READ THIS PAGE FIRST

1. **Howard-McCray would like to thank you for purchasing one of our units.**
   PLEASE READ THIS MANUAL CAREFULLY BEFORE PROCEEDING WITH THE INSTALLATION OR OPERATING OF THIS UNIT.

2. **Environment -** These display cabinets are made to operate at 75°F and 55% relative humidity. Temperature and/or humidity greater than the factory recommendations will hinder the performance of this cabinet.

3. **Cabinet Set-Up** – A qualified refrigeration mechanic should set-up this cabinet. Control settings are extremely critical to the proper operation of this unit. These settings are the responsibility of the customer and are not covered by factory warranties. Failure to have this unit installed by a qualified refrigeration mechanic may VOID all the warranties on this unit.

4. **Proper Loading** – Only pre-cooled foods should be placed in this unit.

5. **Location** – Because of the open area, this cabinet must not be located in the direct rays of the sun, near radiant heat sources, or in an area where it will be subjected to drafts or air disturbances of any type.

6. **Never spray water into the cabinet.** This will cause damage to the seals and cause the evaporator drain system to overflow.

7. **If additional assistance is required, please call us at 1-800-344-8222.**

READ THIS PAGE FIRST

90-300 35E Open Series

Howard-McCray **A Division of HMC Enterprises, LLC.**
831 East Cayuga Street • Philadelphia, PA 19124 USA • (215) 464-6800 • (800) 344-8222
Fax (215) 969-4890 • E-Mail: Parts@howardmccray.com

Howard-McCray

Installation and Operating Instructions For

35E Series
Open Merchandisers

Important Instructions

Please Read carefully
Before attempting to
install or operate the cabinet

Keep this Book for Future Reference

90-300

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Engineering Specifications – SC-OD/M/P35E Models

Model No.	Cabinet Dimensions D x H x L*	Compressor HP BTU @ +20F	Electrical Voltage	Max. Amps
SELF-CONTAINED				
SC-OD/M/P35E-3L	34.5 x 60 x 39	1/2	115/60Hz/1PH	14.0
SC-OD/M/P35E-4L	34.5 x 60 x 51	1/2	115/60Hz/1PH	15.0
SC-OD/M/P35E-5L	34.5 x 60 x 63	3/4	115/208-230/60Hz/1PH	16.0
SC-OD/M/P35E-6L	34.5 x 60 x 75	3/4	115/208-230/60Hz/1PH	16.0
SC-OD/M/P35E-3	34.5 x 78 x 39	1/2	115/60Hz/1PH	16.0
SC-OD/M/P35E-4	34.5 x 78 x 51	3/4	115/208-230/60Hz/1PH	13.0
SC-OD/M/P35E-5	34.5 x 78 x 63	1	115/208-230/60Hz/1PH	16.0
SC-OD/M/P35E-6	34.5 x 78 x 75	1	115/208-230/60Hz/1PH	16.0
SC-OD/M/P35E-8	34.5 x 78 x 96	1.5	115/208-230/60Hz/1PH	16.0
REMOTE				
R-OD/M/P35E-3L	34.5 x 60 x 39	3,550 @ +20F	115/60Hz/1PH	2.0
R-OD/M/P35E-4L	34.5 x 60 x 51	4,750 @ +20F	115/60Hz/1PH	3.0
R-OD/M/P35E-5L	34.5 x 60 x 63	5,920 @ +20F	115/60Hz/1PH	4.0
R-OD/M/P35E-6L	34.5 x 60 x 75	7,100 @ +20F	115/60Hz/1PH	4.0
R-OD/M/P35E-3	34.5 x 78 x 39	4,900 @ +20F	115/60Hz/1PH	2.0
R-OD/M/P35E-4	34.5 x 78 x 51	6,550 @ +20F	115/60Hz/1PH	3.0
R-OD/M/P35E-5	34.5 x 78 x 63	8,200 @ +20F	115/60Hz/1PH	4.0
R-OD/M/P35E-6	34.5 x 78 x 75	9,400 @ +20F	115/60Hz/1PH	4.0

* - Includes End Panels

These cabinets are designed to operate in an air conditioned location ONLY. Temperature not to exceed 75ºF and a relative humidity not to exceed 55%.

The following instructions are for the benefit of the new owner and the installing contractor. They should be studied carefully before attempting to install or operate the cabinet. This manual is the property of the owner and should remain in the owner's possession.

General Specifications and Features

Interior

Aluminum interior surface, aluminum shelving, aluminum interior end panels and heavy gauge galvanized coil housing. The interior has a special finish process that prevents rusting.

Exterior

White or Black acrylic exterior over durable aluminum. Easily cleanable. The standard is White front panel, canopy and ends.

Refrigeration

Refrigeration is proven, Howard-McCray KOLDFLO. KOLDFLO is the properly engineered control of temperature, humidity and air flow throughout, resulting in the product being constantly enveloped by cold air.

Expansion Valve

The expansion valve is located at the left end of the cabinet and is readily accessible. There is no refrigeration tubing buried in the insulation.

Drain

The drain is a sink type with 1" Male NPT threads. A 1" PVC adapter, Drain Trap, & elbow are supplied with each cabinet.

Color Band

Color band available in a variety of colors. Standard is White or Black.

Convenient Shopping

Product is right in front of customer. Mass vertical display invites maximum selection. All adjustable shelves have a price tag strip taking 1 1/4 price tags, for pricing or calling attention to specials.

Lighting

Fluorescent lighting is standard under the canopy. 35E models utilize T8 lamps. Lamp ballast is located in the canopy raceway, out of the refrigerated area.

Shelves

Shelves are adjustable on 1" centers to fit the product requirements. May be used in a flat or 15° sloped position. Front product stop available.

Notes: This cabinet is designed for AIR CONDITIONED LOCATIONS ONLY, not to exceed 75ºF and 55% RH.

Receiving and Inspection Procedure

1) The cabinet has been carefully operation tested and inspected before crating and has been determined to be in good operating condition before leaving the factory.

2) Upon arrival of the cabinet, the crate should be inspected thoroughly for any damage that may have occurred in transit. In the event that any damage is discovered, it should be noted on the delivery ticket or Bill of Lading and signed to that effect. An immediate claim should then be filed against the carrier giving them the description and amount of damage.

3) After the crate has been removed, the cabinet should be examined carefully for any damage. If there is any concealed damage, the carrier should be notified immediately. Make a request in writing with the carrier for an inspection within 15 days, and retain all packaging. The carrier will supply the inspection report and the required claim forms.

4) Our Company can assume no responsibility for filing freight claims as the cabinet was in good condition on a clear Bill of Lading, F.O.B. Philadelphia. However, the factory will assist, if required.

5) Shortages - Check your shipment for any possible shortages of material. If one exists and is found to be responsibility of Howard-McCray, notify the factory. Howard-McCray will acknowledge shortages within ten days from receipt of acknowledgement. If a shortage exists and it involves the carrier, notify the carrier immediately and request an inspection.

Installation

As with all open vertical display refrigerated cabinets, there are several very important requirements that must be complied with for proper operation. They are as follows:

1. This line of display cabinets are designed to operate in a location that is FULLY AIR CONDITIONED. Ambient temperatures must not exceed 75°F and the relative humidity must not exceed 55%. In addition, this cabinet should not be located in an area where it will be subjected to drafts or air disturbances of any type. Locations where the cabinet may be subjected to radiant heat from spot or flood lamps, sun rays or heat from suspended gas heating fixtures should be avoided.

2. After locating the cabinet, it must be leveled (using shims) from front to back as well as end-to-end. This will facilitate proper refrigeration at the evaporator and proper dissipation of the defrost water.

NEVER use a pry bar or jeep prongs on the bottom of end assemblies.

3. The minimum clearance allowed for the rear of the cabinet is 6 inches and the sides can have no clearance if need be.

4. All wiring must be installed by a competent electrician and conform to local codes. The incoming voltage must be maintained to within 5% of the voltage shown on the cabinet nameplate. The electrical connection are provided with a NEMA rated cord and plug, located at the rear of the cabinet (see applicable Plan View drawing).

Electrical Service Connection

The electrical supply must connect to the appropriate receptacle corresponding to the NEMA Rated Cord and Plug provided on the cabinet and is located at the rear of the cabinet (see applicable Plan View drawing for exact location). The incoming voltage must be maintained to within 5% of the voltage shown on the nameplate. Howard-McCray will not accept responsibility for the performance of the cabinet or malfunction of any component due to a lower voltage supply than that indicated on the serial rating plate. Use separate electrical supply lines connected to a fuse block or circuit breaker of proper capacity.

Drain Installation

Properly installed drains are extremely important in ensuring satisfactory cabinet operation, and protection from product loss. The drains on these models must be pitched down a minimum of 1/4" per foot away from the cabinet. Never reduce the drain line size. Maintain the 1" pipe size for the entire length. Never double trap drain lines. If two or more cabinets are joined together, each must be trapped and their outlets connected to a common drain. Be sure that the drain lines are installed to comply with local codes. A 1" PVC drain trap is supplied with each Howard-McCray cabinet.

NEVER connect drain lines before the drain trap from cabinet to cabinet on multiple hook-ups.

Sanitation

Sanitation code compliance is necessary in many localities. It is recommended that the cabinet be sealed to the floor. Use a NSF Approved sealant between the floor and the perimeter of the cabinet base.

CHECK-LIST FOR USE BEFORE START-UP

The following items should be checked when applicable to these cabinets:

Make sure that the gaskets at the joints of all cabinets make a proper seal between the cabinets.

Make sure that all fan motors are properly plugged in.

Make sure that all fan blades are tight on all fan motor shafts.

Make sure that the expansion valve sensing bulb is properly positioned and is tightly secured.

Make sure that all expansion valve flare nuts are tight.

Make sure that tubing entrance holes both inside and outside the cabinet are properly sealed.

Make sure that all SEALANT MATERIAL that was removed from position in the cabinet during installation and piping is correctly replaced and seals in a satisfactory manner.

Make sure that all the loose debris in the cabinet that might plug the drain is removed.

Tighten the attaching bolts on all end assemblies after the cabinets are installed. The ends are factory installed and the attaching bolts might loosen in shipment.

Make sure the interior bottom pans are properly positioned.

Make sure that external drain traps will not become frozen by contact with suction lines.

Start-Up

1. Electrically energize the cabinet. Check the supply voltage, must be within +/- 5%. Check the evaporator fan motors to ensure all are operating and rotating in the correct direction.

2. Electrically energize the refrigeration system. Check the supply voltage, must be within +/- 5%. Check the Thermostatic Expansion Valve Setting (as outlined in the Thermostatic Expansion Valve Setting section below), and adjust if necessary.

3. Check the Electronic Temperature Control is set to Cut-Out at 32^{0}F and will Cut-In at 38^{0}F

4. The Defrost Period is controlled by the Electronic Digital Controller and is set to Defrost Every 4 Hours. Defrost is terminated by temperature and will terminate at 50F.

Thermostatic Expansion Valve Setting

The expansion valve is located at the left end of the evaporator. The valve must be adjusted so that the coil is fully flooded, this will result in a superheat setting of approximately 5^{0}F at the expansion valve sensing bulb.

Temperature Control
(Self Contained Models)

Temperature in the cabinet is controlled with a Digital Electronic Controller located in the machine compartment. Control settings are 32^{0}F cut-out and 38^{0}F cut-in. This should result in air temperatures of 32^{0}F to 38^{0}F at the top discharge jet.

It must be remembered that the cut-in setting must be high enough to permit the coil to completely clear itself of frost and ice during the off cycle. It is strongly recommended that all cabinets be fully loaded or carry a simulated load for at least 24 hours before any control adjustments are made.

ELECTRONIC DIGITAL CONTROLLER TEMPERATURE & DEFROST

This cooler employs an Electronic Controller which controls the cabinets' temperature and defrosts period.

Temperature Controller

The control is programmed to cycle based on discharge air temperature between 30^{0}F to 36^{0}F.at. The sensor for the control is located in Top Discharge Jet on the left side attached to the flue ceiling. The controller is located in the machine compartment behind the front grille on the left side. The display on the controller is indicating the temperature at the Top Discharge Jet in the flue.

Warning

This control has been calibrated and set at the factory to maintain the proper temperature. Before attempting to change this setting, the cabinet should be put into operation for a minimum of 16 hours.

If needed to change the setting of the controller follow these steps:

1. Push the [SET] key on the controller for more than 2 seconds to change Set point value.
2. The value of the set point will be displayed and the ^{0}F LED starts blinking.
3. To change the set value, push the [UP] or [DOWN] arrow to raise or lower set point.
4. To confirm the new set point value, push the [SET].

Once the control has been reset, allow the cabinet to run for 4 hours to stabilize.

Defrost Controller

The cabinet goes into defrost every 4 hours. From the initial start up. If you want to set the defrost period to start during closing hours simply push the [MELTING SNOW FLAKE] key for more than 2 seconds and a manual defrost will start. Now the next defrost will be 4 hours from that point. Defrost will terminate based on the evaporator coil temperature. The sensor to terminate defrost period is located in the evaporator coil on the left side, rear of the cabinet. When the coil temperature reaches 50^{0}F the defrost period will terminate. Remember the Defrost Termination Temperature setting must be high enough to allow the coil to completely clear itself of frost and ice during the off cycle.

Loading Procedures

When loading the cabinet, product should be pre-cooled. Do not load cabinet beyond shelf size limits; this will disturb the air curtain designed to keep the product cool. Do not allow any of the product to obstruct the return air grille, this will have a negative effect on the cabinet's cooling capability.

DO NOT LOAD BEYOND THE "SAFE LOAD LINE".

Maintenance Suggestions

An attractive operation can be a very profitable. Dirty and poorly merchandised cabinets are offensive to most discriminating customers, so a clean attractive cabinet will pay dividends. Weekly or more often, if necessary, the display area should be cleaned and attractively stocked.

Important Notice

1. ALWAYS disconnect the power to the cabinet before attempting to clean it with any liquid.

2. NEVER under any circumstances should a water hose be sprayed into this cabinet.

3. NEVER use ammonia or solutions with ammonia on this cabinet.

4. The use of abrasive cleaning materials on this cabinet will VOID all cabinet warranties.

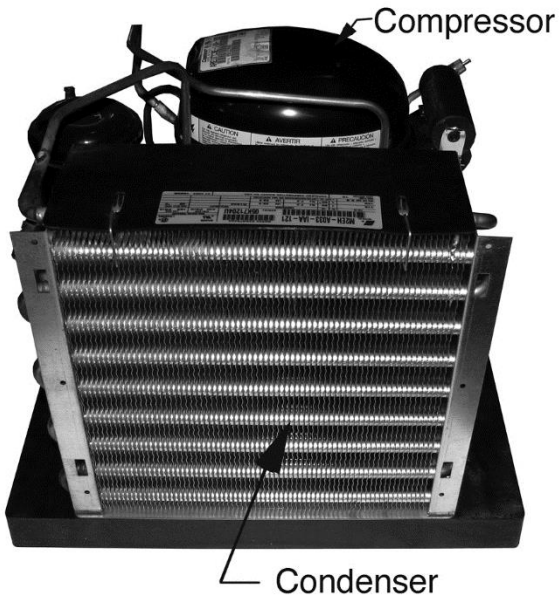
The Cleaning Process

1. Turn the power off from the source.
2. Remove all merchandise from the cabinet and store in a refrigerated area. Then remove all shelves and floor pans.
3. This cabinet can be hand cleaned internally with a mild soap detergent and hot water. Diluted non-chlorine bleach and hot water is a good sanitizer. The cleaning cloth should be just wet enough to get a reasonable cleaning action but should not be wet to a point where it will emit a large amount of water which will flow through the drain system causing it to overflow.
4. After the cabinet is cleaned, any remaining water in the cabinet can be soaked up with the use of a sponge and dried out with a dry cloth completely before resuming operations.
5. Make sure that the internal drain is open and remove all scraps, paper, and lint.
6. All external panels may be cleaned with a damp cloth, and then they may be polished with a dry lint free cloth. This will preserve the luster of the cabinet.

Cleaning the Condenser

It is crucial that the condenser face be cleaned weekly. Due to the condensing unit's location near the floor, the condenser will quickly accumulate any dust or dirt from the location. A dirty condenser will diminish the cooling ability of the system, thus resulting in longer operational times and warmer product temperatures.

The condenser face can be cleaned with the use of a hose/brush attachment on a vacuum cleaner. Take care to avoid bending the condenser fins, It is of vital importance that the condenser gets the proper amount of air through the fins and around the tubes, therefore all dirt, lint, and dust needs to be removed



Cleaning the Machine Compartment

At intervals of four to six months, or before if necessary, it is recommended that the Machine Compartment be cleaned out. It should be accomplished in the following order:

1. Shut down the cabinet electrically.

2. Remove the front grille. Using a hose/brush attachment on a vacuum cleaner, all dirt, store lint and dust can be removed from the machine compartment.

3. If any traces of oil are found contact your Refrigeration Service person as soon as possible.

4. Before reloading the cabinet with merchandise, allow an hour for refrigeration pull-down. Make sure that all merchandise is in a good salable and refrigerated condition when re-loading the cabinet.

Trouble Chart

A. Compressor will not start - no hum

Possible Causes:
1. Disconnect switch open
2. Blown fuse
3. Defective wiring
4. Overload protector tripped
5. Open control contacts (control may be defective, or unit location may be too cold)
6. Defective overload protector

B. Compressor will not start - hums but cycles on overload

Possible Causes:
1. Low voltage
2. Unit wired incorrectly
3. Starting capacitor defective
4. Starting relay contact not closing
5. Compressor motor defective
6. High head pressure
7. Bearings on pistons tight - low oil charge

C. Compressor starts, but starting winding remains in circuit

Possible Causes:
1. Low voltage
2. Unit wired incorrectly
3. Starting capacitor weak
4. Running capacitor defective
5. Starting relay defective
6. Compressor motor defective
7. High head pressure

D. Compressor starts and runs but cycles on overload

Possible Causes:
1. Low voltage
2. Running capacitor defective
3. Overload protector defective
4. High head pressure
5. Fan motor, pump, etc., wired to wrong side of overload protector
6. Compressor motor partially grounded
7. Unbalanced line voltage (3 phase models)
8. Bearing or pistons tight - low oil charge

E. Compressor short cycles

Possible Causes:
1. Control differential set too close
2. Refrigerant undercharge
3. Refrigerant overcharge
4. Discharge valve leaking
5. Expansion valve leaking
6. Cutting out on high pressure control
7. Cutting out on overload protector because of tight bearings, stuck piston, high head pressure or restricted air cooled condenser

F. Compressor tries to start when thermostat closes but cuts out on overload, starts after several attempts

Possible Causes:
1. Low voltage
2. Thermostat differential too close (lower than 10°)
3. Thermostat bulb not in tight contact with evaporator

G. Running cycle too long, or unit operated continuously

Possible Causes:
1. Insufficient refrigerant charge
2. Dirty or restricted condenser
3. Unit: location too hot
4. Control contacts stuck
5. Air or other non-condensable gases in system
6. Expansion valve plugged or defective
7. Cabinet doors left open too long
8. Insufficient, defective or water - logged insulation
9. Evaporator coil plugged with ice or dirt

H. Evaporator temperature too high

Possible Causes:
1. Shortage of refrigerant, or leak on system
2. Restricted capillary tube, strainer or drier
3. Control setting too high
4. Expansion valve restricted
5. Expansion valve too small
6. Evaporator coil plugged with ice or dirt
7. Evaporator oil logged

I. Noisy Unit

Possible Causes:
1. Compressor oil charge low
2. Fan blade bent causing vibration
3. Fan motor bearings loose or worn
4. Tube rattle
5. Loose parts on condensing unit

J. Liquid line hot

Possible Causes:
1. Unit undercharged or leak in system
2. Expansion valve opened too far

K. Liquid line frosted

Possible Causes:
1. Restriction in drier
2. Shut off valve on receiver either partially closed or restricted

L. Suction line sweating or frosted

Possible Causes:
1. Expansion valve open too wide
2. Evaporator iced up
3. Evaporator fan motors not operating

Parts List

Refrigeration Components

Part #	Description	Usage
1SH6521	Evaporator Fan Assembly	ALL Models
21-376-XR40CX-A	Electronic Digital Controller	ALL SC- Models
51-240ERVE03C	Expansion Valve (1/3 Ton R448A)	ALL 3' Models
51-240-ERVE05C	Expansion Valve (1/2) Ton 448A	ALL 4', 5', 6' Models
51-240ERVE15C	Expansion Valve (1.5 Ton R448A)	ALL 8' Models

LED Lighting Components

Part #	Description	Usage
21-387-PS035	35w 24v LED driver	3' Models
21-387-PS060	60w 24v LED driver	4' & 5' Models
21-387-PS100	100w 24v LED driver	6' & 8' Models
21-387-L3	3' Canopy LED Light	ALL 3' Models
21-387-L4	4' Canopy LED Light	ALL 4' Models
21-387-L5	5' Canopy LED Light	ALL 5' Models
21-387-L6	6' Canopy LED Light	ALL 6' Models
21-387-L8	8' Canopy LED Light	ALL 8' Models

Shelf Light Components

Part #	Description	Usage
21-387-L3	3' Shelf LED Light	ALL 3' & 6' Models
21-387-L4	4' Shelf LED Light	ALL 4' & 8' Models
21-387-L5	5' Shelf LED Light	ALL 5' Models

Grille Assemblies

Part #	Description	Usage
3WMH7763	Front Grille	ALL 3' Models
4WMH7763	Front Grille	ALL 4' Models
5WMH7763	Front Grille	ALL 5' Models
6WMH7763	Front Grille	ALL 6' Models
8WMH7763	Front Grille	ALL 8' Models

NOTE: Additional parts not included in this list are available from the factory. Contact the Parts & Service department at the phone numbers at the bottom of the page.

Keep this Page for Your Records:

Dear Customer:

We wish to congratulate you on your judgment. We are very proud to have been privileged to serve you with Howard-McCray equipment to fill your requirements.

Howard-McCray equipment is the product of a company dedicated in producing products of quality, incorporating progressive features on a timely basis and backed by a warranty which provides confidence.

Should you have any questions regarding features, operation, or service, call the Howard-McCray Assistance Center toll free. (800-344-8222)

Thank you,

Howard-McCray

Customer Installation Record:

Cabinet Model Number _____

Serial Number _____

Condensing Unit Model Number and Horsepower _____

Type of Control _____

Refrigerant _____

Thermostat _____

Other _____

Defrost Period _____

Date of Start-Up _____

Other Remarks _____

_____

Installing Contractor

Address _____

Phone Number _____

NOTES:

Limited Warranty Guidelines

Issued 01/01/2025

The warranty does not cover product loss or consequential damages.
TO ACTIVATE THE WARRANTY, THE FOLLOWING MUST BE COMPLETE:

1. Payment in full to Howard McCray.
2. Installed by a Qualified Refrigeration Company (1)

Warranty includes, but is not limited to, Refrigerators, Freezers and display cases sold in the Continental United States to the original Dealer and the respective customer. The warranty must be activated before any claims can be processed. This warranty cannot be transferred under any circumstances. Howard McCray products are made for commercial use only, any warranty claim for residential use will be denied and void immediately.

(1) A Qualified Refrigeration Company is defined as a fully licensed and insured refrigeration company that handles food service equipment.

Warranty for Self Contained Equipment:

Compressor - 1 Year from Date of Installation or 15 Months from Date of Shipment, whichever comes first.
Parts - 1 Year from Date of Installation or 15 Months from Date of Shipment, whichever comes first.
Labor - 90 Calendar days from Date of Installation or 120 days from Date of Shipment, whichever comes first.

Extended Warranty for Self Contained Equipment

Compressor - 4 additional years - 5 years from date of installation or 5 years 3 months from Date of Shipment - whichever comes first.
Compressor age will be prorated according to **Schedule A. - COMPRESSORS**

Warranty for Remote Cases

The above Labor & Parts warranty apply to Remote units, for items that are installed by the factory (Howard McCray). Expansion valves and related components involved in the installation of these units is not covered nor any part affected by the installation. Refrigerant loss is not covered.

FAILURE TO CLEAN THE CONDENSER WEEKLY WILL VOID THE FACTORY WARRANTY

All Warranty Claims must include the following or they will not be processed. The required is:

1. Service Authorization Number (SA#) – Provided by Howard McCray
2. Date of service
3. Model number of unit being serviced
4. Serial number of unit being serviced
5. Copy of wholesaler receipt for all parts replaced including compressor.

Please fill out Request for Warranty Reimbursement Form – **Schedule D**

The Recommended Service Allowances by HMC is listed on **Schedule B**

ITEMS NOT COVERED BY WARRANTY

Product Loss

Expansion Valves on Remote units

Light bulbs of any type except LED – **See Schedule C**

Adjustments of any type including thermostats, time clocks, expansion valves, hinges or controls - electronic or manual

Broken or cracked glass

Improper installation

Electrical surges which cause components to burn out

Damages due to spraying water into the unit

Claims not submitted within 60 days of date of service

Equipment that has experienced other stress or hazards such as floods, fire or other acts of nature.

One call per unit per problem

All Howard McCray equipment is intended for indoor use with ambient temperatures not exceeding 75 degrees and 55% relative humidity

SCHEDULE A – COMPRESSOR REPLACEMENTS

FAILURE TO CLEAN THE CONDENSOR COIL ON A WEEKLY BASIS WILL VOID THE WARRANTY

First 15 months the compressor must be exchanged at the local refrigeration wholesaler.

The Factory reserves the right to supply the replacement compressor if the compressor is older than 16 months.

Months 16-36 - 100% reimbursement from factory provided the factory is provided the Compressor plate (photo will be permitted) and copy of actual invoice from the local refrigeration wholesaler.

Months 37-48 - 75% reimbursement from factory provided the factory is provided the compressor plate (photo will be permitted) and copy of actual invoice from the local refrigeration wholesaler.

Months 49-60 - 50% reimbursement from factory provided the factory is provided the compressor plate (photo will be permitted) and a copy of the actual invoice from the local refrigeration wholesaler.

FAILURE TO CLEAN THE CONDENSOR COIL ON A WEEKLY BASIS WILL VOID THE WARRANTY

SCHEDULE B – LABOR RATES

Item	Allowable Labor hours	Part must be returned
REPAIR MATERIAL/TOOLS NOT EXCEED $200.00		
Compressor Replacement	4.0	Exchange
Compressor components	1.0	No
Replace Evaporator Coil	4.0	Yes
Replace Expansion valve	2.5	Yes
Replace Condenser Fan Motor	2.0	Exchange
Diagnose & repair refrigerant leak, replace sight glass & drier	2.5	No
Diagnose & repair door gasket	1.0	Yes
Diagnose & replace door	1.0	Yes
Electrical Components		
GFCI Light switch	1.0	No
LED Driver	1.0	Yes
Electronic controller	2.0	Yes
Electronic controller sensor	1.0	No
Low pressure switch	2.5	No
Condensate pan	1.0	Yes

Sight glass reimbursement total = $40.00
Filter drier reimbursement total = $40.00

Travel time - Not to exceed 1 hours max charge is $ 125.00
Labor hours - Overtime is not permitted
Reclaim fee - Maximum allowance is $ 50.00 Allowances

SCHEDULE C - PARTS WARRANTY

Some Parts are covered by 1 year Original factory warranty. These parts will be replaced by the original factory supplying these parts or a designated wholesaler as listed.

Hot Wells are covered by APW and all claims must contain APW serial number

Outdoor Condensing units are covered by the refrigeration company supplying the condensing units. These claims must include the condensing unit serial number.

Compressor Components including starter components, relays, condensing fan motors and other related components must be exchanged at the local refrigeration wholesaler within 12 months of date of service or 15 months from factory shipment.

Refrigerant – only the factory specified charge amount will be accepted. The charges are listed on the serial plate. The current Refrigerant rate is $50.00 per LB

Electronics Controls must be returned to factory for reimbursement.

LED lights & drivers must be returned to factory for reimbursement.

It is the responsibility of the repairing refrigeration company to return these parts to HMC in order for the claim to be processed. The part must be MARKED with:
Service Authorization # (SA#)
Model#
Serial #

All reimbursement requests for parts must include wholesaler invoice copy.

Request for Warranty Reimbursement – Schedule D

Howard/McCray
HMC Enterprises LLC
831 E. Cayuga St
Philadelphia, PA 19124

For questions related to Warranty & Service
for Technical Service
TSC@howardmccray.com

Today's Date _____Date of Service _____

Service Authorization Number (SA#) _____

Model Number _____

Serial Number _____

Service Company _____

Address _____

City _____ State/Province _____

Zip Code _____

Contact Phone Number _____

Email Address _____

Service Performed: _____
_____

Labor Rate per hour _____
Labor Hours to perform service_____
Travel Time _____

Checklist

Copy of refrigeration wholesaler invoices for all parts used _____

Original Service invoice from your company _____

Copy or Photo of Compressor Tag _____

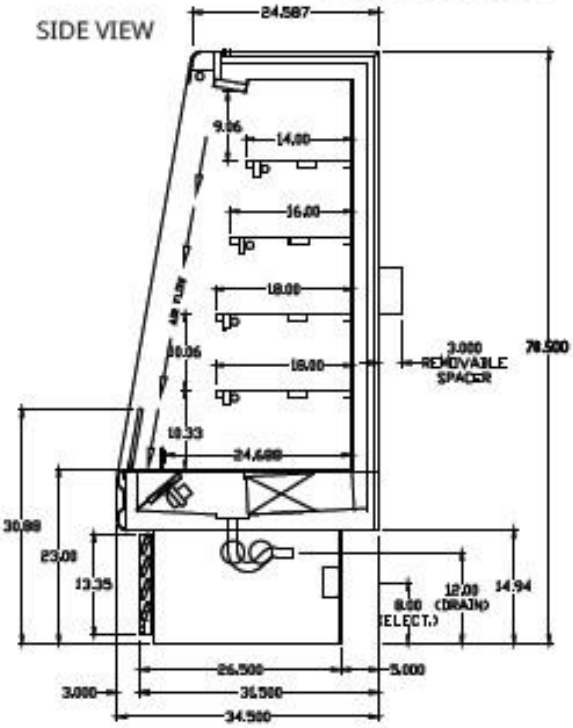
Service Authorization on all documents _____

Name & Contact Number _____

OPEN MERCHANDISERS
35E SERIES – SLOPED – 78.5"H – ENDLESS DESIGN - DAIRY

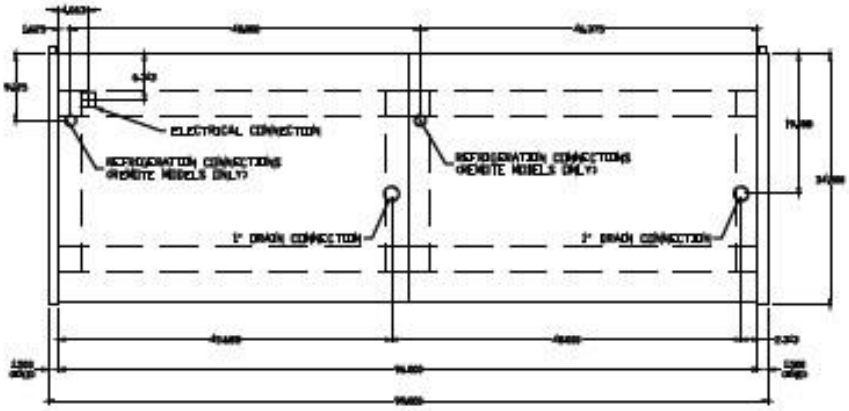
DRAWINGS • SIDE VIEW • PLAN VIEW

SIDE VIEW

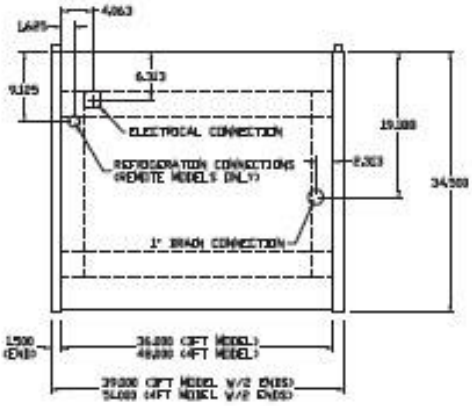


FLOOR PLAN VIEWS

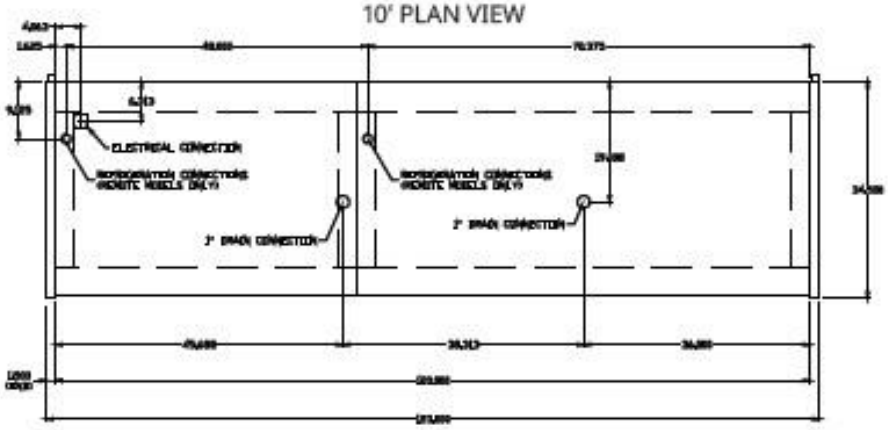
8' PLAN VIEW



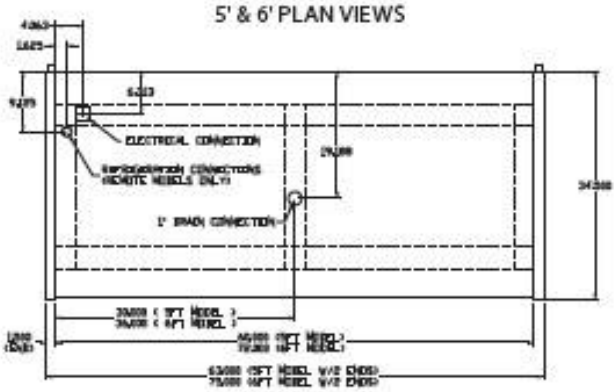
3' & 4' PLAN VIEWS



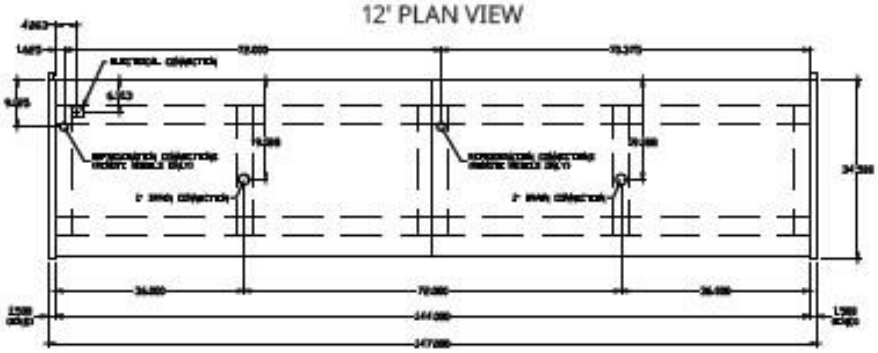
10' PLAN VIEW



5' & 6' PLAN VIEWS



12' PLAN VIEW



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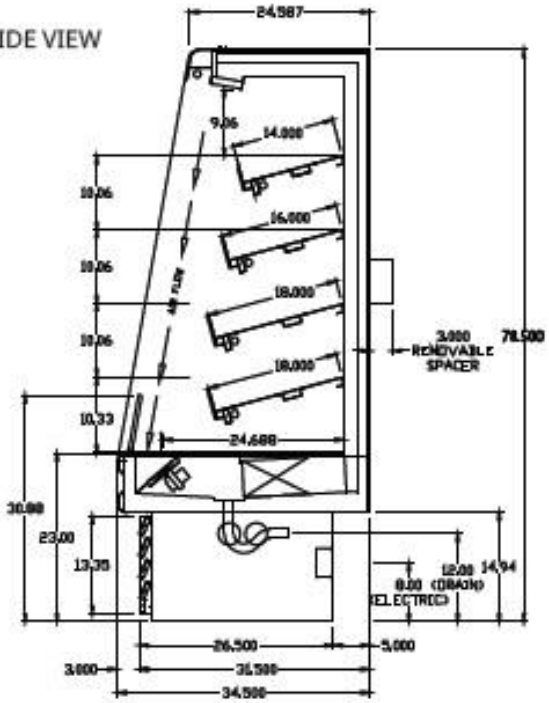
OPEN MERCHANDISERS
35E SERIES – SLOPED – 78.5"H – ENDLESS DESIGN - MEAT

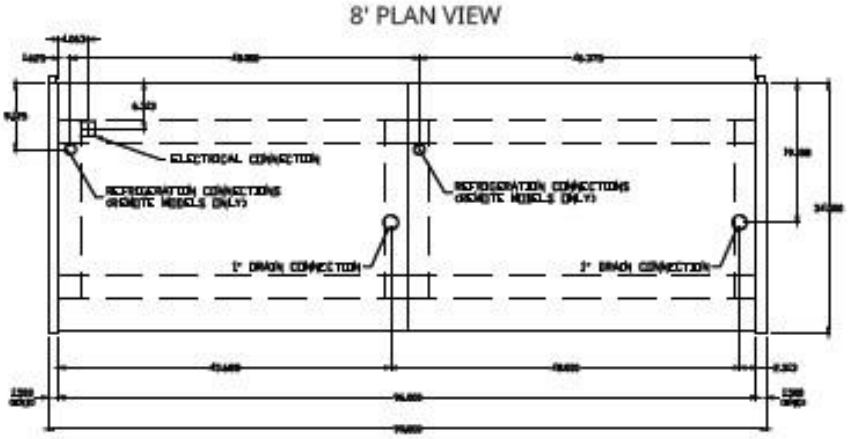
DRAWINGS • SIDE VIEW • PLAN VIEW

SIDE VIEW



FLOOR PLAN VIEWS

8' PLAN VIEW



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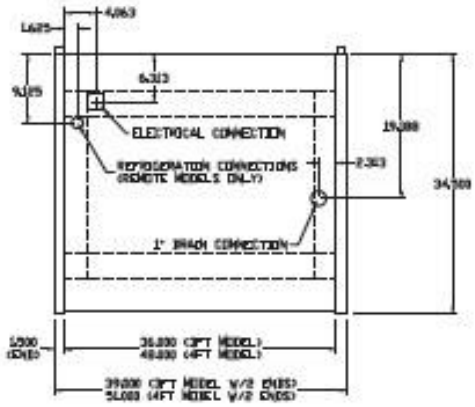
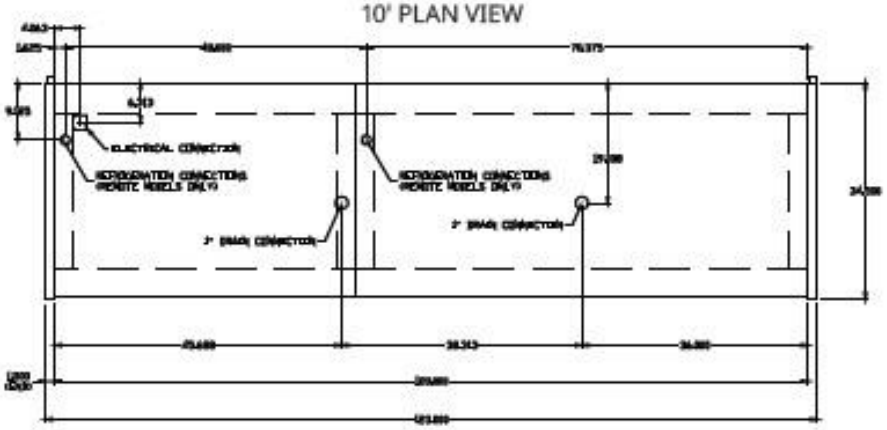


10' PLAN VIEW



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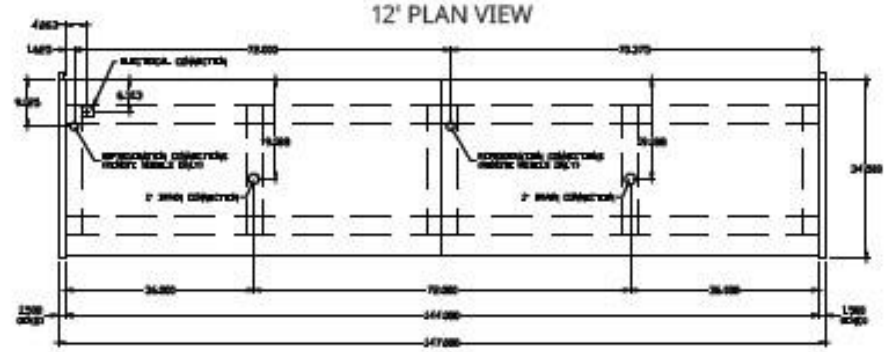

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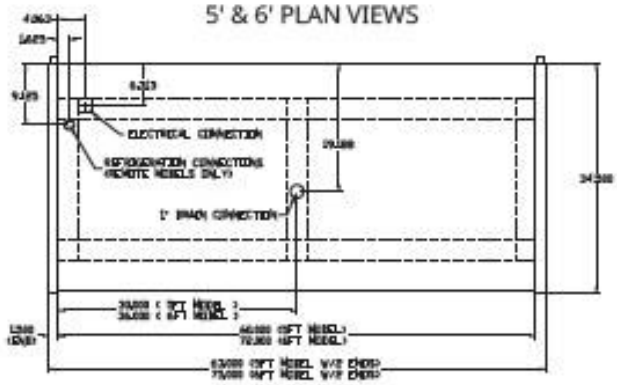

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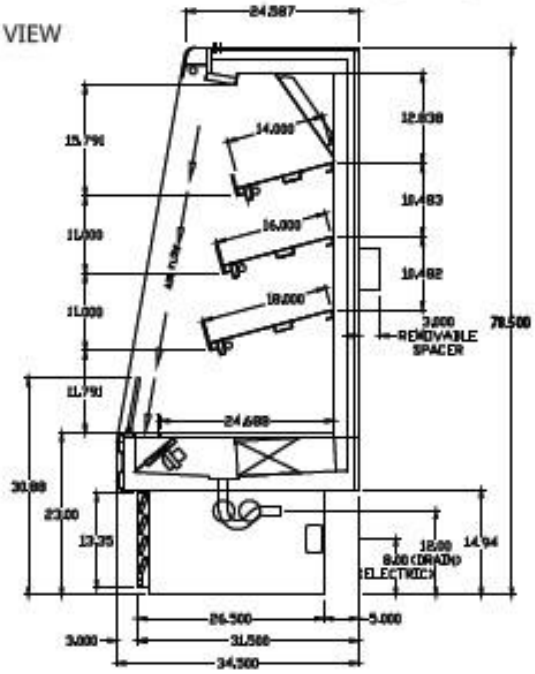
OPEN MERCHANDISERS
35E SERIES – 78.5"H - ENDLESS DESIGN - PRODUCE

DRAWINGS • SIDE VIEW • PLAN VIEWVIEW

SIDE VIEW



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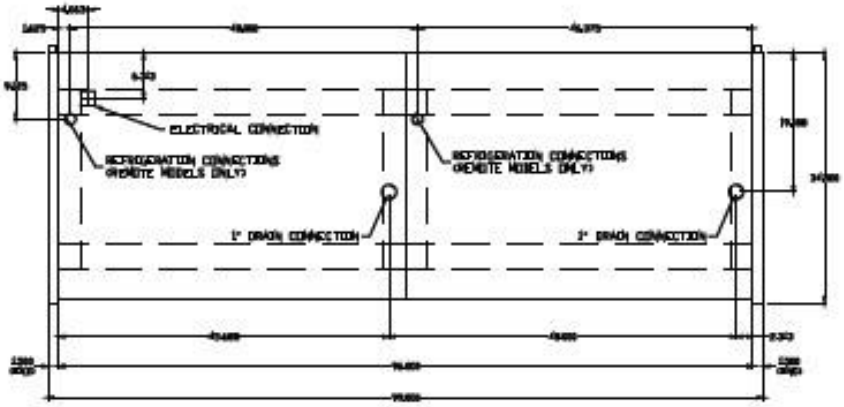

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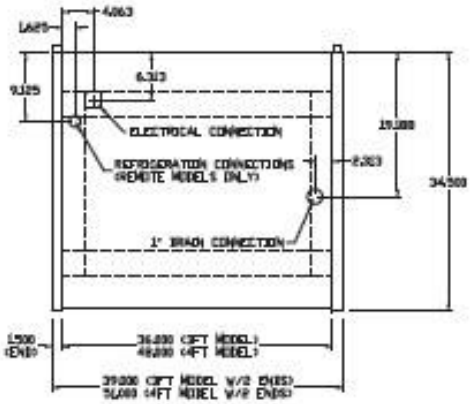

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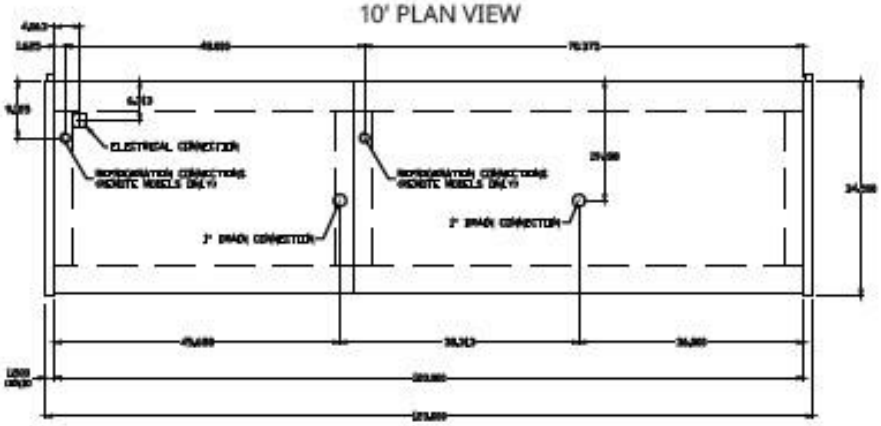

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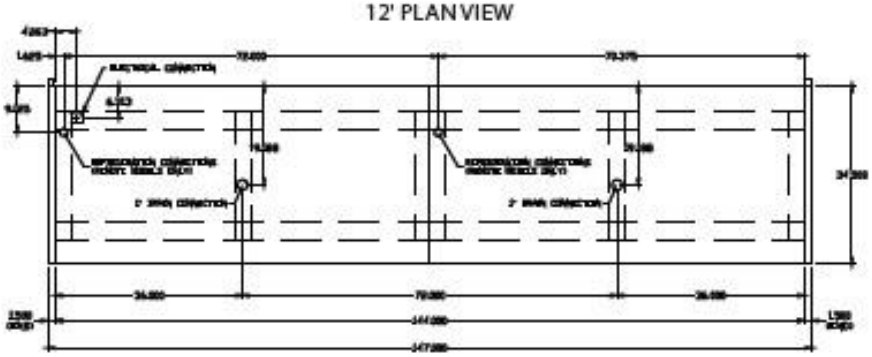

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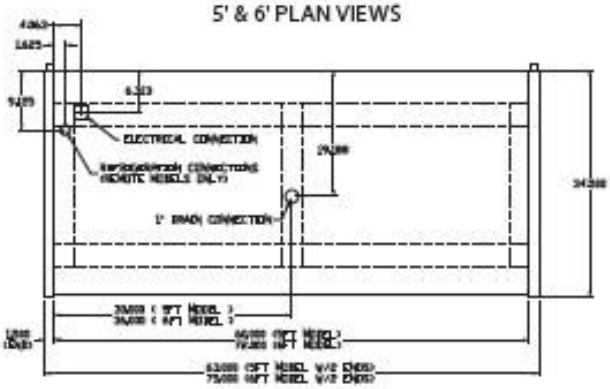

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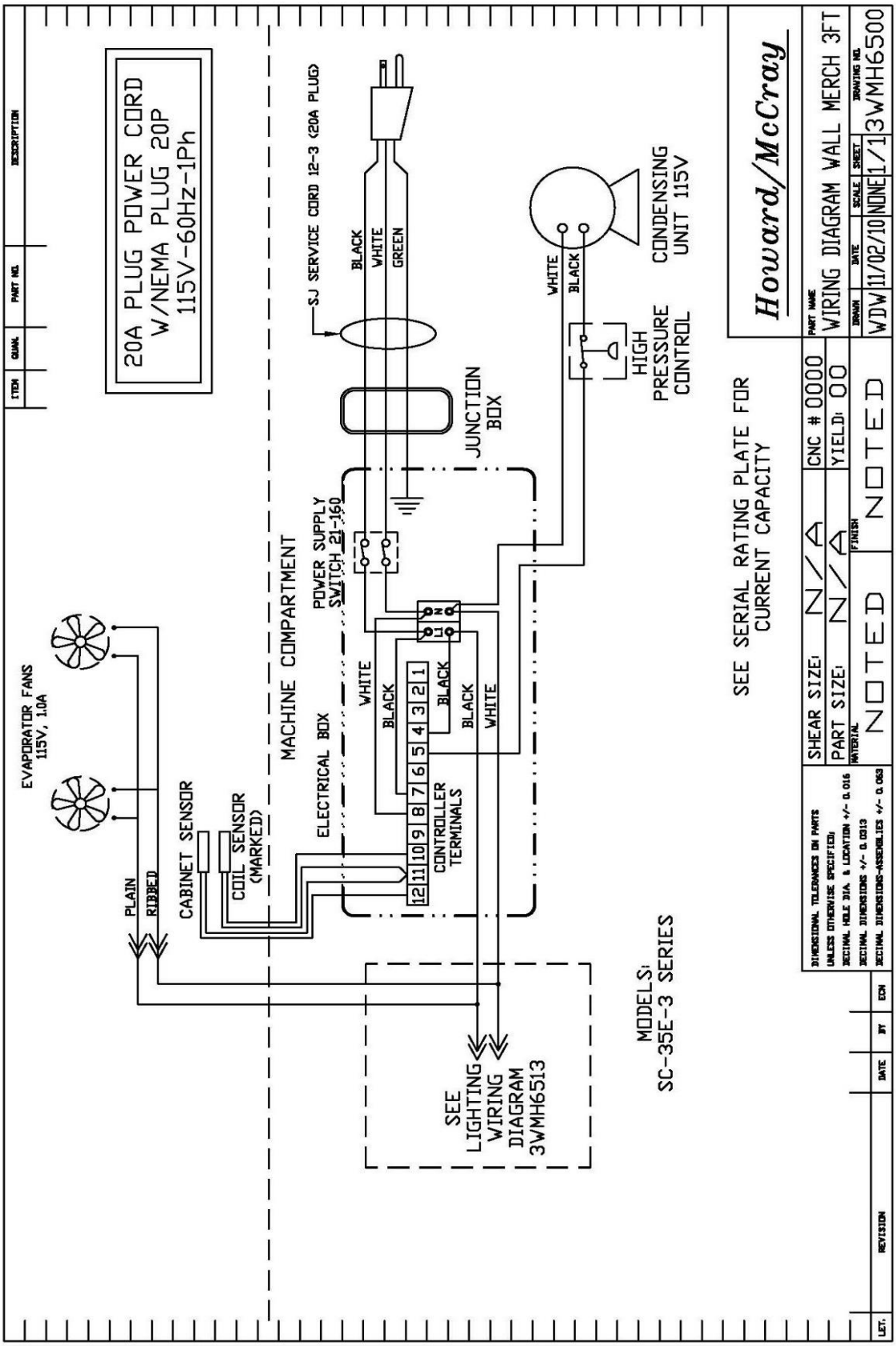

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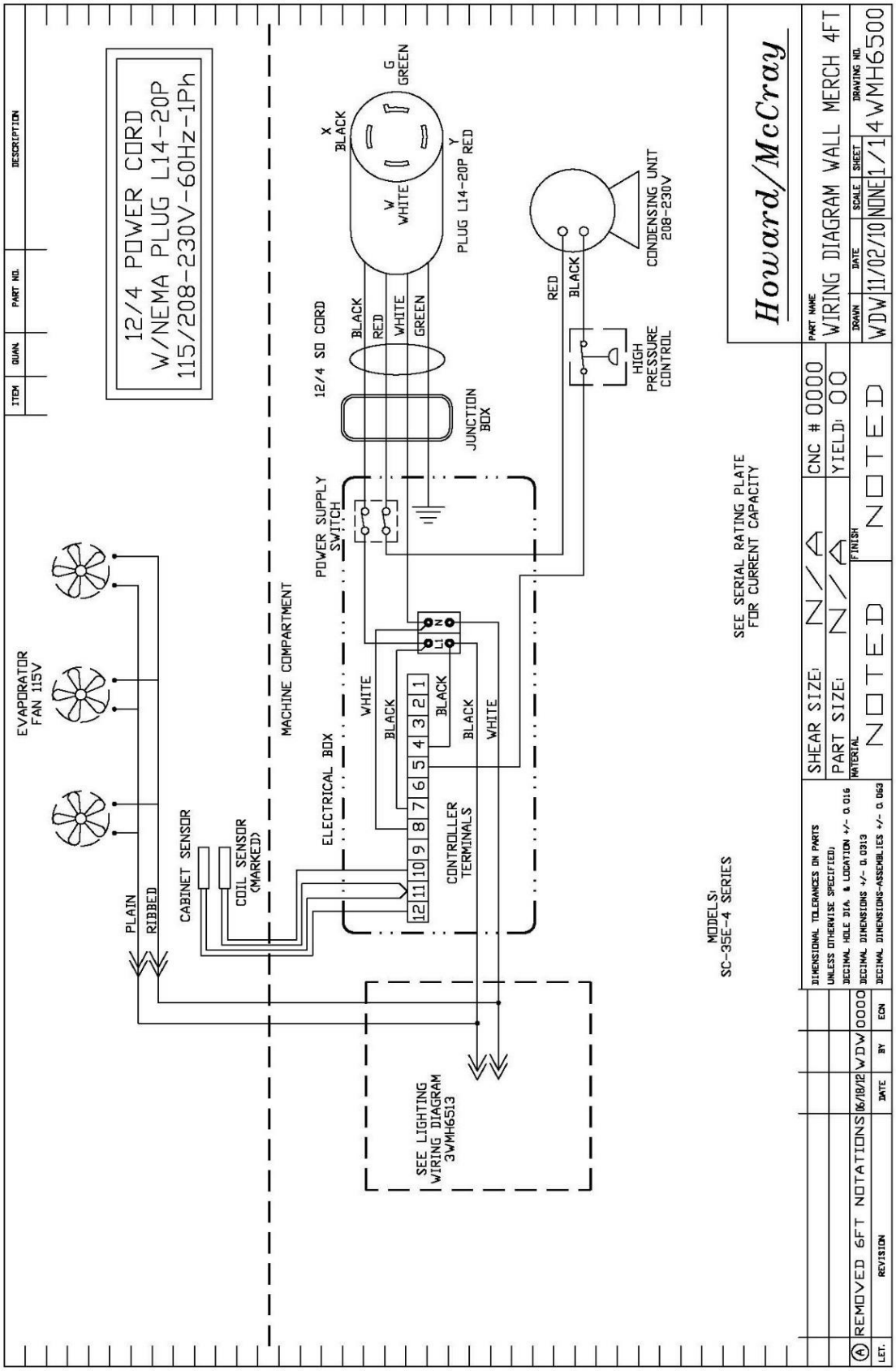

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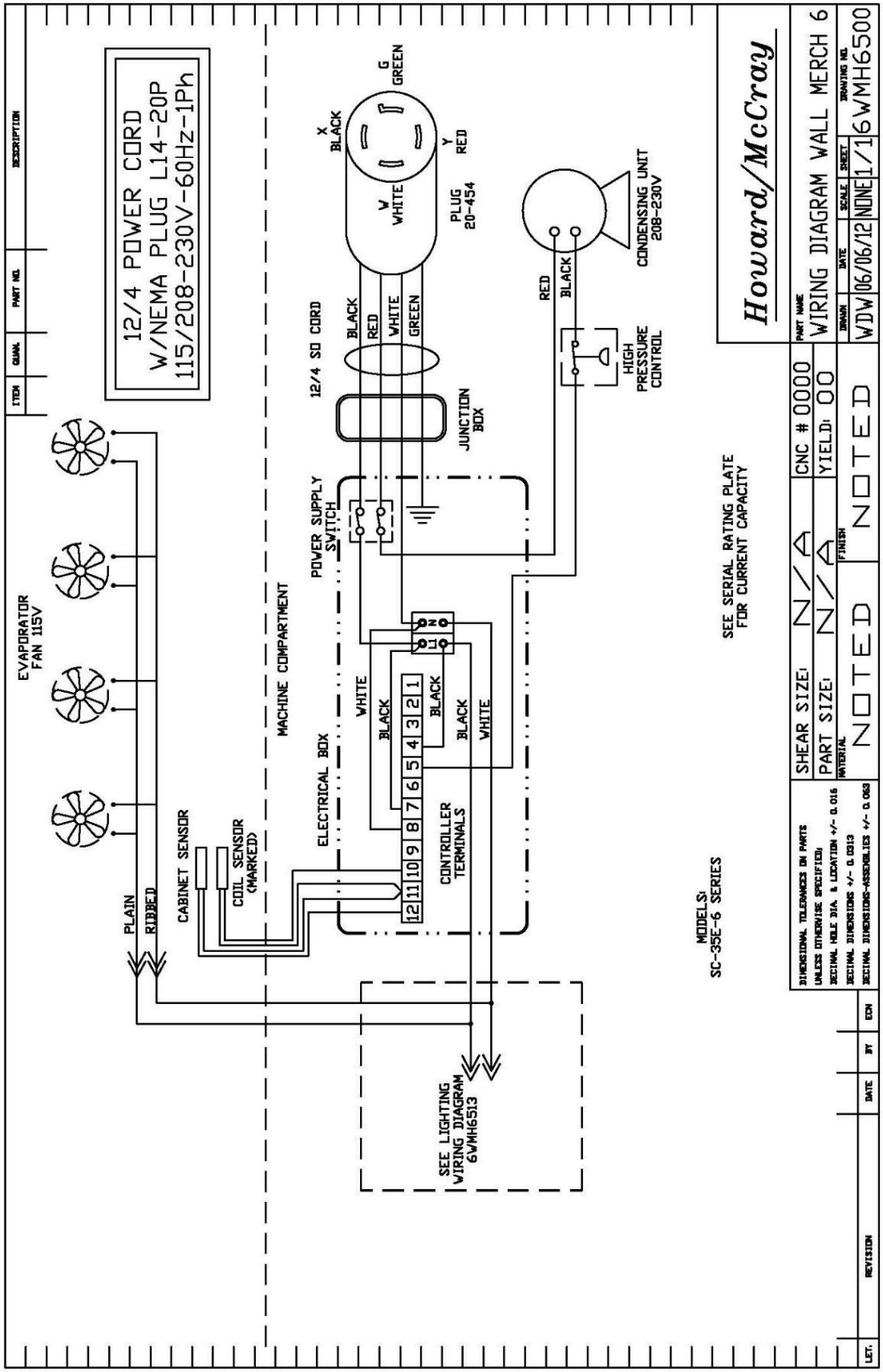
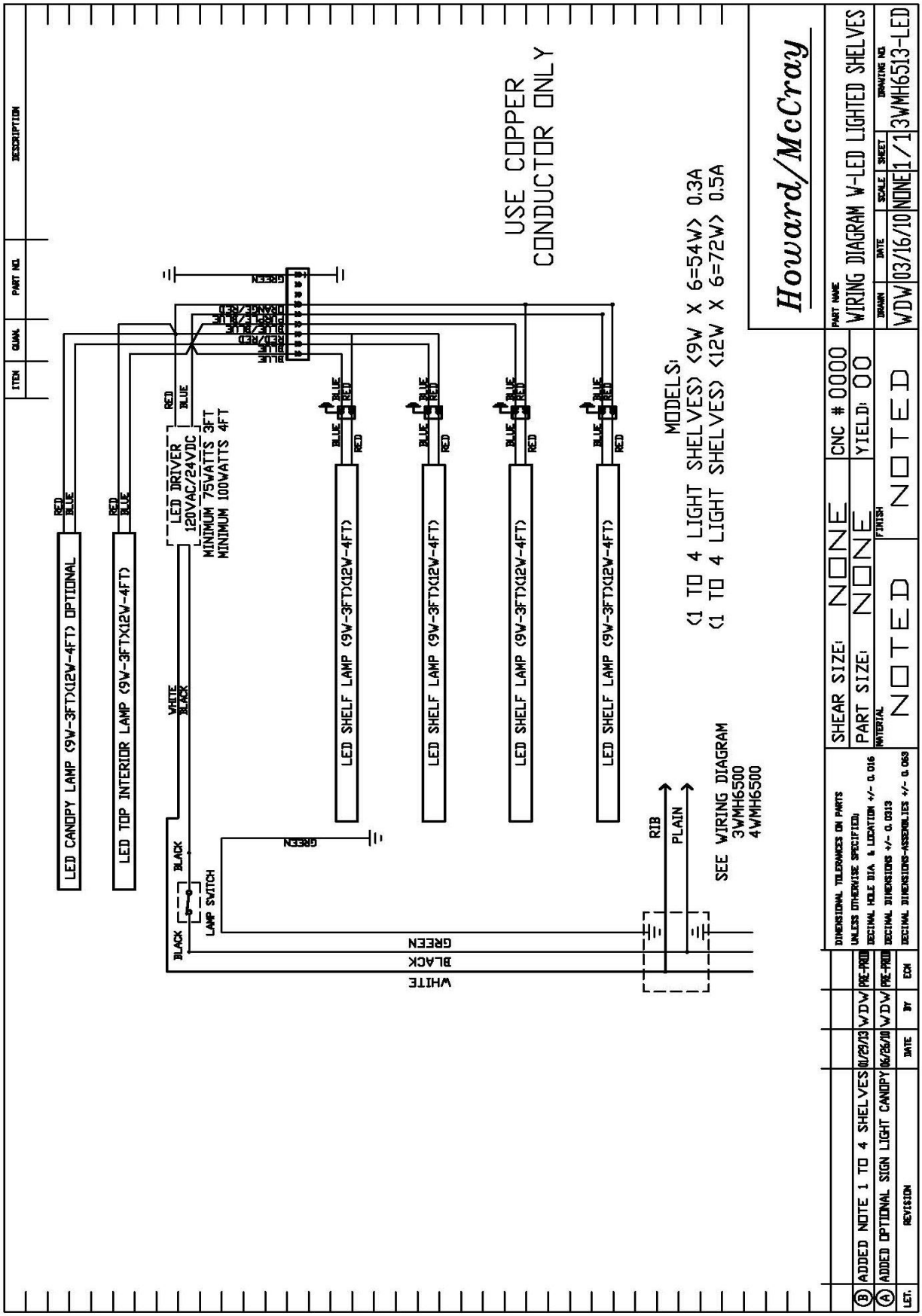

12/4 POWER CORD
W/NEMA PLUG L14-20P
115/208-230V-60Hz-1Ph
Howard/McCray
WIRING DIAGRAM WALL MERCH 6
WDW 06/06/12 NONE 1/1 6WMH6500
MACHINE COMPARTMENT
EVAPORATOR FAN 115V
PLAIN
RIBBED
CABINET SENSOR
COIL SENSOR (MARKED)
ELECTRICAL BOX
CONTROLLER TERMINALS
POWER SUPPLY SWITCH
12/4 SO CORD
JUNCTION BOX
PLUG 20-454
X BLACK
G GREEN
Y RED
W WHITE
BLACK
RED
WHITE
GREEN
HIGH PRESSURE CONTROL
CONDENSING UNIT 208-230V
SEE LIGHTING WIRING DIAGRAM 6WMH6513
SEE SERIAL RATING PLATE FOR CURRENT CAPACITY
MODELS: SC-35E-6 SERIES
CNC # 0000
YIELD: 00
N/A
NOTED



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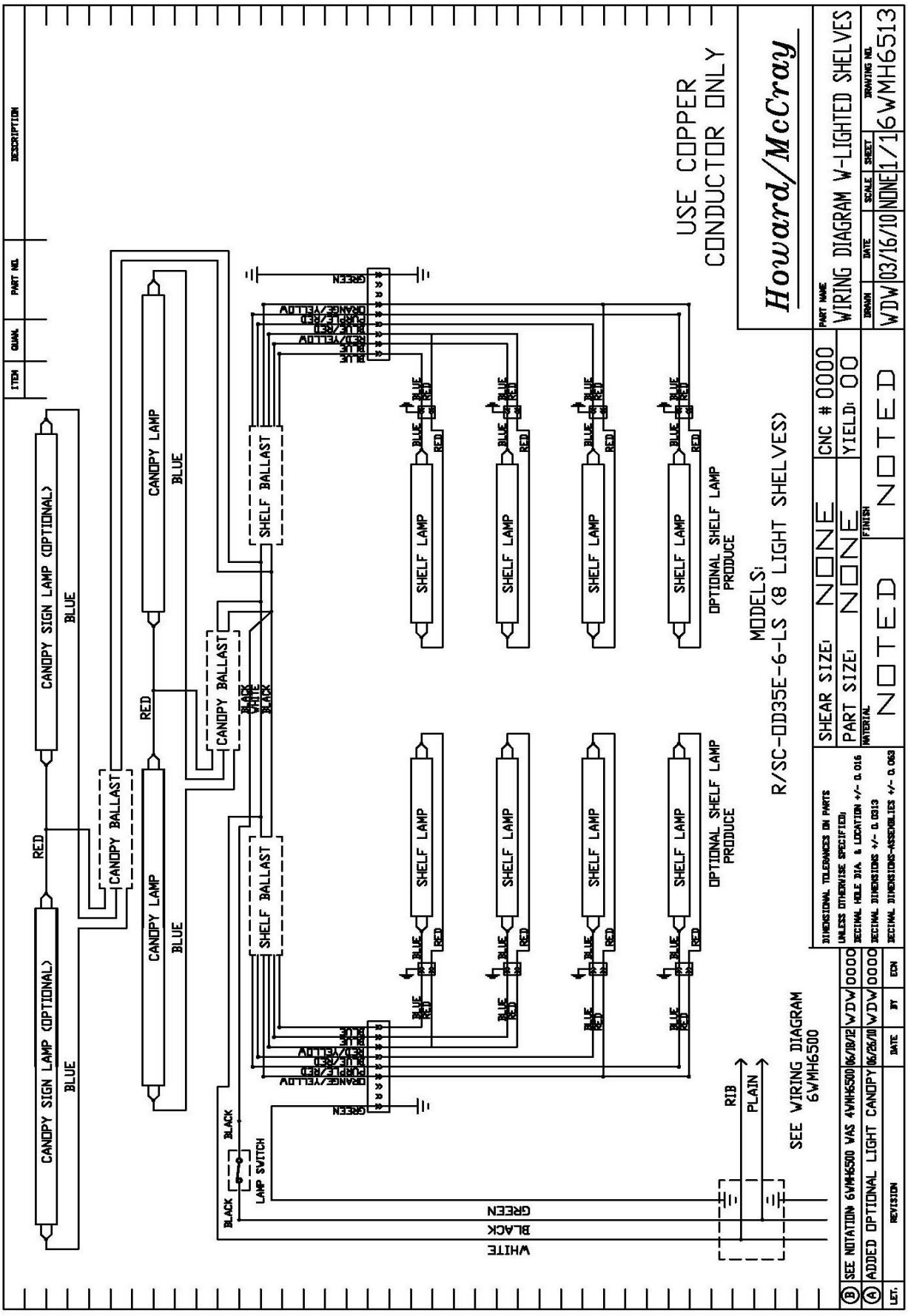

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Control Factory (F-C) Settings April 21, 2010 XR40CX- (21-376)							
Label		**Set-F**	**Set-C**	**Label**	**Name**	**Set-F**	**Set-C**
Set	Set Point	32	0	**dAF**	**Defrost delay after fast freez**	**0.0**	**0.0**
Hy	Differential	6	3.3	**ALc**	**Temp. alarm configuration**	**ab**	**ab**
LS	**Min Set Point**	**20**	**-6**	ALU	MAX. temperature alarm	45	8
US	**Max. Set Point**	**45**	**8**	ALL	MIN. temperature alarm	20	-6
Ot	Thermo Probe Calibration	0	0	**AFH**	**Diff for temp. alarm recovery**	**10**	**5**
P2P	Evap. Probe Presence	y	y	**ALd**	**Temp. alarm delay**	**60**	**60**
OE	**Evap. Probe Calibration**	**0**	**0**	**dAO**	**Delay of temp alarm at start up**	**2.0**	**2.0**
P3P	**Third Probe Presence**	**n**	**n**	**AP2**	**Probe for temp. alarm of cond**	**P4**	**P4**
O3	**Third Probe Calibration**	**0**	**0**	**AL2**	**Cond for low temp alarm**	**-40**	**-40**
P4P	**Fourth Probe Presence**	**n**	**n**	**AU2**	**Cond for high temp alarm**	**230**	**230**
O4	**Fourth Probe Calibration**	**0**	**0**	**AH2**	**Diff for cond. Temp alarm rec**	**10**	**10**
OdS	**Output Delay - Start Up**	**1**	**1**	**Ad2**	**Cond temp alarm delay**	**15**	**15**
AC	Anti-Short Cycle Delay	1	1	**dA2**	**Delay of cond temp alarm start up**	**1.3**	**1.3**
rtr	**P1-P2 Percentage**	**100**	**100**	**bLL**	**Comp off for cond low temp alarm**	**n**	**n**
CCt	**Continuous Cycle Duration**	**0.0**	**0.0**	**AC2**	**Comp off for cond high temp alarm**	**n**	**n**
CCS	**Set Point - Continuous Cycle**	**0**	**0**	**i1P**	**Digital input polarity**	**cL**	**cL**
COn	**Comp. ON - Faulty Probe**	**12**	**12**	i1F	Digital input configuation	EAL	EAL
COF	**Comp. OFF - Faulty Probe**	**8**	**8**	did	Digital input alarm delay	5	5
CF	**Temp. Measure Unit**	**F**	**C**	**Nps**	**Number of act of pressure switch**	**15**	**15**
rES	Resolution	in	in	**odc**	**Compress status when open dr**	**no**	**no**
Lod	**Probe Display**	**P1**	**P1**	**rrd**	**Regulation restart with DR open alarm**	**y**	**y**
dLy	**Display Temp Delay**	**0.0**	**0.0**	**HES**	**Differential for energy saving**	**0**	**0**
dtr	**P1-P2 Percentage for Display**	**50**	**50**	**Adr**	**Serial address**	**1**	**1**
tdF	Defrost Type	EL	EL	**PbC**	**Kind of probe**	**ntc**	**ntc**
dFP	**Probe Selection Defrost Term**	**P2**	**P2**	onF	on/off key enabling	no	no
dtE	Defrost Term Temp.	50	10	**dP1**	**Room probe display**	**--**	**--**
IdF	Interval Between Defrost Cycle	4	4	**dP2**	**Evaporator probe display**	**--**	**--**
NdF	Max. Length for Defrost time	60	60	dP3	Third probe display	nop	nop
dSd	**Start defrost delay**	**0**	**0**	dP4	Fourth probe display	nop	nop
dFd	**Displaying during defrost**	**rt**	**rt**	rSE	Valore set operativo	--	--
dAd	**MAX display delay after def.**	**0**	**0**	**rEL**	**Software release**	**1.0**	**1.0**
Fdt	**Draining time**	**0**	**0**	**Ptb**	**Map code**	**7**	**7**
dPO	**First defrost after startup**	**n**	**n**	**BOLD**	**Pr2**		
TO SEE SET POINT TEMPERATURE, PRESS SET KEY AND RELEASE TO DISPLAY SET POINT							
	BOLD = PARAMETER 2						

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Control Factory (F-C) Produce October 18, 2011 XR40CX- (21-376)							
Label		**Set-F**	**Set-C**	**Label**	**Name**	**Set-F**	**Set-C**
Set	Set Point	36	2.2	**dAF**	**Defrost delay after fast freez**	**0.0**	**0.0**
Hy	Differential	6	3.3	**ALc**	**Temp. alarm configuration**	**ab**	**ab**
LS	**Min Set Point**	**20**	**-6**	ALU	MAX. temperature alarm	45	8
US	**Max. Set Point**	**45**	**8**	ALL	MIN. temperature alarm	20	-6
Ot	Thermo Probe Calibration	0	0	**AFH**	**Diff for temp. alarm recovery**	**10**	**5**
P2P	Evap. Probe Presence	y	y	**ALd**	**Temp. alarm delay**	**60**	**60**
OE	**Evap. Probe Calibration**	**0**	**0**	**dAO**	**Delay of temp alarm at start up**	**2.0**	**2.0**
P3P	**Third Probe Presence**	**n**	**n**	**AP2**	**Probe for temp. alarm of cond**	**P4**	**P4**
O3	**Third Probe Calibration**	**0**	**0**	**AL2**	**Cond for low temp alarm**	**-40**	**-40**
P4P	**Fourth Probe Presence**	**n**	**n**	**AU2**	**Cond for high temp alarm**	**230**	**230**
O4	**Fourth Probe Calibration**	**0**	**0**	**AH2**	**Diff for cond. Temp alarm rec**	**10**	**10**
OdS	**Output Delay - Start Up**	**1**	**1**	**Ad2**	**Cond temp alarm delay**	**15**	**15**
AC	Anti-Short Cycle Delay	1	1	**dA2**	**Delay of cond temp alarm start up**	**1.3**	**1.3**
rtr	**P1-P2 Percentage**	**100**	**100**	**bLL**	**Comp off for cond low temp alarm**	**n**	**n**
CCt	**Continuous Cycle Duration**	**0.0**	**0.0**	**AC2**	**Comp off for cond high temp alarm**	**n**	**n**
CCS	**Set Point - Continuous Cycle**	**0**	**0**	**i1P**	**Digital input polarity**	**cL**	**cL**
COn	**Comp. ON - Faulty Probe**	**12**	**12**	i1F	Digital input configuation	EAL	EAL
COF	**Comp. OFF - Faulty Probe**	**8**	**8**	did	Digital input alarm delay	5	5
CF	**Temp. Measure Unit**	**F**	**C**	**Nps**	**Number of act of pressure switch**	**15**	**15**
rES	Resolution	in	in	**odc**	**Compress status when open dr**	**no**	**no**
Lod	**Probe Display**	**P1**	**P1**	**rrd**	**Regulation restart with DR open alarm**	**y**	**y**
dLy	**Display Temp Delay**	**0.0**	**0.0**	**HES**	**Differential for energy saving**	**0**	**0**
dtr	**P1-P2 Percentage for Display**	**50**	**50**	**Adr**	**Serial address**	**1**	**1**
tdF	Defrost Type	EL	EL	**PbC**	**Kind of probe**	**ntc**	**ntc**
dFP	**Probe Selection Defrost Term**	**P2**	**P2**	onF	on/off key enabling	no	no
dtE	Defrost Term Temp.	50	10	**dP1**	**Room probe display**	**--**	**--**
IdF	Interval Between Defrost Cycle	4	4	**dP2**	**Evaporator probe display**	**--**	**--**
NdF	Max. Length for Defrost time	60	60	dP3	Third probe display	nop	nop
dSd	**Start defrost delay**	**0**	**0**	dP4	Fourth probe display	nop	nop
dFd	**Displaying during defrost**	**rt**	**rt**	rSE	Valore set operativo	--	--
dAd	**MAX display delay after def.**	**0**	**0**	**rEL**	**Software release**	**1.0**	**1.0**
Fdt	**Draining time**	**0**	**0**	**Ptb**	**Map code**	**7**	**7**
dPO	**First defrost after startup**	**n**	**n**	**BOLD**	**Pr2**		
TO SEE SET POINT TEMPERATURE, PRESS SET KEY AND RELEASE TO DISPLAY SET POINT							
	BOLD = PARAMETER 2						

Digital controller with defrost management
XR40CX

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1. GENERAL WARNING

1.1 PLEASE READ BEFORE USING THIS MANUAL

- This manual is part of the product and should be kept near the instrument for easy and quick reference.
- The instrument shall not be used for purposes different from those described hereunder. It cannot be used as a safety device.
- Check the application limits before proceeding.

1.2 ⚠ SAFETY PRECAUTIONS

- Check the supply voltage is correct before connecting the instrument.
- Do not expose to water or moisture: use the controller only within the operating limits avoiding sudden temperature changes with high atmospheric humidity to prevent formation of condensation
- Warning: disconnect all electrical connections before any kind of maintenance.
- Fit the probe where it is not accessible by the End User. The instrument must not be opened.
- In case of failure or faulty operation send the instrument back to the distributor or to "Dixell S.p.A." (see address) with a detailed description of the fault.
- Consider the maximum current which can be applied to each relay (see Technical Data).
- Ensure that the wires for probes, loads and the power supply are separated and far enough from each other, without crossing or intertwining.
- In case of applications in industrial environments, the use of mains filters (our mod. FT1) in parallel with inductive loads could be useful.

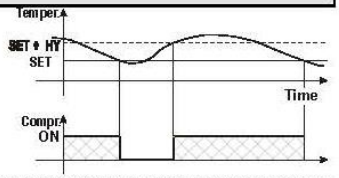
2. GENERAL DESCRIPTION

Model **XR40CX**, format 32 x 74 mm, is microprocessor based controller, suitable for applications on medium or low temperature refrigerating units. It has 2 relay outputs to control compressor and defrost, which can be either electrical or reverse cycle (hot gas). It is also provided with three NTC or PTC probe inputs, the first one for temperature control, the second one, to be located onto the evaporator, to control the defrost termination temperature, the third one, optional, to connect to the HOT KEY terminals to signal the condenser temperature alarm or to display a temperature. The digital input can operate as fourth temperature probe.
The HOT KEY output allows to connect the unit, by means of the external module XJ485-CX, to a network line **ModBUS-RTU** compatible such as the 2Y03# monitoring units of X-WEB family. It allows to program the controller by means the HOT KEY programming keyboard.
The instrument is fully configurable through special parameters that can be easily programmed through the keyboard.

3. CONTROLLING LOADS

3.1 COMPRESSOR

The regulation is performed according to the temperature measured by the thermostat probe with a positive differential from the set point: if the temperature increases and reaches set point plus differential the compressor is started and then turned off when the temperature reaches the set point value again.



In case of fault in the thermostat probe the start and stop of the compressor are timed through parameters "**COn**" and "**COF**".

3.2 DEFROST

Two defrost modes are available through the "**tdF**" parameter: defrost through electrical heater (**tdF = EL**) and hot gas defrost (**tdF = in**). Other parameters are used to control the interval between defrost cycles (IdF), its maximum length (MdF) and two defrost modes: timed or controlled by the evaporator's probe (P2P).
At the end of defrost dripping time is started, its length is set in the FSt parameter. With FSt =0 the dripping time is disabled.

4. FRONT PANEL COMMANDS

SET: To display target set point; in programming mode it selects a parameter or confirm an operation.

(DEF) To start a manual defrost

(UP): To see the max. stored temperature; in programming mode it browses the parameter codes or increases the displayed value.

(DOWN) To see the min stored temperature; in programming mode it browses the parameter codes or decreases the displayed value.

To activate / deactivate the energy saving cycle.

Not enabled.

KEY COMBINATIONS:

+ # To lock & unlock the keyboard.

SET + To enter in programming mode.

SET + # To return to the room temperature display.

4.1 USE OF LEDS

Each LED function is described in the following table.

LED	MODE	FUNCTION
	ON	Compressor enabled
	Flashing	Anti-short cycle delay enabled
	ON	Defrost enabled
	Flashing	Drip time in progress
	ON	An alarm is occurring
	ON	Continuous cycle is running
	ON	Energy saving enbled
°C/°F	ON	Measurement unit
°C/°F	Flashing	Programming phase

5. MAX & MIN TEMPERATURE MEMORIZATION

5.1 HOW TO SEE THE MIN TEMPERATURE

1. Press and release the ▼ key.
2. The "Lo" message will be displayed followed by the minimum temperature recorded.
3. By pressing the ▼ key again or by waiting 5s the normal display will be restored.

5.2 HOW TO SEE THE MAX TEMPERATURE

1. Press and release the ▲ key.
2. The "Hi" message will be displayed followed by the maximum temperature recorded.
3. By pressing the ▲ key again or by waiting 5s the normal display will be restored.

5.3 HOW TO RESET THE MAX AND MIN TEMPERATURE RECORDED

1. Hold press the SET key for more than 3s, while the max. or min temperature is displayed. (rSt message will be displayed)
2. To confirm the operation the "rSt" message starts blinking and the normal temperature will be displayed.

6. MAIN FUNCTIONS

6.1 HOW TO SEE THE SETPOINT

1. Push and immediately release the **SET** key: the display will show the Set point value;
2. Push and immediately release the **SET** key or wait for 5 seconds to display the probe value again.

6.2 HOW TO CHANGE THE SETPOINT

1. Push the **SET** key for more than 2 seconds to change the Set point value;
2. The value of the set point will be displayed and the **"°C" or "°F"** LED starts blinking;
3. To change the Set value push the ▲ # or ▼ arrows within 10s.
4. To memorise the new set point value push the **SET** key again or wait 10s.

6.3 HOW TO START A MANUAL DEFROST

Push the **DEF** key for more than 2 seconds and a manual defrost will start.

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6.4 HOW TO CHANGE A PARAMETER VALUE

To change the parameter's value operate as follows:
1. Enter the Programming mode by pressing the **Set + ▼** keys for 3s (the **"°C" or "°F"** LED starts blinking).
2. Select the required parameter. Press the **"SET"** key to display its value
3. Use **"UP"** or **"DOWN"** to change its value.
4. Press **"SET"** to store the new value and move to the following parameter.

To exit: Press **SET + UP** or wait 15s without pressing a key.
NOTE: the set value is stored even when the procedure is exited by waiting the time-out to expire.

6.5 THE HIDDEN MENU

The hidden menu Includes all the parameters of the instrument.

6.5.1 HOW TO ENTER THE HIDDEN MENU

1. Enter the Programming mode by pressing the **Set + ▼** keys for 3s (the **"°C" or "°F"** LED starts blinking).
2. Released the keys, then push again the Set+**▼** keys for more than 7s. The Pr2 label will be displayed immediately followed from the HY parameter.
   NOW YOU ARE IN THE HIDDEN MENU.
3. Select the required parameter.
4. Press the **"SET"** key to display its value
5. Use **UP** or **▼** to change its value.
6. Press **"SET"** to store the new value and move to the following parameter.

To exit: Press **SET + UP** or wait 15s without pressing a key.
NOTE1: if none parameter is present in Pr1, after 3s the "noP" message is displayed. Keep the keys pushed till the Pr2 message is displayed.
NOTE2: the set value is stored even when the procedure is exited by waiting the time-out to expire.

6.5.2 HOW TO MOVE A PARAMETER FROM THE HIDDEN MENU TO THE FIRST LEVEL AND VICEVERSA.

Each parameter present in the HIDDEN MENU can be removed or put into "THE FIRST LEVEL" (user level) by pressing **"SET + ▼ "**.
In HIDDEN MENU when a parameter is present in First Level the decimal point is on.

6.6 HOW TO LOCK THE KEYBOARD

1. Keep pressed for more than 3 s the **UP + DOWN** keys.
2. The "POF" message will be displayed and the keyboard will be locked. At this point it will be possible only to see the set point or the MAX o Min temperature stored
3. If a key is pressed more than 3s the "POF" message will be displayed.

6.7 TO UNLOCK THE KEYBOARD

Keep pressed together for more than 3s the **UP** and **▼** keys, till the **"Pon"** message will be displayed.

6.8 THE CONTINUOUS CYCLE

When defrost is not in progress, it can be activated by holding the **"UP "** key pressed for about 3 seconds. The compressor operates to maintain the **"ccS"** set point for the time set through the **"CCt"** parameter. The cycle can be terminated before the end of the set time using the same activation key **"UP "** for 3 seconds.

6.9 THE ENERGY SAVING FUNCTION

With **"onF = ES"**, pushing the key, energy saving cycle is enabled: this function allows to change the set point value as the result of the SET+ HES
To stop the energy saving push again the key.

7. PARAMETERS

REGULATION

Hy Differential: (0,1 ÷ 25,5°C / 1÷255 °F) Intervention differential for set point. Compressor Cut IN is Set Point + differential (Hy). Compressor Cut OUT is when the temperature reaches the set point.
LS Minimum set point: (-50°C÷SET/-58°F÷SET): Sets the minimum value for the set point.
US Maximum set point: (SET÷110°C/ SET÷230°F). Set the maximum value for set point.
Ot Thermostat probe calibration: (-12.0÷12.0°C; -120÷120°F) allows to adjust possible offset of the thermostat probe.
P2P Evaporator probe presence: n= not present: the defrost stops by time; **y=** present: the defrost stops by temperature.
OE Evaporator probe calibration: (-12.0÷12.0°C; -120÷120°F). allows to adjust possible offset of the evaporator probe.
P3P Third probe presence (P3): n= not present:, the terminal operates as digital input.; **y=** present:, the terminal operates as third probe.
O3 Third probe calibration (P3): (-12.0÷12.0°C; -120÷120°F). allows to adjust possible offset of the third probe.
P4P Fourth probe presence: (n = Not present; y = present).
o4 Fourth probe calibration: (-12.0÷12.0°C) allows to adjust possible offset of the fourth probe.
OdS Outputs activation delay at start up: (0÷255min) This function is enabled at the initial start up of the instrument and inhibits any output activation for the period of time set in the parameter.
AC Anti-short cycle delay: (0÷50 min) minimum interval between the compressor stop and the following restart.
rtr Percentage of the second and first probe for regulation (0÷100; 100 = P1, 0 = P2): it allows to set the regulation according to the percentage of the first and second probe, as for the following formula (rtr(P1-P2)/100 +P2).
CCt Compressor ON time during continuous cycle: (0.0÷24.0h; res. 10min) Allows to set the length of the continuous cycle: compressor stays on without interruption for the CCt time. Can be used, for instance, when the room is filled with new products.
CCS Set point for continuous cycle: (-50÷150°C) it sets the set point used during the continuous cycle.
COn Compressor ON time with faulty probe: (0÷255 min) time during which the compressor is active in case of faulty thermostat probe. With COn=0 compressor is always OFF.
COF Compressor OFF time with faulty probe: (0÷255 min) time during which the compressor is OFF in case of faulty thermostat probe. With COF=0 compressor is always active.

DISPLAY

CF Temperature measurement unit: °C=Celsius; **°F**=Fahrenheit. WARNING: When the measurement unit is changed the SET point and the values of the parameters Hy, LS, US, Ot, ALU and ALL have to be checked and modified if necessary).
rES Resolution (for °C): (in = 1°C; dE = 0.1 °C) allows decimal point display.
Lod Instrument display: (P1; P2, P3, P4, SET, dtr): it selects which probe is displayed by the instrument: **P1** = Thermostat probe; **P2** = Evaporator probe; **P3** = Third probe(only for model with this option enabled); **P4** = Fourth probe, **SET** = set point; **dtr** = percentage of visualization.
rEd X- REP display *(optional)*: (P1; P2, P3, P4, SET, dtr): it selects which probe is displayed by X- REP: **P1** = Thermostat probe; **P2** = Evaporator probe; **P3** = Third probe(only for model with this option enabled); **P4** = Fourth probe, **SET** = set point; **dtr** = percentage of visualization.
dLy Display delay: (0 ÷20.0m; risul. 10s) when the temperature increases, the display is updated of 1 °C/1°F after this time.
dtr Percentage of the second and first probe for visualization when Lod = dtr (0÷100; 100 = P1, 0 = P2): if Lod = dtr it allows to set the visualization according to the percentage of the first and second probe, as for the following formula (dtr(P1-P2)/100 + P2).

DEFROST

dFP Probe selection for defrost termination: nP = no probe; **P1** =thermostat probe, **P2 =** evaporator probe; **P3** =configurable probe; **P4** = Probe on Hot Key plug.
tdF Defrost type: EL = electrical heater; in = hot gas
dtE Defrost termination temperature: (-50÷50 °C/ -58÷122°F) (Enabled only when EdF=Pb) sets the temperature measured by the evaporator probe, which causes the end of defrost.
IdF Interval between defrost cycles: (0÷120h) Determines the time interval between the beginning of two defrost cycles.
MdF (Maximum) length for defrost: (0÷255min) When **P2P = n**, (not evaporator probe: timed defrost) it sets the defrost duration, when **P2P = y** (defrost end based on temperature) it sets the maximum length for defrost.
dSd Start defrost delay: (0÷99min) This is useful when different defrost start times are necessary to avoid overloading the plant.
dFd Temperature displayed during defrost: (**rt** = real temperature; **it** = temperature at defrost start; **SEt** = set point; **dEF** = "dEF" label)
dAd MAX display delay after defrost: (0÷255min). Sets the maximum time between the end of defrost and the restarting of the real room temperature display.
Fdt Drip time: (0÷120 min) time interval between reaching defrost termination temperature and the restoring of the control's normal operation. This time allows the evaporator to eliminate water drops that might have formed due to defrost.
dPo First defrost after start-up: (y = immediately; n = after the IdF time)
dAF Defrost delay after continuous cycle: (0÷23.5h) time interval between the end of the fast freezing cycle and the following defrost related to it.

ALARMS

ALC Temperature alarms configuration: (Ab; rE)
Ab= absolute temperature: alarm temperature is given by the ALL or ALU values. rE = temperature alarms are referred to the set point. Temperature alarm is enabled when the temperature exceeds the "SET+ALU" or "SET-ALL" values.
ALU MAXIMUM temperature alarm: (SET÷110°C; SET÷230°F) when this temperature is reached the alarm is enabled, after the "ALd" delay time.
ALL Minimum temperature alarm: (-50.0 ÷ SET°C; -58÷230°F when this temperature is reached the alarm is enabled, after the "ALd" delay time.
AFH Differential for temperature alarm recovery: (0,1÷25,5°C; 1÷45°F) Intervention differential for recovery of temperature alarm.
ALd Temperature alarm delay: (0÷255 min) time interval between the detection of an alarm condition and alarm signalling.
dAO Exclusion of temperature alarm at startup: (from 0.0 min to 23.5h) time interval between the detection of the temperature alarm condition after instrument power on and alarm signalling.

CONDENSER TEMPERATURE ALARM (detected by the fourth probe)

AP2 Probe selection for temperature alarm of condenser: nP = no probe; **P1** =thermostat probe; **P2 =** evaporator probe; **P3** =configurable probe; **P4** = Probe on Hot Key plug.
AL2 Low temperature alarm of condenser: (-55÷150°C) when this temperature is reached the LA2 alarm is signalled, possibly after the Ad2 delay.
Au2 High temperature alarm of condenser: (-55÷150°C) when this temperature is reached the HA2 alarm is signalled, possibly after the Ad2 delay.
AH2 Differential for temperature condenser alarm recovery: (0,1÷25,5°C; 1÷45°F)
Ad2 Condenser temperature alarm delay: (0÷255 min) time interval between the detection of the condenser alarm condition and alarm signalling.
dA2 Condenser temperature alarm exclusion at start up: (from 0.0 min to 23.5h, res. 10min)
bLL Compressor off with low temperature alarm of condenser: **n = no:** compressor keeps on working; **Y = yes,** compressor is switched off till the alarm is present, in any case regulation restarts after AC time at minimum.
AC2 Compressor off with high temperature alarm of condenser: **n = no:** compressor keeps on working; **Y = yes,** compressor is switched off till the alarm is present, in any case regulation restarts after AC time at minimum.

DIGITAL INPUT

i1P Digital input polarity: oP: the digital input is activated by opening the contact; **CL:** the digital input is activated by closing the contact.
i1F Digital input configuration: EAL = external alarm: "EA" message is displayed; **bAL** = serious alarm "CA" message is displayed. **PAL** = pressure switch alarm, "CA" message is displayed; **dor** = door switch function; **dEF** = activation of a defrost cycle; **AUS** =not enabled; **Htr** = kind of action inversion (cooling – heating); **FAn = not set it; ES =** Energy saving.
did: (0÷255 min) **with i1F= EAL or i1F = bAL digital input alarm delay:** delay between the detection of the external alarm condition and its signalling.
with i1F= dor: door open signalling delay
with i1F = PAL: time for pressure switch function: time interval to calculate the number of the pressure switch activation.
nPS Pressure switch number: (0 ÷15) Number of activation of the pressure switch, during the **"did"** interval, before signalling the alarm event (I2F= PAL).
If the nPS activation in the did time is reached, switch off and on the instrument to restart normal regulation.
odc Compressor status when open door: no; Fan = normal; **CPr**; **F_C** = Compressor OFF.
rrd Outputs restart after doA alarm: no = outputs not affected by the doA alarm; **yES =** outputs restart with the doA alarm;

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HES Temperature increase during the Energy Saving cycle : (-30,0°C÷30,0°C/-22÷86°F) it sets the increasing value of the set point during the Energy Saving cycle.

OTHER

Adr Serial address (1÷244): Identifies the instrument address when connected to a ModBUS compatible monitoring system.
PbC Type of probe: it allows to set the kind of probe used by the instrument: **PbC** = PBC probe, **ntc** = NTC probe.
onF Enrgy saving key enabling: nu = disabled; **oFF = not set it**; **ES** = enabled.
dP1 Thermostat probe display
dP2 Evaporator probe display
dP3 Third probe display- *optional*.
dP4 Fourth probe display.
rSE Real set point: (readable only), it shows the set point used during the energy saving cycle or during the continuous cycle.
rEL Software release for internal use.
Ptb Parameter table code: readable only.

8. DIGITAL INPUT (ENABLED WITH P3P = N)

The free voltage digital input is programmable in different configurations by the "**i1F**" parameter.

8.1 DOOR SWITCH INPUT (i1F = dor)

It signals the door status and the corresponding relay output status through the "**odc**" parameter: **no, Fan** = normal (any change); **CPr, F_C** = Compressor OFF.
Since the door is opened, after the delay time set through parameter "**did**", the door alarm is enabled, the display shows the message "**dA**" and **the regulation restarts is rtr = yES.** The alarm stops as soon as the external digital input is disabled again. With the door open, the high and low temperature alarms are disabled.

8.2 GENERIC ALARM (i1F = EAL)

As soon as the digital input is activated the unit will wait for "**did**" time delay before signalling the "**EAL**" alarm message. The outputs status don't change. The alarm stops just after the digital input is de-activated.

8.3 SERIOUS ALARM MODE (i1F = bAL)

When the digital input is activated, the unit will wait for "**did**" delay before signalling the "**CA**" alarm message. The relay outputs are switched OFF. The alarm will stop as soon as the digital input is de-activated.

8.4 PRESSURE SWITCH (i1F = PAL)

If during the interval time set by "**did**" parameter, the pressure switch has reached the number of activation of the "**nPS**" parameter, the "**CA**" pressure alarm message will be displayed. The compressor and the regulation are stopped. When the digital input is ON the compressor is always OFF.
If the nPS activation in the did time is reached, switch off and on the instrument to restart normal regulation.

8.5 START DEFROST (i1F = dFr)

It starts a defrost if there are the right conditions. After the defrost is finished, the normal regulation will restart only if the digital input is disabled otherwise the instrument will wait until the "MdF" safety time is expired.

8.6 INVERSION OF THE KIND OF ACTION: HEATING-COOLING (i1F = Htr)

This function allows to invert the regulation of the controller: from cooling to heating and viceversa.

8.7 ENERGY SAVING (i1F = ES)

The Energy Saving function allows to change the set point value as the result of the SET+ HES (parameter) sum. This function is enabled until the digital input is activated.

8.8 DIGITAL INPUTS POLARITY

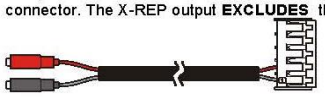
The digital input polarity depends on the "**i1P**" parameter.
i1P=CL: the input is activated by closing the contact.
i1P=OP: the input is activated by opening the contact

9. TTL SERIAL LINE – FOR MONITORING SYSTEMS

The TTL serial line, available through the HOT KEY connector, allows by means of the external TTL/RS485 converter, **XJ485-CX**, to connect the instrument to a monitoring system **ModBUS-RTU** compatible such as the X-WEB500/3000/300.

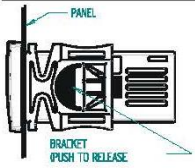
10. X-REP OUTPUT – OPTIONAL

As optional, an X-REP can be connected to the instrument, trough the HOY KEY connector. The X-REP output EXCLUDES the serial connection.



To connect the X-REP to the instrument the following connectors must be used CAB-51F(1m), CAB-52F(2m), CAB-55F(5m),

11. INSTALLATION AND MOUNTING



Instrument **XR40CX** shall be mounted on vertical panel, in a 29x71 mm hole, and fixed using the special bracket supplied.
The temperature range allowed for correct operation is 0÷60 °C. Avoid places subject to strong vibrations, corrosive gases, excessive dirt or humidity. The same recommendations apply to probes. Let air circulate by the cooling holes.

12. ELECTRICAL CONNECTIONS

The instrument is provided with screw terminal block to connect cables with a cross section up to 2,5 mm². Before connecting cables make sure the power supply complies with the instrument's requirements. Separate the probe cables from the power supply cables, from the outputs and the power connections. Do not exceed the maximum current allowed on each relay, in case of heavier loads use a suitable external relay.

12.1 PROBE CONNECTION

The probes shall be mounted with the bulb upwards to prevent damages due to casual liquid infiltration. It is recommended to place the thermostat probe away from air streams to correctly measure the average room temperature. Place the defrost termination probe among the evaporator fins in the coldest place, where most ice is formed, far from heaters or from the warmest place during defrost, to prevent premature defrost termination.

13. HOW TO USE THE HOT KEY

13.1 HOW TO PROGRAM A HOT KEY FROM THE INSTRUMENT (UPLOAD)

1. Program one controller with the front keypad.
2. When the controller is ON, insert the "**Hot key**" and push ↥ key; the **"uPL"** message appears followed a by flashing **"End"**
3. Push "**SET**" key and the **End** will stop flashing.
4. Turn OFF the instrument remove the **"Hot Key"**, then turn it ON again.

NOTE: the "**Err**" message is displayed for failed programming. In this case push again ↥ key if you want to restart the upload again or remove the "**Hot key**" to abort the operation.

13.2 HOW TO PROGRAM AN INSTRUMENT USING A HOT KEY (DOWNLOAD)

1. Turn OFF the instrument.
2. Insert a **programmed "Hot Key" into the 5 PIN receptacle** and then turn the Controller ON.
3. Automatically the parameter list of the **"Hot Key"** is downloaded into the Controller memory, the "**doL**" message is blinking followed a by flashing **"End".**
4. After 10 seconds the instrument will restart working with the new parameters.
5. Remove the **"Hot Key".**

NOTE the message "**Err**" is displayed for failed programming. In this case turn the unit off and then on if you want to restart the download again or remove the "**Hot key**" to abort the operation.

14. ALARM SIGNALS

Message	Cause	Outputs
"P1"	Room probe failure	Compressor output acc. to par. "Con" and "COF"
"P2"	Evaporator probe failure	Defrost end is timed
"P3"	Third probe failure	Outputs unchanged
"P4"	Fourth probe failure	Outputs unchanged
"HA"	Maximum temperature alarm	Outputs unchanged.
"LA"	Minimum temperature alarm	Outputs unchanged.
"HA2"	Condenser high temperature	It depends on the "Ac2" parameter
"LA2"	Condenser low temperature	It depends on the "bLL" parameter
"dA"	Door open	Compressor according to rrd
"EA"	External alarm	Output unchanged.
"CA"	Serious external alarm (i1F=bAL)	All outputs OFF.
"CA"	Pressure switch alarm (i1F=PAL)	All outputs OFF

14.1 ALARM RECOVERY

Probe alarms **P1**", "**P2**", "**P3**" and "**P4**" start some seconds after the fault in the related probe; they automatically stop some seconds after the probe restarts normal operation. Check connections before replacing the probe.
Temperature alarms "**HA**", "**LA**" "**HA2**" and "**LA2**" automatically stop as soon as the temperature returns to normal values.
Alarms **"EA"** and **"CA"** (with i1F=bAL) recover as soon as the digital input is disabled.
Alarm "**CA**" (with i1F=PAL) recovers only by **switching off and on** the instrument.

14.2 OTHER MESSAGES

Pon	Keyboard unlocked.
PoF	Keyboard locked.
noP	**In programming mode**: none parameter is present in Pr1 **On the display** or in dP2, dP3, dP4: the selected probe is nor enabled
noA	**None alarm is recorded.**

15. TECHNICAL DATA

Housing: self extinguishing ABS.
Case: XR40CX frontal 32x74 mm; depth 60mm;
Mounting: XR40CX panel mounting in a 71x29mm panel cut-out
Protection: IP20; **Frontal protection: XR40CX** IP65
Connections: Screw terminal block ≤ 2,5 mm² wiring.
Power supply: according to the model: 12Vac/dc, ±10%; 24Vac/dc, ±10%; 230Vac ±10%, 50/60Hz, 110Vac ±10%, 50/60Hz
Power absorption: 3VA max
Display: 3 digits, red LED, 14,2 mm high; **Inputs**: Up to 4 NTC or PTC probes.
Digital input: free voltage contact
Relay outputs: compressor SPST 8(3) A, 250Vac; or 20(8)A 250Vac
defrost: SPDT 8(3) A, 250Vac
Data storing: on the non-volatile memory (EEPROM).
Kind of action: 1B; **Pollution grade:** 2; **Software class:** A.;
Rated impulsive voltage: 2500V; **Overvoltage Category**: II
Operating temperature: 0÷60 °C; **Storage temperature:** -30÷85 °C.
Relative humidity: 20÷85% (no condensing)
Measuring and regulation range: NTC probe: -40÷110°C (-40÷230°F);
PTC probe: -50÷150°C (-58÷302°F)
Resolution: 0,1 °C or 1°C or 1 °F (selectable); **Accuracy (ambient temp. 25°C)**: ±0,7 °C ±1 digit

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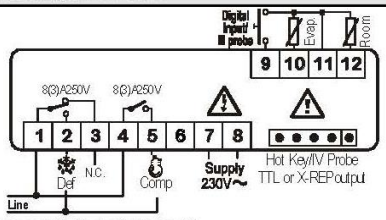
16. CONNECTIONS

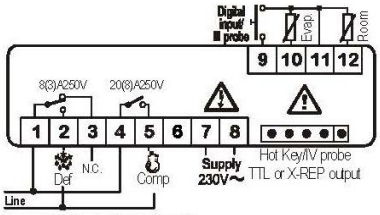
The X-REP output excludes the TTL output.. It's present in the following codes:
XR40CX- xx**2**xx, XR40CX –xx**3**xx;.

16.1 XR40CX – 8A COMPRESSOR



12Vac/dc supply: connect to the terminals 7 and 8.
24Vac/dc supply: connect to the terminals 7 and 8.
120Vac supply: connect to the terminals 7 and 8.

16.2 XR40CX – 20A COMPRESSOR



12Vac/dc supply: connect to the terminals 7 and 8.
24Vac/dc supply: connect to the terminals 7 and 8.
120Vac supply: connect to the terminals 7 and 8.

17. DEFAULT SETTING VALUES

Label	Name	Range	°C/°F	
Set	Set point	LS÷US	-5.0/0	- - -
Hy	Differential	0,1÷25.5°C/ 1÷255°F	2.0/4	Pr1
LS	Minimum set point	-50°C÷SET/-58°F÷SET	-50/-58	Pr2
US	Maximum set point	SET÷110°C/ SET ÷ 230°F	110/230	Pr2
Ot	Thermostat probe calibration	-12÷12°C /-120÷120°F	0.0/0	Pr1
P2P	Evaporator probe presence	n=not present; Y=pres.	Y	Pr1
OE	Evaporator probe calibration	-12÷12°C /-120÷120°F	0.0/0	Pr2
P3P	Third probe presence	n=not present; Y=pres.	n	Pr2
O3	Third probe calibration	-12÷12°C /-120÷120°F	0.0/0	Pr2
P4P	Fourth probe presence	n=not present; Y=pres.	n	Pr2
O4	Fourth probe calibration	-12÷12°C /-120÷120°F	0.0/0	Pr2
OdS	Outputs delay at start up	0÷255 min	0	Pr2
AC	Anti-short cycle delay	0 ÷ 50 min	1	Pr1
rtr	P1-P2 percentage for regulation	0 ÷ 100 (100=P1 , 0=P2)	100	Pr2
CCt	Continuos cycle duration	0.0÷24.0h	0.0	Pr2
CCS	Set point for continuous cycle	(-55.0÷150,0°C) (-67÷302°F)	-5/0	Pr2
COn	Compressor ON time with faulty probe	0 ÷ 255 min	15	Pr2
COF	Compressor OFF time with faulty probe	0 ÷ 255 min	30	Pr2
CF	Temperature measurement unit	°C ÷ °F	°C/°F	Pr2
rES	Resolution	in=integer; dE= dec.point	dE /in	Pr1
Lod	Probe displayed	P1;P2	P1	Pr2
rEd[2]	X-REP display	P1 - P2 - P3 - P4 - SEt - dtr	P1	Pr2
dLy	Display temperature delay	0 ÷ 20.0 min (10 sec.)	0	Pr2
dtr	P1-P2 percentage for disply	1 ÷ 99	50	Pr2
tdF	Defrost type	EL=el. heater; in= hot gas	EL	Pr1
dFP	Probe selection for defrost termination	nP; P1; P2; P3; P4	P2	Pr2
dtE	Defrost termination temperature	-50 ÷ 50 °C	8/46	Pr1
IdF	Interval between defrost cycles	1 ÷ 120 ore	6	Pr1
MdF	(Maximum) length for defrost	0 ÷ 255 min	30	Pr1
dSd	Start defrost delay	0÷99min	0	Pr2
dFd	Displaying during defrost	rt, it, SEt, DEF	it	Pr2
dAd	MAX display delay after defrost	0 ÷ 255 min	30	Pr2
Fdt	Draining time	0÷120 min	0	Pr2
dPo	First defrost after startup	n=after IdF; y=immed.	n	Pr2
dAF	Defrost delay after fast freezing	0 ÷ 23h e 50'	0.0	Pr2
ALc	Temperat. alarms configuration	rE= related to set; Ab = absolute	Ab	Pr2
ALU	MAXIMUM temperature alarm	Set÷110.0°C; Set÷230°F	110/230	Pr1
ALL	Minimum temperature alarm	-50.0°C÷Set/ -58°F÷Set	-50/-58	Pr1
AFH	Differential for temperat. alarm recovery	(0,1°C÷25,5°C) (1°F÷45°F)	1/2	Pr2
ALd	Temperature alarm delay	0 ÷ 255 min	15	Pr2
dAO	Delay of temperature alarm at start up	0 ÷ 23h e 50'	1.3	Pr2
AP2	Probe for temperat. alarm of condenser	nP; P1; P2; P3; P4	P4	Pr2
AL2	Condenser for low temperat. alarm	(-55 ÷ 150°C) (-67÷ 302°F)	-40/-40	Pr2
AU2	Condenser for high temperat. alarm	(-55 ÷ 150°C) (-67÷ 302°F)	110/230	Pr2
AH2	Differ. for condenser temp. alar. recovery	[0,1°C ÷ 25,5°C] [1°F ÷ 45°F]	5/4	Pr2
Ad2	Condenser temperature alarm delay	0 ÷ 254 (min.) , 255=nU	15	Pr2
dA2	Delay of cond. temper. alarm at start up	0.0 ÷ 23h 50'	1,3	Pr2
bLL	Compr. off for condenser low temperature alarm	n(0) - Y(1)	n	Pr2
AC2	Compr. off for condenser high temperature alarm	n(0) - Y(1)	n	Pr2
i1P	Digital input polarity	oP=opening;CL=closing	cL	Pr1
i1F	Digital input configuration	EAL, bAL, PAL, dor, dEF, Htr, AUS	EAL	Pr1
did	Digital input alarm delay	0÷255min	5	Pr1
Nps	Number of activation of pressure switch	0 ÷15	15	Pr2
odc	Compress status when open door	no; Fan; CPr; F_C	no	Pr2
rrd	Regulation restart with door open alarm	n – Y	y	Pr2
HES	Differential for Energy Saving	(-30°C÷30°C) (-54°F÷54°F)	0	Pr2
Adr	Serial address	0÷247	1	Pr2
PbC	Kind of probe	Ptc; ntc	ntc	Pr2
onF	on/off key enabling	nu, oFF; ES	ES	Pr1
dP1	Room probe display	--	–	Pr2
dP2	Evaporator probe display	--	--	Pr2
dP3	Third probe display	--	--	Pr1
dP4	Fourth probe display	--	--	Pr1
rSE	Valore set operativo	actual set	--	Pr1
rEL	Software release	--	--	Pr2
Ptb	Map code	--	–	Pr2

[2] Only for models XR40CX–xx**2**xx, XR40CX–xx**3**xx;

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