flagro **TECHNICAL RESOURCE:**

AIR CONDITIONING SERVICE GUIDE

Pictured at left:
AHSC-140P Air Conditioner
Part Number: AHSC-140P
(220V and 460V)

NOTICE

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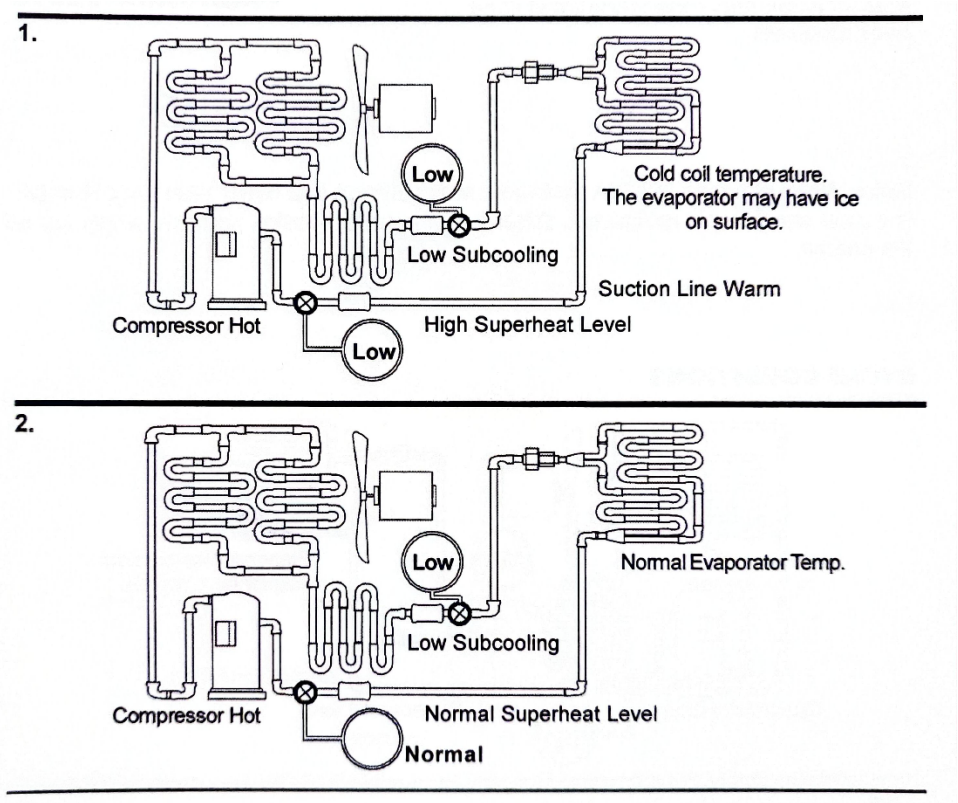
INSUFFICIENT REFRIGERANT CHARGE

When a TXV SYSTEM IS UNDERCHARGED, the TXV may open in the attempt to maintain sufficient suction pressure and vapor superheat. Low condenser pressure will be accompanied by low subcooling. If the CHARGE IS VERY LOW, the system can experience excessively high superheat and excessively low subcooling conditions. The lack of refrigerant vapor, and its cooling effect on motor windings, will cause the compressor motor to run hot and the low suction pressure will leave a cold evaporator coil, which may ice over.



POSSIBLE CAUSES OF CONDITION

- Refrigerant leak(s)

TANGIBLE EVIDENCE OF CONDITION

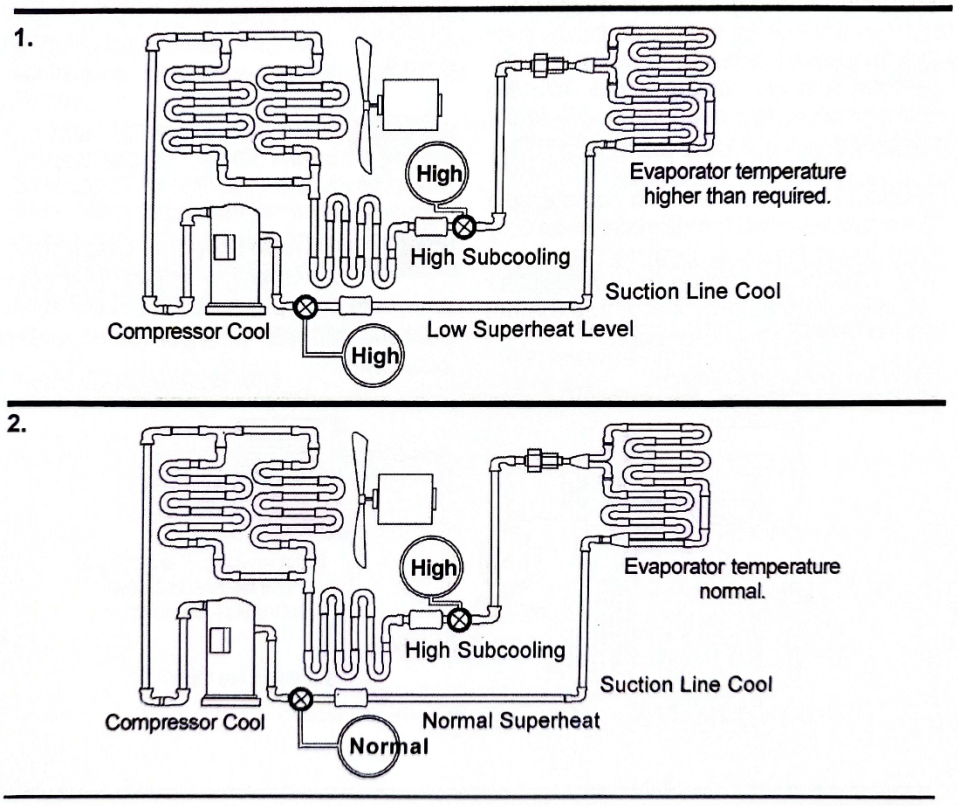
- Low cooling capacity
- Low cooling efficiency
- Overheating compressor motor

SOLUTION

1. Recover refrigerant and weigh charge to make sure it is according to specifications.
2. If the charge is low, leak test the system and repair the leak.
3. Charge the system to stated requirements.

EXCESSIVE REFRIGERANT in the Condenser Coil

When a TXV system is OVERCHARGED, the suction pressure and superheat may register as normal since the TXV will monitor and restrict the excess refrigerant flow into the evaporator coil. This refrigerant overcharge is contained in the condenser coil and the head pressure and liquid subcooling levels will be elevated. If the CHARGE IS VERY HIGH, suction pressure may be elevated while experiencing only a small decrease in superheat levels.



POSSIBLE CAUSES OF CONDITION

- Poor refrigerant installation

TANGIBLE EVIDENCE OF CONDITION

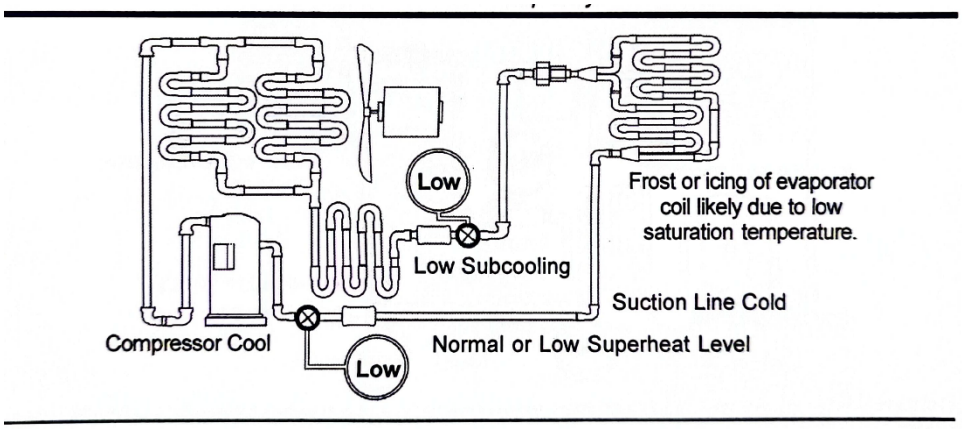
- High humidity
- Low cooling efficiency
- Compressor starting issues
- Compressor failure

SOLUTION

1. Recover refrigerant and weigh charge to make sure it is according to specifications.
2. If the charge is high, charge system to stated requirements.

TOO LOW A HEAT LOAD at the Evaporator Coil

If not enough heat flows across the evaporator coil, the evaporator coil (and suction line) will be very cold and the compressor may show frost while the hot gas line will be cool. If the heat load is low enough, a layer of ice may form on the coil. If the condition is acute, the superheat level could approach zero degrees and liquid could flow back to the compressor.



POSSIBLE CAUSES OF CONDITION

- Undersized ductwork
- Excessive ductwork length
- Dirty evaporator coil
- Dirty filters
- Thermostat setpoint set too low

TANGIBLE EVIDENCE OF CONDITION

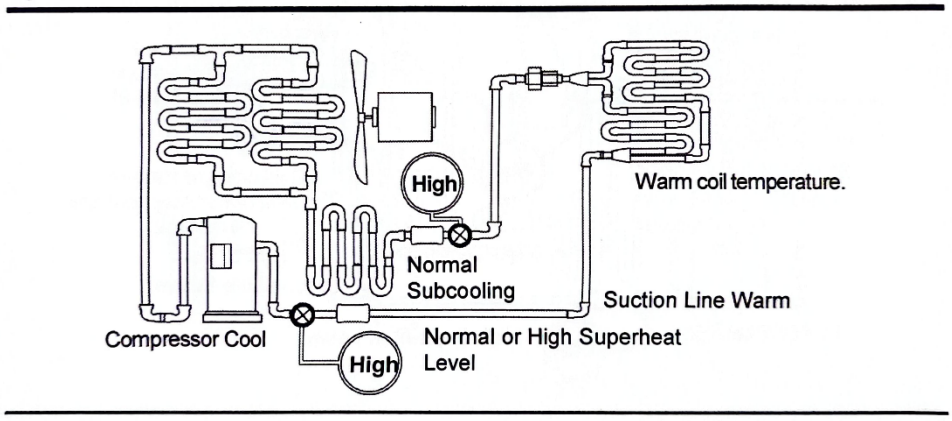
- Frost on evaporator coil and/or suction line
- Compressor housing condensation
- Hot gas line is cool

SOLUTION

1. Thaw evaporator coil.
2. Check return air filter. Replace if dirty.
3. Check that evaporator coil is clean.
4. Check that blower assembly is clean.
5. Ensure return and supply ducting is sized for unit.
6. Ensure sufficient air flow using flowmeter.

TOO GREAT A HEAT LOAD at the Evaporator Coil

If too much heat flows across the evaporator coil, the evaporator coil could hot and the compressor (and hot gas line) will be very hot as well. Running with a high heat load will push the system to pressures above recommended specifications and the compressor may shut down with an internal overload or cause an excessive electrical draw to trip the circuit breaker.



POSSIBLE CAUSES OF CONDITION

- Return air unconditioned
- Excessive ambient temperatures
- System undersized for conditions and/or site

TANGIBLE EVIDENCE OF CONDITION

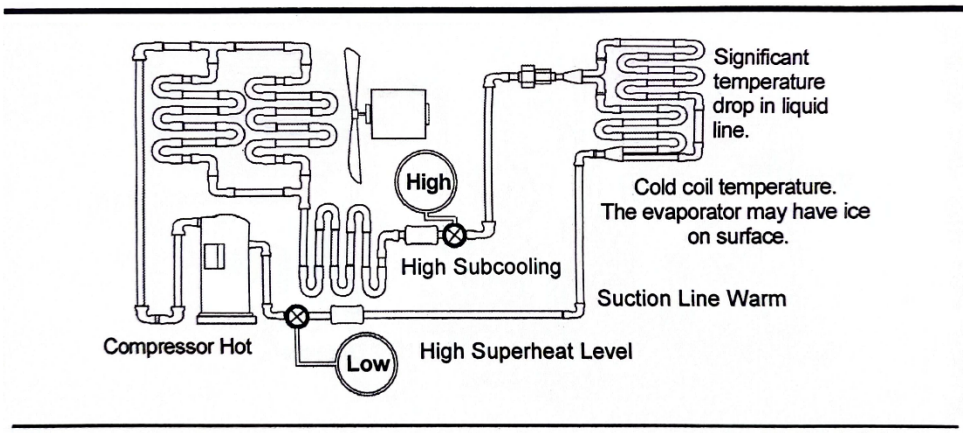
- Compressor internal overload shut-down
- Circuit breaker tripped

SOLUTION

1. Compare temperature of conditioned space to air entering evaporator coil. If air at evaporator is warmer, unconditioned air is infiltrating the conditioned space.
2. If is a new start-up system on a hot day, allow air in conditioned space adequate time to fall within normal operating range.
   NOTE: Return air temperatures above 90°F may have difficulty maintaining a 20°F TD (Temperature Differential).
3. To increase TD to an acceptable range, partially blocking the return air supply may help.
4. Ensure that the system is properly sized for the space.

A RESTRICTION in the LIQUID LINE

If LOW SUCTION LINE PRESSURE is accompanied by HIGH SUPERHEAT, this can be an indication of a liquid line restriction. If the refrigerant charge is increased, both the liquid and suction pressures would rise in unison. However, if the liquid pressure goes up excessively but the suction pressure stays low, the liquid line has a restriction.



POSSIBLE CAUSES OF CONDITION

- Liquid line damage
- Restricted liquid line drier

TANGIBLE EVIDENCE OF CONDITION

- Ice or condensation on the liquid line
- Ice or condensation on the liquid line drier
- Low suction pressure
- High subcooling
- High superheat

SOLUTION

1. If BOTH liquid and suction pressure are low with no obvious signs of sweat or frost on the liquid line, begin to add refrigerant.
2. Both pressures should rise but if the liquid pressure rises substantially but the suction line stays low, the liquid circuit has a restriction.
3. Should be no drop in temperature between the outlet of condenser coil and inlet of metering device (FIG 3). If there is a large temperature drop, isolate the restriction and repair.
4. If no temperature drop, liquid and suction pressures are still offset, and superheat and subcooling remain high, metering device may be restricted.

Fig. 1

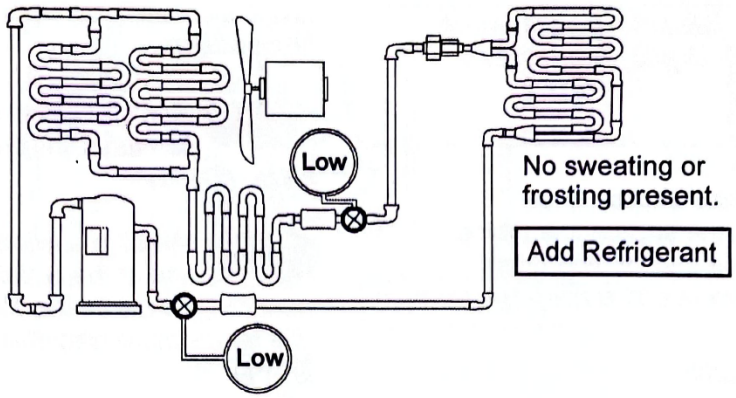


Fig. 2

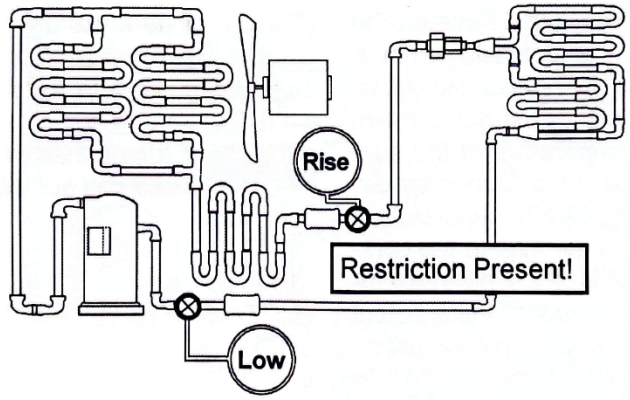
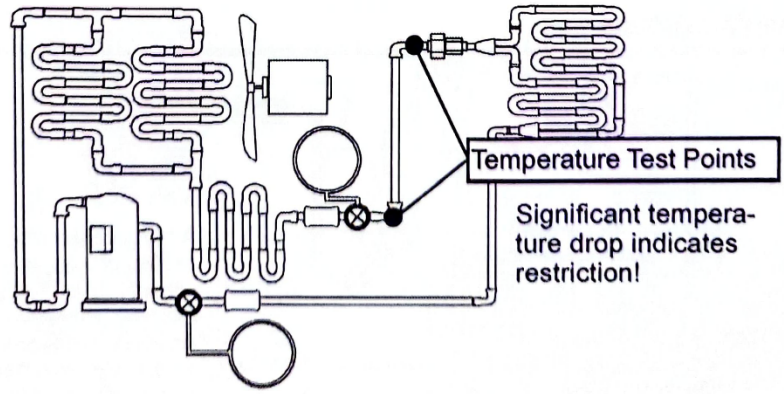
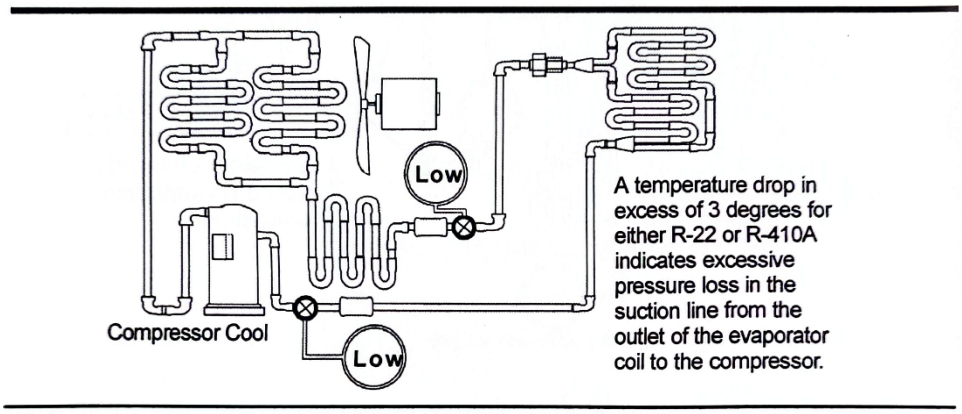


Fig. 3



A RESTRICTION in the SUCTION LINE

If SUCTION LINE PRESSURE is EXTREMELY LOW, this can be an indication of a suction line restriction. The observed superheat will not be accurate as the measurement is being done downstream from the cause of the restriction. To determine is the suction line has a restriction, measure temperature drop between the evaporator coil outlet and the inlet to the compressor; the temp drop should not exceed 3°F.



POSSIBLE CAUSES OF CONDITION

- Suction line damage

TANGIBLE EVIDENCE OF CONDITION

- Reduced cooling capacity
- Ice on evaporator coil

SOLUTION

1. Run system and allow temperatures and pressures to stabilize.
2. Compare temperature between the outlet of evaporator coil and inlet of compressor (FIG 2). Temperature drop should not exceed 3°F.
3. If temperature drop exceeds 3°F, check for kinks in the line.

Fig. 1

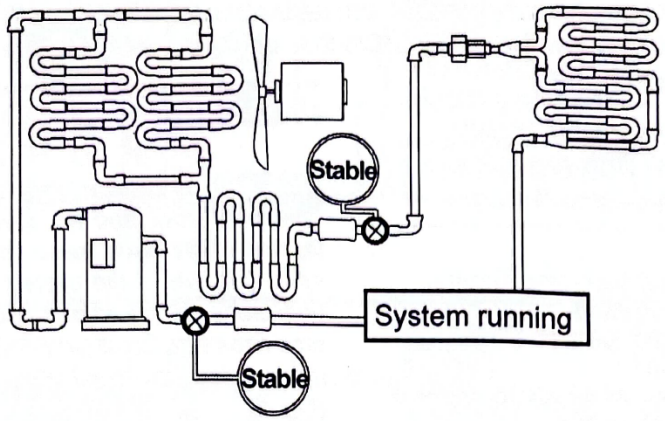


Fig. 2

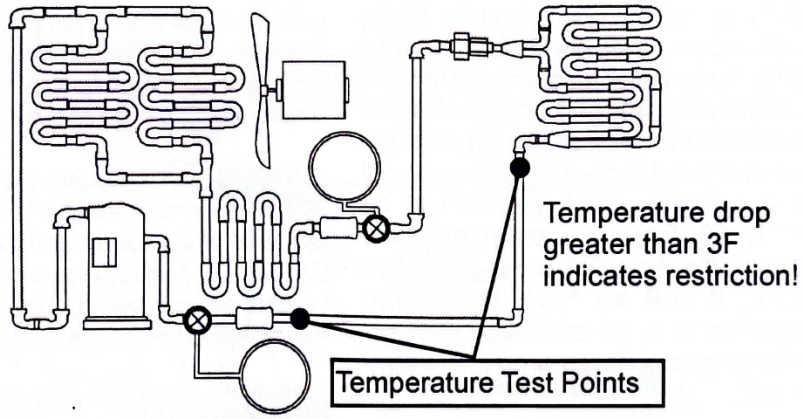
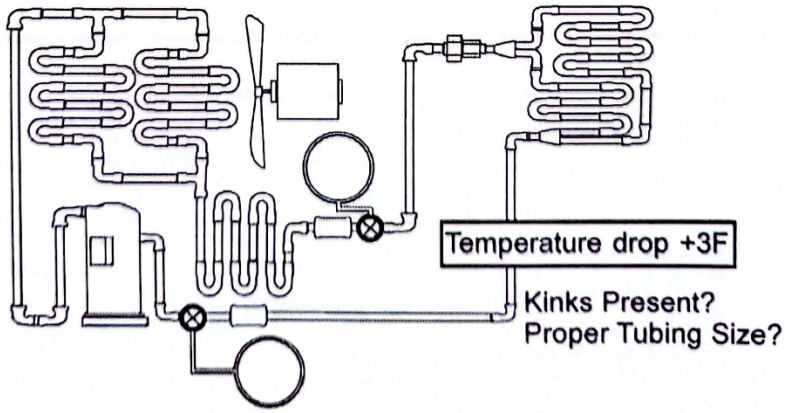
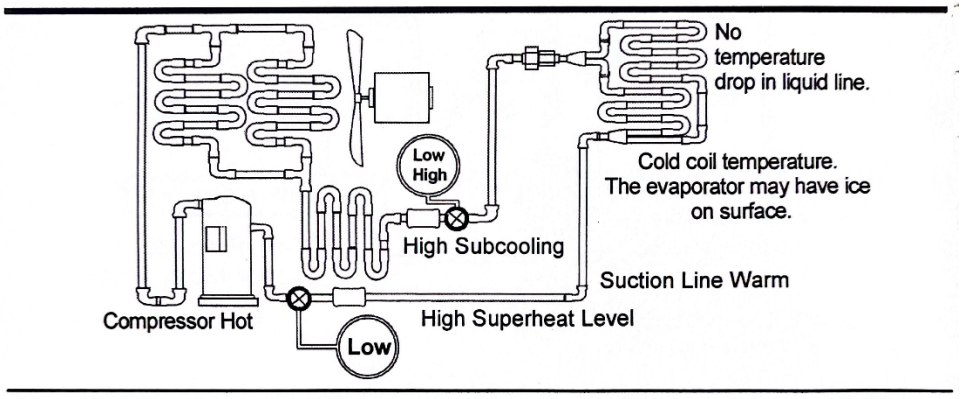


Fig. 3



A RESTRICTION in the TXV METERING DEVICE

If LOW SUCTION LINE PRESSURE is accompanied by HIGH SUPERHEAT, this can be an indication of a metering device restriction. A restriction in the metering device will starve the evaporator coil of refrigerant, leading to low suction pressure, very low saturation temperature, making frost on the evaporator coil likely. If the refrigerant charge was increased, the liquid pressure will rise and the suction pressure will stay low, indicating a problem in the liquid circuit.



POSSIBLE CAUSES OF CONDITION

- Expansion valve failure
- Foreign material in metering device
- Frozen residue at the metering device

TANGIBLE EVIDENCE OF CONDITION

- Ice on evaporator coil
- Frozen residue at the metering device

SOLUTION

1. Turn off the system. If the evaporator coil is frozen, run the evaporator fan motor to thaw the coil.
2. Run system and allow temperatures and pressures to stabilize.
3. Compare temperature between the outlet of evaporator coil and inlet of compressor (FIG 2). Temperature drop should not exceed 3°F.
4. If temperature drop exceeds 3°F, check for kinks in the line.

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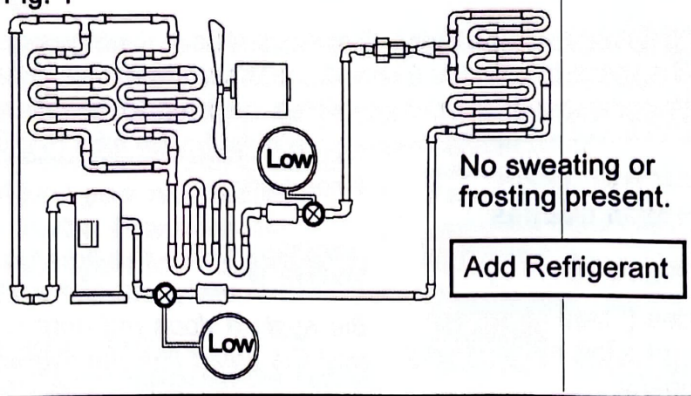

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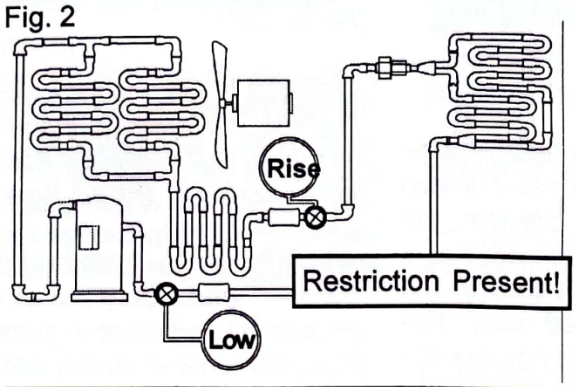

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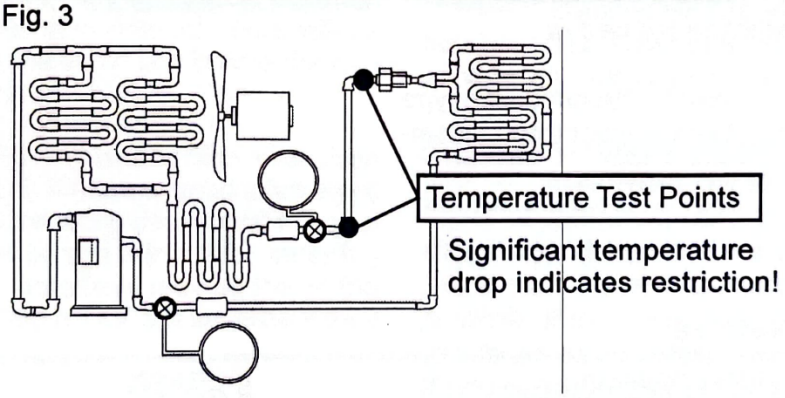
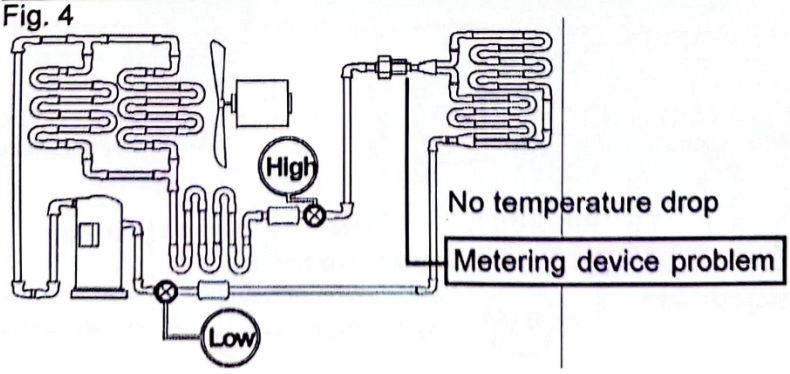
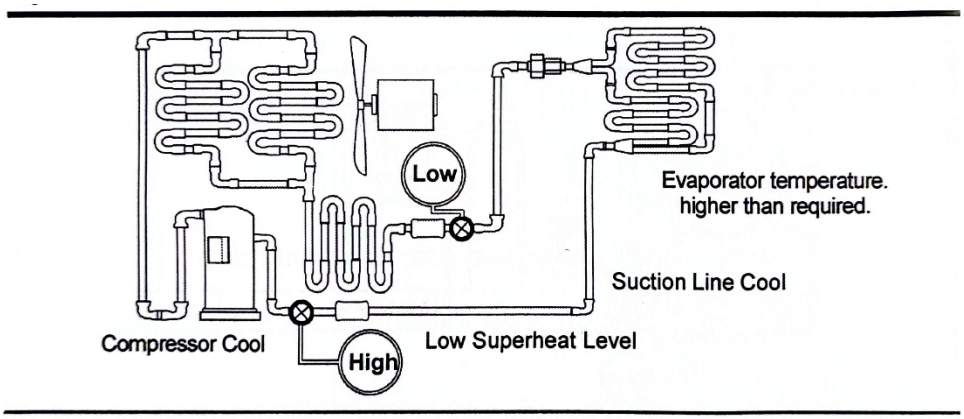


Fig. 4



IDENTIFYING an OVERFEEDING METERING DEVICE

If the EVAPORATOR COIL receives an excessive flow of refrigerant, the metering device is operating in a flooded condition. The metering device isolates the high side pressure from the low side pressure and when flooding occurs the suction side is overfed and the high side is starved. The suction pressure will be high and the superheat will be low.



POSSIBLE CAUSES OF CONDITION

- Dirty piston seat not allowing metering device to seat properly
- TXV Sensing Bulb not insulated and/or not in good conduct with the suction line

TANGIBLE EVIDENCE OF CONDITION

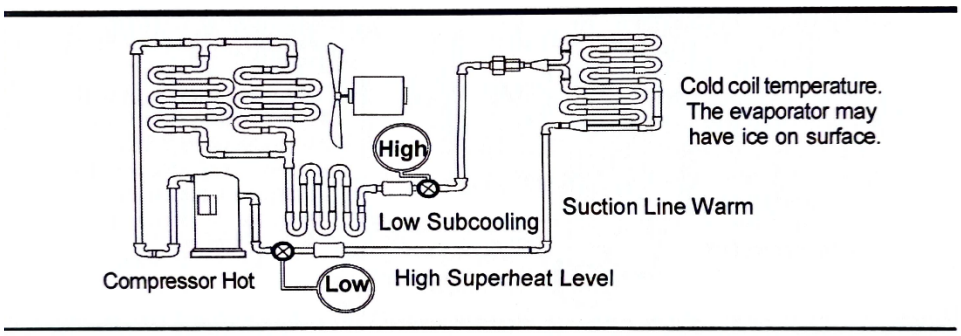
- High humidity in the conditioned space
- Compressor starting problems
- Compressor failure

SOLUTION

1. Close the liquid service valve and pump the system down. If the system does not hold a pump down and the liquid line service valve is properly closed, replace the compressor.
2. Make sure that the TXV Sensing Bulb is properly insulated and in good contact with the suction line. If the Sensing Bulb is not mounted properly, correct the situation. If the Sensing Bulb is mounted correctly, replace the TXV.

CHECKING for NON-CONDENSABLES

Non-condensables in a refrigerant system do not change state within the system (do not condense into a liquid) and will accumulate in the condenser coil and occupy valuable condenser coil circuit space. Possible non-condensables may include air, nitrogen, hydrogen, or other foreign gases.



POSSIBLE CAUSES OF CONDITION

- Poor installation skills
- Failure to properly evacuate the system

TANGIBLE EVIDENCE OF CONDITION

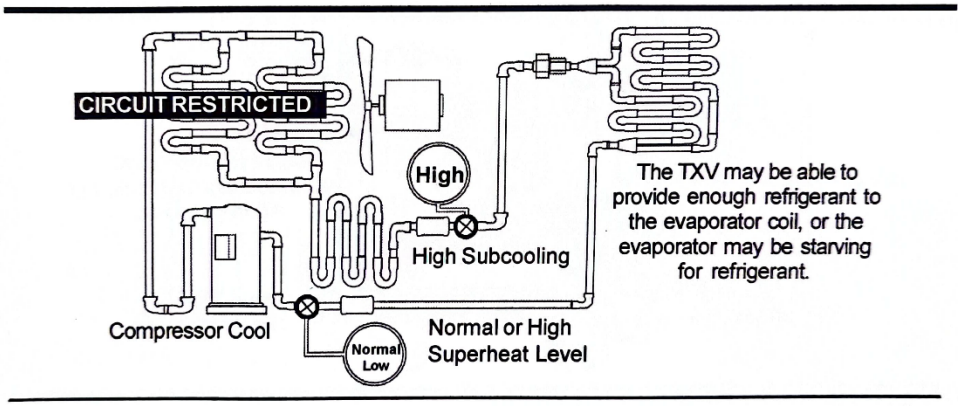
- Higher than normal head pressures
- Subcooling is low
- If no subcooling present, suction pressure will be low and will be flash gas in the liquid line before the metering device
- If subcooling is present, suction pressure may be normal
- Superheat may be high when flash gas is present

SOLUTION

1. Pump refrigerant into the condenser coil by running the compressor with the liquid service valve closed.
   NOTE: Only pump the suction pressure down to 0 PSIG. NEVER RUN IN A VACUUM!
2. When pump-down is complete, shut off the condensing unit. Disconnect power to the compressor and call for COOL so that only the condenser fan runs.
3. Measure the ambient air temperature and the air leaving the condenser coil. When the temperatures are equal, shut off the condenser fan.
4. Measure the pressure in the condenser coil. The coil pressure/temperature should be equal to the outdoor air temperature. If the pressure is higher, non-condensables are present in the system.
5. If non-condensables are present, recover the refrigerant and recharge with fresh refrigerant.

IDENTIFYING CONDENSER CIRCUIT RESTRICTIONS

Systems running with partially, or fully, restricted parallel circuits will run a liquid pressures above normal levels. A restriction in a circuit will lead to a drop in refrigerant temperature, meaning the refrigerant leaving the restricted circuit will be much colder than other circuits.



POSSIBLE CAUSES OF CONDITION

- Debris in the system
- Handling damage to components

TANGIBLE EVIDENCE OF CONDITION

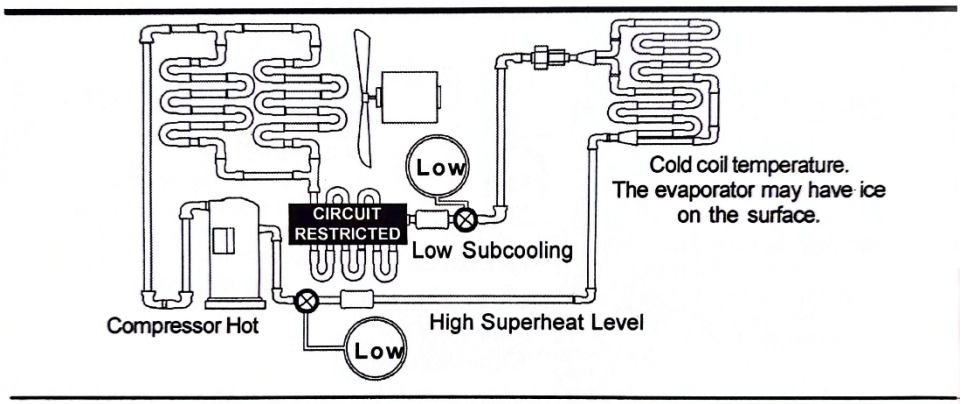
- Decreased efficiency
- Decreased performance

SOLUTION

1. Run the system and call for COOL.
2. Measure the temperature of the refrigerant leaving the parallel circuits.
3. If one circuit has a substantial temperature difference at its outlet (> 20°F), that circuit has a restriction.
4. Repair or replace the condenser coil.

IDENTIFYING SUBCOOLING CIRCUIT RESTRICTIONS

When a subcooling circuit is restricted, the metering of the refrigerant will occur in the condenser coil instead of in the metering device, and the liquid pressure downstream of the restriction will be low. The temperature of the refrigerant leaving the condenser coil will be below the temperature of the ambient air passing through the condenser coil surface and either frosting or sweating will be present on the liquid line.



POSSIBLE CAUSES OF CONDITION

- Debris in the system
- Handling damage to components

TANGIBLE EVIDENCE OF CONDITION

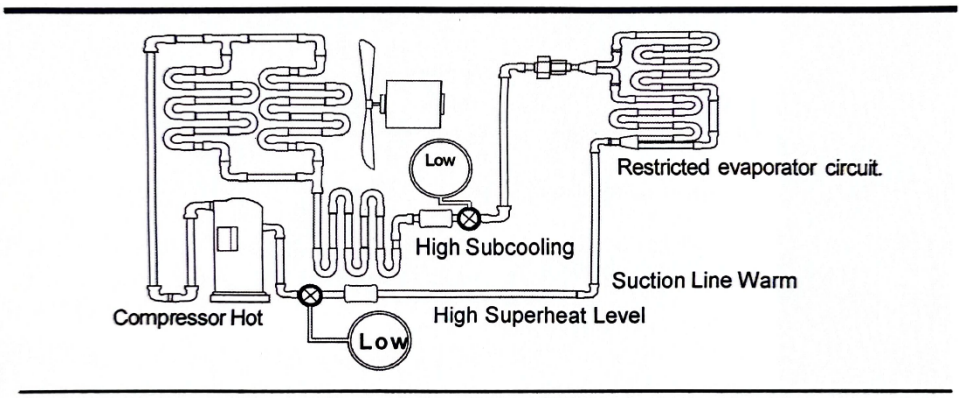
- Sweating on the liquid line
- Frost on the liquid line

SOLUTION

1. Run the system and call for COOL.
2. Measure the temperature of the refrigerant leaving the condenser coil.
3. If the temperature of the refrigerant is below the outdoor air temperature, a restriction is present.
4. Repair or replace the condenser coil.

IDENTIFYING EVAPORATOR CIRCUIT RESTRICTIONS

When an evaporator coil is restricted, the system shows the same operating characteristics as a system with a restricted metering device. If the metering device is okay, the distribution tubes that lead from the metering device fitting into the evaporator circuits should be tested for restrictions. If refrigerant is added to the system, the liquid pressure will rise but the suction pressure will remain low. If subcooling is checked at this time, it will be high which is an indication that an excess of refrigerant is being stored in the condenser coil.



POSSIBLE CAUSES OF CONDITION

- Debris in the system
- Handling damage to components

TANGIBLE EVIDENCE OF CONDITION

- Low suction pressure and high superheat
- No frosting between the condenser coil and the metering device

SOLUTION

1. Access the entire evaporator coil surface area.
2. Disconnect power to the indoor fan motor and set the unit to call for COOL.
3. Frost should form across all evaporator circuits. If one circuit does not frost, that circuit is not receiving adequate refrigerant.
4. Look for a restriction in either the plumbing or the tubes that feed the plumbing.
   NOTE: Checking the tube temperatures will help isolate the restriction.
5. If a uniform frost pattern forms across all evaporator circuits, there is no restriction present at the evaporator.

Source: *Air Conditioner Repair Guide*, Johnstone Supply, Prokup Media, Inc., 2002.

INFORMATION NEEDED BEFORE CALLING TECHNICAL SUPPORT:

- MODEL of unit
- YEAR OF MANUFACTURE
- VOLTAGE present at the unit
- Are the FILTERS CLEAN?
- Does the EVAPORATOR BLOWER RUN?
- Are the COILS FROZEN?
- Is the THERMOSTAT OPERATIONAL?
- Current AMBIENT TEMPERATURE
- Using a manifold gauge set, do the REFRIGERANT PRESSURES ALIGN with the current ambient temperature?
  NOTE: You will need access to a P/T (Pressure/Temperature) chart.

Flagro is a quality manufacturer of portable heaters, liquid and vapour propane torches, and liquid burners. Our manufacturing facility is based in St. Catharines, Ontario, Canada and has been producing high quality heaters for decades. Our line of heating products contains a wide variety of oil, propane, and natural gas fired commercial portable direct and indirect heaters that range in BTU from 85,000 BTU/hr to 1,500,000 BTU/hr.

Flagro, established in 1978, has been able to expand our manufacturing facility and add additional products to our lineup. Recently we have expanded our product offerings to include the Airrex product line of portable air conditioners, heat pumps, dehumidifiers, and air scrubbers/HEPA filtration units. Our goal is to become your one-stop shop for all your portable HVAC needs.

We pride ourselves on the quality of our products along with an unmatched dedication to customer service and technical support. Each of our Flagro and Airrex products is tested by qualified technicians to ensure that they meet all applicable regulatory and safety standards.

flagro ...More Than Just Heat

- Wide product offering, high quality products
- Flagro brand made in Canada since 1978
- Strong technical support
- Fair warranty program
- Competitively priced

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