MASS CLEAN ENERGY CENTER

COMPLETE REFERENCE · ALL MODULE & AUTHENTIC MATERIAL ACTIVITIES

Vocabulary Dictionary for Multilingual Learners

Contextualized ESOL Support Handout

HANDOUT

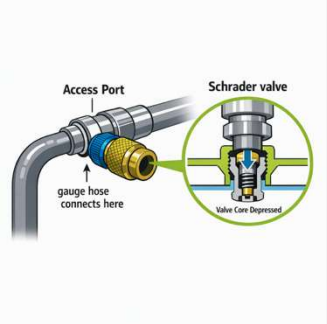
Vocabulary Reference

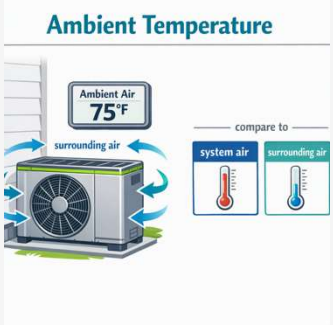
173 terms

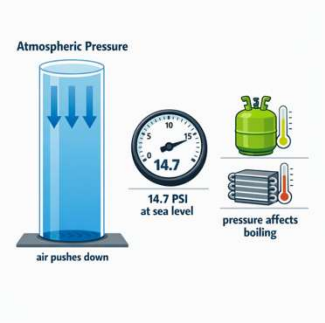
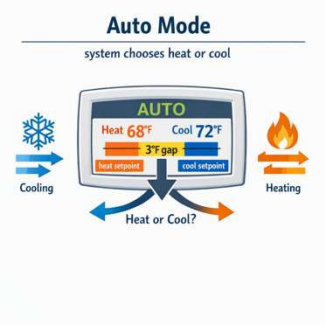
VOCABULARY DICTIONARY

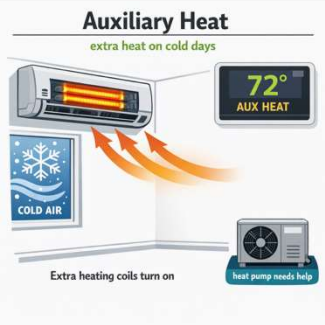
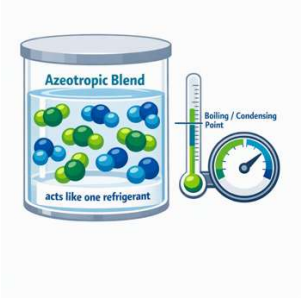
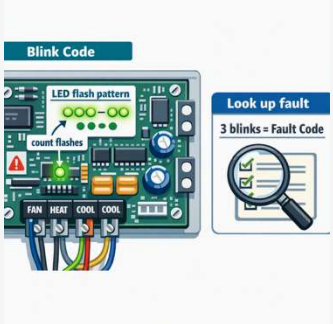
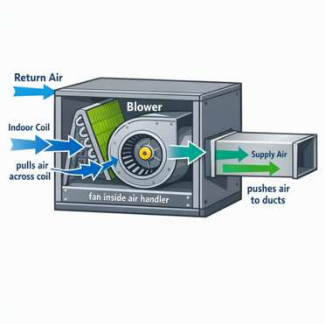
How to Use This Handout

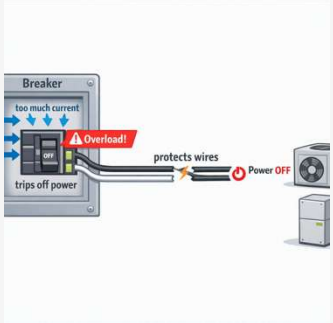
This dictionary is organized alphabetically. Each entry includes a simplified definition and an image box. All images were generated using Microsoft Co-Pilot.

	TERM	DEFINITION	IMAGE
A			
•	**Access Port**	A connection point on a refrigerant line where a technician can attach gauges or hoses. Access ports have Schrader valves that open when a hose fitting is connected.	
•	**Adapter**	A connector that lets you join two different types of fittings. Some multimeters require an adapter to plug in a thermocouple.	

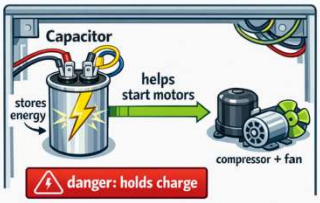
	TERM	DEFINITION	IMAGE
•	**Air Handler**	The indoor unit of a heat pump system. It contains the blower, coil, and sometimes electric heaters. It sends heated or cooled air through the ducts.	
•	**Aluminum**	A lightweight metal. Indoor and outdoor coils are made of aluminum or copper tubing. Aluminum transfers heat well.	
•	**Ambient Temperature**	The temperature of the air in the surrounding area. Technicians compare the air coming from the system to the ambient temperature to check if the system is heating or cooling properly.	
•	**Amperage**	The amount of electrical current flowing through a wire. Measured in amps. Too much amperage can damage equipment or cause fires.	

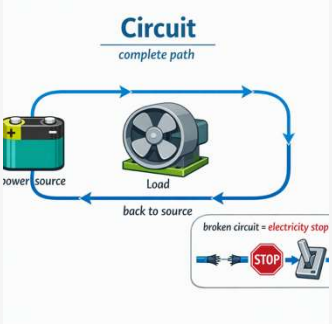
	TERM	DEFINITION	IMAGE
•	**ASHRAE**	The American Society of Heating, Refrigerating and Air-Conditioning Engineers. ASHRAE assigns R-numbers (like R-410A, R-32) to refrigerants so technicians can identify them easily.	
•	**Atmospheric Pressure**	The weight of air pushing down on everything. At sea level, this is about 14.7 PSI. Refrigerants boil at low temperatures because of pressure changes.	
•	**Auto Mode**	A thermostat setting that switches between heating and cooling as needed. The system decides whether to heat or cool based on the temperature. Heat and cool setpoints must be at least three degrees apart.	
•	**Automatically**	Without a person doing it. Some safety switches reset automatically. The system waits, then starts again on its own.	

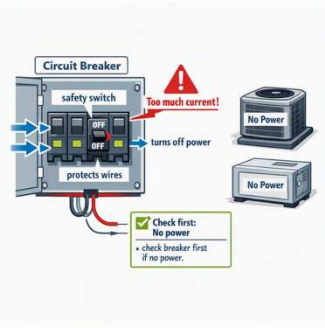
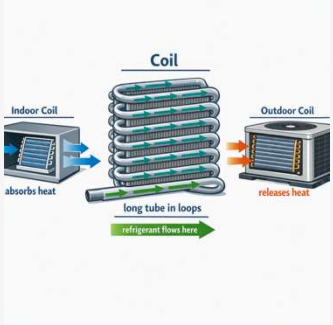
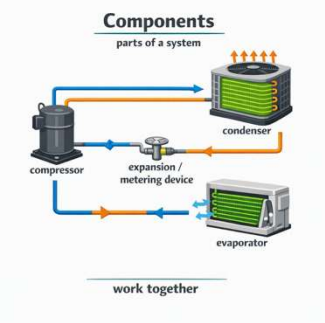
	TERM	DEFINITION	IMAGE
•	**Auxiliary Heat**	Extra heat that turns on when the heat pump cannot keep up. The thermostat calls for auxiliary heat when the outdoor temperature is very low. This usually comes from electric heater strips.	
•	**Azeotropic Blend**	A mixture of two or more refrigerants that behaves like a single refrigerant. Azeotropic blends boil and condense at one temperature at a given pressure. Refrigerants with R-numbers in the 500s are azeotropic blends. Example: R-507.	
B			
•	**Blink Code**	A pattern of LED flashes on a control board that indicates a specific fault. Technicians read the blink code and look it up in the manufacturer's troubleshooting table to identify the problem.	
•	**Blower**	A fan inside the air handler. It pulls air across the indoor coil and pushes it through the ducts into your home.	

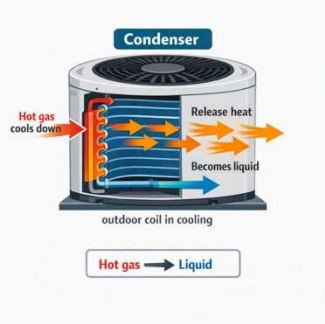
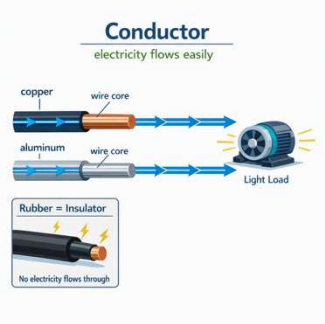
	TERM	DEFINITION	IMAGE
•	**Breaker**	A safety switch in an electrical panel. It turns off power if there is too much current. Breakers protect wires from overheating.	
•	**Bubble Point**	The temperature at which a refrigerant blend first begins to boil at a given pressure. Bubble point and dew point are used to calculate subcooling and superheat for zeotropic blends.	
•	**Butane**	A natural hydrocarbon gas used as a refrigerant. Butane is flammable. It is classified as an A3 refrigerant.	

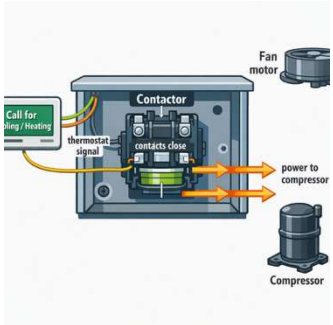
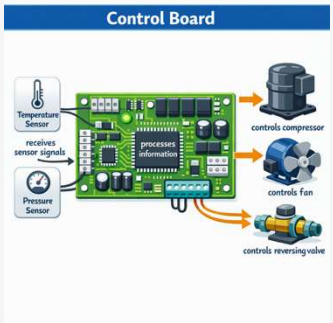
C

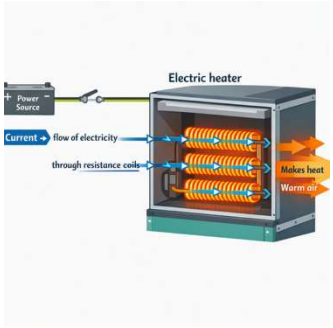
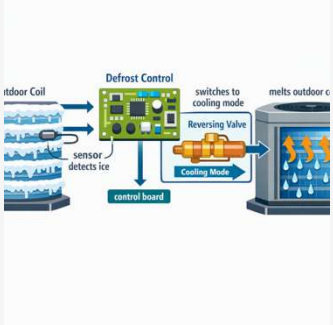
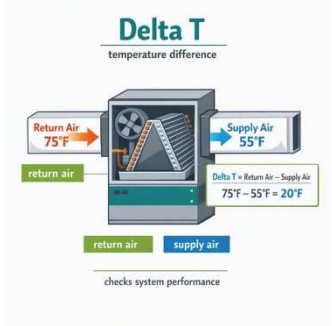
•	**Capacitor**	An electrical part that stores energy. It helps start the compressor and fan motors. Capacitors can hold a dangerous charge — be very careful.	

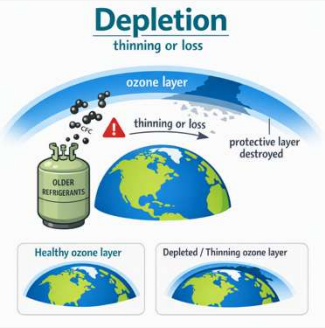
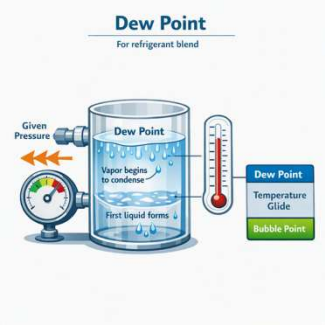
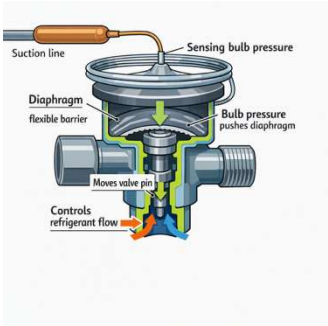
	TERM	DEFINITION	IMAGE
•	**Central Air Conditioning**	A system that heats or cools air in one place and sends it through ducts to the whole building. Forced air heat pump systems are a type of central air conditioning.	
•	**Certification**	Official proof that a person has passed a required exam. Technicians who work with refrigerants must have EPA Section 608 certification.	
•	**CFC (Chlorofluorocarbon)**	An older type of refrigerant that damages the ozone layer. CFCs have been banned. Examples: R-11, R-12. If you find CFC refrigerant in an old system, it must be recovered properly.	
•	**Circuit**	A path for electricity to flow. A complete circuit goes from the power source, through the wires and equipment, and back. If the circuit is broken, electricity stops.	

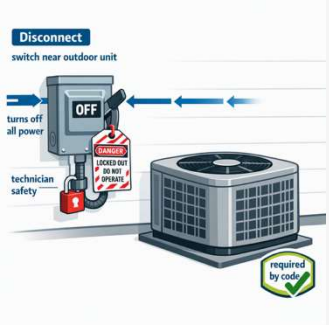
	TERM	DEFINITION	IMAGE
•	**Circuit Breaker**	A safety switch in an electrical panel. It turns off power if there is too much current. Breakers protect wires from overheating. Check the circuit breaker first if there is no power.	
•	**Coil**	A long tube bent into many loops. Heat pumps have two coils: indoor and outdoor. Refrigerant flows through the coils to absorb or release heat.	
•	**Components**	The parts of a system. In HVAC, components include the compressor, condenser, evaporator, and other parts that work together.	
•	**Compression**	1. Squeezing gas to make it smaller and higher pressure. The compressor does this. 2. Also a type of fitting. A compression fitting connects tubes without welding.	

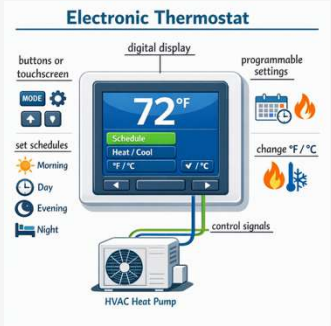
	TERM	DEFINITION	IMAGE
•	**Compressor**	The compressor is like a pump. It pushes refrigerant through the system. It makes the refrigerant hot and high-pressure. This is the most important part of an air conditioner or heat pump.	
•	**Compressor Discharge Line**	The pipe that carries hot, high-pressure refrigerant gas from the compressor to the condenser. It is the hottest line in the system. Do not touch it during operation.	
•	**Compressor Suction Line**	The pipe that carries cool, low-pressure refrigerant gas from the evaporator back to the compressor. It feels cold to the touch and may have condensation on it. Also called the vapor line.	
•	**Condensation**	When gas turns into liquid. Also, water that forms on cold surfaces. Indoor coils create condensation that must drain away.	
•	**Condenser**	The coil where refrigerant releases heat. In cooling mode, this is the outdoor coil. Hot refrigerant gas cools down and becomes liquid here.	
•	**Conductor**	A material that allows electricity to flow through it easily. Copper and aluminum are good conductors. Wires are made of conductors.	

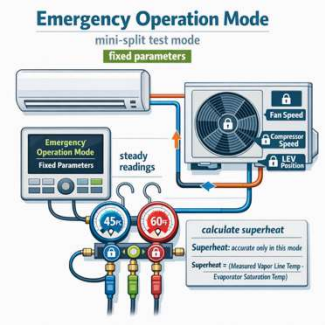
	TERM	DEFINITION	IMAGE
•	**Contactor**	An electrical switch controlled by the thermostat. When the thermostat calls for heating or cooling, the contactor closes and sends power to the compressor and fan motor.	
•	**Control Board**	An electronic circuit board inside the indoor or outdoor unit. It receives signals from sensors, processes them, and controls system components like the compressor, fan, and reversing valve.	
•	**Corrosion**	Damage to metal caused by moisture, chemicals, or weather. Rust is a type of corrosion. Corrosion on a valve coil can interfere with its magnetic field and prevent it from working properly.	
•	**Corrosive**	Able to damage or eat away metal and other materials by chemical reaction. Some refrigerants can become corrosive if moisture enters the system.	

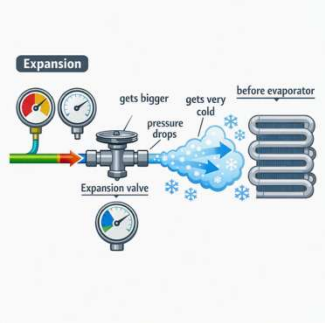
	TERM	DEFINITION	IMAGE
•	**Current**	The flow of electricity. Electric heaters use current to make heat. Current flows through resistance coils and heats them up.	
•	**Cycle**	A process that repeats. The refrigeration cycle moves refrigerant through the system over and over: compress, condense, expand, evaporate.	
•	**Cylinder**	A part that uses fluid (liquid or air) to create movement in a straight line. Pistons move inside cylinders.	
D			
•	**Defrost Control**	An electronic control that prevents ice buildup on the outdoor coil. It uses temperature sensors to detect when defrost is needed, then temporarily switches the system to cooling mode to melt the ice.	
•	**Delta T**	The difference between two temperatures. In HVAC, Delta T usually means the difference between the supply air temperature and the return air temperature at the indoor coil. It is the most important measurement for checking system performance.	

	TERM	DEFINITION	IMAGE
•	**Depletion**	The thinning or loss of something. Ozone depletion means the protective ozone layer in the atmosphere is being destroyed. Some older refrigerants cause ozone depletion.	
•	**Dew Point**	The temperature at which a refrigerant blend first begins to condense at a given pressure. The difference between bubble point and dew point is called temperature glide.	
•	**Diameter**	The width across a circle. For tubing, diameter tells you how wide the pipe is. You must use the correct diameter for each connection.	
•	**Diaphragm**	A flexible barrier inside a valve. In a TXV, the sensing bulb's pressure pushes on the diaphragm, which moves the valve pin to control refrigerant flow.	

	TERM	DEFINITION	IMAGE
•	**Differential**	The temperature difference between when a system turns on and when it turns off. For example, with a setpoint of 68°F and a differential of 1.8°F, the system starts at 70°F in cool mode and shuts off at 68°F.	
•	**Digital**	Showing information as numbers on a screen. Digital thermometers display temperature readings on an electronic screen and can be set to different units.	
•	**Disconnect**	A switch near the outdoor unit that turns off all power. Technicians use the disconnect for safety before working on equipment. It is required by code.	
•	**Dual Run Capacitor**	A single capacitor with three terminals that helps start and run two motors at the same time — usually the compressor motor and the outdoor fan motor. If it fails, one or both motors may not start.	
E			
•	**ECM (Electronically Commutated Motor)**	A type of blower motor with a built-in electronic control module. ECM blowers automatically adjust speed to maintain constant airflow. They are more efficient and reliable than older PSC motors, but more complex to troubleshoot.	

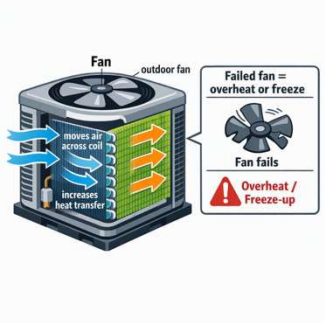
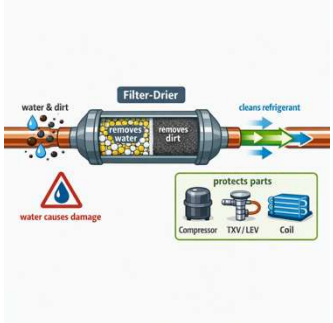
	TERM	DEFINITION	IMAGE
•	**Economical**	Not too expensive; a good value for the cost. An ideal refrigerant should be economical so HVAC systems are affordable to operate.	
•	**Efficiency**	How well a system uses energy. High efficiency = less electricity for the same cooling or heating. This saves money.	
•	**Electrical**	Related to electricity. Follow electrical safety rules when working on heat pumps. Electricity can kill you.	
•	**Electronic Thermostat**	A thermostat with a digital display and programmable settings. Owners can set schedules, change temperature units, and adjust settings through buttons or a touchscreen.	

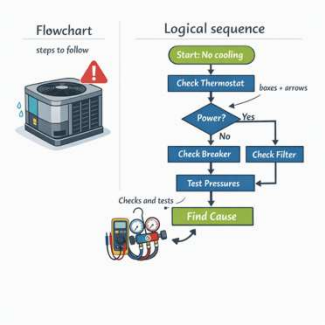
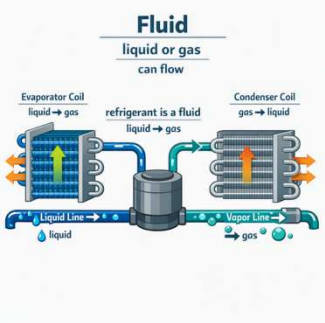
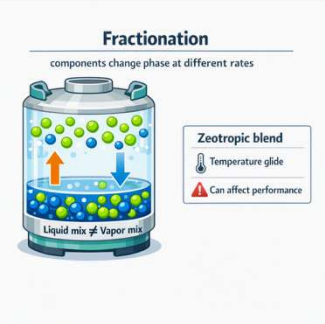
	TERM	DEFINITION	IMAGE
•	**Emergency Heat**	A manual setting on the thermostat used when the heat pump breaks down. It uses only the backup heating source (electric heater strips or gas furnace). A technician should be called for service.	
•	**Emergency Operation Mode**	A special test mode where mini-split operating parameters are fixed. Superheat should only be calculated during emergency operation mode to get accurate readings.	
•	**Enhance**	To improve or make better. Refrigerants are chosen to enhance system performance — they help the system work well and use less energy.	
•	**Environment**	The natural world around us. Releasing refrigerant into the environment is harmful and against the law. Always recover refrigerant properly.	

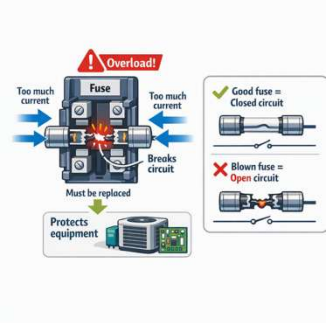
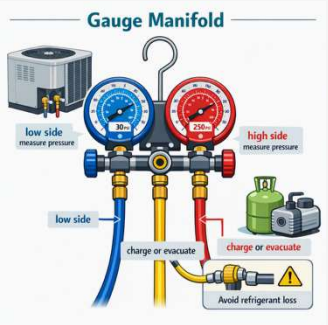
	TERM	DEFINITION	IMAGE
•	**Equipment**	The machines and tools used in HVAC work. Examples: compressors, condensers, evaporators, gauges, and hand tools.	
•	**Evaporator**	The part that makes cold air. Liquid refrigerant enters and absorbs heat from the indoor air. The refrigerant turns to gas. The air becomes cool.	
•	**Expansion**	Getting bigger. When refrigerant expands, it gets very cold. The expansion valve makes this happen before the evaporator.	

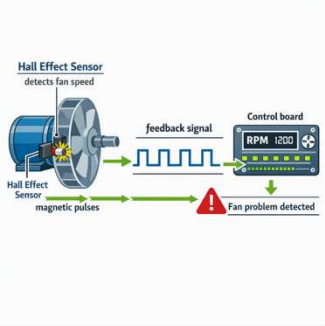
F

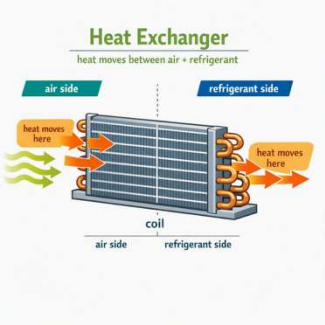
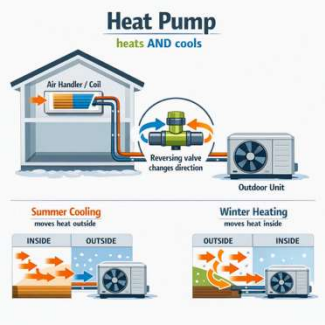
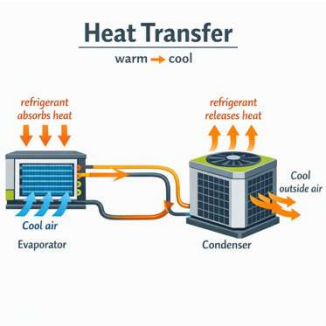
•	**Facilities**	Buildings or places. Refrigeration is used in many facilities: homes, stores, restaurants, hospitals, and factories.	

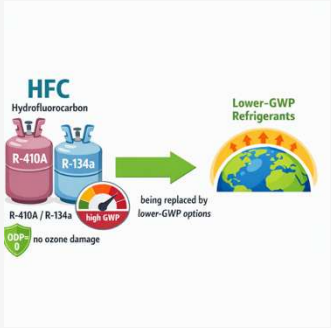
	TERM	DEFINITION	IMAGE
•	**Fan**	A device that moves air across a coil. The outdoor fan draws outside air across the outdoor coil to increase heat transfer. If the fan fails, the system may overheat or freeze up.	
•	**Fault**	A problem or defect in a component. Faults can be electrical (no power, bad wiring) or mechanical (worn parts, blockages). Technicians use tests and troubleshooting tables to find faults.	
•	**Filter-Drier**	This part cleans the refrigerant. It removes water and dirt. Water in the system causes damage. The filter-drier protects other parts.	
•	**Filters**	Parts that catch dirt and dust. Air filters clean the air before it goes through the system. Dirty filters reduce airflow and efficiency.	

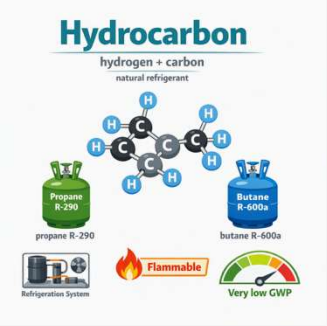
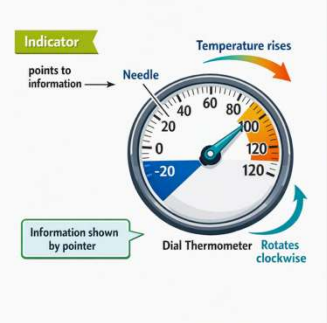
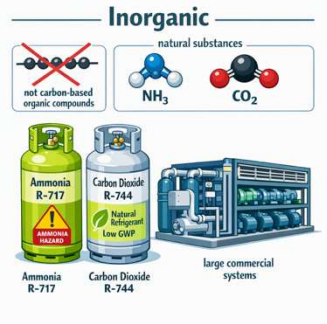
	TERM	DEFINITION	IMAGE
•	**Flammable**	Able to catch fire. Some refrigerants are flammable. Safety classifications use numbers: A1 = not flammable, A2L = low flammability, A3 = highly flammable. Technicians must follow extra safety rules with flammable refrigerants.	
•	**Flowchart**	A diagram that shows the steps to follow when troubleshooting. It uses boxes and arrows to guide you through a logical sequence of checks and tests to find the cause of a problem quickly.	
•	**Fluid**	A liquid or gas that can flow. Refrigerant is a fluid. It changes between liquid and gas as it moves through the system.	
•	**Fractionation**	When the components of a refrigerant blend change phases at different rates, causing the liquid and vapor to have different compositions. Fractionation happens in zeotropic blends and can affect system performance.	

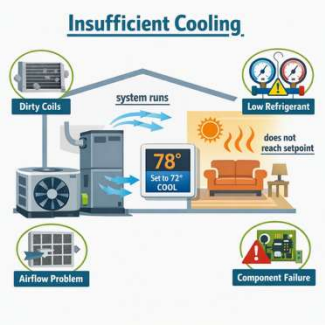
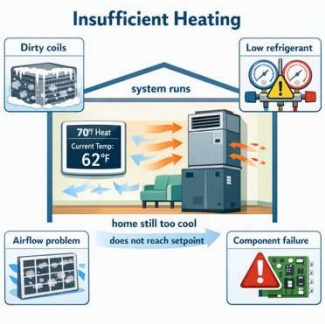
	TERM	DEFINITION	IMAGE
•	**Fuse**	A safety device that melts and breaks the circuit if too much current flows. Once a fuse blows, it must be replaced. Fuses protect equipment from electrical damage.	
G			
•	**Gauge Manifold**	A tool with two gauges (high side and low side) and hoses used to measure system pressures. It can also be used for charging or evacuating refrigerant. Technicians must connect it carefully to avoid refrigerant loss.	
•	**Ground / Grounding**	A safety connection to the earth. Grounding gives electricity a safe path if something goes wrong. All HVAC equipment must be properly grounded.	
•	**GWP (Global Warming Potential)**	A number that shows how much a refrigerant contributes to global warming compared to carbon dioxide (CO_2). A lower GWP number is better for the environment. Newer refrigerants like HFOs have very low GWP.	
H			

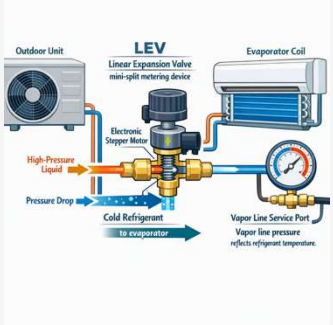
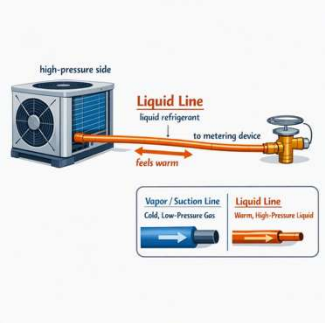
	TERM	DEFINITION	IMAGE
•	**Hall Effect Sensor**	A sensor that detects the speed of a spinning fan by counting magnetic pulses. The control board uses this feedback signal to monitor fan speed and detect problems.	
•	**Halocarbon**	A chemical compound made of carbon and one or more halogen elements (fluorine, chlorine, bromine). Most man-made refrigerants are halocarbons. Examples: CFCs, HCFCs, HFCs, and HFOs.	
•	**Hazardous**	Dangerous. Can hurt you. Pressurized refrigerant, flammable gases, and hot surfaces are hazardous. Always use PPE and follow safety rules.	
•	**HCFC (Hydrochlorofluorocarbon)**	A type of refrigerant that partially damages the ozone layer. HCFCs are being phased out. Example: R-22, once common in home air conditioners.	

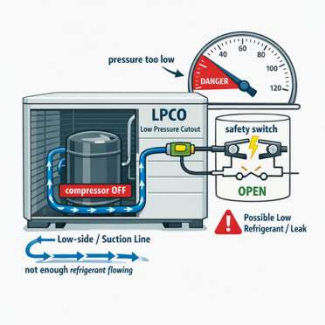
	TERM	DEFINITION	IMAGE
•	**Head Pressure**	Another name for the high-side pressure in the system. It is measured at the service valve or access port near the condenser.	
•	**Heat Exchanger**	A part where heat moves from one place to another. Coils are heat exchangers. Heat moves between the refrigerant and the air.	
•	**Heat Pump**	A system that can heat AND cool. In summer, it moves heat outside (cooling). In winter, it moves heat inside (heating). It uses a reversing valve to change direction.	
•	**Heat Transfer**	Heat moving from a warm place to a cooler place. This is how refrigeration works. Refrigerant absorbs heat in one place and releases it in another.	

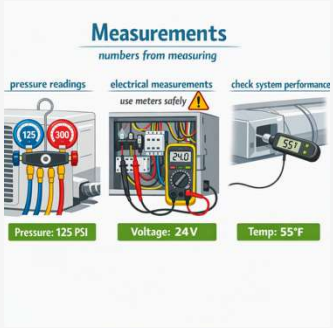
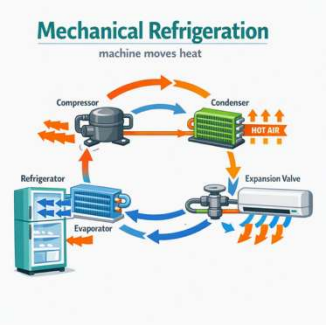
	TERM	DEFINITION	IMAGE
•	**HFC (Hydrofluorocarbon)**	A type of refrigerant that does not damage the ozone layer but has a high Global Warming Potential. Examples: R-410A, R-134a. HFCs are widely used today but are being replaced by lower-GWP options.	
•	**HFO (Hydrofluoroolefin)**	A newer type of refrigerant with very low Global Warming Potential and no ozone depletion. Examples: R-1234yf, R-1234ze. HFOs are used in newer systems and in blends like R-454B.	
•	**HPCO (High Pressure Cutout)**	A safety switch. It turns off the compressor if pressure gets too high. High pressure means the refrigerant is too hot.	
•	**Humidity**	Water in the air. Air conditioning removes humidity to make you feel cooler. Too much humidity feels uncomfortable.	

	TERM	DEFINITION	IMAGE
•	**Hydrocarbon**	A natural substance made of hydrogen and carbon. Some hydrocarbons are used as refrigerants. Examples: propane (R-290), butane (R-600a). Hydrocarbons are flammable but have very low GWP.	
I			
•	**Indicator**	Something that shows or points to information. On a dial thermometer, the indicator needle rotates clockwise as the temperature rises.	
•	**Indoor Air Coil**	The coil located inside the air handler. In cooling mode, it absorbs heat from the indoor air (acts as the evaporator). In heating mode, it releases heat into the indoor air (acts as the condenser).	
•	**Infrared Sensor**	A device that detects heat energy without touching a surface. Laser thermometers and thermal imaging cameras use infrared sensors to measure temperature from a distance.	
•	**Inorganic**	Not made from carbon-based compounds. Some refrigerants are inorganic, such as ammonia (R-717) and carbon dioxide (R-744). These are natural substances used in large commercial systems.	

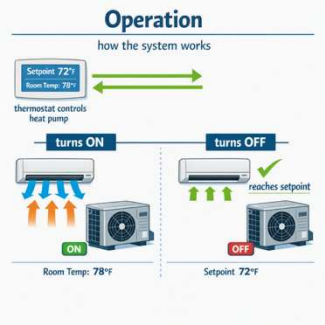
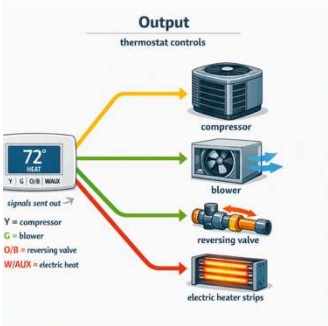
	TERM	DEFINITION	IMAGE
•	**Insert**	To put something into a specific place. Technicians insert temperature probes into duct holes to take accurate air temperature measurements.	
•	**Instructions**	Steps that tell you what to do. Always read the instructions before working on equipment. Follow them carefully.	
•	**Insufficient Cooling**	When the heat pump runs but cannot cool the space enough to reach the thermostat's setpoint. The home feels too warm. Causes include dirty coils, low refrigerant, airflow problems, or component failures.	
•	**Insufficient Heating**	When the heat pump runs but cannot heat the space enough to reach the thermostat's setpoint. The home feels too cool. Causes include dirty coils, low refrigerant, airflow problems, or component failures.	

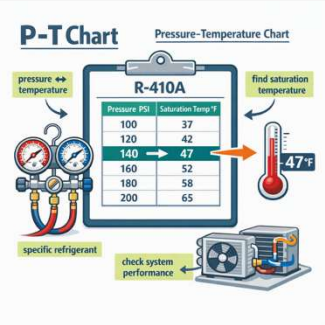
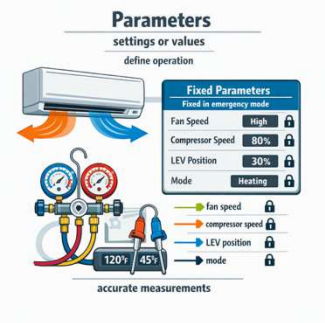
	TERM	DEFINITION	IMAGE
•	**International**	Involving many countries. The Montreal Protocol is an international agreement to protect the ozone layer by phasing out harmful refrigerants worldwide.	
•	**Inverter**	An electronic circuit that controls compressor speed by changing the frequency and voltage of the power supply. Inverter-driven compressors can run at variable speeds for better efficiency and comfort.	
L			
•	**LEV (Linear Expansion Valve)**	The metering device used in mini-split systems. It controls refrigerant flow into the evaporator. The pressure reading at the vapor line service port reflects the refrigerant temperature between the LEV and the compressor.	
•	**Liquid Line**	The pipe that carries liquid refrigerant from the condenser to the metering device. It is on the high-pressure side. It feels warm to touch.	
•	**Liquid Line Service Valve**	A valve on the liquid refrigerant line where a technician can connect gauges or hoses. It allows access to the high-pressure side of the system for testing and charging.	

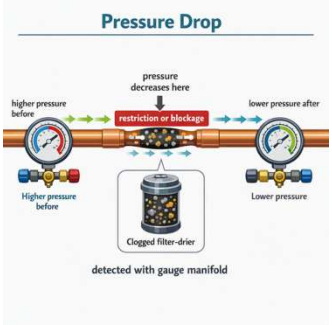
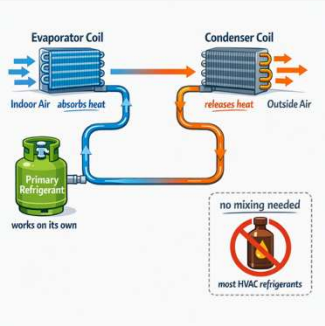
	TERM	DEFINITION	IMAGE
•	**Load**	Any device that uses electricity. The compressor, blower motor, and heater strips are all loads. The wiring must be sized correctly for the load.	
•	**LPCO (Low Pressure Cutout)**	A safety switch. It turns off the compressor if pressure gets too low. Low pressure means not enough refrigerant is flowing.	
M			
•	**Malfunction**	When equipment is not working correctly. A malfunctioning part needs repair or replacement. Always find out why something is malfunctioning.	
•	**Malfunctioning**	Not working correctly. A malfunctioning part needs repair or replacement. Always find out why something is malfunctioning.	
•	**Manifold**	A part with several openings. It lets you connect gauges or hoses to check pressure in the system. Technicians use manifold gauge sets to test refrigerant levels.	
•	**Manufacturer**	A company that makes products. Carrier, Trane, and Lennox are heat pump manufacturers. Always follow the manufacturer's instructions.	

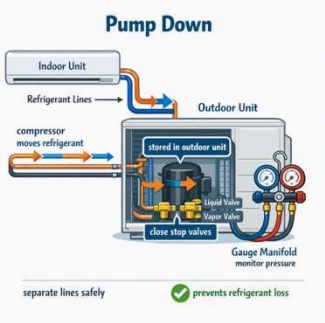
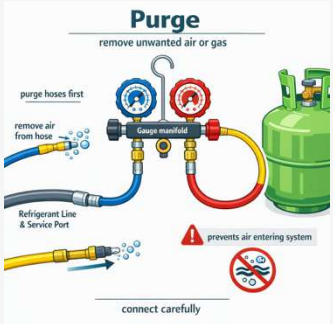
	TERM	DEFINITION	IMAGE
•	**Measurements**	Numbers you get from measuring. Pressure measurements tell you if a system is working right. Use meters to take electrical measurements safely.	
•	**Mechanical Refrigeration**	Using a machine to move heat. The machine has a compressor, condenser, expansion valve, and evaporator. Your refrigerator and air conditioner use mechanical refrigeration.	
•	**Metering Device**	A part that controls refrigerant flow. It creates a pressure drop between the high side and low side. Examples: capillary tube, TXV (thermostatic expansion valve), fixed orifice.	
•	**Muffler**	A small device on the compressor discharge line that reduces noise and vibration. It works like a car muffler — it quiets the pulses of refrigerant gas coming out of the compressor.	
•	**Multimeter**	A tool that measures voltage, current, and resistance. Technicians use a digital multimeter to test electrical components like motors, contactors, capacitors, and wiring in HVAC systems.	

N

	TERM	DEFINITION	IMAGE
•	**Non-condensables**	Gases like air or nitrogen that should not be inside the refrigerant system. Non-condensables raise system pressure and reduce cooling or heating performance. They can cause the high pressure cutout to trip.	
O			
•	**ODP (Ozone Depletion Potential)**	A number that shows how much a refrigerant damages the ozone layer. R-11 has an ODP of 1.0 (the baseline). An ODP of 0 means no ozone damage. Newer refrigerants (HFCs, HFOs) have an ODP of 0.	
•	**Operation**	How something runs or works. A thermostat controls the operation of a heat pump. It tells the system when to turn on and off.	
•	**Outdoor Air Coil**	The coil located in the outdoor unit. In cooling mode, it releases heat to the outside air (acts as the condenser). In heating mode, it absorbs heat from the outside air (acts as the evaporator).	
•	**Output**	What a system sends out or controls. The basic output devices wired to a heat pump thermostat include the compressor, blower, reversing valve, and electric heater strips.	

	TERM	DEFINITION	IMAGE
•	**Overload**	Too much electrical current. An overload can damage the compressor motor. Overload protectors shut off the compressor if current is too high.	
P			
•	**P-T Chart (Pressure-Temperature Chart)**	A reference chart that shows the relationship between pressure and temperature for a specific refrigerant. Technicians use P-T charts to find saturation temperatures and check system performance.	
•	**Parameters**	Settings or values that define how a system operates. In emergency operation mode, the operating parameters are fixed so accurate measurements can be taken.	
•	**Period**	A block of time in a thermostat schedule. Daily schedules have periods for waking, leaving, returning, and sleeping. The owner sets the time and temperature for each period.	
•	**Piston**	A part that moves up and down inside a cylinder. Rings around the piston keep gas from escaping. Some compressors use pistons to squeeze refrigerant.	

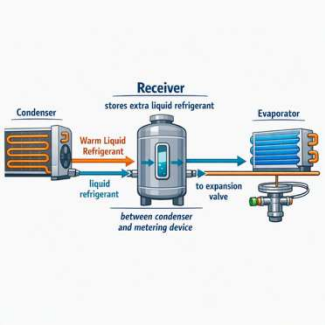
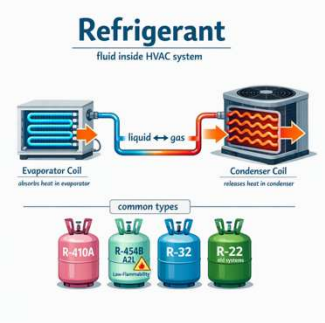
	TERM	DEFINITION	IMAGE
•	**PPE (Personal Protective Equipment)**	Safety items you wear at work. Examples: safety glasses, gloves, work boots, and masks. PPE protects you from injury.	
•	**Pressure**	Force pushing on a surface. In HVAC, we measure pressure in PSI (pounds per square inch). Pressure readings help you check if a system is working correctly.	
•	**Pressure Drop**	A decrease in pressure at a certain point in the system. A restriction or blockage in a line causes a pressure drop. This can be detected with a gauge manifold.	
•	**Primary Refrigerant**	A refrigerant that can absorb and release heat on its own without mixing with another substance. Most refrigerants used in HVAC systems are primary refrigerants.	

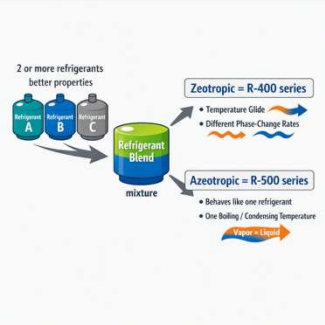
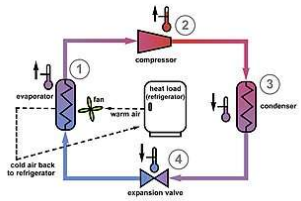
	TERM	DEFINITION	IMAGE
•	**Program / Programmable**	To set instructions for a thermostat to follow. Owners program electronic thermostats through the user interface or via Wi-Fi. Programmable thermostats save energy by adjusting temperature when you are away or asleep.	
•	**Protection Timer**	A built-in delay that prevents the compressor from starting too quickly after it stops. This protects the compressor from damage. The delay is usually up to 5 minutes.	
•	**Pump Down**	A procedure that uses the compressor to move all refrigerant into the outdoor unit. This allows the indoor unit and refrigerant lines to be separated without losing refrigerant.	
•	**Purge**	To remove unwanted air or gas from the hoses or system. Technicians purge hoses before connecting them to prevent air from entering the refrigerant system.	

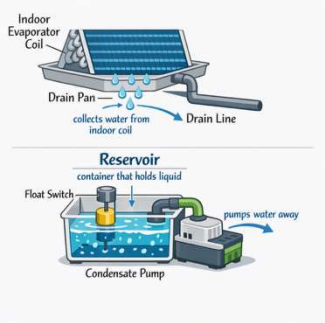
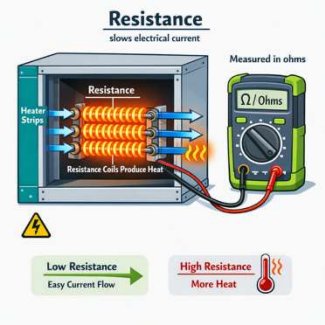
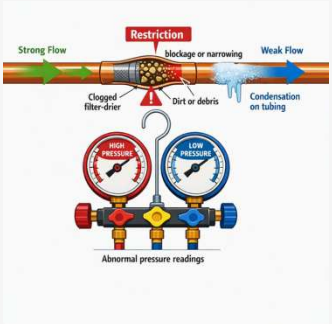
Q

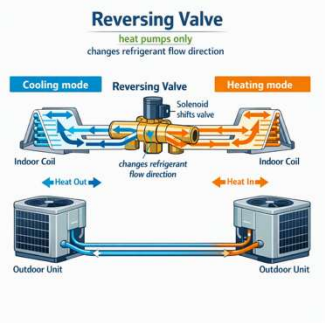
	TERM	DEFINITION	IMAGE
•	**Quality**	The condition or standard of something. The Clean Air Act protects the quality of the air we breathe by controlling refrigerant emissions and other pollutants.	
•	**Quality of Life**	How comfortable and healthy your life is. Air conditioning improves quality of life by controlling temperature and humidity.	

R

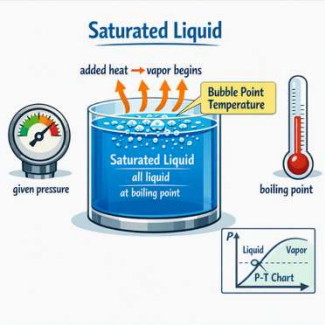
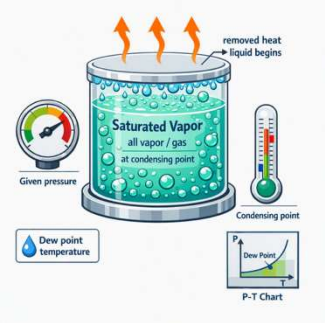
•	**Receiver**	A storage tank in some HVAC systems that holds extra liquid refrigerant. The receiver sits between the condenser and the metering device.	
•	**Refrigerant**	The fluid inside an HVAC system. It absorbs heat in the evaporator and releases heat in the condenser. Common types: R-410A, R-454B (a newer A2L low-flammability refrigerant), R-32, R-22 (old systems).	

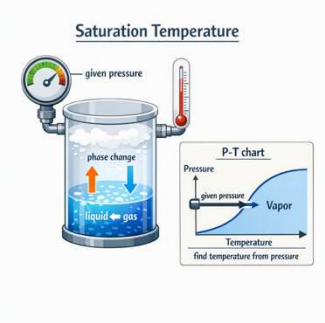
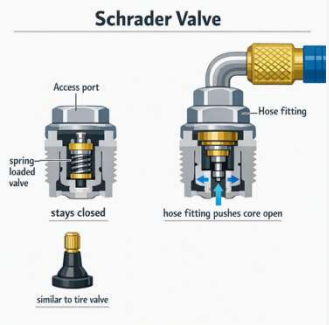
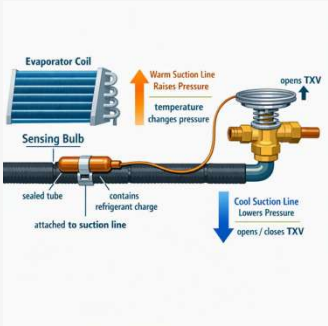
	TERM	DEFINITION	IMAGE
•	**Refrigerant Blend**	A mixture of two or more refrigerants combined to get better properties than a single refrigerant alone. Blends are classified as zeotropic (R-400 series) or azeotropic (R-500 series).	
•	**Refrigeration**	The process of removing heat to make something cold. Your refrigerator, air conditioner, and heat pump all use refrigeration. *Photo Attributed To: National Institute of Standards and Technology, Public domain, via Wikimedia Commons*	
•	**Relationship (Pressure-Temperature)**	The direct connection between pressure and temperature in a saturated refrigerant. When pressure goes up, temperature goes up. When pressure goes down, temperature goes down.	
•	**Relay**	An electrical switch that uses a small current to control a larger current. Relays allow the thermostat's low-voltage signal to turn on high-voltage equipment.	
•	**Requirements**	Rules or conditions that must be followed. Technicians must meet EPA requirements for handling refrigerants, including proper certification and recovery procedures.	

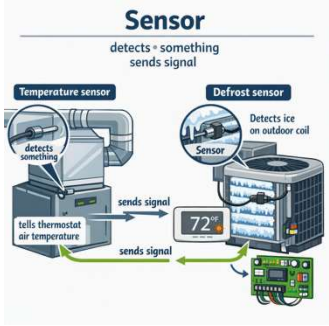
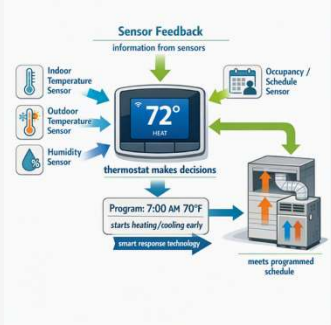
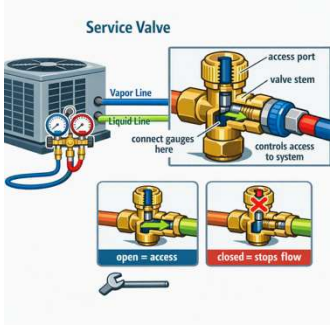
	TERM	DEFINITION	IMAGE
•	**Reservoir**	A container that holds liquid. A condensate pump has a reservoir that collects water from the indoor coil.	
•	**Resistance**	How much a material slows down electrical current. Measured in ohms. High resistance creates heat. Heater strips use resistance to produce heat.	
•	**Resistance Coils**	Wires that heat up when electricity flows through them. Electric heaters in heat pumps use resistance coils for extra heat on cold days.	
•	**Restriction**	A blockage or narrowing in a refrigerant line. Restrictions are caused by clogged filter-driers, dirt, or other debris. They cause abnormal pressure readings and condensation on tubing.	

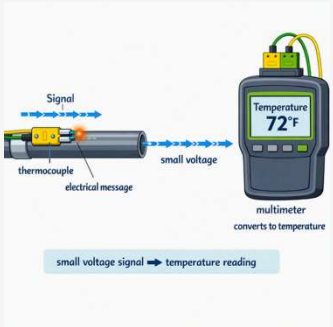
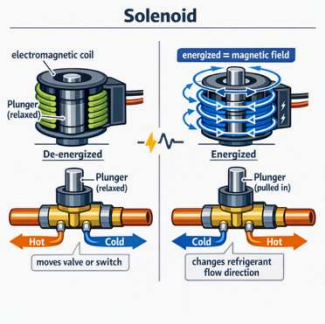
	TERM	DEFINITION	IMAGE
•	**Reversing Valve**	A part in heat pumps only. It changes the direction of refrigerant flow. This lets the system switch between heating and cooling modes.	

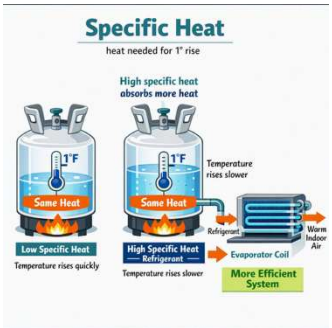
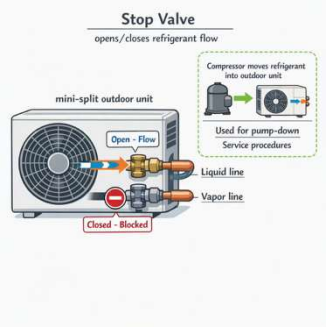
S

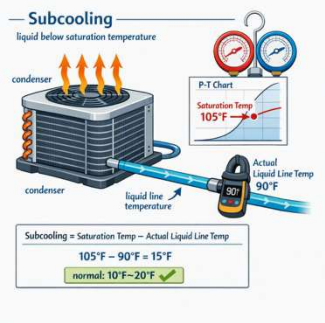
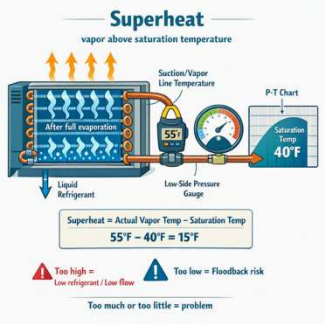
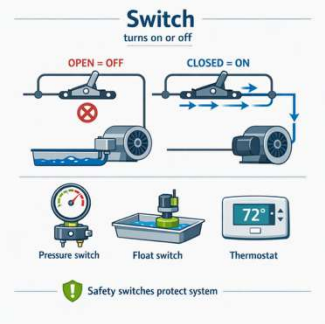
•	**Saturated**	When a refrigerant is part liquid and part vapor at the same time during a phase change. At this point, the temperature and pressure have a direct relationship that can be read from a P-T chart.	
•	**Saturated Liquid**	Refrigerant that is entirely in liquid form at its boiling point for a given pressure. Any added heat will begin turning it into vapor. This is also called the bubble point temperature.	
•	**Saturated Vapor**	Refrigerant that is entirely in vapor (gas) form at its condensing point for a given pressure. Any removed heat will begin turning it into liquid. This is also called the dew point temperature.	

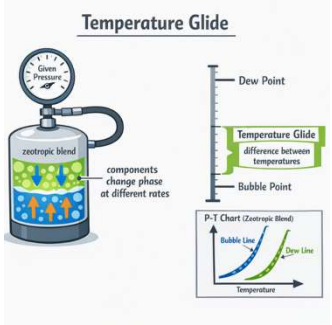
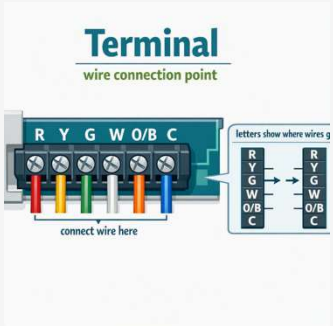
	TERM	DEFINITION	IMAGE
•	**Saturation Temperature**	The temperature at which a refrigerant changes between liquid and gas at a given pressure. Technicians use pressure/temperature charts to find the saturation temperature for each refrigerant.	
•	**Schrader Valve**	A spring-loaded valve inside an access port. It stays closed until a hose fitting pushes the core open. Similar to a tire valve.	
•	**Section 608**	The part of the U.S. Clean Air Act that covers refrigerant handling. Section 608 requires technicians to be certified and to follow rules for recovering, recycling, and reclaiming refrigerants.	
•	**Sensing Bulb**	A small sealed tube attached to the suction line near the evaporator. It is part of the TXV and contains a refrigerant charge. As the temperature changes, the bulb's pressure changes, which opens or closes the TXV.	

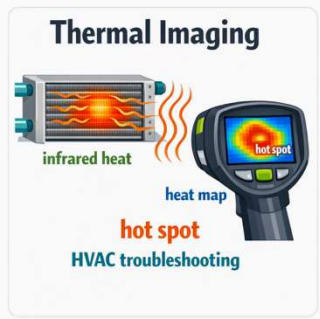
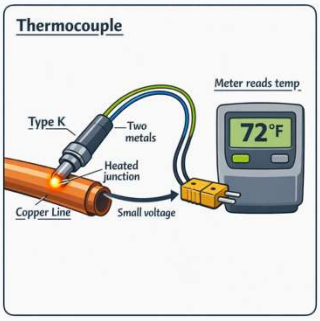
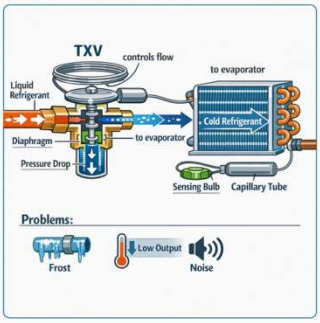
	TERM	DEFINITION	IMAGE
•	**Sensor**	A part that detects something. Temperature sensors tell the thermostat how warm or cold the air is. Defrost sensors detect ice on the outdoor coil.	
•	**Sensor Feedback**	Information from sensors that helps the thermostat make decisions. Some thermostats use sensor feedback to learn when to start heating or cooling to meet the programmed schedule. This is sometimes called smart response technology.	
•	**Service Valve**	A valve on the refrigerant line that allows a technician to connect gauges. The valve stem can be opened or closed to control access to the system.	
•	**Setpoint**	The desired temperature set on the thermostat. The system works to reach and maintain this temperature. The user can change the setpoint using the up and down arrow keys.	

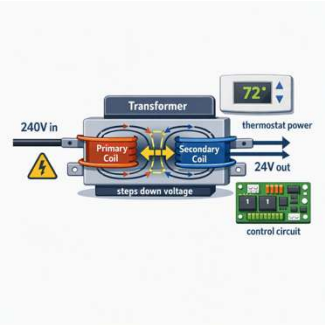
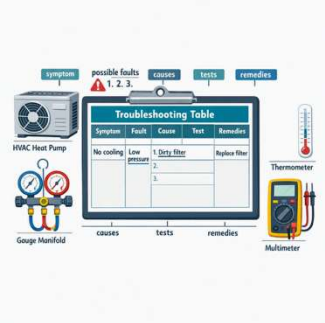
	TERM	DEFINITION	IMAGE
•	**Short Cycling**	When the compressor turns off and on too frequently. Short cycling wastes energy, reduces comfort, causes poor humidity control, and wears out equipment faster. It can be caused by pressure control trips, thermostat problems, or airflow issues.	
•	**Signal**	An electrical message. A thermocouple sends a voltage signal to the multimeter, which converts it to a temperature reading.	
•	**SNAP Program**	The Significant New Alternatives Policy program run by the EPA. SNAP lists which refrigerants are approved as replacements for older, harmful refrigerants.	
•	**Solenoid**	An electromagnetic coil that moves a valve or switch when energized. The reversing valve uses a solenoid to change the direction of refrigerant flow.	

	TERM	DEFINITION	IMAGE
•	**Specific Heat**	The amount of heat energy needed to raise the temperature of a substance by one degree. A refrigerant with high specific heat can absorb more heat, which makes the system more efficient.	
•	**Specific Volume**	The amount of space a substance takes up per unit of weight. Refrigerants with lower specific volume need a smaller compressor, which can save energy and cost.	
•	**Specifications**	Detailed descriptions of how something should be made or how it should perform. Refrigerant specifications include pressure, temperature, flammability, and other properties.	
•	**Standard**	An agreed rule or measurement. ANSI standards are rules that keep HVAC work safe and consistent. Following standards is required.	
•	**Stop Valve**	A valve on a mini-split outdoor unit that can be opened or closed to control refrigerant flow through the liquid or vapor lines. Used during pump-down and service procedures.	

	TERM	DEFINITION	IMAGE
•	**Subcooling**	Cooling liquid refrigerant below its saturation temperature in the condenser. Subcooling is measured by subtracting the actual liquid line temperature from the saturation temperature. Normal range is 10°F to 20°F.	
•	**Suction Port**	A connection point on the suction (vapor) line where a technician can attach a gauge to measure low-side pressure. It has a Schrader valve inside, similar to a tire valve.	
•	**Superheat**	Heating refrigerant vapor above its saturation temperature in the evaporator. After the refrigerant fully evaporates, it continues to absorb heat and becomes superheated. Too much or too little superheat indicates a problem.	
•	**Superheated Vapor**	Refrigerant gas that is hotter than its boiling point. The extra heat means that it won't turn back into liquid. This is normal after the refrigerant leaves the evaporator.	
•	**Supplemental**	Extra or additional. On very cold days, heat pumps need supplemental heat. This can come from electric heaters or a gas furnace.	
•	**Switch**	A part that turns something on or off. Safety switches protect the system. Pressure switches, float switches, and thermostats are all types of switches.	

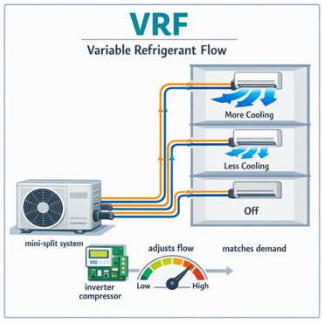
	TERM	DEFINITION	IMAGE
•	**System Cut-Out**	When the heat pump shuts down completely and does not restart on its own. This happens when a safety device trips and requires a manual reset. Causes are similar to short cycling, but the safety devices do not reset automatically.	
T			
•	**Technician**	A trained worker who installs, repairs, or maintains HVAC systems. Technicians must be EPA-certified to work with refrigerants.	
•	**Temperature Glide**	The difference between the bubble point and dew point temperatures of a zeotropic refrigerant blend at a given pressure. Zeotropic blends experience temperature glide because their components change phases at different rates.	
•	**Terminal**	A connection point for a wire. Thermostat terminals are labeled with letters (R, Y, G, W, O/B, C) that tell you which wire connects where.	

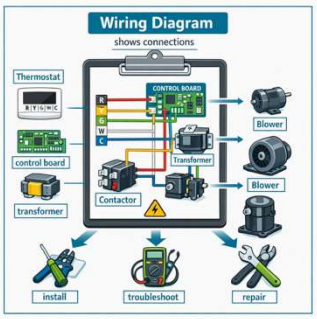
	TERM	DEFINITION	IMAGE
•	**Thermal Imaging**	A method of measuring temperature using infrared light detection. Thermal imaging cameras detect heat energy from a large area and display it on a screen. Useful for HVAC troubleshooting.	
•	**Thermistor**	A temperature sensor that changes its electrical resistance as temperature changes. Thermistors are more expensive but more accurate than thermocouples. They are attached to refrigerant tubing using a threaded body.	
•	**Thermocouple**	A temperature sensor made of two different metals joined at one end. When heated, it produces a small voltage that a meter reads as temperature. Type K thermocouples are most common in HVAC.	
•	**Thermostatic Expansion Valve (TXV)**	A mechanical valve that controls refrigerant flow to the evaporator. It uses a sensing bulb to measure temperature and adjusts flow to maintain proper superheat. TXV problems can cause frosted lines, inadequate heating or cooling, or noisy operation.	

	TERM	DEFINITION	IMAGE
•	**Transformer**	A device that changes voltage from one level to another. In heat pumps, a transformer steps down 240V power to 24V for the thermostat and control circuit.	
•	**Troubleshooting**	Finding and fixing problems. Technicians troubleshoot heat pumps by checking pressures, temperatures, and electrical readings.	
•	**Troubleshooting Table**	A chart that helps technicians find problems. It lists symptoms, possible faults, causes, test methods, and remedies. Causes are usually arranged from most likely to least likely.	

V

•	**Vapor Line**	The pipe that carries refrigerant vapor (gas) from the evaporator back to the compressor. Also called the suction line. It is on the low-pressure side and feels cold to touch.	

	TERM	DEFINITION	IMAGE
•	**Viscosity**	How thick or thin a fluid is — its resistance to flowing. A refrigerant with low viscosity flows easily through the system, which reduces energy use and improves efficiency.	
•	**Voltage**	The force that pushes electricity through a wire. Measured in volts. Most heat pumps use 240V for the outdoor unit and 24V for the thermostat.	
•	**VRF (Variable Refrigerant Flow)**	A type of system that uses an inverter to control compressor speed and adjust refrigerant flow to match the heating or cooling demand. Mini-split systems are a common type of VRF system.	
W			
•	**Wi-Fi**	A wireless connection to the internet. Some thermostats connect to Wi-Fi so owners can control them remotely using a smartphone or tablet.	

	TERM	DEFINITION	IMAGE
•	**Wiring Diagram**	A drawing that shows how electrical parts are connected. Technicians use wiring diagrams to install, troubleshoot, and repair HVAC systems.	

Z

•	**Zeotropic Blend**	A mixture of two or more refrigerants whose components change phases (liquid to gas) at different rates. Refrigerants with R-numbers in the 400s are zeotropic blends. Examples: R-410A, R-404A, R-454B (a newer A2L low-flammability refrigerant).	