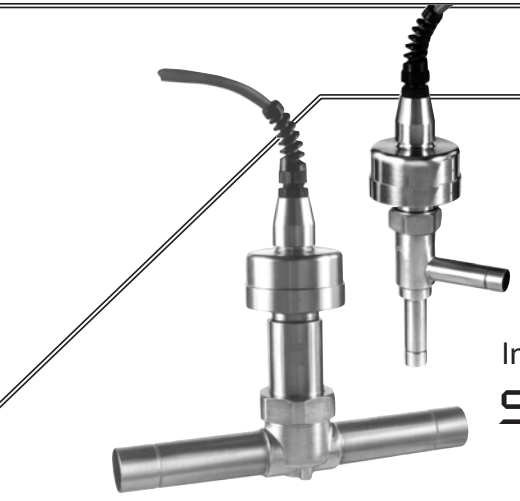


ELECTRIC DISCHARGE BYPASS VALVES

Installation and Service Instructions

SDR-3, 3x and SDR-4

SYSTEM CONSIDERATIONS

The discharge bypass valve is applied in a branch line off the discharge line as close to the compressor as possible. The bypassed vapor can enter the low side at one of the following locations:

1. Evaporator inlet with distributor.
2. Evaporator inlet without distributor.
3. Suction line.

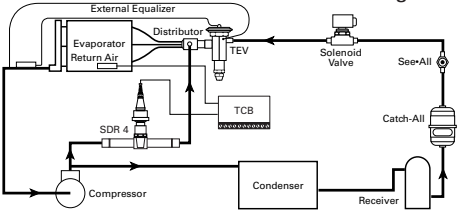
Each is illustrated and discussed below.

BYPASS TO EVAPORATOR INLET WITH DISTRIBUTOR

This method of application, illustrated in Figure 1, offers distinct advantages over the other methods, especially for unitary or field built-up units where the high and low side are close coupled. The primary advantage of this method is that The EDBV can directly control the temperature of the cooled fluid. A sensor placed in the air off the evaporator or on the chilled water line of a chiller can cause the EDBV to modulate to maintain the desired temperature. In addition, the system thermostatic expansion valve will respond to the increased superheat of the vapor leaving the evaporator and will provide the liquid required for desuperheating. The evaporator serves as an excellent mixing chamber for the bypassed hot gas and the liquid-vapor mixture from the expansion valve. This ensures a dry vapor reaching the compressor. Oil return from the evaporator is also improved since the velocity in the evaporator is kept high by the hot gas. Piping for this method of application can be accomplished by the use of a Sporlan 1650R series distributor on a new application, or a Sporlan Auxiliary Side Connector (ASC) when adding the valve to a system with distributor.

NOTE: If the distributor circuits are sized properly for normal cooling duty, the flow of hot gas through the circuits may cause excessive pressure drop and/or noise. Therefore, it is recommended that the distributor circuits be selected one size larger than for straight cooling duty. For complete technical details on the 1650R series distributor and the ASC series Auxiliary Side Connector, refer to Bulletin 20-10.

Figure 1



VALVE / EQUIPMENT LOCATION AND PIPING

When the evaporator is located ***below*** the compressor on a ***remote*** system, bypass to the evaporator inlet is still the best method of hot gas bypass to insure good oil return to the compressor. When this is done, the bypass valve must be located at the compressor rather than at the evaporator section. This will insure obtaining rated capacity from the bypass valve at the conditions for which it was selected. If the evaporator is above or on the same level as the compressor, this valve location will also eliminate the possibility of hot gas condensing in the long bypass line and running back into the compressor during the off cycle. Whenever hot gas bypass to the evaporator inlet is necessary for a system with two or more evaporator

SPORLAN MECHATRONICS

sections each with its own TEV (no liquid line solenoid valves) but handling the same load, two methods may be used to avoid operating interference between sections:

1. Use a separate discharge bypass valve for each evaporator section.

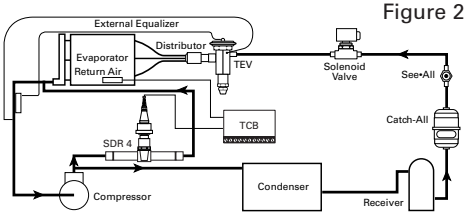
2. Use one discharge bypass valve to feed two bypass lines each with a check valve between the bypass valve and the evaporator section inlet. The check valves will prevent interaction between the expansion valves when the bypass valve is closed.

CAUTION - Introduction of the bypassed gas between the thermostatic expansion valve and the distributor is *not* generally recommended. Hot gas flowing through the distributor nozzle and circuit tubes, that were sized for normal cooling flow rates, causes excessive pressure drop. Careful evaluation and testing should precede any application where hot gas is bypassed between the TEV and the distributor.

BYPASS TO EVAPORATOR INLET WITHOUT DISTRIBUTOR

Many refrigeration systems and water chillers do not use refrigerant distributors, but may require some method of compressor capacity control. This type of application provides the same advantages as bypassing hot gas to the evaporator inlet with a distributor. All information relating to bypassing hot gas to the evaporator inlet with a distributor, except that concerning distributors or ASC's, also applies to bypassing to the evaporator inlet without a distributor.

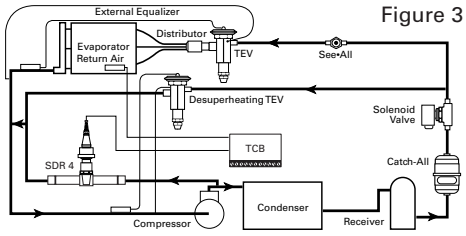
Figure 2



BYPASS TO SUCTION LINE

On many applications, it may be necessary to bypass directly into the suction line (fig. 2). This is generally true of systems with multi-evaporators or remote condensing units, as well as on existing systems where it is easier to connect to the suction line than the evaporator inlet. When hot gas is introduced directly into the suction line, the danger of overheating the compressor and trapping the oil in the evaporator exists. As the suction temperatures rise, the discharge temperature likewise starts to increase. This can cause breakdown of the oil and refrigerant with the possible result being a compressor burnout. This method offers added flexibility for multi-evaporator systems or remote systems because the hot gas bypass components can be located at the condensing unit. However, to insure oil return, special care must be taken in the system piping.

Figure 3



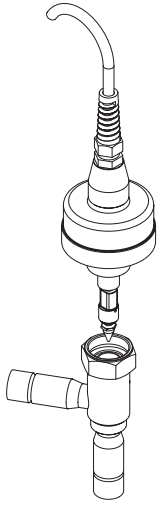
DESUPERHEATING THERMOSTATIC EXPANSION VALVE

On those applications where the hot gas must be bypassed directly into the suction line downstream of the main expansion valve's bulb, an auxiliary thermostatic expansion valve (commonly called a desuperheating TEV or a liquid injection valve) is required. The purpose of this valve is to supply enough liquid refrigerant to cool the hot discharge gas to the recommended suction temperature. Most compressor manufacturers specify a maximum suction gas temperature of 65°F. For these requirements, special desuperheating thermostatic charges are available which will control at the proper superheat to maintain the suction gas at or below 65°F. For applications requiring suction gas temperatures appreciably below 65°F, contact Sporlan Valve Company or the compressor manufacturer for assistance. **In all cases the maximum permissible suction gas temperature published by the compressor manufacturer must be followed.**

INSTALLATION INSTRUCTIONS

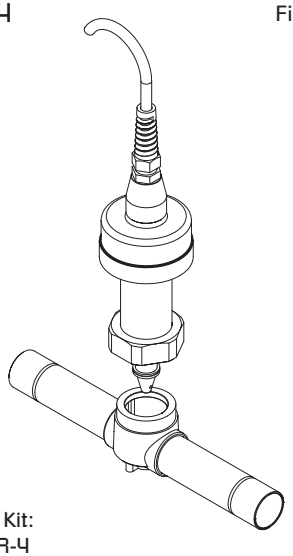
SDR-3, 3x

Figure 4



Repair Kits:
KS-SDR-3
KS-SDR-3x

SDR-4 Figure 5



Repair Kit:
KS-SDR-4

The valves have copper connections and any solder or brazing alloy may be used to install the valve. There is no need to disassemble the valve for installation, however, the torch flame should be directed away from the motor housing and cable. Care must be taken to assure that the cable is not damaged either directly from the flame, or indirectly from contact with hot piping. The valve is shipped in the open position to prevent heat being conducted into the motor, but it is strongly suggested that the valve body be wrapped with a wet cloth during the soldering operation. The valve should be completely installed before connecting to the controller and applying power. The wiring is color-coded and the controller manufacturer should be consulted for the proper attachment to the controller.

FIELD SERVICING INSTRUCTIONS

The following steps are necessary for the proper disassembly, inspection, cleaning and reassembly of the SDR valves (whether in or out of the refrigerant piping).

1. Before disassembling the valve, be sure the refrigerant pressure in the system has been reduced to a safe level (0 PSIG).

2. Disconnect the line voltage to the valve controller.

3. Refer to the exploded view of the SDR valves (Figures 4 and 5) for the remaining instructions. Using the appropriate wrenches or a vice to properly support the valve body, remove the motor assembly from the valve body by loosening the lock nut. **To prevent permanent damage to the motor, DO NOT attempt to disassemble the motor housing.**

CAUTION - Regardless of whether the valve is in the system or in a vise, care must be take to prevent distorting the valve parts when tightening.

4. The motor assembly may be removed for inspection and cleaning.

5. If the motor fails to operate properly, check the resistance of each motor phase. Resistance between the black and white leads or between the red and green leads should be approximately 75 ohms. Differences of more than 10% between phases indicate a defective motor. Resistance between black and red, or any lead and housing should be infinite, any resistance reading will indicate a shorted winding and the motor will need to be replaced.

6. If you have access to a SMA-12 test instrument, operation of the valve may be proven. Connect the motor leads to the proper color-coded connector on the SMA. Set the rate to 200 PPS and toggle in the "OPEN" direction. The piston or pin should retract into the driver guide. After up to 30 seconds, the driver should be fully retracted and a light clicking or "ratcheting" sound may be heard, this is normal to the valves and proves operation of the motor. If the SMA is toggled in the "CLOSE" position, after up to 30 seconds the white polyester driver/pin should disengage the lead screw, and can be removed. Inspect the driver for damage. To replace the driver, toggle the SMA to the "OPEN" position and carefully engage the driver to the lead screw.

CAUTION - Whenever the motor is powered while not in place on the valve, the driver must be fully retracted into the guide before the valve is reassembled. Failure to do this will permanently damage the valve.

7. If the motor responds to step 6 above, the valve body itself should be checked for obstruction. Check for contaminants in the port or strainer, if used.

8. If the valve body and strainer are clear and the motor operates as in step (6) above, the valve is considered operational and the problem lies in the controller or power supply. The manufacturer of these components should be contacted for further assistance.

MOTOR ADAPTER ASSEMBLY REPLACEMENT

If the motor is found to be defective in the above, the entire motor assembly must be replaced.

1. Remove all power from the valve and controller.

2. Cut the existing valve cable at a convenient point at the driest or most protected location.

3. Splice the new cable to the old cable using the waterproof butt splices. **COLOR CODING ON THE INDIVIDUAL WIRES MUST BE MATCHED; FAILURE TO DO SO WILL RENDER THE VALVE INOPERATIVE AND MAY DAMAGE EITHER THE VALVE OR CONTROLLER.**

4. Waterproof the splice with shrink tube or electrical tape suitable for use in cold and damp environments. Care should be taken to prevent the splice from lying in a wet location.

VALVE REPLACEMENT

The entire valve may be replaced if desired. The old valve may be unsoldered or cut out of the piping. If cut out, use a tubing or pipe cutter and not a saw. When installing the new valve any convenient brazing alloy and method may be used. The valve need not be disassembled, but the body and motor assembly should be wrapped with a wet cloth to prevent damage.

Extra care should be taken to prevent damage to the motor cable, either directly from the torch, or indirectly from contact with a hot surface.

Waterproof butt splices are not supplied with complete valves, but must be used to prevent corrosion on the motor leads unless the cable is replaced all the way to the controller. Refer to the instructions for **MOTOR REPLACEMENT** above.

If the valve is disassembled for installation, refer to **REASSEMBLY** instructions, below.

REASSEMBLY

1. Use the SMA-12 in the "OPEN" mode, or use the valve controller to retract the white polyester driver/pin fully into the driver guide. Remove power from the valve or controller.

2. Lightly oil the threads on the new motor adapter as well as the gasket or O-ring. Carefully seat the adapter and motor assembly on the valve body.

3. Engage and tighten the lock nut. One eighth turn more than hand tight is sufficient to achieve a leak proof seal.

4. Pressurize the system and check for leaks.

5. Reapply power to the controller. Each controller manufacturer has a slightly different initialization scheme and the proper procedure must be followed. Since, during service, valve position as calculated by the controller will be lost, the controller should be initialized at least twice. In some instances, cycling power to the controller will accomplish this. However, the controller literature or the manufacturer should be consulted.

SMA-12 VDC BIPOLAR STEP MOTOR ACTUATOR

1. Connect any Sporlan step motor valve to the SMA-12 by matching wire color to terminal color. Any 12 VDC bipolar step motor may be tested with the SMA-12. Phase one leads should be connected to the black and white terminals. Phase two leads should be connected to the red and green terminals.

2. Select a step rate with the selector knob.

3. Push the open/close toggle switch in the "CLOSE" direction to extend the driver or close the valve.

4. Push the open/close toggle switch in the "OPEN" direction to retract the driver or open the valve.

5. Observe the terminal indicator lights. At rates other than 1, indicator lights will flash quickly. Pushing the open/close toggle in either direction at the 1 step rate will alternate the phases energized.

The following sequence of indicator lights will light.

OPENING	CLOSING
Black & Red	Red & White
Red & White	Red & Black
White & Green	Black & Green
Green & Black	Green & White

6. Check that the power indicator light is lit; if not, replace the batteries.

7. If the terminal indicator lights do not light, one or both motor phases are open and the motor must be replaced.

8. If the motor can be powered smoothly in both directions, the motor assembly is functional and the controller must be tested or replaced.

SPECIFICATIONS

Power input – (2) 9 volt Alkaline batteries
Power output – 10 Watts intermittent
Step rate – Selectable – 1, 50, 100, 200 steps per second
Drive type – Bipolar
Connector – Binding post with banana plug socket

An accessory pigtail item number 958112 is available at extra charge to allow the SMA-12 to be directly connected to all Sporlan Packard Weather-Pack™ equipped valves.

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