

System drawings shown in this bulletin are for illustration purposes only. Refrigeration systems should only be serviced by a qualified technician. Always observe proper safety procedures when servicing a refrigeration system. For more information see the latest revision of Phillips Safety Bulletin SGRV.

### GENERAL INFORMATION

**Pressure Rating:** 400 psig (27 bar, gauge)

**Materials of Construction:**

- Brass / Steel (Halocarbon Applications)
- Steel / Steel (Halocarbon or Ammonia Applications)

Phillips Recirculating Injectors are simple, compact devices that use the energy of high pressure liquid refrigerant to maximize flooded evaporator heat transfer. These devices can also be used to transfer oil that collects in various places around a system back to a reservoir.

Injectors are available in four different “families”, to best serve a particular application. Each of these families is described in detail later in this bulletin.

- **2000SL Family:** 2020SL/SLD, 2100SL/SLD
- **2100WCB Family:** 2075WCB, 2100WCB/WCBA
- **2100WA Family:** 2125WA, 2150WA
- **2200WA Family:** 2200WA, 2250WA

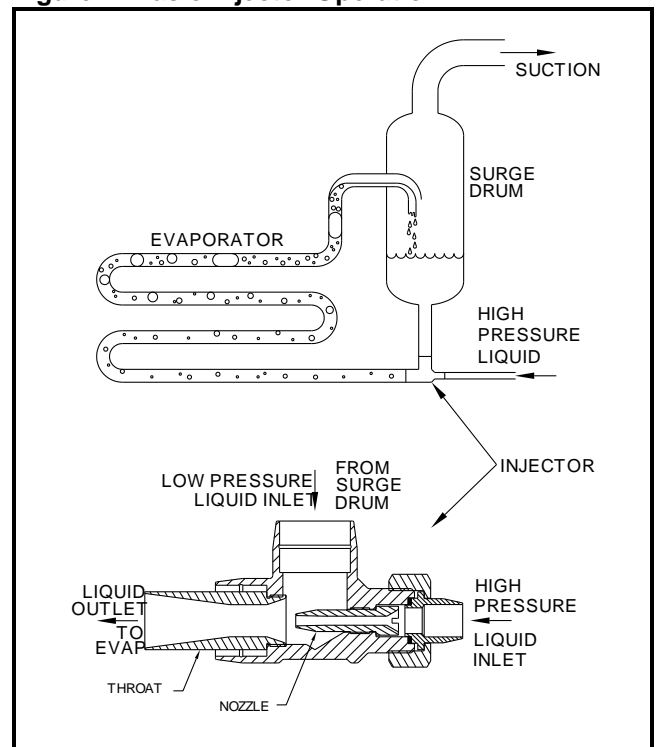
All injectors consist of a nozzle and throat (or “mixing tube”) mounted inside an injector body. The bodies have various connection options, as detailed in Table 1.

This bulletin is intended primarily to assist in the identification of replacement parts for existing installations. Selection of a particular injector family, as well as the nozzle and throat sizes, is explained in the Phillips Recirculating Injector Engineering Data Bulletin.

### INJECTOR FUNCTION

Figure 1 shows the most basic injector application for a fixed-charge system. (Other successful configurations, such as ice cream freezers, use a float valve in conjunction with the injector to maintain the liquid level inside the surge drum.) High pressure liquid, from the right, flows through the injector nozzle. Within the nozzle some of the liquid vaporizes and the velocity increases. At the entrance of the throat, this high-velocity jet pulls liquid from the surge drum at a rate faster than it would normally flow due to thermosyphon alone. Maximum heat transfer inside the evaporator is achieved.

**Figure 1: Basic Injector Operation**



**Table 1: Models and Connection Sizes**

Model	High Pressure Liquid Inlet	Low Pressure Liquid Inlet	Mixed Liquid Outlet
2020SL	3/8"OD Copper (1/4" Nominal)	3/4"OD Copper (5/8" Nominal)	3/4"OD Copper (5/8" Nominal)
2100SL	5/8"OD Copper (1/2" Nominal)	1-3/8"OD Copper (1-1/4" Nominal)	1-3/8"OD Copper (1-1/4" Nominal)
2075WCB	3/8 FPT	3/4" FPT	3/4" Butt Weld
2100WCB	1/2" FPT	1" FPT	1" Butt Weld
2100WCBA	5/8" OD Copper	1" MPT	
2125WA	1/2" FPT 5/8" OD Copper	1-1/4" Butt Weld	1-1/4" Butt Weld
2150WA	3/4" FPT 1" Butt Weld 7/8" OD Copper	1-1/2" Butt Weld	1-1/2" Butt Weld
2200WA	1/2" FPT 3/4" FPT 1-1/8" OD Copper	2" Butt Weld	2" Butt Weld
2250WA	1" FPT 1-3/8" OD Copper	2-1/2" Butt Weld	2-1/2" Butt Weld

## SERVICE AND SPARE PARTS

Injectors are simple devices with no moving parts. It is possible however for the high pressure flow to eventually erode the nozzle. To replace a nozzle, remove the rear connector and nut/flange (Items 3 & 4 in Figures 2 through 5). Then unscrew the nozzle using a screwdriver. Multiple nozzle sizes are available, be sure to replace the old nozzle with one that is the same size. Increasing the nozzle size will allow the injector to serve a higher refrigeration load, but may reduce the recirculation rate. Decreasing the nozzle size will decrease system capacity, raise head pressure, and reduce oil return.

The 2075WCB, 2100WCB, and 2100WCBA injectors have throats that can also be easily replaced (Figure 3). Throats in the 2020SL and 2100SL can also be replaced by de-brazing the outlet pipe and unscrewing the throat from the body. Use high strength thread locking compound when installing a new 2020/2100SL throat. Increasing the throat size will increase the amount of recirculated liquid.

## INJECTOR FAMILIES

### 2020SL/SLD, 2100SL/SLD (Figure 2)

All of these injectors are intended for use on halocarbon systems and have a forged brass injector body and steel nozzle. The steel throats (Item 1) in the 2020SL and 2100SL are threaded into the front of the body. The injector body is installed into the system by brazing the top and front connections. The rear connector (Item 3) is also brazed to the high pressure liquid pipe, and assembled to the injector body with a gasket and nut (Items 4 & 5).

The 'SLD' injectors are supplied with a multi-outlet brass distributor, to be brazed into the front of the injector body, instead of a threaded single-outlet throat. Individual copper tubes are then brazed into each distributor outlet.

### 2075WCB, 2100WCB/WCBA (Figure 3)

The WCB/WCBA family of injectors all have welded steel bodies, and can be used on either halocarbon or ammonia applications. The steel nozzle (Item 2) is threaded into the inlet of the injector, and the throat (Item 1) is held in place at the outlet of the body by a retaining nut (Item 7). As shown in Table 1, the same three high pressure liquid inlet connection options are available on all the injectors in this family. The low pressure liquid inlet connection on the injector is 3/4" FPT (2075WCB), 1" FPT (2100WCB), or 1" MPT (2100WCBA). As shown in Figure 3, the liquid outlet connection is made by slipping the front piece (item 6) into the front retaining nut (Item 7) and welding the front piece to either a 3/4" (2075WCB) or 1" (2100WCB and WCBA) nominal pipe. The front nut then threads onto the injector body with throat and gasket installed.

Figure 2: 2020SL, 2100SL

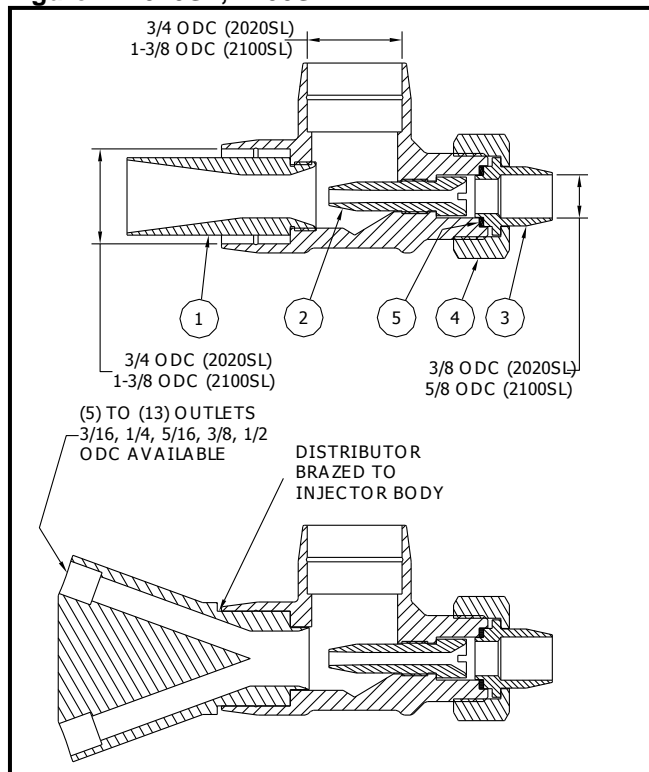
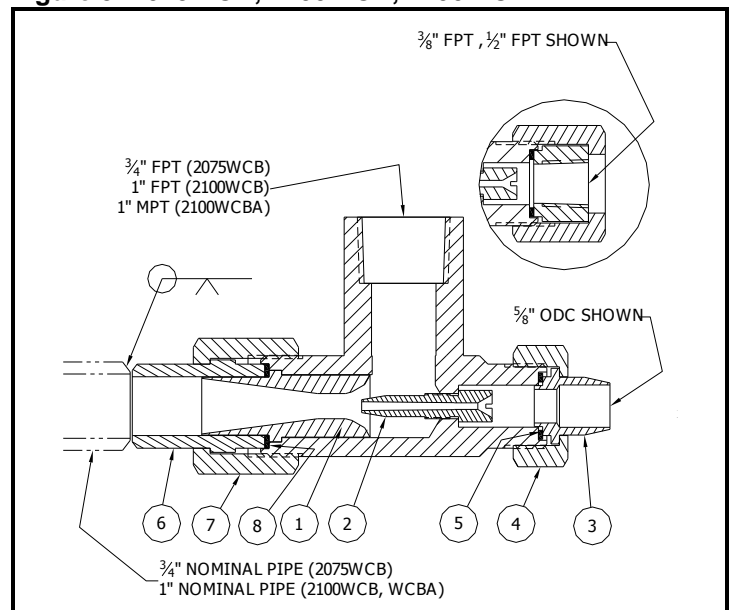
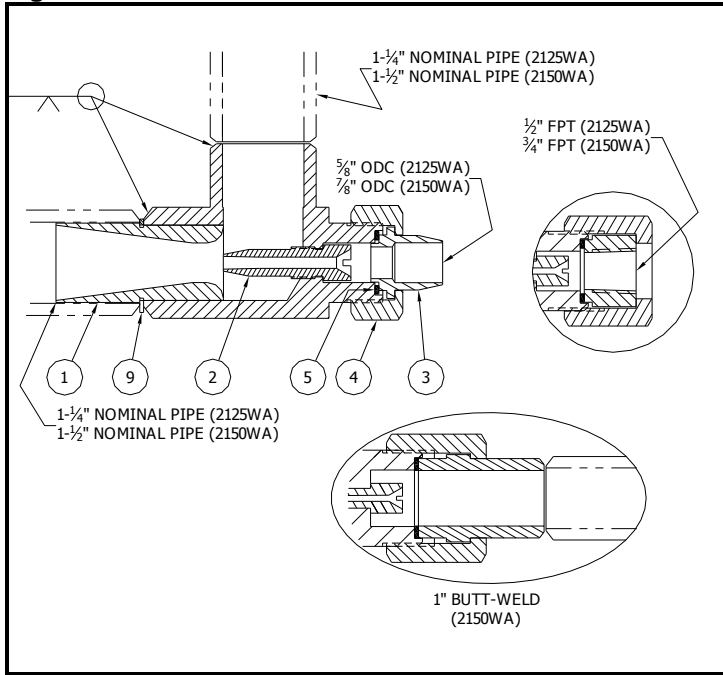


Figure 3: 2075WCB, 2100WCB, 2100WCBA



**Figure 4: 2125WA / 2150WA**

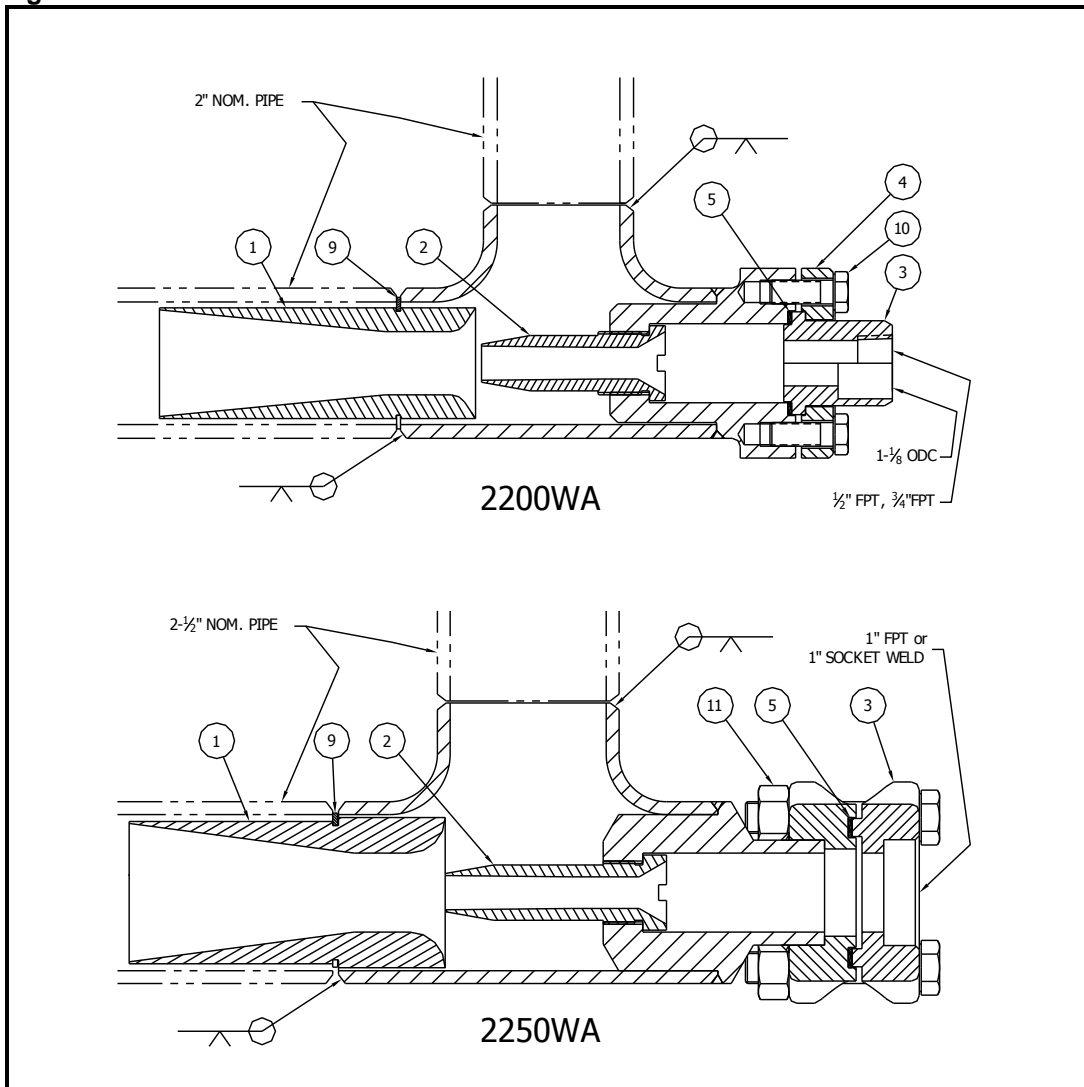


**2125WA, 2150WA (Figure 4)**

The 2125WA and 2150WA injectors have welded steel bodies, and can be used on either halocarbon or ammonia applications. The steel nozzle is threaded into the high pressure liquid inlet of the injector. High and low pressure liquid connection sizes and types are shown in Table 1.

To install the injector into a system, one end of the throat (Item 1) slips into the front of the body and is positioned loosely by a retaining ring (Item 9), as shown in Figure 4. The other end of the throat is then slipped into a 1-1/4" (2125WA) or 1-1/2" (2150WA) nominal pipe. This sandwiches the retaining ring between the injector body and the pipe. The front of the injector is then welded to the pipe. The body's top liquid connection is also welded into the system.

**Figure 5: 2200WA / 2250WA**



**2200WA, 2250WA (Figure 5)**

The 2200WA and 2250WA injectors have welded steel bodies, and can be used on either halocarbon or ammonia applications. The steel nozzle is threaded into the high pressure liquid inlet of the injector. High and low pressure liquid connection sizes and types are shown in Table 1.

To install the injector into a system, one end of the throat (Item 1) slips into the front of the body and is positioned loosely by a retaining ring (Item 9), as shown in Figure 5. The other end of the throat is then slipped into a 2" (2200WA) or 2-1/2" (2250WA) nominal pipe. This sandwiches the retaining ring between the injector body and the pipe. The front of the injector is then welded to the pipe. The body's top liquid connection is also welded into the system.

**Table 2: Replacement Parts**

Item #	Description	2000SL FAMILY		2100WCB FAMILY			2100WA FAMILY		2200WA FAMILY	
		2020SL /SLD	2100SL /SLD	2075WCB	2100WCB	2100 WCB A	2125WA	2150WA	2200WA	2250WA
1	THROAT Contact Phillips to determine the proper replacement throat size	2027SL	2107SL	2077W	2107W	2107W	2127WA	2157WA	2223W	2257WA
2	NOZZLE Contact Phillips to determine the proper replacement nozzle size	2026SL	2106SL	2046SL	2046SL	2046SL	2106SL	2126	2222	2256WA
3	REAR CONNECTOR	2030SL (3/8" ODC)	2110SL (5/8" ODC)	U4-3S (3/8" FPT) U4-3 (1/2" FPT) 2110SL (5/8" ODC)			U4-3 (1/2" FPT) 2110SL (5/8" ODC)	U6-3 (3/4" FPT) 2101W (1" Weld) 2131B (7/8" ODC)	2226 (1/2" FPT) 2226B (3/4" FPT) 2226A (1-1/8" ODC)	8-MT (1" FPT)
4	REAR NUT / FLANGE	2028SL	2108SL	U4-1 (3/8" or 1/2" FPT) 2108SL (5/8" ODC)			U4-1 (1/2" FPT) 2108SL (5/8" ODC)	U6-1 (3/4" FPT) U6-1S (1" Weld) 2130 (7/8" ODC)	2225	8-MS (1" Socket)
5	REAR GASKET	2029	2111	U4-4	U4-4	U4-4	U4-4	U6-4	365	63
6	FRONT CONNECTOR	-	-	2076W (3/4" Nom Weld)	2101W (1" Nom Weld)	2101W (1" Nom Weld)	-	-	-	-
7	FRONT NUT	-	-	U4-1S	U6-1S	U6-1S	-	-	-	-
8	FRONT GASKET	-	-	U4-4	U6-4	U6-4	-	-	-	-
9	RETAINING RING	-	-	-	-	-	5108-118	5108-137	5108-177	5008-243
10	HEX SCREW	-	-	-	-	-	-	-	502 Qty(6)	721B Qty(4)
11	HEX NUT	-	-	-	-	-	-	-	-	57 Qty(4)

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