

S6161-MF-FSE-010

0910-LP-108-4883

REVISION 2

**TECHNICAL MANUAL
FOR**

**SHIPBOARD BULK MILK DISPENSERS,
MECHANICALLY REFRIGERATED, SILVER KING
MODELS SK1 IMP, SK2 IMP, AND SK3 IMP;**

OPERATION AND SERVICE MANUAL

Supersedure Notice: This manual supersedes
S6161-MF-FSE-010 Revision 1, dated 30 October 2001,
and all changes thereto.

“Distribution Statement “A”: Approved for public
release; distribution is unlimited.”

**DEPARTMENT OF THE NAVY
NAVAL SEA SYSTEMS COMMAND**

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IDENTIFYING TECHNICAL PUBLICATION SHEET FOR COMMERCIAL MANUAL

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Technical Manual and Replacement Parts List

Imperial Milk Dispensers



MODEL SK1 IMPERIAL



MODEL SK2 IMPERIAL



MODEL SK3 IMPERIAL

SILVER KING REFRIGERATION INC.

1600 Xenium Lane North, Minneapolis, MN 55441-3787
Phone (763) 923-2441



PART I

General Information, Maintenance, Troubleshooting, and Repair

PART I

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SAFETY SUMMARY

The following are general safety precautions that are not related to any specific procedures and therefore do not appear elsewhere in this publication. These are recommended precautions that personnel must understand and apply during many phases of the operation and maintenance of this equipment.

KEEP AWAY FROM LIVE CIRCUITS

Operating personnel must at all times observe all safety regulations. Do not replace components or make adjustments inside the equipment with the high voltage supply turned on. Under certain conditions, dangerous potentials may exist when the power control is in the **OFF** position, due to charges retained in capacitors. To avoid casualties, always remove power and discharge and ground a circuit before touching it.

DO NOT SERVICE OR ADJUST ALONE

Under no circumstances should repair or adjustment of energized equipment be attempted alone. The immediate presence of someone capable of rendering aid is required. Before making adjustments, be sure to protect against grounding. If possible, adjustments should be made with one hand, with the other hand free and clear of equipment.

TEST EQUIPMENT

Make certain test equipment is in good condition. If a test meter must be held, ground the case of the meter before starting measurement. Do not touch live equipment or personnel working on live equipment while holding a test meter. Some types of measuring devices should not be grounded; these devices should not be held when taking measurements.

FIRST AID

An injury, no matter how slight, should never be unattended. Always obtain first aid or medical attention immediately.

RESUSCITATION

Personnel working with or near high voltages should be familiar with modern methods of resuscitation. If someone is injured and stops breathing, initiate

resuscitation immediately. A delay could cost the victim's life. Refer to Naval Ships Technical Manual, Chapter 300.

GENERAL PRECAUTIONS

The following general precautions are to be observed at all times:

1. All electrical components associated with equipment shall be installed and grounded in accordance with applicable Navy regulations and approved shipboard practices.
2. All maintenance operations shall comply with Navy Safety Precautions for Forces Afloat, OPNAVINST 5100 series.
3. Special precautionary measures are essential to prevent applying power to equipment at any time maintenance work is in progress.
4. Do not make any unauthorized alterations to equipment.
5. Before working on electrical equipment, use a voltmeter to ensure that system is not energized.
6. All circuits not known to be DEAD must be considered LIVE and dangerous at all times.
7. Do not wear loose clothing while working around rotating parts of machinery.
8. When working near electricity, do not use metal rules, flashlights, metallic pencils, or any other objects having exposed conducting material.
9. Be sure to de-energize all equipment before connecting or disconnecting meters or test leads.
10. When connecting a meter to terminals for measurement, Use range higher than expected voltage.
11. Before operating equipment or performing any tests or measurements, ensure that frames of all motors and starter panels are securely grounded.
12. Ensure that area is well ventilated when using cleaning solvent. void prolonged breathing of fumes and solvent contact with skin or eyes.

WARNINGS AND CAUTIONS

The following WARNINGS and CAUTIONS appear throughout the text and are repeated here for emphasis:

CAUTION

Check electrical requirement on equipment plate to ensure that it is the same voltage that is supplied.

CAUTION

Be sure power is being supplied to the equipment in a continuous circuit.

CAUTION

The voltage supply should vary more than plus or minus 10% or required operating voltage

CAUTION

Disconnect the condensing unit from the power line before working around the condenser

WARNING

Prior to performing any work on the refrigeration system, it is required that the unit be de-energized to prevent injury

WARNING

It is unlawful to vent any refrigerant into the atmosphere

WARNING

Overcharging a refrigerant system can be dangerous to personnel

SECTION I

GENERAL INFORMATION

I-1 INTRODUCTION

SILVER KING Bulk Milk Dispensers are mechanically refrigerated cabinets with manually operated dispensing valve mechanisms. Each valve is designed to dispense individual portions of milk or fluid milk products from single service or multi-service containers in a sanitary manner. Silver King imperial milk dispensers are manufactured in three models. Models SK1 IMP - one (1) container, SK2 IMP - two (2) containers and SK3 IMP - three (3) containers. These containers may be 5 gallon capacity stainless steel reusable dispensing cans or 5 to 6 gallon capacity single service bag and box containers. The dispensers are constructed of stainless steel and have front loading doors. The dispensing valves are located just below the cabinet door. Glass locators are provided and positioned in relation to each dispensing valve to aid in the dispensing operation.

All information included in this manual applies to all three dispenser models unless otherwise noted. Table 1 identifies the specifications and shows the basic differences between the three models.

I-2 INSPECTION FOR FREIGHT DAMAGES

Upon receiving the dispenser inspect the exterior of the container for damage and make note of such on the freight bill. Uncrate at once, examine and test for damage. Report any damage to the transportation carrier and file a claim promptly. Your immediate inspection protects you because the manufacturer is not responsible for damages incurred during transit.

I-3 CABINET CONSTRUCTION

The dispenser cabinet interior and exterior are constructed of formed stainless steel. The unit rests on a steel base which incorporates facilities for mounting to a countertop or on free standing adjustable legs. All seams and joints are welded to provide maximum strength and smooth joints. The seams in the liner have been rounded to simplify cleaning. The condenser coil is mounted to the rear of the cabinet with screws. The back panel on the rear of the cabinet directs the heat from the condenser up and away from the unit. The temperature control is mounted on the right side on the cabinet. The evaporator is spot welded to the outer surface of the cabinet liner.

The refrigerated compartment is insulated on the top, sides and back with semi-rigid, batt-type fiberglass insulation. The bottom is insulated with rigid expanded polystyrene insulation.

I-4 DOOR CONSTRUCTION

The full width stainless steel door is insulated with semi-rigid, batt-type fiberglass insulation. The door seals to the cabinet with a one piece vinyl gasket which prevents outside air from entering the refrigerated cabinet. The door is mounted to the cabinet by hinges and is held closed with a lever type, cam action door latch. A temperature indicator is mounted in the door.

I-5 DISPENSING VALVE

The valve used in the milk dispensers is molded zinc die-cast with copper-nickel-chrome plating. The dispensing valves are installed into plastic valve holders located just behind the lower portion of the cabinet door. Milk is dispensed from milk containers placed in the refrigerated compartment of the unit by raising the valve. The milk flows through the valve via a non-toxic,

odorless, synthetic rubber, single service dispensing tube. The weight of the valve holds the tube pinched off until the valve arm is raised.

I-6 TEMPERATURE CONTROL

The temperature control consists of the control, a knob and a calibrated plate which provides a means of selecting and varying the temperature of the milk to be dispensed. The temperature control provides a range of adjustments but for normal use the knob should be set at the #4 position. The control also has an "off" position to turn off the power to the compressor.

I-7 REFRIGERATION SYSTEM

The refrigeration system is a capillary tube design and works identically for all models. The system consists of a hermetic compressor, a condenser, a condenser fan motor, a drier and a cold wall evaporator with an associated heat exchanger. The system is designed to use MP39 (R401a) refrigerant only. No other type of refrigerant should be used in these systems. The entire system is hermetic to lessen the possibility of refrigerant leaks caused by defective service valves or flared connections. All connections are brazed and leak tested at least three times during production processing. Process tubes (see Fig. 2) are located on the compressor (low side) and the drier (high side) should servicing be necessary.

In these simple capillary tube design systems the compressor supplies high pressure, hot refrigerant gas to the condenser. As this high pressure hot refrigerant gas flows through the condenser tubing it is cooled, with the help of the air supplied by the condenser fan, and condenses into a high pressure liquid. This high pressure liquid then passes through the filter drier which functions to remove any water moisture from the refrigerant and also filter out any impurities. After the drier the high pressure liquid refrigerant enters the capillary tube which is a small diameter length of copper tubing. The capillary tube functions as a metering device for the liquid refrigerant and transforms it to a low pressure liquid refrigerant which is supplied to the evaporator. As a low pressure liquid the refrigerant is very cold as it enters the evaporator and will start to absorb heat from the interior storage compartment of the milk dispenser. As the refrigerant travels through the evaporator tubing it continues to pull heat out of the storage compartment and it changes to a low pressure gas as it starts to boil from the heat it is taking on. This low pressure gas is then supplied to the compressor where the cycle starts over as it is transformed to a high pressure gas.

When the cabinet temperature drops to a certain point the temperature control contacts will open and break the compressor motor electrical circuit thereby ending the cool down cycle. The cabinet temp will then start to slowly rise until the temperature control senses it is time to cool the storage compartment again. The temperature control contacts will then close which will close the electrical circuit and the compressor will start and the refrigeration cycle over again.

The specified refrigerant charge is stamped on the serial plate. The correct charge is the amount of refrigerant which will refrigerate all the evaporator coil and at the same time will not cause frosting or sweating on the suction line outside the insulated cabinet wall. An undercharge will starve the evaporator coil and will cause excessive or possible continuous compressor running while the cabinet temperature could become either too warm or too cold.

SECTION II

INSTALLATION

II-1 LOCATION

The stainless steel exterior of the cabinet has been protected by a plastic covering during manufacturing and shipping. This covering can be readily peeled off before installation. After removing this covering, wash the exterior and interior surfaces using a warm mild soapy water solution and a sponge or cloth. Rinse and wipe dry.

When locating your new milk dispenser, convenience and accessibility are important considerations, but the following factors must be observed:

- When placing the unit on a counter, the counter must be able to support a minimum of 350 pounds.
- When wall mounting the dispenser, follow the instructions supplied with the wall mount kit.
- When placed on a counter, the unit must be on the legs supplied **and** secured to the counter with the Hold Down Brackets supplied or secured to the counter with shipboard legs or a marine base.
- The vent at the top rear of the cabinet must not be blocked as this serves as an outlet for circulating air. There must be at least 4 inches of clear space above the unit.
- Correct serving height is important so that those using the dispenser can operate the valve properly.
- The unit must be level.
- Avoid placing the unit next to an oven, heating element or hot air source which would adversely affect the performance of the unit.

II-2 ELECTRICAL CONNECTION

Be sure to check the data plate, located on the liner of the cabinet, for required voltage prior to connecting the unit to power. The specifications on the data plate supersede any future discussion.

The standard dispenser is equipped with an eight (8) foot power cord that requires a 115 Volt, 60 Cycle, 1 Phase **properly grounded** electrical receptacle. The power cord comes with a 3 prong plug for grounding purposes. Any attempt to cut off the ground spike or to connect to an ungrounded adapter plug will void the warranty, terminate the manufacturers responsibility and could result in serious injury.

The circuit must be protected with a 15 or 20 ampere fuse or breaker.

SECTION III

OPERATION

III-1 INITIAL START-UP

After satisfying the installation requirements, the milk dispenser is ready to start. The unit will start when the power cord is connected to a live electrical receptacle. If the compressor and condenser fan are not running when the unit is initially plugged in, check to make sure that the temperature control is not set to the 'off' position. Allow the unit to run a minimum of one hour before loading it with product.

III-2 PREPARATION FOR USE

After the unit has achieved proper operating temperature, observe the following procedures for preparing the unit to dispense milk:

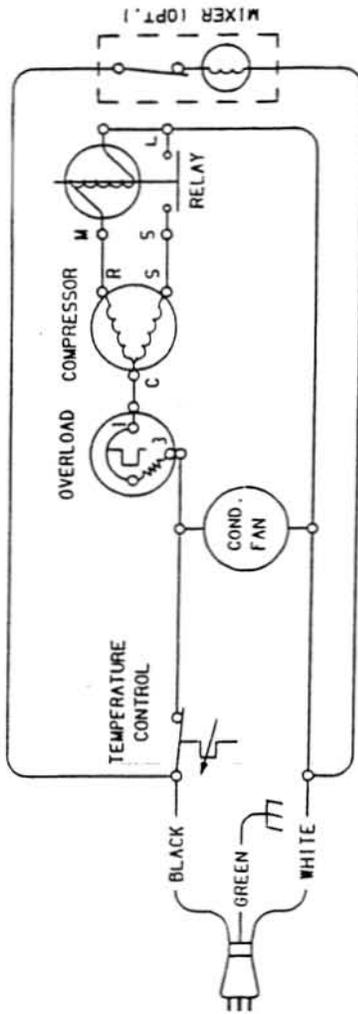
- Place a full, previously cooled, milk container in the unit and locate it over the valve so the dispensing tube lines up with the valve.
- Remove the plastic film covering the dispensing tube if supplied.
- With the valve installed in the valve holder, open the valve by lifting the weight and feed the dispensing tube through the tube passage in the valve. Refer to the label on the door liner for a graphic view of this procedure.
- Allow the valve to close thus pinching the dispensing tube closed.
- Cut the dispensing tube with a knife or scissors approximately one (1) inch below the pinch point of the valve.
- Close and latch the dispenser door.
- To dispense milk, place a glass under the dispensing tube and lift the valve.

III-3 TEMPERATURE CONTROL

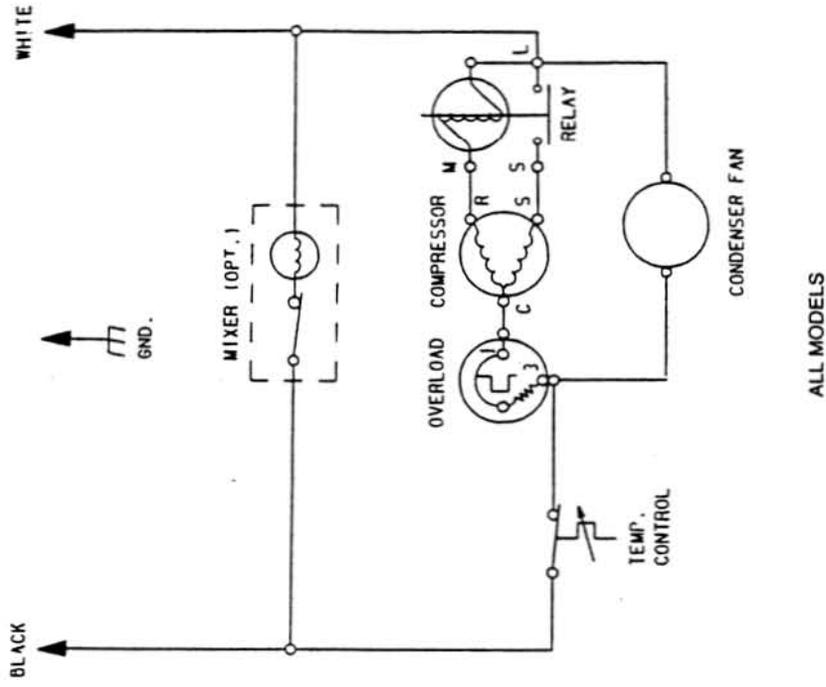
The temperature control, located on the lower left side of the cabinet, is factory set at the midpoint position, #4, which will maintain an average product temperature of about 37 Deg F. To obtain colder temperatures turn the temperature control knob clockwise and vice versa. Allow the unit a minimum of six hours to fully respond to a temperature control setting adjustment if the product is in the cabinet.

III-4 TEMPERATURE INDICATOR

The temperature indicator, mounted on the door, is factory set to indicate the temperature of the product within two (2) degrees. Should the temperature indicator read inaccurately the are instructions for recalibrating it located on the door liner.



SK1



ALL MODELS

FIGURE 1 (SHEET 1 OF 2)

**WIRING DIAGRAM
SK-1, SK-2, SK-3**

SK2 & SK3

FOR MODELS WITH COMPRESSOR EM20NR, PW4.5K11 AND FF6BK

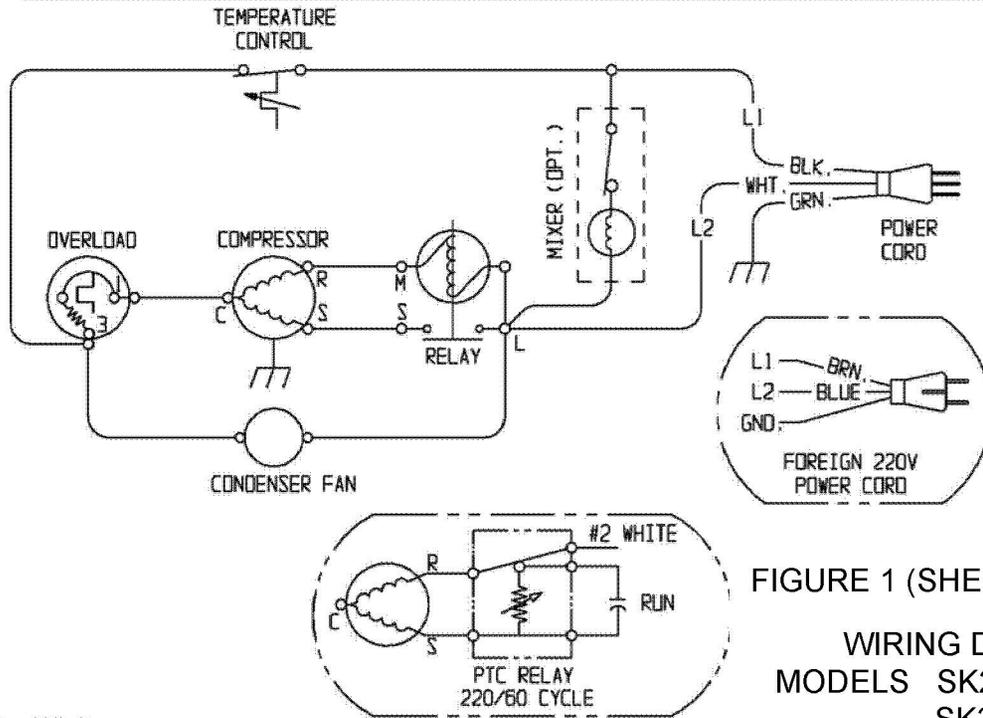
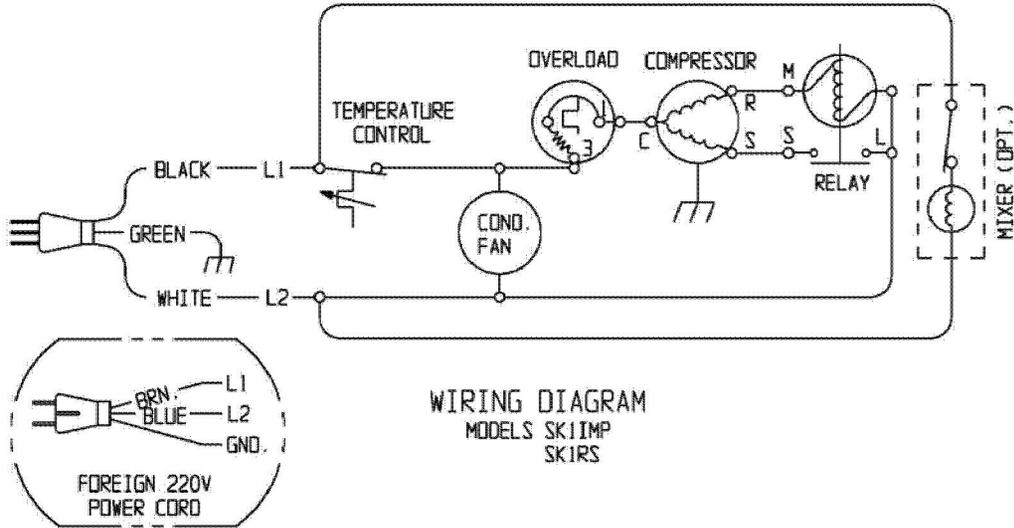
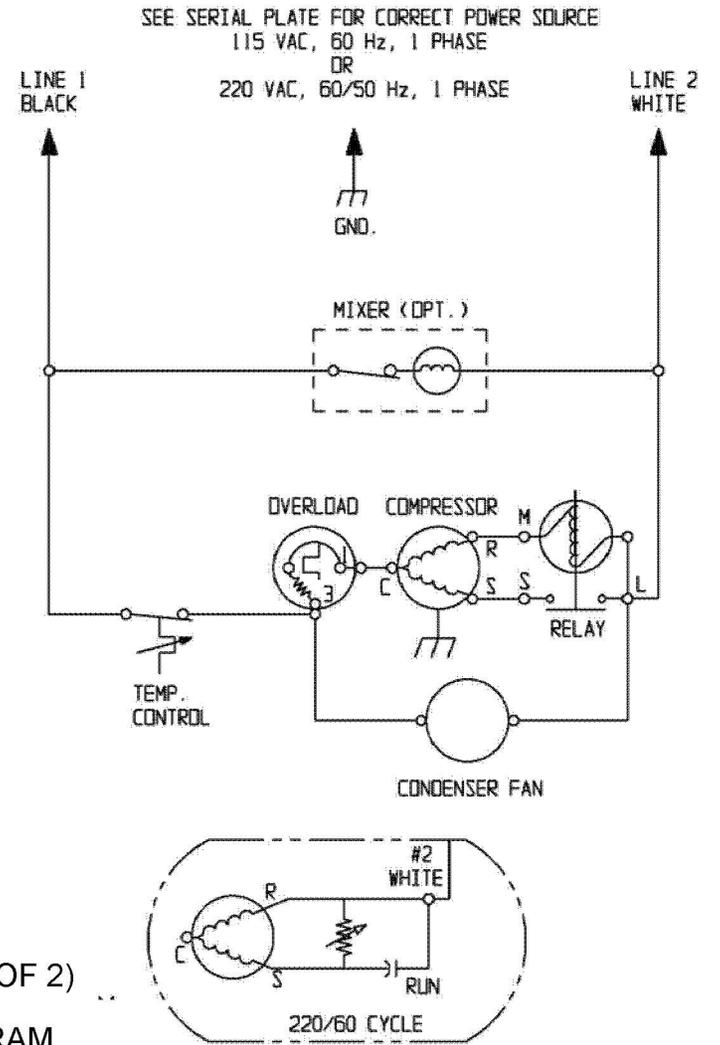


FIGURE 1 (SHEET 2 OF 2)

WIRING DIAGRAM
MODELS SK2IMP SK2RS
SK3IMP SK3RS

FOR MODELS WITH COMPRESSOR EM20HHR



III-5 DEFROSTING

The Silver King milk dispenser is a manual defrost unit. The unit should be defrosted whenever the walls accumulate a frost bank that is ½ inch thick. To defrost the unit, either turn the temperature control to the 'off' position or disconnect the power cord from the electrical receptacle, and open the door. After the frost has melted or come loose from the walls, wipe dry the cabinet interior. DO NOT attempt to scrape or chisel the frost as you could do irreparable damage to the unit.

SECTION IV

MAINTENANCE

IV-1 CLEANING

Preventative maintenance is minimal, although these few steps are very important to continued operation and maximizing the life of the unit.

The cabinet interior and exterior surfaces are stainless steel and should be cleaned periodically with a solution of warm water and mild soap, rinsed and wiped dry with a clean soft cloth. Should a surface become stained or discolored, do not attempt to clean with an abrasive cleaner or scouring pad. Use a soft cleaner and rub with the grain of the metal to avoid scratching the surface.

Remove the valves and valve holders from the unit and clean them with warm soapy water. Do not place them in the dishwasher for cleaning.

IV-2 CONDENSER COIL

Periodically, dust and debris should be removed from the condenser coil and screen. First disconnect the unit from the power supply. Remove the back panel to expose the condenser. Brush or vacuum all accumulated dust from the coil and replace the back panel. Check the air intake screen located on the bottom of the cabinet for any accumulation and remove if needed. Proper maintenance will reduce energy consumption and extend compressor life.

IV-3 LEAKING VALVES

Should you encounter a situation where a valve is steadily leaking or dripping milk, the problem can be remedied by making sure that the dispensing tube runs straight down the milk container to the pinch point of the valve. If the tube has to bend before the pinch point, it tends to 'walk' around the pinch point as you operate the valve. One way to eliminate this problem is to raise the milk container in the cabinet by placing it on the platform extension (part number 61942) which you can obtain from your local Silver King Center.

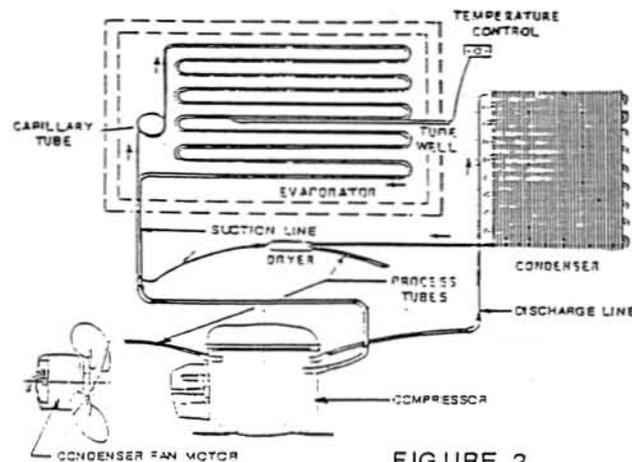


FIGURE 2

SECTION V

SERVICING AND REPAIR

V-1 GENERAL

Diagnosing and testing are the first two factors to be considered before changing any parts or performing any servicing operations. The serviceworker must accept responsibility for thorough diagnosis of the complaint to determine if a replacement part is necessary and what must be replaced. They must also be responsible for following the recommended procedures to successfully accomplish component replacement.

In certain service operations, the hermetically sealed refrigeration system must be opened to perform specific tests or functions such as attaching pressure gauges, charging and evacuating the system or replacing refrigeration components. Two 1/4" process tubes have been provided for these functions. The low side tube is located on the compressor and the high side tube is located on the drier (see Fig. 2). By law any individual working on these systems must be EPA certified if they access the refrigerant system.

V-2 COMPRESSOR REPLACEMENT

Once the compressor has been diagnosed as being defective, using the troubleshooting guide (section VIII), follow the steps outlined below to replace the compressor.

1. Disconnect the unit from the power supply.
2. Remove the cover on the defective compressor to expose the electrical components (see section VI) and remove the lead wires.
3. Attach tube piecing valves to the process tubes and evacuate and recover the remaining refrigerant in the system. By law this step must be performed. It is illegal to discharge the refrigerant into the air.
4. Once all of the refrigerant has been recovered, either cut the discharge and suction lines near the compressor or use a torch to sweat off the lines at the compressor.
5. Remove the 4 hairpin clips holding the compressor to the base and lift the defective compressor off the base and out of the cabinet. Pinch off and seal the open tubes to the compressor so that the remaining oil in it does not spill out. Dispose of properly.
6. Install the new compressor on the base in the cabinet using the grommets and hairpin clips from the defective compressor.
7. Braze the suction and discharge line to the new compressor. Also braze in a new process tube to the compressor. These joints should all be silver soldered.
8. Install new drier (section V-5).
9. Pressurize the system and inspect for leaks (section V-3).
10. Evacuate and recharge the system (section V-4).

11. Connect all electrical leads as shown in Fig. 1 and replace the cover on the compressor.

V-3 LEAK DETECTION

Visibly inspect the system for refrigerant leaks. Feel each soldered connection to check for small deposits of oil which would indicate a leak. If this procedure fails to reveal a leak, proceed to test each connection with a soap bubble solution and/or an electronic leak detector. If no leak is found with these methods, check to make sure that the system is not completely out of refrigerant.

If the system has no refrigerant or pressure in it, attach a gauge manifold set to the system and pressurize the system to 30 psig with a small amount of refrigerant and then to 150 psig using dry nitrogen. Use the soap bubble solution or electronic leak detector again to look for leaks in the pressurized system.

Allow the pressurized system to bleed off prior to repairing any leaks found. If a leak is found either rebraze the joint or replace the length of tubing where the leak was found. Retest your connections for leaks prior to recharging the system. The drier should also be replaced (section V-5) whenever the system is opened. After all leaks have been located and repaired, evacuate and recharge the system (section V-4).

V-4 EVACUATING AND RECHARGING

Anytime the refrigeration system is opened, evacuation and recharging of the system is required to remove air, moisture and all noncondensable gases. Evacuate and recharge the system as follows:

1. Disconnect the unit from the power supply.
2. Replace the drier (section V-5).
3. When evacuating the system, always connect to both process tubes with a gauge manifold set and use the largest diameter connections possible to reduce the time required to evacuate the system. With the gauge manifold set properly connected to both process tubes and to a vacuum pump, the system should be evacuated down to 100 microns or held at 30" on the gauge manifold for 30 minutes. If the system will not pull down this low, check all connections and the refrigeration system for leaks.
4. Close the valve on the manifold that goes to the vacuum pump and remove the vacuum pump from the system and connect a supply tank of MP39 (R401a) refrigerant in its place. Open the valve on the refrigerant tank and purge the supply line hose to the gauge manifold set by cracking open the supply line at the gauge manifold and purging the air out of the line, the line should be filled with refrigerant only. Retighten the supply line to the gauge manifold following the purging.
5. Slowly open the supply line valve on the gauge manifold to begin charging the unit. Charge the unit with the specified amount of liquid phase MP39 (R401a) refrigerant as noted on the data plate located on the unit. Close the supply line valve once the unit is properly charged.
6. Connect the unit to power and let it run. The pressures on the gauge set should read approximately 12 lbs. on the low side and 125 lbs. on the high side when the cabinet temp is 30-40 Deg F and the ambient is 70 Deg F. Adjust the charge if necessary. Remember that the lines to the manifold set will contain about 1-2 oz. of the charge when the unit is running.

Part I

7. When properly charged, remove the gauge manifold and pinch off and seal the process tubes.

V-5 DRIER AND CONDENSER REPLACEMENT

Prior to removing the drier or condenser coil the refrigerant in the system must by law be recovered. To do so attach piercing valves to both process tubes and attach a gauge manifold set to them. Recover the refrigerant by connecting the gauge manifold set to a designated refrigerant recovery unit and follow the instructions for such unit.

Once the refrigerant in the system has been recovered, remove the drier or condenser coil by heating and unbrazing the connections to the inlet and outlet of each.

Install the replacement part by rebrazing the connections.

Check the connections for leaks (section V-3).

Evacuate and recharge the system (section V-4).

V-6 TEMPERATURE CONTROL REPLACEMENT

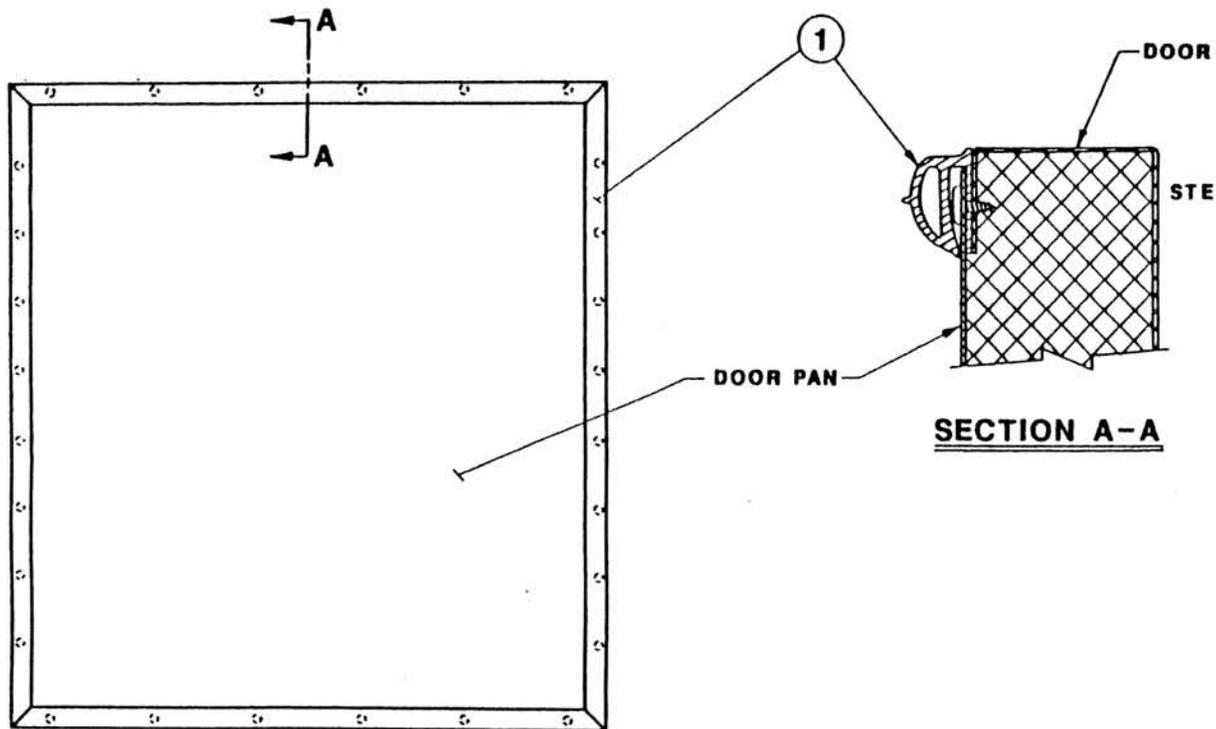
Once the temperature control has been diagnosed as being defective, replace it as follows:

1. Disconnect the unit from the power supply.
2. Remove the temperature control knob by pulling it straight out and remove the temperature control from the side of the unit by removing the 2 screws that hold it in place.
3. Disconnect the 2 quick connect leads from the temperature control and remove the sensing bulb from the tube well. Be sure to hold the tube well in place with one hand while slowly pulling the sensing bulb out of it.
4. Install the new temperature control by reversing the above procedure. The sensing bulb inserts into the tube well 19" on model SK1 and 16" on models SK2 and SK3. The opening of the tube well should be sealed with permagum after installing the sensing bulb.

V-7 FAN MOTOR REPLACEMENT

The fan motors are most easily accessed from the front of the unit on the SK1 and SK2 models and from the back on the SK3 model. Once the fan motor has been diagnosed as being defective, replace it as follows:

1. Disconnect the unit from power.
2. Remove the back panel on all units and the front apron on models SK1 and SK2.
3. Disconnect the fan motor leads from their connection points.
4. Disconnect the fan motor from the bracket and remove the fan blade.
5. To install the new fan motor, reverse the above procedure.



INSTALLATION INSTRUCTIONS

STEPS:

- 1.) REMOVE OLD DOOR GASKET BY LIFTING INNER EDGE OF GASKET TO REMOVE GASKET MOUNTING SCREWS AND DOOR PAN.
- 2.) PLACE NEW DOOR GASKET AROUND PERIMETER OF DOOR PAN.
- 3.) REPLACE DOOR PAN.
- 4.) PERIODICALLY CLEAN GASKET USING A MILD SOAP OR DETERGENT WITH A SOFT RAG OR SPONGE.

FIGURE 3

V-8 DOOR GASKET REPLACEMENT

SECTION VI Checking Compressor Motor Circuits

All the tests indicated should be made with a good volt-ohmmeter (Simpson model 260 or equivalent).
NOTE: IT IS IMPORTANT TO DO TESTING IN SAME SEQUENCE AS LISTED!

Locate relay and overload terminals by indicated letter or number, not by diagrammed position.

Normal Starting Torque Motors (RS1R) Current Type Relay Mounted on Compressor Terminals

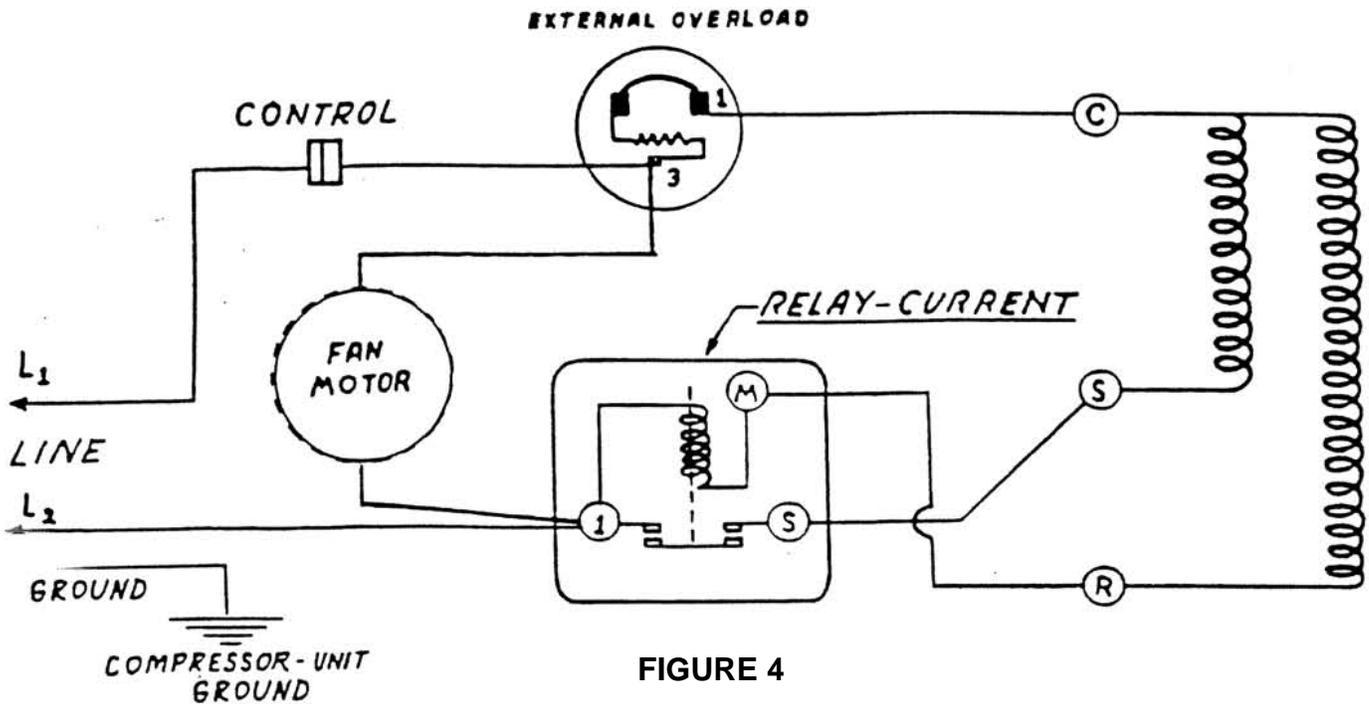


FIGURE 4

The starting contacts on a current type relay are normally open.

The electrical system on this type of Embraco hermetic compressor (see Fig. 5) can be checked as follows:

Using voltmeter, check power source.

Using ohmmeter, check continuity (Unit *not* connected to power and with fan motor circuit opened if one is used), across the following:

1. L₁ and 3—No continuity—close control contacts—still no continuity, replace control.
2. 3 and 1 on overload—No continuity—protector may be tripped—wait 10 minutes—try again—if still no continuity, protector is defective—replace protector.
3. Pull relay off compressor terminals—KEEP UPRIGHT!

4. Relay terminal 1 (or L) and S—if there is continuity—relay contacts closed and should be open—replace relay.
5. 1 (or L) and M. If no continuity—replace relay.
6. Compressor terminals C and R. No continuity—open run winding—replace compressor.
7. C and S—No continuity—open start winding—replace compressor.
8. C and shell of compressor—continuity—grounded motor—replace compressor.
9. If all above tests prove satisfactory, and there is no capillary restriction, and unit still fails to operate properly, change relay. The new relay will eliminate any faulty electrical characteristics, such as improper pick-up or drop out, which cannot be determined with above tests. If good relay fails to correct difficulty, the compressor shall be considered inoperative because of internal defects and must be replaced.

SECTION VII

Part I

TROUBLESHOOTING - SERVICEPERSONS GUIDE

COMPLAINT	POSSIBLE CAUSE	REMEDY
A: COMPRESSOR WILL NOT START -NO HUM	POWER SOURCE CORD DISCONNECTED	CONNECT TO RECEPTACLE
	BLOWN FUSE OR BREAKER	LOCATE, REPLACE / RESET
	DEFECTIVE WIRING	CHECK FOR LOOSE CONNECTIONS AND REPAIR
	OVERLOAD PROTECTOR TRIPPED	CHECK AIR FLOW TO COMPRESSOR, IF GOOD AND COMPRESSOR IS NOT HOT, REPLACE OVERLOAD
	OPEN TEMP. CONTROL CONTACTS	REPLACE TEMP. CONTROL
B: COMPRESSOR WILL NOT START - HUMS BUT CYCLES ON OVERLOAD	LOW VOLTAGE	115V COMPRESSOR REQUIRES 104-126 VOLTS
	UNIT WIRED INCORRECTLY	CHECK WIRING DIAGRAM AND FOR LOOSE CONNECTIONS
	RELAY CONTACTS NOT CLOSING	CHECK COMP. MOTOR CIRCUITS (SECTION VI)
	COMPRESSOR DEFECTIVE	CHECK CONTINUITY USING FIG 6. REPLACE IF DEFECTIVE
	HIGH HEAD PRESSURE	CHECK REMEDIES UNDER H.
C: COMPRESSOR STARTS, BUT START WINDING REMAINS IN CIRCUIT	LOW VOLTAGE	SEE B.
	UNIT WIRED INCORRECTLY	CHECK WIRING DIAGRAM AND FOR LOOSE CONNECTIONS
	RELAY DEFECTIVE	CHECK CONTINUITY PER FIG 6 AND REPLACE IF NECESSARY
	COMPRESSOR DEFECTIVE	CHECK CONTINUITY USING FIG 6.
	HIGH HEAD PRESSURE	CHECK REMEDIES UNDER H.
D: COMPRESSOR STARTS AND RUNS BUT CYCLES ON OVERLOAD	LOW VOLTAGE	SEE B.
	OVERLOAD PROTECTOR DEFECTIVE	CHECK CONTINUITY USING FIG 6 REPLACE IF NECESSARY.
	HIGH HEAD PRESSURE	CHECK REMEDIES UNDER H.
	CONDENSER FAN NOT OPERATING	REPLACE FAN MOTOR.
E: COMPRESSOR TRIES TO START WHEN CONTROL CONTACTS CLOSE BUT CUTS OUT ON OVERLOAD AND FINALLY STARTS AFTER SEVERAL ATTEMPTS	LOW VOLTAGE	SEE B.
	CONTROL DIFFERENTIAL TOO CLOSE	USE OEM PARTS.
	RELAY CONTACT POINTS PITTED	REPLACE RELAY
	CONDENSER FAN MOTOR NOT OPERATING	REPLACE FAN MOTOR.
	AIR OR NON CONDENSABLE IN SYSTEM	CHECK FOR LEAKS, EVACUATE AND RECHARGE
F: COMPRESSOR STARTS BUT IMMEDIATELY CUTS OUT ON OVERLOAD	RELAY CONTACTS WELDED TOGETHER	REPLACE RELAY
	LOW VOLTAGE	SEE B.

Part I

G: RELAYS BURN OUT	IMPROPER VOLTAGE	SEE B.
	COMPRESSOR SHORT CYCLING	POSS. BAD TEMP CONTROL OR CHARGE IS INCORRECT.
	INCORRECT RELAY BEING USED	USE OEM PARTS.
H: HEAD PRESSURE TOO HIGH	SYSTEM OVERCHARGED	REDUCE CHARGE SO FROST DOES NOT FORM ON SUCTION LINE.
	AIR OR NON CONDENSABLE IN SYSTEM	RECOVER REFRIGERANT, CHECK FOR LEAKS, EVACUATE AND RECHARGE.
	DIRTY CONDENSER	CLEAN COIL AND SCREEN.
	AMBIENT TEMP TOO HIGH	RELOCATE UNIT.
	LEGS OR BASE NOT INSTALLED	INSTALL LEGS.
	CONDENSER FAN NOT OPERATING	REPLACE FAN MOTOR.
I: HEAD PRESSURE TOO LOW	INSUFFICIENT REFRIGERANT CHARGE	REFER TO DATA PLATE FOR PROPER CHARGE. ADD REFRIGERANT.
	LEAK IN SYSTEM	LOCATE AND REPAIR LEAK.
	AMBIENT TEMP TOO LOW	RELOCATE UNIT.
	INEFFICIENT COMPRESSOR	REPLACE IF NECESSARY.
J: COMPRESSOR RUNNING TOO LONG OR OPERATING CONTINUOUSLY	INSUFFICIENT REFRIGERANT CHARGE	SEE I.
	DIRTY OR RESTRICTED CONDENSER	SEE H.
	AMBIENT TOO WARM	SEE H.
	TEMPERATURE CONTROL DEFECTIVE	REPLACE .
	EXCESSIVE DOOR OPENINGS OR DOOR UNLATCHED	LATCH DOOR.RESTRICT OPENINGS
	INEFFICIENT COMPRESSOR	REPLACE IF DIAGNOSED AS FAULTY.
K: NOISY UNIT	TUBE RATTLE	REMOVE BACK PANEL AND CHECK FOR TUBE CONTACT. BEND FOR CLEARANCE.
	LOOSE MOUNTINGS ON COMPRESSOR OR CONDENSER	INSPECT AND REPAIR.
	DEFECTIVE COMPRESSOR	REPLACE IF NECESSARY
L: REFRIGERATED CABINET TEMP TOO HIGH	SHORT ON REFRIGERANT	SEE I.
	RESTRICTION IN CAP. TUBE OR DRIER	REPLACE IN NECESSARY.
	TEMP. CONTROL SETTING TOO HIGH	ADJUST SETTING.
	INEFFICIENT COMPRESSOR	REPLACE IF DIAGNOSED AS FAULTY.
	CONDENSER FAN OUT	REPLACE FAN MOTOR.
	ICE ON WALLS	DEFROST UNIT.
M: SUCTION LINE IS SWEATING	REFRIGERANT OVERCHARGE	REMOVE SOME CHARGE FROM THE SYSTEM.

PART II

Drawings and Parts Lists For Milk Dispensers with Embraco Compressor Model Numbers EM20NR, PW4.5K11 and FF6BK

PART II

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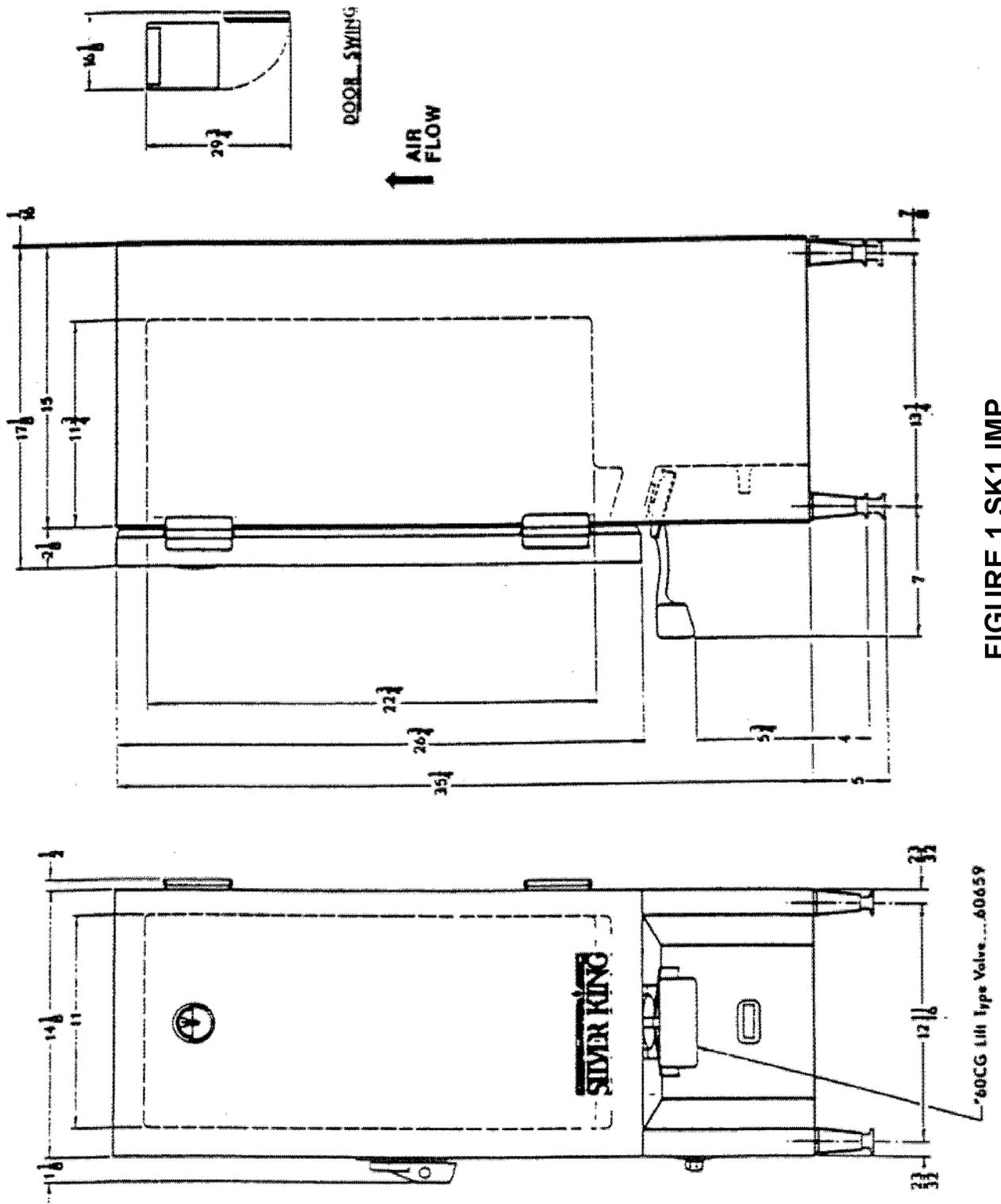


FIGURE 1 SK1 IMP

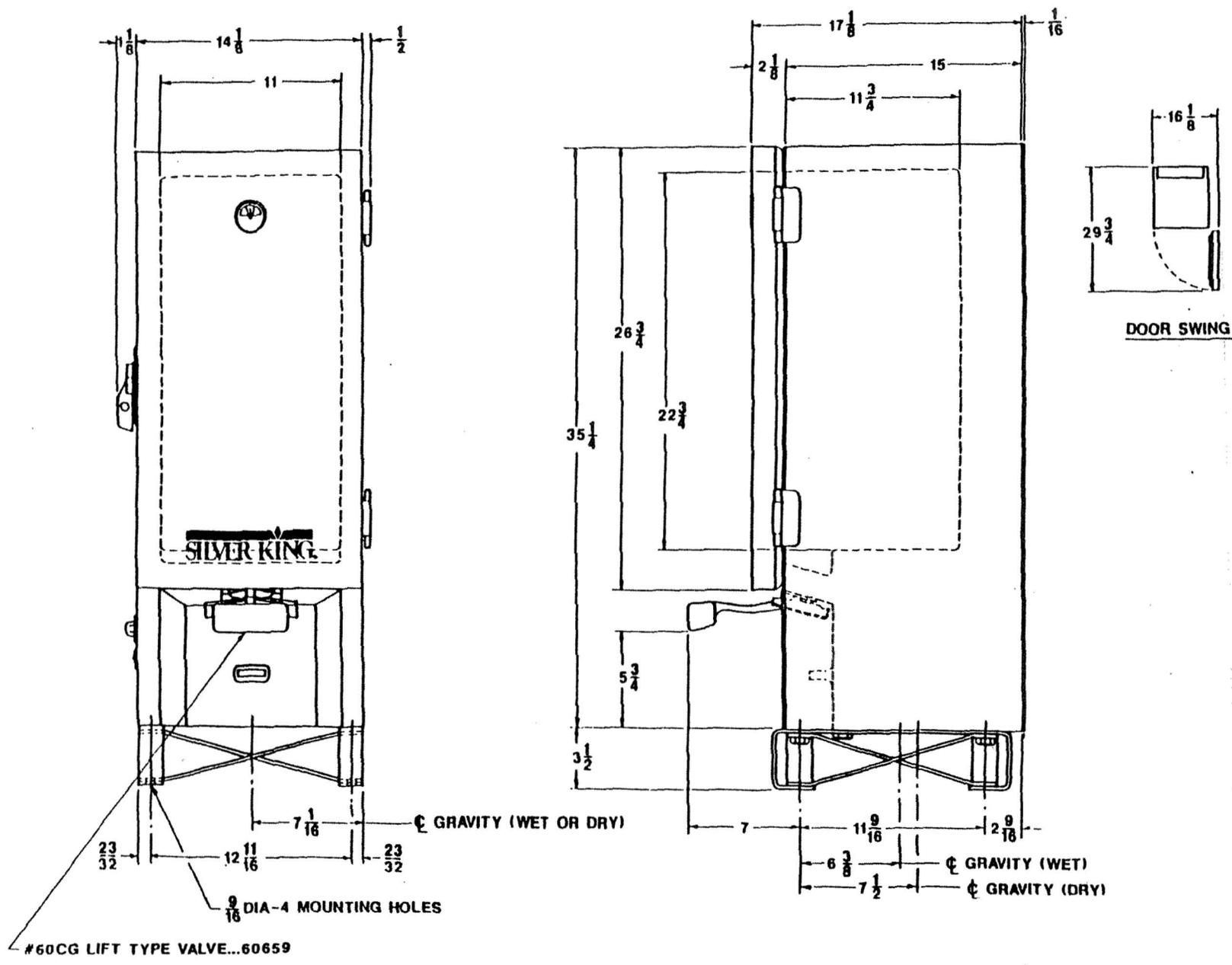


FIGURE 2 SK1 IMP/MARINE
 FIGURE B SK1 IMP/MARINE

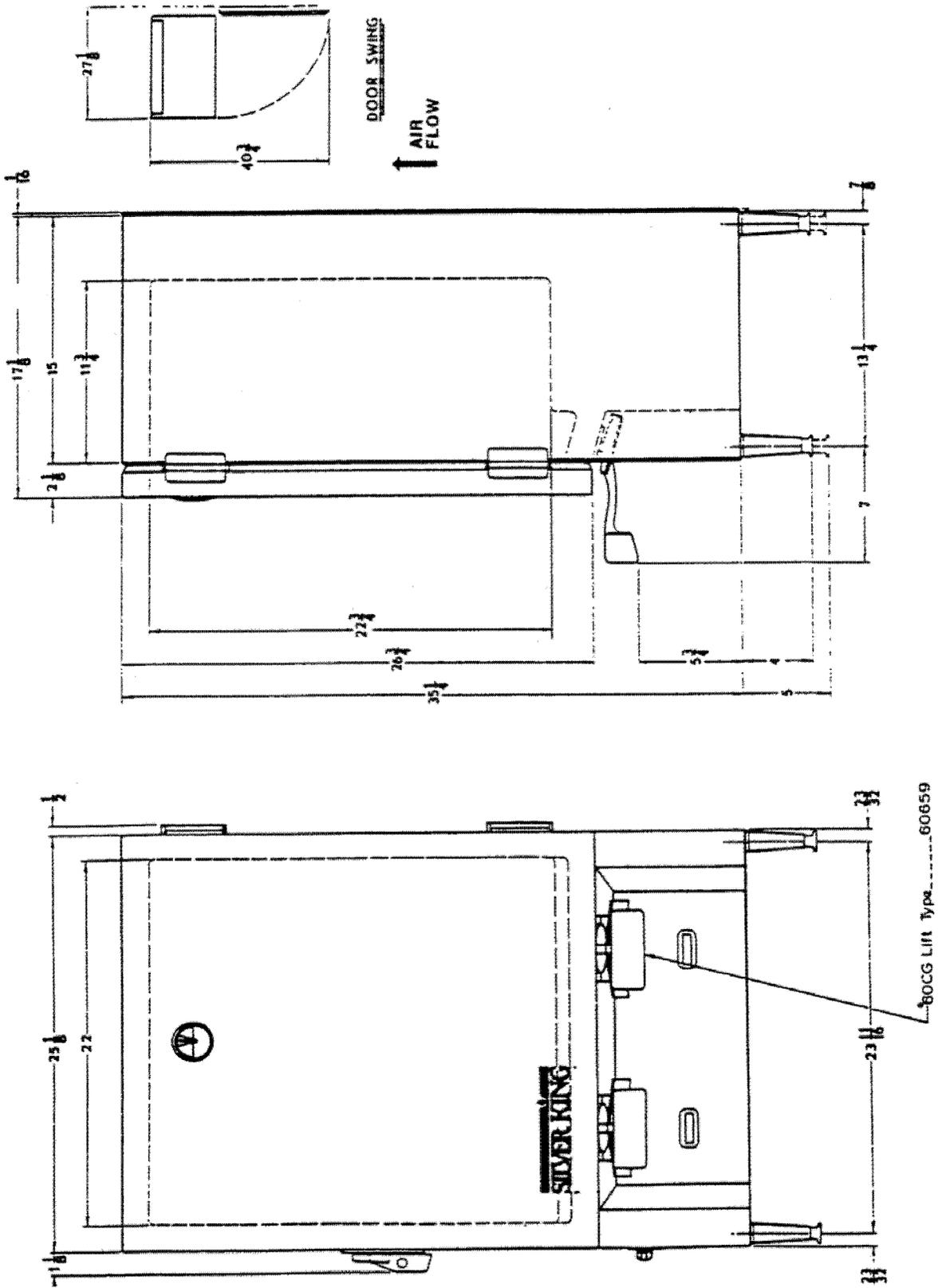


FIGURE 3 SK2 IMP

2

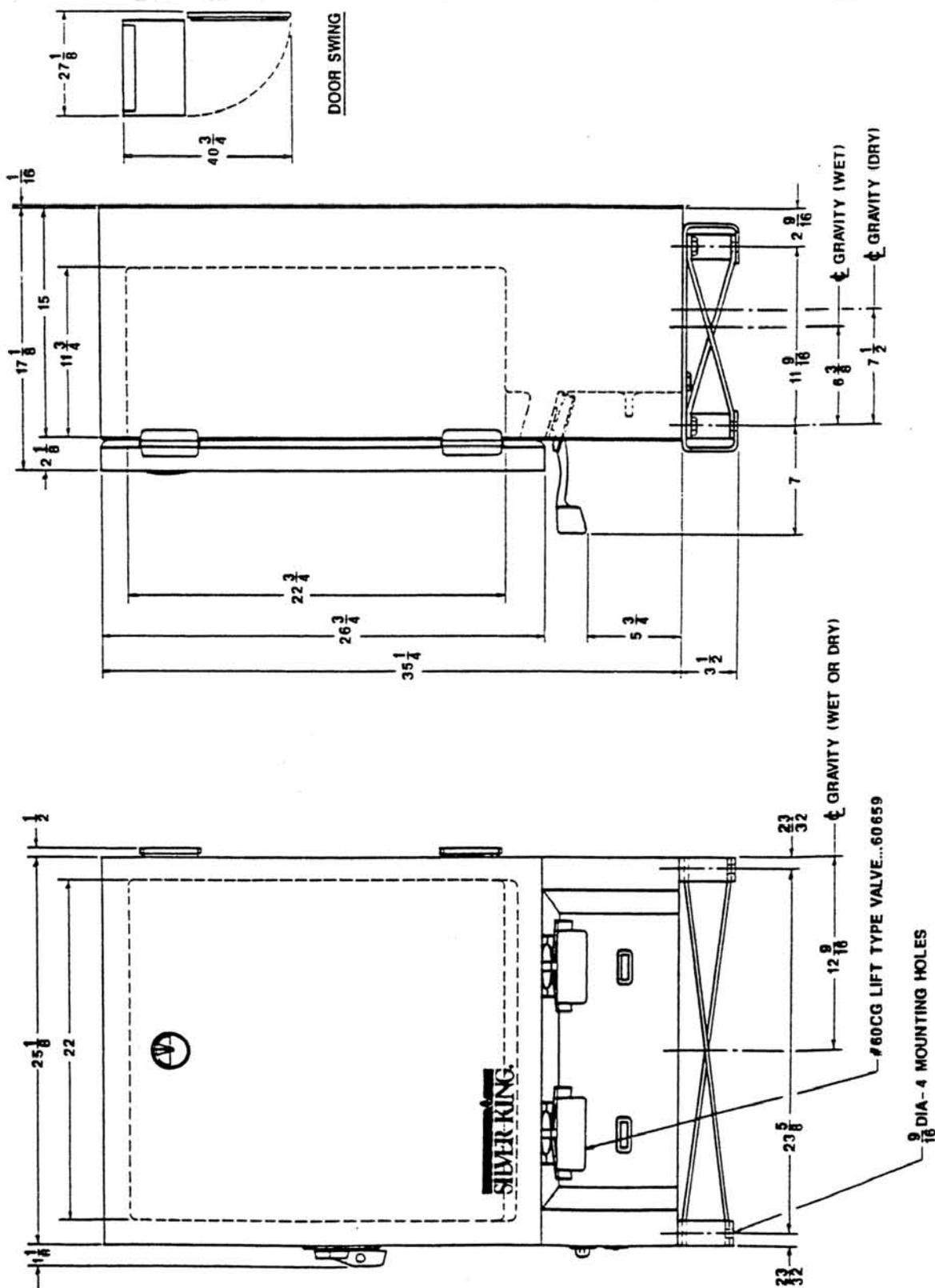


FIGURE 4 SK2 IMP/MARINE

FIGURE D SK2 IMP/MARINE

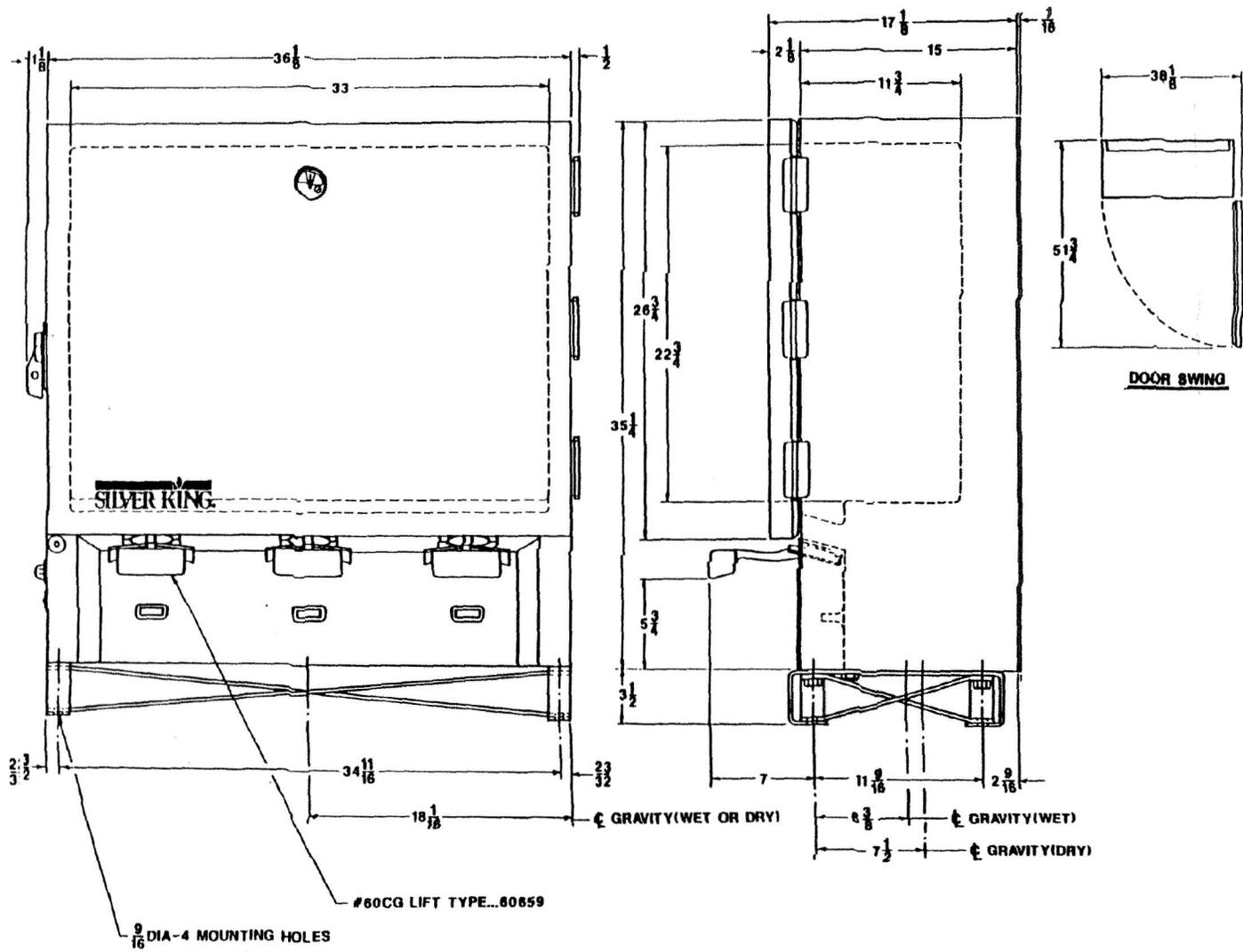
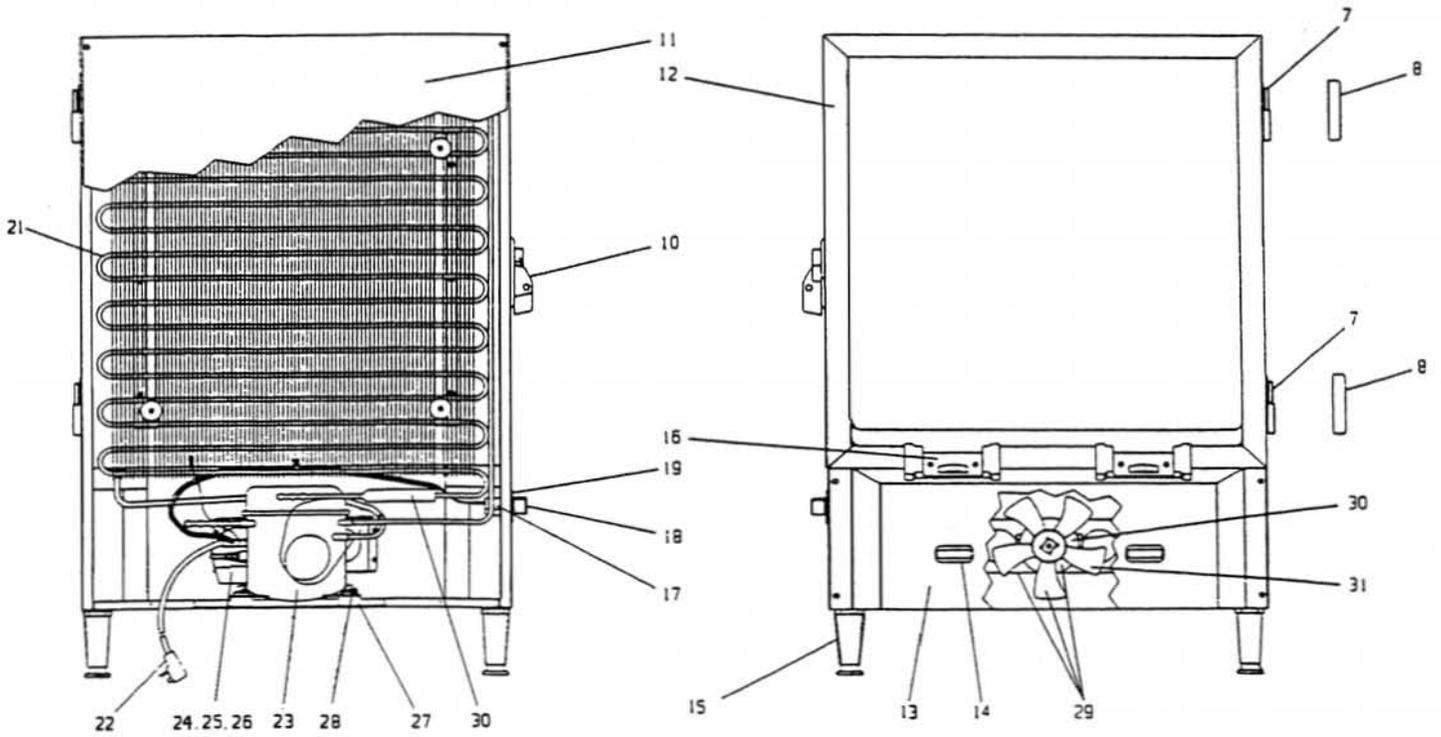
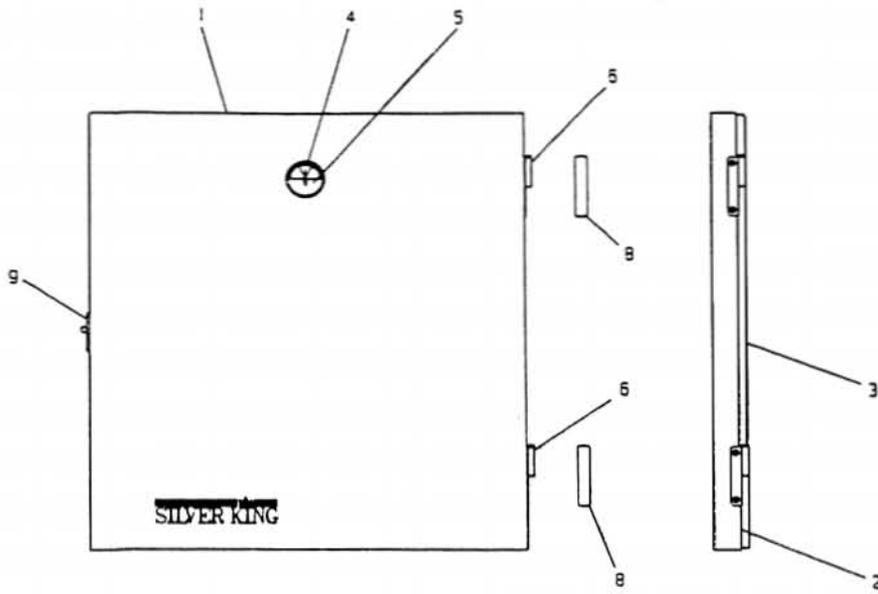


FIGURE 6 SK3 IMP/MARINE

Part II



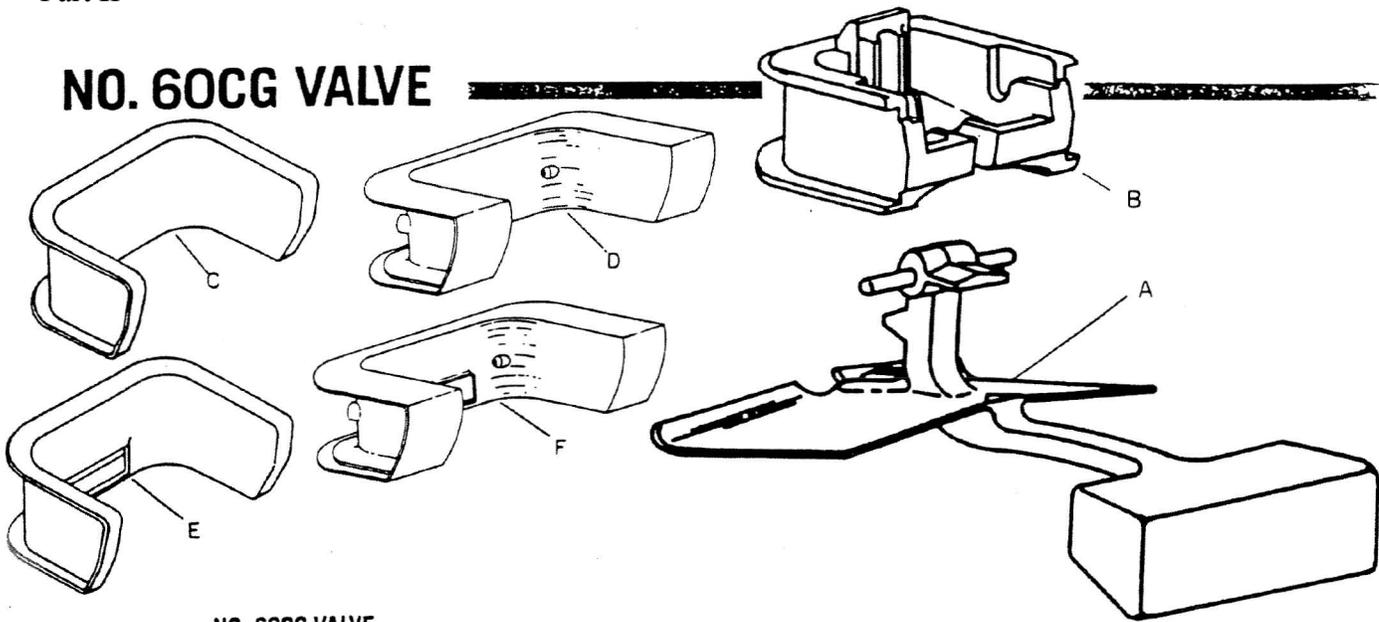
**REPLACEMENT PARTS - SK2 IMP SHOWN
MODEL SK2IMP SHOWN**

REPLACEMENT PARTS LIST ROYAL SPECIAL AND IMPERIAL MILK DISPENSERS

ITEM NO.	PART DESCRIPTION	DISPENSER MODEL NUMBER					
		SK1RS	SK1IMP	SK2RS	SK2IMP	SK3RS	SK3IMP
1	DOOR - COMPLETE	60298	60298	60307	60307	60323	60323
2	DOOR LINER (NOT SHOWN)	20405	20405	40367	40367	40370	40370
3	DOOR GASKET	10310-07	10310-07	10310-08	10310-08	10310-09	10310-09
4	TEMPERATURE INDICATOR	20361	20361	20361	20361	20361	20361
5	LENS. TEMPERATURE INDICATOR	22986	22986	22986	22986	22986	22986
6	DOOR HINGE	21755	21755	21755	21755	21755	21755
7	CABINET HINGE	21756	21756	21756	21756	21756	21756
8	HINGE COVER	21758	21758	21758	21758	21758	21758
9	DOOR STRIKE	21073	21073	21073	21073	21073	21073
10	DOOR LATCH	21069	21069	21069	21069	21069	21069
11	BACK PANEL	40445-1	40445	40444-1	40444	40443-1	40443
12	BREAKER STRIP	60326	60326	60327	60327	60328	60328
13	APRON	62888	23088	60426	20428	60429	20446
14	GLASS LOCATOR		21074		21074		21074
15	LEG - 4" ADJUSTABLE	22994	22994	22994	22994	22994	22994
16	MOLDING CLOSURE	60936	60906	60936	60906	60936	60936
17	TEMPERATURE CONTROL	40300	40300	40300	40300	40300	40300
18	KNOB. TEMPERATURE CONTROL	20651	20651	20651	20651	20651	20651
19	PLATE. TEMPERATURE CONTROL	20653	20653	20653	20653	20653	20653
20	DRIER	22677	22677	22677	22677	22677	22677
21	CONDENSER	62796	62796	63024	63024	62773	62773
22	POWER CORD 115V 60Hz 1PH	22099	22099	22099	22099	22099	22099
	POWER CORD 230V 50Hz 1PH	23038	23038	23038	23038	23038	23038
23	COMPRESSOR 115V 60Hz 1PH	43171	43171	42539	42539	42748	42748
	COMPRESSOR 230V 50Hz 1PH	42789	42789	42507	42507	42815	42815
24	RELAY 115V 60Hz 1PH	99896	99896				
	RELAY 230V 50Hz 1PH	99900	99900				
25	OVERLOAD 115V 60Hz 1PH	23329	23329				
	OVERLOAD 230V 50Hz 1PH	99901	99901				
26	RELAY/OVERLOAD ASSEMBLY 115V 60Hz 1PH			99819	99819	99894	99894
	RELAY/OVERLOAD ASSEMBLY 230V 50Hz 1PH			99798	99798	99895	99895
27	GROMMET	20363	20363	20363	20363	20363	20363
28	HAIRPIN CLIP	98106	98106	98106	98106	98106	98106
29	FAN MOTOR ASSEMBLY 115V 60Hz 1PH	42822	42822		42814	42814	42814
	FAN MOTOR ASSEMBLY 230V 50Hz 1PH	42822-01	42822-01	42814-01	42814-01	42814-01	42814-01
30	FAN MOTOR 115V 60Hz 1PH	21251-2	21251-2	22048	22048	22048	22048
	FAN MOTOR 230V 50Hz 1PH	21251-3	21251-3	99179	99179	99179	99179
31	FAN BLADE	22974	22974	99228	99228	99228	99228

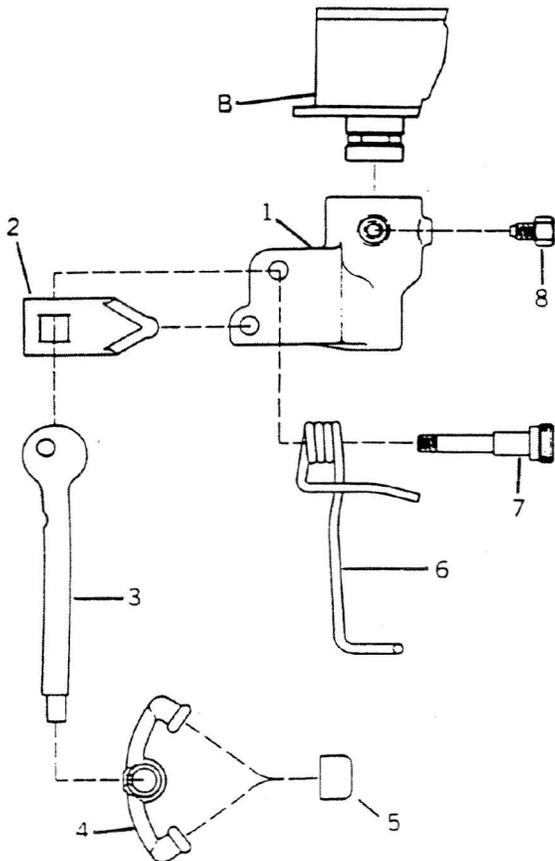
NOTE: TO ASSURE CORRECT REPLACEMENT PARTS PROVIDE DISPENSER MODEL AND SERIAL NUMBER

NO. 60CG VALVE



- NO. 60CG VALVE**
- A. 60659 60CG VALVE ASSEMBLY
 - B. 60634 VALVE HOLDER
 - C. 40013 MOLDING CLOSURE
 - D. 60936 MOLDING CLOSURE
 - E. 40712 MOLDING CLOSURE
 - F. 60906 MOLDING CLOSURE

No. 70 VALVE



- A. 21051 NO. 70 PUSH VALVE ASSEMBLY (COMPLETE)**
- VALVE PARTS**
- 1. 41141 VALVE BODY
 - 2. 21057 SHUTTLE
 - 3. 21053 VALVE ARM
 - 4. 21054 YOKE BAR
 - 5. 21055 BUMPER
 - 6. 21052 SPRING
 - 7. 21056 SET SCREW, SPRING
 - 8. 20298 SET SCREW
- B. 60016-2 VALVE HOLDER
 - C. 40013 MOLDING CLOSURE
 - D. 60936 MOLDING CLOSURE

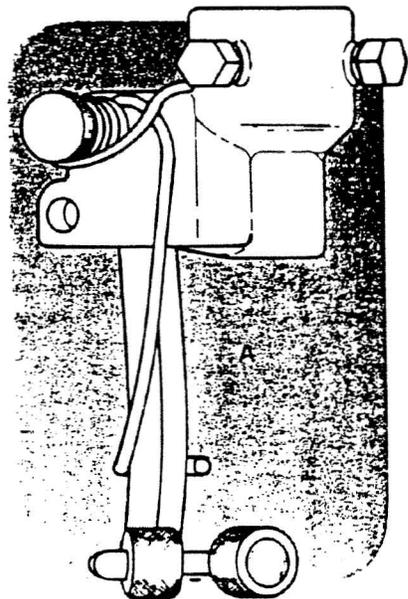


FIGURE 7
DISPENSER VALVE

WARRANTY

SILVER KING DIVISION OF STEVENS LEE CO. MINNEAPOLIS, MN. 55441-3787 (612) 553-1881 U.S.A.

THE EIGHTEEN (18) MONTH COMPONENT WARRANTY IS YOUR PROTECTION AGAINST FAULTY WORKMANSHIP, MATERIALS AND PARTS AS ORIGINALLY CONSTRUCTED. THE FACTORY, AT IT'S OPTION, WILL REPAIR OR REPLACE ANY PARTS, WHICH UPON EXAMINATION AT THE FACTORY, ARE FOUND TO BE DEFECTIVE WITHIN THE TIME PERIOD COVERED BY WARRANTY. THESE PARTS MUST BE RETURNED TO THE FACTORY WITH ALL PACKAGING, CRATING AND TRANSPORTATION CHARGES PREPAID.

THE FIVE (5) YEAR COMPRESSOR WARRANTY IS YOUR PROTECTION AGAINST COMPRESSOR FAILURE DURING THE WARRANTY PERIOD. THE WARRANTY BEGINS ON THE DATE OF SHIPMENT FROM OUR FACTORY IN MINNEAPOLIS. THE WARRANTY PROVIDES FOR THE REPLACEMENT OF THE HERMETICALLY SEALED COMPRESSOR, EXCLUSIVE OF DELIVERY AND INSTALLATION CHARGES. IT IS THE OWNER'S RESPONSIBILITY TO RETURN THE COMPRESSOR SERIAL NUMBER PLATE OF THE FAILED COMPRESSOR TO THE FACTORY. FAILURE TO DO SO WILL VOID THE WARRANTY. ALL WARRANTIES WILL BE VOID IF ANY ALTERATION IS MADE TO THE UNIT OR IS IMPROPERLY INSTALLED. MODEL AND SERIAL NUMBER OF THE UNIT MUST ACCOMPANY ALL RETURNS.

PART III

Drawings and Parts Lists For Milk Dispensers with Embraco Compressor Model Number EM20HHR

PART III

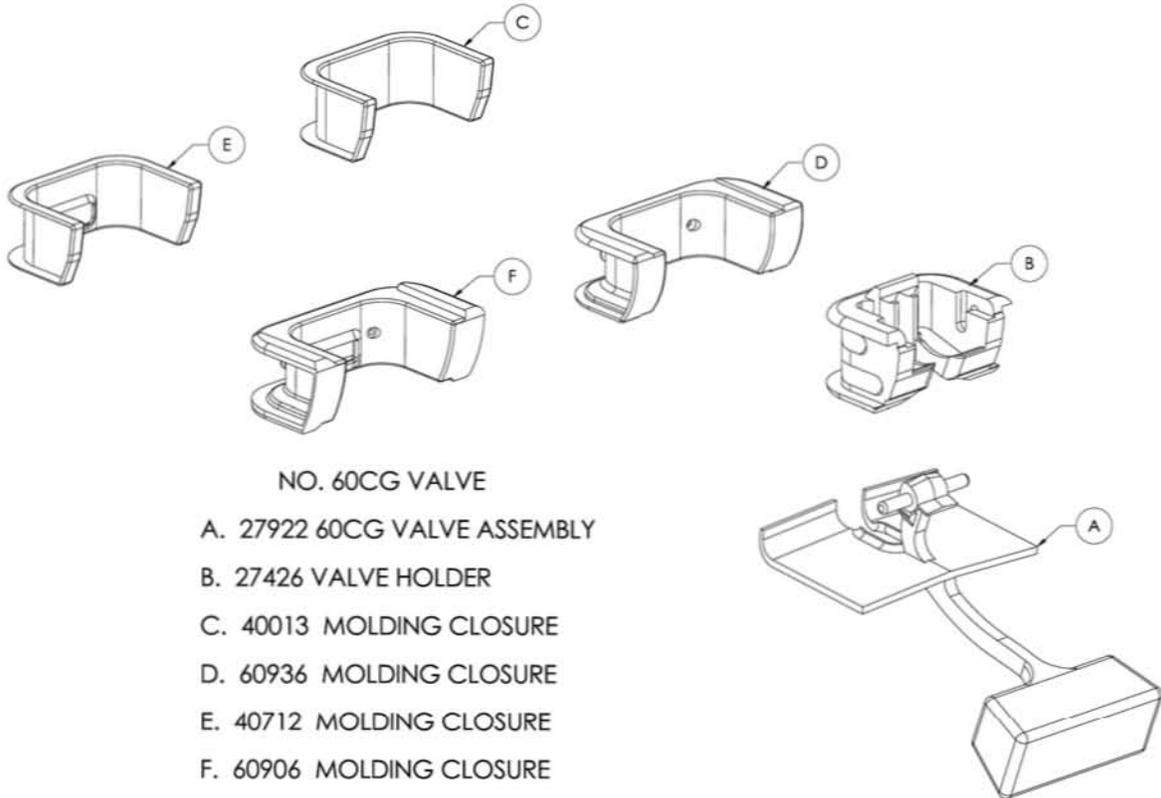
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NO. 60CG VALVE

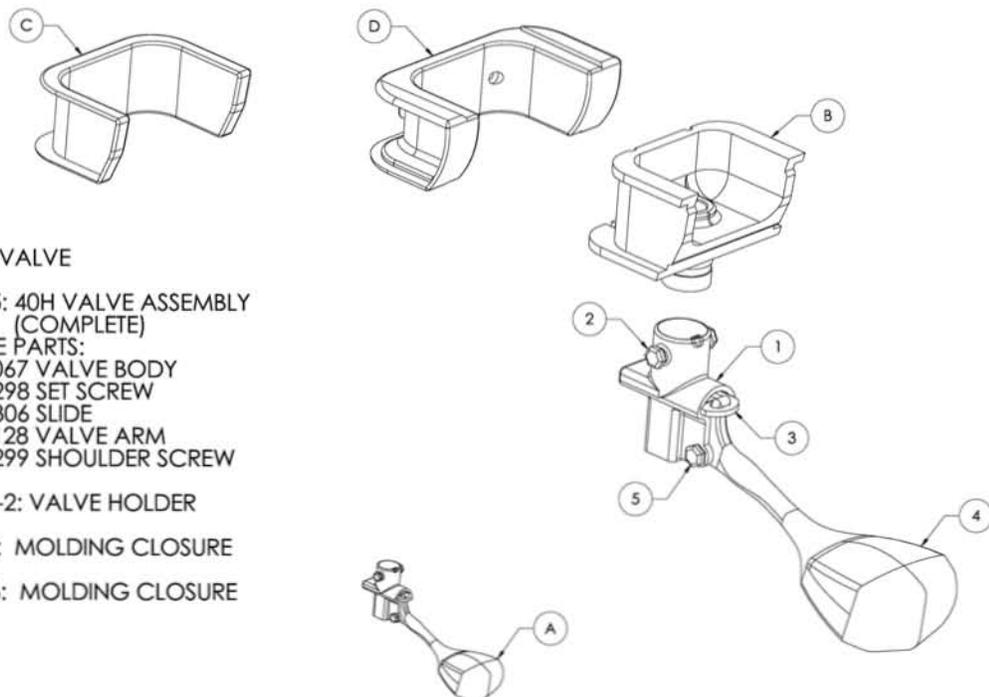


NO. 60CG VALVE

- A. 27922 60CG VALVE ASSEMBLY
- B. 27426 VALVE HOLDER
- C. 40013 MOLDING CLOSURE
- D. 60936 MOLDING CLOSURE
- E. 40712 MOLDING CLOSURE
- F. 60906 MOLDING CLOSURE

30906 REV A

NO. 40H VALVE



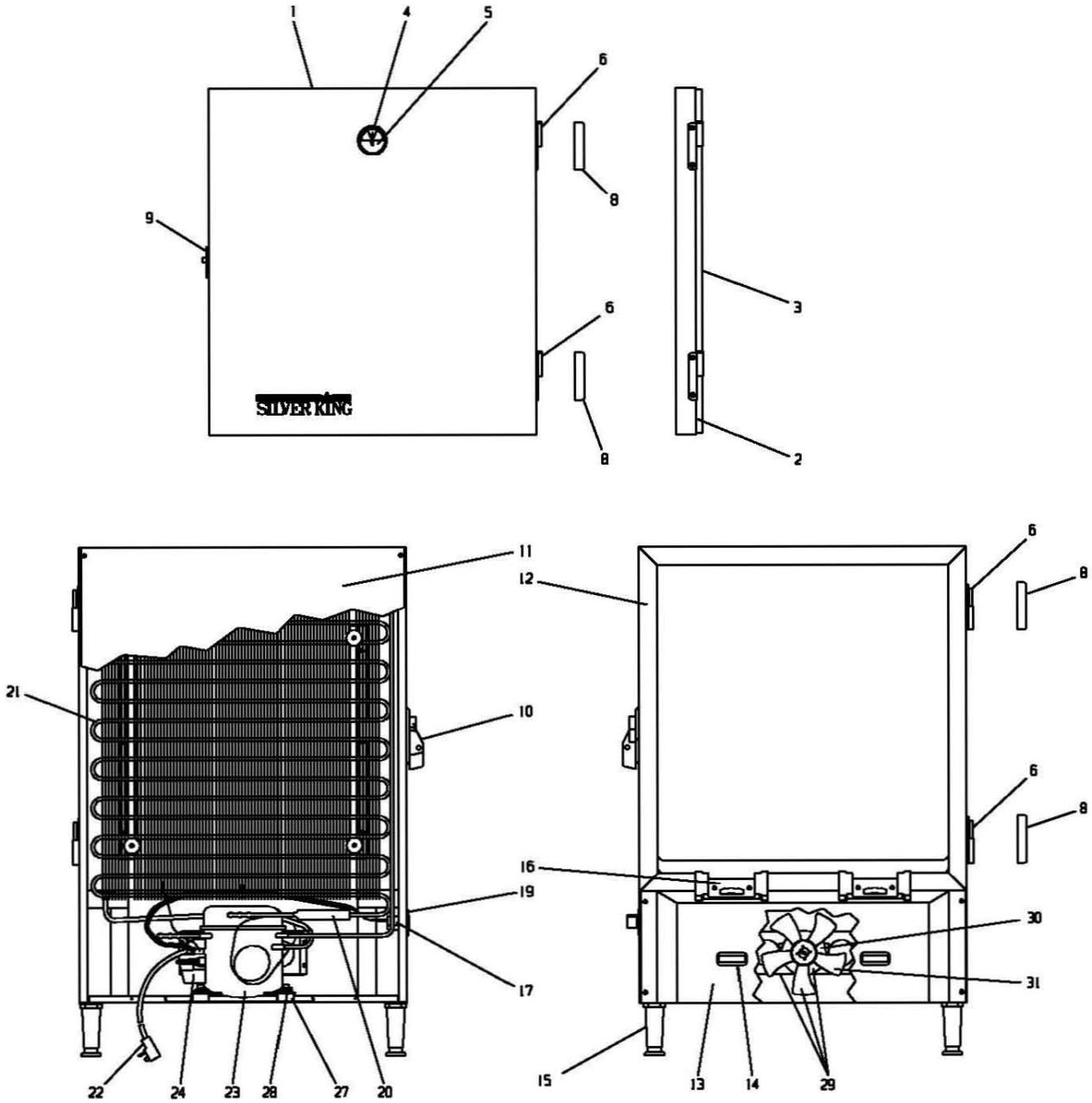
NO. 40H VALVE

- A. 20305: 40H VALVE ASSEMBLY (COMPLETE)
- VALVE PARTS:
 - 1. 60067 VALVE BODY
 - 2. 20298 SET SCREW
 - 3. 20306 SLIDE
 - 4. 60128 VALVE ARM
 - 5. 20299 SHOULDER SCREW
- B. 60016-2: VALVE HOLDER
- C. 40013: MOLDING CLOSURE
- D. 60936: MOLDING CLOSURE

30905 REV A

FIGURE 1
DISPENSER VALVE

Part III



REPLACEMENT PARTS – SK2 IMP SHOWN

REPLACEMENT PARTS LIST: IMPERIAL MILK DISPENSERS

ITEM NO.	PART DESCRIPTION	MODEL NUMBER		
		SK1IMP	SK2IMP	SK3IMP
1	DOOR, COMPLETE	10335-05	10335-08	10335-11
2	DOOR LINER (NOT SHOWN)	20405	40367	40370
3	DOOR GASKET	10310-07	10310-08	10310-09
4	TEMPERATURE INDICATOR	20361	20361	20361
5	LENS REPLACEMENT - TEMP. INDICATOR	22986	22986	22986
6	HINGE ASSY (BOTH HALVES AND COVERS)	10327-09	10327-09	10327-09
8	HINGE COVER	21758	21758	21758
9	DOOR STRIKE	21073	21073	21073
10	DOOR LATCH	21069	21069	21069
11	BACK PANEL	40445	40444	40443
12	BREAKER STRIP	60326	60327	60328
13	APRON	23088	20428	20446
14	GLASS LOCATOR	21074	21074	21074
15	KIT LEG 4" ADJUSTABLE	10314-61	10314-61	10314-61
16	VALVE WELL INSERT	60906	60906	60906
17	TEMPERATURE CONTROL	43064	43064	43064
19	PLATE, TEMPERATURE CONTROL	20653	20653	20653
20	DRIER	22677	22677	22677
21	CONDENSER COIL	62796	63024	62773
22	POWER CORD (115V)	22099	22099	22099
	POWER CORD (230V)	23038	23038	23038
23	COMPRESSOR (115V 60 HZ)	10343-51	10343-02	10343-40
	COMPRESSOR (230V 50HZ)	10343-24	10343-78	10343-32
	COMPRESSOR (230V 60HZ)	10343-78	10343-78	10343-64
24	ELECTRICAL KIT (115V) (RELAY AND OVERLOAD)	10344-51	10344-02	10344-40
	ELECTRICAL KIT (230V 50HZ)	10344-24	10344-78	10344-32
	ELECTRICAL KIT (230V 60HZ)	10344-78	10344-78	10344-64
27	GROMMET, COMPRESSOR MOUNT	20481	20481	20481
28	CLIP, HAIRPIN	98106	98106	98106
29	FAN MOTOR ASSEMBLY (115V)	42822	42814	42814
	FAN MOTOR ASSEMBLY (230V)	42822-01	42814-01	42814-01
30	FAN MOTOR (115V)	21251-2	22048	22048
	FAN MOTOR (230V)	21251-3	43193	43193
31	FAN BLADE	22974	99228	99228

WHEN ORDERING REPLACEMENT PARTS, PLEASE PROVIDE MODEL AND SERIAL NUMBERS

P/N 32902 ELECTRICAL KIT/ EMBRACO P/N U/A

SEQ	P/N	ITEM	VENDOR #
010	25476	OVERLOAD	4TM730KFBYY-53
020	25477	RELAY	EMBRACO 213514024
030	99937	COVER	EMBRACO 013555028

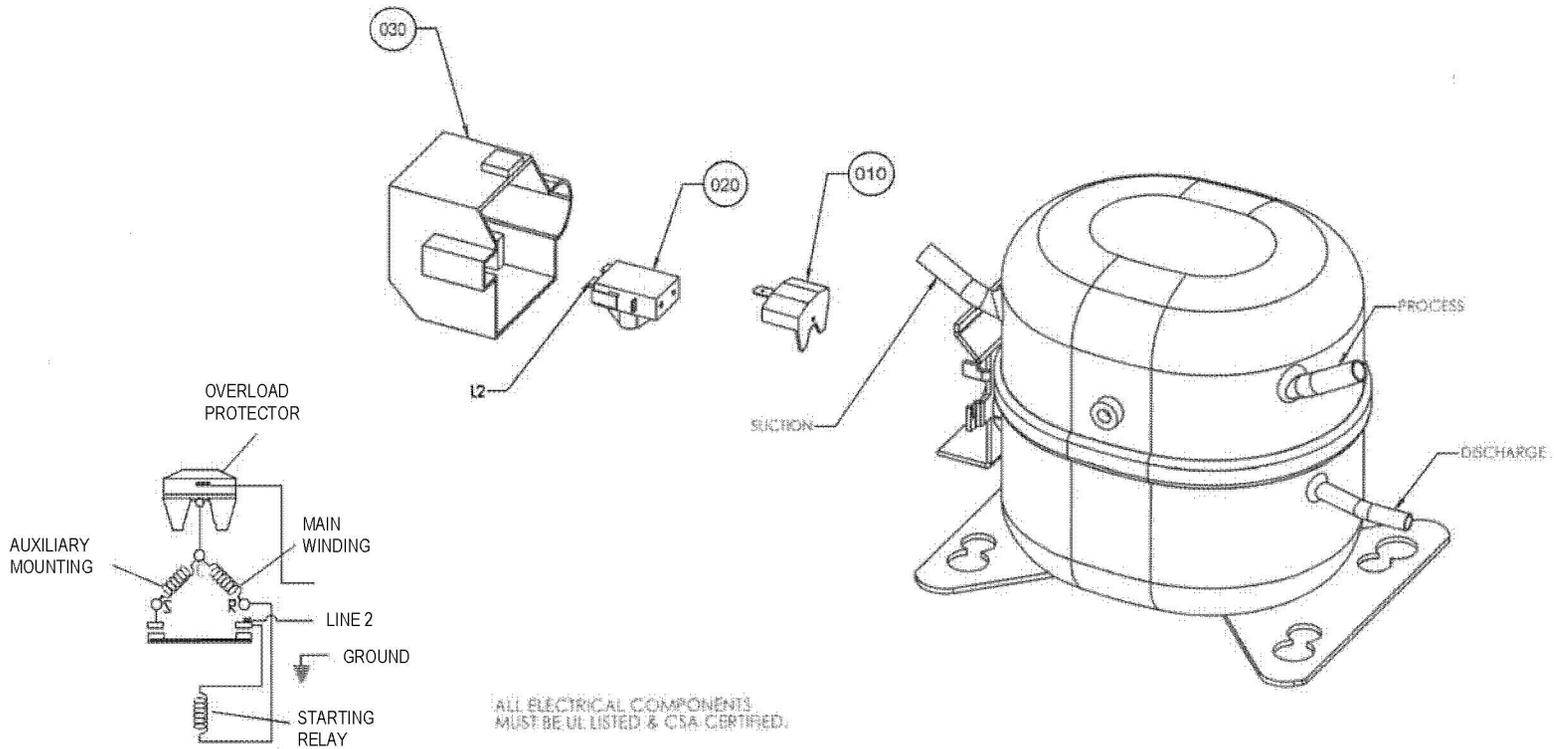


FIGURE 2

ECN	REV	DESCRIPTION	DATE	BY	APP'D	DATE	BY
6448	G	CORRECT BALLGONS TO 3 PLACE	1/22/2007	ALP			
5512	F	REDRAWN TO SOLIDWORKS	9/22/2003	RMP			

SILVER KING REFRIGERATION, INC.		TAMPA, FL	
COMPR 115V/60HZ EM20HR			
SHEET 1 OF 1	G	11.5	25473



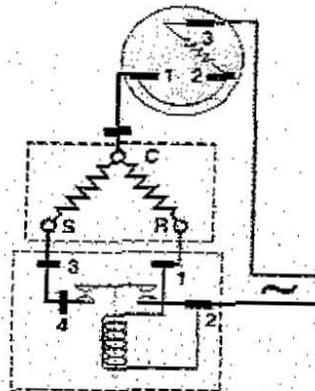
EM20HHR

L/M/HBP

115 V

R134a

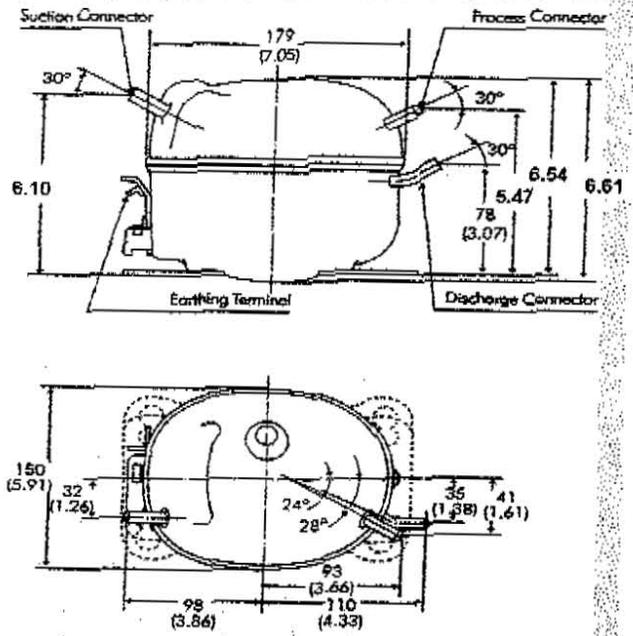
Wiring Diagram



Compressor Terminals
 C = Common
 R = Run
 S = Start

Electrical Components are supplied unassembled. Use of components other than specified will void warranty.

Dimensional Drawing



Tube Diameter

	ID (in)	OD (in)	ID (mm)	OD (mm)
Suction	0.260	0.420	6.604	10.668
Discharge	0.190	0.290	4.826	7.366
Process	0.260	0.360	6.604	9.144
Oil Cooler	N/A	N/A	N/A	N/A

Mechanical Data

	English		Metric	
Bore	0.7	in	17.78	mm
Stroke	0.3	in	7.62	mm
Displacement	0.14	in ³	2.27	cc
Speed	3500	rpm		
Weight	14.7	lbs	32.4076	kg
Oil Charge	6	oz	170	ml
Oil Type	ESTER		ISO22	

Electrical Data

Rev 06/05/03

Motor:

2 Pole - Single Phase	RSIR/CSIR
Voltage	115 V
Frequency	60 Hz
Voltage Range	V
Run Winding Resist at 25 C	8.15 Ω
Start Winding Resist at 25 C	24.90 Ω
Locked Rotor Current	9.0 A

Overload Protector:

Trip Current at 25 C	5.7	A
Trip Time	5 - 15	sec
Disc Opening Temperature	105	F
Disc Closing Temperature	61	F

Compressor Cooling

Static Cooling

Static/NotControlled/115

Restrictor: Expansion Valve or Capillary Tube

Temperature (F)	-10 to 5	5 to 20	20 to 35
Length (ft)	15	10	
Diameter ID (in)	0.026	0.026	

Tube Placement and Material

Suction	Straight/Copper
Discharge	Straight/Copper
Process	Straight/Copper
Oil Cooler	Straight (Separate Circuit For Heat Transfer)

Other Information

Houseing Type	EMSU
Rod Material	FE

Relay:

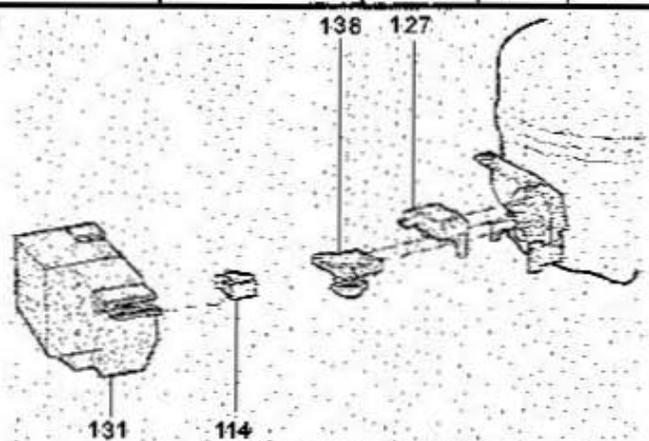
Pick Up Max	N/A	A
Drop Out Max	N/A	A

Start Capacitor:

Capacitance	124-149	uF
Voltage	90	V

Run Capacitor:

Capacitance	N/A	uF
Voltage	N/A	V

		EM20HHR			L/M/HBP	115 V	R134a																																																																						
Application				Usage																																																																									
Approximate H.P.		1/12		Domestic Refrigerators																																																																									
Starting Torque		HST		Domestic Freezers																																																																									
Refrigerant		R134a		Reach-In Freezers																																																																									
Evap Temp Rating		L/M/HBP		Ice Cream Cabinets																																																																									
Evap Temp Range				Frozen Food Cabinets																																																																									
				Slush Drink Machines																																																																									
				Beverage Vendors (Ice)																																																																									
Controlled ASHRAE Conditions																																																																													
LBP - Performance					Rating Conditions																																																																								
Temperature - F	-20	-10	0	10	20	General 130 F Condensing Temp 90 F Return Gas Temp 90 F Ambient Temp 90 F Liquid Temp at TXV																																																																							
Capacity - BTU/Hr	179	195	290	405	539																																																																								
Power - W		66																																																																											
Current - Amps		0.91																																																																											
Temperature - C	-28.9	-23.3	-17.8	-12.2	-6.7																																																																								
Capacity - Kcal/Hr	30	49	73	102	136	Low Back Pressure (Low Temp) -10 F Evaporator Temp High Back Pressure (High Temp) +45 F Evaporator Temp																																																																							
HBP - Performance																																																																													
Temperature - F	5	15	30	45	50																																																																								
Capacity - BTU/Hr	345	469	636	872	982																																																																								
Power - W				117																																																																									
Current - Amps				1.3																																																																									
Temperature - C	-15.0	-9.4	-1.1	7.2	10																																																																								
Capacity - Kcal/Hr	87	118	159	220	247																																																																								
Bill Of Material				Cross Reference																																																																									
Compressor BOM	513307690			<table border="1"> <thead> <tr> <th>Manufacturer</th> <th>Model</th> <th>BTU/Hr</th> <th>H.P.</th> <th>Refrigerant</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table>				Manufacturer	Model	BTU/Hr	H.P.	Refrigerant																																																																	
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Electrical Assembly Alt	513524489																																																																												
Relay Alt	213514024																																																																												
Overload Alt	4TM730KFBYY-53																																																																												
Overload Holder	-																																																																												
Start Capacitor	N/A																																																																												
Capacitor Bracket	N/A																																																																												
Capacitor Cap	N/A																																																																												
Run Capacitor	N/A																																																																												
Terminal Cover	N/A																																																																												
Terminal Group	N/A																																																																												
Electrical Box	N/A																																																																												
Grommet Sleeve	2221003 2222003																																																																												
Base Plate	Universal																																																																												
Picture																																																																													
EMBRACO NORTH AMERICA, INC. 2232 Northmont Parkway, Duluth GA 30096 Phone: (770) 814-8004 Fax: (770) 622-4627																																																																													

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