

U.S.C.G. Merchant Marine Exam

DDE – Unlimited HP

Q624 General Subjects

(Sample Examination)

Choose the best answer to the following Multiple Choice Questions:

1. What is meant by the term emergency bilge suction?

- (A) The means by which the machinery space bilge is pumped out by a pump not normally used as a bilge pump and drawing a suction directly on the bilge independent of any bilge manifolds or automatic bilge suction valves.
- (B) The means by which the machinery space bilge is pumped out by a pump normally used as a bilge pump and drawing a suction directly on the bilge independent of any bilge manifolds or automatic bilge suction valves.
- (C) The means by which the machinery space bilge is pumped out by a pump normally used as a bilge pump and drawing a suction on the bilge through either bilge manifolds or automatic bilge suction valves.
- (D) The means by which the machinery space bilge is pumped out by a pump not normally used as a bilge pump and drawing a suction on the bilge through either bilge manifolds or automatic bilge suction valves.

If choice A is selected set score to 1.

2. Which of the listed valve types is typically used for the low-pressure stage of a reciprocating air compressor?

- (A) Sliding
- (B) Rotary
- (C) Ring-plate
- (D) Strip-type

If choice D is selected set score to 1.

3. Which of the following statements represents the proper criteria to decide when to drain a filter/moisture separator as used in a ship's service air system hose station?

- (A) The bowl should be drained after the bowl completely fills with moisture.
- (B) The bowl should be drained daily with no need to check the moisture level.
- (C) The bowl should be drained whenever moisture droplets appear in the bowl.
- (D) The bowl should be drained before the moisture level reaches the lower baffle.

If choice D is selected set score to 1.

4. As shown in figure "A" of the illustrated block diagram of a central operating system configured for direct digital control, what does the output system block "DIGITAL CONTACT" represent? Illustration EL-0095

- ☐ (A) It receives analog outputs from the analog device sensors and conditions these as analog signals for CPU processing.
- ☒ (B) It receives digital outputs from the binary device sensors and conditions these as digital signals for CPU processing.
- ☐ (C) It receives digital outputs from the binary device sensors and converts these to analog signals for CPU processing.
- ☐ (D) It receives analog outputs from the analog device sensors and converts these to digital signals for CPU processing.

If choice B is selected set score to 1.

5. Which of the following liquid level sensors would be most suitable for measuring the liquid level in a pressure vessel, such as a water-tube boiler steam drum?

- ☐ (A) Static pressure sensor
- ☒ (B) Differential pressure sensor
- ☐ (C) Capacitance probe
- ☐ (D) Displacement float level sensor

If choice B is selected set score to 1.

6. In which of the following fresh water generators would an air ejector be unnecessary?

- ☐ (A) Flash type unit
- ☐ (B) Submerged tube unit
- ☒ (C) Reverse osmosis unit
- ☐ (D) Titanium plate unit

If choice C is selected set score to 1.

7. Which of the following roller bearing types would be limited to radial thrust load applications?

- ☐ (A) double row spherical roller bearing
- ☐ (B) single row spherical roller bearing
- ☐ (C) single row tapered roller bearing
- ☒ (D) single row cylindrical roller bearing

If choice D is selected set score to 1.

- 8.** What is the primary indication of a grease lubricated bearing that is over-lubricated in terms of the quantity of grease in the housing?
- (A) The bearing would tend to produce a noticeable change in sound.
 - (B) The bearing temperature would tend to produce unusual vibrations.
 - (C) The bearing temperature would tend to run hotter than normal for the load.
 - (D) The bearing temperature would tend to run cooler than normal for the load.

If choice C is selected set score to 1.

- 9.** In order for a reverse osmosis fresh water generator to be able to overcome the osmotic pressure without damaging the spiral-wound membrane modules, the pressure must be controlled. What is the location of the pressure regulator?
- (A) Brine outlet from the membrane modules.
 - (B) Suction side of the high-pressure pump.
 - (C) Discharge side of the high-pressure pump.
 - (D) Fresh water outlet from the membrane modules.

If choice A is selected set score to 1.

- 10.** For the operation of the illustrated device, what fluid flow would be expected at the connection labeled "I"? Illustration MO-0110
- (A) The salt water feed.
 - (B) Main engine jacket water.
 - (C) The distillate discharge.
 - (D) The sea water used for condensing the water vapor.

If choice D is selected set score to 1.

- 11.** According to the illustration, which of the following conditions would most likely cause pump "A" to short cycle? Illustration GS-0173
- (A) The hydro-pneumatic expansion tank is operating with an insufficient air charge.
 - (B) The hydro-pneumatic tank is operating with a low water level.
 - (C) A low water level exists in the potable water storage tank.
 - (D) Pump "A" wearing rings have excessive clearance.

If choice A is selected set score to 1.

12. What is meant by the term "deadband" as it applies to prime mover speed control governors?

- (A) Deadband is the result of transient speed changes of a prime mover as the governor responds to load changes.
- (B) Deadband is the repeated and sometimes rhythmic variation of speed due to over-control by the governor.
- (C) Deadband is the repeated variation of speed due to under-control by the governor and a lack of governor power.
- (D) Deadband is the change in speed required before the governor will initiate a corrective action as the result of a load change.

If choice D is selected set score to 1.

13. If a heat exchanger is designed to condense refrigerant vapor using central cooling fresh water as a condensing medium, what statement is true?

- (A) The refrigerant vapor gains latent heat, the central cooling fresh water loses sensible heat.
- (B) The refrigerant vapor loses latent heat, the central cooling fresh water gains sensible heat.
- (C) The refrigerant vapor loses latent heat, the central cooling fresh water loses latent heat.
- (D) The refrigerant vapor loses sensible heat, the central cooling fresh water gains latent heat.

If choice B is selected set score to 1.

14. Suppose a diesel engine is fitted with sea water-cooled lube oil and jacket water coolers. What statement is true concerning the system operating pressures?

- (A) The jacket water pressure is maintained higher than the sea water pressure in the jacket water cooler, and the lube oil pressure is maintained higher than the sea water pressure in the lube oil cooler.
- (B) The jacket water pressure is maintained lower than the sea water pressure in the jacket water cooler, and the lube oil pressure is maintained higher than the sea water pressure in the lube oil cooler.
- (C) The jacket water pressure is maintained lower than the sea water pressure in the jacket water cooler, and the lube oil pressure is maintained lower than the sea water pressure in the lube oil cooler.
- (D) The jacket water pressure is maintained higher than the sea water pressure in the jacket water cooler, and the lube oil pressure is maintained lower than the sea water pressure in the lube oil cooler.

If choice A is selected set score to 1.

15. Which characteristic or condition will have the greatest effect on increasing a hydraulic oil's viscosity?

- (A) Pour point
- (B) Pressure
- (C) Vacuum
- (D) Cloud point

If choice B is selected set score to 1.

16. A flare-type tubing connector is used in the hydraulic hatch cover system and has developed a slight leak. To stop the leak you should _____.

- ☐ (A) keep the system in operation and tighten the flare nut
- ☒ (B) shut down the power unit and use two wrenches to avoid damaging the tubing when tightening
- ☐ (C) stop the system and use only one wrench to tighten the flare nut
- ☐ (D) replace both the tubing sections and the fitting

If choice B is selected set score to 1.

17. A hydraulic system flow control circuit is shown in the illustration and is known as a _____.
Illustration GS-0105

- ☒ (A) metered-in circuit
- ☐ (B) metered-out circuit
- ☐ (C) bleed-off circuit
- ☐ (D) bleed-in circuit

If choice A is selected set score to 1.

18. Which of the listed pressure control valves would be used to permit the completion of one action of a hydraulic system before a second action would be permitted?

- ☐ (A) Unloading valve
- ☐ (B) Pressure-reducing valve
- ☒ (C) Sequence valve
- ☐ (D) Counterbalance valve

If choice C is selected set score to 1.

19. If you attempt to tighten a leaking hydraulic fitting with pressure on the system, you will _____.

- ☐ (A) be successful every time
- ☐ (B) cause the system to vibrate
- ☒ (C) find that the pressure will prevent the components from being tightened
- ☐ (D) dislodge any scale in the tubing, and it will damage the system

If choice C is selected set score to 1.

20. In which lubrication application is a lubricating oil with an alkaline reserve most likely to be used?

- ☐ (A) Steam turbine lubricating oil.
- ☒ (B) Trunk type diesel engine lubricating oil.
- ☐ (C) Stern tube bearing lubricating oil.
- ☐ (D) Crosshead diesel engine bearing lubricating oil.

If choice B is selected set score to 1.

21. In a forced-feed lubrication system, what statement is true concerning lube oil reservoir/sump residence time?

- (A) The lower the oil level, the longer the residence time, and the cooler the oil will be as delivered by the pump.
- (B) The lower the oil level, the longer the residence time, and the hotter the oil will be as delivered by the pump.
- (C) The lower the oil level, the shorter the residence time, and the hotter the oil will be as delivered by the pump.
- (D) The lower the oil level, the shorter the residence time, and the cooler the oil will be as delivered by the pump.

If choice C is selected set score to 1.

22. What type of diesel engine lubricating oil filtration scheme filters a small portion of the output of the lubricating oil pump prior to delivery back to the sump via a fine filter?

- (A) Shunt filter
- (B) Bypass filter
- (C) Full flow filter
- (D) Batch filter

If choice B is selected set score to 1.

23. What is meant by the term tensile strength of a material?

- (A) The ability to resist compression stresses.
- (B) The ability to resist shearing stresses.
- (C) The ability to resist bending stresses.
- (D) The ability to resist stretching stresses.

If choice D is selected set score to 1.

24. A typical oily-water separator has three stages of separation. Which statement represents the correct sequential order of the stages?

- (A) First stage: gravimetric. Second stage: inclined plate coalescer. Third stage: polishing filter coalescer.
- (B) First stage: inclined plate coalescer. Second stage: polishing filter coalescer. Third stage: gravimetric.
- (C) First stage: polishing filter coalescer. Second stage: inclined plate coalescer. Third stage: gravimetric.
- (D) First stage: gravimetric. Second stage: polishing filter coalescer. Third stage: inclined plate coalescer.

If choice A is selected set score to 1.

25. The line labeled "C", as shown in the illustration, would be identified as the _____. Illustration GS-0175

- (A) waste oil discharge line
- (B) oily bilge water inlet line
- (C) processed water outlet line
- (D) clean water inlet line

If choice D is selected set score to 1.

26. Referring to the illustration, what would be the result if the lower oil/water interface detection probe became faulty? Illustration GS-0175

- (A) The unit would not be able to transition from ending the separation processing mode to initiating the oil discharge mode.
- (B) The unit would not be able to transition from the overboard discharge mode to the recirculation mode while in the separation processing mode.
- (C) The unit would not be able to transition from ending the oil discharge mode to initiating the separation processing mode.
- (D) The unit would not be able to come out of the oily-water separator idle mode and begin processing bilge water.

If choice A is selected set score to 1.

27. Suppose the illustrated self-contained, internal-pilot, piston-operated temperature control valve is part of the temperature control system for a steam-heated heavy fuel oil service heater for a steam boiler. If there was an increase in demand for fuel by the boiler, what statement correctly represents how the valve would initially respond? Illustration GS-0045

- (A) The fuel oil heater fuel outlet temperature would decrease, causing the remote bulb pressure to decrease and the thermostatic diaphragm to flex upward and through lever action, further open the pilot valve.
- (B) The fuel oil heater fuel outlet temperature would increase, causing the remote bulb pressure to increase and the thermostatic diaphragm to flex upward and through lever action, further open the pilot valve.
- (C) The fuel oil heater fuel outlet temperature would decrease, causing the remote bulb pressure to decrease and the thermostatic diaphragm to flex downward and through lever action, further close the pilot valve.
- (D) The fuel oil heater fuel outlet temperature would increase, causing the remote bulb pressure to increase and the thermostatic diaphragm to flex downward and through lever action, further close the pilot valve.

If choice A is selected set score to 1.

28. Suppose the illustrated pneumatically operated diaphragm actuated control valve is used to control the fuel oil outlet temperature of a steam-heated heavy fuel oil heater by controlling the steam flow. What would be the result if there was a complete loss of pilot air being delivered to the valve actuator? Illustration GS-0051

- ☐ (A) The valve would fail in the fully closed position, most likely resulting in a low fuel oil temperature alarm condition.
- ☒ (B) The valve would fail in the fully open position, most likely resulting in a high fuel oil temperature alarm condition.
- ☐ (C) It is not possible to predict how the valve would respond to a loss of pilot air.
- ☐ (D) The valve would fail in the exact position just before the loss of pilot air. The fuel temperature will fluctuate with changes in fuel demand.

If choice B is selected set score to 1.

29. In the figure shown in the illustration, the standard blueprint symbols above the letters "A", "B", and "C" indicate _____. Illustration GS-0036

- ☒ (A) the use of internal threads
- ☐ (B) hole tolerance
- ☐ (C) finished diameter
- ☐ (D) interference fit

If choice A is selected set score to 1.

30. The working depth of the gear illustrated is represented by _____. Illustration GS-0111

- ☒ (A) A
- ☐ (B) B
- ☐ (C) C
- ☐ (D) I

If choice A is selected set score to 1.

31. What statement is true concerning the purpose of an independent main thrust bearing where used?

- ☐ (A) The main purpose of the main thrust bearing is to absorb radial thrust and to transmit the radial thrust developed by the propeller to the ship's hull.
- ☒ (B) The main purpose of the main thrust bearing is to absorb axial thrust and to transmit the axial thrust developed by the propeller to the ship's hull.
- ☐ (C) The main purpose of the main thrust bearing is to absorb axial thrust and maintain the shaft in proper axial alignment.
- ☐ (D) The main purpose of the main thrust bearing is to absorb radial thrust and maintain the shaft in proper radial alignment.

If choice B is selected set score to 1.

32. Of the following propulsion modes, which one would operate with a geared-drive featuring a double reduction?

- ☐ (A) Slow-speed diesel
- ☐ (B) Medium-speed diesel
- ☐ (C) High-speed diesel
- ☒ (D) Gas turbine

If choice D is selected set score to 1.

33. Charring or glazing of the inner circumference of the packing rings in a centrifugal pump is caused by _____.

- ☐ (A) packing ring rotation
- ☒ (B) insufficient lubrication of the packing
- ☐ (C) failure to seat the packing rings
- ☐ (D) under-tightening the packing

If choice B is selected set score to 1.

34. A pump shaft that is bent or distorted should normally be _____.

- ☐ (A) reconditioned by metalizing and machining
- ☐ (B) straightened by applying heat and torsion
- ☒ (C) replaced with a satisfactory spare
- ☐ (D) repaired by a suitable welding process

If choice C is selected set score to 1.

35. Assuming that a standard micrometer (without a Vernier scale) has the ability to read to the nearest one thousandths of an inch, such a micrometer with a Vernier scale would make it possible to read to the nearest _____.

- ☐ (A) five thousandths of an inch
- ☒ (B) ten thousandths of an inch
- ☐ (C) twenty-five thousandths of an inch
- ☐ (D) one fortieth of an inch

If choice B is selected set score to 1.

36. Which of the fasteners in illustration GS-0080 would be used in conjunction with figure "C" in illustration GS-0015? Illustrations GS-0080 and GS-0015

- ☐ (A) figure A
- ☐ (B) figure F
- ☒ (C) figure K
- ☐ (D) figure D

If choice C is selected set score to 1.

37. What is the name of the opening in a bilge margin bracket that reduces the weight of the bracket without materially reducing its strength?

- (A) Drain holes
- (B) Air holes
- (C) Lightening holes
- (D) Manholes

If choice C is selected set score to 1.

38. What statement is true concerning the plating meeting at the gunwales of a ship?

- (A) The strakes of side plating nearest to the deck and the deck plating nearest to the side are both termed "stringer plates". These stringer plates meet at the gunwales.
- (B) The strakes of deck plating nearest to the sides are termed "sheerstrakes" and the side plating nearest to the deck are termed "stringer plates". The sheerstrakes and stringer plates meet at the gunwales.
- (C) The strakes of side plating nearest to the deck are termed "sheerstrakes" and the deck plating nearest to the side are termed "stringer plates". The sheerstrakes and stringer plates meet at the gunwales.
- (D) The strakes of side plating nearest to the deck and the deck plating nearest to the side are both termed "sheerstrakes". These sheerstrakes meet at the gunwales.

If choice C is selected set score to 1.

39. What statement is true concerning watertight doors fitted below the waterline of a vessel?

- (A) Watertight doors below the waterline may be either of the vertical sliding type or the swinging hinged type.
- (B) Watertight doors below the waterline may be either of the horizontal sliding type or the swinging hinged type.
- (C) Watertight doors below the waterline may be either of the vertical or horizontal sliding type.
- (D) Watertight doors below the waterline may be of the vertical or horizontal sliding type or the swinging hinged type.

If choice C is selected set score to 1.

40. In accordance with the federal regulations in 33 CFR Subchapter O (Pollution), continuing violations of The Federal Water Pollution Control Act and international MARPOL regulations may constitute separate violations subject to civil penalties. Which of the following statements is true?

- (A) Each hour of a continuing violation constitutes a separate violation.
- (B) Each day of a continuing violation constitutes a separate violation.
- (C) Each week of a continuing violation constitutes a separate violation.
- (D) Each month of a continuing violation constitutes a separate violation.

If choice B is selected set score to 1.

41. A spur gear pump should be operated with the discharge valves _____.

- ☐ (A) halfway opened
- ☐ (B) throttled
- ☒ (C) fully opened
- ☐ (D) slightly opened

If choice C is selected set score to 1.

42. The function of the section labeled "C" in the device illustrated is to provide a/an _____.
Illustration GS-0075

- ☐ (A) passage for sealing liquid to enter the pump
- ☐ (B) bearing surface for the rotor shaft
- ☒ (C) passage for gas to be discharged
- ☐ (D) area for pump packing

If choice C is selected set score to 1.

43. A distinguishing feature of an eductor, when compared to other pumps, is the _____.

- ☐ (A) small size of impeller
- ☐ (B) ease at which the wearing rings may be changed
- ☐ (C) discharge end being smaller than the suction end
- ☒ (D) lack of moving parts

If choice D is selected set score to 1.

44. A vessel is in compliance with federal regulations regarding the discharge of sewage by _____.

- ☐ (A) pumping the sewage ashore to an approved container
- ☐ (B) treating sewage in an approved system
- ☐ (C) holding all sewage onboard
- ☒ (D) all of the above

If choice D is selected set score to 1.

45. In an electro-hydraulic steering system, damage due to rudder shock is prevented by _____.

- ☐ (A) buffer springs
- ☒ (B) relief valves
- ☐ (C) oil flowing through the pumps
- ☐ (D) dashpots

If choice B is selected set score to 1.

46. How would you prevent the rudder from moving while a repair is made on the steering system using the illustrated actuator? Illustration GS-0116

- ☐ (A) tighten the locking pins, item "H" at each position of item "I" to keep the rudder from swinging
- ☐ (B) screw in the locking pin, item "J"
- ☒ (C) secure the valves in the supply and return lines
- ☐ (D) tighten the locking screws in item "S"

If choice C is selected set score to 1.

47. The action necessary to use the steering gear room trick wheel when transferring the steering control from the wheelhouse to local control is to _____.

- ☒ (A) align the trick wheel to the rudder angle position before engaging
- ☐ (B) set the six-way control valve in the trick wheel position
- ☐ (C) open the power transfer switch before engaging the trick wheel
- ☐ (D) always place the rudder in the amidships position to engage the trick wheel

If choice A is selected set score to 1.

48. Overall heat transfer processes often involve two or more modes of heat transfer. Specifically, when heat is being transferred from one side of an air compressor cylinder wall to the opposite side, what mode of heat transfer is associated with that particular part of the overall process?

- ☐ (A) Radiation
- ☒ (B) Conduction
- ☐ (C) Natural convection
- ☐ (D) Forced convection

If choice B is selected set score to 1.

49. What statement represents the ideal gas law?

- ☐ (A) For a given mass of a gas, the volume is inversely proportional to its pressure and inversely proportional to its temperature.
- ☒ (B) For a given mass of a gas, the volume is inversely proportional to its pressure and directly proportional to its temperature.
- ☐ (C) For a given mass of a gas, the volume is directly proportional to its pressure and directly proportional to its temperature.
- ☐ (D) For a given mass of a gas, the volume is directly proportional to its pressure and inversely proportional to its temperature.

If choice B is selected set score to 1.

50. Referring to the illustrated diagram, what type of HVAC system is shown? Illustration RA-0043

- (A) A dual duct system
- (B) A terminal reheat system
- (C) A variable air volume system
- (D) A single zone system

If choice A is selected set score to 1.

51. What statement is true concerning a one-pipe hydronic heating system? Illustration GS-0192

- (A) Each heating coil inlet temperature is identical, as the hot water inlet temperature to each heating coil progressively rises as the water passes through each successive series connected coil.
- (B) Each heating coil inlet temperature is identical, as the hot water inlet temperature to each heating coil progressively drops as the water passes through each successive series connected coil.
- (C) Each heating coil inlet temperature is different, as the hot water inlet temperature to each heating coil progressively rises as the water passes through each successive series connected coil.
- (D) Each heating coil inlet temperature is different, as the hot water inlet temperature to each heating coil progressively drops as the water passes through each successive series connected coil.

If choice D is selected set score to 1.

52. Generally speaking, when using a twist drill to bore a hole in metal, the harder the metal, the greater the drill's required _____.

- (A) diameter
- (B) lip clearance
- (C) cutting speed
- (D) included point angle

If choice D is selected set score to 1.

53. Which of the listed temperature sensors is made of heat-treated metallic oxides and generally has a negative coefficient of resistance?

- (A) Thermistor
- (B) Bimetallic device
- (C) Resistance temperature detector
- (D) Thermocouple

If choice A is selected set score to 1.

54. What is the operating principle of a variable area flow meter, such as a rotameter?

- (A) The float or rotor is more dense than the fluid being measured and is positioned so that the gravitational force down is balanced by the upward motion of the fluid flow.
- (B) The float or rotor is less dense than the fluid being measured and is positioned so that the gravitational force up is balanced by the downward motion of the fluid flow.
- (C) The float or rotor is more dense than the fluid being measured and is positioned so that the gravitational force up is balanced by the downward motion of the fluid flow.
- (D) The float or rotor is less dense than the fluid being measured and is positioned so that the gravitational force down is balanced by the upward motion of the fluid flow.

If choice A is selected set score to 1.

55. The "tare weight" of a refrigerant storage cylinder refers to what weight?

- (A) the weight of an empty cylinder
- (B) the weight of a cylinder AND its current contents
- (C) the maximum weight of the refrigerant allowed
- (D) the total weight of a fully charged cylinder

If choice A is selected set score to 1.

56. In attempting to start the hydraulic pump drive motor of a horizontal electro-hydraulic anchor windlass, what condition would prevent the electric motor from starting?

- (A) Failure to start could be the result of an electrical interlock associated with the wildcat clutches being disengaged.
- (B) Failure to start could be the result of an electrical interlock associated with the hydraulic pump stroke control being in the neutral position.
- (C) Failure to start could be the result of an electrical interlock associated with handwheel operated wildcat band brakes being set.
- (D) Failure to start could be the result of an electrical interlock associated with the hydraulic pump stroke control being in other than the neutral position.

If choice D is selected set score to 1.

57. What statement is true concerning the door interlock devices associated with a winding drum or traction drive passenger elevator onboard ship?

- (A) Door interlocks are used to prevent elevator operation if the doors are still open and only allow elevator operation if the doors are proved closed.
- (B) Door interlocks are used to prevent elevator operation in a shipboard emergency when elevators are not to be used.
- (C) Door interlocks are used to prevent elevator operation if the doors are still closed and only allow elevator operation if the doors are proved open.
- (D) Door interlocks are used to override elevator emergency status in a shipboard emergency when elevators are required to be used.

If choice A is selected set score to 1.

58. The term "oil foaming" in refrigeration practice, is used to describe what event?

- (A) sudden evaporation of entrapped moisture from the crankcase lubricant
- (B) sudden evaporation of entrapped air from the refrigerant liquid
- (C) release of dissolved lubricant from the refrigerant in the crankcase
- (D) sudden evaporation of dissolved refrigerant from the lubricant in the crankcase

If choice D is selected set score to 1.

59. In the illustrated refrigeration system, what is the proper name for the component labeled "A"?
Illustration RA-0012

- (A) condenser
- (B) compressor
- (C) filter drier
- (D) accumulator

If choice B is selected set score to 1.

60. If the discharge reed valves used in a refrigeration compressor are leaking badly, what statement is true?

- (A) the low side pressure will indicate below normal
- (B) the high-pressure cut-out setting should be lowered
- (C) the reed valves should be reground and relapped
- (D) the reed valve assemblies should be replaced

If choice D is selected set score to 1.

61. Leaking suction valves in a refrigeration compressor are indicated by which of the following?

- (A) noticeable increase in compressor noise
- (B) lower than normal evaporator temperature
- (C) lower than normal suction pressure
- (D) higher than normal suction pressure

If choice D is selected set score to 1.

62. In a refrigeration system, the bulb for the thermal expansion valve is always located where?

- (A) in the middle of the evaporator coils
- (B) at the beginning of the bottom row of the evaporator coils
- (C) at the evaporator coil outlet
- (D) at the evaporator coil inlet

If choice C is selected set score to 1.

63. The coil temperature measured at the expansion valve sensing bulb of an operating system is 10°F. The low side pressure with the compressor running as shown on the gauge illustrated indicates 15 psig. What adjustments or changes, if any, should be made to the system? Illustration RA-0016

- ☐ (A) The evaporator coils need to be steam cleaned or high-pressure washed.
- ☐ (B) The filter drier needs to be changed to increase the suction pressure.
- ☐ (C) The liquid line strainer is fouled and needs to be cleaned.
- ☒ (D) The expansion valve should not be adjusted, as the degree of superheat is within the accepted range.

If choice D is selected set score to 1.

64. A high-pressure centrifugal chiller currently charged with R-134a is being evaluated for the need for leak testing. Using the leak test procedures decision tree illustrated and the R-134a pressure-temperature chart illustrated, with the machine idle and the pressures equalized at 10 psig with an ambient temperature of 60°F, what statement is true? Illustrations RA-0011 and RA-0047

- ☐ (A) The machine has a suspected leak; therefore, nitrogen should be added to bring the pressure to 70 psig prior to checking for leaks.
- ☒ (B) The machine has a suspected leak; therefore, the refrigerant pressure should be raised to 35 psig by adding refrigerant prior to checking for leaks.
- ☐ (C) The machine definitely does not have a leak; therefore no attempt at leak detection is necessary.
- ☐ (D) The machine may or may not have a leak; therefore the machine should be checked for leaks without any adjustments in pressure.

If choice B is selected set score to 1.

65. Which of the illustrated devices would be the LEAST accurate for the purposes of weighing-in a refrigerant charge? Illustration RA-0045

- ☐ (A) A
- ☐ (B) B
- ☒ (C) C
- ☐ (D) D

If choice C is selected set score to 1.

66. Which of the following statements is true concerning the gauge labeled "A" of the illustrated gauge manifold set? Illustration RA-0001

- ☐ (A) The gauge labeled "A" is a standard pressure gauge and is usually color-coded blue.
- ☒ (B) The gauge labeled "A" is a compound gauge and is usually color-coded blue.
- ☐ (C) The gauge labeled "A" is a compound gauge and is usually color-coded red.
- ☐ (D) The gauge labeled "A" is a standard pressure gauge and is usually color-coded red.

If choice B is selected set score to 1.

67. In general, the thermal bulb for a thermal expansion valve used in a reciprocating air conditioning system is usually charged with what substance?

- (A) the same refrigerant as the system
- (B) bees wax
- (C) mercuric sulfate
- (D) distilled water

If choice A is selected set score to 1.

68. Concerning the arrangement of equipment and associated hoses shown in the illustration, what statement is true? Illustration RA-0058

- (A) When recovering refrigerant from the centrifugal chiller using this method, it minimizes the risk of chiller tube freeze-up.
- (B) When recovering refrigerant from the centrifugal chiller using this method, it is possible to achieve the recovery levels required by law without any further recovery.
- (C) When recovering refrigerant from the centrifugal chiller using this method, it is permissible to exceed 90% of the weight capacity of the refrigerant drum.
- (D) When recovering refrigerant from the centrifugal chiller using this method, the vent hose connection should be closed.

If choice A is selected set score to 1.

69. To prevent the unnecessary loading of an air conditioning system while maintaining the designed dry bulb temperature and relative humidity in an air conditioning system, what should be done?

- (A) lower the compressor head pressure
- (B) admit only enough fresh outside air to provide proper ventilation
- (C) operate the purge recovery unit continuously
- (D) reduce the air reheating system load

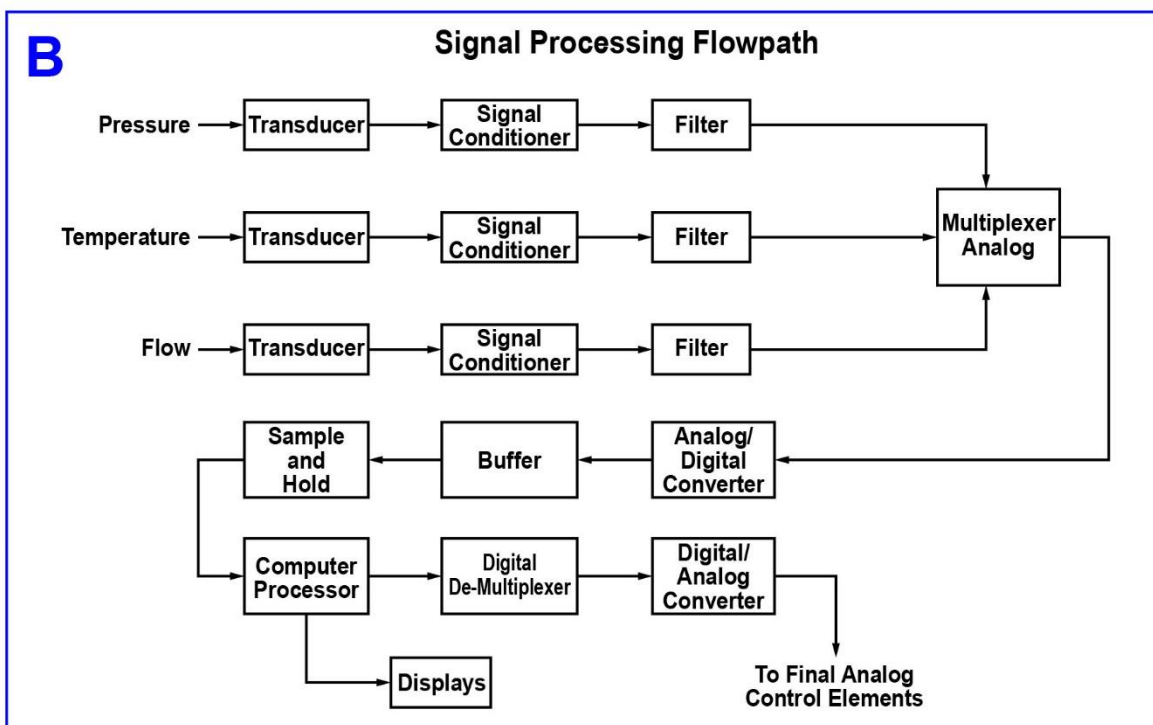
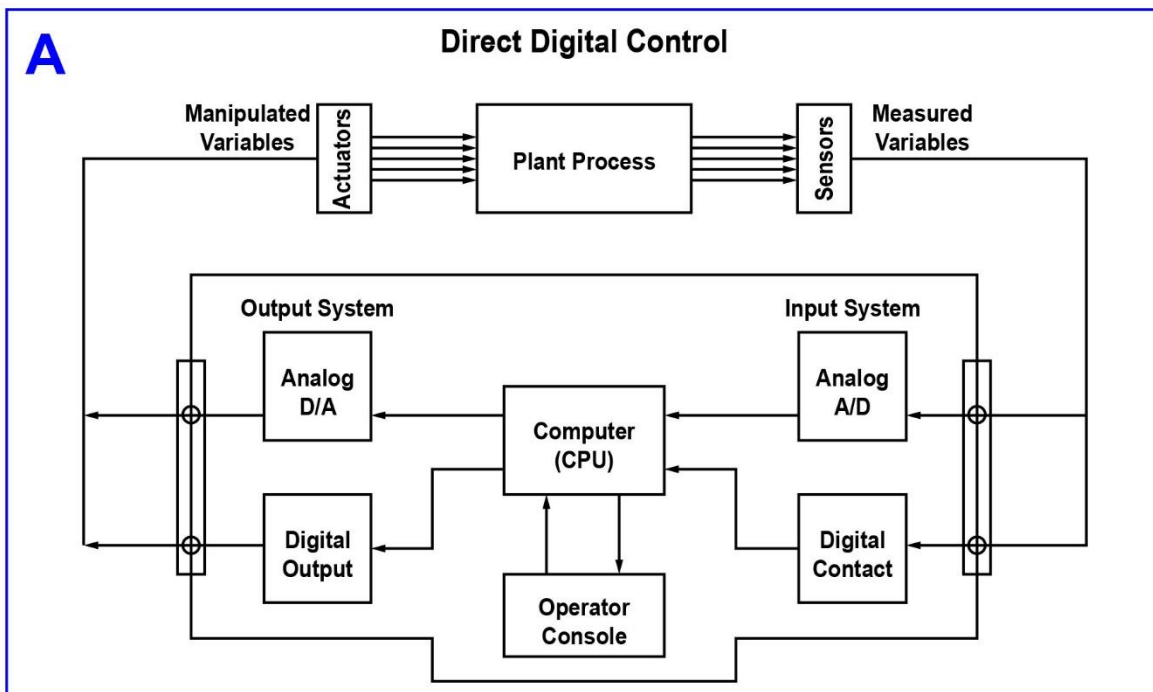
If choice B is selected set score to 1.

70. What component of a reverse osmosis fresh water generator could be isolated and replaced with the unit remaining in service?

- (A) A series connected membrane module.
- (B) The secondary pre-treatment filter.
- (C) A parallel connected membrane module.
- (D) The primary pre-treatment filter.

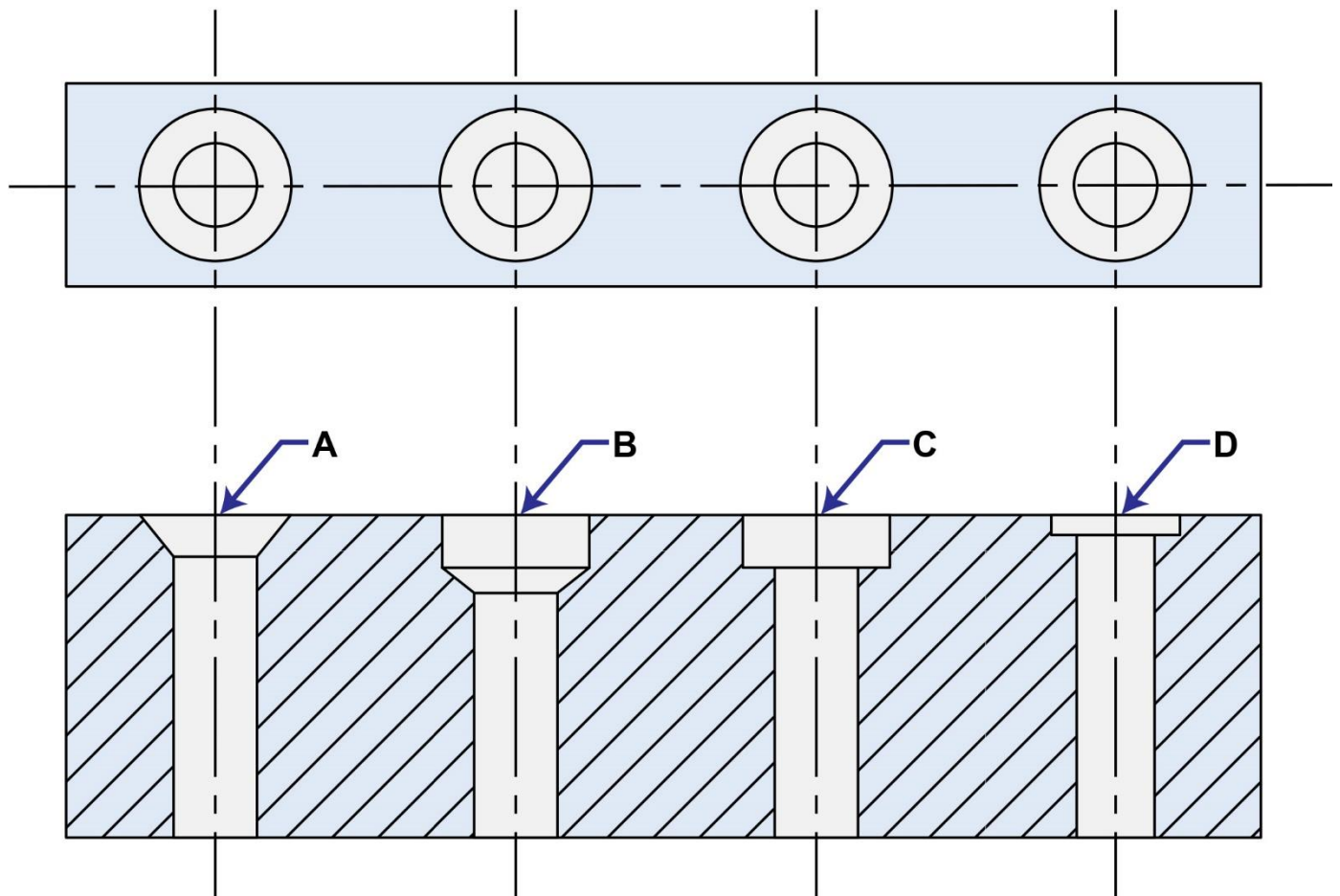
If choice C is selected set score to 1.

EL-0095



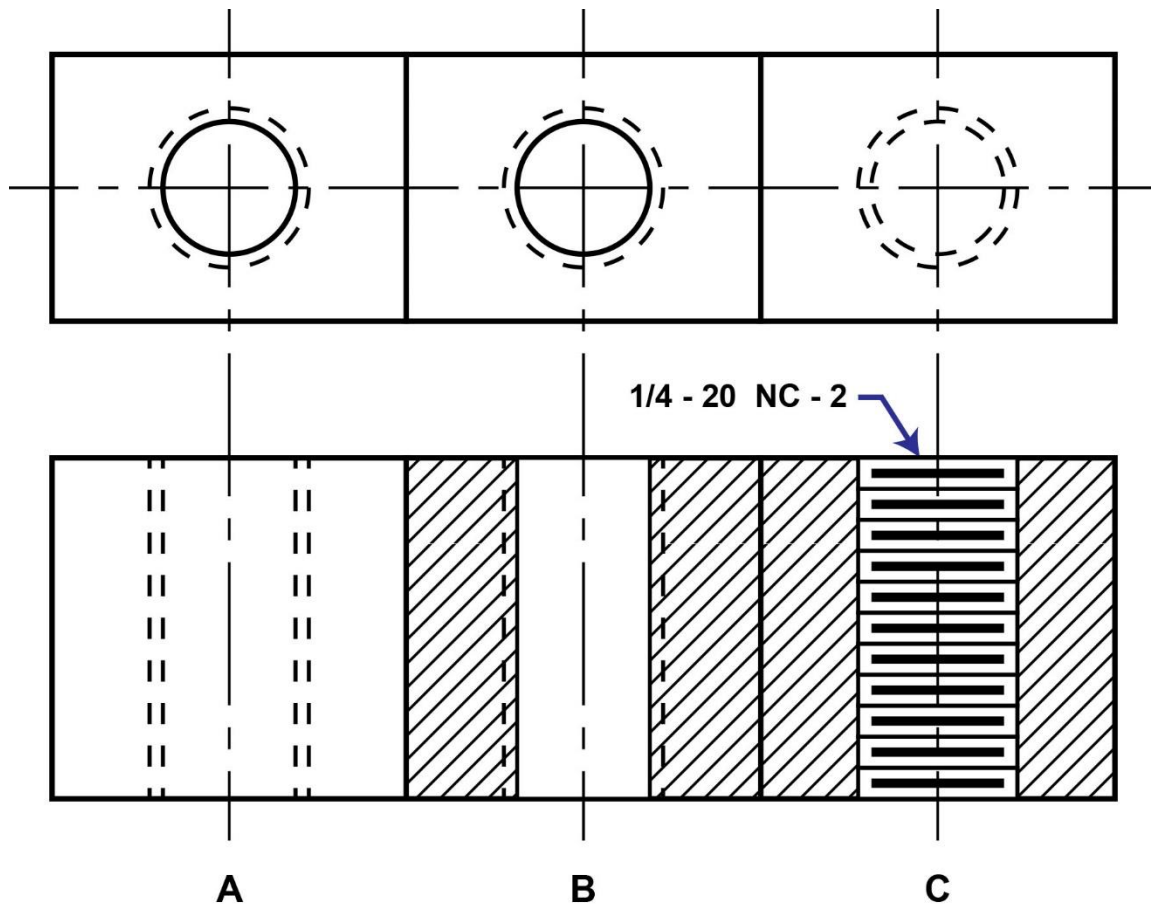
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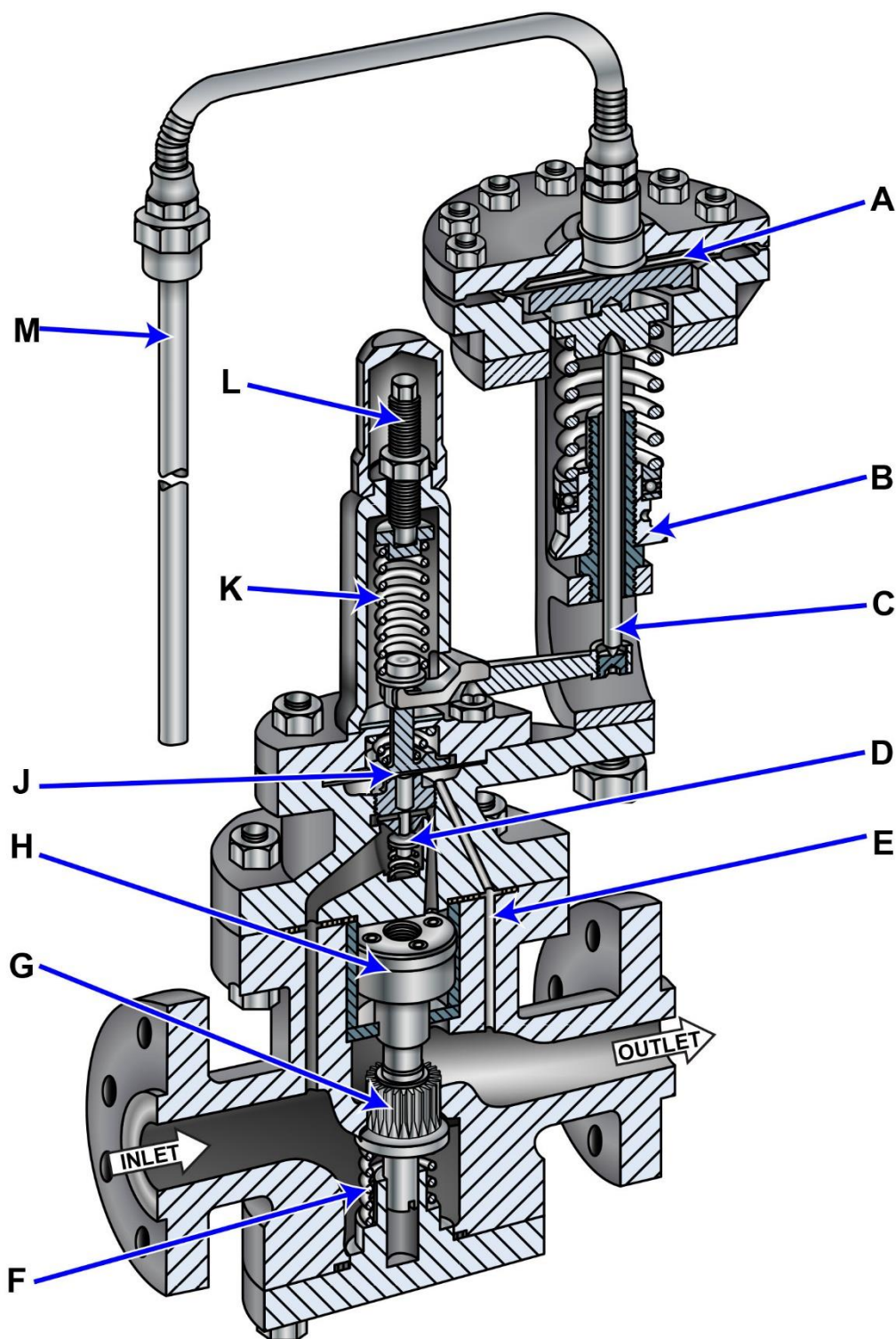


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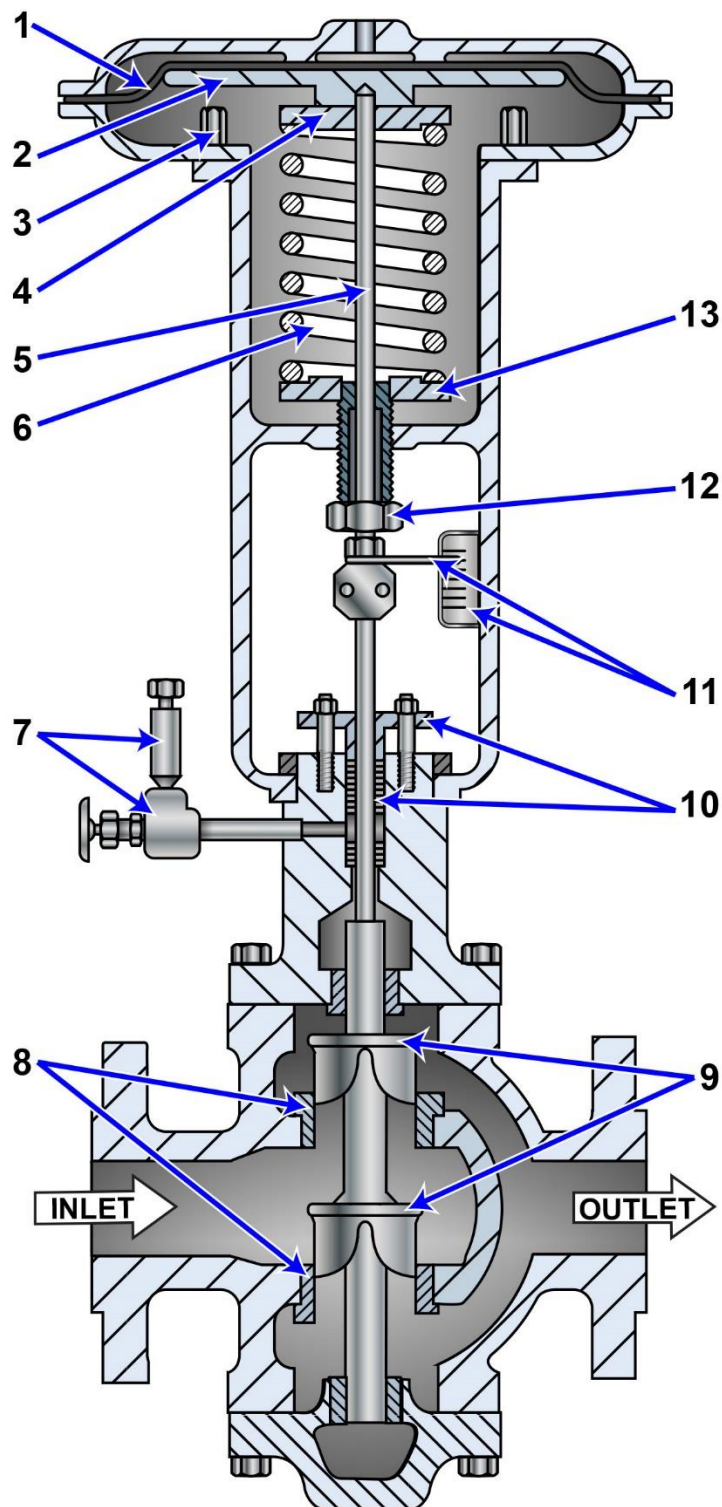


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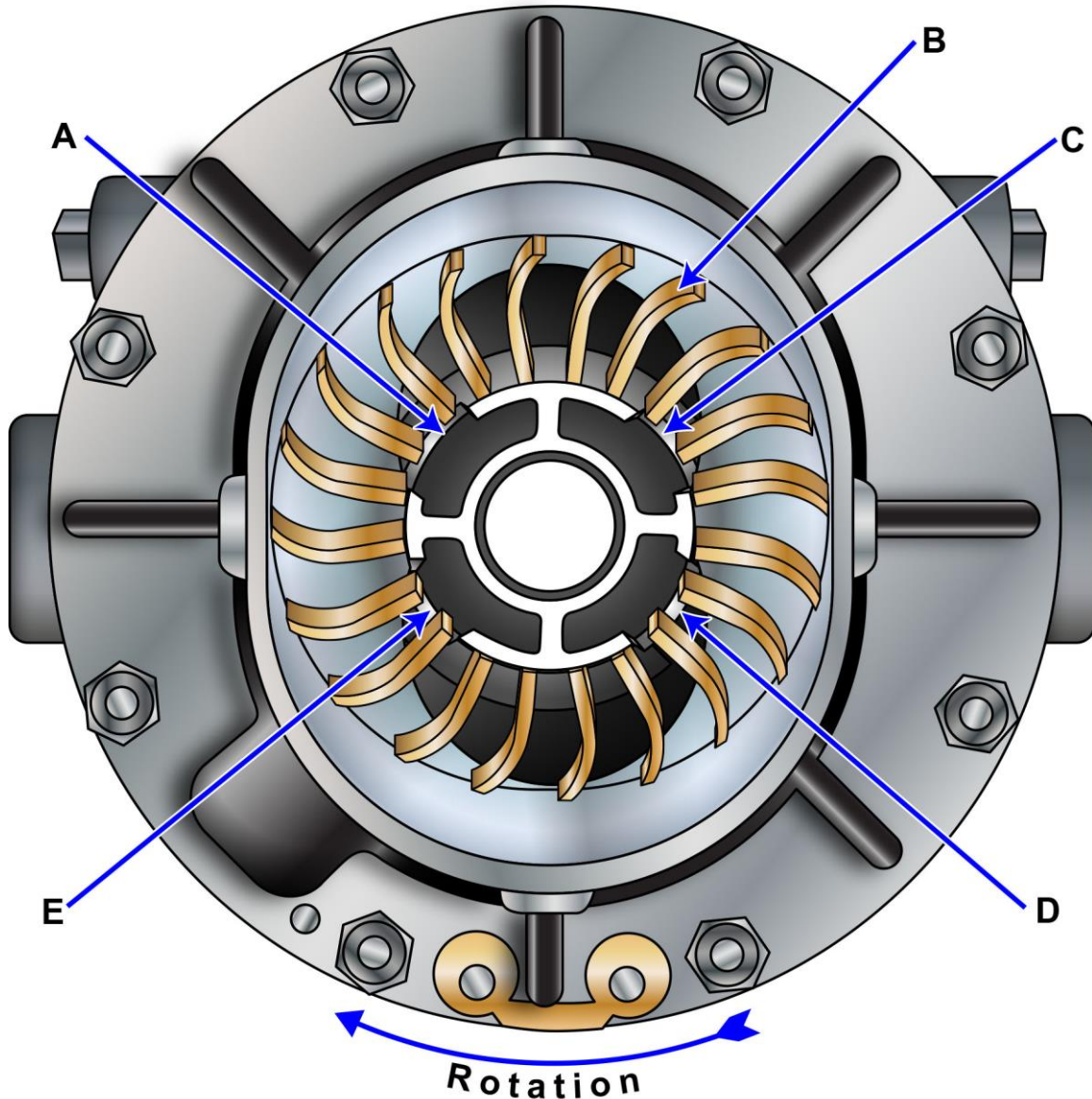
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GS-0080



A



B



C



D



E



F



G



H



I



J



K



L

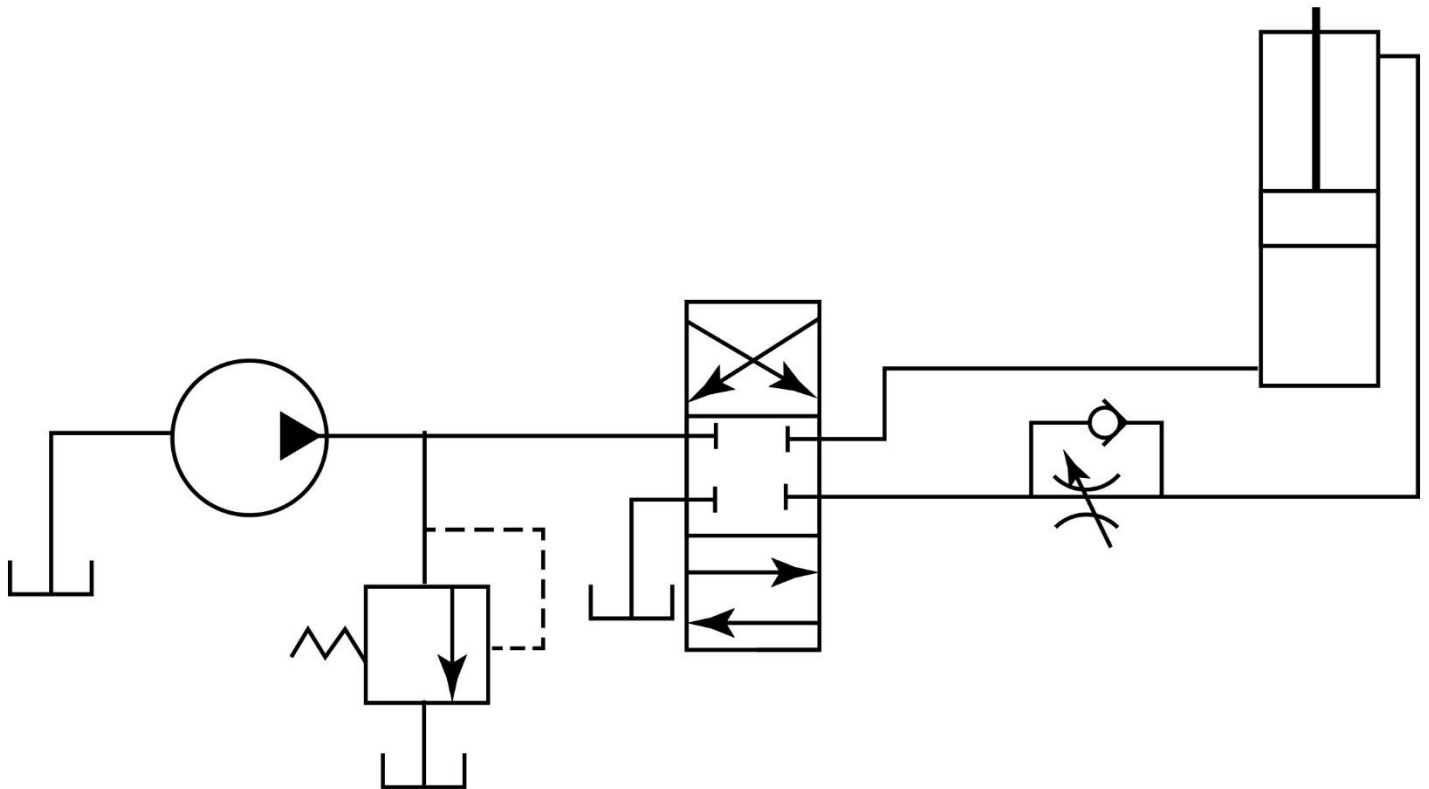


M



N

GS-0105

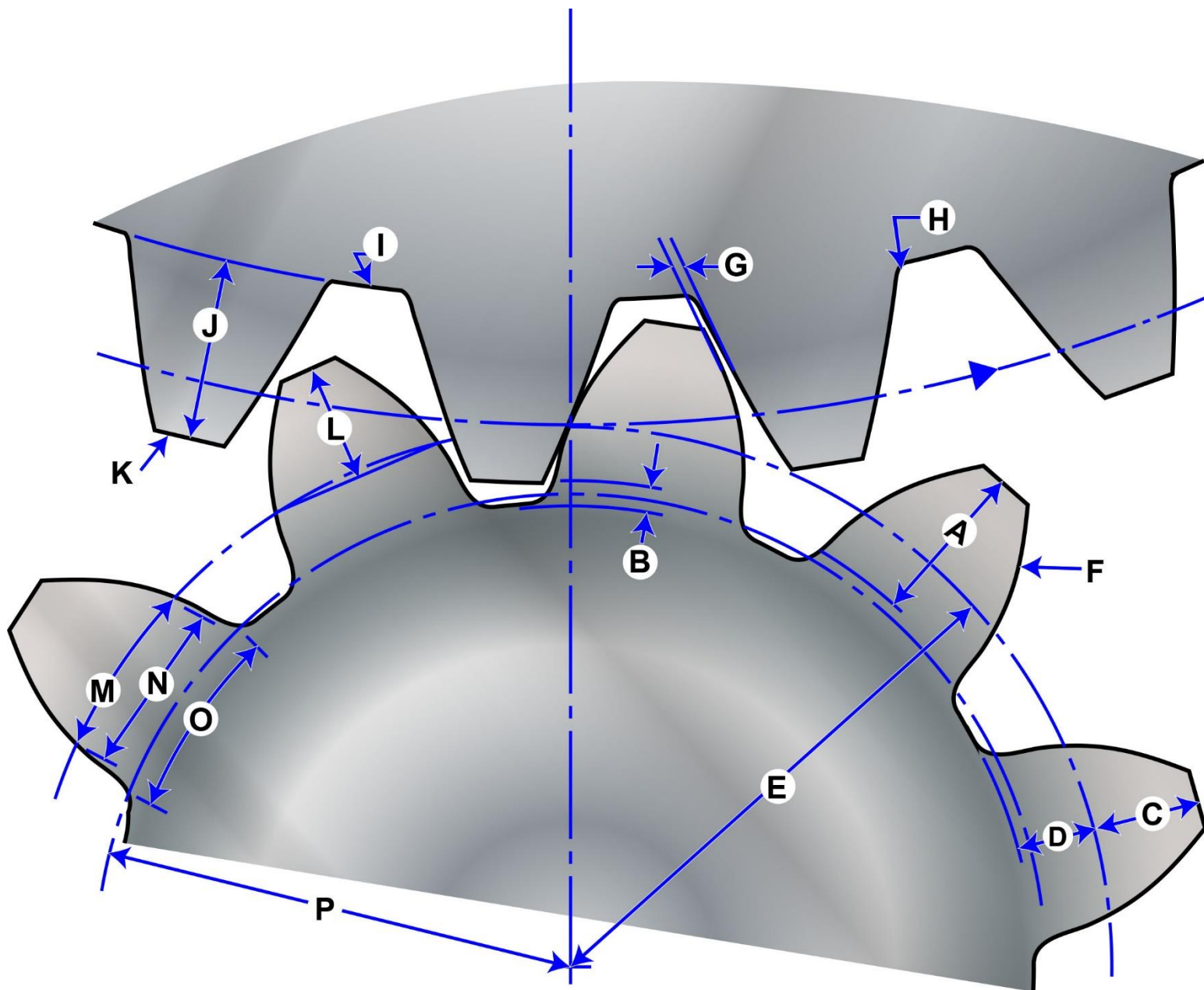


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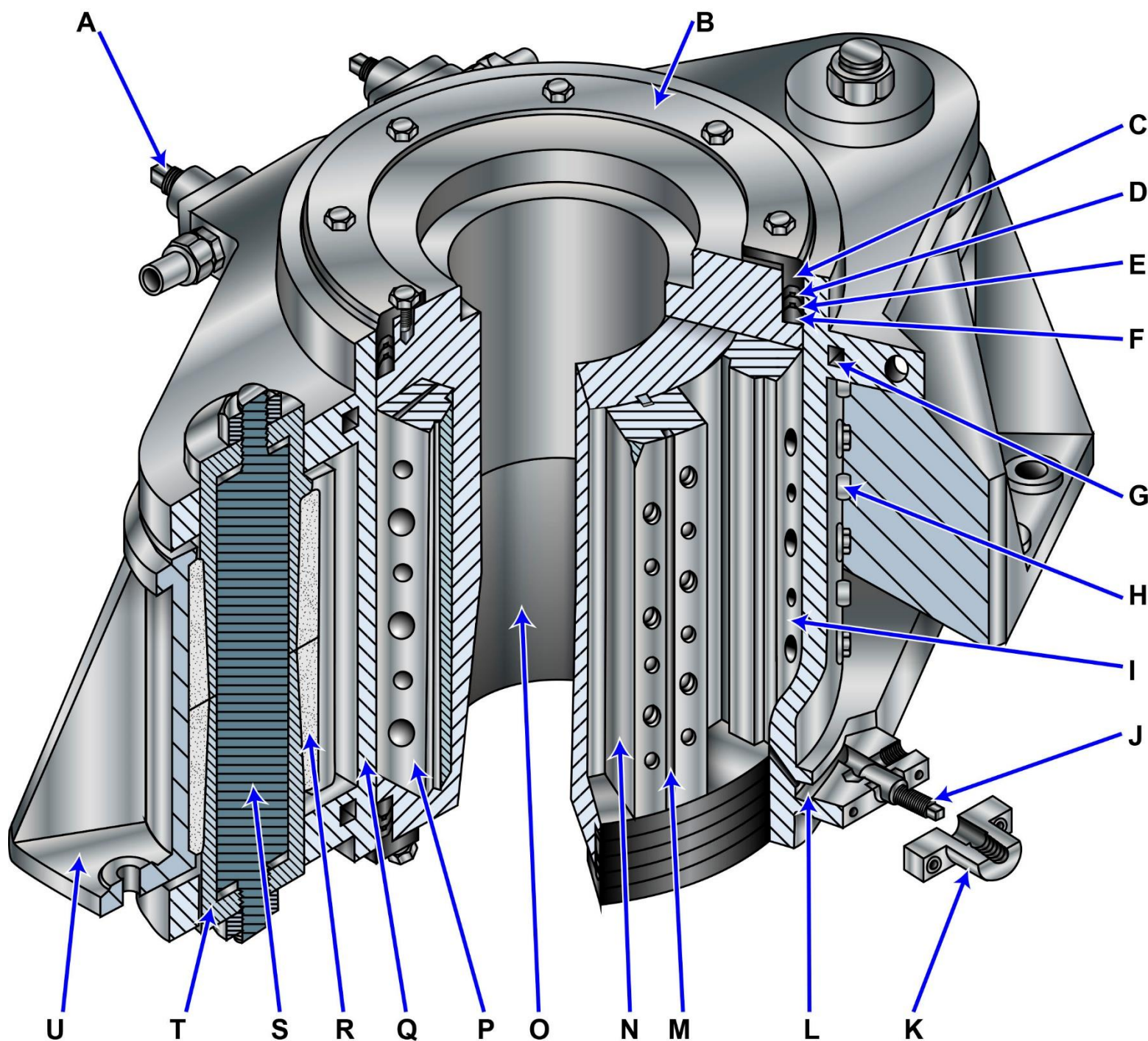
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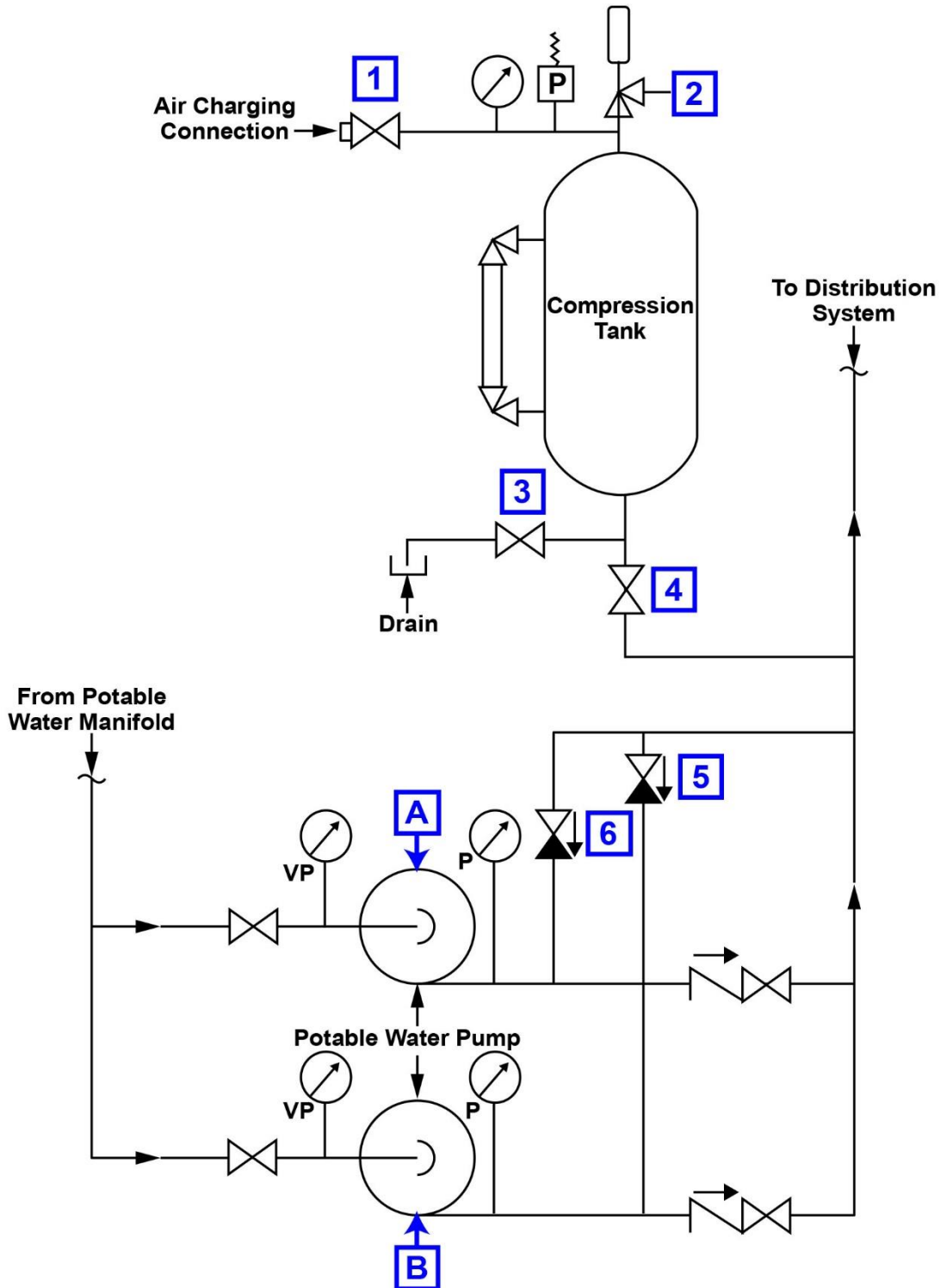
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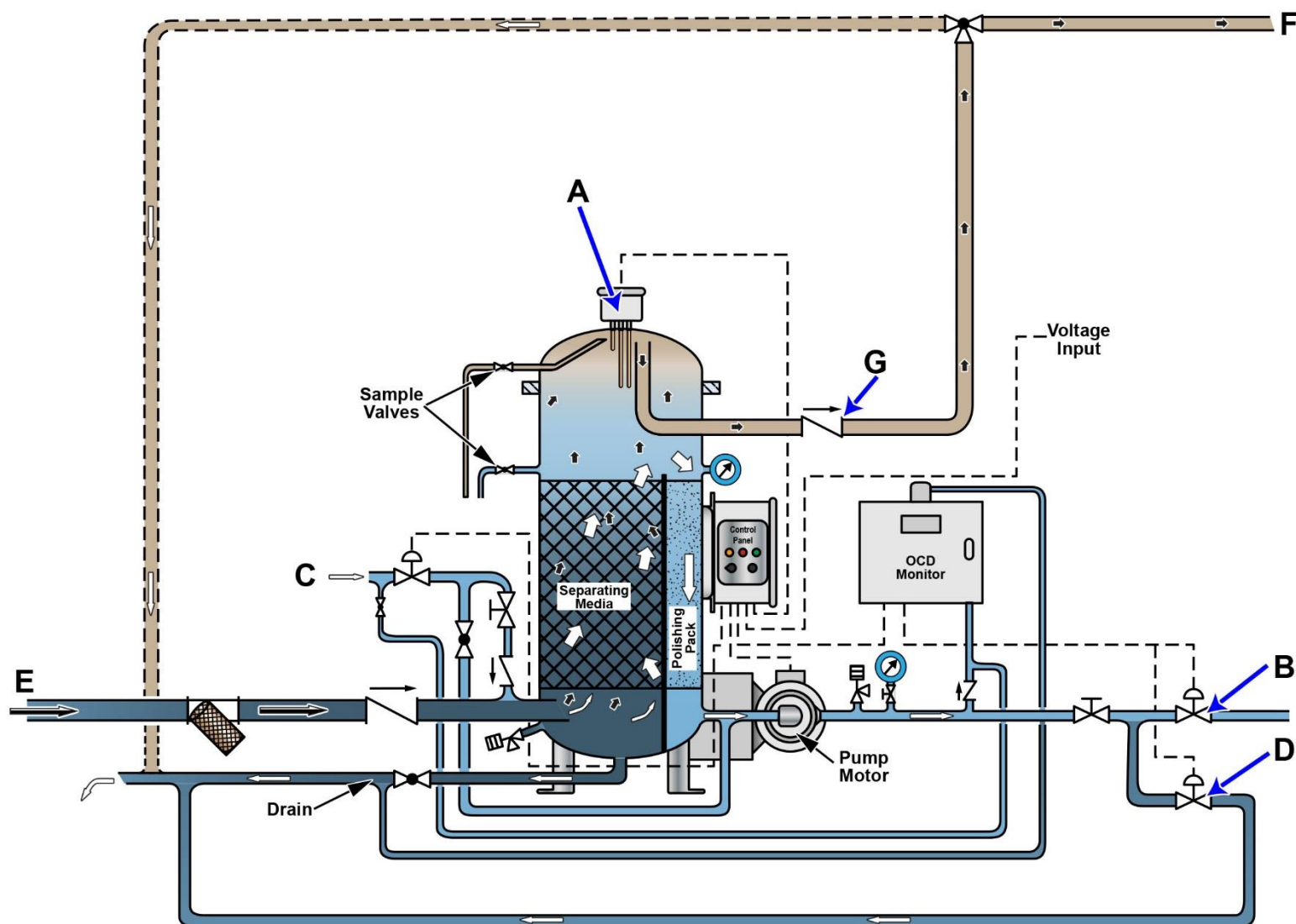
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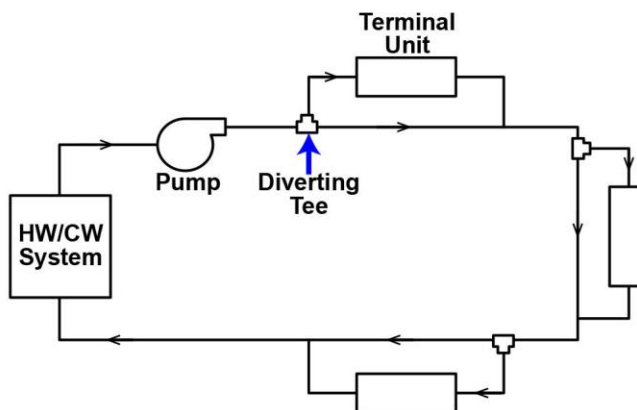
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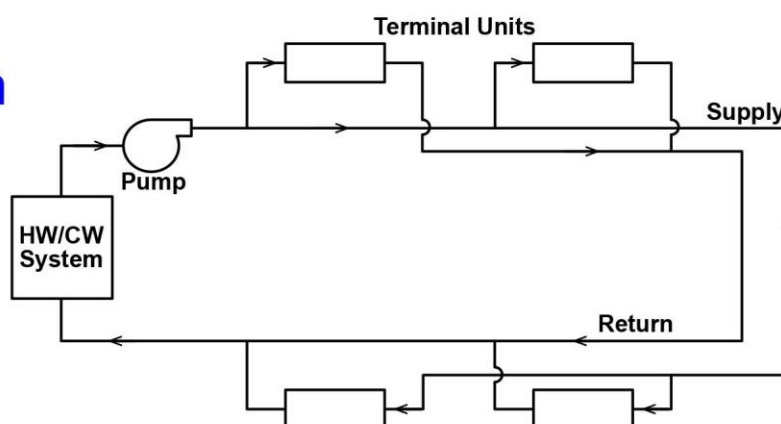
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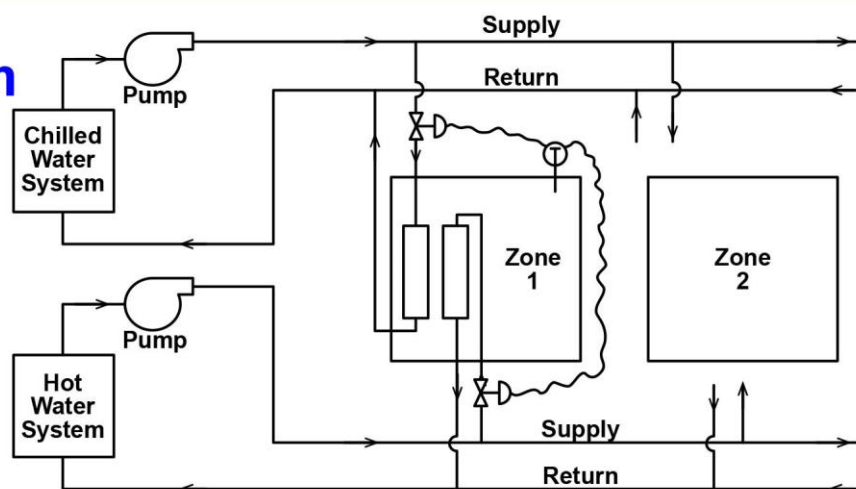
One-Pipe Water System



Two-Pipe Water System



Four-Pipe Water System



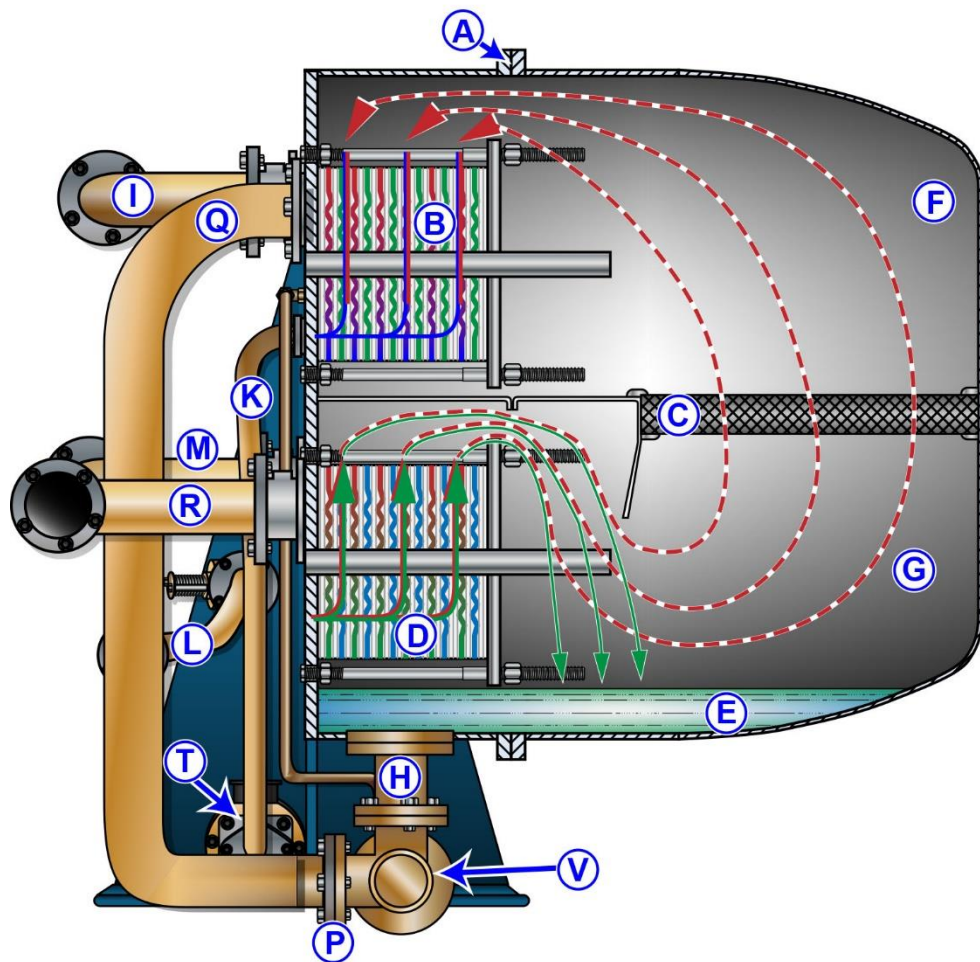
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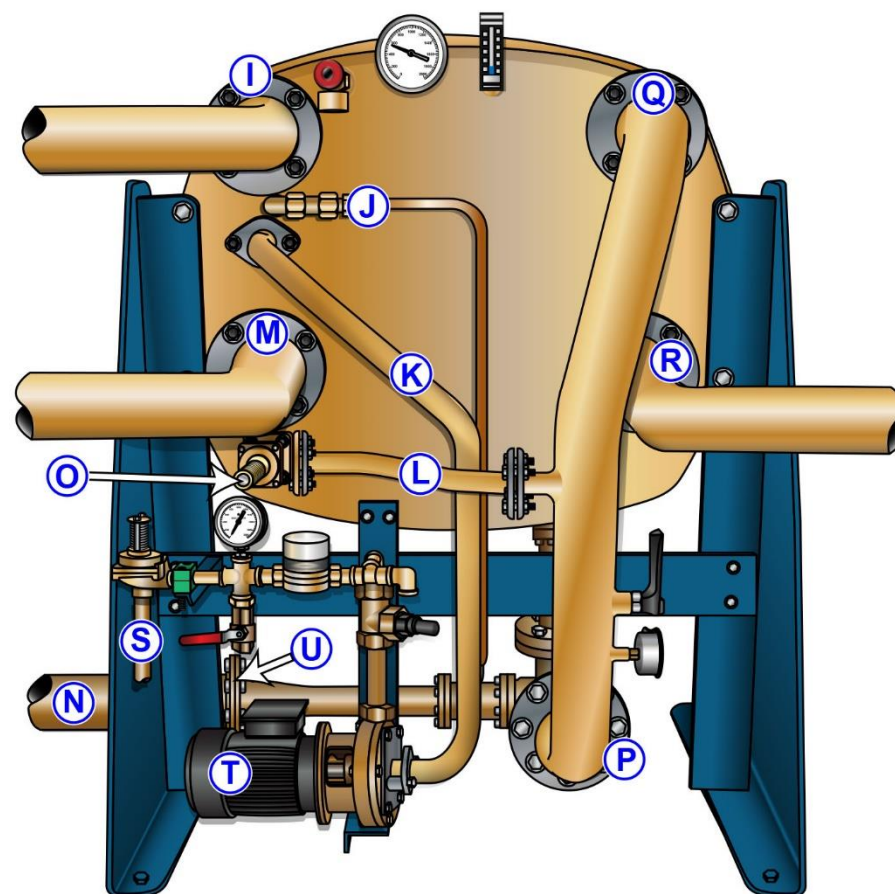
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MO-0110

Side View



Rear View

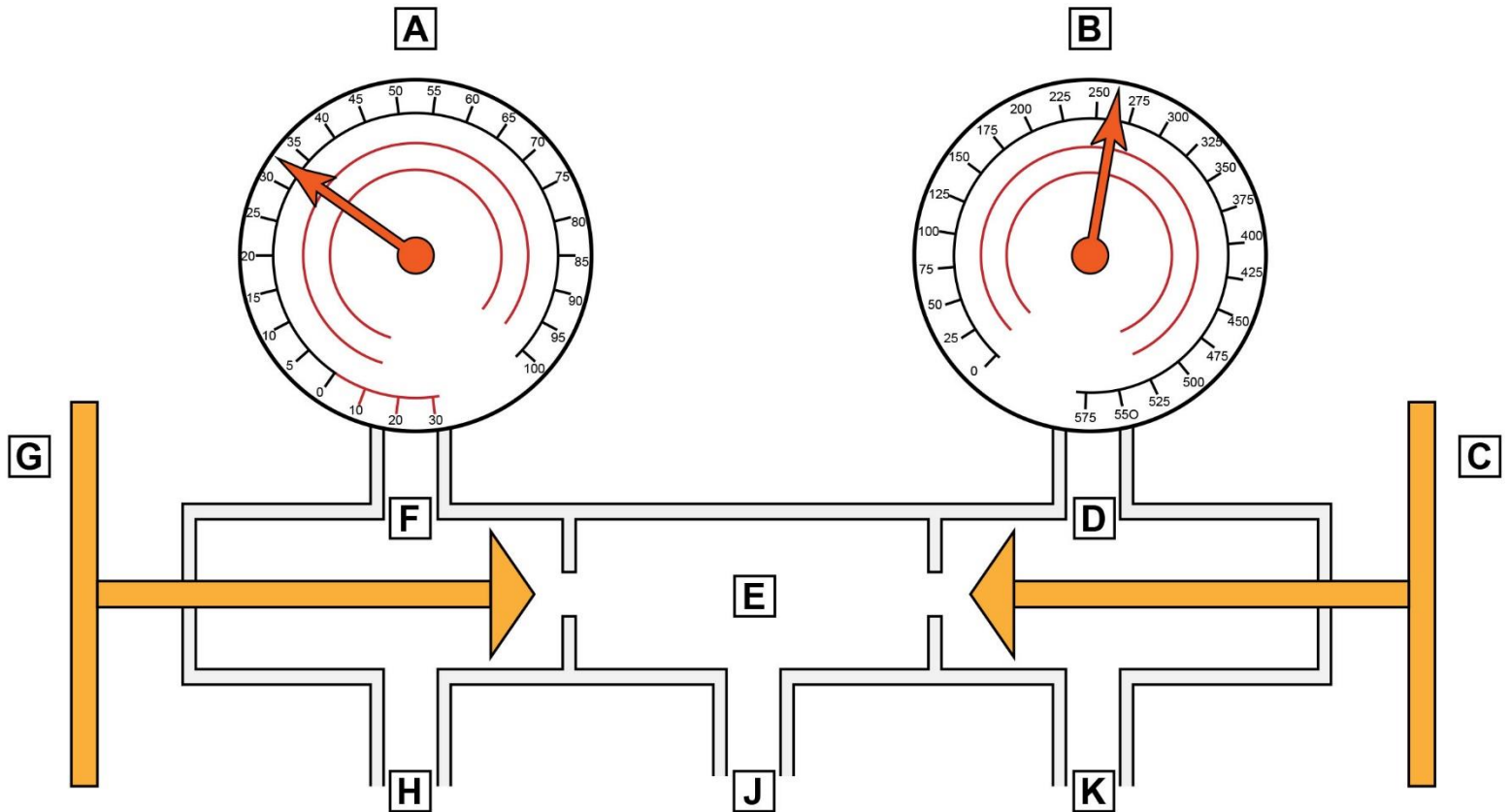


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RA-0011

R-134a Pressure-Temperature Chart

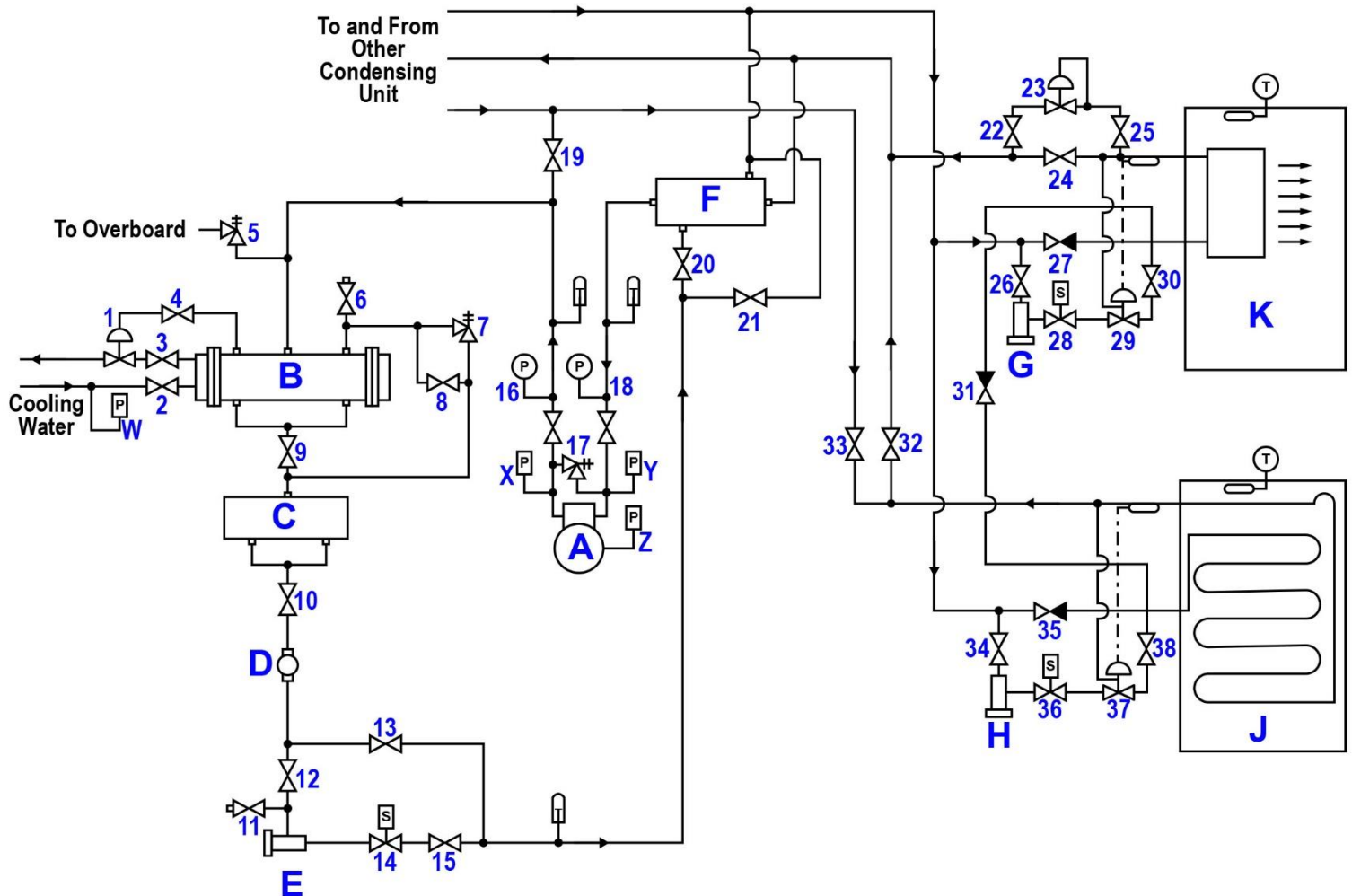
Temperature °F	Vacuum “Hg
-40	14.6
-35	12.3
-30	9.7
-25	6.7
-20	3.5
-18	2.1
-16	0.6

Temperature °F	Pressure psig
-14	0.4
-12	1.2
-10	2.0
-8	2.9
-6	3.7
-4	4.6
-2	5.6
0	6.5
2	7.6
4	8.6
6	9.7
8	10.8
10	12.0
12	13.2
14	14.5
16	15.8
18	17.1
20	18.5
22	19.9
24	21.4
26	22.9

Temperature °F	Pressure psig
28	24.5
30	26.1
32	27.8
34	29.6
36	31.3
38	33.2
40	35.1
45	40.1
50	45.5
55	51.2
60	57.4
65	64.1
70	71.1
75	78.7
80	86.7
85	95.3
90	104.3
95	114.0
100	124.2
105	135.0
110	146.4
115	158.4
120	171.2
125	184.6
130	198.7
135	213.6
140	229.2
145	245.6
150	262.9
155	281.1

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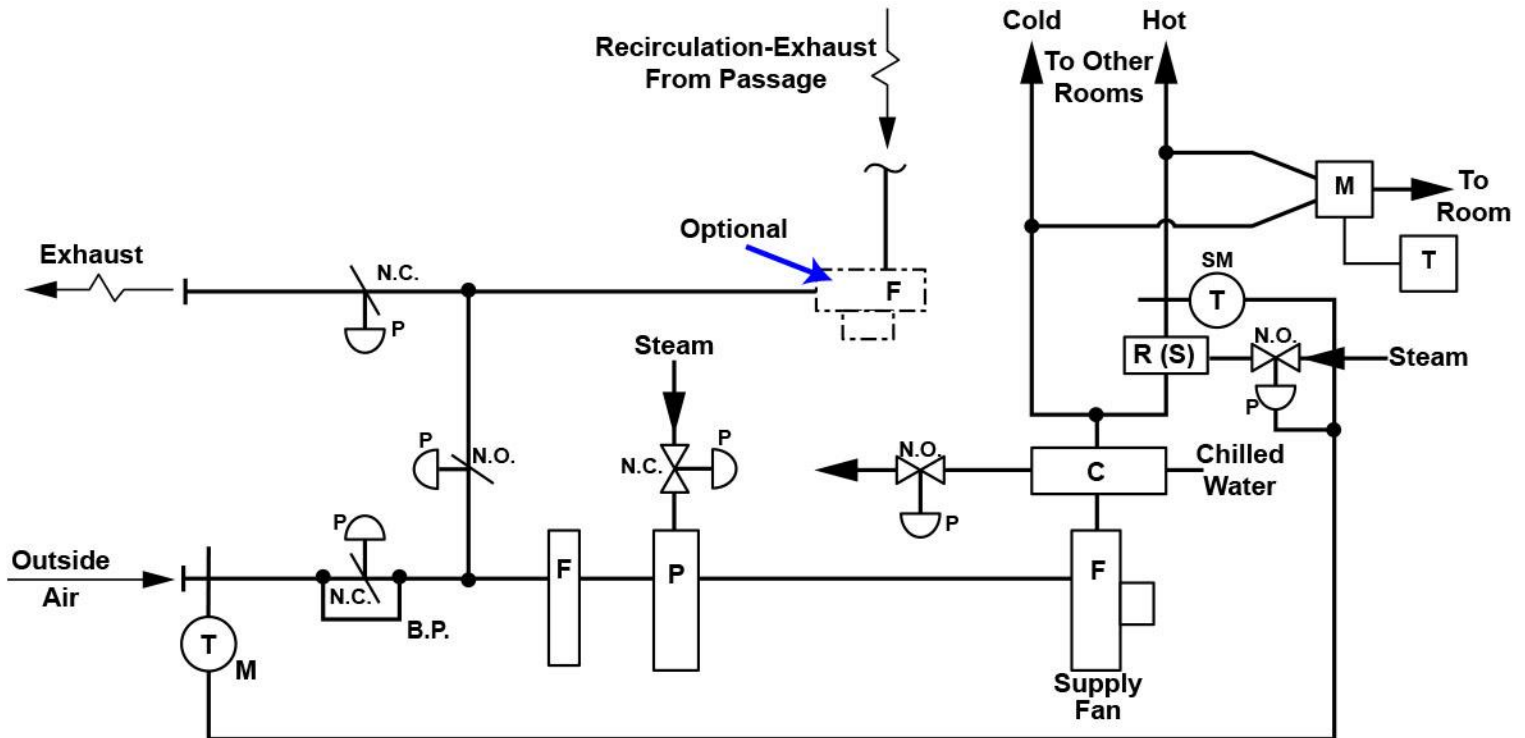


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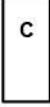







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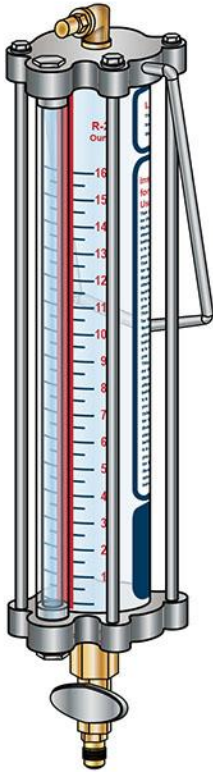
LEGEND

	Fan		Room Thermostat
	Filter		Duct Thermostat
	Cooling Coil		Pneumatic Damper and Motor
	Preheater (Steam)		Pneumatic Relay
	Reheater (Steam)	N.C.	Normally Closed (Valve or Damper)
	Dual Duct Air Mixing Unit	N.O.	Normally Open (Valve or Damper)
		B.P.	Minimum Outside Air Bypass
		P	Positive Positioning Relay
		M	Sub-Master
		SM	Master

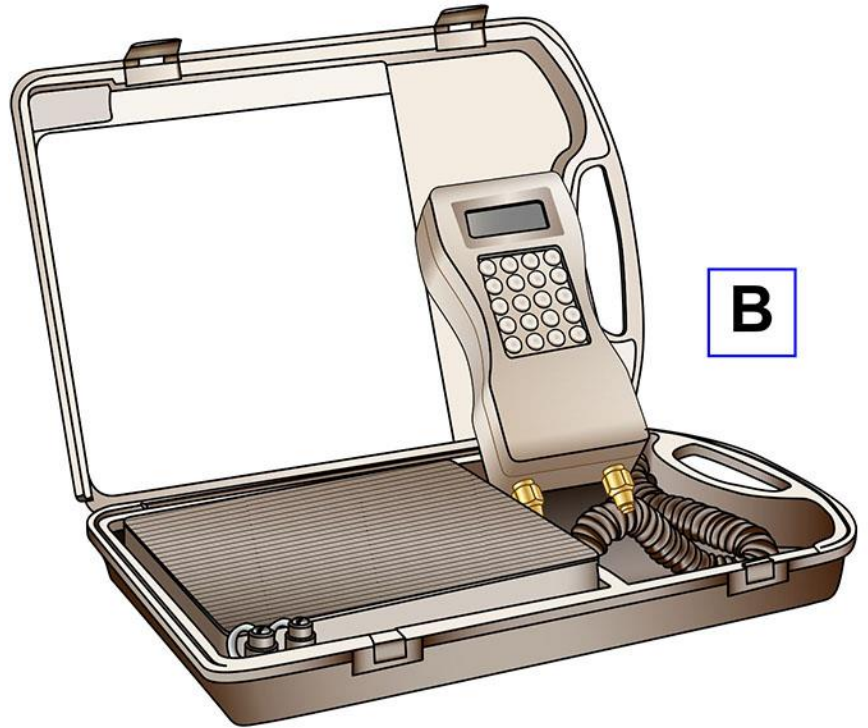
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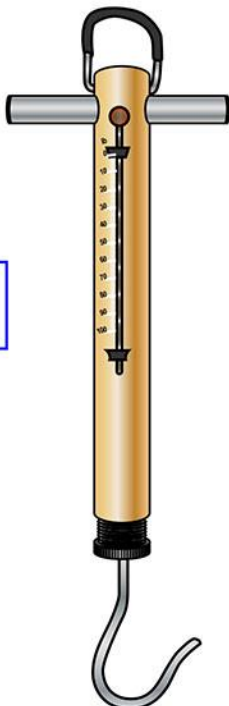
A



B



C



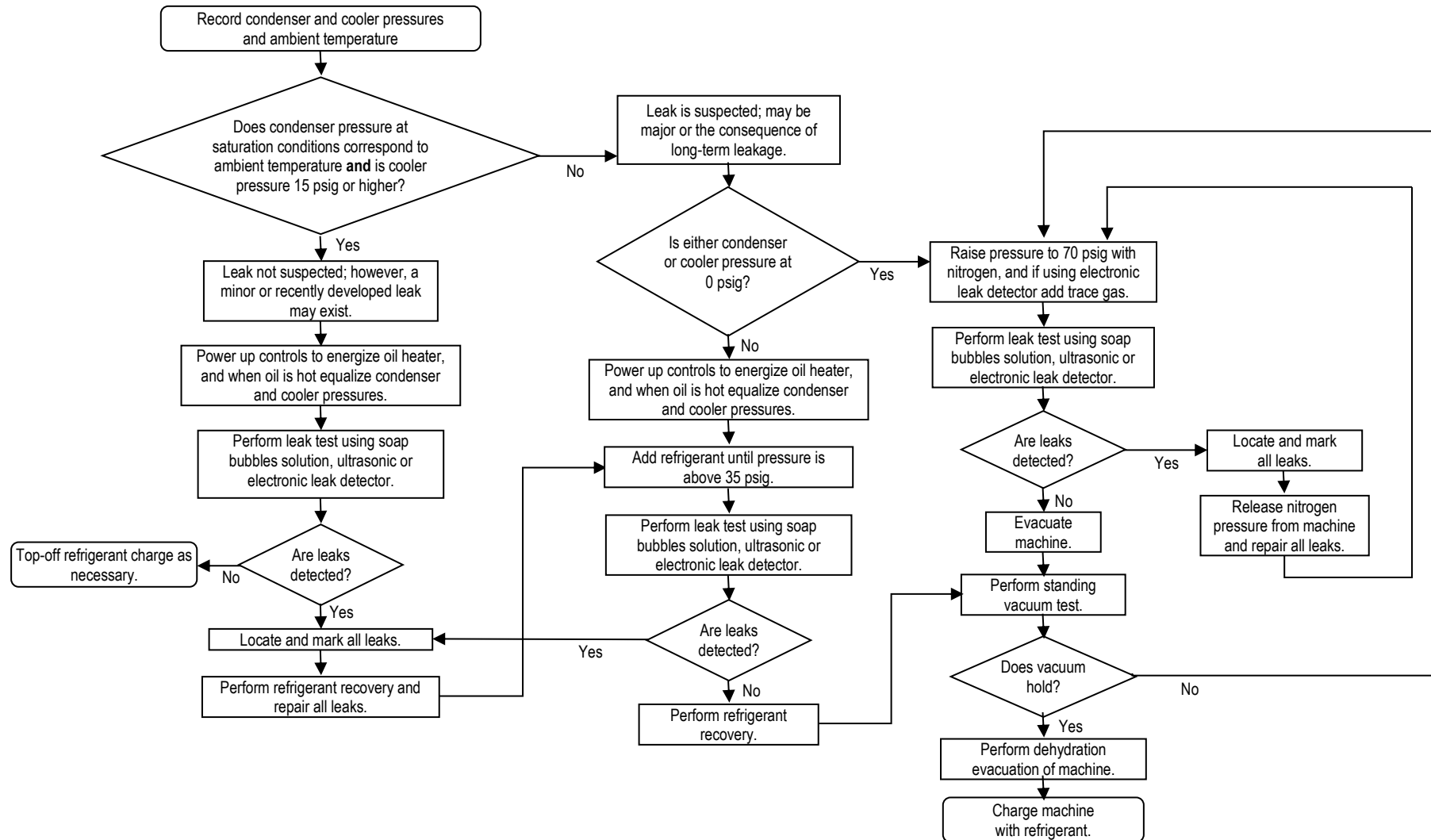
D



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RA-0047

Leak Test Procedure for Idle Centrifugal Chiller Charged with R-134a Refrigerant



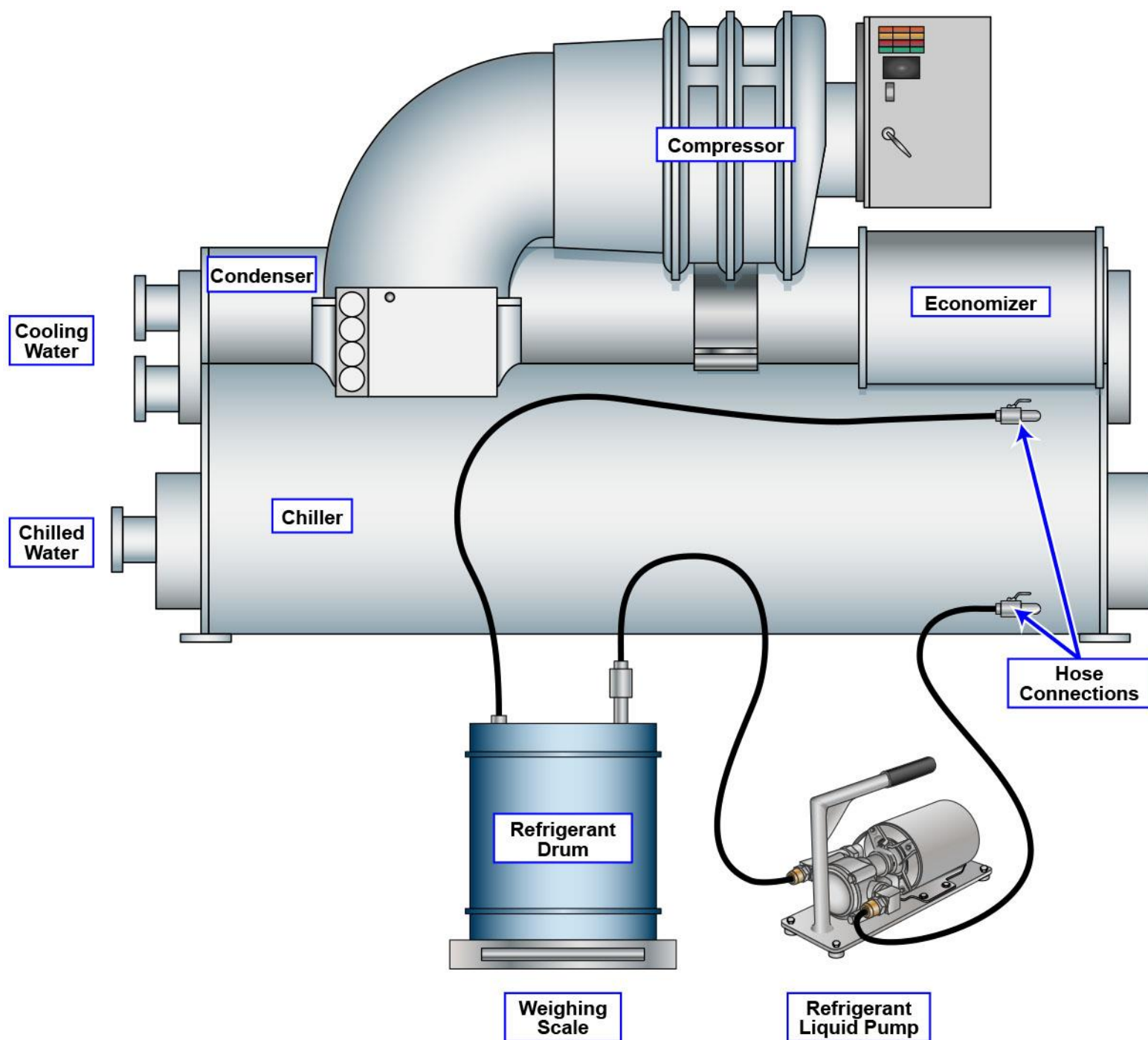
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Start-Up, Operation, and Maintenance Instructions

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RA-0058



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