

Emerson Cooling Controls

Solenoid Valves & Receivers



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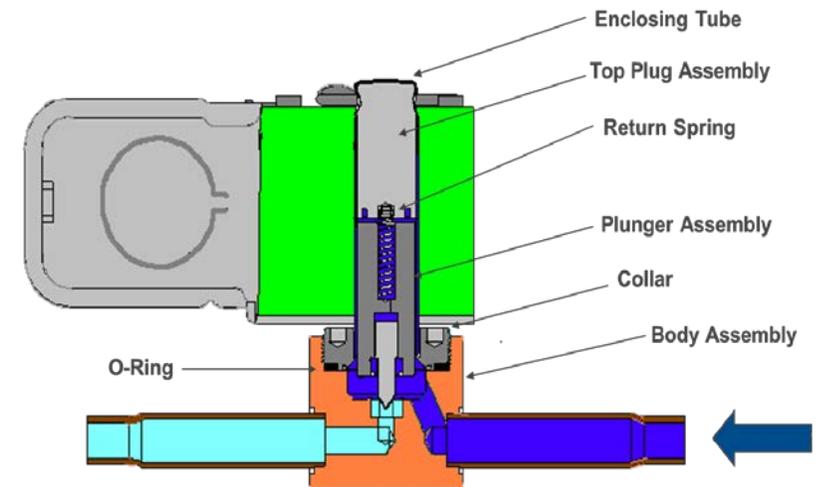


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What is a Solenoid Valve?

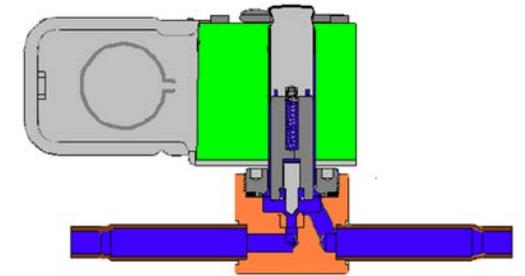
- A Solenoid Valve is an Electro-mechanical On/Off valve used to remotely control the flow of liquids and gases
- Solenoid valves are comprised of two main components:
 - The **Electromagnet** contains a moving Plunger, a Top Plug Arrangement, an Enclosing Tube, and a Wound Coil
 - The **Body** contains an Orifice through which the media flows when Open. A needle or rod is seated on the Orifice, and is attached directly to the lower part of the Plunger
- Solenoid valves can be **Normally Closed (NC)** or **Normally Open (NO)**.



Types of Solenoid Valve

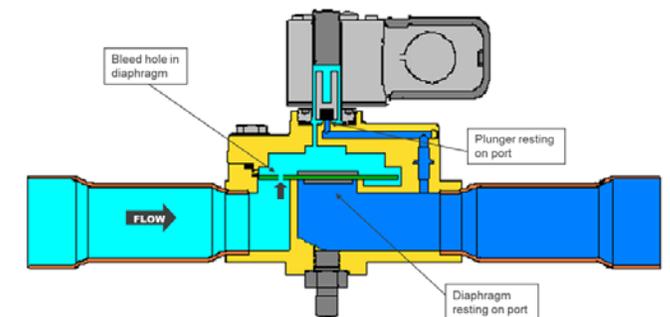
- **Direct Acting**

- When solenoid is energized, plunger directly opens the orifice (of the main valve port) of a normally closed valve or closes the orifice of a normally open valve



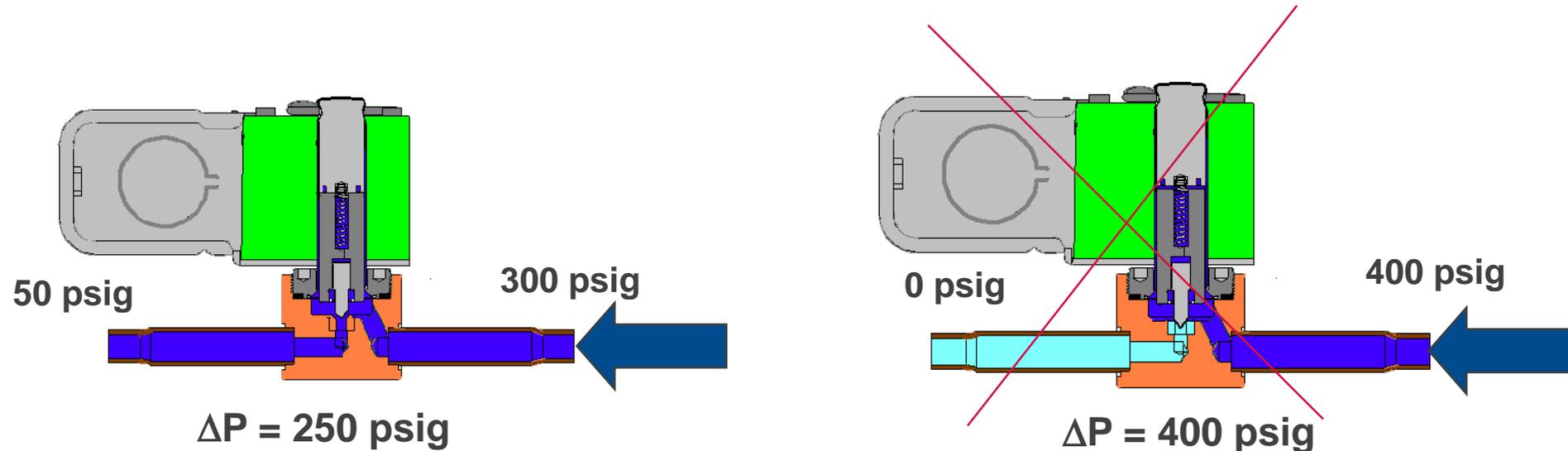
- **Pilot-operated**

- Use a combination of line pressure and the solenoid coil to operate



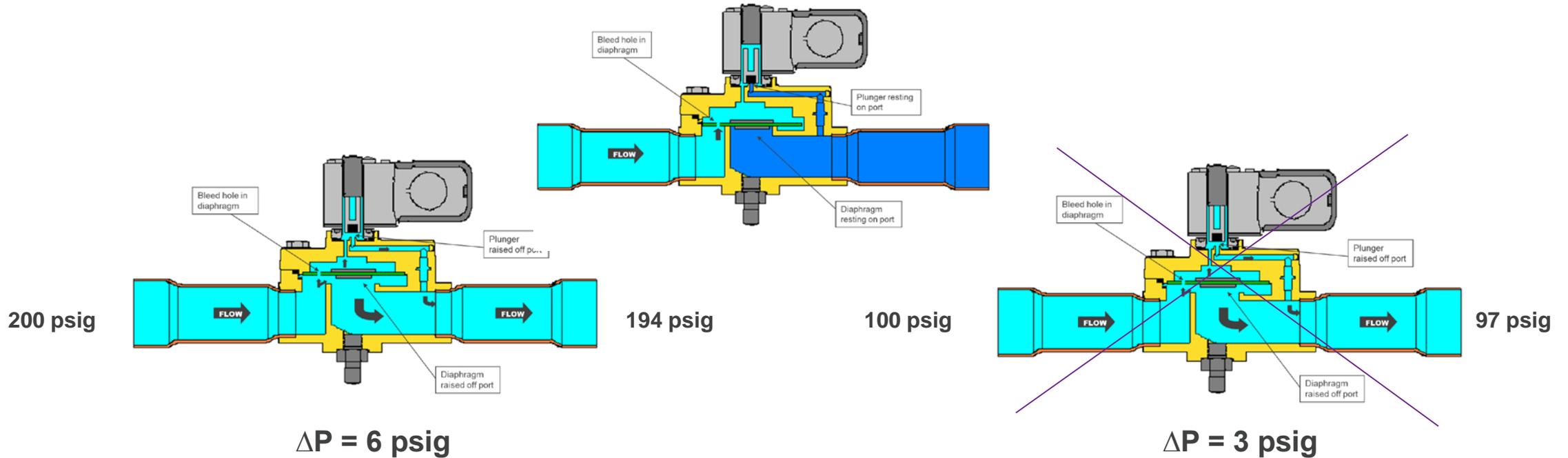
MOPD - Maximum Operating Pressure Differential

- The Maximum Operating Pressure Differential (MOPD) refers to the Maximum Difference in pressure between the Inlet and Outlet against which the Solenoid can safely operate the valve
- Refrigerant solenoid valves require a Very High MOPD typically in the range of **300 psig**



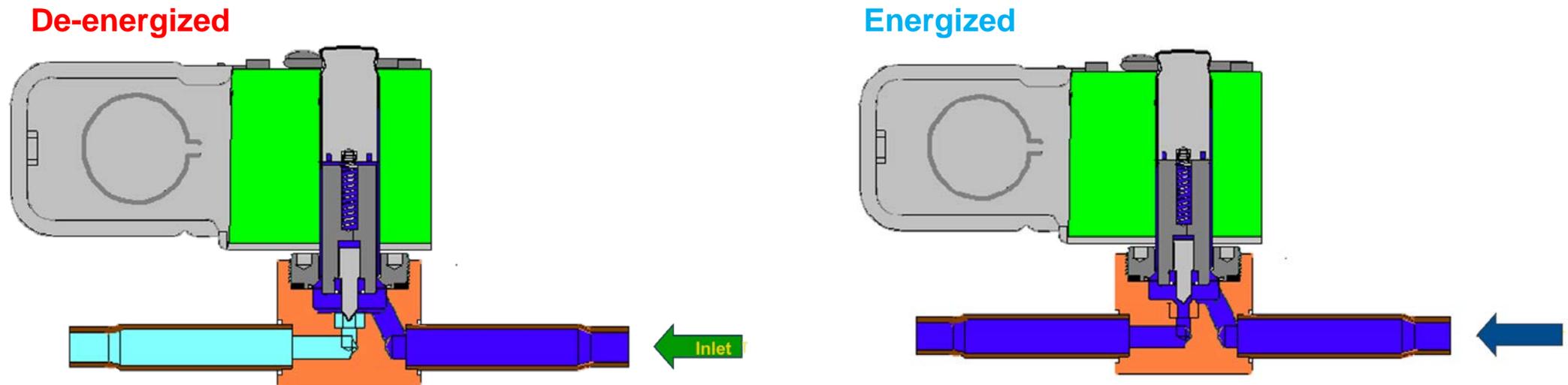
MinOPD - Minimum Operating Pressure Differential

- A small amount of pressure differential is required to raise the diaphragm off of the main orifice after the pilot orifice has allowed both the inlet and outlet pressure to equalize.
- Typically 2 to 5 psig of pressure differential is required and called the minimum opening pressure differential.



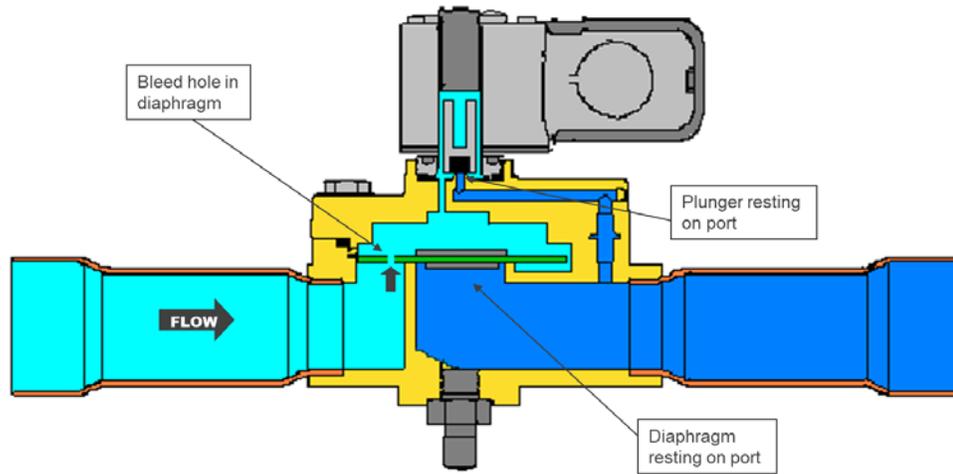
Direct-Acting

- Operate from 0 psig (0 bar) differential to its maximum operating pressure differential (MOPD)
- Valve can be Normally Open or Normally Closed.
- In a Normally Closed valve → The valve is closed when the coil is **de-energized**. When the coil is **energized**, the plunger lifts up (against the spring) to open the valve.
- In a Normally Open valve → The valve is open when the coil is **de-energized**. When the coil is **energized**, the plunger pushes down to close the valve.

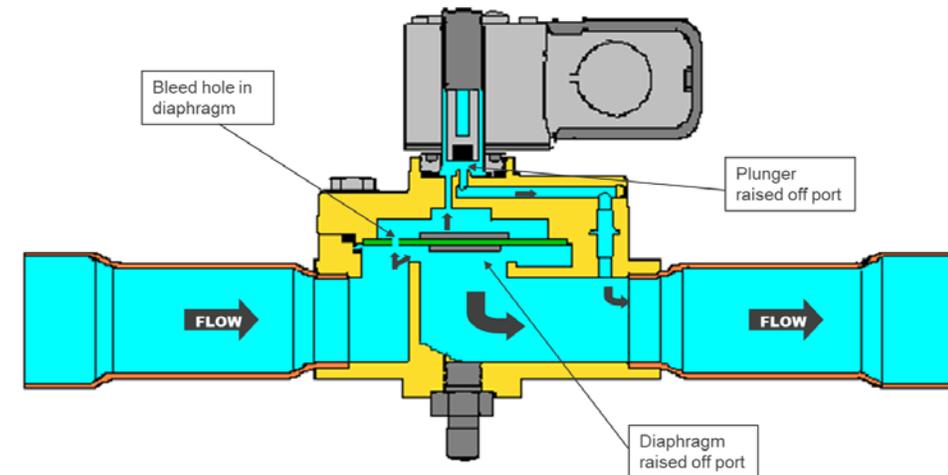


Pilot Operated Valve

De-energized



Energized



• Operation

- Plunger is attached to a needle covering a **pilot orifice** rather than the main port.
- Line pressure holds a floating diaphragm closed against the main port
- Larger Flow Capacities
- Requires Only 1 or 2 PSI Minimum OPD
- Very Sensitive To Oversizing
- Lower electrical power requirement

Benefits of Pilot-Operated Valve

- Excellent for very large flow
- Pressure assist valve operation
- Needs MIN pressure differential
- Lower electrical power level requirement

Emerson Solenoid Valves Product Range

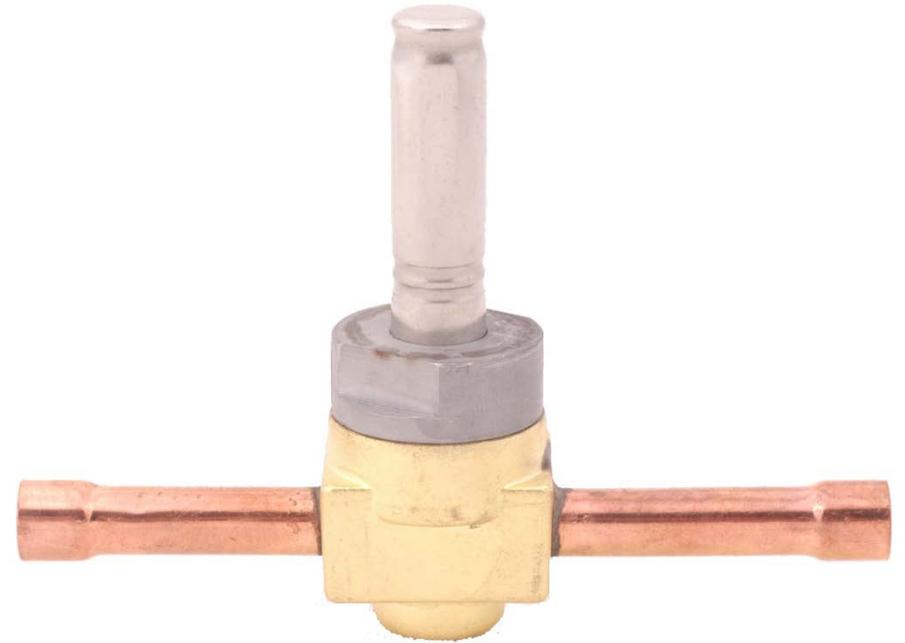
100RB Solenoid Valve

- Nominal R-22 Liquid Capacity Range 1.04 to 1.64 Tons
- **Direct Acting**
- **Take-Apart Construction**
- Normally Closed
- PTFE Seat Material
- Available With 1/4", 3/8", And 1/2" ODF Connections
- Available With 1/4" And 3/8" SAE Connections
- Available With 1/4" NPTF Connections
- Extended Ends Standard For ODF Connections



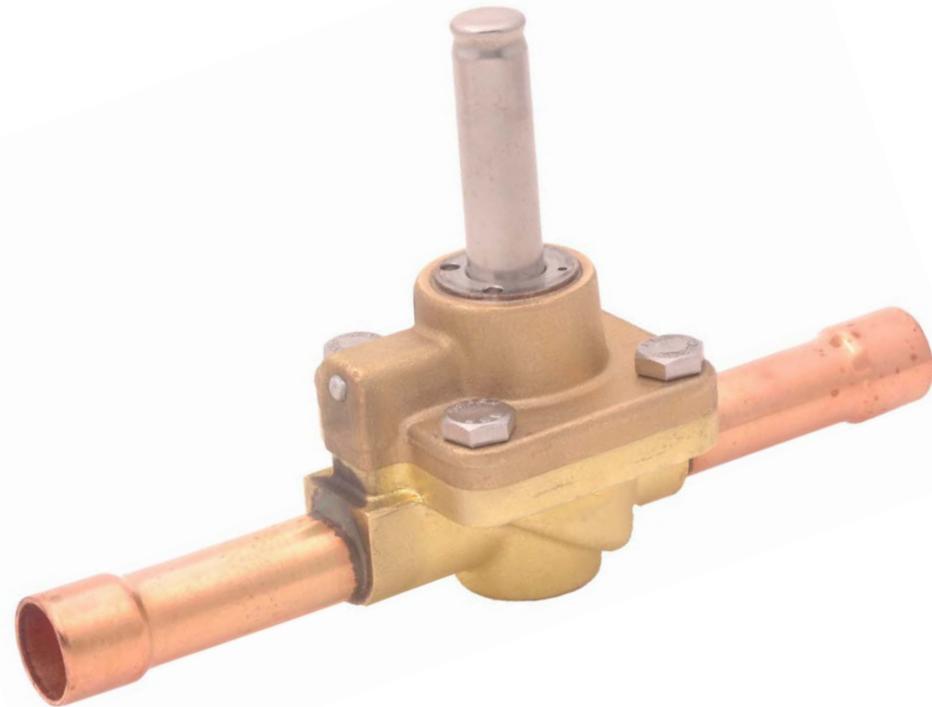
200RB/500RB Solenoid Valves

- Nominal R22 Liquid Capacity Range 2.6 to 34.9 Tons
- **Pilot Operated**
 - 2 Psig MinOPD
- **Take Apart Construction**
- Normally Closed (N.O. Available)
- PTFE Seat Material
- **Suitable for High Pressure refrigerants**
- Available With Manual Operator Stem (Except For 200RB2)
- Available With 1/4", 3/8", 1/2", And 5/8 ODF Connections
- Available With 1/2" And 5/8" SAE Connections
- Available With 3/8" NPTF Connections.
- Extended Ends Standard For ODF Connections



240RA/540RA Solenoid Valves

- Nominal R22 Liquid Capacity Range 12.7 to 122.5 Tons
- **Pilot Operated**
 - 1 Psig MinOPD
- **Take Apart Construction**
- Normally Closed (N.O. Available)
- PTFE Seat Material
- Available In 5/8" Through 2-1/8" ODF Connections
- Available With Manual Operator Stem
- Suitable For Liquid, Suction And Hot Gas Service
- Extended Ends Standard



Coil Overview

Features

- Compact designs
- Coil windings are insulated to provide shock and vibration protection
- ASC2 is designed to provide weather protection
- Interchangeable housings

Voltage Options

- 24V 50/60 Hz
- 120V 50/60 Hz (standard)
- 208-220/208-240V 50/60 Hz
- 480V 50/60 Hz
- 120-240V 50/60 Hz
- 12V D.C. (MM Series recommended)
- 24V D.C. (MM Series recommended)

ASC2 – DIN



Requires ASC2 female connector (PCN 059261).

MMG – Special DC



AMC - 1/2" Conduit



AMG - Junction Box



AMS - Open Frame



Solenoid Multi-Purpose Tool

The Solenoid Multi-Purpose Tool is a magnetic tool that holds key components together as the valve is disassembled. The manual stem adjustment makes it easy to open valves. This tool provides longer life utilizing its spanner wrench which not only makes it easier to service valves, but also protects the enclosing tube from damage.

Features

- Magnet opens a normally closed Emerson solenoid valve that is in the de-energized state
- Incorporates a spanner wrench and drive socket which enable easy disassembly of Emerson solenoid valves 100RB & 240RA/540RA by using a 3/8" socket wrench
- Tool has a manual stem orifice used to manually adjust opening stem
- May reassemble valve with proper torque specifications on collar



PCN 066019

Specifications

- Drive Socket size 3/8"

Dimension Data

Solenoid Nomenclature

Nomenclature example: 200RB 4T3M VLC

200RB	4	T	3	M	BF	VLC
Series	Port Size	Connection Type	Connection Size	(Optional)	(Optional)	Coil*
	(In 1/16")	F = SAE S = Short Solder T = Copper Extended Ends	(In 1/8")	T = Mounting Stud M = Manual Opening Stem	BF = Bi-Flow	VLC = Valve Less Coil

* Valves are shipped without the solenoid coils (VLC = Valve Less Coil). See coil assemblies for availability.

Troubleshooting

Solenoid Won't Open

- Oversized Valve
- Not Within – 10% Rated Voltage
- Coil Burnout
- Damaged Parts

Solenoid Won't Close

- Manual Stem Engaged
- Installed Backwards
- Damaged Parts

Solenoid Valves Sizing & Selection

How to get there?

The screenshot shows a web browser window with the URL `climate.emerson.com/en-us`. The page features a navigation menu with categories like **Products**, **Industries**, **Training & Support**, **Tools & Resources**, and **Expertise**. Under **Products**, the **Thermostats** sub-menu is expanded, showing options such as **THERMOSTATS**, **Do-It-Yourself Thermostats**, **Professional Thermostats**, **Programmable Thermostats**, and **Thermostat Manuals**. On the right side, a **BRANDS** section is visible, with **White-Rodgers** highlighted by a red arrow. Other brands listed include **Sensi™** and **Verdant**. A **Feedback** button is located in the bottom right corner. A cookie notice is displayed at the bottom of the page, and the Windows taskbar is visible at the very bottom.

How to get there?

The screenshot shows the Emerson website interface. At the top, there is a navigation bar with links for "Emerson.com", "About Us", "Investors", "Careers", "Contact Us", "News & Events", "Sign In", and "United States (English)". Below this is a secondary navigation bar for "CLIMATE TECHNOLOGIES" with links for "Products", "Industries", "Training & Support", "Tools & Resources", and "Expertise". A search bar and a shopping cart icon are also present.

The main content area features four large cards:

- Find My Manual:** "Locate a manual for your Emerson, White-Rodgers or Sensi Thermostat." Includes a magnifying glass icon over an open book.
- Cross Reference & Product Information:** "Access product information with our powerful cross reference for OEM, competitive or White-Rodgers products." Includes an image of a person holding a tablet with various icons.
- Air Conditioning & Refrigeration Product Selector:** "Find the right valves, controls and system protectors for your air conditioning or refrigeration application." Includes an image of HVAC components. A red arrow points to this card.
- Quick Reference Guide:** "Access cross-reference and product information for our top products, all in one quick reference guide." Includes an image of hands typing on a laptop.

At the bottom of the page, there is a cookie notice: "HOW WE USE COOKIES: We use cookies and similar technologies to improve our website, to personalize website content to you, and to deliver advertising messages and offers on content that are relevant to you. For more specific information on how we use cookies and to change your cookie preferences, see our [Cookie Notice](#). WE COLLECT PERSONAL INFORMATION SUBJECT TO THE CALIFORNIA CONSUMER PRIVACY ACT. Learn more [here](#). Understand and don't want to see this message again? Click the X to close this notice." A green 'X' icon is visible to the right of the notice.

The browser's address bar shows the URL: <https://webapps.emerson.com/wrproductselector/flowcontrols.aspx>

At the bottom right, there are vertical buttons for "Feedback" and "Chat Now". The Windows taskbar at the very bottom shows the time as 1:59 PM on 2020-04-02.

Product Selection Webpage



WHITE-RODGERS™

Home / Product Family / Air Conditioning & Refrigeration

Air Conditioning & Refrigeration



System Protectors



Expansion Valves



Solenoid Valves & Coils



Oil Controls



Shut Off Valves



Temperature Pressure Controls

<https://webapps.emerson.com/wrproductselector/flowcontrols.aspx>

Solenoid Valves Selection Software



Emerson | webapps.emerson.com/wrproductselector/flowcontrols.aspx

Apps | Emerson bookmarks | Canada Emergency... | Google | Sandler Virtual Play... | My Courses and Le... | Copeland Sample R... | Quote Request | Imported | WR Product Selector | OPI Home Page

EMERSON | WHITE-RODGERS

Solenoid Valves

Solenoid Valves

Solenoid Valves

AUTO CONVERT

REFRIGERANT [Dropdown]	LOCATION Liquid Line [Dropdown]
TYPE Normally Closed [Dropdown]	CAPACITY 0 [Input] Tons [Dropdown]
VOLTAGE (optional) [Dropdown]	COIL CONNECTION (optional) [Dropdown]
LIQUID TEMPERATURE 100 [Input] °F °C [Buttons]	PRESSURE DROPS 0.14 [Input] BAR PSIG [Buttons]

SEARCH >

Windows Taskbar: 9:49 AM 2020-04-06

You can also use the WR Product Selector

The screenshot shows a web browser window displaying the 'White-Rodgers Cross-Reference and Product Information' page. The browser's address bar shows the URL 'webapps.emerson.com/wrproductselector/'. The page features the Emerson and White-Rodgers logos at the top. Below the logos is a dark blue header with the text 'White-Rodgers Cross-Reference and Product Information'. The main content area contains two promotional cards: one for 'Select Popular Products by Features and Attributes' (highlighted with a red border) and another for 'Search Replacement Heating Controls by Major OEM Brand'. Below these cards is a search bar with the placeholder text 'ENTER MODEL NUMBER' and a search icon. At the bottom of the page, there are three icons: a person with a question mark, two speech bubbles, and a mobile device icon. The Windows taskbar is visible at the very bottom, showing various application icons and the system clock indicating 8:03 PM on 2020-04-01.

Product Selector



White-Rodgers Cross-Reference and Product Information

Home / Product Family

Choose a Product Family



Product Selection Webpage



WHITE-RODGERS™

Home / Product Family / Air Conditioning & Refrigeration

Air Conditioning & Refrigeration



System Protectors



Expansion Valves



Solenoid Valves & Coils



Oil Controls



Shut Off Valves



Temperature Pressure Controls

Solenoid Valves Selection Software

The screenshot shows a web browser window with the URL `webapps.emerson.com/wrproductselector/flowcontrols.aspx`. The page features the Emerson logo and the White-Rodgers brand name. The main content area is titled "Solenoid Valves" and includes a sub-section with a radio button selected for "Solenoid Valves". Below this, there are several input fields and dropdown menus for configuring the valve selection. A green "SEARCH >" button is located at the bottom of the form.

EMERSON **WHITE-RODGERS**

Solenoid Valves

Solenoid Valves

Solenoid Valves

AUTO CONVERT

REFRIGERANT

LOCATION

TYPE

CAPACITY

VOLTAGE (optional)

COIL CONNECTION (optional)

LIQUID TEMPERATURE

PRESSURE DROPS

SEARCH >

Info For Sizing A Liquid Line Solenoid

Selection Data

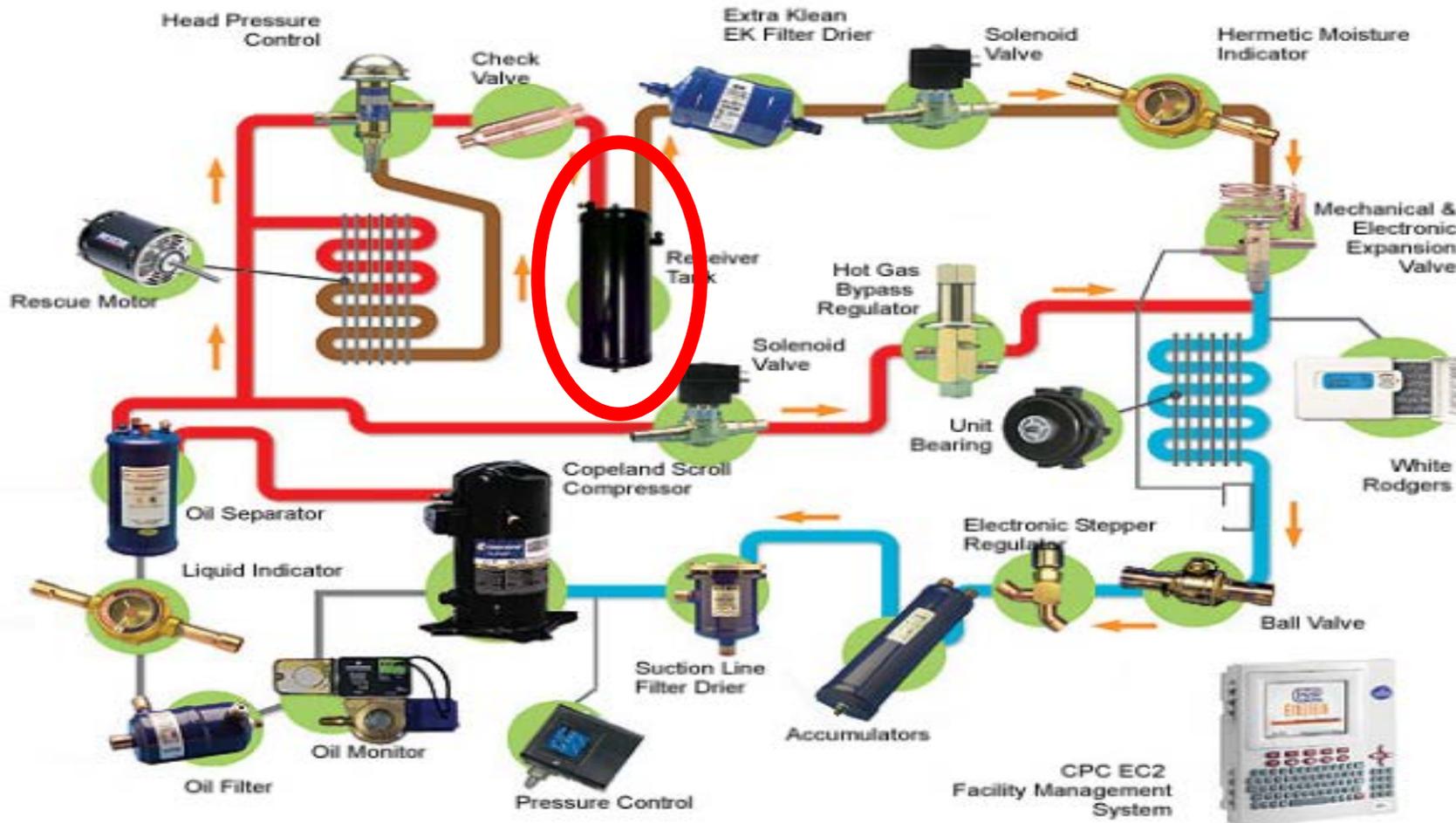
- System Refrigerant
- Application / Location
- Evaporator Capacity
- Liquid Temperature
- Pressure Drop
- Voltage
- Coil Connections

Selection & Sizing Example

- R-134a
- Liquid Line
- Capacity = 3 Tons
- Liquid Temperature = 90 deg F
- Pressure drop = 3 psig
- Voltage = 120 / 60 HZ
- Standard valve / Normally Closed
- Coil Connection = Junction Box
- Connection size = ¼ Braised

Emerson Liquid Receiver

Liquid Receiver Location

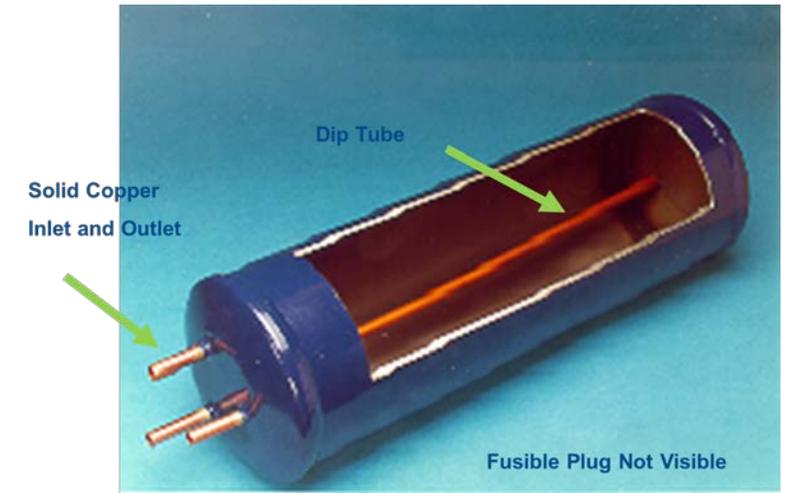


Receives Liquid Downstream of the Condenser

Liquid Refrigerant Receiver Anatomy

Functions of a Liquid Refrigerant Receiver

- Provides a reservoir for refrigerant during normal operation
- Allows the system to react to widely varying load demands
- Provides a place to store refrigerant charge during pump down
- Provides liquid for condenser flooding in winter
- Accommodates leakage or overcharge



Kal Zgheir

Kal Zgheir, *MBA (Hons), CMA*
TERRITORY SALES MANAGER – ALBERTA

Kal currently manages the channel sales for Emerson in Alberta, working with distribution partners and local HVAC contractors directly for training, technical support and sales promotions.

He has over 23 years of experience in a variety of industries.

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