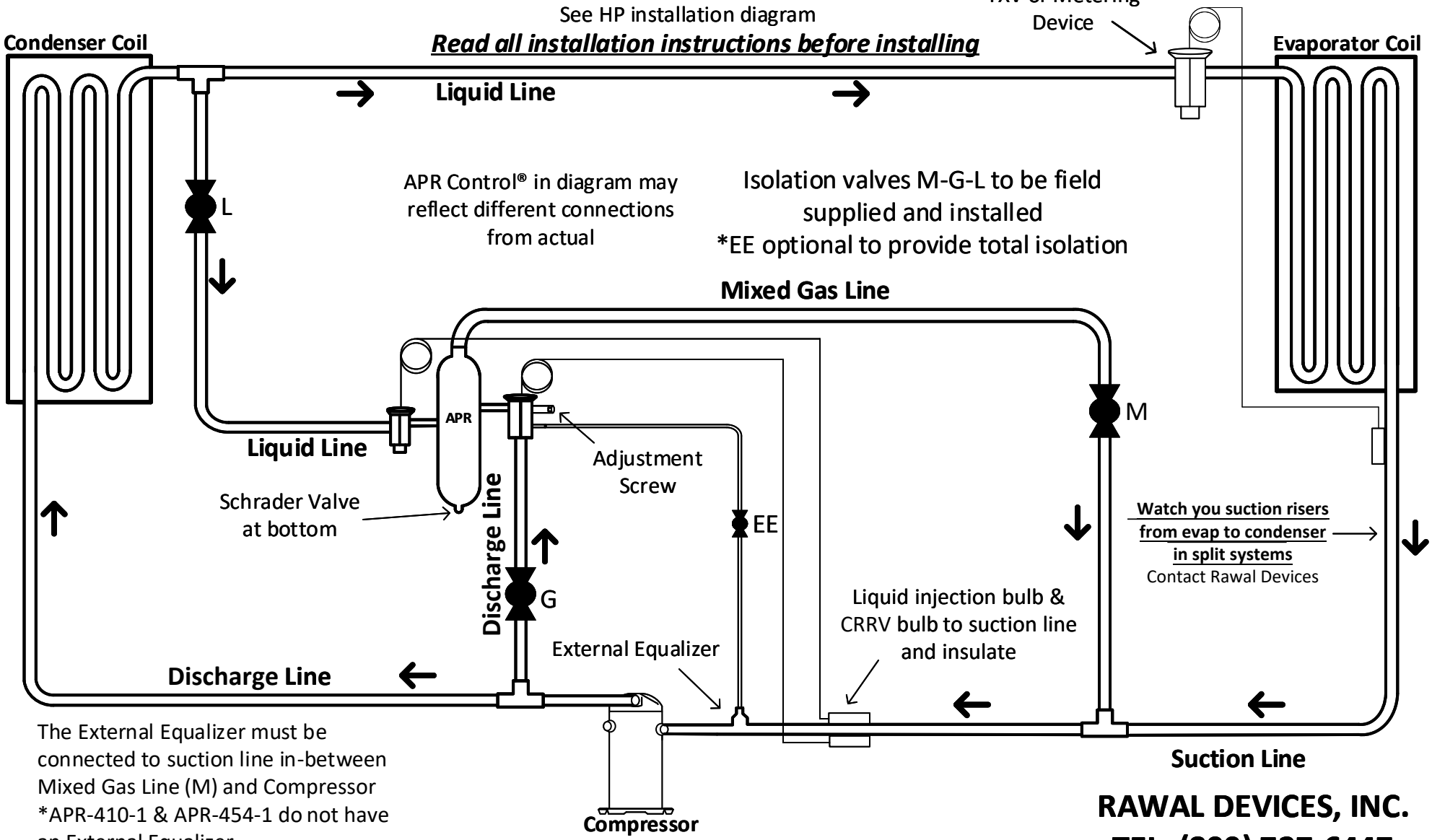
FREE 20-MINUTE ONLINE PRE-INSTALLATION TRAINING AVAILABLE

APR CONTROL® IN SINGLE EVAPORATOR MODE

Heat Pump(HP) installation will be different.
See HP installation diagram

Read all installation instructions before installing



The External Equalizer must be connected to suction line in-between Mixed Gas Line (M) and Compressor
*APR-410-1 & APR-454-1 do not have an External Equalizer

RAWAL DEVICES, INC.
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www.Rawal.com
techsupport@rawal.com

*Drawing for illustrative purposes only
Please call for assistance

APR Control Spec & Dimension Sheet

R-410A

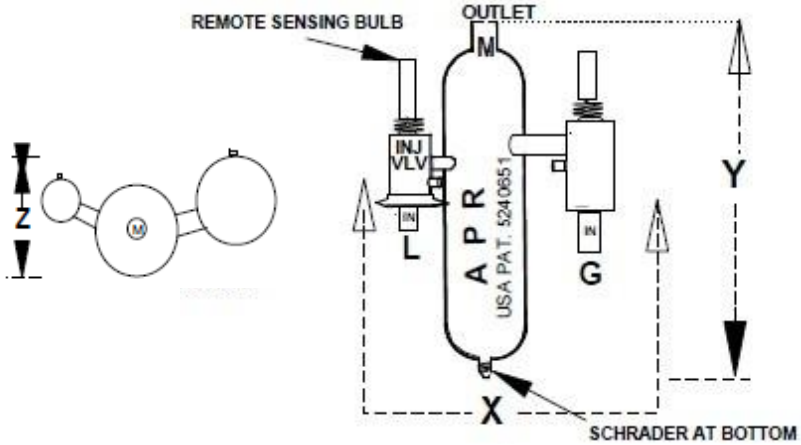
		Unit Dimensions				Connection Dimensions (OD)			
Model #	**Modulation Capacity**	**X**	**Y**	**Z**	**EE**	**L**	**M**	**G**	**G Location**
APR-410-1	1.5 tons	8.5”	8”	4”	N/A	3/8”	5/8”	3/8”	G – Bottom Connection
APR-410-2	2.5 tons	8.5”	8”	4”	1/4”	3/8”	5/8”	3/8”	G – Bottom Connection
APR-410-2R	3 tons	7.5”	8”	4”	1/4”	3/8”	5/8”	5/8”	G – Side Connection
APR-410-3	3.5 tons	8.5”	8”	4”	1/4”	3/8”	5/8”	3/8”	G – Bottom Connection
APR-410-5	5.5 tons	10”	10”	5”	1/4”	3/8”	5/8”	5/8”	G – Side Connection
APR-410-6	6.5 tons	9.5”	10”	4.5”	1/4”	3/8”	5/8”	5/8”	G – Side Connection
APR-410-10	10 tons	12”	11”	5.5”	1/4”	3/8”	7/8”	7/8”	G – Side Connection

R-454B

		Unit Dimensions				Connection Dimensions (OD)			
Model #	**Modulation Capacity**	**X**	**Y**	**Z**	**EE**	**L**	**M**	**G**	**G Location**
APR-454-1	1.5 tons	8.5”	8”	4”	N/A	3/8”	5/8”	3/8”	G – Bottom Connection
APR-454-2	2.5 tons	8.5”	8”	4”	1/4”	3/8”	5/8”	3/8”	G – Bottom Connection
APR-454-2R	3 tons	7.5”	8”	4”	1/4”	3/8”	5/8”	5/8”	G – Side Connection
APR-454-3	3.5 tons	8.5”	8”	4”	1/4”	3/8”	5/8”	3/8”	G – Bottom Connection
APR-454-5	5.5 tons	10”	10”	5”	1/4”	3/8”	5/8”	5/8”	G – Side Connection
APR-454-6	6.5 tons	9.5”	10”	4.5”	1/4”	3/8”	5/8”	5/8”	G – Side Connection
APR-454-10	10 tons	12”	11”	5.5”	1/4”	3/8”	7/8”	7/8”	G – Side Connection

Please refer to Rawal Devices Engineering & Sales Team for proper APR Control Selection

Isolation Ball Valves/ Manual Shut-off Valves Required for ALL CONNECTIONS



Call Tech Support: (800) 727 – 6447

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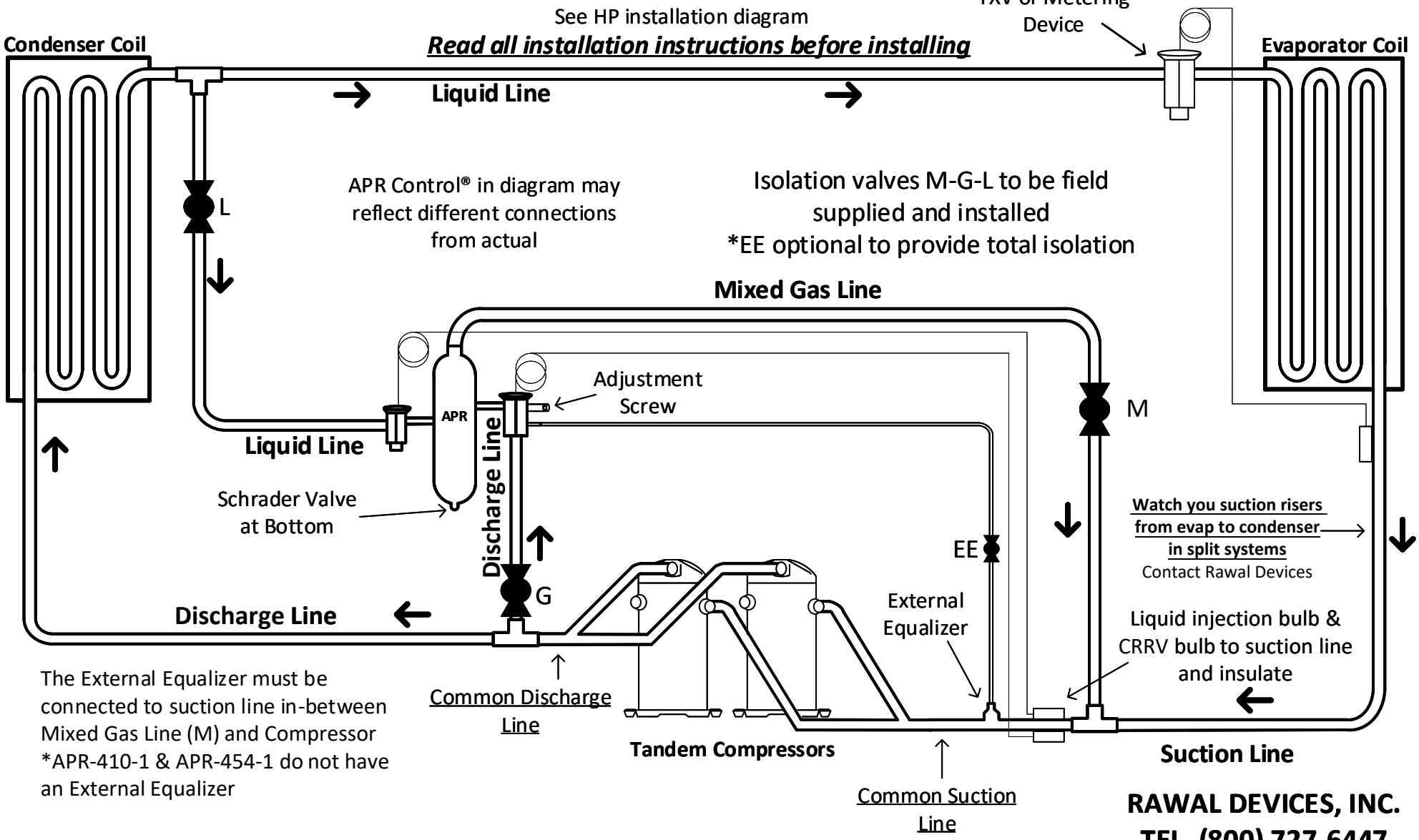
Visit: www.rawal.com

FREE 20-MINUTE ONLINE PRE-INSTALLATION TRAINING AVAILABLE

APR CONTROL® IN TANDEM COMPRESSOR CONFIGURATION

Heat Pump(HP) Installation will be different.
See HP installation diagram

Read all installation instructions before installing



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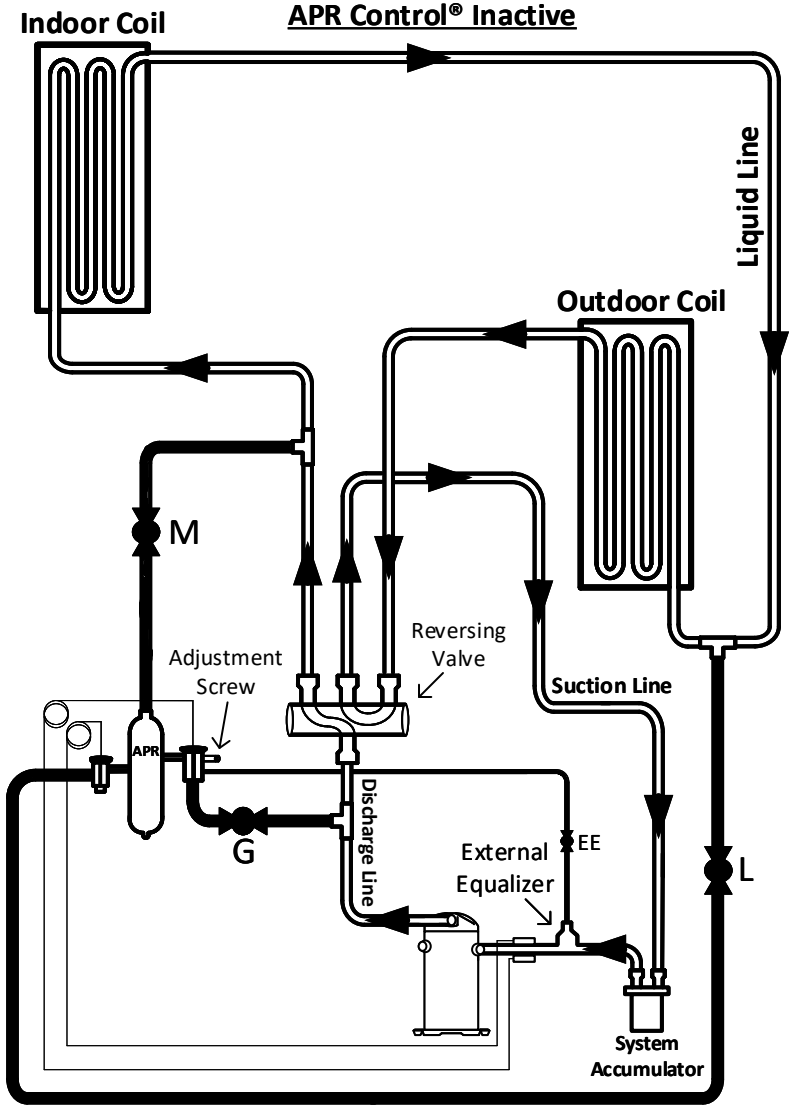
FREE 20-MINUTE ONLINE PRE-INSTALLATION TRAINING AVAILABLE

APR CONTROL® IN A HEAT PUMP SYSTEM

Read all installation instructions before installing

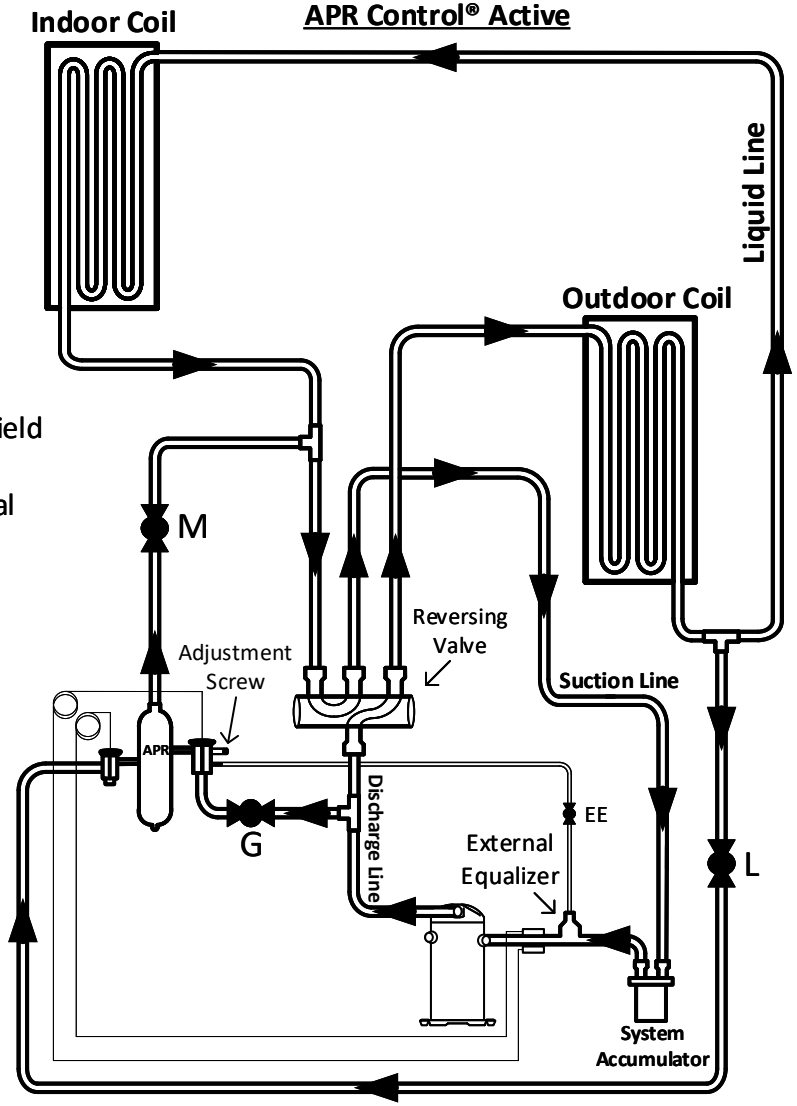
Heating Mode
APR Control® Inactive



Isolation valves M-G-L to be field supplied and installed
*EE optional to provide total isolation

APR Control® active in cooling mode only

Cooling Mode
APR Control® Active



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APR Control Installation Instructions

If possible pump down system and lock existing refrigerant in the receiver or condenser. If you cannot secure existing system charge, use proper refrigerant recovery methods to save and store the refrigerant charge. Before installing the APR Control, make sure your system is clean –if not, or in doubt a new filter / strainer must be used to protect the APR Control to isolate and remove the system contaminants. Particles of dirt can settle on the valve seat of the Compression Ratio Reduction (CRR) Valve and prevent it from closing, leading to possible compressor overheating and system damage.

After you install the APR Control, use standard evacuation procedures and follow the directions listed below. All connections between the system and the APR Control can be made in the condensing section. The APR Control may be mounted outside the condensing unit housing if space or access are a problem. The APR Control should be mounted vertical, with discharge from the desuperheating chamber UP or an orientation so chamber discharge is above Schrader valve at bottom. Manual Shut off valves to isolate the APR Control connections to liquid, discharge and suction lines ***are to be field supplied and installed***. Functionally, isolation valves will assist in charging the systems and troubleshooting should difficulty with set-up arise.

Connections to the refrigerant circuit can be on horizontal or vertical pipes, but discharge from the APR Control desuperheating chamber to the suction line must be into the top of the suction line to prevent oil from draining into the APR Control chamber.

All connections to the APR Control should be made with Stay-Silv® 15 or equivalent Brazing Alloy. Keep in mind when brazing that the exterior of the APR Control is stainless while the interior is copper clad.

Always use plenty of wet rags or heat absorbing paste on the valves and aim your flame away from valve bodies to prevent possible damage.

1) Tee in a line shut off valve (G) at the compressor discharge line, (size to APR CRR Valve inlet) where strainer is supplied, install it in the APR CRRV inlet only.
2) Tee in a line shut off valve (M) at the suction line prior to compressor, (size to APR mixed gas discharge outlet at top of desuperheating chamber).
3) Tee in a line shut off valve (L) at the liquid line near the condenser coil or receiver outlet, size to APR injection valve inlet.
4) Mount APR Control securely in the condensing unit.
5) Connect discharge line from valve (G) to the inlet on CRR Valve connected to APR Control. CRR valve inlet marked with Red Discharge Line sticker.
6) Connect suction from the line valve (M) to the mixed gas outlet on top of APR Control desuperheating chamber.
7) Connect liquid from the line valve (L) to the liquid injection valve (TXV) inlet on APR Control.
8) External equalizers on sides of APR Control Compression Ratio Reduction valve should be connected to the suction line between mixed gas discharge connection from the APR Control and compressor inlet.
9) The injection valve bulb and CRR Valve bulb *must* be mounted, and insulated, to the suction line between compressor and mixed gas discharge connection from the APR Control.
10) Leak test system and evacuate. Before charging system close all APR Control line valves, do not leave the APR Control open when charging the system. No additional charge is required for the APR Control to operate.

For R-410A (High Temperature Systems):

- CRR Valve set to open at 118psig (40°F)
- Liquid Injection Valve set to open at approx. 65°F (20° Superheat) for compressor protection

For R-454B:

- CRR Valve set to open at 120psig (43°F)
- Liquid Injection Valve set to open at approx. 65°F (20°Superheat) for compressor protection

Please refer to the Spec. & Dimension sheet for connection sizes for specific model APR Controls.

Adjustment settings to all APR Control valves need to be confirmed in the field.

APR Control Operation and Adjustment

The APR Control® valve is a capacity modulation and dehumidification device that modulates the air conditioning system's refrigeration (circuit capacity to match the varying load conditions of the space. Often utilized to minimize the challenges of oversized air conditioning systems, the APR Control is a device that operates in response to suction pressure of an active air conditioning system. As the heat load (including occupancy, ventilation and solar loads, for example of the conditioned space drops, your suction pressure drops to the point the APR Control begins to open. A portion of discharge gets sent through the desuperheating chamber, then back to the suction line. A liquid injection valve mixes liquid with the discharge gas in the desuperheating chamber when the mixed gas temperature reaches approximately 20°superheat returning to the compressor.

The APR Control externally unloads the compressor, keeping the evaporator coil at a constant temperature below dew point, thereby dehumidifying during the extended run time achieved. Extended run time is achieved by keeping the thermostat from being satisfied too quickly (a standard cause of short cycling.

The APR Control comes factory set at approximately 120psig and typically does not require adjustment. During part-load conditions, as the heat content of the return air (including the sensible temperature drops, the saturated suction temperature will drop, resulting in a drop in suction pressure. As the suction pressure falls to approximately 120psig the APR Control will begin to open and attempt to stabilize the system suction pressure at approximately 120psig.

However, if the runtime is inadequate or low load operation fails to cause suction pressure to fall low enough (the point at which the APR Control starts to open), you may need to adjust the APR Control® Compression Ratio Reduction valve. The adjustment port can be found on the side or the bottom of the CRR valve. Remove the cap to access the set screw. The pressure setting will adjust in the range of approximately 5 lbs per 360° turn. As you adjust the APR Control, it will to reduce system capacity in order to match capacity to changing load conditions beginning at the new setting, see adjustment chart below for more details:

Each HVAC System can be different and be utilized in various applications - to get the most out of the APR Control we are striving for **Maximum Modulation of the APR Control before Compressor Termination** from the thermostat or control system!

Model #	Pressure Range (psi)	PSI Change per turn	Factory Setting (psi)
APR-410-1	96-142	5.0 # per turn Counter Clockwise Raises Setpoint	118
APR-410-2	96-137	5.0 # per turn Counter Clockwise Raises Setpoint	118
APR-410-3	90-130	5.0 # per turn Counter Clockwise Raises Setpoint	118
APR-410-5	95-115	2.5 # per turn *Clockwise** Raises Setpoint	110
APR-410-6	96-142	5.0 # per turn Counter Clockwise Raises Setpoint	118
APR-410-10	96-132	5.0 # per turn Counter Clockwise Raises Setpoint	118

Model #	Pressure Range (psi)	PSI Change per turn	Factory Setting (psi)
APR-454-1	96-142	5.0 # per turn Counter Clockwise Raises Setpoint	120
APR-454-2	96-137	5.0 # per turn Counter Clockwise Raises Setpoint	120
APR-454-3	90-130	5.0 # per turn Counter Clockwise Raises Setpoint	120
APR-454-5	95-115	2.5 # per turn *Clockwise** Raises Setpoint	115
APR-454-6	96-142	5.0 # per turn Counter Clockwise Raises Setpoint	120
APR-454-10	96-132	5.0 # per turn Counter Clockwise Raises Setpoint	120