# MODELS
# IL-MD-600/900-REF-SQ

PRODUCT MANUAL 33308

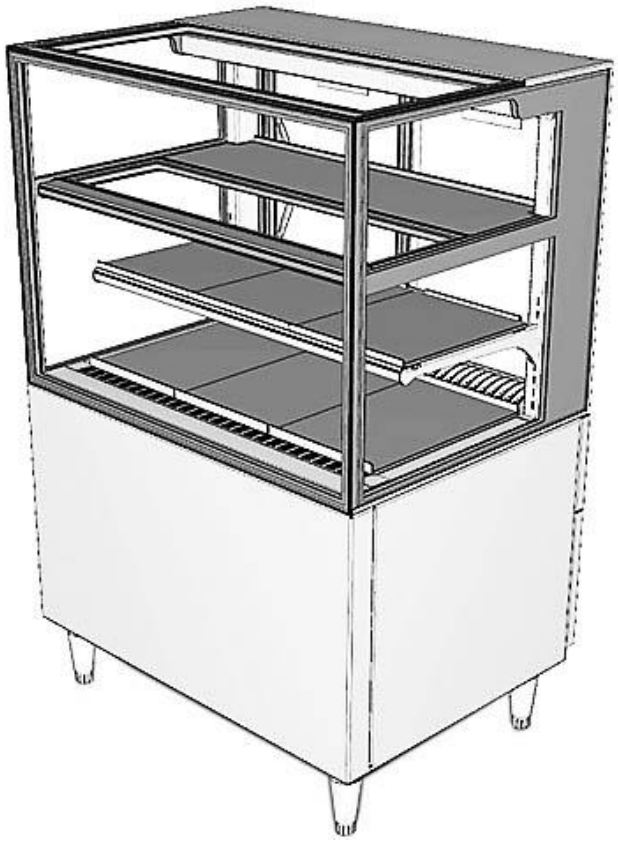
REV C OCT 2024

FPG

FPGWORLD.COM

# CUSTOM

## McDONALD'S MEA INLINE
## HORIZONTAL SPLIT CABINET
## REFRIGERATED: R-290 **VSD**



WIDTHS: 600/900mm

FIXED FRONT/SLIDING REAR DOORS

INTEGRAL REFRIGERATION

# Warnings

| | |
|---|---|
| **Operational Safety** | This appliance is not intended for use by young children or infirm persons, unless they have been adequately supervised by a responsible person, to ensure that they can use the appliance safely.<br>Young children should be supervised, to ensure that they do not play with the appliance. |
| **Function** | **This cabinet is not designated as a beverage cabinet.**<br>**It is intended to display food items, chilled in the lower section and ambient temperature in the upper section.** |
| **Caution** | **Do not store explosive substances, such as aerosol cans with flammable propellant, in this appliance.** |
| **Mains Supply Cord** | **If the supply cord is damaged, it must be replaced by the manufacturer, its service agent or similarly qualified persons, in order to avoid a hazard.** |
| **Specialist Disposal** | Specialist disposal procedures are required for the safe removal of refrigerant gasses and potentially flammable foam materials.<br>Pentane, Dimethyl Ether, Isobutene, Butane and Propane may be present. |

FPGWORLD.COM

# Table of Contents

# INTRODUCTION

## Welcome

**REFRIGERATED CABINETS - INTRODUCTION**

**Future Products Group (FPG)**

Welcome to the world of FPG! Our products are designed and engineered to give you the optimal performance that you deserve with innovative visual merchandising appeal.

We are confident that you will be delighted with your state of the art inline food service cabinet, and that it will become a valued appliance in your store.

**Guidance and Help**

Any new appliance can seem very complex and confusing at first glance. To ensure you receive the utmost benefit from your new inline cabinet, there are two things you can do.

- Before operating the cabinet, please read the instruction book carefully and follow its recommendations. The time taken will be well spent. These instructions both general and technical tell you how to install, operate and look after your inline food service cabinet so that you can receive the full benefits that this cabinet has to offer.
- These instructions cannot, however, cover all eventualities. If you are unsure of any aspect of the installation, instructions or performance of your cabinet, contact your dealer promptly or contact us via email to support@fpgworld.com.

## Warranty

**REFRIGERATED CABINETS - INTRODUCTION**

**Warranty Period**

Future Products Group Limited warrants, to the original purchaser of an FPG manufactured food service cabinet, that for TWO YEARS (24 months) from the date of purchase, any defect in workmanship or material resulting in the product malfunctioning while under correct use will be rectified.

For refrigerated cabinets with integral or near-remote refrigeration the warranty is extended to THREE YEARS (36 months), for refrigeration condenser units. Conditions apply, see Liability Exceptions.

Liability under this warranty is limited to replacing or repairing a part, without charge.

*Continued on next page*

# Warranty cont.

**REFRIGERATED CABINETS - INTRODUCTION**

| | |
|---|---|
| **Liability Exceptions** | Liability under this warranty does not include:<br>• Any loss, damage, or expenses directly or indirectly arising from the use of, or inability to use, the product or from any other cause.<br>• Any part of the cabinet which has been subject to misuse, neglect, alteration, incorrect installation, accident, or damage caused by transportation, use of abrasive or caustic chemicals, flood, fire or acts of God.<br>• Damage, resulting from failure to have the cabinet regularly serviced by a refrigeration engineer:<br>  ○ For cabinets with integral or near-remote refrigeration, every three months. NB: You will be required to provide copies of service records in the event of condenser failure.<br>  ○ For cabinets with remote refrigeration, annually.<br>• Any damage or malfunction, resulting from the use of non-FPG supplied spare parts. |
| **Specific Exclusions** | The following are specifically excluded from warranty:<br>• Breakage of glass or plastic components, or the replacement of LED lighting assemblies or gaskets.<br>• Maladjustment of the electronic refrigeration controller, by an unqualified person.<br>• For cabinets with integral or near-remote refrigeration, failure resulting from a lack of routine condenser / radiator cleaning.<br>• Failure to re-assemble the cabinet correctly after cleaning.<br>• Fair wear and tear. |
| **Assessment** | The liability under this warranty is dependent on an assessment by FPG, to determine the defect in workmanship or materials. |
| **Time Limit** | FPG does not guarantee that any service to be performed under this warranty will be carried out within any particular time limit. |
| **Caution** | **FPG will not be held responsible for any servicing costs incurred prior to FPG's acceptance of a warranty claim.** |

# OPERATION

## Cabinet Layout

**REFRIGERATED CABINETS - OPERATION**

**Square Series Cabinets**

This Square Series cabinet has a refrigerated main section, with an upper ambient temperature section.

The cabinet has fixed front glass, and rear sliding doors.

The cabinet is Free Standing, with an integral condenser unit.

Condensate is piped to an internal ACR unit.

**Shelf Lighting**

Cabinets are fitted with a top light and lights below each shelf.

Cabinets are fitted with high efficiency LED lighting.

**Shelves**

The lower shelf and base trays are made from stainless steel.

The upper section base is fixed in position.

It is made from coated PVC, and part double glazed glass.

This insulates the upper, ambient section from the chilled lower section.

## Controls

**REFRIGERATED CABINETS - OPERATION**

**Power, Lights and Refrigeration Controller**

The refrigeration controller features a touch-screen display.

The controller regulates the cabinet temperature and controls the automatic defrost cycles.


**Keyboard Lock**

The keyboard is normally locked to prevent accidental parameter changes.

To activate/deactivate the keyoard lock, simply touch all four keys at the same time until the display shows “Loc”/”UnL”, respectively.

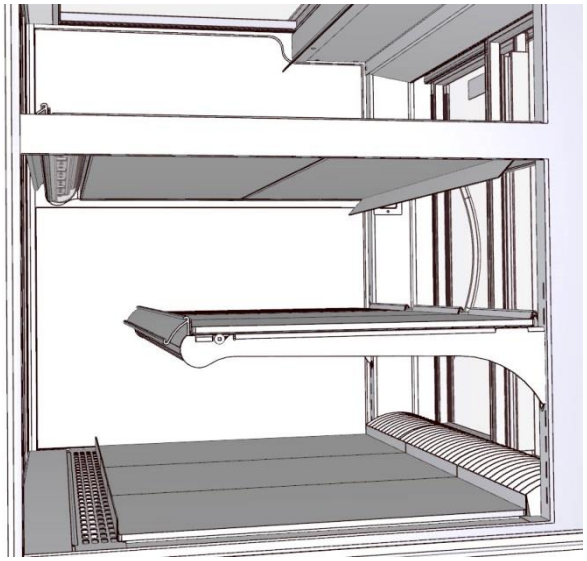
When a key is touched with the keyboard locked, the display shows “Loc”.

The keyboard is automatically locked after 60s of inactivity.

# Preparation

**REFRIGERATED CABINETS - OPERATION**

**Shelf Location and Ticketing**



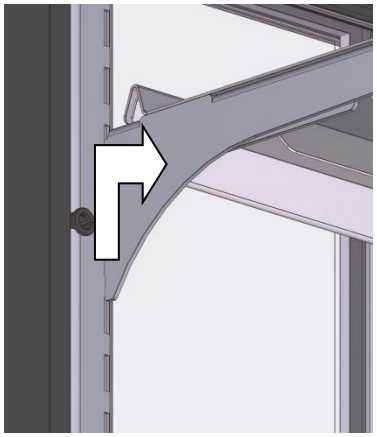
The top base position is fixed.

The lower shelf position is adjustable in height and can easily be moved up or down, to match product size.

The movement is restricted to 50mm, because of the electric cables to the lights. For greater movement contact the manufacturer or supplier for advice, as electrical modifications may be required.

The front and rear edges of the shelves are profiled to carry ticketing/labels.

**Shelf Adjustment**



To move the shelf brackets, first remove the shelf trays.

Lift the brackets straight up firmly and then pull the brackets forward, to disengage them from the slots in the support posts.

Insert the brackets into their new position, and push bracket down firmly.

The brackets may be positioned to give two different degrees of slope to the shelf.

Refit the shelf trays and doors.

**N.B.** *Make sure brackets are pushed down as far as they can go. Failure to do this may result in shelf collapse, when loaded with product.*

**Turn on Refrigeration**

The refrigeration condenser will run as soon as the cabinet main switch is turned ON, and the cabinet temperature will begin to fall.

The temperature controller is pre-set to maintain the lower section temperature at 2° - 4° C, and should not need adjustment.

*Continued on next page*

## Preparation cont.

**REFRIGERATED CABINETS - OPERATION**

**Switch Power and Lights**


The temperature controller is pre-set to maintain the cabinet temperature between 2°C and 4°C. It should not need adjustment.

Press the power button for 5s to toggle the cabinet ON OFF.

Press the light button until "Lit" displayed then for 1s to toggle the lights ON and OFF.

**Load Cabinet**

After the cabinet has run for a 30 minute initial cool-down period, load it with pre-chilled products.

The cabinet is designed to maintain the temperature of pre-chilled products.

**If warm product is introduced, there could be a delay before the temperature falls to the normal operating level.**

**Loading Restrictions**

It is important to leave adequate free space for the refrigerated air to circulate within the cabinet.

Allow at least 40mm above canned drinks, or other cylindrical containers.

The air grills at the front of the cabinet must not be covered or restricted.

**Embraco Sync Information**

***Contact FPG for more information about the controller, and to obtain passwords, which may be required to alter settings.***

## Routines

**REFRIGERATED CABINETS - OPERATION**

**After Hours**

Ideally, cabinets should not be turned off after hours or at night. Products can either be left in the cabinet or placed in night storage. Shut the cabinet doors and turn off the lights. The cabinet will then operate on minimum load, and stay cold, ready for instant operation when next required.

If the cabinet is turned off, allow it to run for about half an hour before replacing the pre-chilled products.

**Cleaning**

Since the cabinet needs to be switched off during cleaning operations, it is best to clean it at the end of the working day. The cabinet will then have time to recover its normal operating temperature, before replacing the products.

# CLEANING

## Cautions

**REFRIGERATED CABINETS - CLEANING**

| | |
|---|---|
| **Power** | **ALWAYS TURN THE POWER SUPPLY OFF BEFORE CLEANING.** |
| **Water** | THIS UNIT IS NOT WATERPROOF. DO NOT USE A WATER JET SPRAY TO CLEAN THE INTERIOR OR EXTERIOR OF THIS CABINET. |

## Procedures

**REFRIGERATED CABINETS - CLEANING**

| | |
|---|---|
| **McDonald's Standard Procedures** | McDonald's Planned Maintenance, PM cards, should be followed for all regular cleaning procedures. |

**Sliding Doors**

Sliding glass doors are located by plastic guides at the top and bottom.

The doors can be removed for cleaning by sliding the door to a central position, placing hands either side of the door, lifting it up and then swinging it out at the bottom.

When replacing doors, make sure that they are located in the correct slots, top and bottom. The left door should be in the inner slots, and the right door in the outer slots.

Sliding door tracks should be vacuumed out regularly to keep doors sliding freely.

*Continued on next page*

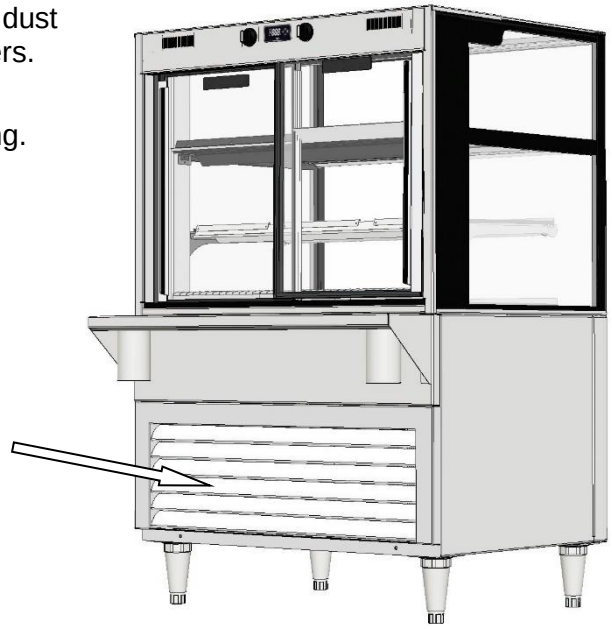
## Procedures cont.

**REFRIGERATED CABINETS - CLEANING**

**Louvers**

Use a vacuum cleaner to remove dust and fluff from the ventilation louvers.

This will maintain the refrigeration efficiency, and prevent overheating.



**Removable Parts**

All of the parts shown above can be removed for cleaning with McD APSC. Stainless steel parts **only** may be cleaned in a dishwasher.

Remove the doors, by sliding them to the centre and lifting, to disengage them from the door tracks.

*Continued on next page*

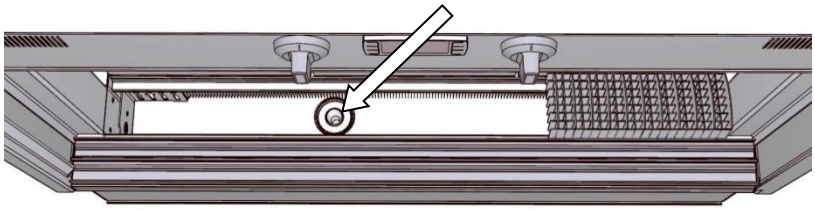
# Procedures cont.

**REFRIGERATED CABINETS - CLEANING**

**Cleaning the Base Cavity**

Remove two screws to release the fan deck and coil cover.

Sweep out, or use a vacuum cleaner, to remove any debris from the cabinet base cavity. **Make sure that the condensate drain hole is clean.**



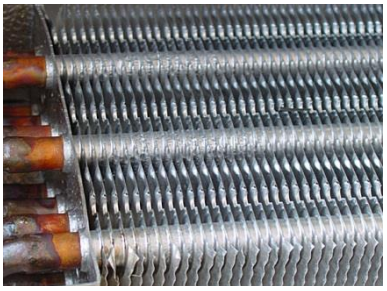
A Wet-and-Dry vacuum cleaner should be used, since there is likely to be some water in the bottom. Finally, wipe out the bottom with a damp sanitized cloth.

**Do not pour water into the base, or the condensate container will overflow.**

**Cooling Fins**

If there is food lodged in the cooling fins, it is best to use a wet and dry vacuum cleaner to suck out the food. DO NOT attempt to hose food parts from fins.

**Caution:** The fins are very sharp. Take extra care when cleaning this area. Do not bend the fins over, as this would restrict the air flow and degrade cabinet performance.



**Temperature Probes**

Take care not to damage or move the temperature probes, when cleaning the cooling fins. One probe is located on the fan side of the cooling coil, in free air. A second probe is inserted between the fins of the cooling coil on the air exit side.

**Do NOT move the probes.**

**Condensate Container**

The condensate container is only designed to handle cooling-coil defrosting liquid that drains from the well.

**DO NOT fill the well with liquid, or attempt to hose out as condensate container will overflow and leak onto floor.**

# Routines

**REFRIGERATED CABINETS - CLEANING**

**Schedules**

To maintain optimum performance, regular cleaning schedules should be established, as specified in the McDonald's PM card.

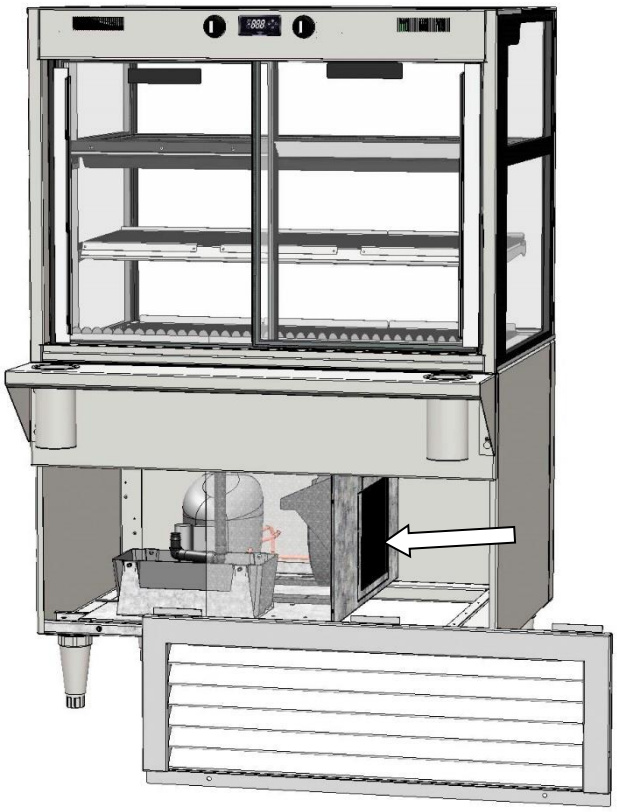
**Failure to carry out routine cleaning/servicing schedules will void the warranty on the refrigeration equipment.**

**Condenser Assembly**

For efficient refrigeration performance, the condenser radiator must be kept clean. Failure to do this will lead to a build-up of dust, and restricted airflow will prevent the unit from working properly. The compressor may overheat and the cabinet temperature may rise.

**Regular vacuuming will prevent a build-up of dust and fluff, however, three monthly service checks by a refrigeration engineer, which include cleaning the condenser with compressed air, are mandatory.**

Be very careful not to bend or damage the soft aluminium fins when vacuuming the radiator. If the fins are flattened, airflow will be restricted and overheating will result.



**NOTE: The condenser assembly is rotated to face the back on the 600mm cabinet.**

# INSTALLATION

## Regulations

REFRIGERATED CABINETS - INSTALLATION

**Compliance with Local Requirements**

It is very important that your inline food cabinet is installed correctly and that the operation is correct before use. Installation must comply with local electrical, health & safety and hygiene requirements.

## Setting Up

REFRIGERATED CABINETS - INSTALLATION

**Unpacking**

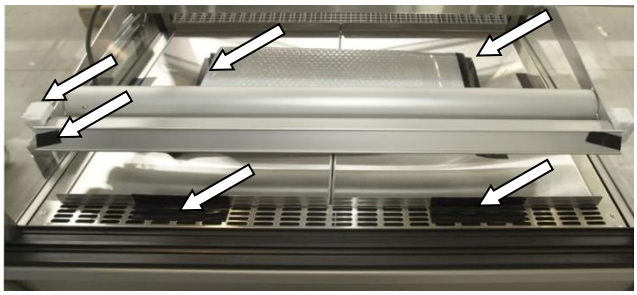
Unpack and check unit for damage and report any damage to the carrier and supplier. Report any deficiencies to your supplier.

The display cabinet is supplied fully assembled, but shelf trays, inserts and rear shelf are packed separately.

**Level the Cabinet**

Using a spirit level, adjust the feet to ensure the cabinet is level from side to side and front to back. (If this is not carried out, water may accumulate in the cabinet well, and uneven temperature distribution could also occur).

**Cabinet Preparation**



Remove all protective plastic film, tapes, ties and packers, used to prevent movement during transit.

Lift out the deck trays to gain access to the cabinet well. Be sure to replace them as shown.

**Shelves trays and Rear Shelf**

Assemble the shelf trays and inserts on the support members.
Fit the rear shelf and inserts, using the key-hole slots and pre-fitted machine screws.

**Grounding**

**WARNING: THIS APPLIANCE MUST BE GROUNDED TO EARTH**

The grounding lead, in the mains cable, must always be connected to earth.

**Power Supply**

Before connecting to the power supply, check that the local supply is correct to that shown on the rating plate, located on the rear of the cabinet.

# SPECIFICATIONS

## Mechanical

**REFRIGERATED CABINETS - SPECIFICATIONS**

| | CABINET MODEL | |
|---|---|---|
| | **IL-MD-600-REF-SQ** | **IL-MD-900-REF-SQ** |
| Height | 1353 (-0+30) mm | 1353 (-0+30) mm |
| Width | 600 mm | 900 mm |
| Depth | 664 mm (+150mm shelf) | 664 mm (+150mm shelf) |
| Dry Weight | Approx. 110 kg | 170 kg |
| Cabinet Well Material | Stainless steel | |
| Cabinet Colour | Black and natural anodised aluminium. | |
| Top Lighting | Standard | Standard |
| Shelf Lighting | Standard | Standard |
| Glass Type | Double glazed | Double glazed |
| Front Doors | Fixed glass | Fixed glass |
| Rear Doors | Sliding glass | Sliding glass |
| Number of Shelves | Two plus base | Two plus base |
| Ambient Display Area | 0.27 $m^2$ | 0.4 $m^2$ |
| Chilled Display Area | 0.45 $m^2$ (including base) | 0.6 $m^2$ (including base) |
| Refrigerant | R-290 | R-290 |
| Refrigerant charge | see Rating Label | see Rating Label |
| Condensate capacity | 3 litres | 3 litres |
| Climatic Class & IP | All cabinets are suitable for class N climates and have an IP X3 rating | |

## Electrical

**REFRIGERATED CABINETS - SPECIFICATIONS**

| | CABINET MODEL | |
|---|---|---|
| | **IL-MD-600-REF-SQ** | **IL-MD-900-REF-SQ** |
| Voltage | 220 - 240 V 50/60 Hz 1ϕ | 220 - 240 V 50/60 Hz 1ϕ |
| Power | 419 W max | 500 W max |
| Current (max) | 1.82 A | 2.18 A |
| Energy Consumption | 0.09 kWh/h | 0.09 kWh/h |
| Connection | 3 pin plug, 10 A lead | 3 pin plug, 10 A lead |
| Temperature Range | 2° - 4° C Lower Section<br>Ambient Upper Section | 2° - 4° C Lower Section<br>Ambient Upper Section |
| Top Lights | 1 x LED strip | 1 x LED strip |
| Shelf Lights | 2 x LED strips | 2 x LED strips |

## Controller Settings

REFRIGERATED CABINETS - SPECIFICATIONS

| Parameter | Description | Settings | | Units/Range |
|---|---|---|---|---|
| | | 600 | 900 | |
| t00 | Set Point | 3 | 3 | deg C |
| t01 | Hysteresis | 2 | 2 | deg C |

## Compliance

REFRIGERATED CABINETS - SPECIFICATIONS

**Safety Aspects**

This cabinet has been designed to comply with the relevant requirements of the following specifications:

- IEC 60335-1 Ed 5.2 : Household and similar electrical appliances – Safety-General Requirements.
- IEC 60335-2-89 Ed 2.2 : Particular requirements for commercial refrigerating appliances with an incorporated or remote refrigerant unit or compressor.

**Operational Safety**

This appliance is not intended for use by young children or infirm persons, unless they have been adequately supervised by a responsible person, to ensure that they can use the appliance safely.

Young children should be supervised, to ensure that they do not play with the appliance.

**Performance Aspects of Refrigerated Cabinets**

The cabinet is HACCP compliant, with the following performance:

| Cabinet Operating Temperature | Average Internal Humidity | Test Conditions |
|---|---|---|
| +2° to +4°C | 70% RH | 25°C Ambient with 60% RH |

## Improvements

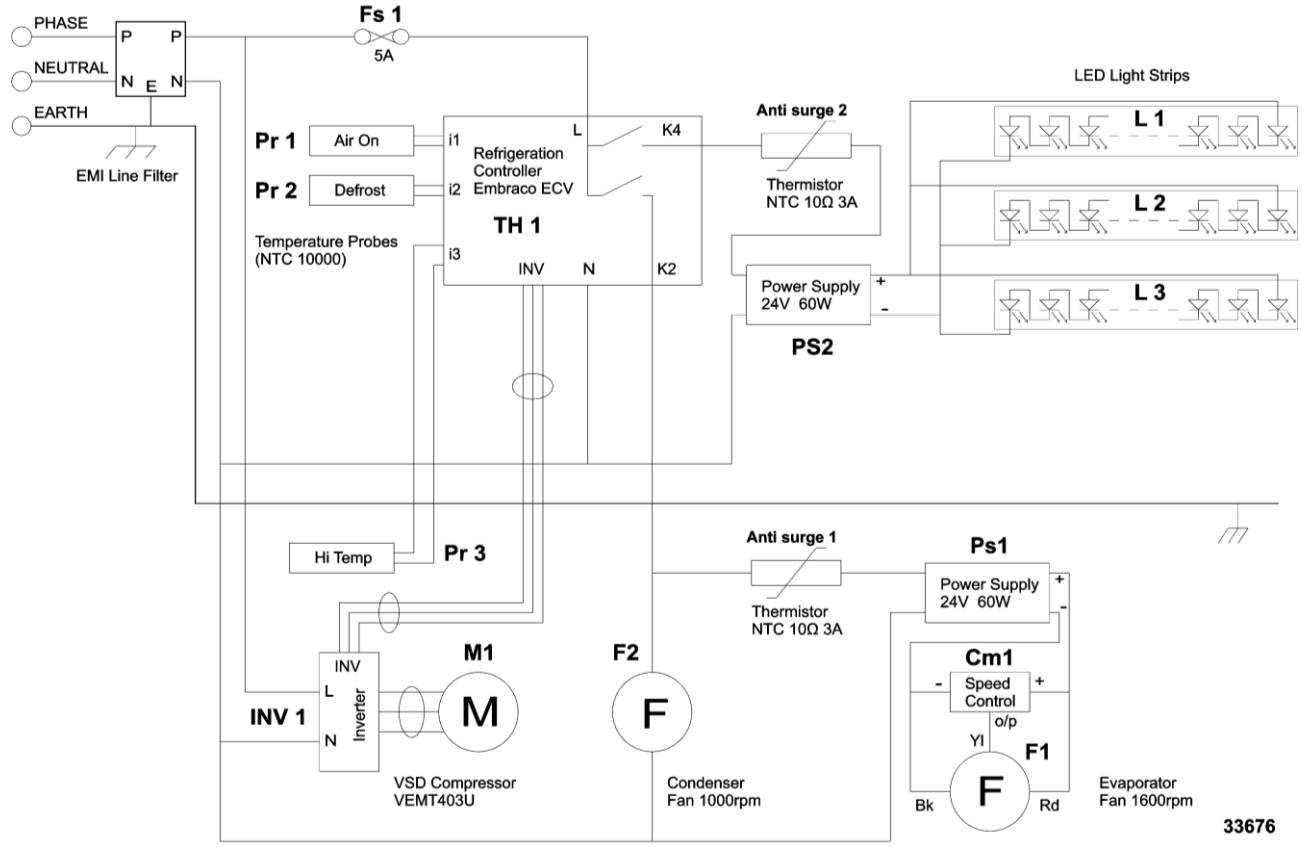
REFRIGERATED CABINETS - SPECIFICATIONS

**Ongoing Development**

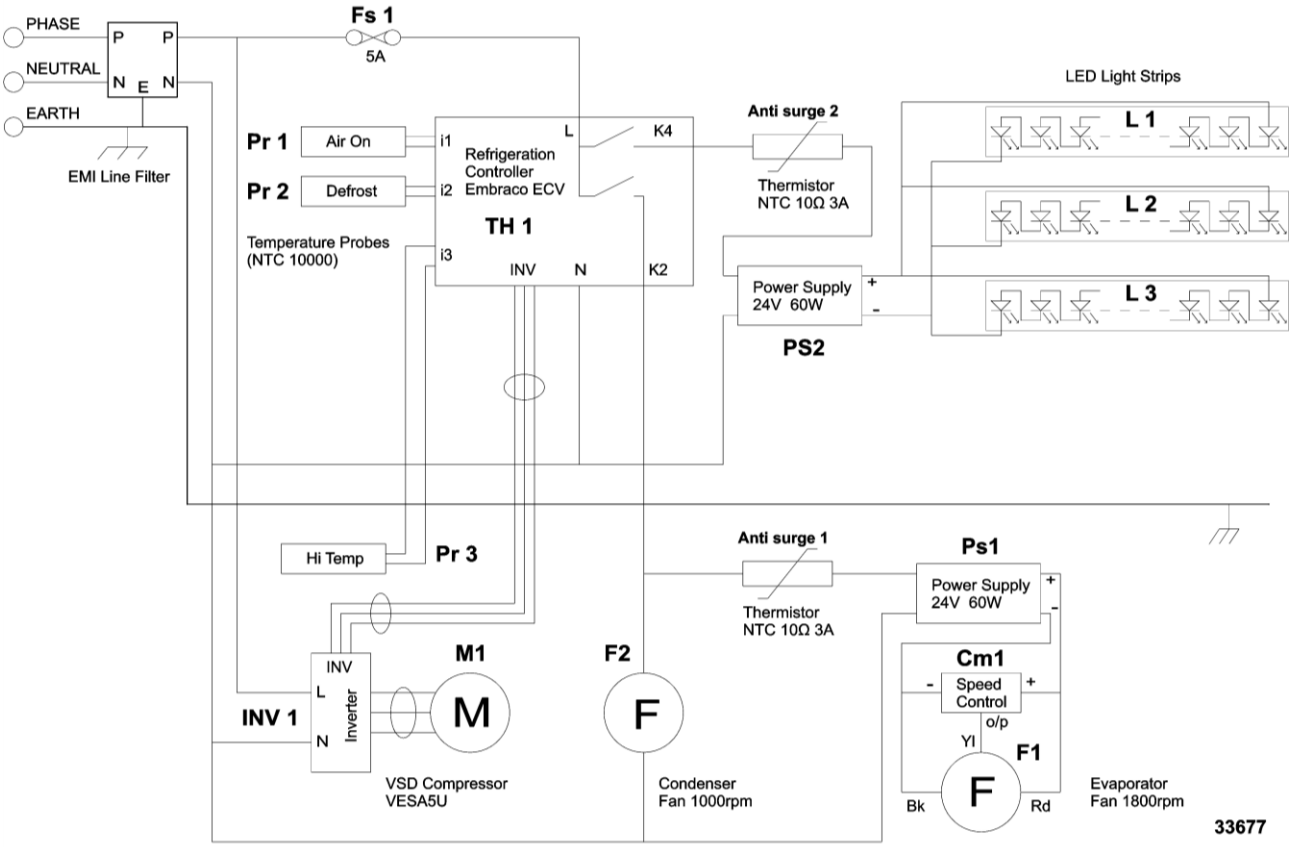
FPG reserves the right to change specifications and construction, as part of ongoing product improvement.

# ELECTRICAL CIRCUIT DIAGRAMS

**Model: IL-MD-600-REF-SQ** **Square Format Series, 600mm Refrigerated Horizontal Split Cabinet**




**Model: IL-MD-900-REF-SQ** **Square Format Series, 900mm Refrigerated Horizontal Split Cabinet**



FPGWORLD.COM

# SPARE PARTS

**Cabinet Serial Number**

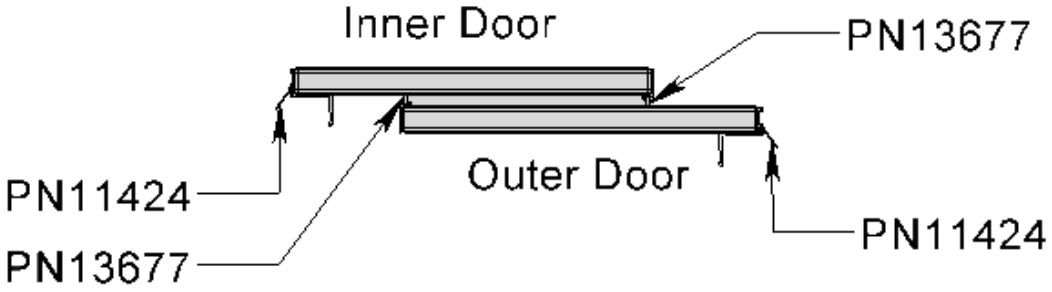
When ordering spare parts, it is important to quote the Serial Number printed on the label fixed to the control panel. This will enable FPG to trace details of the build specification of your particular cabinet, and hence ensure that spare parts are fully compatible.

**To satisfy warranty conditions, and ensure optimum performance, use only FPG supplied spare parts.**

| Part Description | FPG Part No. |
|---|---|
| Fuse Link (5A, 250V, Slow Blow)* | 13330 |
| Ant-surge Thermistor 10 Ohm 3A* | 22354 |
| 24V 60W LED power supply* | 25473 |
| Polycarbonate Top Light Cover, (600 cabinet) | 25222 |
| Polycarbonate Top Light Cover, (900 cabinet) | 25223 |
| Polycarbonate Divider Shelf Light Cover, (600 cabinet) | 32907 |
| Polycarbonate Divider Shelf Light Cover, (900 cabinet) | 32908 |
| Polycarbonate Shelf Light Cover, (600 cabinet) | 33693 |
| Polycarbonate Shelf Light Cover, (900 cabinet) | 33694 |
| Top Light Replacement Kit, (600 cabinet) | 78257 |
| Top Light Replacement Kit, (900 cabinet) | 78259 |
| Divider Shelf Light Replacement Kit, (600 cabinet) | 78292 |
| Divider Shelf Light Replacement Kit, (900 cabinet) | 78297 |
| Bottom Shelf Light Replacement Kit, (600 cabinet) | 78275 |
| Bottom Shelf Light Replacement Kit, (900 cabinet) | 78260 |
| Embraco Sync Controller **(Frequency Coms 600/900 cabinets)*** | 78792 |
| Embraco Sync Controller **(Serial Coms 600/900 cabinets)*** | 78793 |
| NTC temperature probe (Black, Defrost)* | 79029 |
| NTC temperature probe (Red, Hi Temp)* | 79031 |
| NTC temperature probe (Green, Air On)* | 79028 |
| Evaporator fan 24V dc * | 32378 |
| Condenser fan 200mm 1000rpm* | 78498 |
| Embraco VEMT403U inverter/compressor (600 cabinet)* | 33473 |
| Embraco VESA5U inverter/compressor (900 Cabinet)* | 33214 |

***Recommended Spare Parts to be carried by Service Provider**

**Door Seals**

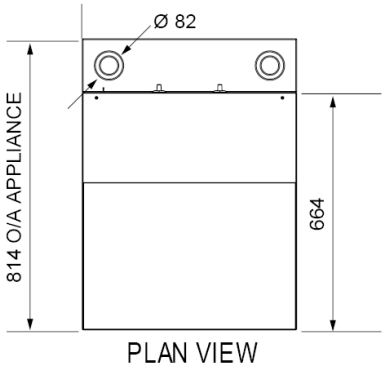


| Part Description | FPG Part No. |
|---|---|
| ***All glass parts are double glazed***<br>***Handed parts are identified as viewed from the rear of the cabinet*** | |
| MD 600/900 LH End Glass Replacement Kit* | 75181 |
| MD 600/900 RH End Glass Replacement Kit* | 75180 |
| MD 600 Ref Front Glass Replacement Kit* | 75142 |
| MD 900 Front Glass Replacement Kit* | 75179 |
| MD 600 Ref Top Glass Replacement Kit* | 75182 |
| MD 900 Top Glass Replacement Kit* | 75183 |
| Shelf Front Air Baffle Panel, (600 cabinet)* | 73319 |
| Shelf Front Air Baffle Panel, (900 cabinet)* | 73363 |
| Divider shelf glass insert, (600 cabinet)* | 27150 |
| Divider shelf glass insert, (900 cabinet)* | 26892 |
| Rear Inner Sliding Door, (600 cabinet)* | 71909 |
| Rear Inner Sliding Door, (900 cabinet)* | 71006 |
| Rear Outer Sliding Door, (600 cabinet)* | 71910 |
| Rear Outer Sliding Door, (900 cabinet)* | 71007 |
| Slide-in rubber door seal | 11424 |
| Qlon door seal | 12922 |
| Rear vane flap replacement kit, (600 cabinet)* | 75568 |
| Rear vane flap replacement kit, (900 cabinet)* | 75567 |
| Plastic Air Grille* | 12480 |
| Black Acrylic Base Tray (600 cabinet) | 27152 |
| Black Acrylic Shelf Tray (600 cabinet) | 29507 |
| Bamboo Base Tray (600 cabinet) | 28656 |
| Bamboo Shelf Tray (600 cabinet) | 29906 |
| Black Acrylic Base Tray (900 cabinet) | 26581 |
| Black Acrylic Shelf Tray (900 cabinet) | 29367 |
| Bamboo Base Tray (900 cabinet) | 29499 |
| Bamboo Shelf Tray (900 cabinet) | 29500 |
| Tumbler/Tong Holder, Stainless Steel 100 x 80mm | 30513 |
| | |
| Product Manual for Square Format Refrigerated R290 VSD | 33308 |

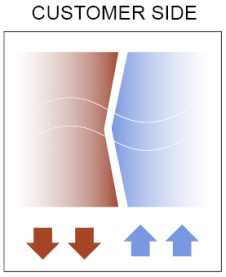
***Recommended Spare Parts to be carried by Service Provider**

# MECHANICAL DRAWINGS

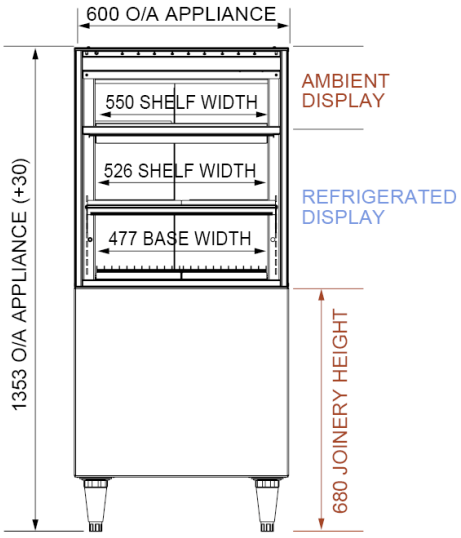
**Model: IL-MD-600-REF-SQ-B100-01**



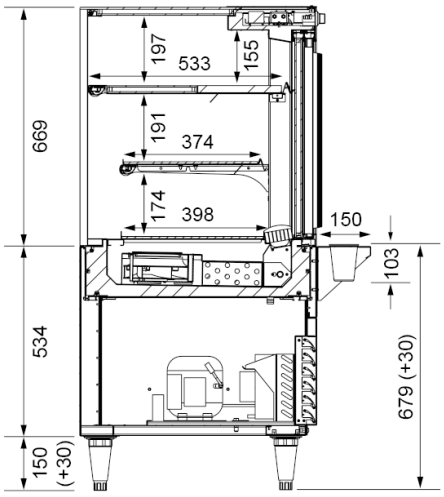

PLAN VIEW



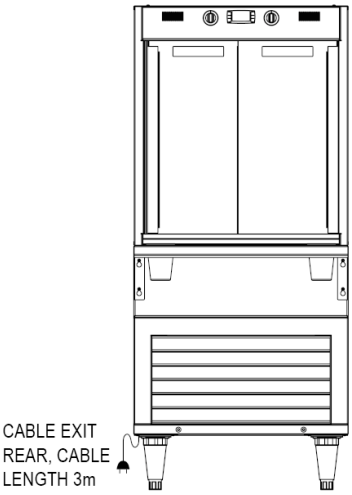

PLAN VIEW - AIRFLOW
FREEFLOW AIR TECHNOLOGY




FRONT ELEVATION

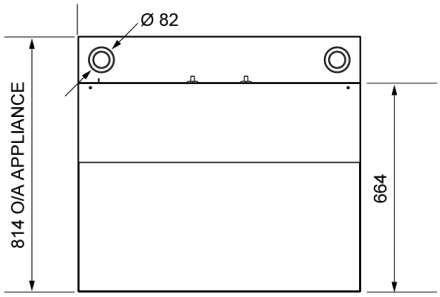



SECTION VIEW

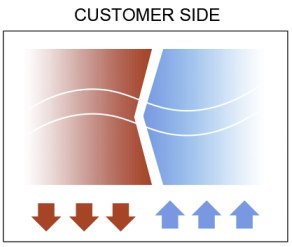



REAR ELEVATION

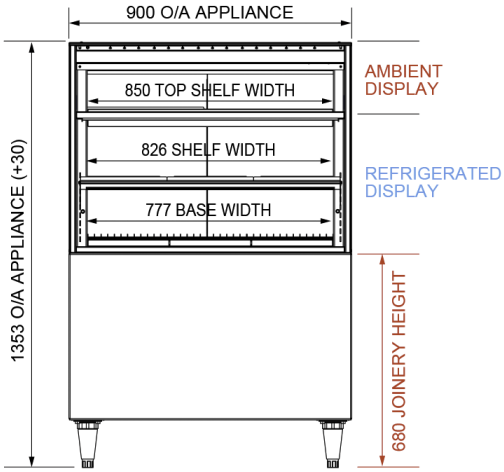
**Model: IL-MD-900-REF-SQ-B100-01**



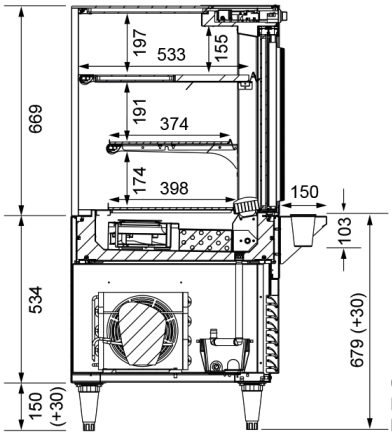

PLAN VIEW



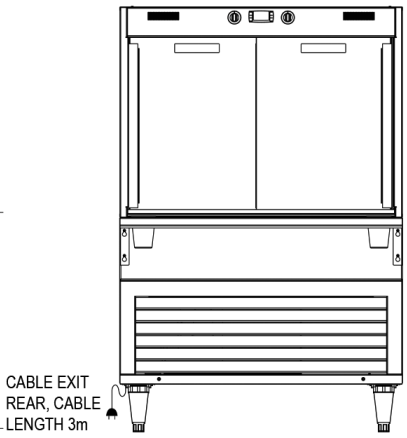

PLAN VIEW - AIRFLOW
FREEFLOW AIR TECHNOLOGY




FRONT ELEVATION




SECTION VIEW




REAR ELEVATION

FPGWORLD.COM

# APPENDIX A
# R-290 Refrigerant

## General Guidance

**REFRIGERATED CABINETS - APPENDIX A**
**R-290 Refrigerant**

| | |
|---|---|
| **R-290** | R-290 is the name for refrigerant grade high purity odorless propane.<br>**It is NOT barbeque grill propane.**<br>PROPANE IS HIGHLY FLAMMABLE. You MUST observe caution and proper safety practices when servicing equipment with R-290.   |
| **Servicing** | Servicing refers to making repairs to the hermetically-sealed system and any parts of the electrical system. |
| **Specialized Training** | Although not mandatory, specialized training of service personnel is desirable. |
| **Environment** | Repair on R-290 equipment should always be done in a well ventilated area. |
| **Gas Detector** | Because R-290 is highly flammable, an electronic combustible gas leak detector is required when servicing R-290 systems. |
| **Replacement Parts** | When opening any refrigeration system, the filter/dryer must be replaced with the manufacturers specified spare part. |
| **Fault Diagnosis** | Since there are no access fittings on R-290 systems, temperatures and current draw must be used to evaluate system performance. |
| **Check List** | Before proceeding with servicing, check the following:<br>**MONITOR**: make sure the combustible-gas meter is on and in proper position.<br>**VENTILATE**: make sure there is adequate ventilation in the work area.<br>**ELIMINATE**: make sure to eliminate any potential ignition sources. |

# Servicing

**REFRIGERATED CABINETS - APPENDIX A**
**R-290 Refrigerant**

**Gas Monitor**

Before entering any service area that may have hydrocarbons, always turn on a combustible gas monitor to alert you to the presence of flammable refrigerants while you are working.

Do not turn the combustible gas monitor off until you leave the service area.

**Ignition**

Do not unplug, disconnect power to, or begin servicing a system before checking for flammable refrigerants with the combustible gas monitor.

Sparks from unplugging or power disconnects could ignite flammable refrigerants.

**Danger Sign**

Display a Danger Propane placard to alert all that you are working on a R-290 system.

**No open flames or smoking is allowed.**

Instruct anyone in the immediate area the nature of the work taking place.
Be aware that E-cigarettes or similar electronic devices could be a source of ignition.


**Fire Extinguisher**

An approved fire extinguisher is required when servicing a system that contains a flammable refrigerant.

**Access Fittings**

Since access fittings are not supplied on any R-290 systems. Before adding access-fittings you should check temperatures and amps and contact FPG for guidance on fault finding.

**Electrical Connectors**

Wire nuts are not approved for R-290. All connectors must be UL approved for use with Hydrocarbons.

Wire connectors must have sufficient strength to hold the conductor/wire in place.

**Replacement Components**

When replacing components, ignition-proof sealed electrical components are required.

To avoid using unapproved parts, only FPG replacement parts are to be used on a R-290 system.

# Tools

**REFRIGERATED CABINETS - APPENDIX A**
**R-290 Refrigerant**

**Basic Tools**

Use the same basic refrigeration tools as for R404-A & R-134a refrigerant.

**Required Tools**

| | | | |
|---|---|---|---|
|  | Combustible gas leak detector (Inficon Gas Mate) or equal |  | Propane warning notice |
|  | Tubing cutter |  | Approved fire extinguisher (Class B dry powder type) |
|  | Vacuum gauge |  | 30cm charging hose (low Loss design) |
|  | Ball charging valves (3) |  | Gram scale |
|  | Tap valves 1/4” (2) |  | Digital thermometer |
|  | Pinch off tool (2 |  | Venting hose |

## Leak Checking

**REFRIGERATED CABINETS - APPENDIX A**
**R-290 Refrigerant**

**Warning**

Do NOT use any leak test dyes when working on an R-290 refrigeration system.

**Detection Methods**

- Bubble test.
- Electronic combustible gas detection.
- Nitrogen holding pressure test (only possible on accessed systems).

For the most part, you would leak check a R-290 system the same way you would a R-134a or R-404A system with a couple of exceptions.

You cannot use a halide leak detector on an R-290 system, the electronic leak detector must be designed specifically for combustible gas.

Using oxygen-free dry nitrogen with a trace gas not exceeding 150PSIG is also recommended.

## Accessing the Refrigeration System

**REFRIGERATED CABINETS - APPENDIX A**
**R-290 Refrigerant**

**Installing Piercing Valves**

Line tap valves can be used to access the refrigeration system. Line tap valves should be temporarily placed on the suction and liquid process tubes.

**IMPORTANT:** Never leave piercing valves of any type on the R-290 refrigeration system. This would void the warranty.

**Procedure**

| | |
|---|---|
| Make sure the cabinet is disconnected from the power source.<br>Wear safety glasses and gloves (rubber coated are best). |  |
| Turn the combustible-gas leak detector “ON”.<br>Refer to the manufacturer’s instructions for the detector you are using. |  |
| Post the warning notice in plain view for all to see on the front and rear of the refrigeration appliance. |  |
| Remove the red sleeves on the suction and liquid line process tubes.<br>Install the piercing valves following manufacturer’s instructions.<br>Red sleeves must be replaced when done servicing. |  |

# Recovering Refrigerant



**Recovery Machines**

Recovery machines for use with hydrocarbon refrigerants are in limited production.

**Only an explosion proof recovery machine can be used to recover**.

**Procedure Without Machine**

1. Evacuate an empty recovery cylinder into a vacuum.
2. Using an accurate refrigerant scale, zero out the refrigerant scale and weigh the empty recovery cylinder prior to adding refrigerant gauges or hoses. Note this weight.
3. Securely connect the evacuated cylinder to the refrigeration system using refrigerant gauges and hoses.
4. Open both refrigerant gauges to allow refrigerant to flow through the gauges to the recovery cylinder. You must evacuate from both sides.
5. Once the pressures have equalized, valve off the refrigerant gauges and the recovery cylinder securely.
6. Carefully remove the refrigerant hose from the recovery cylinder.
7. Zero out the refrigerant scale and weigh the recovery cylinder. Note this weight.
8. Subtract the empty tank weight recorded from the cylinder now containing the refrigerant. This will be the amount recovered.
   **NOTE**: You can check Serial Label to verify any leak.
9. A recovery cylinder containing R-290 can be vented outdoors.
   See “Venting R-290” for instructions on venting R-290.
10. After venting the refrigerant, purge the recovery cylinder with nitrogen at a flow rate of 5PSIG through the liquid port of the recovery cylinder for 2 minutes outdoors, 3 metres away perimeter from any structures or ignition sources.
11. Repeat steps 1-9 until the recovery cylinder and the system equalize into a vacuum.

**NOTE:** Trace amounts of R-290 will remain trapped in the POE oil of the compressor.

## Venting R-290

**REFRIGERATED CABINETS - APPENDIX A**
**R-290 Refrigerant**

**Venting Procedures**

1. Do NOT vent hydrocarbon refrigerants inside a building under any circumstance (SAFETY RISK).
2. Venting hydrocarbon refrigerants to a public area or where people are unaware of the procedure is not permitted.
3. When venting R-290 YOU MUST make everyone in the immediate area aware that you are venting a flammable gas to the atmosphere.
4. Ensure there are no ignition sources within a 10 ft. perimeter of the area you are venting R-290. Be aware that E-cigarettes or similar electronic devices could be a source an ignition.
5. Ensure that all local legislation/regulations addressing safety of hazardous or flammable substances are satisfied.
6. Ensure you are not venting R-290 into a low-lying area. R-290 is heavier than air and can accumulate in floor drains, grease traps, piping troughs, etc.
7. After venting, purge with Nitrogen through the system for a minimum of 10 seconds.

## System Evacuation

**REFRIGERATED CABINETS - APPENDIX A**
**R-290 Refrigerant**

**Preliminary Tasks**

Prior to sealing up the system make sure you have a sufficient amount of service access tubing remaining for service in the future.

1. Remove the crimped tubing and piercing/saddle valve from the process tube.
2. Extend the process tube a minimum of 30cm.
3. Crimp and braze the process tube extension.
4. Install piercing/saddle valve just before last crimp.

After the system has been sealed and leak checked, it is necessary to evacuate it in order to remove air, moisture, and unwanted residual refrigerant.

**NOTE**

**Technician must use tube cutter instead of torch when removing refrigeration system components.**

## System Evacuation cont.

**REFRIGERATED CABINETS - APPENDIX A**
**R-290 Refrigerant**

**Evacuation Procedure**

1. It is necessary to purge the system with nitrogen. This is necessary to prevent flammable mixtures from occurring.
2. When connecting the hoses between the system, gauge manifolds, and vacuum pump, ensure that the connections are secure and there are no potential ignition sources nearby.
3. Ensure that the pump discharge is in an area free of potential ignition sources.
4. Ensure that a micron gauge is used since conventional manifold gauges may not provide a proper reading.
5. The system should be evacuated to the desired pressure (typically 250 microns or less) and then left to stand for 15 minutes to ensure that the entire refrigerant charge has been removed from the oil and any residual moisture has been evaporated from the system.
6. Ensure that the vacuum pump is of good quality and of appropriate capacity for the system, and the oil level is correct.

## Charging the System

**REFRIGERATED CABINETS - APPENDIX A**
**R-290 Refrigerant**

**WARNING** **Dial-a-charge cylinders, with a sight glass, should not be used to charge systems with flammable refrigerant.**

**Precautions**

Although charging procedures are similar to those used with any other type of refrigerant, the following considerations are important for R-290:

- Prior to charging, ensure the system has been leak checked.
- Hoses or lines must be as short as possible to minimize the amount of refrigerant contained in them.
- Evacuate the hoses and manifold prior to charging to avoid contamination of the refrigerant.
- Upon completion of charging, a further leak check must be carried out prior to leaving the site.
- After charging, carefully disconnect the hoses, attempting to minimize the release of refrigerant.
- After charging, all access ports/points must be removed following the correct procedures.

**DO NOT OVERCHARGE A SYSTEM USING R-290.**
**Weigh in the exact charge.**

## Removal and Sealing of Access Ports

**REFRIGERATED CABINETS - APPENDIX A**
**R-290 Refrigerant**

**CAUTION** **Do not leave piercing valves on the system.**

**Procedure**

1. Pinch line off just before the temporary access port two times using a crimping tool. Keep crimping tool in place as shown in photo.
2. Verify that there are no leaks.
3. Remove the piercing valve/temporary access port.
4. Snap off at “crimp 1” and check for leaks.
5. Braze open end shut while crimping tool is in place.
6. Leak check the system, with crimping tool removed.

## Electrical Repairs

**REFRIGERATED CABINETS - APPENDIX A**
**R-290 Refrigerant**

**CAUTION**

The electrical power to the equipment must be disconnected. A combustible-gas leak detector must be on at all times.

Protect yourself from hazards of working on the electrical components by following some basic guidelines before you begin the repair. Prior to starting your repair work on an electrical component, use your combustible gas detector to see if flammable gas is present.

Only when the area is clear of any flammable gas should you start the repair.

**Guidlines**

- Do not use components that produce sparks, discharge, etc.
- Components that could produce a potential ignition source need to be positioned in an area, distant and unreachable, from any potential refrigerant leak.
- FPG components are designed for use with flammable refrigerants.
- Do not replace faulty components that are intended not to spark with components that do. ONLY use FPG recommended spares.
- • Do not modify components that are intended not to spark in such a way that they will spark.

## Electrical Repairs cont.

**REFRIGERATED CABINETS - APPENDIX A**
**R-290 Refrigerant**

**Check General Condition**

You may not be the first person that has worked on this system.

- Check all components for unauthorized/non-OEM replacement parts.
- Look beyond your repair for any wear, stresses, that could become an ignition source. Are terminal connections tight and in a UL approved connectors?
- Check all protective conductors' connections each time you access a system or repair is made.
- Finally, check the plug, cabling and wiring for any damage.

# R-290 SERVICING FLOW CHART

**Before starting work on the R-290 system, turn on the gas-leak detector and place it on the floor, next to the cabinet.**

| | Refrigeration Circuit Access | Comments |
|---|---|---|
| 1 | Disconnect electrical supply to appliance. | If possible, ground the appliance to avoid static electric sparks. |
| 2 | Access condenser/compressor and install two piercing valves. | Vent both the high and low side of the system in case there is a blocked cap tube and/or drier. |
| 3 | Connect your refrigeration gauge equipped with 30cm hoses to the two piercing valves. | |
| 4 | Connect the yellow hose of your gauge set to a recovery bag or a venting tube, if a safe venting location is available. | |
| 5 | Once the charge is removed, connect the Nitrogen tank. | |
| 6 | Purge Nitrogen through the system for a min. of 10 seconds. | If using a recovery bag, be sure to take it to a safe location and vent. |
| 7 | Always cut the compressor or other components out with a tubing cutter. | |
| 8 | Purge Nitrogen through the system at 70 to 140 hPa, before any parts must are un-brazed. | |
| 9 | Purge Nitrogen through system at 70 to 140 hPa, while brazing in new components. | |

| | Installing New Components | Comments |
|---|---|---|
| 1 | Remove old compressor, drier and any other defective component. | If the compressor is removed, seal the suction and discharged tubes to prevent a spill. |
| 2 | Install new FPG approved spare parts. | A new dryer must be fitted if the compressor is replaced. |
| 3 | If the two access line tubes are not at least 30cm long, add more tube with brazed pinched-off ends. Reinstall tap valves. | Access tubing lines may need to be braced to prevent bending over. |
| 4 | Purge with Nitrogen again at 70 to 140 hPa while brazing. Wrap drier with wet rag when brazing. | |
| 5 | Fill the system with Nitrogen to 1000 kPa and check for leaks. | |
| 6 | Release Nitrogen and pull a vacuum on the system to 250 microns or less. Turn off the vacuum and confirm that it holds the vacuum. | |
| 7 | If vacuum holds, the system can now be charged. | Propane labelled ‘R-290 Refrigerant’ must be used. **DO NOT USE BBQ PROPANE**. |
| 8 | Purge the charging hoses and ready your gauge set and hoses so they will not move during the charging process. | |
| 9 | Check the cabinet Serial Number label for the required charge. | |
| 10 | Use the ball valves installed on your hose to meter in the charge. | Because the charge is small, take care and be precise. |
| 11 | Charge the circuit. (preferred method of charging is to charge liquid into liquid line). | |
| 12 | If new starting components have been fitted, check electrical connections and install all terminal covers. | FPG compressor start components are designed for use with HC refrigerants. Do not use non-FPG approved spare parts. |
| 13 | Start the system and check operation. Do a final check for leaks | |

FPGWORLD.COM

# Revision History

| Revision Level | Date of Change | Change Details |
|---|---|---|
| A | 22/11/23 | New manual for R290 VSD cabinet |
| B | 05/07/24 | Circuits and manual revised to use Embraco Sync refrigeration controller |
| C | 08/10/24 | Updated Embraco information, spares and electrical specs |
| | | |
| | | |
| | | |
| | | |

# PRODUCT MANUAL 33308
REV C  OCT 2024

In line with our policy to continually develop, improve and support our products,
Future Products Group Ltd reserves the right to change specifications and design without notice.

Have a question? Please email us at:
sales&fpgworld.com or visit www.fpgworld.com for full contact details for your region.

Worldwide contact details: