



# 3-Way Valves

Installation and Servicing Instructions

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# 3-Way Heat Reclaim Valves

B5D, 8D, 12D, 16D, 8D-HP, 12D-HP,  
SB5D, S8D, S12D, S16D, S8D-HP, S12D-HP

## OPERATION

### “B” Type

#### Normal (Outdoor) Condenser - De-energized

See Figure 1. With the pilot valve de-energized, high side pressure is prevented from entering the cavity above the piston assembly. At the same time, the upper pilot port is open to suction pressure. The resulting pressure differential across the piston moves the piston-seat assembly to close the reclaim condenser port (upper main port). In this mode, the refrigerant flows to the normal condenser. The pilot valve opens the cavity above the piston to suction. This allows the reclaim condenser to be pumped out through a small bleed hole in the piston. The pump out process reduces the reclaim condenser to suction pressure. Once suction pressure is reached, the flow through the bleed hole in the piston stops. There is no high to low side bleed with continued operation in the normal condenser mode. For a more efficient pump out of the reclaim condenser, a normally open solenoid valve can be added to the lowest physical location of the reclaim coil to remove liquid.

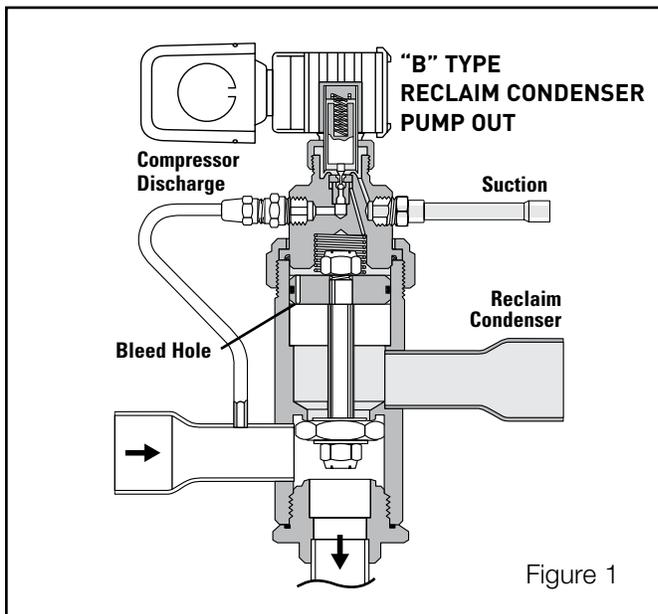


Figure 1

### “C” Type

#### Normal (Outdoor) Condenser - De-energized

With the pilot valve de-energized, high side pressure is prevented from entering the cavity above the piston-seat assembly. At the same time the upper pilot port is opened to suction pressure. The resulting pressure differential across the piston moves the piston-seat assembly to close the reclaim (upper) main port, thereby eliminating high to low side bleed and the resulting capacity loss with the system in the normal condenser mode.

### “B” and “C” Type

#### Reclaim (Reheat) Condenser - Energized

When the pilot valve is energized, high side pressure is permitted to flow through the lower pilot port at the same time the

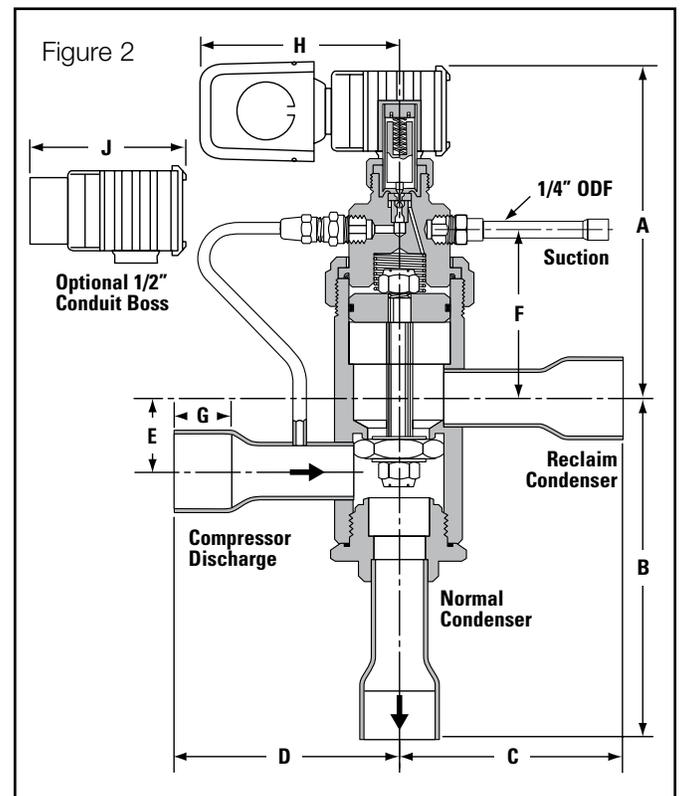
upper pilot port is closed to suction. High side pressure build up on top of the piston moves the piston-seat assembly to close the normal condenser port and open the reclaim (upper) main port. With the upper pilot port and closed, there is no high to low side bleed and resulting capacity loss with the system in the reclaim mode.

Valves using the MKC-1 coil may be used on fluids or gases where the temperature does not exceed 240°F (116°C), while the valve ambient is 120°F (49°C). The coil is Underwriters Laboratory Class F rated.

## INSTALLATION

### Piping Suggestions

Valves must be installed in a horizontal or vertical position with the coil level with or above the valve body. Install Heat Reclaim Valves so the connections are in the proper flow direction as shown in Figure 2.



## DIMENSIONS – Inches (mm)

Type	Port Size	Connection ODF Solder Inches	A	B	C	D	E	F	G	H	J
(S)B5D5B (S)B5D5C	5/8	5/8	5.00 (127)	4.36 (111)	3.22 (82)	3.22 (82)	0.79 (20)	3.84 (98)	0.50 (13)	2.94 (75)	
(S)8D7B(-HP) (S)8D7C(-HP)	3/4	7/8	5.18 (132)	5.06 (129)	3.44 (87)	3.44 (87)	1.13 (29)	2.63 (67)		0.75 (19)	
(S)8D9B(-HP) (S)8D9C(-HP)		1-1/8	5.13 (130)							0.91 (23)	
(S)12D11B(-HP) (S)12D11C(-HP)	1-1/4	1-3/8								0.97 (25)	2.89 (73)
(S)12D13B(-HP) (S)12D13C(-HP)		1-5/8	6.87 (174)	6.94 (176)	4.19 (106)	4.19 (106)	2.38 (60)	4.25 (108)		1.09 (28)	
(S)12D17B(-HP)		2-1/8								1.25 (32)	
(S)16D17B (S)16D17C	2	2-1/8	8.18 (208)	9.53 (242)	5.47 (139)	5.47 (139)	3.50 (89)	5.44 (138)	1.25 (32)	3.17 (81)	

Figure 3 shows piping schematics only to illustrate the general installation of the Heat Reclaim Valves. Sporlan recommends that recognized piping references be consulted for assistance in piping procedures. Sporlan is not responsible for system design, any damage resulting from system design, or for misapplication of its products.

Proper support of heat reclaim valves is essential. Concentrated stresses resulting from thermal expansion or compressor vibrations can cause fatigue failure of tubing, elbows and valve fittings. Fatigue failures can also result from vapor propelled liquid slugging, and condensation induced shock. The use of piping brackets close to each of the 3-Way valve fittings is recommended.

## HEAD PRESSURE CONTROL FOR RECLAIM SYSTEMS

When employing heat reclaim on a refrigeration system, the addition of head pressure controls is important not only to maintain liquid pressure at the expansion valve inlet, but also to assure the availability of quality hot gas at the reclaim heat exchanger.

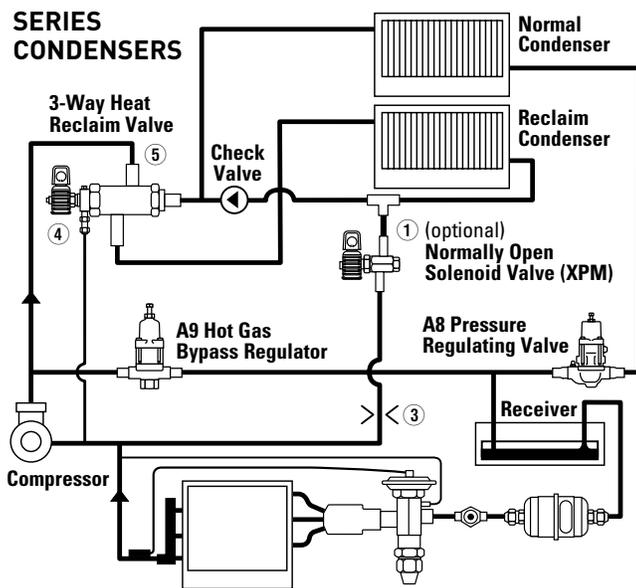
See Sporlan Bulletin 90-30, Head Pressure Control Valves for high and low ambient stability. When low ambient conditions are encountered during fall-winter-spring operation, the Sporlan head pressure controls hold back liquid refrigerant so a portion of the condenser surface is inactive. This results in a rise in condensing pressure.

**NOTE:** To calculate additional charge required for head pressure control, see Bulletin 30-20, or Bulletin 90-30-1.

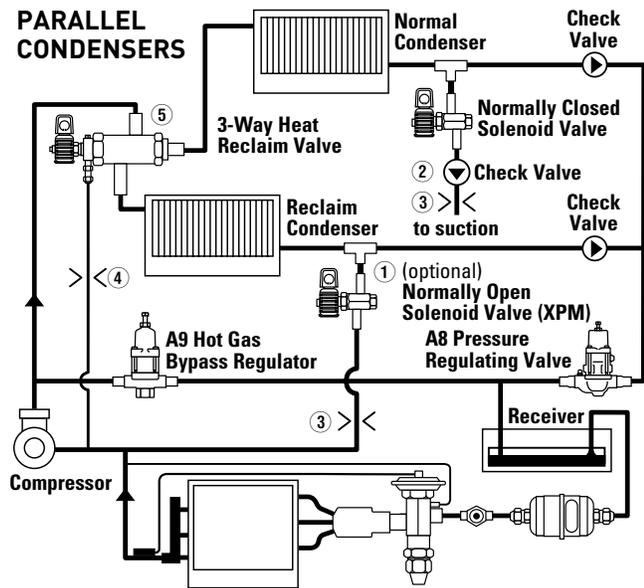
### TYPICAL PIPING SCHEMATICS

Figure 3

#### SERIES CONDENSERS



#### PARALLEL CONDENSERS



- ① Use normally open solenoid valve and piping if pump out is required and "C" model Heat Reclaim Valve is used, see note 4. Or, if a normally closed valve can be used then use XSP-10. It has a 0.031" orifice, this may eliminate need of cap tube or Sporlan Restrictor 2449-004.
- ② This check valve required if lowest operating ambient temperature is lower than evaporator temperature.
- ③ Restrictor 2449-004 may be required to control pump out rate on inactive condenser.

- ④ Pilot suction line must be open to common suction whether or not Heat Reclaim Coil is installed at time of installation and regardless of Heat Reclaim Valve model/type.
- ⑤ Proper support of heat reclaim valves is essential. Concentrated stresses resulting from thermal expansion or compressor vibrations can cause fatigue failure of tubing, elbows and valve fittings. Fatigue failures can also result from vapor propelled liquid slugging, and condensation induced shock. The use of piping brackets close to each of the three way valve fittings is recommended.

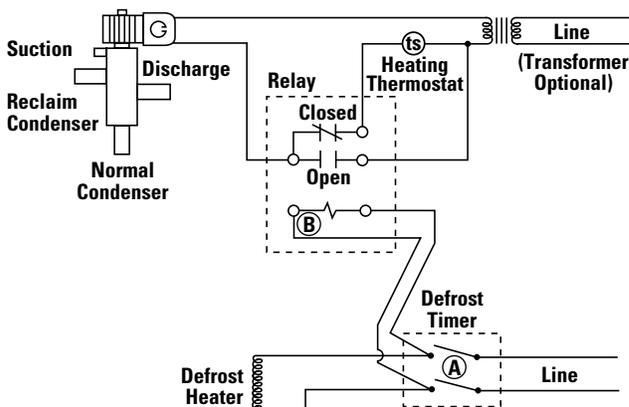
## TYPICAL WIRING SCHEMATICS & ELECTRICAL CONSIDERATIONS

### Single Compressor Systems

Wiring of single compressor units may require the use of relays to prevent high to low side bleed during periods when the compressor is not circulating refrigerant. This is necessary to prevent refrigerant migration to the low side of the system where it may condense into liquid and damage system components when the compressor restarts.

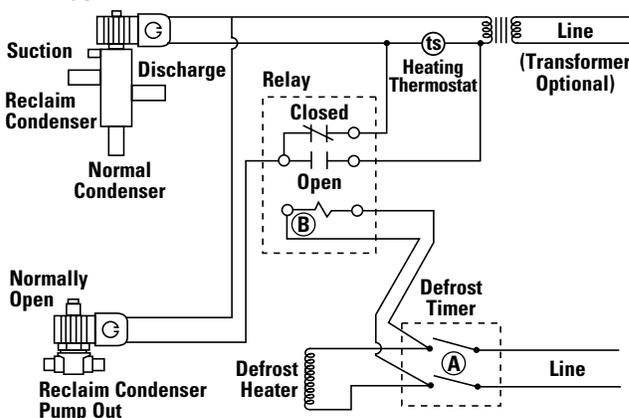
It is always a good idea to check with the equipment manufacturer for recommendations on the application of heat reclaim on the specific type of equipment. It is necessary to adhere to local piping and electrical codes that apply to each application. For complete product information, refer to Bulletin 30-20.

#### “B” Type - OFF CYCLE ELECTRIC DEFROST SYSTEM



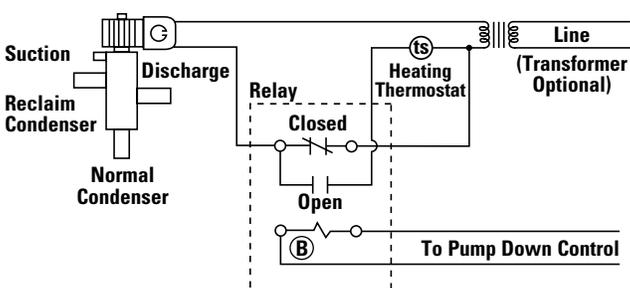
Defrost timer (A) energizes relay coil (B) to close normally open contact. This bypasses the (ts) when defrosting to energize the heat reclaim coil and shut off the valve's bleed to suction.

#### “C” Type - OFF CYCLE ELECTRIC DEFROST SYSTEM



Defrost timer (A) energizes relay coil (B) to close the normally open contacts. This bypasses the (ts) when defrosting to close the pump out solenoid and shut off the valve's pump out to suction.

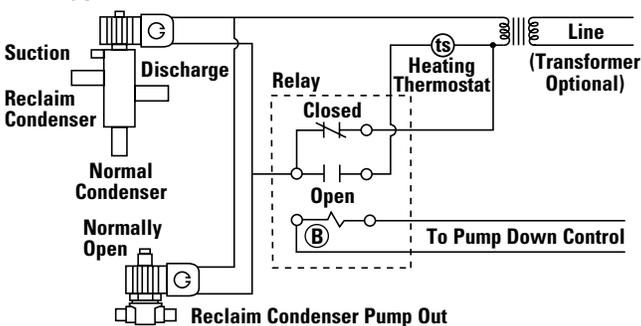
#### “B” Type - PUMP DOWN or ELECTRIC DEFROST with PUMP DOWN (unit off)



When the pump down control is energized, relay coil (B) is energized. This allows the heating (ts) to control the 3-Way Heat Reclaim Valve operation.

When the pump down control is de-energized, the normally closed contact is closed. This bypasses the heating (ts) to energize the coil and shut off the valve's bleed to suction.

#### “C” Type - PUMP DOWN SYSTEM (unit off)



When the pump down control is energized, relay coil (B) is energized. This allows the heating (ts) to control the 3-Way Heat Reclaim Valve operation.

When the pump down control is de-energized, the normally closed contact is closed. This bypasses the heating (ts) to energize the reclaim condenser pump out solenoid and shut off the valve's pump out to suction.

## SERVICE

### Typical Malfunctions

There are only three possible malfunctions: 1. Coil burnout. 2. Failure to shift to Reclaim Mode. 3. Failure to shift to Normal Mode. Each is discussed below:

#### COIL BURNOUT

Coil burnouts are extremely rare unless caused by one of the following:

1. Improper electrical characteristics.
2. Continuous over-voltage, more than 10%.
3. Under-voltage of more than 15%. This applies only if the operating conditions are such that the reduced MOPD causes stalling of the plunger, which results in excessive current draw.
4. Incomplete magnetic circuit due to the omission of the

plunger assembly during reassembly.

5. Mechanical interference with movement of plunger which may be caused by a deformed enclosing tube.
6. Coil energized while not installed on a valve.

#### FAILURE TO SHIFT TO RECLAIM MODE

1. Coil burnout (see coil burnout at left).
2. MOPD greater than specifications.
3. Restricted high pressure pilot connection.
4. May not have allowed sufficient time to pump out the reclaim coil while in the normal mode.

#### FAILURE TO SHIFT TO NORMAL MODE

1. Stray voltage holding plunger up.
2. Restricted, closed service valve, or capped suction connection on pilot.

For a list of replacement part kits, see table on page 13.

## 3-Way Split Condenser Valves

8D-SC, 12D-SC, 16D-SC, S8D-SC, S12D-SC, S16D-SC

The Split Condenser Valves are a relatively simple modification of the standard Heat Reclaim Valves. Figure 7 shows that the Split Condenser Valves only use the upper port; the lower port is always open. The location of the seat disc has been optimized such that when the valve is in the two condenser mode, the flow is split evenly between the two condensers.

The pilot valve is different from the standard heat reclaim valve. It is normally open to high pressure.

### OPERATION

#### “B” and “C” Type

##### Two Condenser Mode - De-energized

See Figure 4. With the pilot valve de-energized, high side pressure ① is permitted to flow through the lower pilot port at the same time the upper pilot port is closed to suction ②. High side pressure ① built on top of the piston moves the piston-seat assembly down to evenly split the flow between the two condensers. The piston-seat assembly is held in place by a plate located in the Condenser A connection. This plate is designed to limit restriction through that port. With the upper pilot port closed, there is no high to low side bleed and no resulting capacity loss with the system in the two condenser mode.

Valves using the MKC-1 coil may be used on fluids or gases where the temperature does not exceed 240°F (116°C), while the valve ambient is 120°F (49°C). The coil is Underwriters Laboratory Class F rated.

**NOTE:** If the pressure in your idle Condenser B is less than the suction pressure that the suction connection of the valve is connected to, you may have charge migration back into your idle Condenser B. A small check valve in the suction pilot line can be used to prevent this.

#### “B” (Bleed) Type

##### Single Condenser Mode - Energized

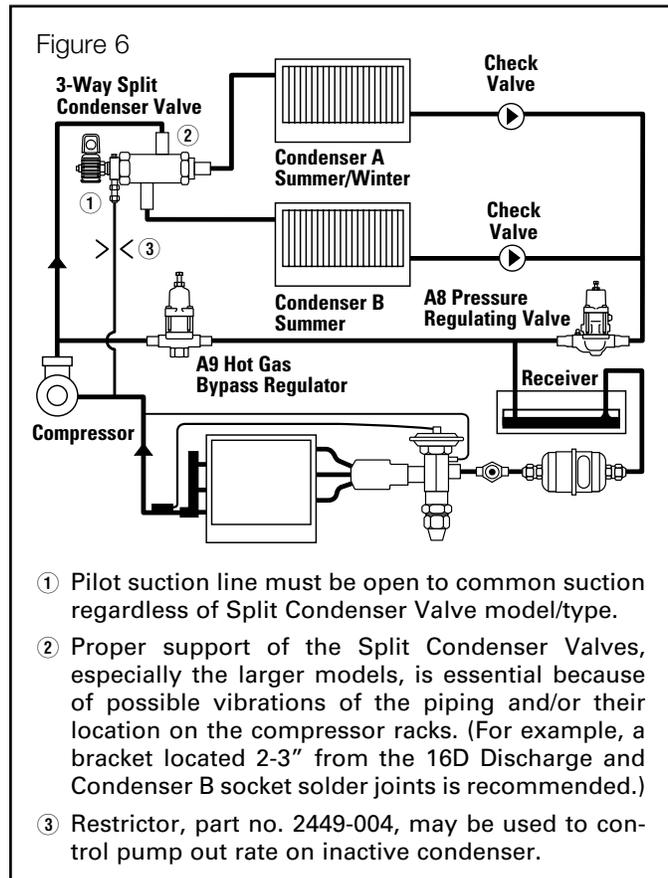
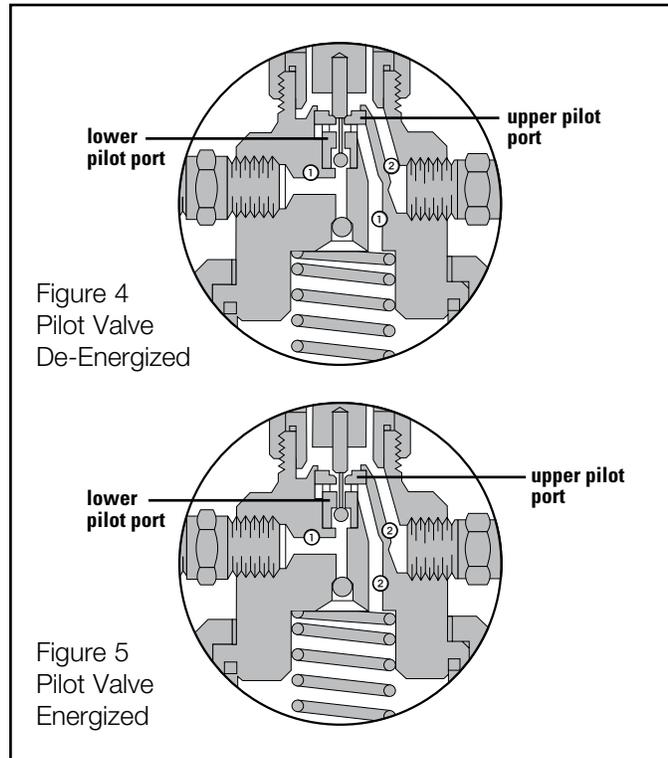
See Figure 5. With the pilot valve energized, high side pressure ① is prevented from entering the cavity above the piston-seat assembly. At the same time the upper pilot port is opened to suction pressure ②. This opens the cavity above the piston-seat assembly to suction pressure ②. The cavity below the piston is exposed to high pressure. The resulting pressure differential across the piston moves the piston-seat assembly up to close the upper (Condenser B) port. We use a solid piston ring on the piston, thereby eliminating high to low side bleed around the piston. When the upper pilot port opens, Condenser B is pumped out through a small bleed hole in the piston. When Condenser B has been pumped out and reduced to suction pressure, all flow ceases, thus eliminating high to low side bleed and the resulting capacity loss that may occur with the system in the single condenser mode.

#### “C” (No Bleed) Type

##### Single Condenser Mode - Energized

See Figure 5. With the pilot valve energized, high side pressure ① is prevented from entering the cavity above the piston-seat assembly. At the same time the upper pilot port is opened to suction pressure ②. This opens the cavity above the piston-seat

assembly to suction pressure ②. The cavity below the piston is exposed to high pressure. The resulting pressure differential across the piston moves the piston-seat assembly up to close the upper (Condenser B) port. A solid piston ring is used on the piston thereby eliminating high to low side bleed around the piston and the resulting capacity loss that may occur with the system in the single condenser mode.



# INSTALLATION

## Piping Suggestions

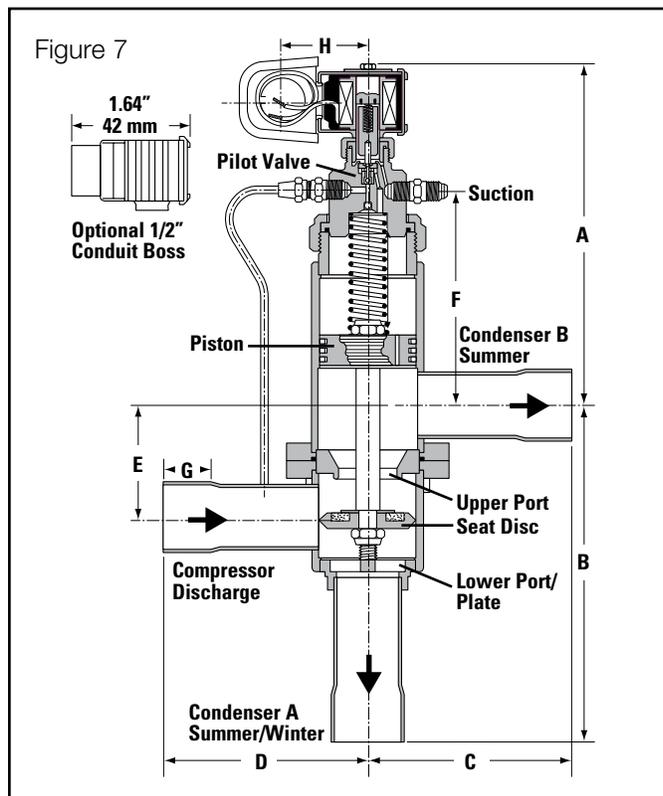
Valves must be installed in a horizontal or vertical position with the coil level with, or above the valve body. Install Split Condenser Valves so the connections are in the proper flow direction as shown in Figure 7.

Figure 6 shows a piping schematic to illustrate the general installation of the Split Condenser Valves. Sporlan recommends that recognized piping references be consulted for assistance in piping procedures. Sporlan is not responsible for system design, any damage resulting from system design, or for misapplication of its products.

Proper support of Split Condenser Valves, especially the larger models, is essential because of possible vibrations of the piping and/or their location on the compressor racks. (For example, a bracket located 2 to 3 inches from the 16D Discharge and Condenser B socket solder joints is recommended.)

## DIMENSIONS – Inches (mm)

Type	Port Size	Connection ODF Solder Inches	A	B	C	D	E	F	G	H
(S)8D9B-SC	3/4	1-1/8	5.18 (132)	5.13 (130)	3.44 (87)	3.44 (87)	1.13 (29)	2.63 (67)	0.91 (23)	
(S)12D11B-SC	1-1/4	1-3/8	6.87 (174)	6.94 (176)	4.19 (106)	4.19 (106)	2.38 (60)	4.25 (108)	0.97 (25)	2.94 (75)
(S)12D13B-SC		1-5/8						1.09 (28)		
(S)16D17B-SC (S)16D17C-SC	2	2-1/8	8.18 (208)	9.53 (242)	5.47 (139)	5.47 (139)	3.50 (89)	5.44 (138)	1.25 (32)	



# 3-Way Hot Gas Defrost Valves

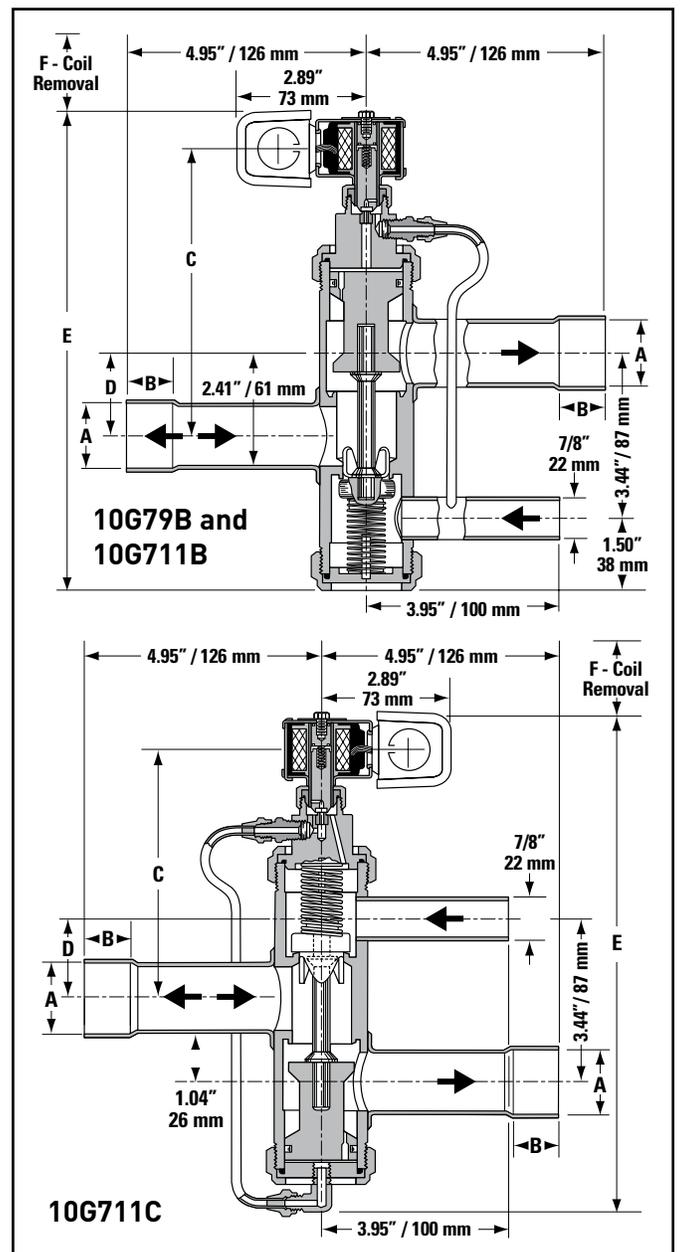
10G79B, 10G711B, 10G711C

## INSTALLATION

**CAUTION:** The valve body must be wrapped with a wet cloth while soldering to avoid damage to synthetic internal parts. While the valve's steel body construction will help avoid overheating of internal parts due to conduction, convection of heat up through the tubing and valve body while making bottom connections can damage the internal parts. If possible bench assemble the valve utilizing stub tubes in a horizontal plane. Cool the valve body thoroughly after making each connection.

## DIMENSIONS – Inches (mm)

Type	A	B	C	D	E	F
10G79B	1-1/8 (29)	.91 (23)	6.00 (152)	1.81 (46)	9.79 (249)	1.56 (40)
10G711B	1-3/8 (35)	.97 (25)	5.87 (149)	1.74 (44)	9.79 (249)	
10G711C	1-3/8 (35)	.97 (25)	5.16 (131)	1.72 (44)	10.62 (270)	



## SERVICE

Service parts for these valves may be ordered through your local Sporlan wholesaler.

If a pilot assembly kit is required, note that they – unlike the internal parts kits – are not interchangeable. For a list of replacement part kits, see table on page 13.

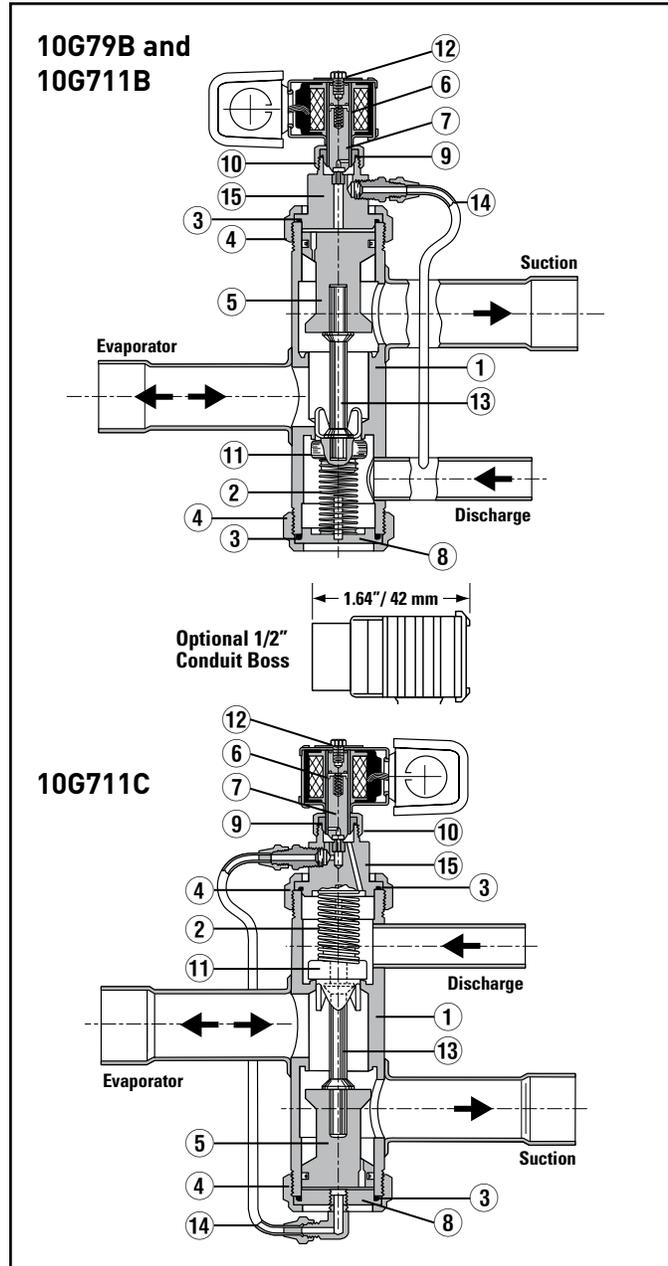
## DISASSEMBLY

1. Disconnect the coil lead wires and remove the coil assembly ⑫.
2. Remove the enclosing tube locknut ⑩ to inspect the plunger assembly ⑦.
3. Loosen and disconnect the pilot tube ⑭ at the flare nut.
4. Loosen the suction end locknut ④ using a pipe wrench or other suitable wrench. Remove the pilot assembly ⑮ from the body.
5. Loosen the discharge end lock nut ④, but use care to prevent damaging the parts. Remove the locknut ④, bottom cap assembly ⑧, valve spring ② and seat assembly ⑪.
6. Slide the piston ⑤ up and out of the valve body bore.
7. Inspect the piston ⑤ and seat assembly ⑪ for damage. Replace all tetraseals or gaskets ③ ⑨ if valve has been in service.

**NOTE: OIL TETRASEALS and GASKETS BEFORE INSTALLATION.**

## REASSEMBLY

1. As a unit, install from the bottom of the body assembly ①:  
**10G79B, 10G711B** – pushrod ⑬, seat assembly ⑪, valve spring ②, tetraseal ③, bottom cap assembly ⑧.  
**10G711C** – pushrod ⑬, piston ⑤, bottom cap assembly ⑧. Check center shaft adjustment by looking into the body from the top. Push down on the pushrod ⑬ to realign if necessary.
2. Install the bottom locknut ④ and tighten with a pipe wrench or torque wrench to 50-60 foot-pounds torque. This must be leak tight. Do not overtighten.
3. From the top of the body assembly ① install:  
**10G79B, 10G711B** – piston ⑤ in body bore, compress the piston ring and slide the piston ⑤ all the way into the bore.  
**10G711C** – seat assembly ⑪, valve spring ②.
4. Install the pilot assembly ⑮ on the body assembly ① and tighten the top locknut ④ with a pipe wrench or torque wrench to 50-60 foot-pounds torque. This must be leak tight. Do not overtighten.
5. Connect the pilot tube ⑭ flare nut(s) and tighten to 80 inch-pounds torque. This must be leak tight. Do not overtighten.
6. Install the plunger assembly ⑦, enclosing tube assembly ⑥, and enclosing tube locknut ⑩. Tighten the enclosing tube locknut to 10-15 foot-pounds torque.
7. Reinstall the coil assembly ⑫ and connect the lead wires.



Item	Part Name
①	10G79 Body Assembly 10G711 Body Assembly
②	Valve Spring
③	Tetraseal (641-6) or Gasket 14000-5*
④	Locknut
⑤	Piston
⑥	Enclosing Tube Assembly
⑦	Plunger Assembly
⑧	Bottom Cap Assembly
⑨	Tetraseal (641-1) or Gasket 14000-1*
⑩	Enclosing Tube Locknut
⑪	Seat Assembly
⑫	Coil Assembly (MKC-1)
⑬	Pushrod
⑭	Pilot Tube
⑮	Pilot Assembly

\*Part is available separately.

# Type 180 Solenoid Pilot Control Valve



## FEATURES

The Type 180 Solenoid Pilot Control offers three outstanding features for refrigeration applications:

- **Costs less, more economical to install.**
- **Only one size.**
- **Assures positive shut-off of liquid line.**

The 180 Solenoid Pilot Control is available as a supplementary device to Sporlan Thermostatic Expansion Valves. It is used in place of large capacity solenoid valves for positive shut-off of liquid lines. Since only one size is necessary it costs less and is more economical to install.

The Solenoid Pilot Control does not directly close the liquid line, but acts on the thermostatic expansion valve causing the expansion valve to close. The 180 is installed in the external equalizer line of the thermostatic expansion valve and has a third 1/4" connection from the liquid line.

## OPERATION

To understand the operation of the 180 Solenoid Pilot Control, it is important to review the principle of operation of a thermostatic expansion valve. There are three fundamental pressures involved in the operation of any thermostatic expansion valve. They are: ① bulb pressure; ② evaporator pressure; and, ③ spring pressure, as shown in Figure 8.

The bulb pressure acts on one side of the diaphragm tending to open the valve. The evaporator pressure acts on the opposite side of the diaphragm tending to close the valve, and the spring pressure assists in closing the valve. A variation of any one of the three pressures changes the amount of opening of the valve. In normal operation of the valve, these pressures tend to establish a point of equilibrium to maintain a constant

superheat at the outlet of the evaporator. However, when an abnormal pressure is introduced which upsets the equilibrium, another effect may be accomplished. The principle upon which the 180 Solenoid Pilot Control influences the expansion valve action is by the creation of a pressure under the valve diaphragm, which is higher than the bulb pressure. This is how it is accomplished.

The Type 180 has two ports in the valve body — one high pressure and one low pressure. When the solenoid coil is energized, the plunger moves upward sealing off the high-pressure port. With the high pressure excluded from the pilot control, true suction pressure acts on the underside of the expansion valve diaphragm through the equalizer line and the low pressure port. This is illustrated in Figure 9. When the solenoid coil is de-energized, the low pressure port is closed, thereby closing the equalizer line from the valve to the suction line. The high pressure port is open and liquid line pressure is applied to the underside of the thermostatic expansion valve diaphragm. This high-side pressure instantly overcomes the bulb pressure and supplements of the valve spring, immediately closing the port of the expansion valve. See Figure 10.

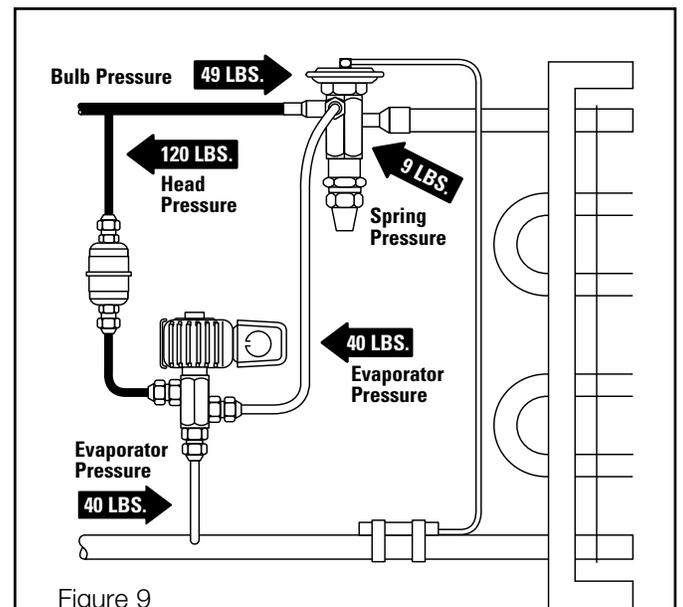
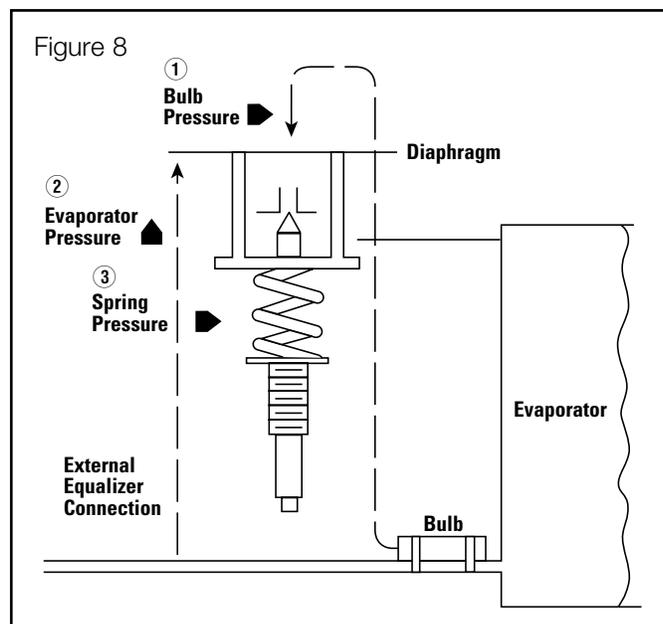


Figure 9

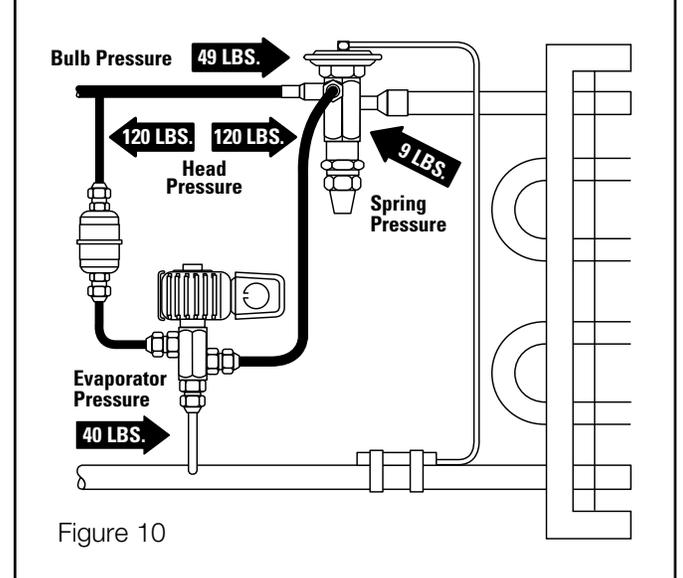
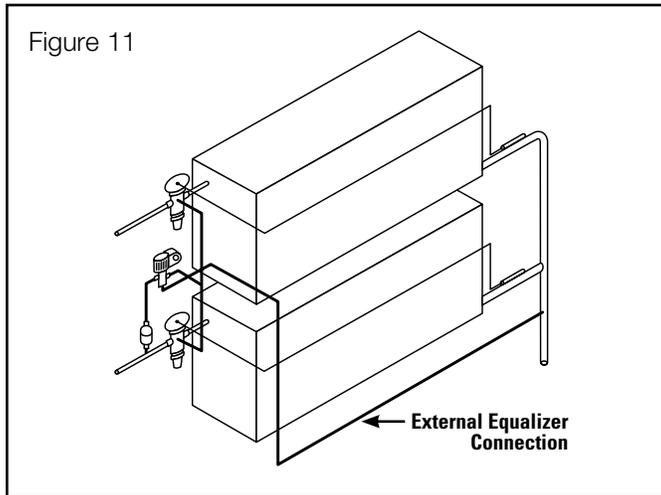


Figure 10

Upon re-energizing the solenoid coil, the low pressure port of the 180 opens and allows instantaneous relief of pressure under the thermostatic expansion valve diaphragm and normal operation of the thermostatic expansion valve.

## APPLICATION

The Type 180 Solenoid Pilot Control may be connected to any number of thermostatic expansion valves as large as those nominally rated at 132 tons on Refrigerant 134a and 180 tons on Refrigerant 22. Thus one Solenoid Pilot Control simultaneously controls the action of all expansion valves on one evaporator or system of evaporators. See Figure 11.



**NOTE:** Since the thermostatic expansion valve Types V and W have an extended neck between the thermostatic element and the valve body, a relatively large quantity of liquid refrigerant resides at this point during the off-cycle (Type 180 de-energized). Upon re-energizing the Type 180 control this liquid must boil off if the TEV is installed so that the “neck” volume is NOT free draining. The consequence of such an arrangement is chilling of the thermostatic element and possible gas charge condensation or migration.

Therefore, we recommend that Types V or W thermostatic expansion valves (with gas or Type “P” thermostatic charges), when installed with the Type 180 solenoid pilot control, be placed in an upright position and at a point above the suction line so that the volume under the diaphragm is free draining.

The Solenoid Pilot Control is actuated in the same manner as a liquid line solenoid valve, e.g. with a thermostat, a pressure switch, or by manual control. Since the Type 180 design requires that the liquid line pressure during the off-cycle be slightly higher than the expansion valve bulb pressure, certain types of applications require special precautions.

### Comfort Cooling Applications

Sporlan thermostatic expansion valves for comfort cooling applications are generally supplied with Type P air conditioning charged thermostatic elements. These charges limit the maximum operating or opening pressure during the off-cycle, as well as during the running cycle. The table lists these standard maximum operating pressures at an approximate 60°F (16°C) saturated evaporator temperature.

Refrigerant	Standard Maximum Operating Pressure
12, 134a	50 psig (3.5 bar)
22	90 psig (6.2 bar)

Therefore, during the off-cycle the receiver ambient temperature needs to be only slightly higher, 65°F (18°C) or more, to maintain a higher liquid line pressure and to ensure satisfactory Solenoid Pilot Control operation.

### Commercial or Low Temperature Refrigeration Applications

This type of application requires that the expansion valve and sensor bulb be installed within the refrigerated space, so the bulb temperature will be the same as the evaporator during the off-cycle. Not only will this prevent compressor flood-back on start-up, but it will help ensure a liquid line pressure higher than the bulb pressure to keep the expansion valve closed tight during the off-cycle.

### Comfort Cooling Application (Intermittent Operation)

In certain locales during mild weather, wide variations between night and day temperatures can create unusual system pressure conditions. This occurs when the receiver, hence the liquid line pressure, falls below the maximum thermostatic expansion valve operating pressures listed above. This is liable to occur when the receiver is located on the outside of the building or is subjected to unusually low ambient temperatures. Proper attention to receiver location can minimize the possibility.

### Other Applications

On other applications where the Solenoid Pilot control may be applied, care must be exercised to maintain the correct liquid line – expansion bulb pressure relationship. If the expansion valve bulb is located near heating coils or any other location warmer than the receiver location, trouble may occur. During the off-cycle, the bulb pressure for expansion valves with thermostatic charges other than the Type P air conditioning charge will rise and open the valve.

This will tend to flood the evaporator; and, if the compressor is on pressure control, cause it to run for a short period of time when cooling is not required. Therefore, proper attention to component location is important to ensure correct operation of the Type 180 Solenoid Pilot Control.

### Recommendations

Where the unusual conditions exist as previously described, and where normal location precautions are not feasible, Sporlan recommends that a conventional liquid line solenoid valve be installed instead of the Type 180 Solenoid Pilot Control.

All refrigeration and air conditioning systems should be protected from moisture and other system contaminants by the Sporlan Catch-All® Filter Drier. When using the Type 180 Solenoid Pilot Control, the expansion valve is used to shut off the liquid line in place of a standard liquid line solenoid valve. Therefore, it is essential that the system be free of these contaminants which might prevent the thermostatic expansion valve from seating tight.

On double-ported thermostatic expansion valves, such as Sporlan's Types V and W, the chance of dirt causing leakage is increased since either port could be partially blocked open. If this occurs, the leakage would be even greater since both ports would leak because the seating discs operate on the same shaft. Therefore, an adequately sized Catch-All should be installed ahead of the thermostatic expansion valve for complete protection.

The Type 180 Solenoid Pilot Control is not recommended for application with other makes of thermostatic expansion valves. The reason is that Sporlan diaphragm assemblies are specially designed to withstand the admission of high side pressure through the external equalizer connection.

The Type 180 may be installed either upright or on its side. However, it should not be mounted with the coil housing below the valve body.

## INSTALLATION

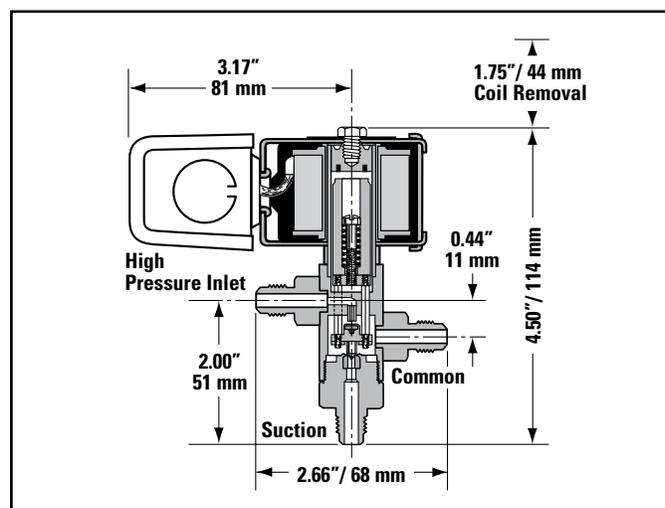
In addition to first cost, flexibility of the Type 180 offers an installation savings. Standard 1/4" soft copper tubing is the only tubing required for the three valve connections as shown in Figure 12. A C-032-F Catch-All Filter-Drier is furnished with each Type 180, since protection of the valve ports from system contaminants is important for proper operation.

### Electrical

For normal summer operation of air conditioning systems, the Type 180 Solenoid Pilot Control may be energized through any actuating device such as a thermostat, a micro-switch, or a manual switch. The compressor can be operated separately through the magnetic starter, wired with a low pressure cut-out switch for pump down control.

If it is necessary to shut down a system for a long period, the main liquid line or receiver valve should be closed before de-energizing the entire system at the main electrical service switch. This will protect against compressor floodback if any of the unusual pressure conditions mentioned in the Application section occur during shutdown.

## DIMENSIONS - Inches (mm)



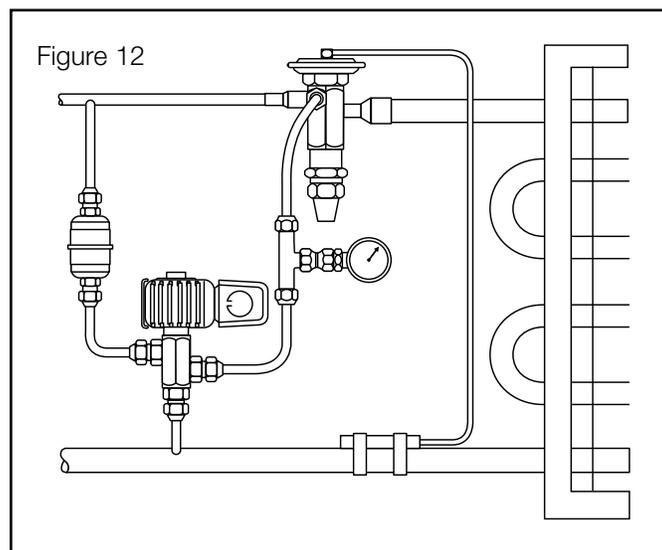
## SPECIFICATIONS

### MKC-2 Coil

Type 180		Standard Coil Ratings	
Connections - 1/4 SAE Flare		Volts/Cycles	Watts
MOPD psi	300 AC (21 bar)	24/50-60	15
	225 DC (15.5 bar)	120/50-60	
Maximum Rated Pressure - psi 500 (35 bar)		208-240/50-60	
		120-208-240/50-60	

## SERVICE

The Type 180 Solenoid Pilot Control can not be taken apart in the field. To properly analyze suspected trouble on an installation, it is advisable to install a pressure gauge by means of a "T" fitting in the external equalizer connection to the thermostatic expansion valve, as shown in Figure 12.



By successively opening and closing the circuit to the Pilot Control only, with the refrigeration system and circulating fans or pumps in operation, variations approximating condensing pressure and suction pressure should be observed on this gauge.

A. If pressure does not build up rapidly to condensing pressure when the Pilot Control is de-energized, proceed as follows:

1. Make certain that the electrical circuit has been broken to the Pilot Control. Since the actuating device is generally at a remote point, we suggest that a means for temporarily interrupting the current be made near the valve installation to facilitate servicing the equipment.
2. Check to see that no restriction exists and pressure is ahead of both the Solenoid Pilot Control and the C-032-F Catch-All Filter-Drier.
3. Check to ascertain that the low pressure port is closing tightly. A leak in many instances can be detected by a much cooler line from the Pilot Control to the suction line than the liquid inlet line of the control. A further check can be made by removing the suction line connection at the Pilot Control and temporarily plugging it. No leak should be indicated at the suction fitting of the Pilot Control.

4. In the event that full liquid line pressure is available and the bottom port is **NOT** leaking, then it is necessary to replace the Pilot Control valve.

B. If the Pilot Control functions satisfactorily, then the thermostatic expansion valve should be checked. Various causes could be the reason for operation difficulties: push-rod packing leak, seat leak, diaphragm failure, and several others. For a complete service analysis on thermostatic expansion valves, refer to Bulletin 10-11.

## General Information

### INSTALLATION PRECAUTIONS

1. Do not attempt installation of the valve before pumping the entire system down.
2. The solenoid coil must not be energized unless it is installed on the valve. To do so would cause coil to overheat and burn out.
3. The solenoid coil should be fused in accordance with local codes.
4. If a service valve is installed ahead of a solenoid valve, it should be closed during service procedures. **Do not use a solenoid valve as a safety shutoff while making repairs to the system. Be sure there is no liquid in the line between the service and solenoid valves when they are in the closed position that could create dangerous hydraulic pressures.**
5. Do not twist the valve assembly by pulling or pushing on the enclosing tube or coil assembly.
6. Do not carry a coil assembly or complete valve by the coil leads. This could damage the coil and cause a coil burnout. Do not carry the valve by the pilot tube. This could cause damage to the flare (SAE) joint creating an external leak.
7. Electrically ground the valve body. Typically this is done through the fluid piping or the electrical conduit.
8. Before energizing the valve, verify that the supply voltage and frequency matches the solenoid coil marking.

### Soldering Precautions

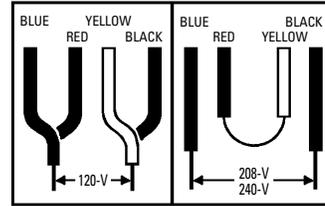
Solder connections on Sporlan Heat Reclaim Valves are copper. Any of the commonly used types of solder are satisfactory with these materials. Regardless of the type of solder used, it is important to avoid over-heating the valve. **Extreme care should be taken when brazing connections to avoid damage to internal synthetic parts.** The torch tip should be large enough to avoid prolonged heating of the connection during the brazing operation. Overheating can also be minimized by directing the flame away from the valve body. **Cool body thoroughly after making each connection.** As an extra precaution, a wet cloth may be wrapped around the valve body during the soldering operation.

**CAUTION:** When installing 1/4" flare pilot line connections, flare body **MUST** be supported with another wrench. On the

5D valve, the pilot valve body **MUST** be supported when tightening the 1/4" flare connection. **Failure to do either of the above may cause leaks or valve damage.**

### Wiring

Check the electrical specifications of the coil to be sure that they correspond to the available electrical service. See page 5 for typical wiring schematics for single compressor systems.



The 1/2" BX conduit connection of junction box on the coil of Heat Reclaim Valves may be rotated to any position by loosening the coil screw. Valves with four-wire dual voltage coil have a wiring diagram decal (see diagram above) on the coil housing or bracket. This illustrates which wires to connect for either 120, 208, or 240 volt operation. Wiring and fusing (when used) must comply with prevailing local and national wiring codes and ordinances.

### TRANSFORMER SELECTION

Coil Kit	24v/50-60c		120v/50-60c		240v/50-60c		Transformer Rating Volt-Amperes
	Current Amperes						For 100% of Rated MOPD of Valve
	In-rush	Holding	In-rush	Holding	In-rush	Holding	
MKC-1	1.90	0.63	0.39	0.14	0.19	0.09	60
MKC-2	3.10	1.40	0.60	0.26	0.31	0.13	100

### TEMPERATURE RATINGS

Basic Valve Type	Coil Type	Ambient Temp. Ratings	Max. Fluid Temp. Rating	Min. Fluid Temp. Rating
8D, 12D, 16D (12-03 & after), 8D-HP, 12D-HP, S8D, S12D, S8D-HP, S12D-HP, 10G	MKC-1	120°F 49°C	240°F 116°C	-40°F -40°C
16D (12-03 & before), 180	MKC-2	120°F 49°C	240°F 116°C	-40°F -40°C

Suitable for use with all Halogenated refrigerants.

### Replacement Part Kits for

**8D, 12D, 16D, 8D-SC, 12D-SC, 16D-SC, 8D-HP, 12D-HP, S8D, S12D, S16D, S8D-HP, S12D-HP, 10G**

The parts kit for the 3-Way Heat Reclaim Valves include the piston assembly. This requires separate kits for Bleed "B" and Non-Bleed "C" versions of the 3-Way Valves.

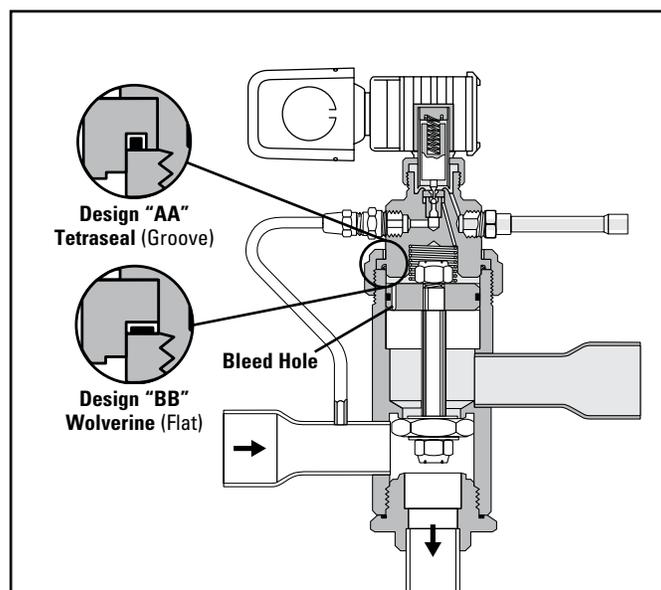
**CAUTION:** If you are replacing the internal parts on an older "B" style valve with split piston rings, you must use the existing piston and piston rings. **Do not use the new piston assembly supplied with your parts kit.** (See page 13.)

3-Way Valve	Manufactured with Split Cast Iron Piston Rings and Honed Body Bore
8D7B	7-96 & Earlier
8D9B	7-96 & Earlier
12D11B	1-94 & Earlier
12D13B	1-94 & Earlier
16D17B	4-91 & Earlier

The parts kit contains two different gaskets for the pilot valve. Which ones are used depends on the pilot valve design.

The Tetraseal, part #641-6 is a flexible gasket and is used on design “AA” valves. These valves can be identified by the square groove on the bottom of the pilot valve.

The bottom of the pilot valve on the design “BB” valve is machined flat to accommodate the metal “Wolverine” gasket part #14000-5.



## Replacement Parts Kits

Valve Type	Kit Number	Description of Contents
<b>Heat Reclaim Valves / Split Condenser Valves</b>		
(S)8D7B / 8D9B(-HP)	KS-8DB	1 Pilot Body Gasket 1 Stem and Seat Assembly 1 Piston Assembly* 1 Lower Body O-Ring 1 Lower Body Gasket (8D ONLY) 1 Upper Valve Seat (12D & 16D ONLY)
(S)8D7C / 8D9C(-HP)	KS-8DC	
(S)8D9B-SC	KS-8DB-SC	
(S)8D9C-SC	KS-8DC-SC	
(S)12D11B / 12D13B (-HP)	KS-12DB	
(S)12D11C / 12D13C(-HP)	KS-12DC	
(S)12D11B-SC / 12D13B-SC	KS-12DB-SC	
(S)12D11C-SC / 12D13C-SC	KS-12DC-SC	
16D17B	KS-16DB	1 Stem and Seat Assembly 1 Upper Valve Seat 1 Piston Assembly* 1 or 2 Lower Body O-Ring (16D Valves dated 6-06 and after are welded construction. Stem and Seat Assembly Kits are not available.)
(S)16D17B (12-03 and after)	KS-16DB-A	
16D17C	KS-16DC	
(S)16D17C (12-03 and after)	KS-16DC-A	
16D17B-SC	KS-16DB-SC	
(S)16D17B-SC (12-03 and after)	KS-16DB-SC-A	
16D17C-SC	KS-16DC-SC	
(S)16D17C-SC (12-03 and after)	KS-16DC-SC-A	
<b>Pilot Assembly</b>		
(S)8D & 12D (-HP)	KS-8D/12DP	1 Enclosing Tube Tetraseal 1 Coil Housing Screw 1 Pilot Valve Assembly
(S)8D-SC & 12D-SC	KS-8D/12DP-SC	
16D	KS-16DP	1 Coil Housing Screw 1 Pilot Valve Assembly
(S)16D (12-03 and after)	KS-16DP-A/KS-S16DP-A	
16D-SC	KS-16DP-SC	
(S)16D-SC (12-03 and after)	KS-16DP-SC-A/KS-S16DP-SC	
<b>Hot Gas Defrost Valves</b>		
10G79B	KS-10G	1 Enclosing Tube Gasket, 2 Pilot Assembly Gaskets 1 Plunger Assembly, 1 Pushrod 1 Seat Assembly, 1 Piston Assembly, 1 Valve Spring
10G711A, B, C		
10G713		
<b>Pilot Assembly</b>		
10G-B	KS-10GP-B	2 Pilot Assembly Gaskets 1 Pilot Valve Assembly 1 Coil Housing Screw, 1 Bottom Plate
10G-C	KS-10GP-C	
<b>Enclosing Tube Kits</b>		
10G, (S)16D, (S)16D-SC (12-03 and after)	KE-6	1 Enclosing Tube Assembly 1 Enclosing Tube Gasket 1 Coil Housing Screw
16D/16D-SC (before 12-03)	KE-9	
8D/12D, 8D-SC/12D-SC	KE-8D/12D	

\* Use existing piston on valves with honed bore. See caution note on page 12.

## RECOMMENDED TORQUE

Valve Series	Enclosing Tube Locknut	Pilot Valve Assembly Locknut	Lower Body Locknut	Body Flange Cap Screw	Coil Screw
S8D, S8D-HP, 8D, 8D-SC, 8D-HP, S8D-SC	10-15	60-65	25	—	2.3
S12D, S12D-HP, 12D, 12D-SC, S12D-SC	10-15	60-65	—	15-18	2.3
16D, 16D-SC	30-35	***	—	20-24	2.3
S16D, S16D-SC, 16D, 16D-SC (12-03 and after)	10-15	60-65	—	20-24	2.3
10G	10-15	60-65	60-65	—	2.3
180	—	—	—	—	2.3

\*\*\* The 16D pilot assembly is connected to the body with a pipe connection. Apply a light coat of #242 (blue) Loctite to the male pipe threads and torque to 30-60 ft.-lb.

Listed by Underwriters' Laboratories, Inc.  
Listed by Canadian Standards Association

Guide-Y10Z  
Guide-440-A-0

File No. MH4576  
File No. 19953

## OFFER OF SALE

The goods, services or work (referred to as the “Products”) offered by **Parker-Hannifin Corporation**, its subsidiaries, groups, divisions, and authorized distributors (“Seller”) are offered for sale at prices indicated in the offer, or as may be established by Seller. The offer to sell the Products and acceptance of Seller’s offer by any customer (“Buyer”) is contingent upon, and will be governed by all of the terms and conditions contained in this Offer of Sale. Buyer’s order for any Products specified in Buyer’s purchase document or Seller’s offer, proposal or quote (“Quote”) attached to the purchase order, when communicated to Seller verbally, or in writing, shall constitute acceptance of this offer.

**1. Terms and Conditions.** Seller’s willingness to offer Products for sale or accept an order for Products is subject to the terms and conditions contained in this Offer of Sale or any newer version of the same, published by Seller electronically at [www.parker.com/saleterms/](http://www.parker.com/saleterms/). Seller objects to any contrary or additional terms or conditions of Buyer’s order or any other document or other communication issued by Buyer.

**2. Price; Payment.** Prices stated on Seller’s Quote are valid for thirty (30) days, except as explicitly otherwise stated therein, and do not include any sales, use, or other taxes or duties unless specifically stated. Seller reserves the right to modify prices to adjust for any raw material price fluctuations. Unless otherwise specified by Seller, all prices are F.C.A. Seller’s facility (INCO-TERMS 2010). Payment is subject to credit approval and payment for all purchases is due thirty (30) days from the date of invoice (or such date as may be specified by Seller’s Credit Department). Unpaid invoices beyond the specified payment date incur interest at the rate of 1.5% per month or the maximum allowable rate under applicable law.

**3. Shipment; Delivery; Title and Risk of Loss.** All delivery dates are approximate. Seller is not responsible for damages resulting from any delay. Regardless of the manner of shipment, delivery occurs and title and risk of loss or damage pass to Buyer, upon placement of the Products with the shipment carrier at Seller’s facility. Unless otherwise stated, Seller may exercise its judgment in choosing the carrier and means of delivery. No deferral of shipment at Buyer’s request beyond the respective dates indicated will be made except on terms that will indemnify, defend and hold Seller harmless against all loss and additional expense. Buyer shall be responsible for any additional shipping charges incurred by Seller due to Buyer’s acts or omissions.

**4. Warranty.** Seller warrants that the Products sold hereunder shall be free from defects in material or workmanship for a period of twelve (12) months from the date of delivery or 2,000 hours of normal use, whichever occurs first. All prices are based upon the exclusive limited warranty stated above, and upon the following disclaimer: **DISCLAIMER OF WARRANTY: THIS WARRANTY IS THE SOLE AND ENTIRE WARRANTY PERTAINING TO PRODUCTS PROVIDED. SELLER DISCLAIMS ALL OTHER WARRANTIES, EXPRESS AND IMPLIED, INCLUDING DESIGN, MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.**

**5. Claims; Commencement of Actions.** Buyer shall promptly inspect all Products upon receipt. No claims for shortages will be allowed unless reported to the Seller within ten (10) days of delivery. No other claims against Seller will be allowed unless asserted in writing within thirty (30) days after delivery. Buyer shall notify Seller of any alleged breach of warranty within thirty (30) days after the date the defect is or should have been discovered by Buyer. Any claim or action against Seller based upon breach of contract or any other theory, including tort, negligence, or otherwise must be commenced within twelve (12) months from the date of the alleged breach or other alleged event, without regard to the date of discovery.

**6. LIMITATION OF LIABILITY.** IN THE EVENT OF A BREACH OF WARRANTY, SELLER WILL, AT ITS OPTION, REPAIR OR REPLACE A DEFECTIVE PRODUCT, OR REFUND THE PURCHASE PRICE WITHIN A REASONABLE PERIOD OF TIME. **IN NO EVENT IS SELLER LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF, OR AS THE RESULT OF, THE SALE, DELIVERY, NON-DELIVERY, SERVICING, USE OR LOSS OF USE OF THE PRODUCTS OR ANY PART THEREOF, OR FOR ANY CHARGES OR EXPENSES OF ANY NATURE INCURRED WITHOUT SELLER’S WRITTEN CONSENT, WHETHER BASED IN CONTRACT, TORT OR OTHER LEGAL THEORY. IN NO EVENT SHALL SELLER’S LIABILITY UNDER ANY CLAIM MADE BY BUYER EXCEED THE PURCHASE PRICE OF THE PRODUCTS.**

**7. User Responsibility.** The user, through its own analysis and testing, is solely responsible for making the final selection of the system and Product and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met. The user must analyze all aspects of the application

and follow applicable industry standards and Product information. If Seller provides Product or system options based upon data or specifications provided by the user, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the Products or systems.

**8. Loss to Buyer’s Property.** Any designs, tools, patterns, materials, drawings, confidential information or equipment furnished by Buyer or any other items which become Buyer’s property, will be considered obsolete and may be destroyed by Seller after two (2) consecutive years have elapsed without Buyer ordering the items manufactured using such property. Seller shall not be responsible for any loss or damage to such property while it is in Seller’s possession or control.

**9. Special Tooling.** A tooling charge may be imposed for any special tooling, including without limitation, dies, fixtures, molds and patterns, acquired to manufacture Products. Such special tooling shall be and remain Seller’s property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in apparatus belonging to Seller which is utilized in the manufacture of the Products, even if such apparatus has been specially converted or adapted for such manufacture and notwithstanding any charges paid by Buyer. Unless otherwise agreed, Seller has the right to alter, discard or otherwise dispose of any special tooling or other property in its sole discretion at any time.

**10. Buyer’s Obligation; Rights of Seller.** To secure payment of all sums due or otherwise, Seller retains a security interest in all Products delivered to Buyer and this agreement is deemed to be a Security Agreement under the Uniform Commercial Code. Buyer authorizes Seller as its attorney to execute and file on Buyer’s behalf all documents Seller deems necessary to perfect its security interest.

**11. Improper Use and Indemnity.** Buyer shall indemnify, defend, and hold Seller harmless from any losses, claims, liabilities, damages, lawsuits, judgments and costs (including attorney fees and defense costs), whether for personal injury, property damage, patent, trademark or copyright infringement or any other claim, brought by or incurred by Buyer, Buyer’s employees, or any other person, arising out of: (a) improper selection, application, design, specification or other misuse of Products purchased by Buyer from Seller; (b) any act or omission, negligent or otherwise, of Buyer; (c) Seller’s use of patterns, plans, drawings, or specifications furnished by Buyer to manufacture Products; or (d) Buyer’s failure to comply with these terms and conditions. Seller shall not indemnify Buyer under any circumstance except as otherwise provided.

**12. Cancellations and Changes.** Buyer may not cancel or modify or cancel any order for any reason, except with Seller’s written consent and upon terms that will indemnify, defend and hold Seller harmless against all direct, incidental and consequential loss or damage. Seller may change Product features, specifications, designs and availability.

**13. Limitation on Assignment.** Buyer may not assign its rights or obligations under this agreement without the prior written consent of Seller.

**14. Force Majeure.** Seller does not assume the risk and is not liable for delay or failure to perform any of Seller’s obligations by reason of events or circumstances beyond its reasonable control (hereinafter “Events of Force Majeure”). Events of Force Majeure shall include without limitation: accidents, strikes or labor disputes, acts of any government or government agency, acts of nature, delays or failures in delivery from carriers or suppliers, shortages of materials, or any other cause beyond Seller’s reasonable control.

**15. Waiver and Severability.** Failure to enforce any provision of this agreement will not invalidate that provision; nor will any such failure prejudice Seller’s right to enforce that provision in the future. Invalidation of any provision of this agreement by legislation or other rule of law shall not invalidate any other provision herein. The remaining provisions of this agreement will remain in full force and effect.

**16. Termination.** Seller may terminate this agreement for any reason and at any time by giving Buyer thirty (30) days prior written notice. Seller may immediately terminate this agreement, in writing, if Buyer: (a)

breaches any provision of this agreement (b) appoints a trustee, receiver or custodian for all or any part of Buyer’s property (c) files a petition for relief in bankruptcy on its own behalf, or one filed by a third party (d) makes an assignment for the benefit of creditors; or (e) dissolves its business or liquidates all or a majority of its assets.

**17. Governing Law.** This agreement and the sale and delivery of all Products are deemed to have taken place in, and shall be governed and construed in accordance with, the laws of the State of Ohio, as applicable to contracts executed and wholly performed therein and without regard to conflicts of laws principles. Buyer irrevocably agrees and consents to the exclusive jurisdiction and venue of the courts of Cuyahoga County, Ohio with respect to any dispute, controversy or claim arising out of or relating to this agreement.

**18. Indemnity for Infringement of Intellectual Property Rights.** Seller is not liable for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights except as provided in this Section. Seller will defend and indemnify Buyer against allegations of infringement of U.S. patents, U.S. trademarks, copyrights, trade dress and trade secrets (“Intellectual Property Rights”). Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on an allegation that a Product sold pursuant to this agreement infringes the Intellectual Property Rights of a third party. Seller’s obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of such allegations of infringement, and Seller having sole control over the defense of any allegations or actions including all negotiations for settlement or compromise. If a Product is subject to a claim that it infringes the Intellectual Property Rights of a third party, Seller may, at its sole expense and option, procure for Buyer the right to continue using the Product, replace or modify the Product so as to make it noninfringing, or offer to accept return of the Product and refund the purchase price less a reasonable allowance for depreciation. Notwithstanding the foregoing, Seller is not liable for claims of infringement based on information provided by Buyer, or directed to Products delivered hereunder for which the designs are specified in whole or part by Buyer, or infringements resulting from the modification, combination or use in a system of any Product sold hereunder. The foregoing provisions of this Section constitute Seller’s sole and exclusive liability and Buyer’s sole and exclusive remedy for infringement of Intellectual Property Rights.

**19. Entire Agreement.** This agreement contains the entire agreement between the Buyer and Seller and constitutes the final, complete and exclusive expression of the terms of sale. All prior or contemporaneous written or oral agreements or negotiations with respect to the subject matter are herein merged. The terms contained herein may not be modified unless in writing and signed by an authorized representative of Seller.

**20. Compliance with Laws.** Buyer agrees to comply with all applicable laws, regulations, and industry and professional standards of care, including those of the United Kingdom, the United States of America, and the country or countries in which Buyer may operate, including without limitation the U. K. Bribery Act, the U.S. Foreign Corrupt Practices Act (“FCPA”), the U.S. Anti-Kickback Act (“Anti-Kickback Act”) and the U.S. Food Drug and Cosmetic Act (“FDCA”), each as currently amended, and the rules and regulations promulgated by the U.S. Food and Drug Administration (“FDA”), and agrees to indemnify and hold harmless Seller from the consequences of any violation of such provisions by Buyer, its employees or agents. Buyer acknowledges that it is familiar with the provisions of the U. K. Bribery Act, the FCPA, the FDA, and the Anti-Kickback Act, and certifies that Buyer will adhere to the requirements thereof. In particular, Buyer represents and agrees that Buyer will not make any payment or give anything of value, directly or indirectly to any governmental official, any foreign political party or official thereof, any candidate for foreign political office, or any commercial entity or person, for the purpose of influencing such person to purchase Products or otherwise benefit the business of Seller.

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