



REFRIGERATION
DIAGNOSTICS ACADEMY

— DIAGNOSE FASTER. FIX SMARTER. —



DATA



DIAGNOSIS



KNOWLEDGE



PROGRESSION

REAL SYSTEMS. REAL FAULTS. REAL SOLUTIONS.

BEGINNER COURSE

Refrigeration Basics

By the end of this course you can:

- Identify each main component
- Explain what each one does
- Say where it sits in the cycle

DIAGNOSE FASTER. FIX SMARTER.

Refrigeration is moving heat

A fridge doesn't make cold. It moves heat from where we don't want it (inside the cabinet) to where we don't mind it (outside).

01.

Cold is just less heat

You can't add cold. To cool something down, we take heat away.

02.

Heat flows warm to cool

On its own, heat always moves from a warmer thing to a cooler thing.

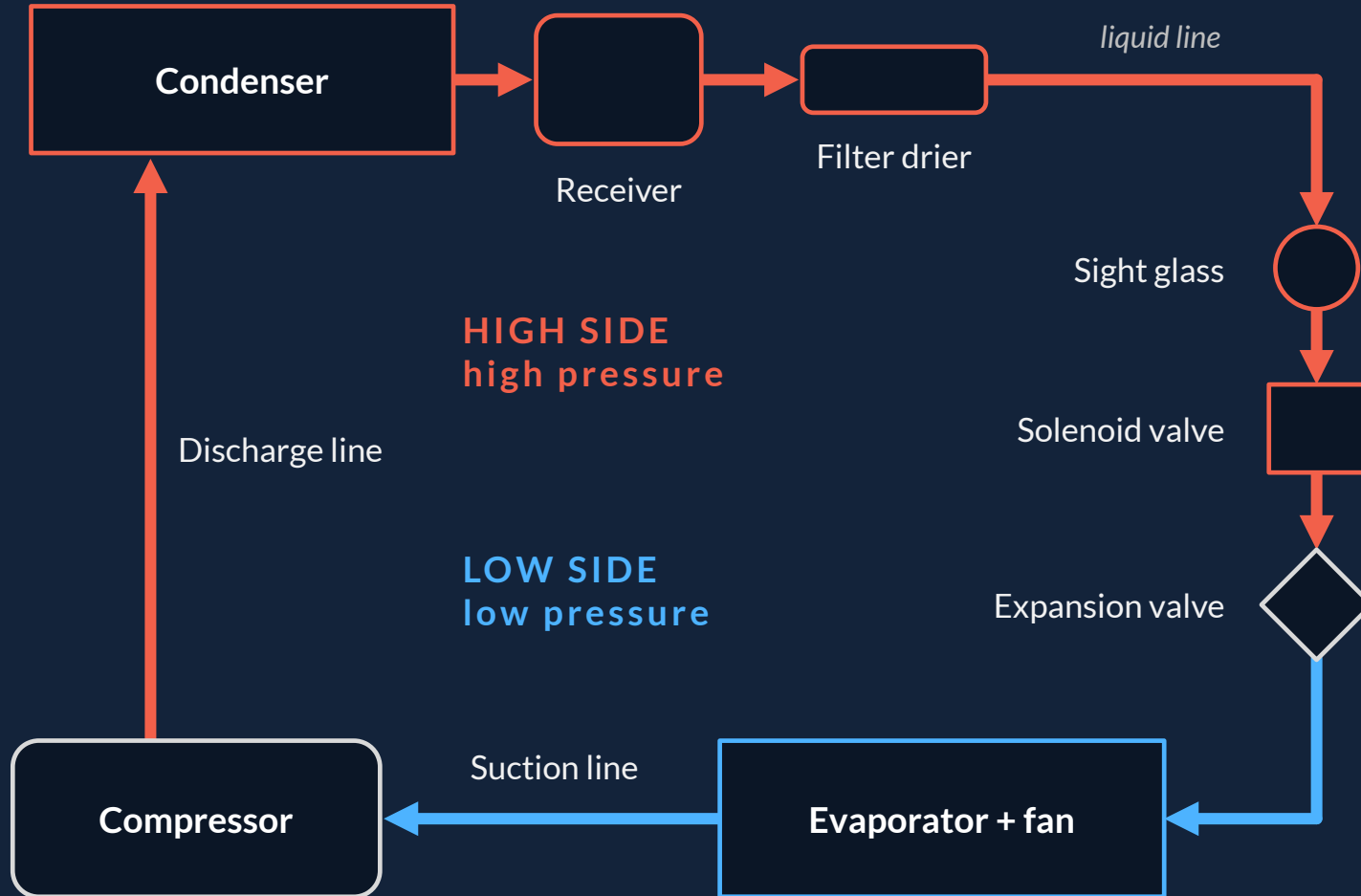
03.

Refrigerant carries it

It soaks up heat as it boils inside, then gives it off as it condenses outside.

The big picture: one sealed loop

Eight main parts on one pipe circuit. Red is the high side (high pressure). Blue is the low side (low pressure).



Follow the arrows

High side: from the compressor, through the condenser and the liquid line, up to the expansion valve.

Low side: from the expansion valve, through the evaporator, and back along the suction line.

The compressor and the expansion valve are where the two sides meet.

8

main parts in one loop

The compressor: the heart of the system

It pumps the refrigerant round. Cool, low-pressure gas goes in; hot, high-pressure gas comes out.

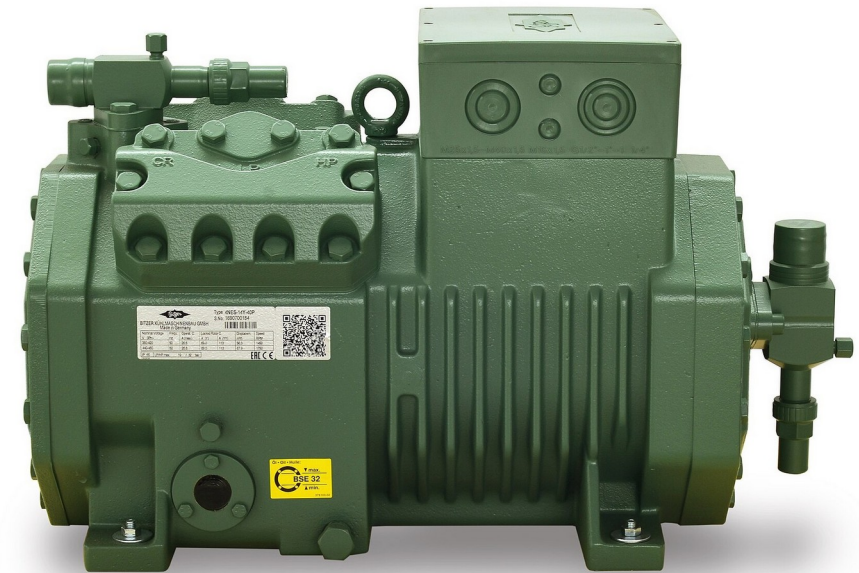
Main types: reciprocating (pistons), scroll (two spirals) and screw (two rotors, big systems).



Suction line
from the evaporator



Discharge line
to the condenser



The condenser: where the heat goes out



Air-cooled condenser with four fans, on the wall of a cold store

Photo: Kopiersperre, Wikimedia Commons, CC BY-SA 3.0

01 Gets rid of the heat

Hot gas gives its heat to the outside air, cools down and turns back into a liquid.

02 Air-cooled, with fans

Fans pull outside air across a coil of finned tubes. Usually outdoors or on a roof.

03 Where it sits

After the compressor (discharge line in), before the receiver (liquid out).

Receiver and filter drier

Both sit on the liquid line, after the condenser: receiver first, then the filter drier.

A

Receiver

A storage tank for liquid refrigerant. It holds the spare charge, ready for the system to use.

B

Filter drier

A filter on the liquid line. It traps moisture, dirt and debris before they cause damage.



Filter drier

Photo (cropped): AnyNameWillExpire, CC BY-SA 4.0, Wikimedia Commons



Receiver

Photo: Vladimir Lobachev, CC BY-SA 4.0

Sight glass and solenoid valve

Both sit on the liquid line, between the filter drier and the expansion valve.

Sight glass: a little window. Clear liquid is good; lots of bubbles can mean something's wrong, such as being short of refrigerant. The coloured ring shows moisture: on many, green = dry, yellow = wet.

Solenoid valve: an electric on/off tap. Coil powered: open, liquid flows. Power off: closed, flow stops.



Sight glass

Window + moisture indicator

Illustration: Andrew.wittkamper, Wikimedia Commons, CC BY-SA 3.0



Solenoid valve

Electric coil on a valve body

Photo: InterCity(IC), Wikimedia Commons, CC BY-SA 4.0

The expansion valve

Just before the evaporator

It does two jobs:

- Drops the pressure, so the refrigerant can boil at a low temperature.
- Controls how much liquid flows into the evaporator.

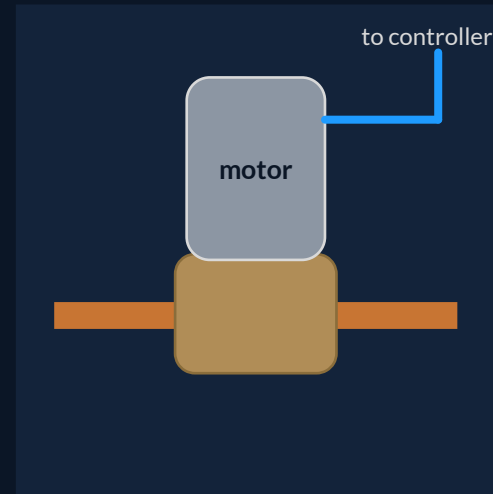


TEV

Thermostatic expansion valve

A sensing bulb on the evaporator outlet opens or closes it.

Photo: Neurotronix, Wikimedia Commons, CC BY-SA 4.0

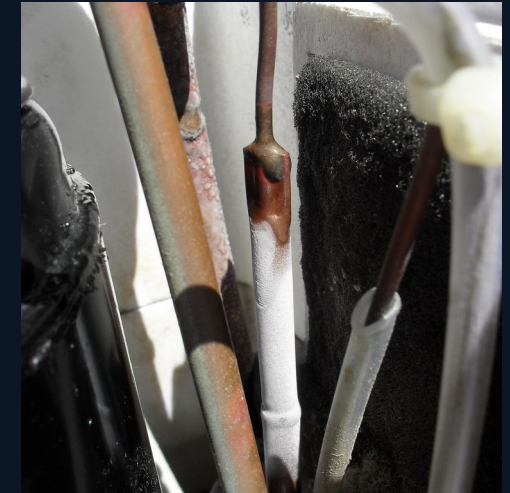


EEV

Electronic expansion valve

A controller and motor set the opening from sensor readings.

Simple drawing, not a photo



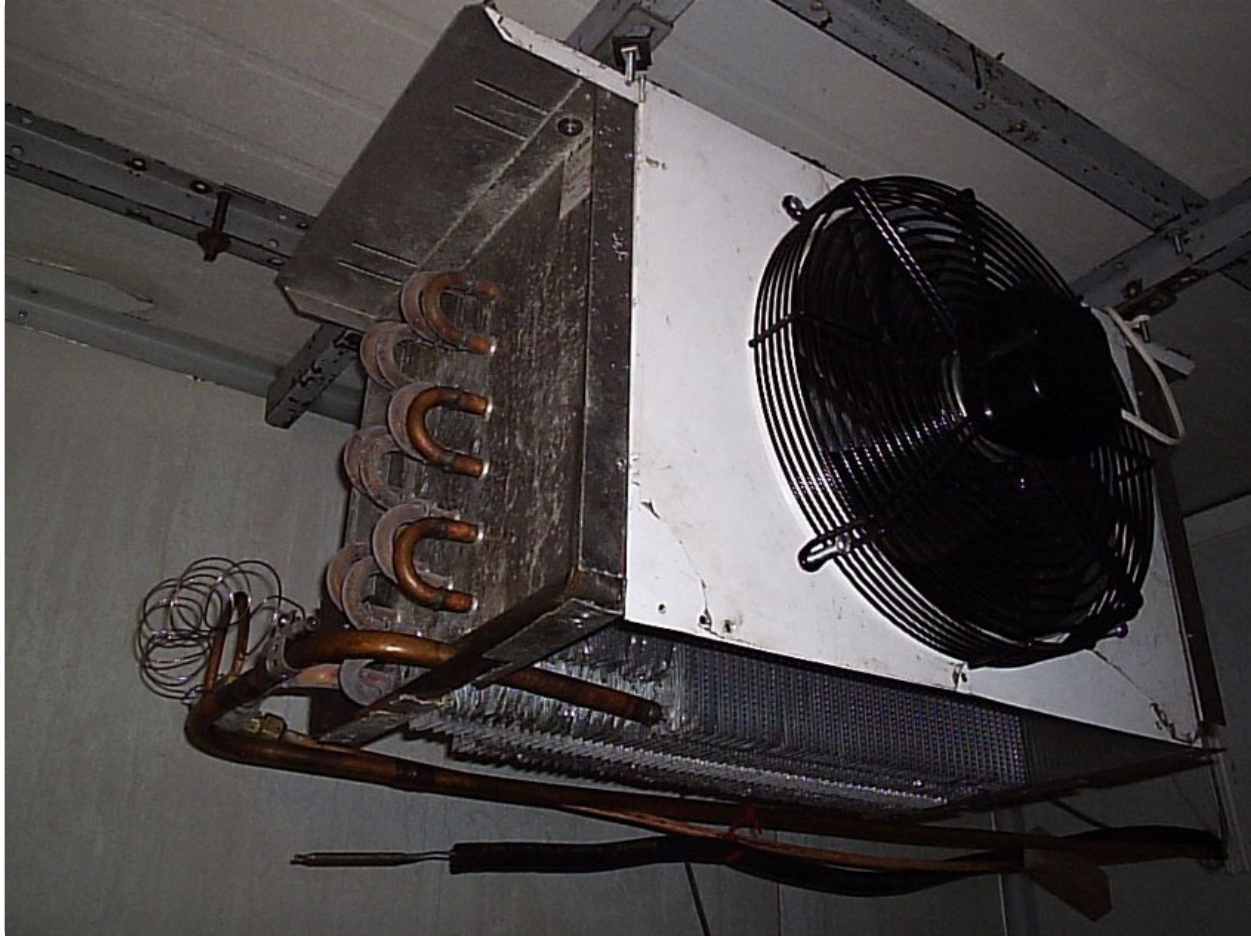
Capillary tube

Fixed, very thin tube

No moving parts. Used on small kit, like domestic fridges.

Photo: Kristoferb, Wikimedia Commons, CC BY-SA 3.0

The evaporator: where the heat comes in



WHAT IT DOES

1

Soaks up heat from the cabinet

INSIDE THE COIL

2

Refrigerant boils and takes in heat

THE FANS

3

Blow cabinet air across the coil

Sits after the expansion valve, inside the cabinet or cold room. Out goes the suction line.
Ice builds up on the coil over time, so it's defrosted every so often to keep air flowing.

Pipework: three lines to know

D

Discharge line

Hot gas, from the compressor to the condenser. Can be hot enough to burn.

L

Liquid line

Warm liquid, from the condenser and receiver to the expansion valve.

S

Suction line

Cool gas, from the evaporator back to the compressor. Often insulated.

?

Telling them apart

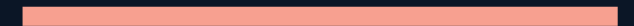
Follow the pipe to the part it joins. Suction is usually the fattest and lagged.

How they look



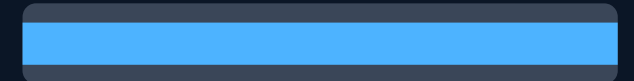
Discharge

hot gas · high side



Liquid

warm liquid · high side



Suction

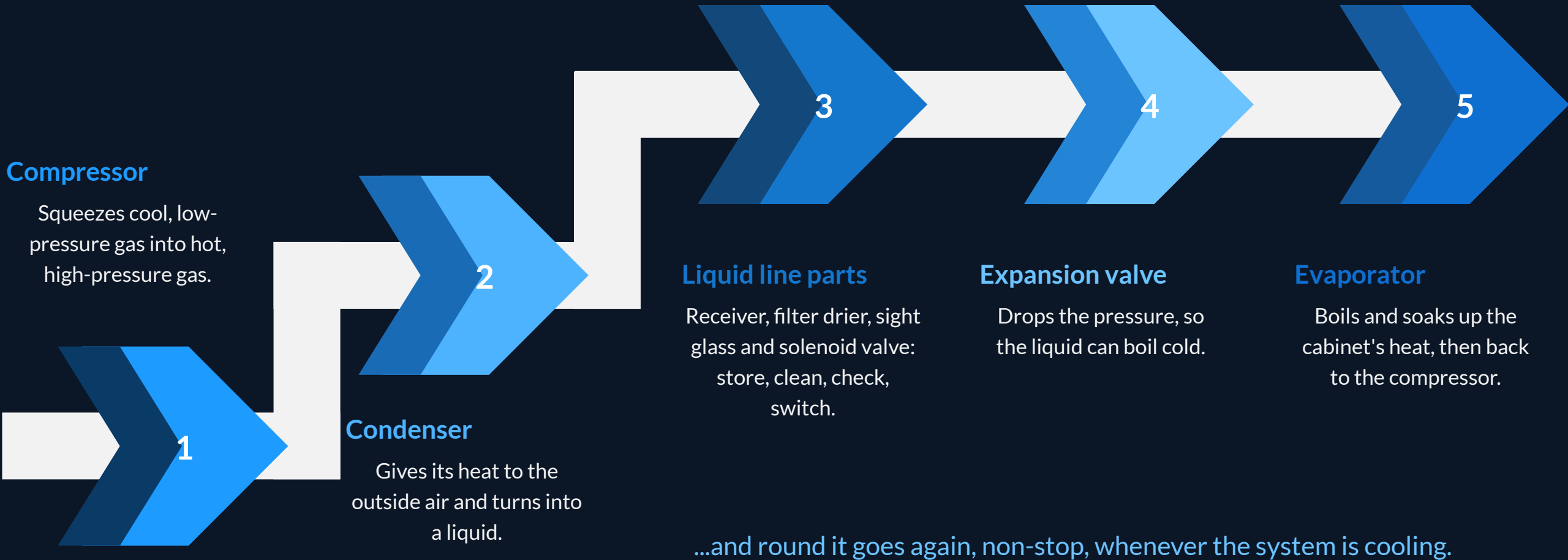
cool gas · low side · lagged

Safety: don't grab pipes to test them. Some are very hot, some very cold.

The refrigeration cycle: everything in order



Follow the refrigerant: one lap in 5 steps

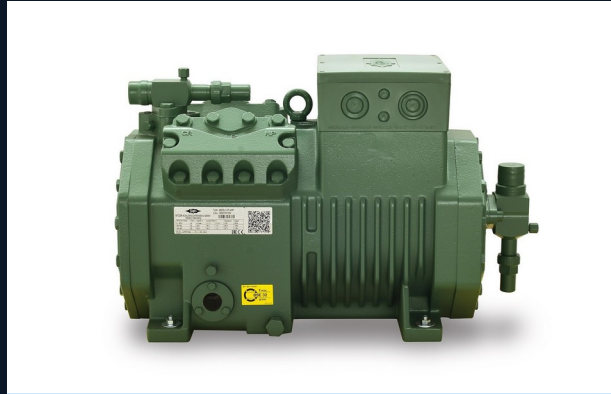


Quiz: name that part

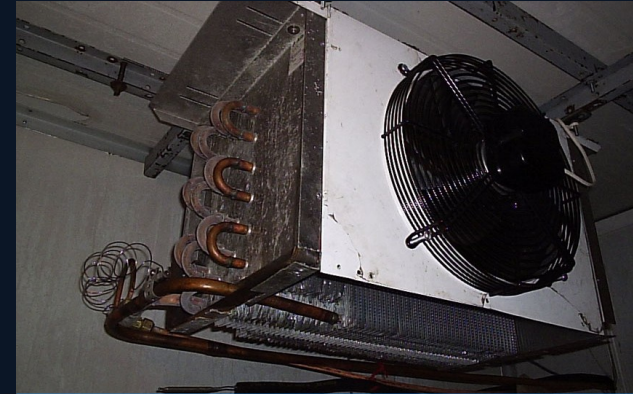
Pause the video and write down your six answers.



1



2



3



4



5



6

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Quiz: where is it in the cycle?



Word bank: evaporator + fans · compressor · sight glass + solenoid valve · condenser · expansion valve · receiver + filter drier

Pause the video, write each part in its place, then press play for the answers.

Well done, you've finished the course!

You can now:

- ☐ Identify each main component
- ☐ Explain what each one does
- ☐ Say where it sits in the cycle
- ☐ Get your certificate of completion

Keep going with RDA Fault Finder: putting this knowledge to work on real faults.

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Next course: RDA Fault Finder