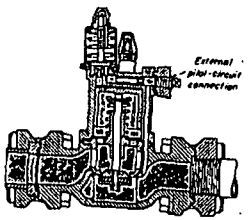
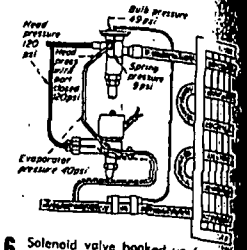


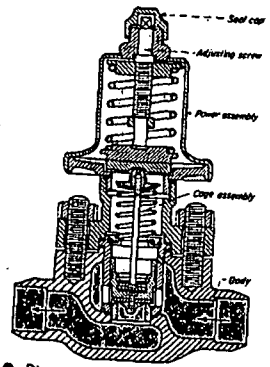
1 Metering and automatic waste valve protects condenser from winter frost



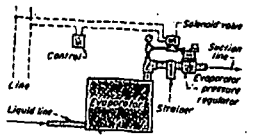
3 Pilot-operated evaporator pressure regulator gives sensitive control



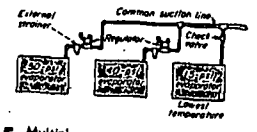
6 Solenoid valve hooked up for liquid-line shutoff service on an evaporator



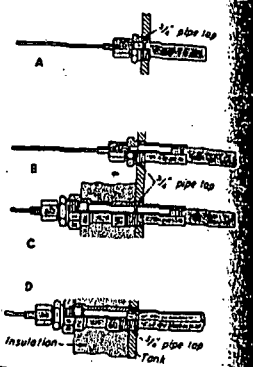
2 Direct-acting evaporator pressure regulator is adjusted from outside



4 Pilot-operated evaporator pressure regulator hooked up for stop duty



5 Multiple evaporator installation has regulators on high-temperature units

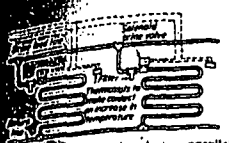


7 Various sleeve and well arrangements for thermal bulbs actuating controls

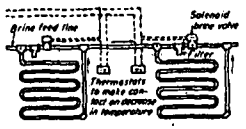
Refrigeration Q&A: Special Control Valves for Your System

By TYLER HICKS, *Associate Editor*

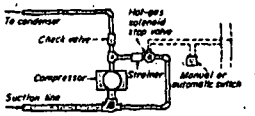
Sixteen questions and answers that help you round out your know-how on specially designed controls for many jobs in the plant. See how the right unit can protect your equipment from many common troubles, make plant operation and upkeep easy



8 Solenoid valves fitted to parallel coils serve as automatic stops



9 These solenoid valves on the parallel brine coils bypass liquid if desired



10 Compressor cylinder bypass is solenoid valve connected as shown here

1 What's one way to protect evaporative condensers from winter freezing?

Use an automatic drain valve, Fig. 1. This design has two checks, one for metering flow to condenser, the other for discharging unwanted water in condenser to waste.

2 How does hookup in Fig. 1 work?

When solenoid valve closes, stopping water flow, pressure in condenser line gradually dissipates and automatic valve opens to allow water in condenser to drain to waste. Solenoid valve may be actuated by an outside thermostat, timer or other control.

3 What precautions must you take when installing automatic valve?

See that maximum distance between spray nozzles and automatic valve does not exceed manufacturer's recommendations. Also, pitch from valve so water drains by gravity to waste when valve opens. If some water remains in the equipment there is still danger of freezing in the winter.

4 What is an evaporator pressure regulator for refrigeration systems?

This is often a spring-loaded valve designed to keep evaporating pressure at a constant value. Installed in suction line, valve maintains a preset evaporator pressure for loads up to maximum rated capacity. Smaller units are direct-acting; larger ones are pilot-operated for greater accuracy.

5 How do direct- and pilot-operated controls differ in construction?

Direct-operating valve, Fig. 2, has a manual adjusting screw that is set before or after the unit is installed. Use an evaporator pressure gage to check effect of changing adjusting screw setting. Pilot-operated unit, Fig. 3, has an amplifying piston acted upon by pilot pressure. Piston opens or closes main valve to keep evaporator pressure at constant pressure desired.

6 Can a pilot-operated control act as a suction stop, too?

Yes, if hooked up as in Fig. 4. Here solenoid valve controls flow in the external pilot circuit. By properly adjusting the solenoid valve the evaporator pressure regulator can be closed when desired.

7 How should a hookup of more than one evaporator be made?

Fig. 5 shows a typical application with two "high-temperature" evaporators and one "low-temperature" unit. Common suction line serves the three evaporators. Low-temperature unit has a check valve instead of a regulator.

8 Is a solenoid valve suitable for liquid-line shutoff service?

Yes, if designed for this job. Fig. 6 shows one special valve suitable for liquid-line shutoff service on many different systems.

9 How does valve in Fig. 6 work?

The solenoid valve is connected between the liquid and gas lines and to the under side of the expansion-valve diaphragm. When solenoid pilot-control port is open, liquid passes from high-pressure side through port to compressor suction line. If port is closed, by actuating solenoid, high pressure from liquid line acts on diaphragm's under side to close the expansion valve, shutting off liquid flow to the evaporator.

10 What are the hookup advantages?

Valves designed for this service are smaller and more economical than large capacity solenoid valves. Usually, but one size may be used on any capacity job. Lastly, they give positive shutoff of the liquid line.

11 What kinds of sleeves, extensions, and wells do refrigerant controls use?

Fig. 7 shows four ways of supporting thermal bulbs in a wall. *First* has a standard ¾-in. demountable union-holding bulb. *It screws into a tapped* opening in the wall. Where bulb must project further into the tank an extension like that at *B* is used. Bulb at *C* has two extensions, one inside the tank and the other outside. Outside extension allows thick insulation to be applied to tank exterior. Installation at *D* is the same as *C* except that a closed well permits bulb removal without draining any liquid that may be in the tank.

12 How are solenoid valves used in brine systems to control flow?

Fig. 8 and 9 show two typical applications of solenoid valves for brine service. In Fig. 8, valves are used for stops; a thermostat in room or compartment cooled shuts valve to stop flow when desired temperature is reached. Thermostats may be set to maintain different temperatures in different rooms.

With the bypass hookup, Fig. 9, flow is shunted past coil when it reaches desired temperature. Thermostat controls valve operation. In both hookups illustrated, one brine pump serves all coils in the system.

13 Can a solenoid valve be used for compressor capacity control?

Yes, if designed for this service. Fig. 10 shows how the valve is *installed in* a bypass around one or more of the compressor cylinders. Check valve is used to separate bypassed cylinders from the active ones. Solenoid valve may be controlled by either an automatic or manual switch.

14 What precautions are needed in picking solenoid-valve power supply?

See that power-supply voltage does not vary more than the amount valve manufacturer allows. *This is usually* 10% over or under rated valve voltage. Avoid excessive voltage drop by wiring valve into a separate circuit, *if possible*. Never connect valve into a motor circuit because there may be a large voltage drop during starting.

15 Are strainers needed with solenoid valves in refrigeration systems?

Yes, most manufacturers recommend a strainer with each valve even though there may be a master strainer somewhere else in the system. Be sure the strainer has enough capacity to prevent restricting flow through the solenoid valve. Install ahead of solenoid valve.

16 What's the purpose of a manual-opening stem on a solenoid valve?

It allows you to open the valve by hand if circuit to coil is not in operation or valve coil burns out. The stem is used only in emergency, normally does not interfere with valve operation.