optional)

A wide variety of electronic expansion valves and case controllers can be utilized. Please refer to EEV and controller manufacturers information sheet. Sensors for electronic expansion valves will be installed on the coil inlet, coil outlet, and in the discharge air. (Some supermarkets require a 4th sensor in the return air). Case controllers will be located in the electrical raceway or under the case.

Thermostatic Expansion Valve Location

This device is located on the same side as the refrigeration stub. An Alco balanced port expansion valve model is furnished as standard equipment, unless otherwise specified by customer.

Expansion Valve Adjustment

Expansion valves must be adjusted to fully feed the evaporator. Before attempting any adjustments, make sure the evaporator is either clear or very lightly covered with frost, and that the fixture is within 10° F of its expected operating temperature.

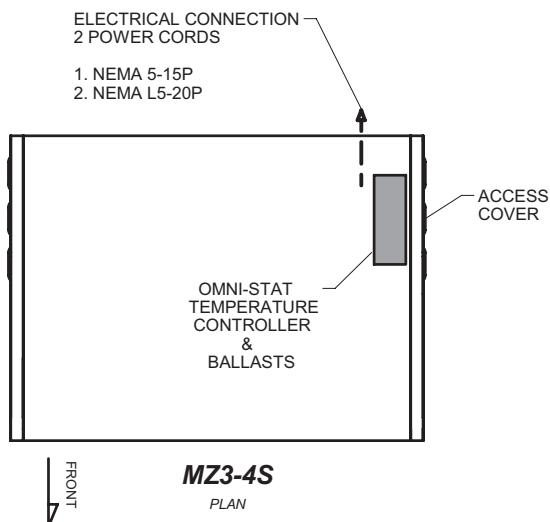
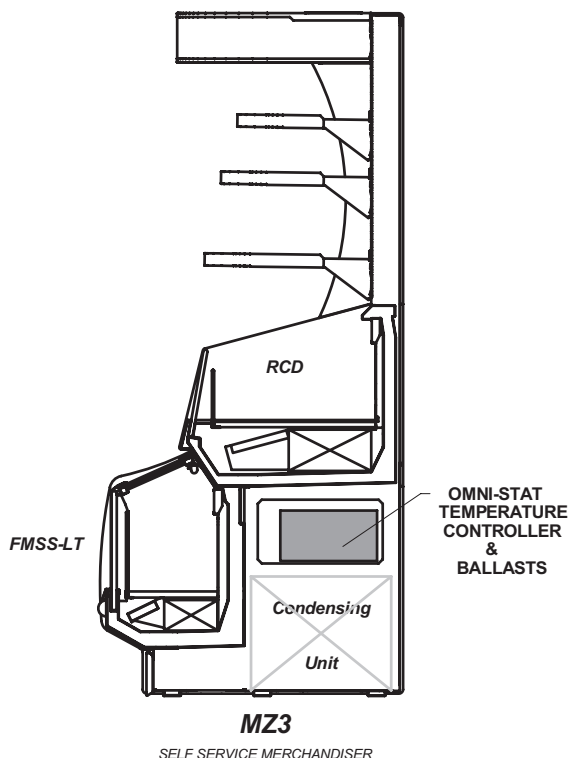
Measuring the Operating Superheat

1. Determine the suction pressure with an accurate pressure gauge at the evaporator outlet.
2. From a refrigerant pressure temperature chart, determine the saturation temperature at the observed suction pressure.
3. Measure the temperature of the suction gas at the thermostatic remote bulb location.
4. Subtract the saturation temperature obtained in step No. 2 from the temperature measured in step No. 3. The difference is superheat.
5. Set the superheat for 5° F - 7° F

Omni-STAT Location

The Omni-Stat case controllers are located in the access area in the right end panel. To gain access, remove the right louvered panel. Please refer to the MZ3-S Technical Data Sheet for the proper recommended temperature and defrost settings.

Refrigeration (Cont'd)



Refrigeration Data

Note: This data is based on store temperature and humidity that does not exceed 75F and 55% R.H.

Discharge Air (F) 28

Evaporator (F) 20

Note: Not recommended to control temp by regulating coil temp allow T-STAT to cycle and control temp.

*Btu/hr/ft**

Parallel 400

Conventional 460

Low Temp

Discharge Air (F) -10

Evaporator (F) -20

Note: Not recommended to control temp by regulating coil temp allow T-STAT to cycle and control temp.

*Btu/hr/ft**

Parallel 600

Conventional 690

*For all refrigeration equipment other than Hussmann, use conventional Btu values.

Defrost Data

Frequency Hrs 8

OFFTIME

Temp Term °F 54

Failsafe Minutes 30

ELECTRIC or GAS Not Recommended

Physical Data

Merchandiser Drip Pipe (in.) 1½

Merchandiser Liquid Line (in.) 3/8

Merchandiser Suction Line (in.) 5/8

Estimated Charge (lb)***

4ft 1.2

5ft 1.5

6ft 1.8

*** This is an average for all refrigerants types. Actual refrigerant charge may vary by approximately half a pound.

Glycol Requirements

GPM PSI

N/A N/A

Electrical

Wiring Color Code Refrigerated

STANDARD CASE WIRE COLOR CODE CODIGO DE COLORES DE LOS ALAMBRES PARA LAS VITRINAS ESTANDAR CODE COULER POUR FILS DE BOITIER NORMALISE		
COLOR DESCRIPTION	DESCRIPCION	DESCRIPTION
■ GROUND	TIERRA MASA	MASSE
■ ANTI-SWEAT	ANTICONDENSACION	ANTI-SUINTEMENT
■ LIGHTS	LUCES	ECLAIRAGE
■ RECEPTACLES	ENCHUFES	PRISE DE COURANT
■ T-STAT/SOLENOID 230VAC	TERMOSTATO/SOLENOIDE (230VAC)	SOUPAPE A SOLENOID (230 VAC)
■ T-STAT/SOLENOID 115VAC	TERMOSTATO/SOLENOIDE (115VAC)	SOUPAPE A SOLENOID (115 VAC)
■ T-STAT/SOLENOID 24VAC	TERMOSTATO/SOLENOIDE (24VAC)	SOUPAPE A SOLENOID (24 VAC)
■ FAN MOTORS	VENTILADORES	VENTILATEUR
■ BLUE CONDENSING UNIT	UNIDAD DE CONDENSACION	UNITE DE CONDENSATION

USE COPPER CONDUCTORS ONLY
UTILISEZ LES CONDUCTEURS DE CUIVRE SEULEMENT
UTILICE LOS CONDUCTORES DE COBRE SOLAMENTE
430-01-0338 R101003

CASE MUST BE GROUNDED

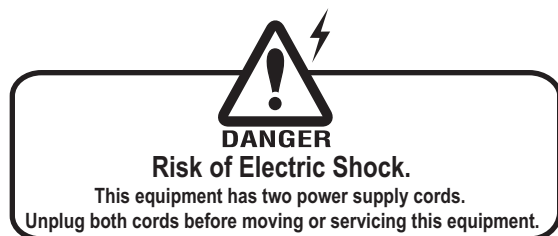
NOTE: Refer to label affixed to case to determine the actual configuration as checked in the "TYPE INSTALLED" boxes.

Electrical Circuit Identification

Standard lighting for all models will be full length fluorescent lamps located on the underside of each shelf, in the freezer section, and half-length lamps in the canopy section. The switch controlling all lamps is located on the rear wall just above to top of the medium temperature case (RCD) and under the bottom shelf.

Electrical Service Receptacles (When Applicable)

The receptacles located on the exterior of the merchandiser are intended for scales and lighted displays. They are not intended nor suitable for large motors or other external appliances.



Attachment Plugs

This unit contains two power supply cords. Each cord is a different type. Connect each plug to a single outlet circuit. The first attachment plug is a NEMA 5-15P type plug with a 15 amp rating. A 15 amp line is required for the NEMA 5-15P plug. The second is a NEMA L5-20P type plug with a 20 amp rating. A 20 amp line is required for the NEMA L5-20P type plug. Each line must be separate with separate circuit breakers. **Do not attach both plugs to the same electrical line!**

Field Wiring and Serial Plate Amperage

Field Wiring must be sized for component amperes printed on the serial plate. Actual ampere draw may be less than specified. Field wiring from the refrigeration control panel to the merchandisers is required for refrigeration thermostats. Case amperes are listed on the wiring diagram, but always check the serial plate.

Ballast Location

Ballasts are located within the access panel that runs the length of the rear of the case. Refer to diagram on page 6.

User Information

Stocking

Improper temperature and lighting will cause serious product loss. Discoloration, dehydration and spoilage can be controlled with proper use of the equipment and handling of product. Product temperature should always be maintained at a constant and proper temperature. This means that from the time the product is received, through storage, preparation and display, the temperature of the product must be controlled to maximize life of the product.

Hussmann cases were not designed to “heat up” or “cool down” product-but rather to maintain an item’s proper temperature for maximum shelf life. To achieve the protection required always:

1. Minimize processing time to avoid damaging temperature rise to the product. Product should be at proper temperature.
2. Keep the air in and around the case area free of foreign gasses and fumes or food will rapidly deteriorate.
3. Maintain the display merchandisers temperature controls as outlined in the refrigerator section of this manual.
4. Do not place any product into these refrigerators until all controls have been adjusted and they are operating at the proper temperature. Allow merchandiser to operate a minimum of 6 hours before stocking with any product.
5. When stocking, never allow the product to extend beyond the recommended load limit. **Air discharge and return air flue must be unobstructed at all times to provide proper refrigeration.**
6. Keep the service doors closed (when applicable). Refrigeration performance will be seriously affected if left open for a prolonged period of time.
7. Avoid the use of supplemental flood or spot lighting. Display light intensity has been designed for maximum visibility and product life at the factory. The use of higher output fluorescent lamps (H.O. and V.H.O.), will shorten the shelf life of the product.

Important Steps

1. Do not set temperature too cold, as this causes product dehydration.
Recommended Omni-Stat Temperature Control Settings:
-RCD 26°
-FMSS-LT -15°
See Case Specifications for Details.
2. Temperature control is adjusted by the Omni-Stat Temperature Controller.

Case Cleaning

Long life and satisfactory performance of any equipment are dependent upon the care given to it. To insure long life, proper sanitation and minimum maintenance costs, the refrigerator should be thoroughly cleaned frequently. **SHUT OFF FAN DURING CLEANING PROCESS.** It can be unplugged within the case, or shut off case at the source. The interior bottom may be cleaned with any domestic soap or detergent based cleaners. Sanitizing solutions will not harm the interior bottom, however, these solutions should always be used according to Hussmann’s directions. It is essential to establish and regulate cleaning procedures. This will minimize bacteria causing discoloration which leads to degraded product appearance and significantly shortening product shelf life.

CAUTION

CLEANING PRECAUTIONS

When cleaning:

- Do not use high pressure water hoses
- Do not introduce water faster than waste outlet can drain
- **NEVER INTRODUCE WATER ON SELF CONTAINED UNIT WITH AN EVAPORATOR PAN**
- **NEVER USE A CLEANING OR SANITIZING SOLUTION THAT HAS AN OIL BASE** (these will dissolve the butyl sealants) or an **AMMONIA BASE** (this will corrode the copper components of the case)
- **TO PRESERVE THE ATTRACTIVE FINISH:**
- **DO USE WATER AND A MILD DETERGENT FOR THE EXTERIOR ONLY**
- **DO NOT USE A CHLORINATED CLEANER ON ANY SURFACE**
- **DO NOT USE ABRASIVES OR STEEL WOOL SCOURING PADS** (these will mar the finish)

Soap and hot water are not enough to kill bacteria. A sanitizing solution must be included with each cleaning process to eliminate bacteria.

1. Clear debris and solid food product that may be in areas that need cleaning.
2. Using a spray bottle, apply cleaning solution liberally to surfaces. Thoroughly scrub all surfaces using a non-abrasive cloth.
3. Using another spray bottle containing only water, rinse surfaces that require rinsing. **Do not use running water to rinse. See warning above.**
4. Dry completely using a clean, non-abrasive cloth.

User Information (Cont'd)

Cleaning Glass and Mirrors

Only use a soft cloth and water for cleaning any glass or mirrored components. Be sure to rinse and/or dry completely.

Never use hot water on cold glass surfaces! It may shatter and cause serious injury! Allow glass surfaces to warm first.

Plexiglass and Acrylic Care

Improper cleaning not only accelerates the cleaning cycle but also degrades the quality of this surface. Normal daily buffing motions can generate static cling attracting dust to the surface. Incorrect cleaning agents or cleaning cloths can cause micro scratching of the surface, causing the plastic to haze over time.

Cleaning

Husmann recommends using a clean damp chamois, or a paper towel marketed as dust and abrasive free with **210® Plastic Cleaner and Polish** available by calling Sumner Labs at **1-800-542-8656**. Hard, rough cloths or paper towels will scratch the acrylic and should not be used.

Antistatic Coatings

The **210®** has proven to be very effective in not only cleaning and polishing the Plexiglas surface, but also providing anti-static and anti-fog capabilities. This product also seals pores and provides a protective coating.

Maintenance



DANGER BEFORE SERVICING

Disconnect both Attachment Plugs to completely De-energize unit.

Failure to disconnect both plugs may result in damage to equipment, serious personal injury!

This includes (but not limited to) Fans, Heaters, Thermostats and Lights.

Replacing Fluorescent Lamps

Fluorescent lamps are furnished with moisture resistant lamp holders, shields and end caps. Whenever a fluorescent lamp is replaced, be certain to reinstall the lamp shield and end caps over the lamp. The lamps supplied are single slim-line or bi-pin type with or without starters.

HUSMANN®

ENCAPSULITE

SHATTERPROOF COATING - SA 10645



Complies with FDA USDA
& OSHA Regulations



for replacement call:

1-800-395-9229



Turn switch off then on after replacing bulb



Evaporator Fans

The evaporator fans are located at the center front of these merchandisers directly beneath the display pans.

Copper Coils

The copper coils used in Husmann merchandisers may be repaired in the field. Materials are available from local refrigeration wholesalers.

Husmann recommends using #15 Sil-Fos for repairs.

Tips and Troubleshooting

Before calling for service, check the following:

1. Check electrical power supply to the equipment for connection.
2. Check fixture loading. Overstocking case will affect its proper operation.
3. If frost is collecting on fixture and/or product, check that no outside doors or windows are open- allowing moisture to enter store.



**IMPORTANT
INFORMATION**

FOR PROMPT SERVICE

When Contacting the Factory regarding problems.

**Be sure to have the Case MODEL and
SERIAL NUMBER Handy. This Information
is on a plate located on the case itself.**

Maintenance (Cont'd)

Stainless Steel Cleaning and Care

There are three basic things, which can break down your stainless steel's passivity layer and allow corrosion.

1. Mechanical Abrasion

Mechanical Abrasion means those things that will scratch the steel's surface. Steel Pads, wire Brushes, and Scrapers are prime examples.

2. Water

Water comes out of our tap in varying degrees of hardness. Depending on what part of the country you live in, you may have hard or soft water. Hard water may leave spots. Also, when heated, hard water leaves deposits behind that if left to sit, will break down the passive layer and rust your stainless steel. Other deposits from food preparation and service must be properly removed.

3. Chlorides

Chlorides are found nearly everywhere. They are in water, food and table salt. One of the worst perpetrators of chlorides can come from household and industrial cleaners.

Don't Despair! Here are a few steps that can help prevent stainless steel rust.

1. Use the Proper Tools

When cleaning your stainless steel products, take care to use non-abrasive tools. Soft Clothes and plastic scouring pads will NOT harm the steel's passive layer. Stainless steel pads can also be used but the scrubbing motion must be in the same direction of the manufacturer's polishing marks.

2. Clean With the Polish Lines

Some stainless steels come with visible polishing lines or "grain". When visible lines are present, you should ALWAYS scrub in a motion that is parallel to them. When the grain cannot be seen, play it safe and use a soft cloth or plastic scouring pad.

3. Use Alkaline, Alkaline Chlorinated or Non-chloride Containing Cleaners

While many traditional cleaners are loaded with chlorides, the industry is providing an ever increasing choice of non-chloride cleaners. If you are not sure of your cleaner's chloride content contact your cleaner supplier. If they tell you that your present cleaner contains chlorides, ask for an alternative. Also, avoid cleaners containing quaternary salts as they also can attack stainless steel & cause pitting and rusting.

4. Treat your Water

Though this is not always practical, softening hard water can do much to reduce deposits. There are certain filters that can be installed to remove distasteful and corrosive elements. Salts in a properly maintained water softener are your friends. If you are not sure of the proper water treatment, call a treatment specialist.

5. Keep your Food Equipment Clean

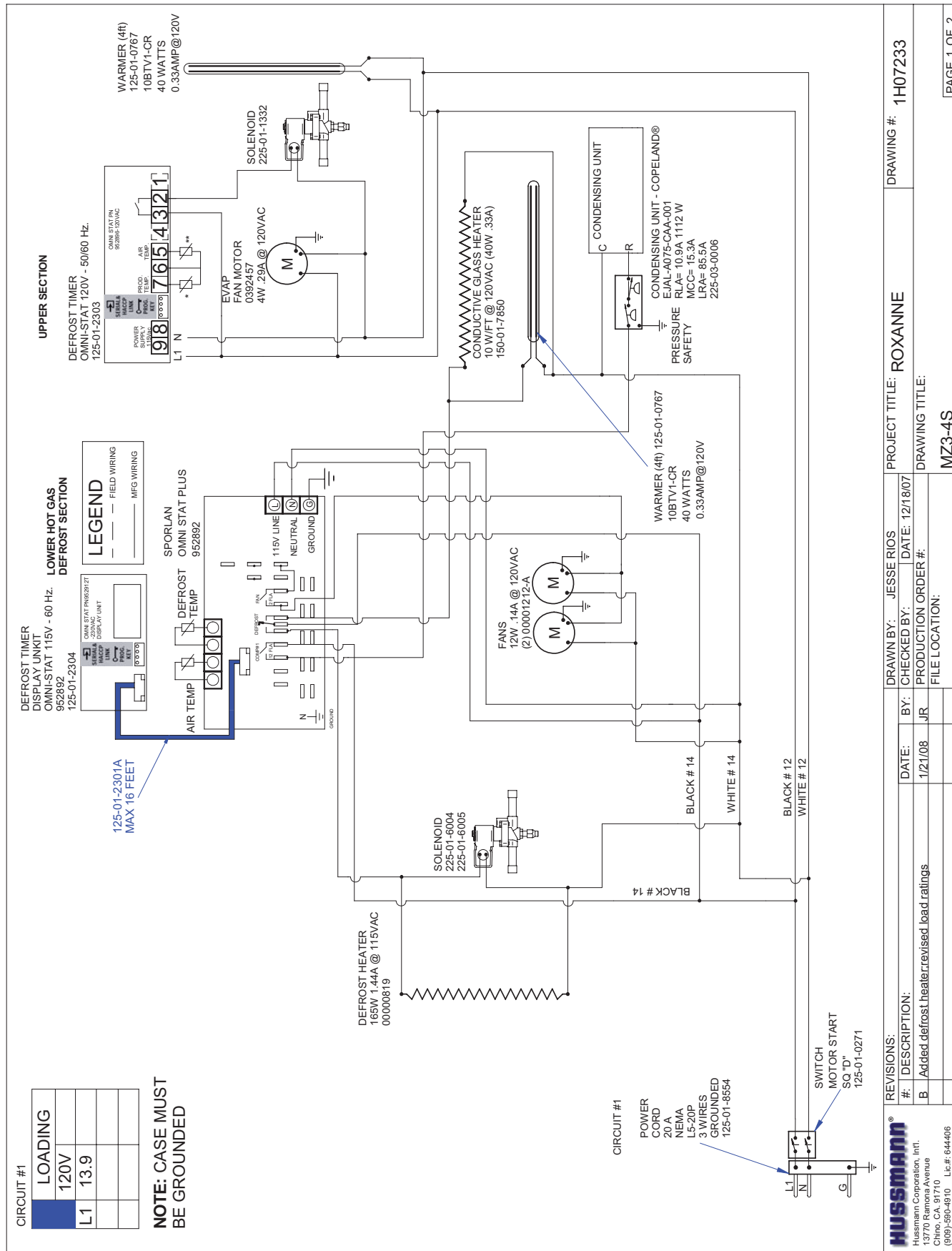
Use alkaline, alkaline chlorinated or non-chlorinated cleaners at recommended strength. Clean frequently to avoid build-up of hard, stubborn stains. If you boil water in your stainless steel equipment, remember the single most likely cause of damage is chlorides in the water. Heating cleaners that contain chlorides has a similar effect.

6. Rinse, Rinse, Rinse

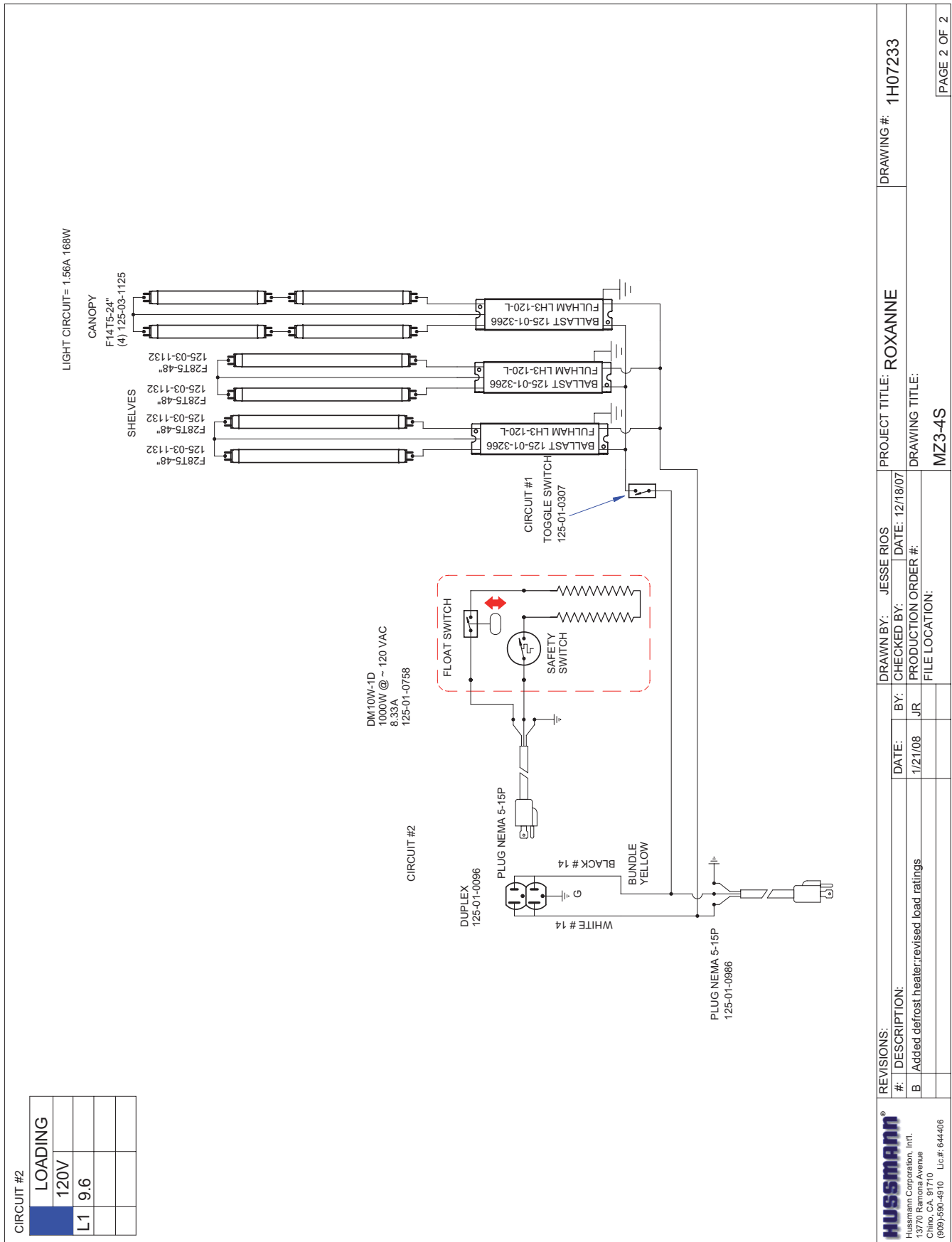
If chlorinated cleaners are used you must rinse, rinse, rinse and wipe dry immediately. The sooner you wipe off standing water, especially when it contains cleaning agents, the better. After wiping the equipment down, allow it to air dry for the oxygen helps maintain the stainless steel's passivity film.

7. Never Use Hydrochloric Acid (Muriatic Acid) on Stainless Steel

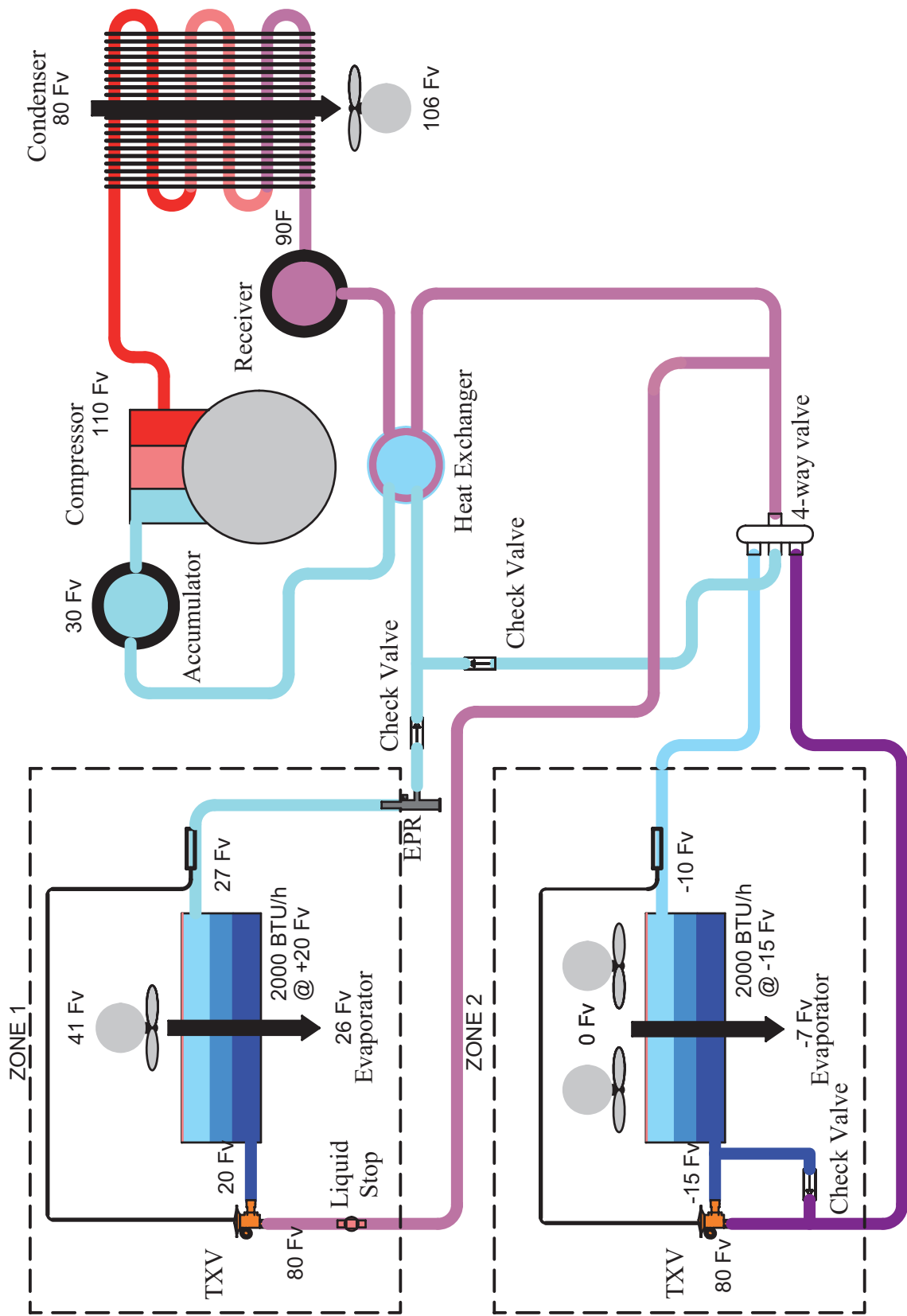
8. Regularly Restore/Passivate Stainless Steel



Wiring Diagram (Cont'd)



Piping Schematic



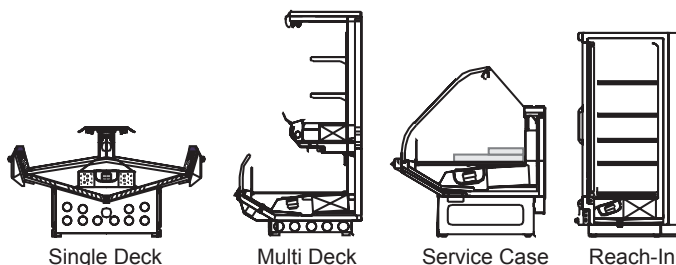
Appendices

Appendix A. - Temperature Guidelines

The refrigerators should be operated according to Hussmann's published engineering specifications for entering air temperatures for specific equipment applications. Table 1 shows the typical temperature of the air entering the food zone one hour before the start of defrost and one hour after defrost for various categories of refrigerators. Refer to Appendix C for Field Evaluation Guidelines.

TABLE 1

<u>Type of Refrigerator</u>	<u>Typical Entering Air Temperature</u>
I. OPEN DISPLAY	
A. Non frozen:	
1) Meat	28°F
2) Dairy/Deli	32°F
3) Produce	
a. Processed	36°F
b. Unprocessed	45°F
B. Frozen	0°F
C. Ice Cream	-5°F
II. CLOSED DISPLAY	
A. Non frozen:	
1) Meat	34°F
2) Dairy/Deli	34°F
3) Produce	
a. Processed	36°F
b. Unprocessed	45°F
B. Frozen	0°F
C. Ice Cream	-5°F



Single Deck

Multi Deck

Service Case

Reach-In

I. Open Display Styles

II. Closed Display Styles

Appendix B. - Application Recommendations

- 1.0 Temperature performance is critical for controlling bacteria growth. Therefore, the following recommendations are included in the standard. They are based on confirmed field experience over many years.
- 1.1 The installer is responsible for following the installation instructions and recommendations provided by Hussmann for the installation of each individual type refrigerator.
- 1.2 Refrigeration piping should be sized according to Hussmann equipment recommendations and installed in accordance with normal refrigeration practices. Refrigeration piping should be insulated according to Hussmann recommendations.

- 1.3 A clogged waste outlet blocks refrigeration. The installer is responsible for the proper installation of the system which dispenses condensate waste through an air gap into the building indirect waste system.
- 1.4 The installer should perform a complete start-up evaluation prior to the loading of food into the refrigerator, which includes such items as:
 - a) Initial temperature performance, Coils should be properly fed with a refrigerant according to Hussmann recommendations.
 - b) Observation of outside influences such as drafts, radiant heating from the ceiling and from lamps. Such influence should be properly corrected or compensated for.
 - c) At the same time, checks should be made of the store dry-bulb and wet-bulb temperatures to ascertain that they are within the limits prescribed by the Hussmann.
 - d) Complete start-up procedures should include checking through a defrost to make certain of its adequate frequency and length without substantially exceeding the actual needs. This should include checking the electrical or refrigerant circuits to make sure that defrosts are correctly programmed for all the refrigerators connected to each refrigeration system.
 - e) Recording instruments should be used to check performance.

Appendix C. - Field Recommendations

Recommendations for field evaluating the performance of retail food refrigerators and hot cases.

- 1.0 The most consistent indicator of display refrigerator performance is the temperature of the air entering the product zone (Refrigerated see Diagram 1, Appendix A). In practical use, the precise determination of return air temperature is extremely difficult. Readings of return air temperatures will be variable and results will be inconsistent. The product temperature alone is not an indicator of refrigerator performance.

NOTE: Public Health will use the temperature of the product in determining if the refrigerator will be allowed to display potentially hazardous food. For the purpose of this evaluation, product temperature above the FDA Food Code 1993 temperature for potentially hazardous food will be the first indication that an evaluation should be performed. It is expected that all refrigerators will keep food at the FDA Food Code 1993 temperature for potentially hazardous food.

Appendices (Cont'd)

- 1.1 The following recommendations are made for the purpose of arriving at easily taken and understood data which, coupled with other observations, may be used to determine whether a display refrigerator is working as intended:
- a) **INSTRUMENT** - A stainless steel stem-type thermometer is recommended and it should have a dial a minimum of 1 inch internal diameter. A test thermometer scaled only in Celsius or dually scaled in Celsius and Fahrenheit shall be accurate to 1°C (1.8°F). Temperature measuring devices that are scaled only in Fahrenheit shall be accurate to 2°F. The thermometer should be checked for proper calibration. (It should read 32°F when the stem is immersed in an ice water bath).
 - b) **LOCATION** - The probe or sensing element of the thermometer should be located in the airstream where the air first enters the display or storage area, and not more than 1 inch away from the surface and in the center of the discharge opening.
 - c) **READING** - It should first be determined that the refrigerator is refrigerating and has operated at least one hour since the end of the last defrost period. The thermometer reading should be made only after it has been allowed to stabilize, i.e., maintain a constant reading.
 - d) **OTHER OBSERVATIONS** - Other observations should be made which may indicate operating problems, such as unsatisfactory product, feel/appearance.
 - e) **CONCLUSIONS** - In the absence of any apparent undesirable conditions, the refrigerator should be judged to be operating properly. If it is determined that such condition is undesirable, i.e., the product is above proper temperature, checks should be made for the following:
 1. Has the refrigerator been loaded with warm product?
 2. Is the product loaded beyond the "Safe Load Line" markers?
 3. Are the return air ducts blocked?
 4. Are the entering air ducts blocked?
 5. Is a dumped display causing turbulent air flow and mixing with room air?
 6. Are spotlights or other high intensity lighting directed onto the product?
 7. Are there unusual draft conditions (from heating /air-conditioning ducts, open doors, etc.)?
 8. Is there exposure to direct sunlight?
 9. Are display signs blocking or diverting airflow?
 10. Are the coils of the refrigerator iced up?
 11. Is the store ambient over 75°F, 55% RH as set forth in ASHRAE Standard 72 and ASHRAE Standard 117?
 12. Are the shelf positions, number, and size other than recommended by Hussmann?
 13. Is there an improper application or control system?
 14. Is the evaporator fan motor/blade inoperative?
 15. Is the defrost time excessive?
 16. Is the defrost termination, thermostat (if used) set too high?
 17. Are the refrigerant controls incorrectly adjusted?
 18. Is the air entering the condenser above design conditions? Are the condenser fins clear of dirt, dust, etc.?
 19. Is there a shortage of refrigerant?
 20. Has the equipment been modified to use replacements for CFC-12, CFC-502 or other refrigerant? If so, have the modifications been made in accordance with the recommendations of Hussmann's equipment? Is the refrigerator charged with the proper refrigerant and lubricant? Does the system use the recommended compressor?

Appendix D. - Recommendations to user

- 1.0 Hussmann should provide instructions and recommendations for proper periodic cleaning. The user will be responsible for such cleaning, including the cleaning of low temperature equipment within the compartment and the cooling coil area(s). Cleaning practices, particularly with respect to proper refrigerator unloading and warm-up, must be in accordance with applicable recommendations.
- 1.1 Cleaning of non frozen food equipment should include a weekly cleaning of the food compartment as a minimum to prevent bacteria growth from accumulating. Actual use and products may dictate more frequent cleaning. Circumstances of use and equipment design must also dictate the frequency of cleaning the display areas. Weekly washing down of the storage compartment is also recommended, especially for equipment subject to drippage of milk or other liquids, or the collection of

Appendices (Cont'd)

vegetable, meat, crumbs, etc., or other debris or litter. Daily cleaning of the external areas surrounding the storage or display compartments with detergent and water will keep the equipment presentable and prevent grime buildup.

1.2 Load levels as defined by Hussmann must be observed.

1.3 The best preservation is achieved by following these rules:

- a) Buy quality products.
- b) Receive perishables from transit equipment at the ideal temperature for the particular product.
- c) Expedite perishables to the store's storage equipment to avoid unnecessary warm-up and prolonged temperature recovery. Food store refrigerators are not food chillers nor can they reclaim quality lost through previous mishandling.
- d) Care must be taken when cross merchandising products to ensure that potentially hazardous vegetable products are not placed in non refrigerated areas.
- e) Display and storage equipment doors should be kept closed during periods of inactivity.
- f) Minimize the transfer time of perishables from storage to display.

- g) Keep meat under refrigeration in meat cutting and processing area except for the few moments it is being handled in processing. When a cut or tray of meat is not to be worked on immediately, the procedure should call for returning it to refrigeration.
- h) Keep tools clean and sanitized. Since mechanical equipment is used for fresh meat processing, all such equipment should be cleaned at least daily and each time a different kind of meat product comes in contact with the tool or equipment.
- i) Make sure that all refrigeration equipment is installed and adjusted in strict accordance with Hussmann's recommendations.
- j) See that all storage and refrigeration equipment is kept in proper working order by routine maintenance.

Service Record

Last service date: By:

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

HUSSmann®/Chino

Additional copies of this publication may be obtained by contacting:

Hussmann® Chino
 13770 Ramona Avenue • Chino, California 91710
 (909) 628-8942 FAX
 (909) 590-4910
 (800) 395-9229

The *MODEL NAME* and *SERIAL NUMBER* is required in order to provide you with the correct parts and information for your particular unit.

They can be found on a small metal plate on the unit.
 Please note them below for future reference.

MODEL:

SERIAL NUMBER: