HABEGGER
COMPLETE HVAC SOLUTIONS

Puron Advance

presented by:

Roman Krywyn
Distributor Service Managers

DISCOVER THE DIFFERENCE

Your Habegger Technical Support Team

Residential Support

- **Roman Krywyn 309-690-9711** Peoria, Springfield, Champaign, Spring Valley.
- **Rob Young 309-690-9725** Rock Island, Cedar Rapid IA

Warranty Support

- **Francisco Mendez 309-690-9712**

Commercial Support

- **Dirk Nauman 309-690-9705**
- **Jason Ruggles 309-690-9714**

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Why? The AIM Act

The AIM Act, which was included in the Consolidated Appropriations Act, directs the EPA to phase down production and consumption of HFCs in the United States by 85% over the next 15 years.

Refrigerants used in new HVAC equipment will need to have a GWP of no greater than 700 by January 1st, 2025.

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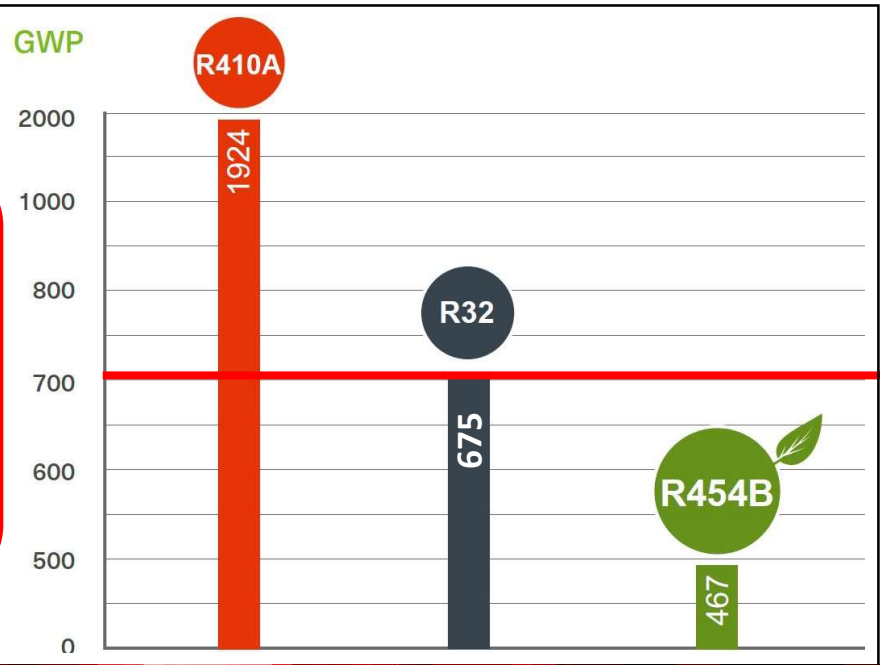
GWP

Global Warming Potential



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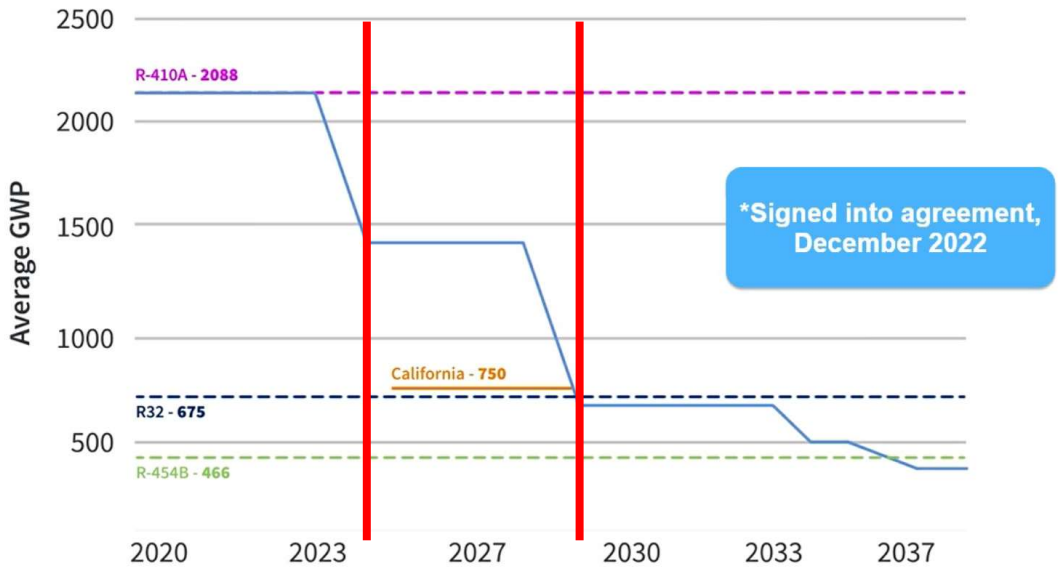
Kigali Amendment Phase-down Schedule



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Puron® Advance: Why We Win

R-454B

Leader in regulatory.

Puron® Advance will be compliant until at least 2034

GWP

466

Lower discharge temperatures

- Fewer design changes to the compressor and fewer design changes for higher ambient temperatures
- Lower discharge temperatures are also associated with longer reliability

R-32

Short term solution.

Will begin phase-out in 2029

GWP

675 Over 200 pts higher than R-45B

Higher discharge temperatures

When compared to R-454B

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	ASHRAE CLASS	EXAMPLE REFRIGERANTS	
Higher Flammability	A3	Propane, Isobutane	Ignites very easily Potentially Explosive
Lower Flammability	A2	R-152A	Ignites Easily Relatively Low Energy Release
	A2L	R-454B, R-32, R-454A, R-455A	"Mildly Flammable" Difficult to Ignite Relatively Low Energy Release Low Flame Speed
No Flame Propagation	A1	R-410-A, R-404A, R-134a, R-452A Equinox Blends	No Ignition

Refrigerant Charge Limits

- The dissipation system can use a continuous fan
- A leak detection-activated system
- Other approved dissipation system

Refrigerant Charge Limits: Mitigation

m1	3.9 lbs.	Dissipation system not required
m2	33.9 lbs.	Dissipation system required
m3	169.3 lbs	Dissipation system in addition to other requirements

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Factory Leak Detection

WHAT WE DID TO COMPLY:

- Continually scans for R-454B leak
- Mitigation threshold = 20% LFL
- Located in lower coil cabinet
  - Adjustment required for horizontal install

** actual part design and location may vary*

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Ignition Source Isolation: Outdoor unit

- Electrical ignition points
  - All potential ignition sources assessed at factory
  - Protection installed on wiring
  - Electric heaters on units are not an ignition source

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Ignition Source Isolation: Outdoor unit

- Compressor plug
  - Enclosed plugs provide necessary protection
- Electrical ignition points
  - Wire sleeves on compressor and crankcase heater wiring*
  - Manual operation still available

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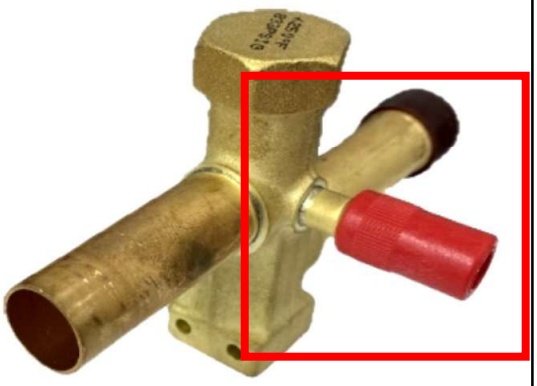
Additional R-454B installation points to remember:

- Straight stub outs
- Push fit and press fit connections are allowed



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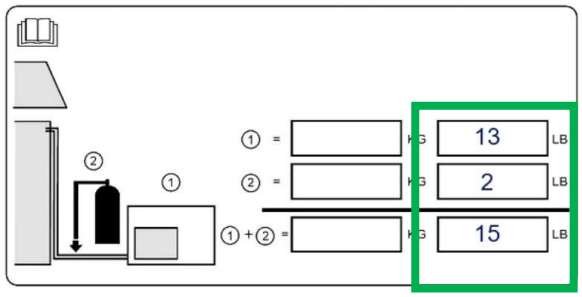
Charging Label

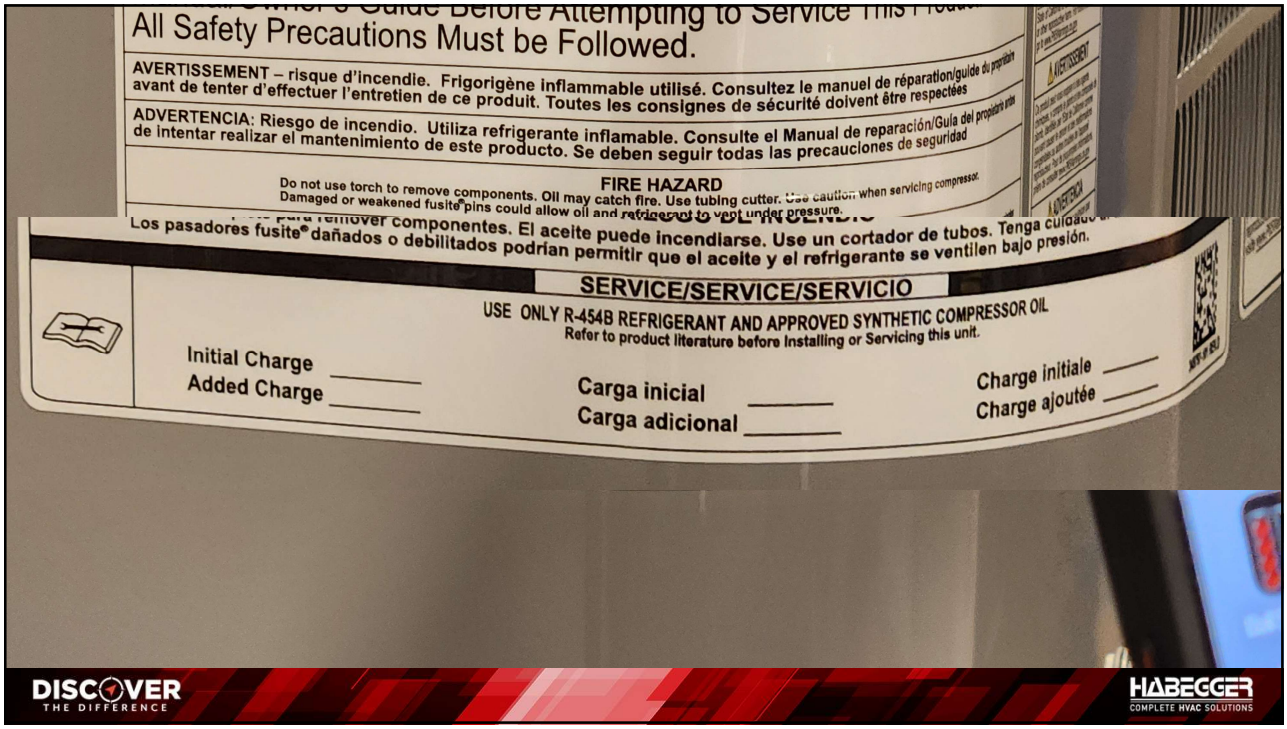
WHAT WE DID TO COMPLY:

- Documents how much refrigerant a system contains
- Completed by installing technician

1. Unit Charge
2. Unit Set Charge
3. 1 + 2 = Total Charge



DISCOVER THE DIFFERENCE HABEGGER COMPLETE HVAC SOLUTIONS



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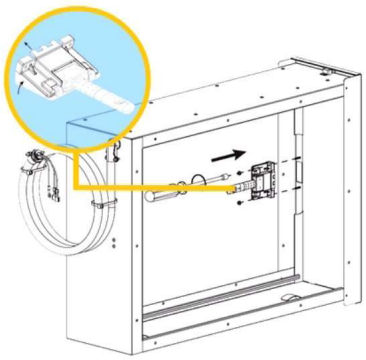
Electronic air cleaners (purifiers)

Air flow sensor is REQUIRED if purifier is installed

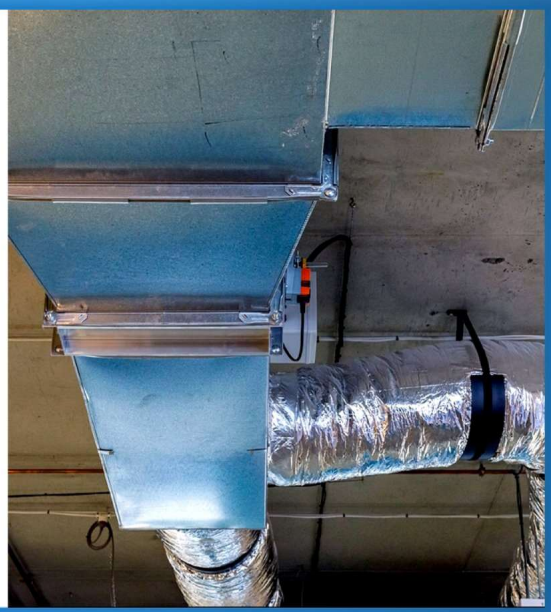
Refer to the accessory product data to determine if it comes with an air flow sensing device or if an air flow sensing kit (KIT160000) is needed.



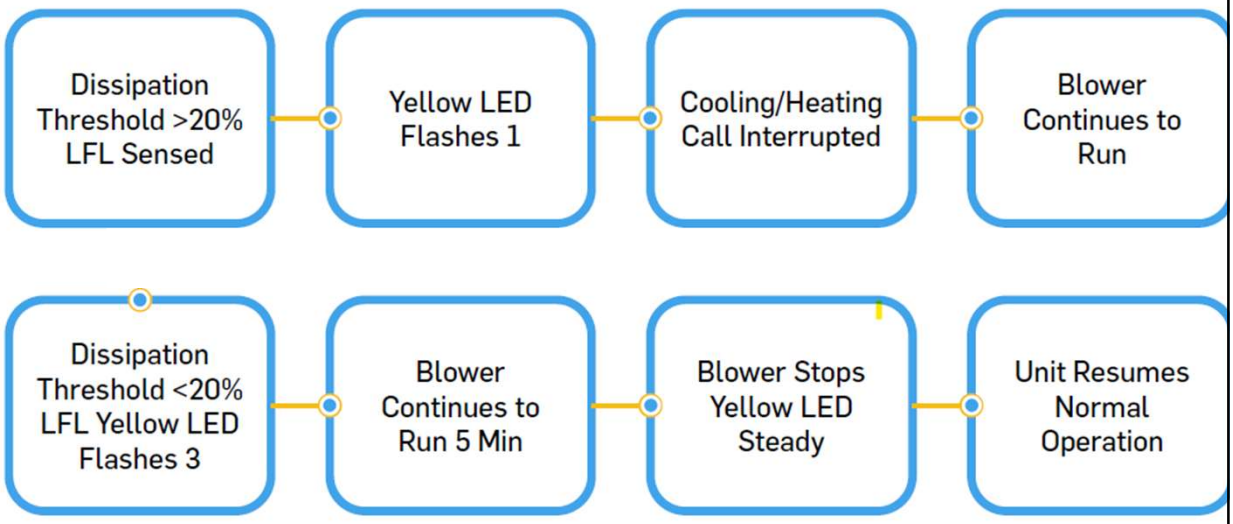
Ductwork and accessories

Requirements regarding ductwork:

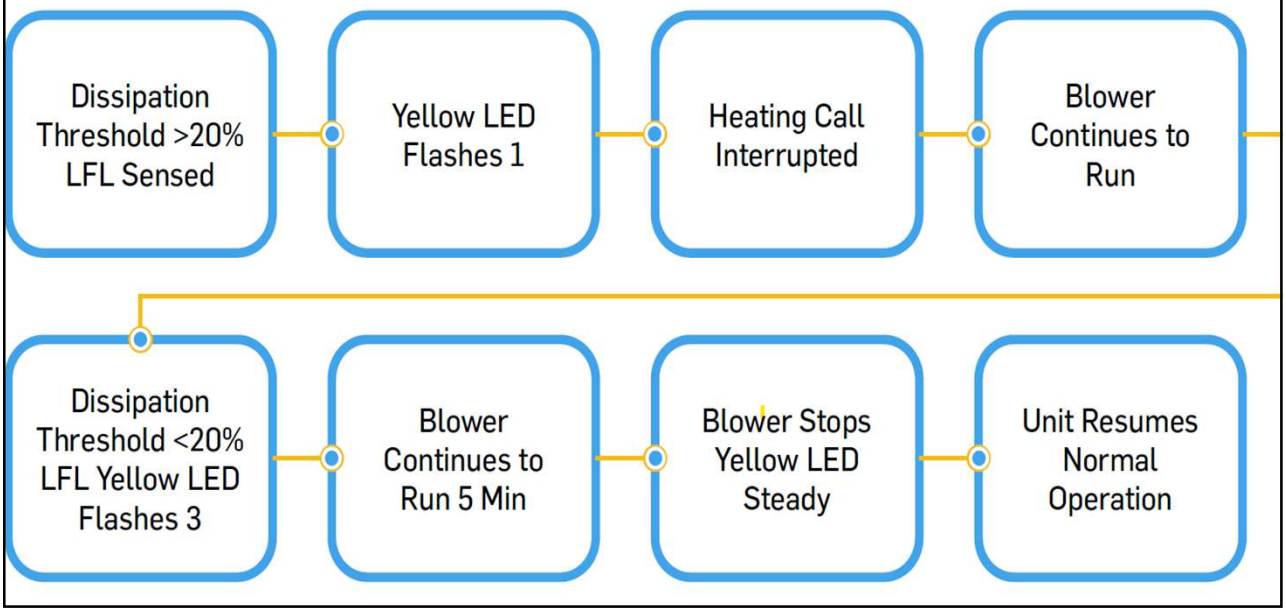
- Air ducts connected to accessory must not contain potential ignition source.
- Auxiliary devices which may be a potential ignition source must not be installed in the duct work.
  - Hot surface temperature not to exceed: 1292°F (700°C).
- Supply and return air must be directly ducted to connected room(s).
- Open areas (false ceilings, etc.) must not be used as return air ducts.



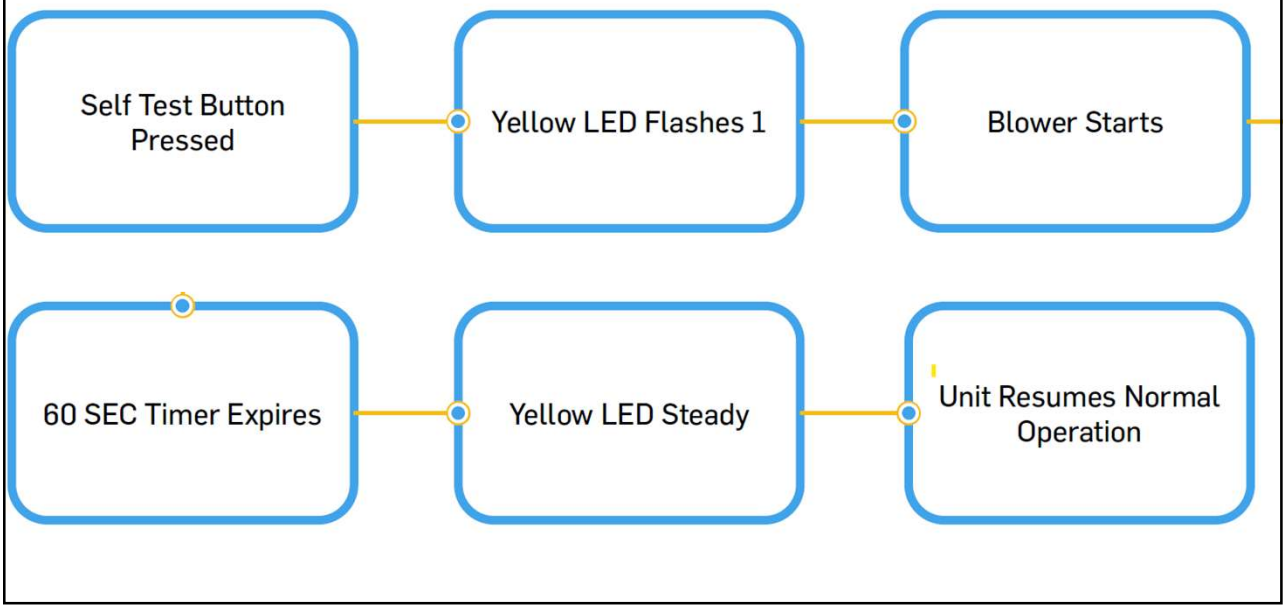
DISSIPATION MODE: COOLING / HP HEATING



DISSIPATION MODE: GAS HEATING

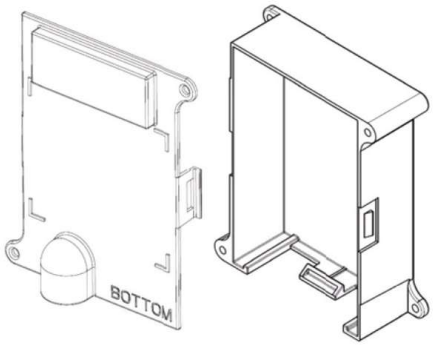


DISSIPATION MODE: SELF TEST



Installing the dissipation board

Dissipation board assembly = Dissipation board inserted inside the enclosure or housing



DO mount the dissipation board assembly:

- As close as possible to the furnace control box
- In a vertical orientation with the harnesses coming out of the bottom
- Where easily accessible and indicator light is visible

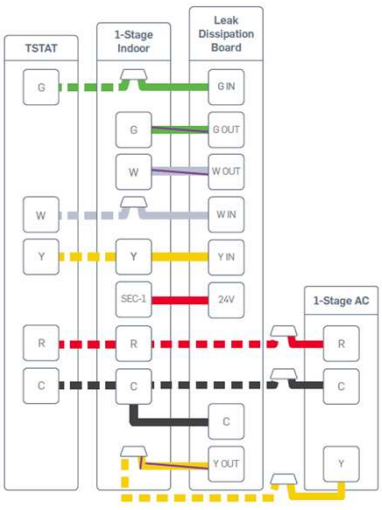
DO NOT mount the dissipation board assembly:

- Where it will be exposed to water
- Inside evaporator coil
- Inside furnace
- Inside ductwork

Thermostat with Single Stage Indoor and Single Stage Outdoor AC

Puron ADVANCE

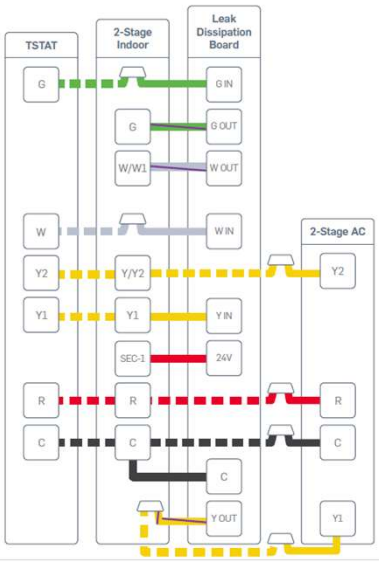
Dashed: Field supplied wires
Solid: Wires provided with unit



Thermostat with Two-Stage Indoor and Two-Stage Outdoor AC

Puron ADVANCE

Dashed: Field supplied wires
Solid: Wires provided with unit



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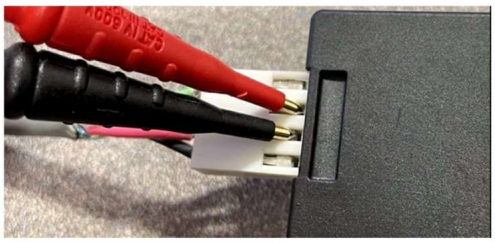
A2L Sensor Testing

- Power up with sensor connected – Wait for 10 sec (sensor warm up delay)
- Ensure the Yellow Status LED is glowing steadily (no flashes)
  - Meaning: Sensor is communicating
- Disconnect the sensor harness from the dissipation board
- Verify that within 5 sec the relays click and the yellow Status LED begins flashing 2
  - Meaning: Sensor is no longer communicating

Steps to help identify if the failure is the board, harness or sensor.

1	Verify 24 VAC between R and C on IDU and at Dissipation control R and C.
2	Remove sensor harness from A2L sensor.
3	Measure DCV between outer wires on Molex pins 1 and 4.
4	Measure DCV between pins 2 and 3.
5	Reconnect harness to sensor.
6	Measure DC voltage on outer pins 1 and 4.
7	Measure DC voltage between inner pins 2 and 3.



- Sensor should read .02 VDC to .20 VDC.
- If readings are not as indicated, replace A2L sensor.

What is dissipation?

- **Dissipation system:** Dilutes refrigerant in the event of a leak

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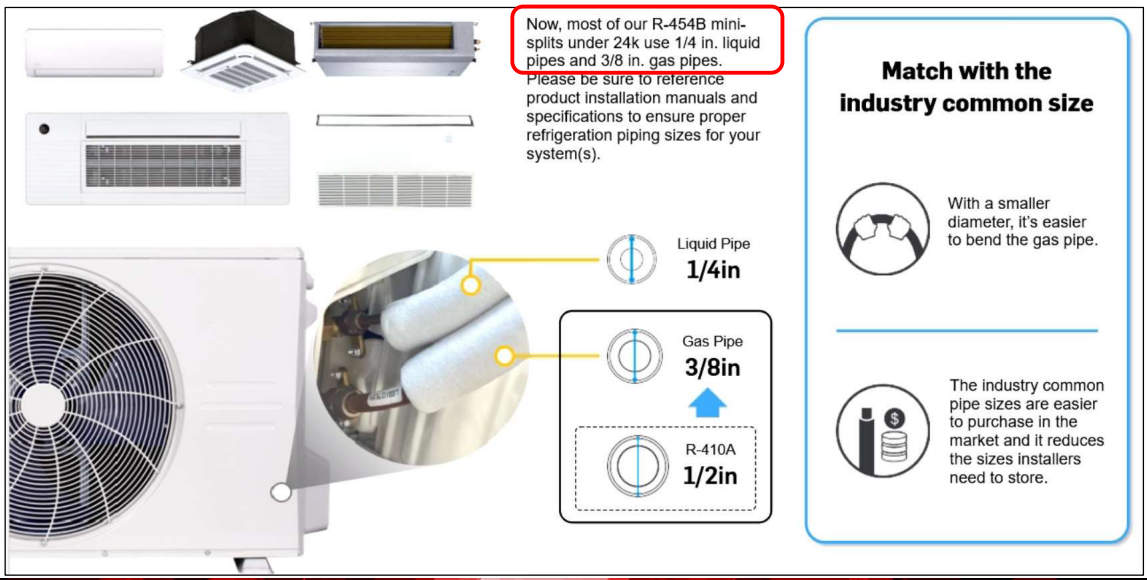
Ductless Components and Changes



DISCOVER THE DIFFERENCE

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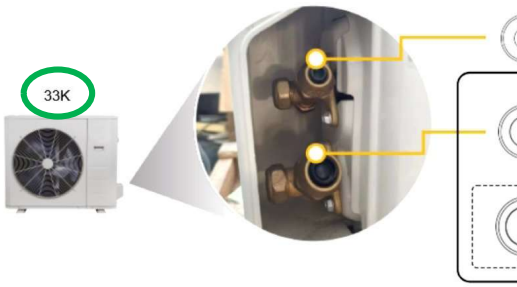
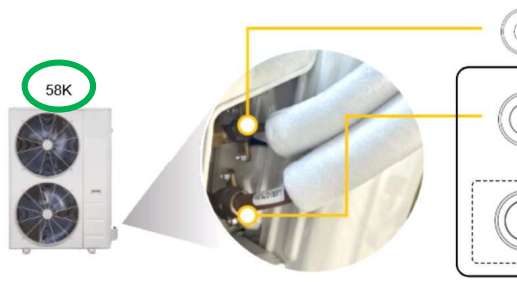
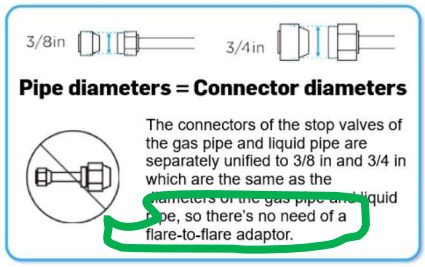
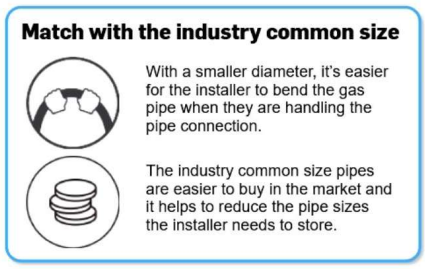
Ductless Components and Changes



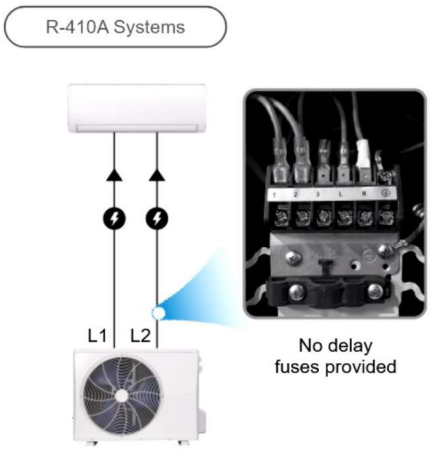




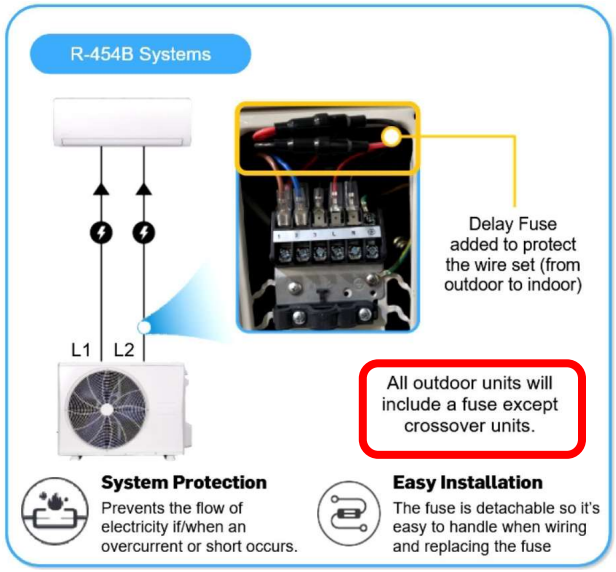


DISCOVER THE DIFFERENCE HABEGGER COMPLETE HVAC SOLUTIONS

Ductless Components and Changes



No fuses to prevent possible short circuits or over current at the wiring terminal.



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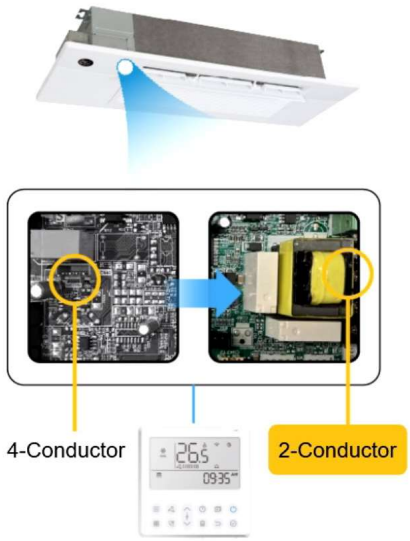
Ductless Components and Changes

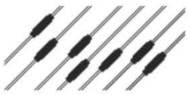


Friendly for the installers' operation

Easy for Wire Preparation
2-conductor electrical wire is more common in the market

No Polarity

Less Wire Conductors
With fewer conductors and no polarity, there are less connections to troubleshoot



Easy for Wire Extension
Easy to connect multiple 2-conductor wires

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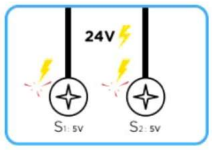
Ductless Components and Changes

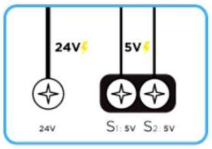
R-410A Connection Board 24V and S1/S2 Improper Termination



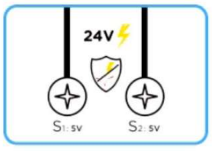
Improper Connection and Board Damage Could Occur:

- Easier for improper wiring at the 24V and S1/S2 terminals
- Could result in short circuits and over currents resulting in a damaged board

Updated Layout of R-454B Connection Board 24V and S1/S2 Terminals



Easy Connection
The 24V and S1/S2 terminals are separated, making it easier to properly terminate wiring.



Decrease in Board Damage
The firmware is upgraded to help prevent damage to the connection board if communication wiring is improperly wired.

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Ductless Components and Changes

Sensor

Shutoff valve in multi-zone outdoor units

Supercapacitor in outdoor unit

Sensor

The R-454B refrigerant leak sensor is a key component in the dissipation system and is located in the indoor unit.

The sensitivity (or detection threshold) of the sensor is determined from its LFL (or Lower Flammability Limit) range. The lower flammability limit, usually expressed in volume percent, is the lower end of the concentration range over which a flammable mixture of gas or vapor in air can be ignited at a given temperature and pressure. While the R-454B refrigerant leak sensor is set to detect at concentration levels of 20-25%, it can detect concentrations as low as 11.8% LFL.

In typical ambient conditions, the sensor has high sensitivity point of accuracy within 2.5% LFL. Even at extreme conditions, the sensor remains accurate to a 5% LFL range.

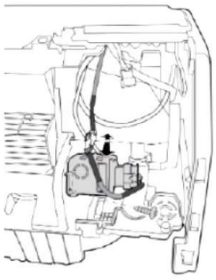
If the sensor does detect a leak, typical response times are between 15 and 30 seconds.

A life cycle counter tracks the sensor's service life, which is about 15 years.

Sensor Location: High Wall

The sensor is located on the right side, in front of the right drain connection.

There's one screw holding the bracket near the blower assembly.



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Sensor Location: High Wall

Shows the interconnecting harness to allow the sensor to be disconnected for better access and easy servicing.

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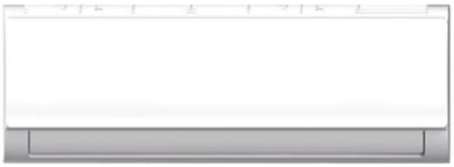
Sensor Location: High Wall

The sensor is located inside the lower cover on the right side, below the right louver motor.



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Sensor Location: 4-way Cassette

The sensor is behind the PCB assembly, held in place by two screws.

To access it, remove the trim panel, the control box assembly, and the blower guard/water collector.

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Sensor Location: 1-way Cassette

The sensor is centered in the supply air stream, attached with one screw.

The trim panel needs to be removed to access the sensor.

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Sensor Location: Ceiling Console

The sensor is in the middle of the supply air stream, attached to a metal bracket with one screw.

Open the filter panel for access.

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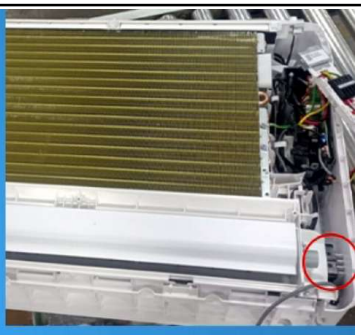
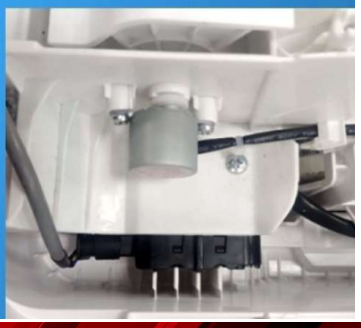
Sensor Location: Floor Console

The sensor is located in the lower right corner inside the front cover, next to the louver motor.

The front panel/display board/panel frame/lower air outlet assembly needs to be removed to access the sensor.





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Sensor Location: LOW STATIC

The sensor is attached with 2 screws on the supply side of the evaporator coil. (The photo is looking down on the unit with the bottom facing up and with the bottom panel/"water collector" removed.)

The bottom cover/water collector/side access panel needs to be removed for access.

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Sensor Location: HIGH STATIC

The sensor is located next to the coil feeder tubes. The sensor on the high static unit is different from that on the low static unit due to UL requirements.

The side service panel and pump need to be removed for sensor access.

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Sensor Location: Indoor Fan Coil Unit

The sensor is on a bracket behind the lower front panel, connected by one screw.

When you remove the lower panel, the bracket clip will still hold the sensor in place.

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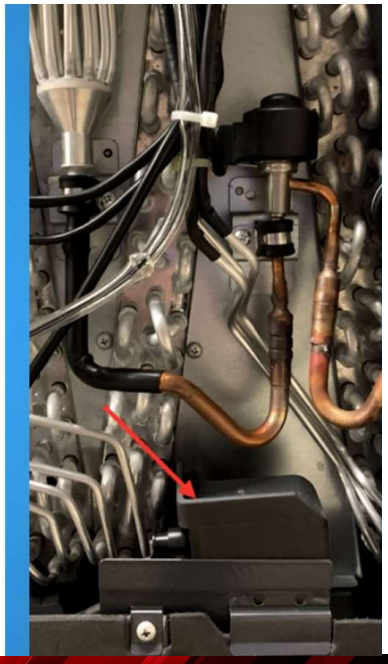
Sensor Location: Modular Indoor Fan Coil Unit

The sensor clip is attached to the top of the drain pan with one screw.

This is the preferred sensor location for all AHUs.



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Shutoff valve in multi-zone outdoor units

Multi-zone capable outdoor units are equipped with shutoff valves that operate automatically when a leak is detected.

Simultaneously, the compressor is shut off and the blower speed on the indoor unit is increased.

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Supercapacitor in multi-zone outdoor units

One of the updates for ductless R-454B multi-zone outdoor units are additional capacitors that boost the unit's capacitance to power the shutoff valves. This is a key safety factor for the dissipation system, as it ensures the shutoff valves are closed following the detection of a leak.

Following the detection of a refrigerant leak, or anytime the unit is shut off for servicing or replacement of components, this safety feature keeps the unit charged (or, hot) for up to 10 minutes.

That means you'll need to wait 10 minutes to allow the capacitor to discharge properly.

Once the capacitor has been properly measured to ensure it is fully discharged, you can then access the equipment.

Another option is to use the handheld service tool as an indicator to know when the capacitor has been fully discharged so that it's safe to access the outdoor unit.

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1:1

When a leak is detected:

1. Error code EHC1 will be displayed on the IDU
2. IDU blower switches to turbo and louvers open fully
3. Continuous audible alarm from IDU
4. ODU shuts down

DISCOVER THE DIFFERENCE HABEGGER COMPLETE HVAC SOLUTIONS

1:1

If the released refrigerant drops below the LFL threshold:

- Audible alarm resets after 2 minutes
- Error code clears after 5 minutes

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1:1

If the leak is above the LFL threshold, the audible alarm can be turned off by pressing any button on the wireless remote/wired controller (but will not remove the error code)

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1:1

Power cycling the ODU for 5 minutes will:

- Reset the audible alarm and the error code
- Place the equipment back in normal operation following correction of the leak

DISCOVER THE DIFFERENCE HABEGGER COMPLETE HVAC SOLUTIONS

Multi Zone

When a leak is detected:

- Error code EHC1 is displayed on IDU detecting leak
- All other units not detecting will display ECC1
- IDU fans set to Turbo fan speed; louvers fully open (all units)
- Continuous audible alarm from IDU detecting leak
- ODU shuts down; emergency shut off valves in ODU close

DISCOVER THE DIFFERENCE HABEGGER COMPLETE HVAC SOLUTIONS

Multi Zone

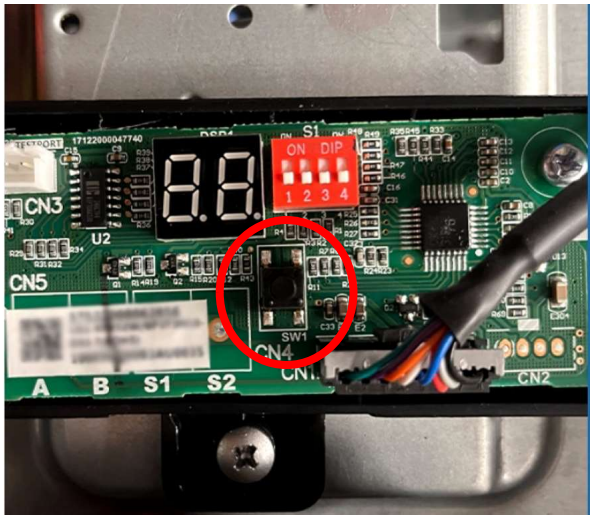
If the leak drops below the LFL threshold:

- Audible alarm resets after 2 minutes
- Error codes clear after 5 minutes
- Emergency shut off valves open after 2.5 hours
- ODU resumes operation after 2.5 hours

Multi Zone

Following leak detection and mitigation, the dissipation system must be reset.

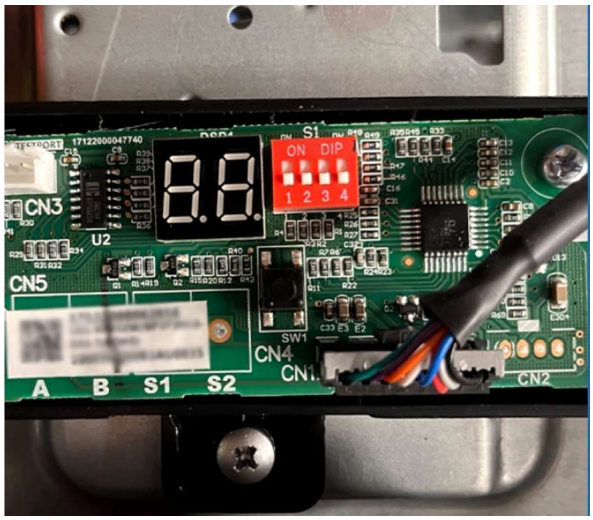
- Hold down the inquiry button in the outdoor unit for 10 seconds
- **Note:** If the outdoor unit is power cycled (without holding down the inquiry button first), ensure the outdoor unit is powered on and hold down the inquiry button for 10 seconds



Multi Zone

Following leak detection and mitigation, the dissipation system must be reset.

- **DO:** Press the Reset/Inquiry button in the outdoor unit for 10 seconds to reset the code and also reset the shutoff valves.
- **DO NOT:** Shut the power off. If the power is shut off, the error code will not reset.



DISCOVER THE DIFFERENCE

HABEGGER COMPLETE HVAC SOLUTIONS

Multi Zone

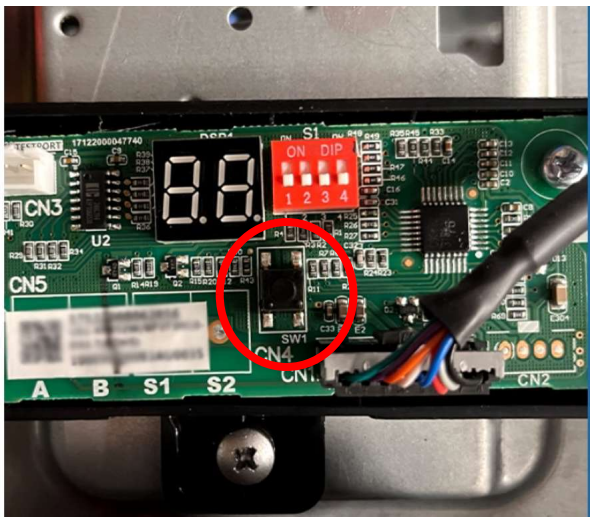
After holding the Reset/Inquiry button for 6 seconds:

- CE error code (pipe correction) appears

After holding down for 4 more seconds:

- CL (clear) code will be displayed

The 2 ½-hour lock out/reset capability for multi-zone units requirement comes from the UL 60335 standard.



DISCOVER THE DIFFERENCE

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Multi Zone

Sensor Error Codes

- EHC1 – Leak detected (triggers audible alarm)
- EHC2 – Leak detected/sensor out of range (triggers audible alarm)
- EHC3 – Sensor out of range
- FHCC – Sensor malfunction
- ECC1 – Other indoor unit sensor detecting a leak (MZUs)
- EL0C – Low refrigerant charge detection

Installation/Service

Dissipation Sensor

Checking or replacing the sensor

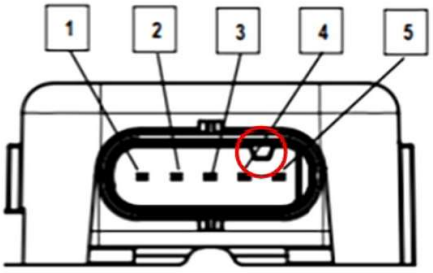
- The service life of the refrigerant sensor is 15 years
- The refrigerant sensor cannot be repaired, only replaced with the manufacturer-specified sensor
- Do not swap refrigerant leak sensors between indoor units

Installation/Service

Dissipation Sensor

Use the plastic notch inside the pin connection area for pin orientation

- Pin 1 – Input voltage
- Pin 2 – Signal voltage DC+
- Pin 3 – Signal voltage DC-
- Pin 4 – Ground
- Pin 5 – Not used (closest to notch)



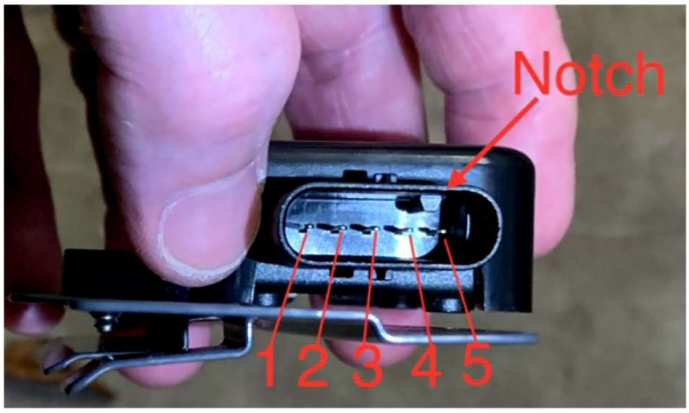
DISCOVER THE DIFFERENCE HABEGGER COMPLETE HVAC SOLUTIONS

Installation/Service

Dissipation Sensor

Sensor resistance values:

- Pins 1~2 = 245~261 kΩ
- Pins 1~3 = 248~265 kΩ
- Pins 1~4 = 30~60 kΩ
- Pins 2~3 = 70 kΩ
- Pins 2~4 = 231~265 kΩ
- Pins 3~4 = 230~261 kΩ



DISCOVER THE DIFFERENCE HABEGGER COMPLETE HVAC SOLUTIONS

Installation/Service

Dissipation Sensor

Disconnect sensor prior to checking DC voltage

If you get these readings, it indicates that the board (PCB) is good and that the issue is with the sensor itself:

- Pin 1~4= 5 VDC
- Pin 2~3= 0~1.6 VDC (range)

DISCOVER THE DIFFERENCE HABEGGER COMPLETE HVAC SOLUTIONS

Temp/Pressure 410A vs 454B

°F	R-410A
60	170
65	185
70	201
75	217
80	235
85	254
90	274
95	295
100	317
105	340
110	365
115	391
120	418
125	446
130	476

R-454B is 5.3 % Lower Pressure

°F	R-454B
60	161.0
65	175.3
70	190.4
75	206.4
80	223.3
85	241.1
90	260.0
95	279.9
100	300.8
105	322.8
110	346.0
115	370.4
120	395.9
125	422.8
130	450.9

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Installation/Service

Pressure/vacuum tests:

DISCOVER THE DIFFERENCE HABEGGER COMPLETE HVAC SOLUTIONS

Installation/Service

Purging

New R-454B unit with new piping	New R-454B unit with existing R-410A piping	New R-454B unit with existing R-454B piping
Recommended purge with nitrogen to clean debris from lines during the recovery process	Recommended purge with nitrogen during the recovery process	Double evacuation and purging with nitrogen of the line set IS REQUIRED during the recovery process
Single evacuation will suffice	Single evacuation will suffice	Standard flaring and pipe connections apply. Be sure to flow nitrogen during brazing; brazing is acceptable

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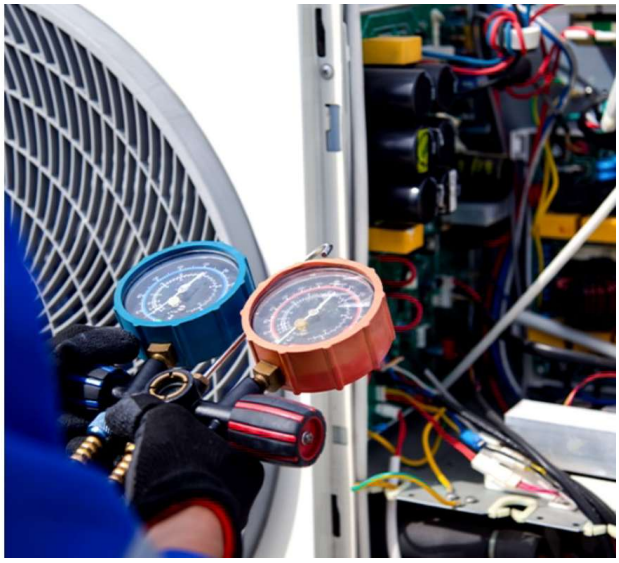
Installation/Service

Charging must be performed by the liquid charging method



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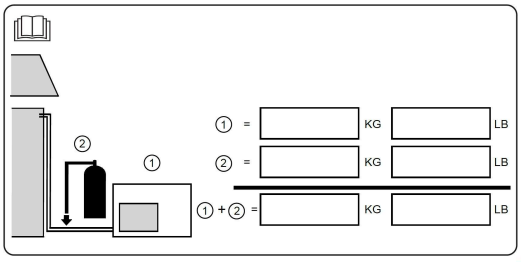
CHARGING A R-454B SYSTEM

- Ensure disconnect box is not attached to the unit

Ensure ignition sources are eliminated

- Have refrigerant tank on scale and add charge to the unit as liquid only
- Add charge to achieve desired subcooling using charging chart on unit
  - Charging chart is different than with R-410A
- Record charge amount on unit label



DISCOVER THE DIFFERENCE HABEGGER COMPLETE HVAC SOLUTIONS

Installation with R-454B vs. R-410A:

- Federal regulations prohibit venting any refrigerant (R-410A or R-454B) to the atmosphere
- TXVs meet rating requirements for the appropriate refrigerant
- Charge TXV units with the subcooling method in COOLING mode (if in ideal temperature range*)
- If temperatures are out of range, weigh in the refrigerant and recheck when temperatures are in range

* Favorable conditions (ideal temperature range) exist when:

The outdoor temperature is between 70°F and 100°F (21.11°C – 37.78°C) AND

The indoor temperature is between 70°F and 80°F (21.11°C – 26.67°C)

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Puron Advance

presented by:

Roman Krywyn

Distributor Service Managers

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