

# Gas Powered Suction Stop Valve

Product Bulletin 50-32

Type: CK-2W

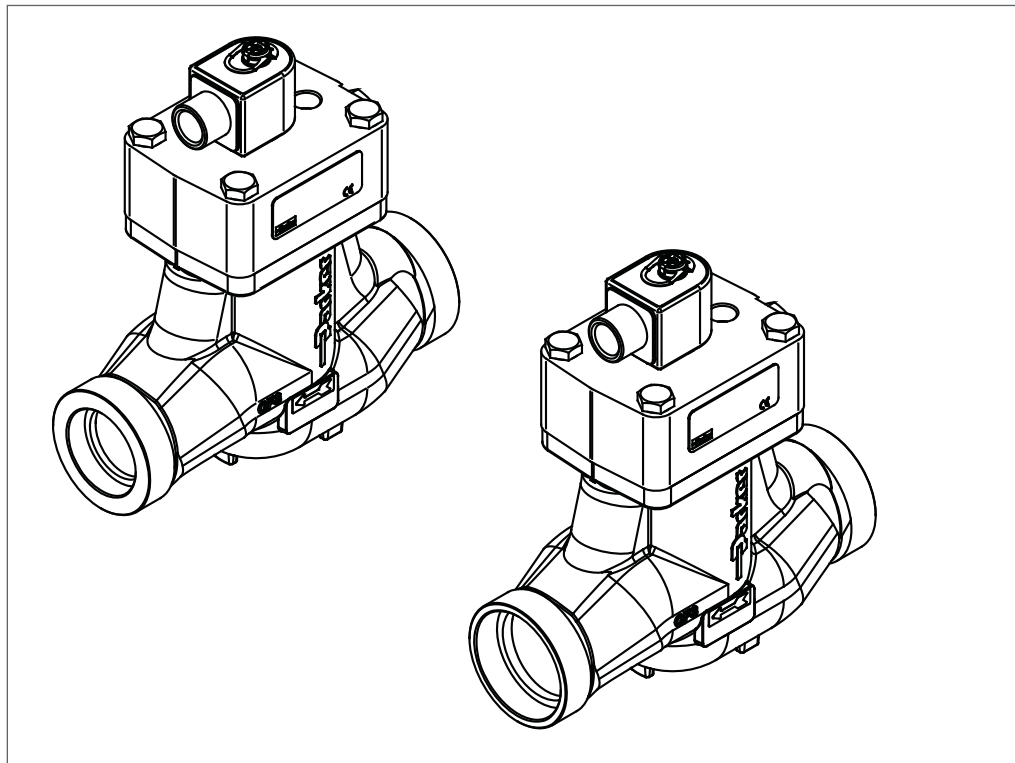
Size: 50 mm (2")

Design Pressure Rating: 32 bar (464 psig)



## Purpose:

The CK-2W, normally opened, gas powered suction stop valve are used in low temperature applications to positively close suction lines and both, liquid leg and gas return, on flooded evaporators. This valves improved design has a higher working pressure, greater working temperature range, and minimizes the effects of system impurities for a more durable operation. The CK-2Ws most beneficial features are its stainless steel and aluminum construction, which allows it to withstand corrosive environments and its overall light weight minimizes installation costs.



## Contact Information: Product Features:

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[www.parker.com/refspec](http://www.parker.com/refspec)

- Suitable for Ammonia, CO<sub>2</sub>, R-22, R-404a, and other common refrigerants
- Designed with corrosion resistant material – 304 stainless steel and aluminum
- No body wearing surfaces
- Stainless steel components are resistant to wire drawing
- Normally open
- Variable Flow Regulator (VFR) to reduce slamming
- Design drastically reduces foreign material
- Light weight
- Can be mounted in a horizontal and vertical position
- Fluid temperature rating: -60°C to 116°C (-76°F to 240°F)
- Ambient temperature rating: -40°C to 60°C (-40°F to 140°F)
- Complies with Pressure Equipment Directive 97/23/EC



Patent Pending

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**Description**

The CK-2W gas powered suction stop valves are an integrated assembly of two modules:

1. A body, which contains the modulating plug, but is ordered to suit a particular connection size. The port size defines the size of the body;
2. A port plate, which contains the pilot plug, coil, high pressure inlet, and strainer.

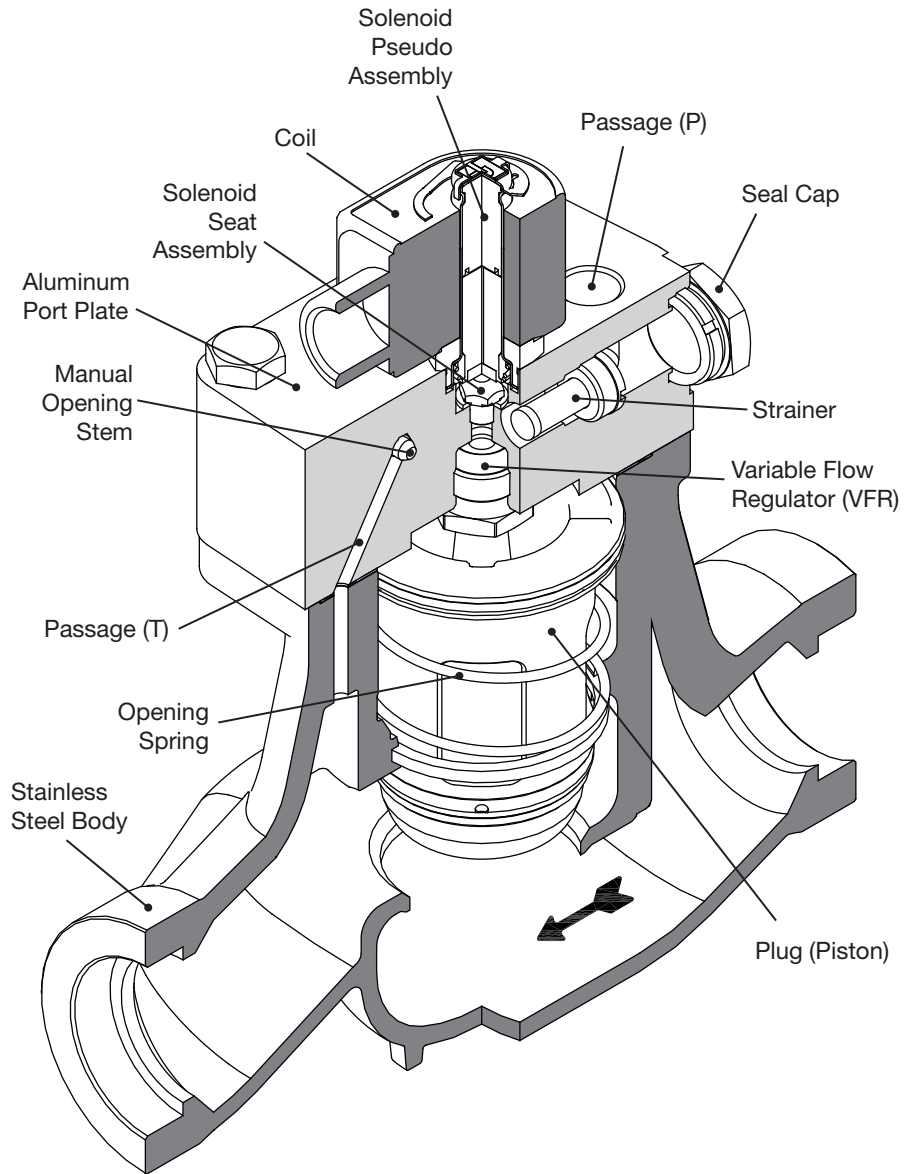
The CK-2W is a normally opened valve furnished with socket weld and weld neck options only. The valve requires a high pressure source of 0.35 bar (5psi) above the downstream pressure to close. Due to the modulating plug sprint, no line pressure drop is required to open the valve. Therefore, on suction line applications pressure drop is nominal and on flooded evaporators normal gravity circulation is unrestricted. Using pressure to close, this valve can overcome sticking at low temperatures caused by the presence of viscous oil.

This unique design allows the check valve to be welded into the line without disassembly, yet provides full access for cleaning and servicing from the top only.

**Principle of Operation**

Gas from a high pressure source is connected to the valve pilot port through passage (P). To close the CK-2W the solenoid is energized allowing high pressure to flow through the strainer, solenoid seat, pilot plug and into the chamber above the piston. The higher pressure above the piston forces the piston down against the opening spring and closes the valve. The valve will not close unless the high pressure source exceeds the downstream pressure by at least 0.35 bar (5 psi). To open the valve simply de-energizes the solenoid to stop the flow of high pressure to the top of the piston. The high pressure above the piston equalizes to the downstream pressure through the piston bleed hole and piston opening spring forces the valve open.

Port Size	Connection Size (SW, BW)	Body Size	Kv	Cv
50 mm (2")	1-1/2", 2"	2"	49.7	58

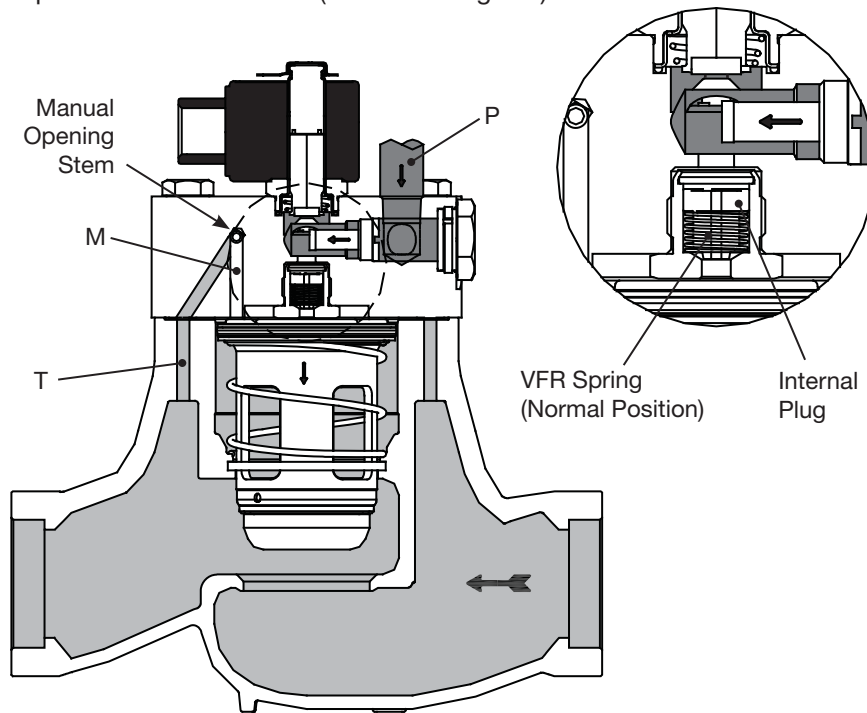
**CK-2W Port, Connection, and Flow Coefficient Table****CK-2W Cross Section****Variable Flow Regulator (VFR)****Principle of Operation**

The unique pilot plug, VFR, design helps reduce the initial flow of high pressure gas, which prevents the valve from slamming closed as shown in the principle of operation cross-section steps 1 through 3.

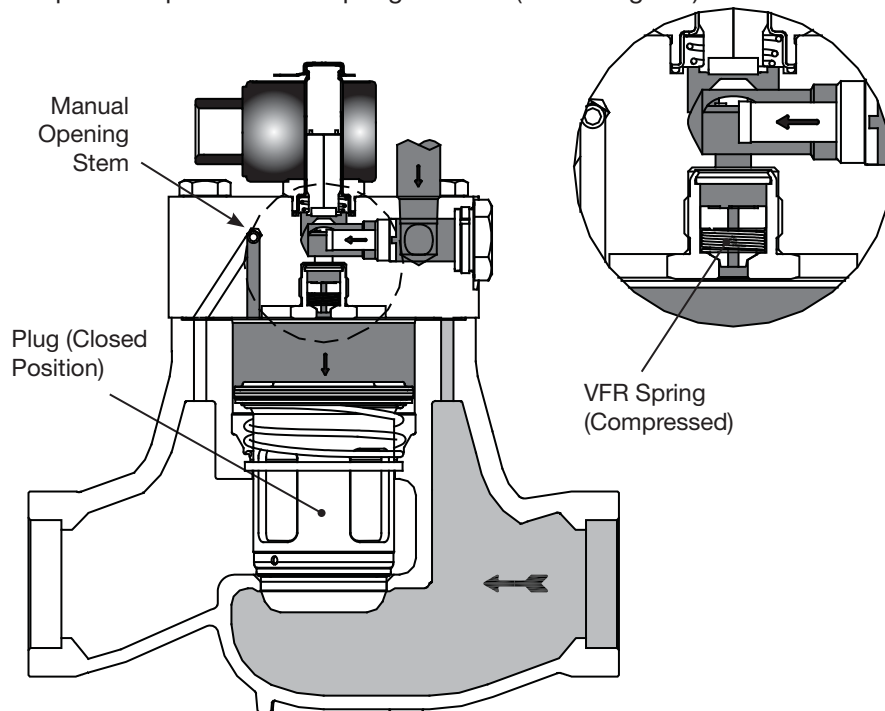
When the solenoid is energized and the high pressure gas hits the top of the internal VFR plug the spring compresses, pushing the VFR plug downward, only allowing the gas to travel through the smaller orifice

as shown in the CK-2W principle of operation cross section step 2 diagram. When the pressure exceeds the piston spring force the valve closes and the VFR plug equalizes, opening up the orifice to the area above the piston. This design prevents valve slamming, while as the same time maintaining the pressure required to maintain the valve closed.

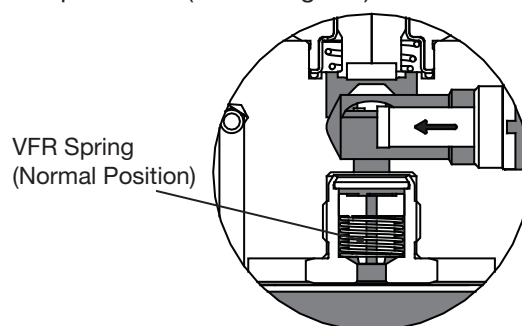
## Step 1: Initial VFR Position (Coil De-Energized)



## Step 2: Compressed VFR Spring Position (Coil Energized)



## Step 3: Final VFR Position After Equalization (Coil Energized)



Passage	Description
P	Piston Pressure, Top
T	Outlet Pressure
M	Manual Opening Stem

**CK-2W Port Plate Passage Table****Manual Opening Stem**

These valves are equipped with a pressure driven manual opening system versus the mechanical screw thread mechanism. A small valve is opened that allows the inlet pressure trapped above the piston to escape via passage (M), through the port plug and into passage (T), the valve outlet. Using a screw driver, turn the CCW to manually open the valve. Turn the stem CW to put the valve back into automatic operation. If the downstream pressure is more than 0.35 bar (5psi) higher than the inlet pressure the valve will not open. There is still a leak path between the valve inlet and outlet through the manual opening valve for pump down purposes.

**Installation**

All gas powered suction stop valves are packed for a maximum protection. Unpack carefully. Check the carton to make sure all items are unpacked. Save the enclosed instruction for the installer and eventual user.

Do not remove the protective coverings from the inlet and outlet of the regulator until the stop valve is ready to be installed. Protect the inside of the regulator from dirt and chips before and during installation.

The valves should not be disassembled before welding. This grade of stainless steel is a poor conductor of heat and conventional weld processes (stick, MIG, and TIG) do not create enough heat that transfers to the valve's internal parts that could be affected.

Contractors need to follow a WPS (Welding Procedure Specification) for all welding. The procedure must be qualified and welder doing the weld qualified to perform that procedure. For welding the stainless steel 304L body to carbon steel pipe, E309L and ER309L-15, -16, or -17 filler metal

is a common choice. Contractors can develop their own standards and have them qualified based on the equipment they use and the environment they may encounter.

The codes applicable to the welding of socket weld valves require that the pipe be inserted into the socket until bottomed against the stop. The pipe is then to be backed out approximately 1/16 of an inch before welding. Use of welding rings is optional, but recommended for butt weld valves. They help alignment, control gap for full penetration welding, and reduce welding debris entry.

**Note:** When welding carbon steel and stainless steel the welded joint should be painted to prevent galvanic corrosion.

Socket welding where allowed is the preferred connection. This connection does help to reduce the amount of welding debris in the piping system.

Welded valves may be installed in horizontal or vertical pipelines. In a horizontal pipeline the valve can be mounted 90 degrees to either side from the upright position. These valves can not exceed below the 3-O'clock and 9-O'clock positions. It is important that the valves are installed in the correct direction of flow.

Before putting valves into service, all pipe connections, valve seats, and stem seals should be tested for leaks at pressure levels called for in appropriate codes.

#### **Disassembly (See also Bulletin RSBCV)**

All CK-2W can be disassembled, serviced and moving parts replaced without disturbing the piping, but of course, disassembly will cause exposure of some section of piping to atmosphere, which should be addressed before disassembly by evacuation and reclaim of the refrigerant.

For the CK-2W series stop valve, the high pressure supply line, passage (P), should be removed prior to disassembling the valve. The solenoid

coil (#2) should now be removed by removing the coil clip (#1). Never energize a solenoid coil that is not mounted and secured on its solenoid actuator (#3). The port plate, solenoid, strainer, and pilot plug can remain intact by removing the four bolts (#9). The solenoid pseudo assembly (#3-7) and the strainer (#12) can be replaced with out the removal of the port plate.

Removal of the port plate may require a sharp tap on their sides to unseat the parts from their sealed position, for which a rubber or rawhide hammer is recommended so as to avoid damage to the sealing surfaces. Removal of the port plate will expose the top of the piston. The piston spring (#30) and piston (#29) should be removed and inspected. Continue to inspect the wear ring (#32), metal rings, and gaskets.

Before re-assembly, all parts must be cleaned with a suitable solvent, permitted to dry, and lubricated with a light film of refrigerant oil, simply wiped on with the fingers. All gaskets and o-rings should be renewed, and insertion and sealing will be facilitated if a similar film of oil is applied to them as well.

Re-assembly is exactly the reverse of disassembly, with the precaution that the reliefs cut into each module of the valve assembly and the corresponding gaskets be aligned with the appropriate location. Ensure that all access fittings, solenoid features, and bypass plug are sealed when re-installing the corresponding parts. Prior to installing the port plate inspect the piston, using your hand, by pulling up and pushing down. The piston should move freely, without dragging or hesitation. Adjust all torques to the values indicated by torque requirement table.

Tighten all bolts equally to draw the assembly together evenly, to ensure proper sealing of all joints.

#### **Electrical**

The Refrigerating Specialties Division molded water resistant Class "H" solenoid coil is designed for long life and powerful opening force. The

#### **⚠ Caution**

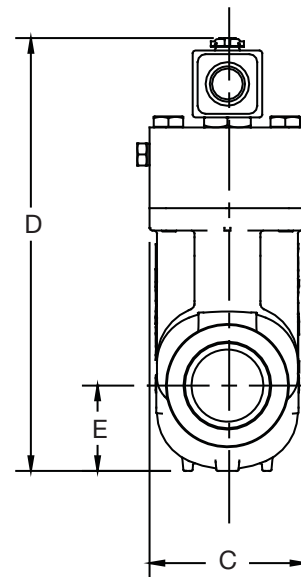
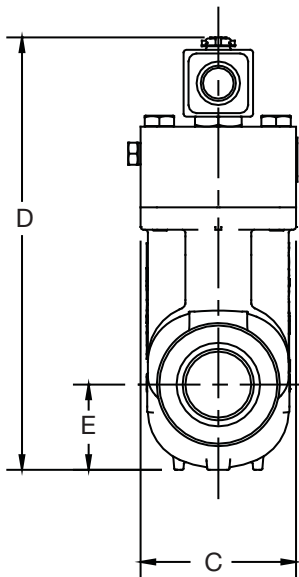
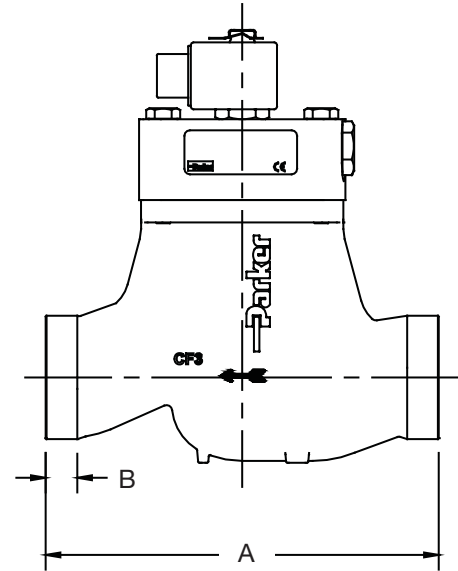
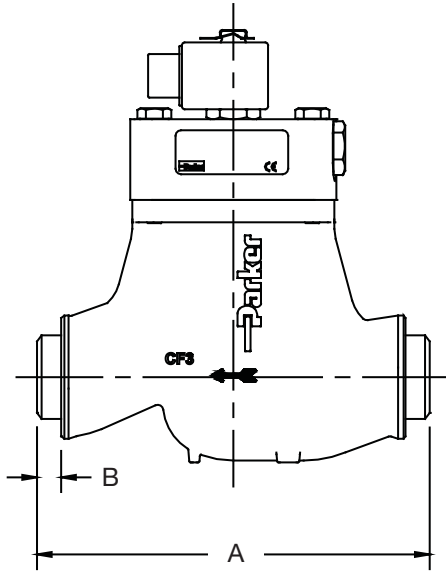
All personnel working on valves must be qualified to work on refrigeration systems. If there are any question, contact Refrigerating Specialties before proceeding with the work.

Before doing any service work, always be sure to disconnect the power and isolate the valve. Failure to do so will result in venting of ammonia.

standard coil housing meets NEMA 3R and 4 requirements. This sealed construction can withstand direct contact with moisture and ice. By definition, Class "H" coil construction will permit coil temperatures, as measured by resistance method, as high as 185°C. (366°F.) Final coil temperatures are a function of both fluid and ambient temperatures. The higher fluid temperatures require lower ambient temperatures for the maximum coil temperature not to be exceeded. Conversely, low fluid temperatures permit higher ambient temperatures.

A solenoid coil should never be energized except when mounted on its corresponding solenoid tube. The molded Class "H" coil is available from stock with most standard voltages. However, coils are available for other voltages and frequencies, as well as for direct current.

The solenoid coil must be connected to electrical lines with volts and Hertz same as stamped on coil. The supply circuits must be properly sized to give adequate voltage at the coil leads even when other electrical equipment is operating. The coil is designed to operate with line voltage from 85% to 110% of rated coil voltage. Operating with a line voltage above or below these limits may result in coil burn-out. Also, operating with line voltage below the limit will definitely result in lowering the valve's maximum opening pressure differential. Power consumption during normal operation will be 18.2 watts or less.

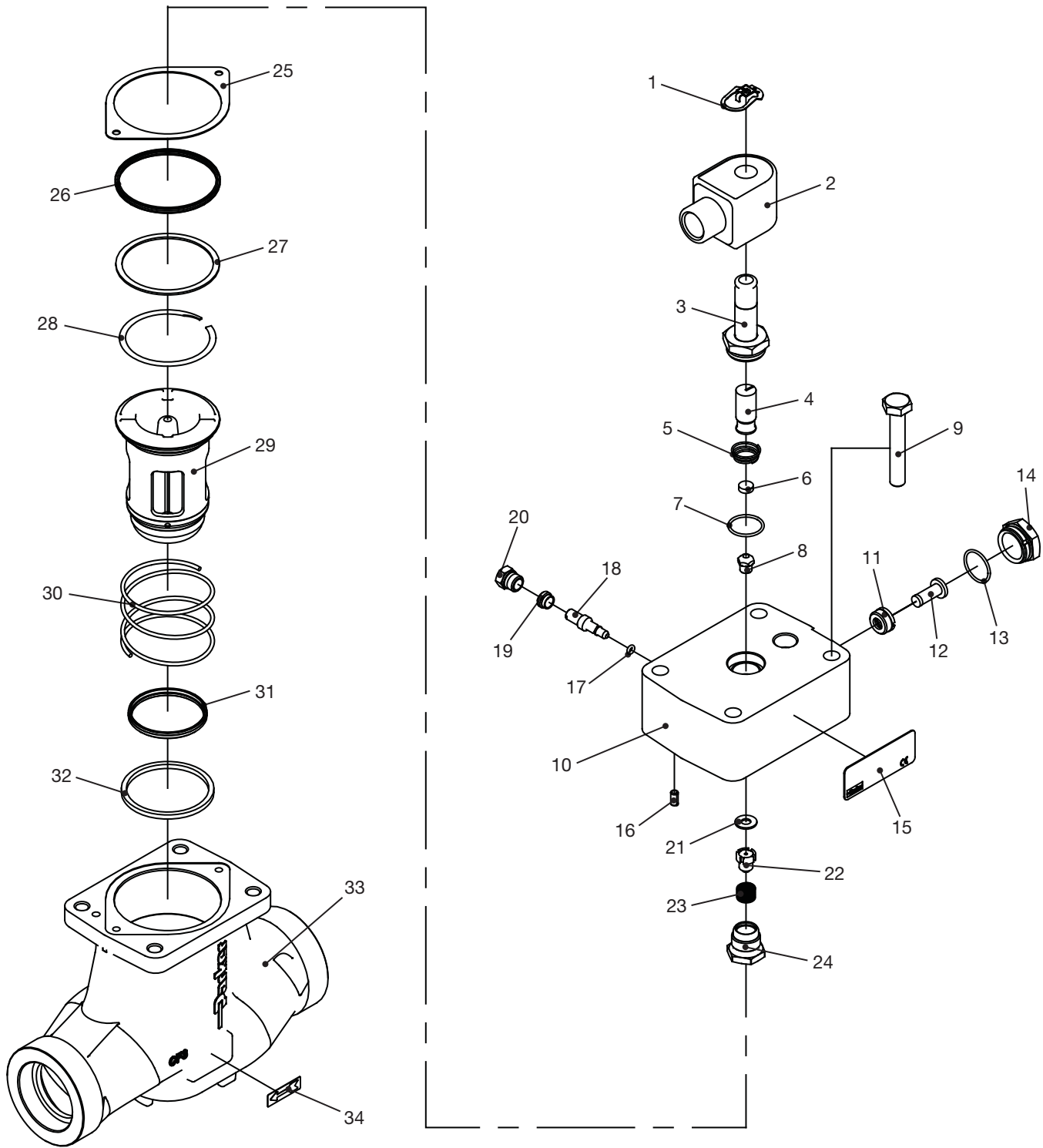


Dimension	Port Size
	50 mm (2")
A	227.1 mm (8.94")
B	16.0 mm (0.63")
C	90.0 mm (3.54")
D	249.7 mm (9.83")
E	49.3 mm (1.94")

**CK-2W Butt Weld (BW) Dimensions**

Dimension	Port Size
	50 mm (2")
A	227.1 mm (8.94")
B	16.0 mm (0.63")
C	90.0 mm (3.54")
D	249.7 mm (9.83")
E	49.3 mm (1.94")

**CK-2W Socket Weld (SW) Dimensions**



CK-2W Exploded Parts View

Item No.	Description	Material	Qty
1	Clip, Coil	S.S.	1
2	Coil	-----	1
3	Solenoid Pseudo Assembly	S.S.	1
4	Armature, Coil	S.S.	1
5	Spring, Coil	S.S.	1
6	Seal, Coil	Teflon	1
7	O-Ring, 0.813 ID x 0.938 OD x 0.062	Neoprene	1
8	Seat, Solenoid	303 S.S.	1
9	Bolt, M10 x 45MM	DIN-ISO Standard 3506-1	4
10	Port Plate	6061-T6 Al	1
11	Nut, Retainer 0.750 RD	303 S.S.	1
12	Screen Assembly, 50 Mesh	S.S.	
13	O-Ring, 0.801 ID x 0.941 OD x 0.070	Neoprene	1
14	Seal Cap	6061-T6 Al	1
15	Nameplate, Sticker	-----	1
16	Pin, Roll	420 S.S.	1
17	O-Ring, 0.125 ID x 0.25 OD x 0.062	Neoprene	1
18	Stem, Manual Opening	303 S.S.	1
19	Nut, Retainer	416 S.S.	1
20	Plug Cap, Manual Opening 7/16-20	6061-T6 Al	1
21	Washer, Flat 0.250 ID x 0.562 OD x 0.049	S.S.	1
22	Plug, Pilot	6061 Al	1
23	Spring, Pilot Compression	17-7 PH Cond CH 900	1
24	Seat, Pilot	303 S.S.	1
25	Gasket, Port Plate	MP 15	1
26	Ring, Seal 2.528 ID x 2.706 OD	PTFE S.S.	1
27	Ring, Backing	302/304 S.S.	1
28	Ring, Retaining 2.174 Internal	302 S.S.	1
29	Piston	303 S.S.	1
30	Spring, Piston	Music Wire ASTM A-228	1
31	Ring, Seal	Teflon (PTFE)	1
32	Ring, Wear	PTFE EMS-103	1
33	Body	304L S.S.	1
34	Flow Direction, Sticker	-----	2

**CK-2W Parts List**

Item No.	Kit Description	Port Size
		50 mm (2")
12	Screen, Strainer	208861
13 - 14	Seal Cap, Strainer	208773
8, 10 - 24	Port Plate	208774
17 - 20	Manual Opening Stem	208809
21 - 24	Pilot Plug	208775
25 - 32	Piston	208810
25 - 28, 31 - 32	Wear Seal, Piston	208821
7, 13, 17, 25 -28, 31 - 32	Gasket / O-Ring	208770
9	Bolt, Port Plate	208801
3 - 7	Solenoid Pseudo	208940
1 - 2	Coil, 120/60 or 110/50 18.5 Watt Leaded	204843
1 - 2	Coil, 240/60 or 220/50 18.5 Watt Leaded	204844
1 - 2	Coil, 208/60 18.5 Watt Leaded	204845
1 - 2	Coil, 240/50 18.5 Watt Leaded	204846
1 - 2	Coil, 24/60 18.5 Watt Leaded	206244

**CK-2W Repair Kits**

Symptom	Probable Cause	Correction
Failure to close	Pilot solenoid is not opening	Check voltage or solenoid coil burnout
	Strainer may be plugged	Remove and clean
	Pilot pressure source is not high enough	Must be 0.35 bar (5 psi) above the main valve downstream pressure
Failure to open	Opening spring may be broken	Disassemble valve and replace spring
	Pressure between remote pressure source and main valve downstream pressures are not equalizing	Check for leakage or backward installation of the CK-2W
Leakage through valve when closed	There are dirt or chips under the piston	Disassemble valve and clean thoroughly
	Wear ring may be worn	Disassemble valve and replace wear ring

### CK-2W Service Pointers

Location	Description (SAE)	Torque mkg (Ft-Lbs)
Port Plate Screws	M10 x 45 MM	(35)
Solenoid Pseudo Assembly	—	Snug
Pilot Plug	3/4-16 UNF	Snug

### CK-2W Torque Requirement Table

Valve	Port Size
	50 mm (2")
CK-2W	3.6 kg (8.0 lbs)

### Socket Weld (SW) and Butt Weld (BW) Valve Weights

#### Safe Operation (See Bulletin RSBCV)

People doing any work on a refrigeration system must be qualified and completely familiar with the system and the Refrigerating Specialties Division valves involved, or all other precautions will be meaningless. This includes reading and understanding pertinent Refrigerating Specialties Division Product Bulletins and Safety Bulletin RSB prior to installation or servicing work.

Where cold refrigerant liquid lines are used, it is necessary that certain precautions be taken to avoid damage which could result from liquid expansion. Temperature increase in a piping section full of solid liquid will cause high pressure due to the expanding liquid which can possibly rupture a gasket, pipe or valve. All hand valves isolating such sections should be marked, warning against accidental closing, and must not be closed until the liquid is removed. Check valves must never be installed upstream of solenoid valves, or regulators with electric shut-off, nor should hand valves upstream of solenoid valves or downstream of check valves be closed until the liquid has been removed.

It is advisable to properly install relief devices in any section where liquid expansion could take place. Avoid all piping or control arrangements which might produce thermal or pressure shock.

For the protection of people and products, all refrigerant must be removed from the section to be worked on before a valve, strainer, or other device is opened or removed. Flanges with ODS connections are not suitable for ammonia service.

#### Warranty

All Refrigerating Specialties products are under warranty against defects in workmanship and materials for a period of one year from date of shipment from factory. This warranty is in force only when products are properly installed, field assembled, maintained, and operated in use and service as specifically stated in Refrigerating Specialties Catalogs or Bulletins for normal refrigeration applications, unless otherwise approved in writing by the Refrigerating Specialties Division. Defective products, or parts thereof returned to the factory with transportation charges prepaid and found to be

defective by factory inspection, will be replaced or repaired at Refrigerating Specialties option, free of charge, F.O.B. factory. Warranty does not cover products which have been altered, or repaired in the field, damaged in transit, or have suffered accidents, misuse, or abuse. Products disabled by dirt or other foreign substances will not be considered defective.

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