

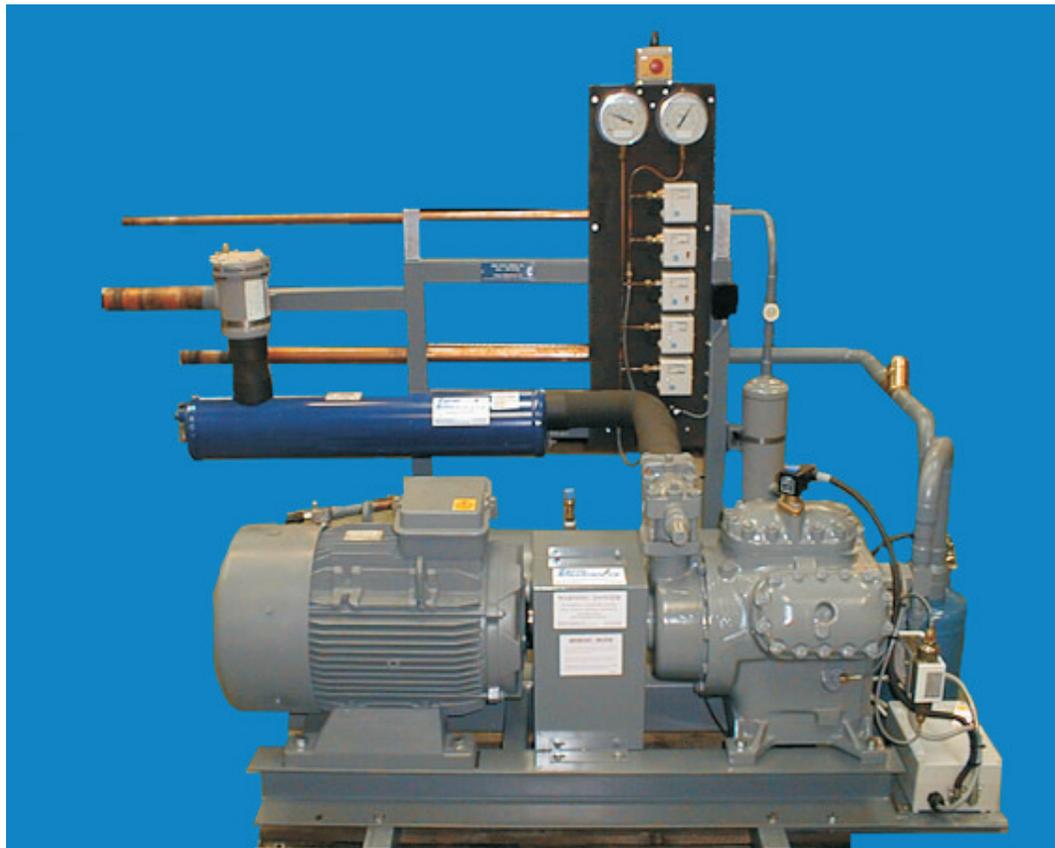


REFRIGERATION PLANT

OPEN DRIVE COMPRESSORS

Farm Electronics

Operator Instructions



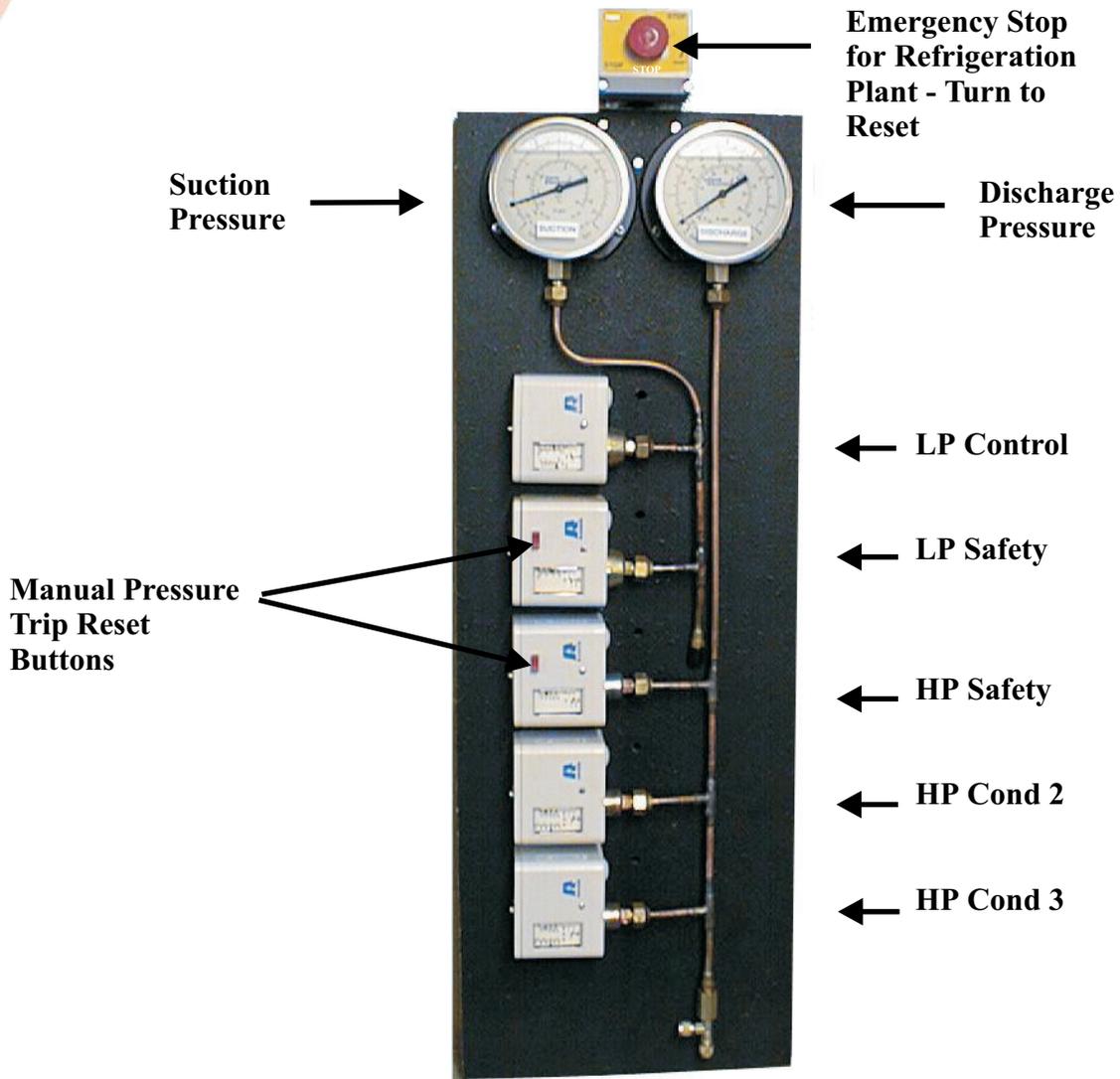
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Instruction Code:
Ref/Open01/0303

Crop Storage Equipment



STANDARD FE GAUGE BOARD LAYOUT





MAINTAINANCE & FAULT FINDING GUIDE

OPEN DRIVE COMPRESSORS

IMPORTANT WARNINGS - Before Restarting Plant

Ensure the **Main Selector Switch** on the refrigeration control panel is in the **OFF** position before turning the mains power back on. The compressor motor must not be allowed to run at all. This is to allow the crankcase oil heater to warm up the oil to the correct temperature. During normal operation this heater is automatically switched on whenever the plant is idle

Main Selector Switch



REFRIGERATION PLANT - OPERATOR INFORMATION

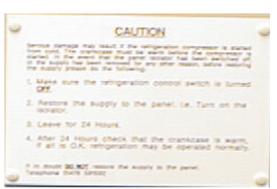
OPEN DRIVE COMPRESSOR PLANTS

The long term reliability of your refrigeration Equipment, can be greatly enhanced by carrying out some basic maintenance checks periodically and by being aware of the general operation of the system which will enable potential problems to be identified quickly.

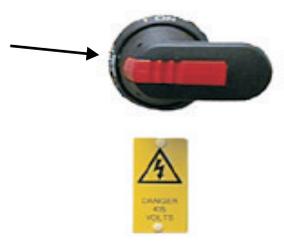
BASIC DO'S AND DON'TS

Before stating the Plant.

If the plant has been switched **OFF** at the **Main Panel Isolator** or the **Mains Power** for more than 12 hours, it should not be restarted until the power has been switched back on again for at least **4 hours**. Failure to do this could result in serious damage to the Compressor.



Mains Isolator Handle





REFRIGERATION PLANT - OPERATOR INFORMATION (Continued)

The Compressor Shaft Seal.

Open Drive Compressors have an internal refrigerant seal which relies on the crankcase oil to maintain a good seal. During normal running, the seal is constantly lubricated with oil. If however the plant is left switched off for an extended period the seal will Dry Out and could loose effectiveness. If the seal fails all the refrigerant gas may be lost. For this reason we recommend that the plant is left switched on in the Pump Down selection at all times, even when not required. The periodic running of the compressor to maintain the pump down pressure status will keep the shaft seal well lubricated and leak tight.



Shaft Seal

Keep it Clean

A clean tidy plant tends to be a reliable one. Keep the area around the compressor and receiver tank clear. This will enable you to spot any oil leaks which are indicative of a problem with the plant. Any suspected leaks should be immediately investigated to avoid unnecessary loss of expensive Refrigerant gas.

We recommend that you examine the pipe work regularly, (large or small) for signs of seeping of oil. Care should be taken not to confuse water condensation with oil - make sure the deposit is in fact oily.

Low cost butane gas refrigerant leak detectors are available for checking pipe work joints for leaks. These work by using a flexible tube to probe each joint, this tube feeds back to the butane flame which will change from clear to greeny/blue if refrigerant gas is detected.



REFRIGERATION PLANT - OPERATOR INFORMATION (Continued)

PRESSURE GAUGES ETC.

Pressure Gauges - What they indicate. FE Refrig Plants are fitted with 2 No Analogue Pressure Gauges, one indicates the **Discharge** pressure or the refrigerant output from the compressor, the other indicates the **Suction** pressure or refrigerant return to the compressor.

These gauges should be used for determining the operation of the Refrig Plant while it is running. On normal refrigeration, the pressures indicated will vary between a minimum and maximum value. This variation is largely dependent on the ambient air temperature which will alter the performance of the outside **Condenser** unit

If the ambient temperature is high the pressures will tend to be higher. Conversely if the ambient temperature is low the pressures will tend to be lower. Typical pressure ranges that may occur are shown in the table below:-

Gauge	High Ambient	Low Ambient
Discharge	14 - 17 bar	13 - 17 bar
Suction	2.5 - 5 bar	2.5 - 4 bar

If either gauge consistently shows a value well beyond these guide values, it is recommended that you **Pump Down** the system and seek advice from our service department.

PRESSURE SWITCHES

The plant utilises several pressure switches to provide safety cut outs and operation of equipment at certain pressure levels, these switches have been carefully adjusted to the optimum requirements of your plant. **DO NOT ATTEMPT TO RE-ADJUST THESE SWITCHES**, without correct knowledge of the pressures within the system, it will be **DANGEROUS or DAMAGING** to alter the settings on these switches.



REFRIGERATION PLANT - OPERATOR INFORMATION (Continued)

SAFETY WARNING LIGHTS

All the devices of tripping the Refrigeration Plant Off are fitted with a RED tell tale warning lamp, these are all mounted on the main control panel door and are labelled to show their function. If the plant stops for an unknown reason always check these lights first to see which device cut the plant out, make a note of which device it was before attempting to reset the fault. If any fault will not reset or continues to repeat, contact our service department immediately for advice.

Compressor Hours Run Totaliser - All FE control panels are fitted with an hours run meter. It is recommended that at least a weekly record of the total hours run is maintained. This will give a good indicator to the satisfactory operation of the equipment.

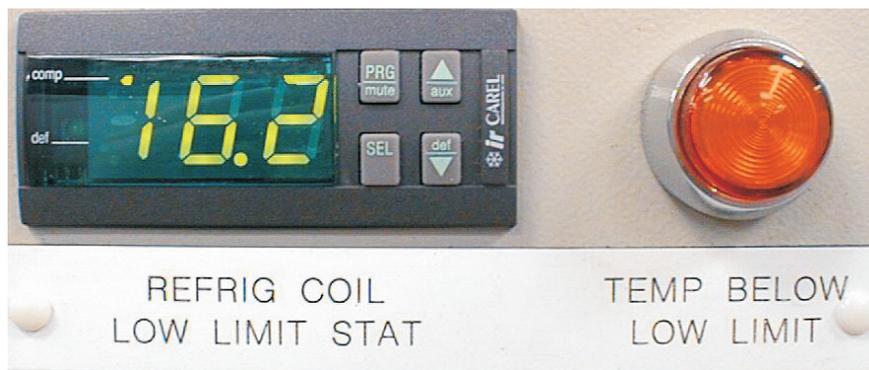




REFRIGERATION PLANT - OPERATOR INFORMATION (Continued)

LOW LIMIT SAFETY THERMOSTAT

Most FE systems are fitted with a Return Air Low Limit safety stat. This digital thermostat gives a readout in degrees Celsius and has a remote sensor fitted in the air stream return to the evaporator cooling coil. A set point temperature can be manually entered, which will stop the refrigeration system if the Return Air falls below it. This situation is indicated by the large Amber warning lamp next to the thermostat labelled - Temp Below Set.



DEFROST OF THE EVAPORATOR COIL

During the normal operation of the refrigeration plant, an ice build up will gradually occur on the fins of the **Evaporator Coil**. This build up must be limited to prevent **Bridging** between the coil fins. If bridging is allowed to happen, large areas of the coil can quickly become totally iced up thereby drastically reducing the efficiency of the plant. In order to prevent this ice build up, the system is designed to periodically run in a **Defrost** mode.

In plants designed to hold temperatures at a minimum 2.5 degrees C the Defrost is carried out using the **Off Cycle** system. This technique simply pumps down the compressor for a preset period based upon the total running time of the compressor but leaves the evaporator fans running in order that the air friction over the evaporator coil will melt off the ice build up.

In plants designed for temperatures below 2.5 degrees C **Electric Defrost** is normally used. This system will pump down the compressor and stop the evaporator fans again for a period based on the compressor total running time. Electric Heater elements which run inside tubes within the evaporator coil will then be switched on in order to melt the ice. If little ice is on the coil the Defrost period will terminate early, this is because the **Defrost Termination Thermostat** fitted to the face of the evaporator coil will heat up again and signal to the panel that defrost can now be ended.



REFRIGERATION PLANT - OPERATOR INFORMATION (Continued)

The frequency of these Defrost periods has to be determined and set to suit each installations particular requirements.

Periodically check the evaporator coil for ice build up. This is most likely to start at the base of the coil on the **Air Off** side. This can be quite difficult to see and a torch is recommended to improve viewing. Remember ice is **Clear** in colour.

If excessive ice is found it is important to completely remove it before trying to run the refrigeration plant. If the ice is only partially removed bridging will quickly re-occur and the problem will be the same. A good way to dislodge the ice from the coil is to use a water hose to play between the coil fins. This warmer water will help melt the ice much more quickly. If desired the evaporator fans can be run manually to speed up the process.

Defrost Override Thermostat - On some systems it may be considered that Defrost is not necessary until the return air temperature has fallen below a certain temperature. In this case a dedicated thermostat is installed to prevent Defrost occurring until the temperature has fallen below this level.

EVAPORATOR FANS

These are the main fans used to draw the store air over the Evaporator Coil and discharge the cooled air into the store. It is important that these fans are running whenever the refrigeration plant is cooling. For this reason it is normal to electrically interlock the switch for these fans with the Refrigeration initiation circuit. Unless the Evaporator Fans switches are set to **Auto** the refrigeration plant will not run in cooling.

LOADING OR UNLOADING THE STORE

Inevitably you will need to have the main doors of the building open to carry out loading operations, during this time it will be impossible for the Refrigeration Plant to cope with the incoming outside air. No effective cooling can be achieved in this situation and you are only wasting electricity. The only result if the plant remains running will be to ice up the evaporator coil. This can, if left for too long result in mechanical damage to and failure of the compressor. To prevent this always turn the Refrigeration to **Pump Down** if the doors are to be open for more than 5 minutes. Once the doors are closed again, turn the plant back to **Auto**.



REFRIGERATION PLANT - OPERATOR INFORMATION (Continued)

MOTOR OVERLOAD TRIPS & FUSEGEAR

Status Lamps

On FE control panels the majority of the equipment have an individual status lamp. These take the form of a GREEN lamp for motor running and a RED lamp to show an overload trip (see figure 10). In the event of a RED trip light refer to the following information on how to reset.

(figure 10)



Motor Breaker

This type of Starter uses a re-settable Current Breaker instead of fuses. In the event of a trip the red button will flick out. In order to reset the device the red button must be pressed in, followed by the green button (see figure 1). The motor trip amperage setting is made using the screwdriver adjustable scale. (See figure 1a).

Motor Breaker (figure 1)

