Ductless Heat Pumps

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www.nwBuildings.org/dhp.aspx

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Northwest Building Efficiency Center

Outline

- Heat Pump Basics
- Ductless Heat Pumps
  - Efficiency
  - Advantages
  - Commercial installations
- Planning (applications, codes)
- Purchasing (sizing, styles)
- Installation (locating, condensate, power)
- Commissioning
- Maintenance

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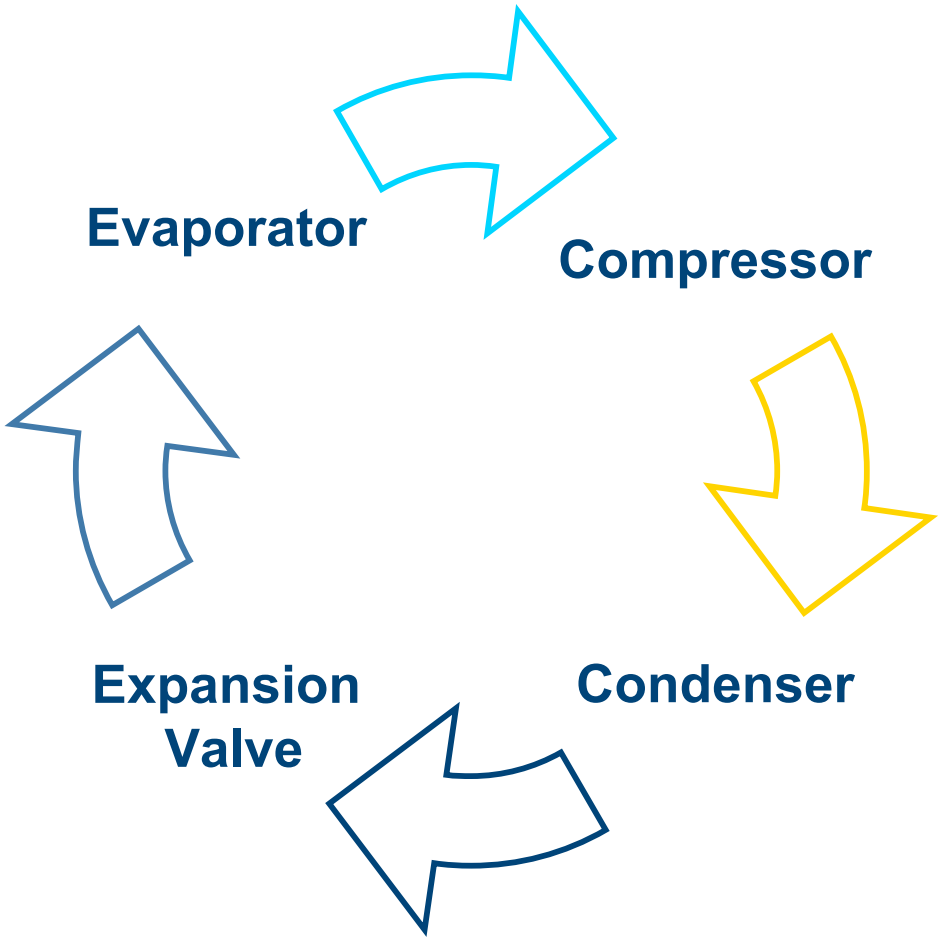
What is a Heat Pump?

Heat Pump Components

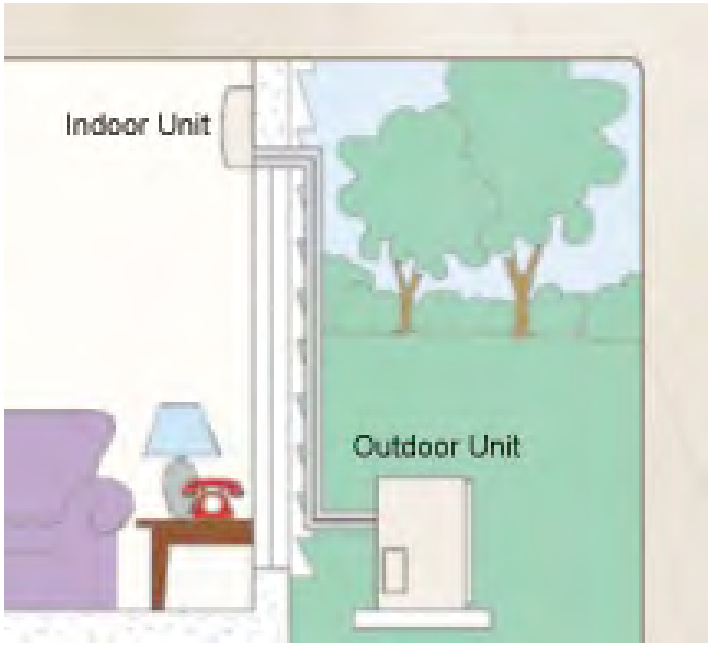


What's a Split System?

- **An HVAC system with components located both inside and outside**

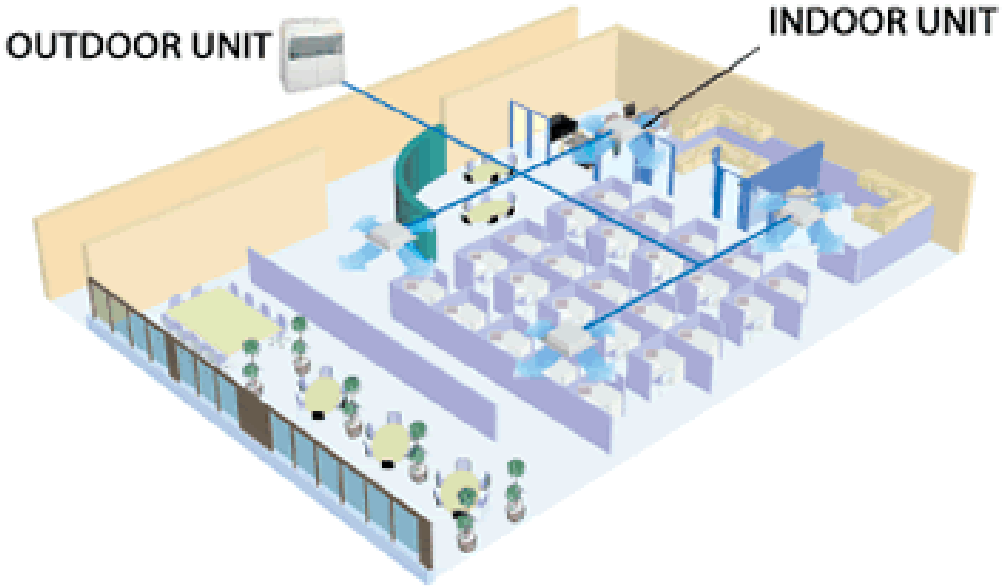
  Compressor/Condenser – outside
  Air handler - inside

- **Mini Split**
- **Multi-Zone (Multi-Split)**



Multi-Split System

- **Suitable for multiple zones with *varying loads***
- **One outdoor unit, several indoor units, one controller**



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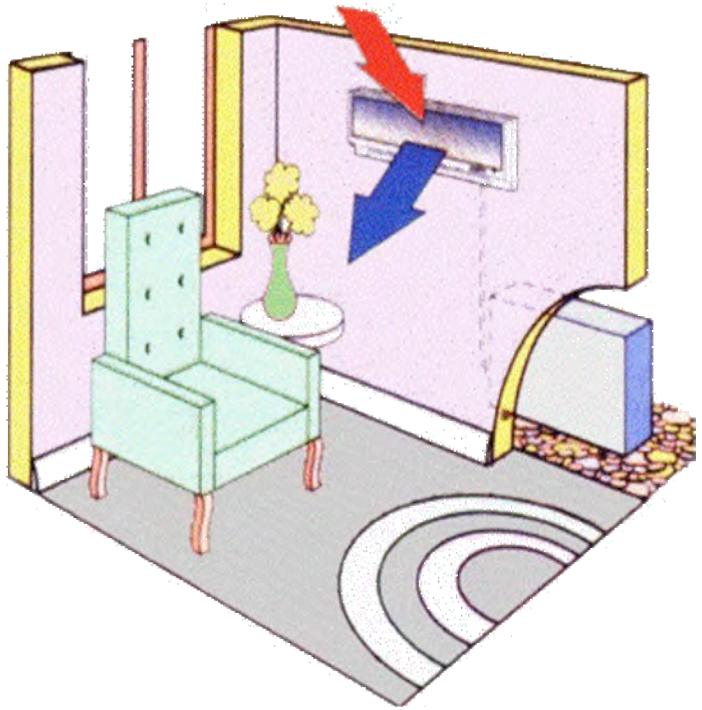
OK, What's a Ductless Heat Pump?

- 30-year history
- Many manufacturers *
- Split system
- Air Source heat pump
- No ducts
- Efficient



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How Efficient ?

- **Seasonal Energy Efficiency Ratio**

  # of BTU of cooling from one watt of energy

  SEER = *20*+

- **Heating Season Performance Factor**

  # of BTU of heating from one watt of energy

  HSPF = *9*+

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How Efficient

- What does it save over electric resistance?
- HSPF-COP
- $1 worth of heat from an electric resistance heat = $3 worth of heat from a DHP

AHRI

The Air Conditioning, Heating and Refrigeration Institute is a trade association that produces the

AHRI Certified Product Directory

http://www.ahridirectory.org/ahridirectory/pages/vrfhp/VRFHP9-17-08.pdf

Advantages of Ductless Heat Pumps

- High efficiency
- Low cost heating and cooling
- Zonal system
- Improve occupant comfort
- Easy installation
- Eliminates ductwork
- Efficient at low outdoor temps

High Efficiency – Lower Cost

- Inverter technology
  - Allows variable speed operation
- High SEER and HSPF
  - SEER ratings of 20+
  - HSPF ratings of 9.0

Zonal Systems

- Only heat or cool areas in use-not the entire building
- Can result in increased occupant comfort
- Ducted systems waste 10% -30%+

Special Considerations in Commercial Installs

- **Ventilation requirements**

  15-20 cfm/person

  (ASHRAE 62.1 or IMC Chapter 11)
- **Interactions with existing systems**

  Simultaneous heating and cooling
- **Power supply requirements**
- **Building control systems**
- **Amount of refrigerant allowed by IMC**

Questions?

Next we'll cover

- **Planning (applications, codes, purpose)**
- **Purchasing (sizing, styles, shop)**
- **Installation (locating, condensate, power)**
- **Commissioning**
- **Maintenance**

Think you are Ready? Planning Questions

- Is my application a good one?
- Can I meet all required codes?
- Will it save money or improve comfort?
- Can the unit be installed where I want to install it?

Planning: Good Applications

- Add cooling to an existing zone
- Supplemental heating and cooling for an undersized zone
- Heat or cool a small area to allow shutting down a large system
- Computer room backup or cooling

Planning: Codes

- Commercial buildings must be ventilated during occupied hours *
- Check airside economizer requirements and exceptions
- Simultaneous heating & cooling prohibitions
- Pressure testing of refrigerant lines

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Planning: Save Money?

- Offset more expensive heating and/or cooling with higher efficiency equipment
- Extend the life and reduce maintenance of existing equipment
- Zonal heating
- Calculate fuel costs to be sure*
- Value of improved comfort

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Planning: Where NOT to Install

- If your central system has existing problems

Planning: Where NOT to Install

- In hospital treatment areas

- In areas with corrosives or dust in the air

Now You are Ready?
Before You Buy

- What size heat pump do I need?
  - Providing heating or cooling or both?
  - Determine the number of zones
  - Calculate heating / cooling loads*
- Voltage requirements
- Comparison shop
- Check for rebates or incentives

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Sizing Considerations

- Determine the load *
  - Supplemental heating or cooling
  - DHP for entire load?
- Where does ventilation air come from?
  - Does the DHP have to heat or cool outside air? *

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Choose an Indoor Unit

- Wall mounted
- Ceiling hung

Choose an Indoor Unit

- In-Ceiling Unit
- Concealed duct (ducted ductless)

Installing Ductless Heat Pumps

- Plan the installation
- Install outdoor unit
- Power supply
- Install indoor unit(s)
- Connect refrigerant and power lines
- Run condensate drain
- Commission the unit

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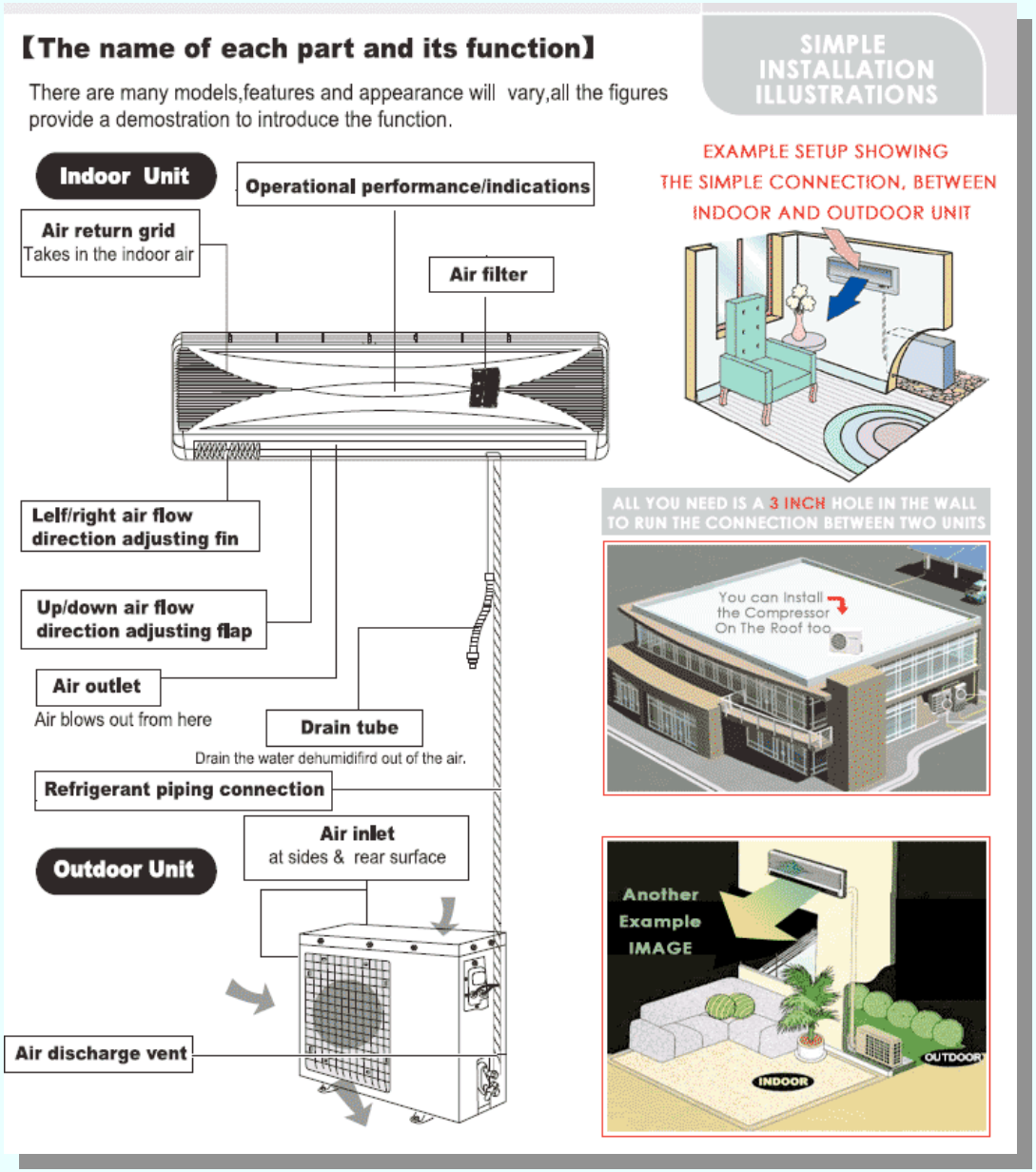
How Easy?



Installing the Outdoor Unit

- Provide secure mounting
- Check clearances
- Determine line set length and height restrictions
- Locating on building
- Seal wall penetrations

Locating the Outdoor Unit(s)

Outdoor units may be placed on ground or attached to the building

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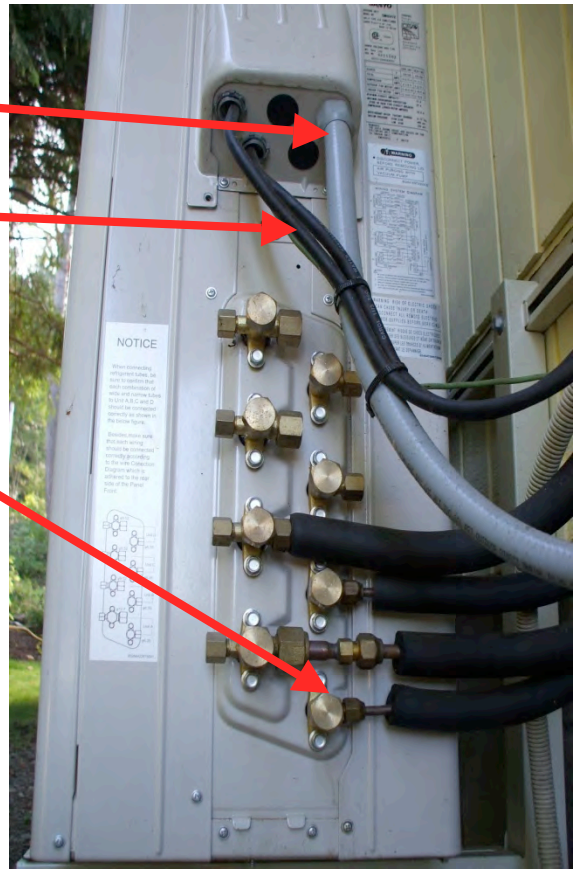
Power Supply

- 208v-230v from electrical panel to outdoor unit
- Provide electrical disconnect
- Provide separate breaker for DHP

Line Sets & Power Connections

- 230 power from panel
- Power to indoor units
- Refrigerant lines
  - 2 indoor units installed



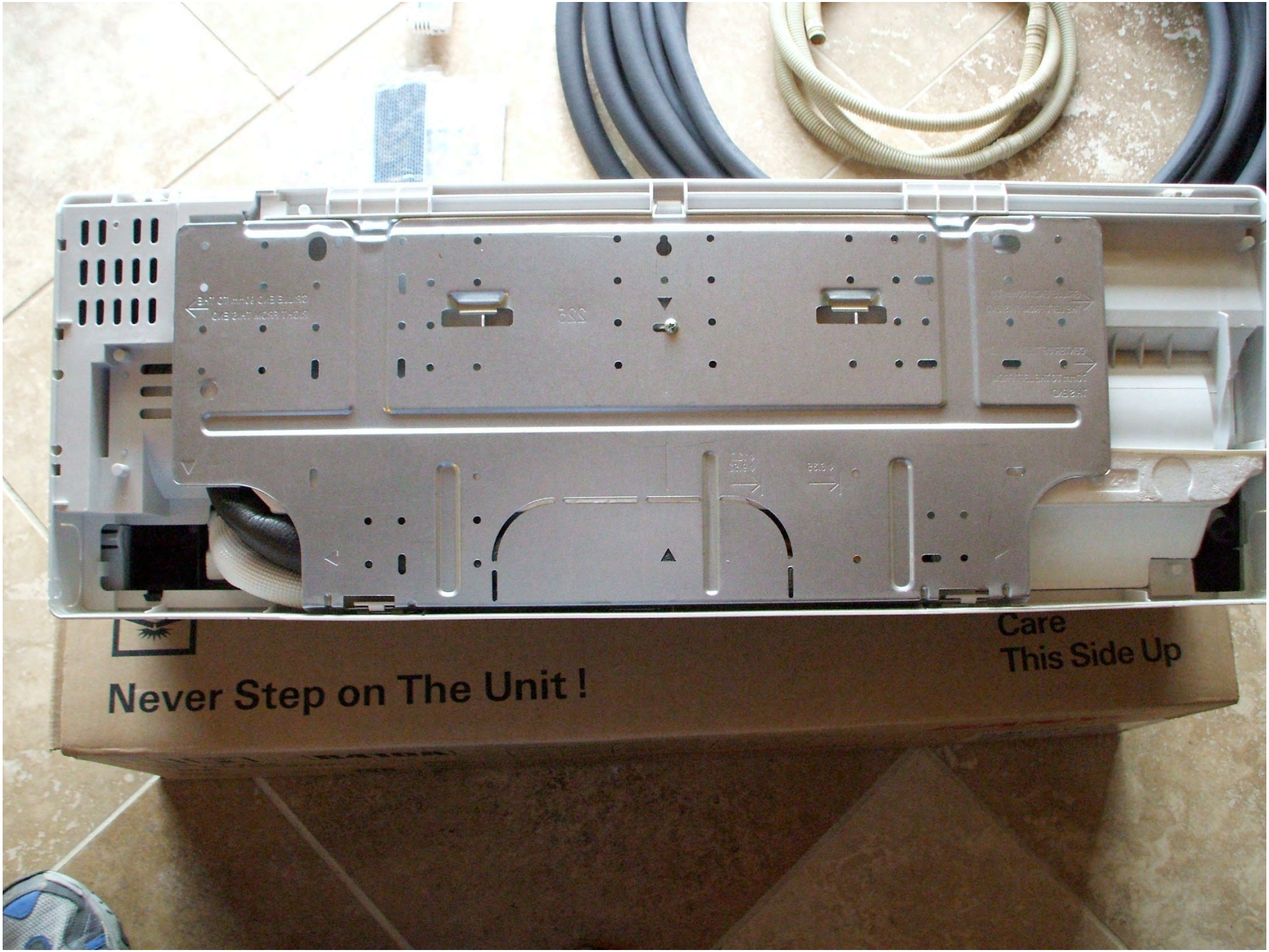
Locating the Indoor Unit(s)

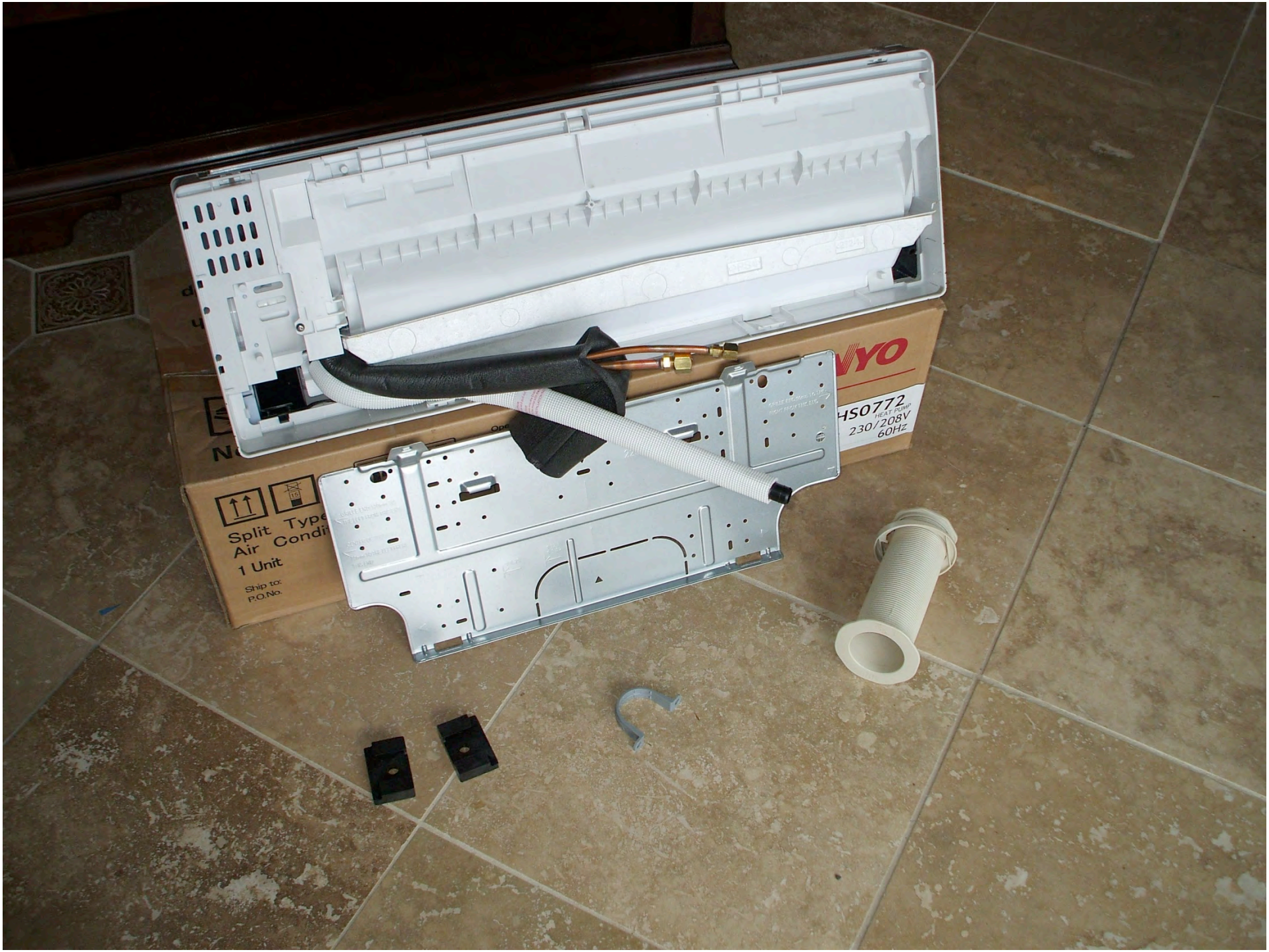
- Noise levels
- Air circulation
- Line set location
- Condensate drain
- Power

Locate the Indoor Unit

- Can installation clearances be met?
- If using a concealed duct unit
  - Check allowable duct lengths
  - Never install in unconditioned space


SANYO
R410A
Split Type
Air Conditioner
1 Unit
Operating Temperature Range
SANYO FISHER COMPANY
A DIVISION OF SANYO NORTH AMERICA CORPORATION
in Canada:Distributed by
SANYO CANADA Inc.
Made in China
SANYO
KMHS0772
HEAT PUMP
230/208V
60Hz


Never Step on The Unit !
Care
This Side Up


Split Type
Air Condi
1 Unit
Ship to:
P.O.No.
HS0772
HEAT PUMP
230/208V
60Hz

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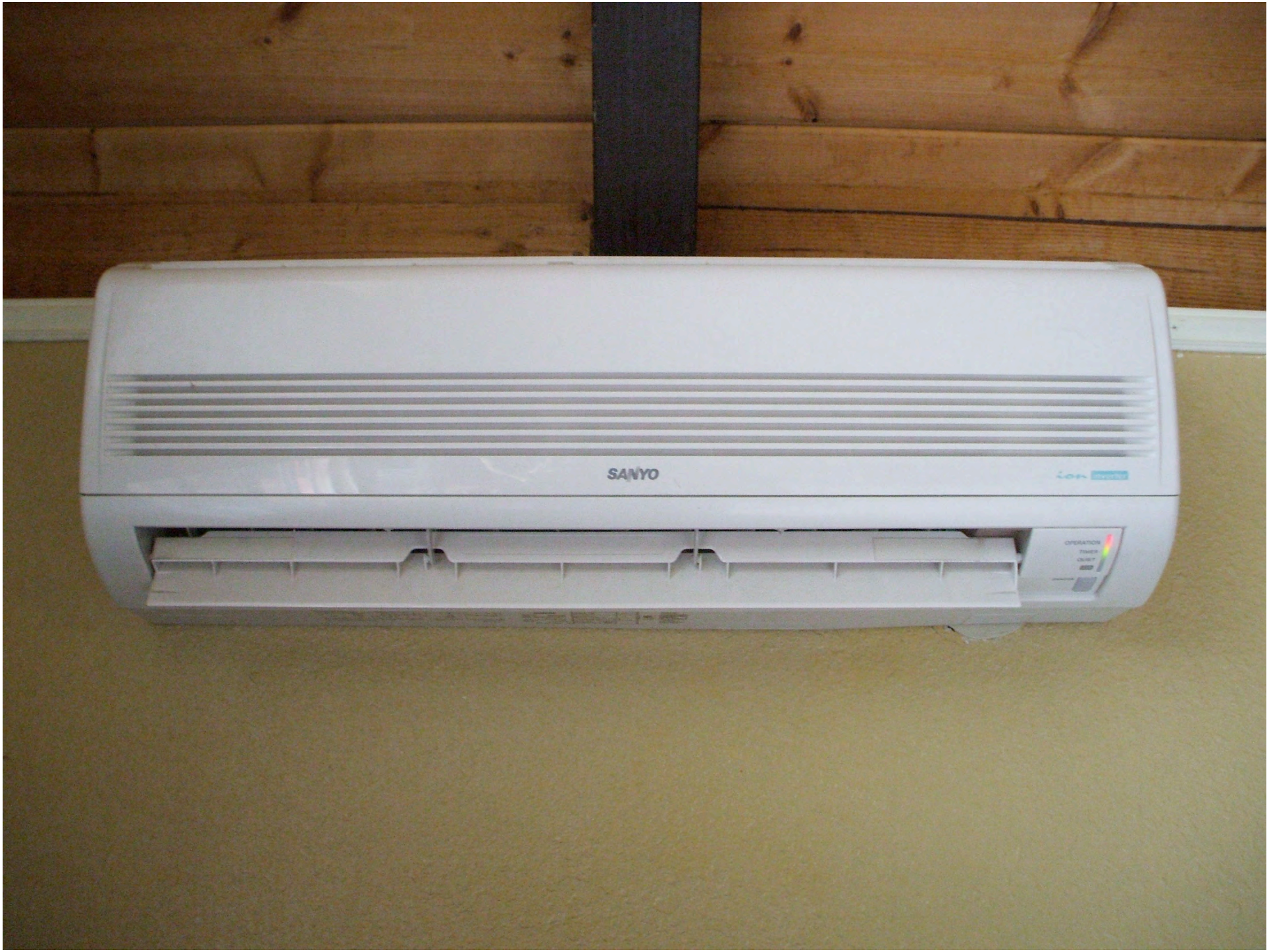
Removable filters for cleaning

Electrical connection


SANYO

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Condensate Line

- Route to storm drain or sanitary drain

OR

- Provide small condensate pump which may be included with some models
  - Pumps require power
- Trap may be necessary

Commissioning the Unit

- Refrigerant charge – R-410
- Recommended: have it done by contractor with the proper equipment
- EPA requires license to service system when refrigerant loss is a risk

Commissioning the Unit

- When ductless heat pump supplements existing HVAC system:
  - Set and lock unit cooling and/or heating temperatures so the more efficient heat pump comes on first

Don’t Forget Maintenance

- Clean air filter(s) regularly
- Check outdoor coils for blockage annually
- Check the condensate drain and pan to make sure condensate can drain freely from the unit
- If using wireless controls, change batteries as needed

Summary

Ductless heat pumps are:

- Market ready
- Efficient
- Easy to Install
- Quiet
- Cost effective
- Available in various design options
- Good supplemental or primary heating or cooling system

More Information

The Northwest Building Efficiency Center has posted supplementary resources related to ductless heat pump technology at:

www.nwBuildings.org/dhp.aspx

Contact Us: *Info@nwBuildings.org*