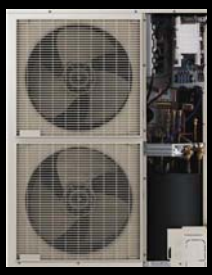
DVMS ECO 1.1
Rev 3.5 8 hr.

DVM S Eco Training

Introduction – Basic Installation & Commissioning



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DVM S Eco Training

Due to Samsung's policy of ongoing product development, specifications are subject to change without prior notice. Every effort has been made to insure that the information included in this presentation is as accurate as possible at the time of it's publication.

This presentation is provided as a guide to help HVAC field technicians understand the proper procedures for installing, and commissioning Samsung DVM S Eco VRF systems. This training module is not intended to replace Samsung service manuals, technical data books, installation/operation manuals or other factory documents.

Only properly trained, HVAC professionals should attempt to install and start up any Samsung heating and air-conditioning system.

High Voltage Caution:
Extra care must be taken when working on or around DVM S equipment due to numerous high voltage components. Whether installing or servicing DVM S equipment in the field or while attending Samsung HVAC training classes which include powered simulators and equipment, be aware of the potential dangers of high voltage – use caution

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For technical support issues, always contact your Samsung product provider.

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DVM S Training

Samsung *DVM S* Product Line

***DVM S* Eco** 3,4,4.4 & 5 ton models
Single phase air-cooled VRF Heat Pump & Heat Recovery - residential and light commercial applications
Focus for this training

***DVM* Chiller** 10 to 240 ton
3 phase air to water heat pump commercial applications
Register for this training

***DVM S* Water** 6 to 50 ton
Single & 3 phase water-cooled VRF residential and commercial applications
Heat Pump, Heat Recovery Systems & Geothermal
Register for this training

DVM S & DVM S MAX-Heat 6 to 44 ton
3 phase air-cooled VRF commercial applications
Heat Pump & Heat Recovery Systems
Register for this training

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Training Topics

- Eco System Introduction
- Outdoor Unit Features
- Outdoor Unit Installation Guidelines
- Heat Recovery – HR Changer & Sub MCU
- Basic Controls
- Digital Control Wiring
- Refrigerant Piping Specifications
- Field Piping Components & Installation
- Basic System Addressing
- Outdoor Unit Start-up – Service & Option Settings
- Start-up Tool – SNET Pro 2
- Review questions

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DVM S Eco System Introduction

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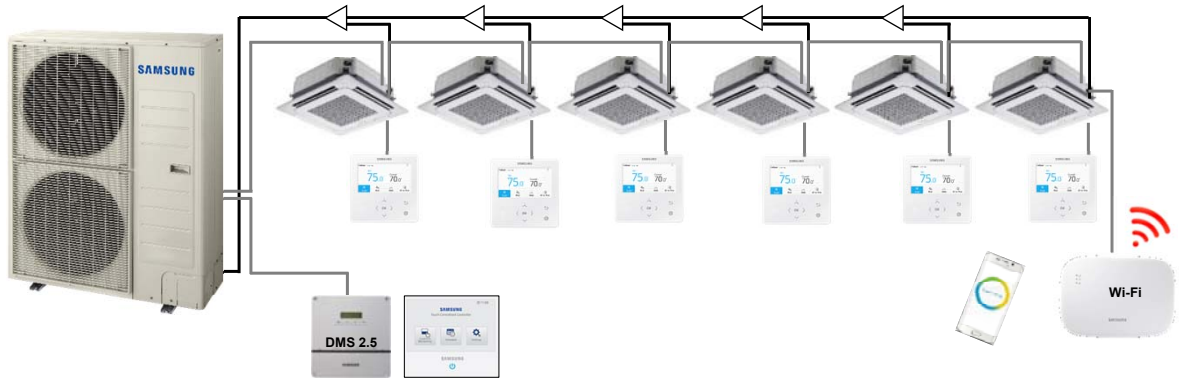
- ***DVM S*** Eco is a residential & light commercial single phase VRF heat pump system comprised of 1 outdoor unit connected to a maximum of 10 indoor units on a single refrigerant network up to 492 ft. (ODU to farthest IDU)
- The ***DVM S*** Eco product line includes Heat Pump and Heat Recovery systems
- ***DVM S*** Eco systems are controlled by optional wired and wireless remote controllers including “Samsung Smart Things” WiFi and DMS centralized controls through a 2 conductor digital communication buss



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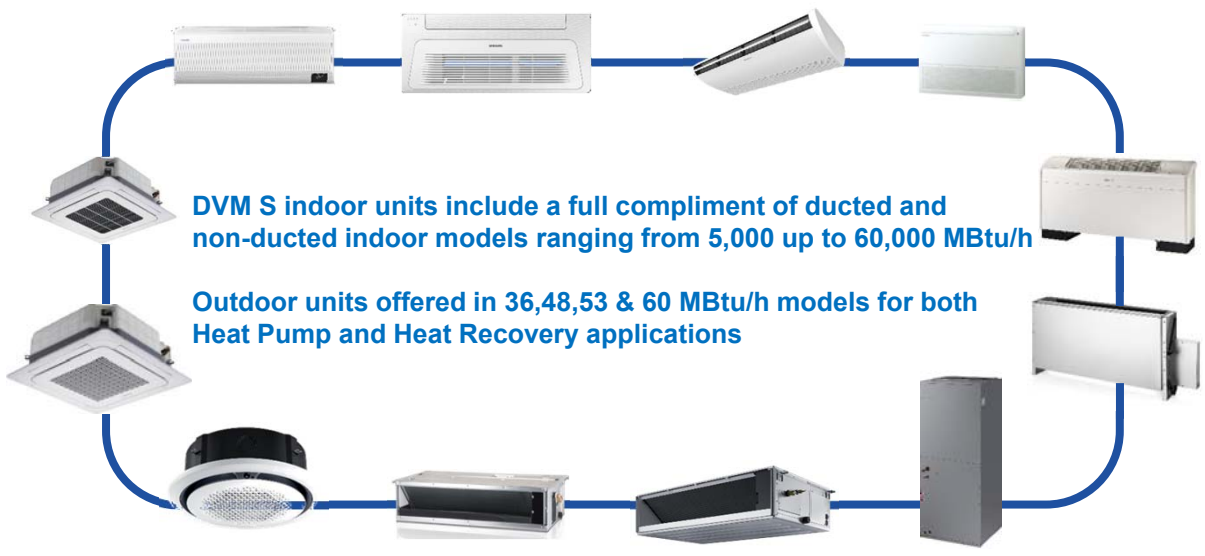

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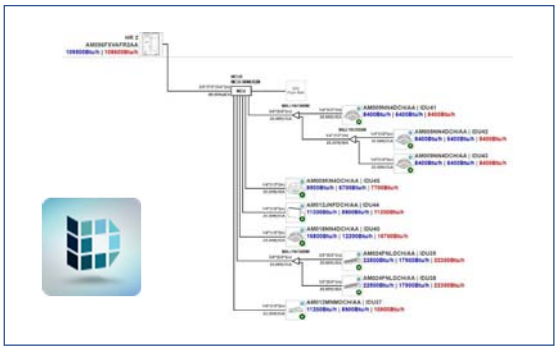
DVM S "Load Diversity"

- VRF systems are designed to efficiently control "Load Diversity" in any comfort controlled application
- As loads shift in the building due to solar heat gain and orientation, building use, etc., operating capacity can be transferred from where the load is reduced to areas with an increased load that require more capacity in the system network.
- Diversity provides a higher level of temperature control and system efficiency.
- All VRF applications must be properly designed based on specific load calculations



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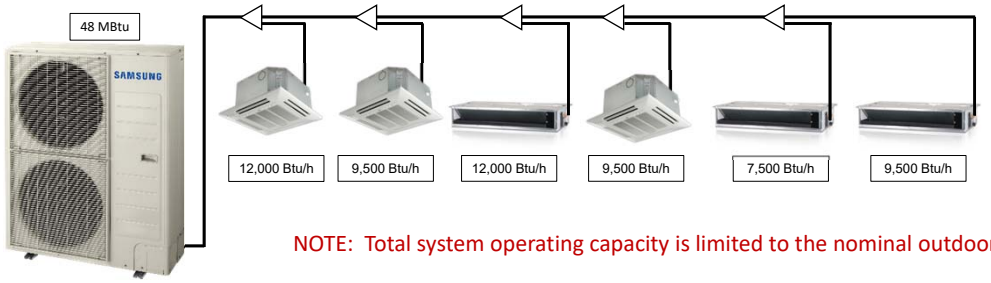
"Capacity Connection Ratio"

- All Samsung DVM S, VRF systems incorporate the "Connection Ratio" feature
- Connection Ratio is the maximum nominal capacity of the outdoor unit in relation to the cumulative total capacity of the connected indoor units
  - Indoor unit capacity can be increased above the maximum capacity of the outdoor unit
- DVM S Eco standard connection ratio range: 50% - 130% for Heat Pump and Heat Recovery systems

Example: 60,000 Btu/h total nominal indoor unit capacity connected to a 48,000 Btu/h outdoor unit = Capacity Ratio of 125%



NOTE: Total system operating capacity is limited to the nominal outdoor unit capacity

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"Load Diversity"

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Cooling operation shown

- Example: 1,900 sq. ft. 3 bedroom home
- Standard 4 ton split system
  - The main trunk and each branch duct is sized to deliver the designed airflow for the normal load in each room
  - System operates in full capacity based on thermostat location and cool temperature setpoint
- The cooling load changes throughout the day due to the orientation of the sun to the house and occupant usage
- Because of the centralized ductwork and single temperature control, all rooms receive the same air flow and cooling capacity regardless of the individual load requirements

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Eco System With "Load Diversity"

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Cooling operation shown

- Example: 1,900 sq. ft. 3 bedroom home
- ECO AM048FXMDCH 4 ton system
  - Little or no ductwork
  - Small diameter refrigerant lines with Y-joints
  - Individual zone control
- Individual indoor units cool the space according to the setpoint temperatures on the remote controllers
- The cooling load changes throughout the day due to the position of the sun and occupant usage
- Zones with reduced cooling loads decrease system capacity and energy consumption

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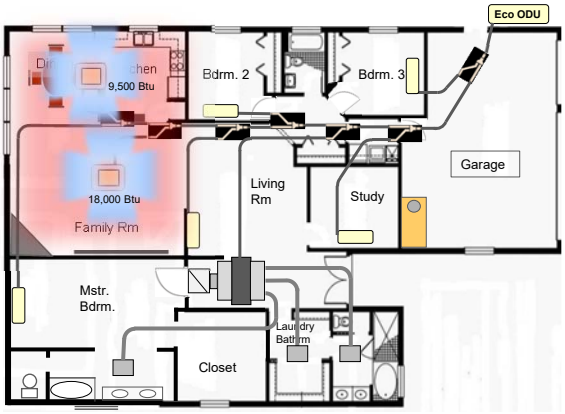
Capacity Control Ability with Load Diversity



- Certain zones within the temperature controlled areas can experience occasional increased loads
  - Example: Parties or holiday celebrations which include more people in the zone than normal
  - Indoor unit(s) can be upsized in capacity to handle the occasional increased loads
  - The total indoor unit capacity can be increased to a maximum of 130% of the outdoor unit nominal capacity output
  - System capacity is transferred from areas with reduced loads to the area(s) which are experiencing temporary high loads
- NOTE: The outdoor unit will only provide it's design capacity in full load conditions

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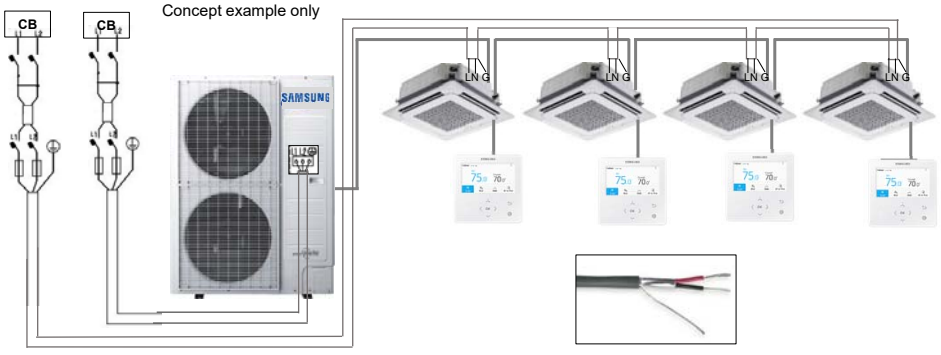
DVMS Eco System Power & Control Circuits

The outdoor unit is powered by a dedicated 208/230vac single phase line voltage circuit
Indoor units are powered by a separate dedicated 208/230vac circuit

The outdoor unit communicates with the indoor units and controllers via a digital 2 conductor control wire which is installed in a daisy chain configuration



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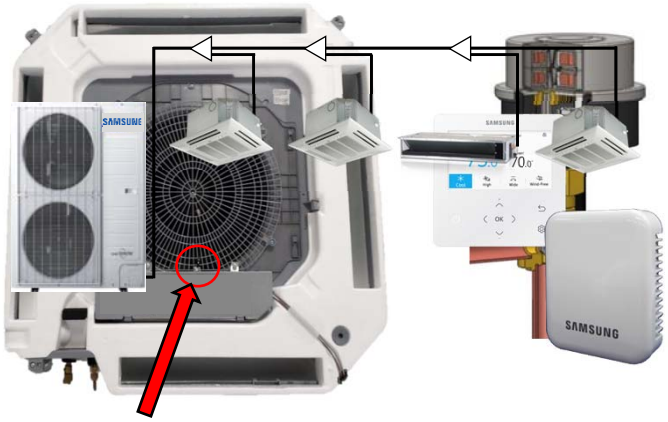
Variable System Capacity Control

- All DVMS Indoor units incorporate an internal EEV (excl. Under Ceiling unit)
  - EEV controls individual fan coil superheat and subcooling based on load demand
- Indoor ambient temperature is read from the indoor unit return air sensor (Default), or optional wired controller with built-in room temperature sensor, or external room temperature sensor
- Overall system capacity modulates based on load demand of the conditioned space and controller temperature setpoint

Example: 4-Way Cassette



Return Air Temperature Sensor

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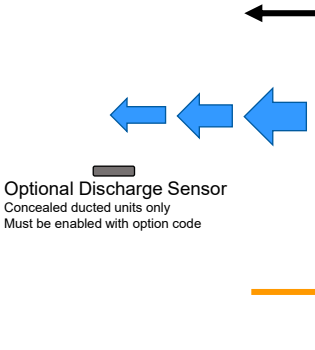
Indoor Fan Coil Basic Components

- Indoor unit component diagram
  - Control components
    - Control PCB
    - Electronic Expansion Valve (EEV)
    - Wired Remote Controller w/built-in sensor (optional)
    - External Room Sensor (optional)
    - Condensate Lift Pump (specific units)

Example: 4-Way Cassette PCB



(Actual product appearance may vary)

Example:
MWR-WGOOUN

Room Sensor

MWR-TA
External Room Sensor

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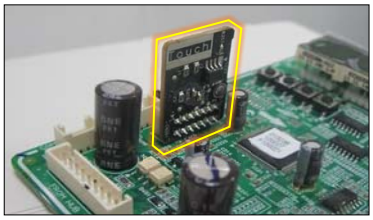
Removable/Rewritable EEPROM

- DVMS indoor and outdoor units have an EEPROM to store all unit settings and information
- Maintains system information during service or PCB replacement
- EEPROM is replaceable and rewritable



Outdoor unit main PCB

Front

Back

Outdoor unit data stored in EEPROM
- HP information
- Auto start up result
- Key tact option
- Error back up data (30min)
- Serial and model number

Indoor unit data stored in EEPROM
- Model/serial number (Excl. Multi-position AHU)
- Option settings
- Saves unit name for future service work and controls setup
- Other data

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Eco Outdoor Unit Features

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Outdoor Unit Model Nomenclature

Heat Pump Models

AM	036	T	X	M	D	C	H	/	AA
AM	048	T	X	M	D	C	H	/	AA
AM	053	T	X	M	D	C	H	/	AA
AM	060	M	X	M	D	C	H	/	AA
①	②	③	④	⑤	⑥	⑦	⑧		

① Classification
AM = DVM S

② Capacity
3 digits x 1,000 Btu/h

③ Version
F = 2013
M = 2016
N = 2018

④ Product Type
X = Outdoor Unit

Heat Recovery Models

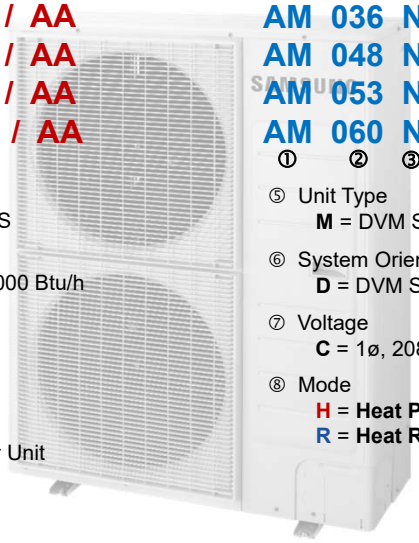
AM	036	N	X	M	D	C	R	/	AA
AM	048	N	X	M	D	C	R	/	AA
AM	053	N	X	M	D	C	R	/	AA
AM	060	N	X	M	D	C	R	/	AA
①	②	③	④	⑤	⑥	⑦	⑧		

⑤ Unit Type
M = DVM S Eco Outdoor Unit

⑥ System Orientation Type
D = DVM S Eco Single ODU only

⑦ Voltage
C = 1ø, 208/230vac, 60Hz

⑧ Mode
H = **Heat Pump**
R = **Heat Recovery**



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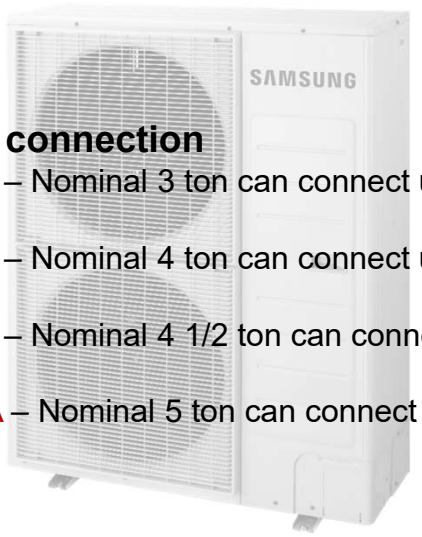
DVMS Eco Systems



Maximum indoor unit connection

- AM036FXMDCH/AA – Nominal 3 ton can connect up to 6 indoor units
  AM036NXMDCR
- AM048FXMDCH/AA – Nominal 4 ton can connect up to 8 indoor units
  AM048NXMDCR
- AM053FXMDCH/AA – Nominal 4 1/2 ton can connect up to 9 indoor units
  AM053NXMDCR
- AM060MXMDCH/AA – Nominal 5 ton can connect up to 10 indoor units
  AM060NXMDCR

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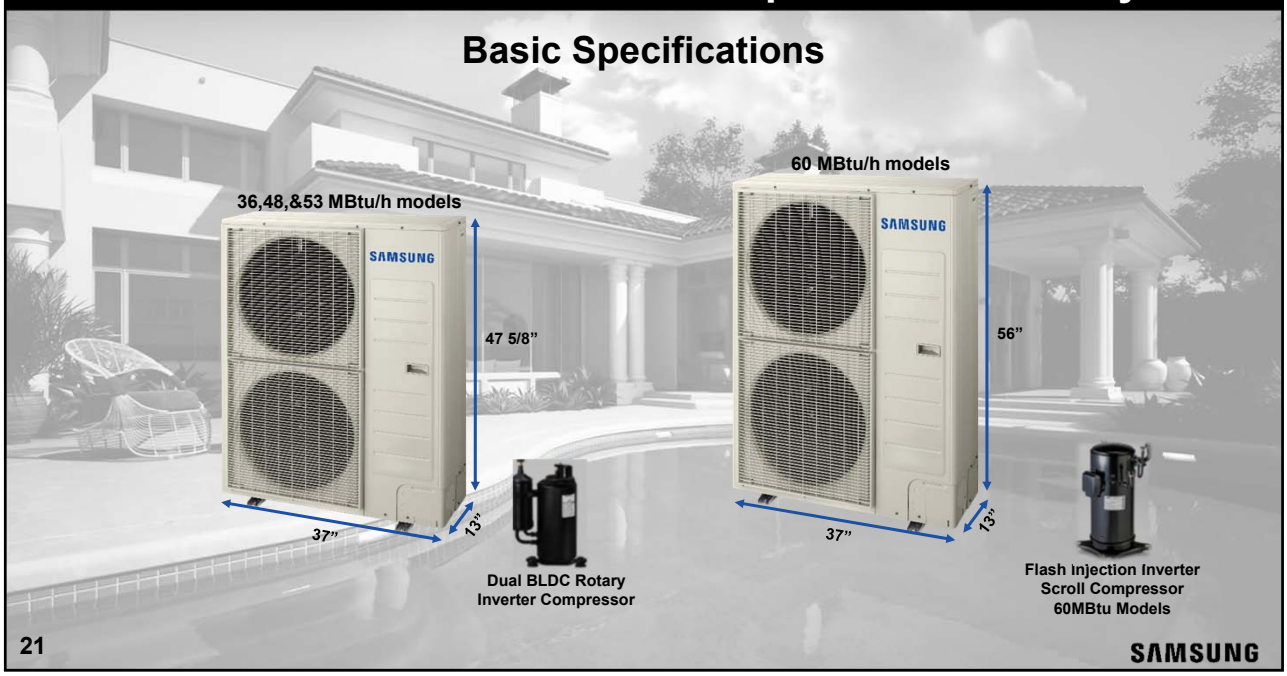
Eco Outdoor Units – Heat Pump & Heat Recovery

Basic Specifications



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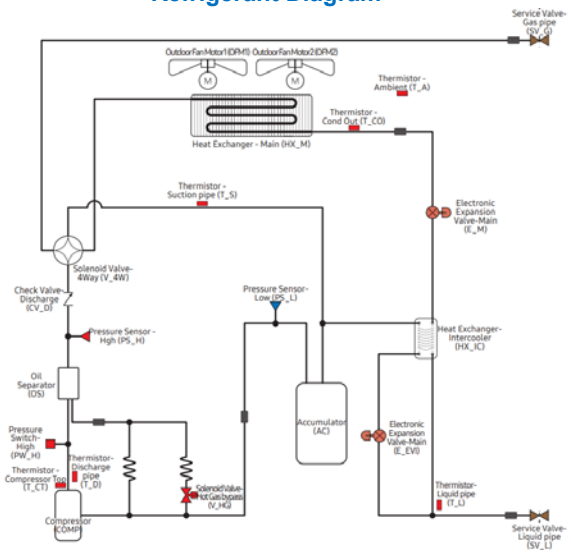
Eco 36,48 & 53MBtu Heat Pump Models

Dual BLDC Rotary Compressor

Refrigerant Diagram



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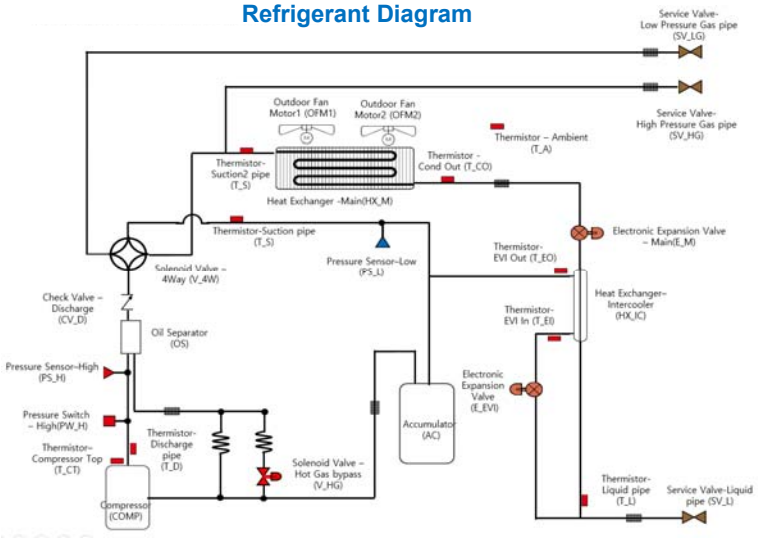
Eco 36,48 & 53MBtu Heat Recovery Models

Dual BLDC Rotary Compressor

Refrigerant Diagram



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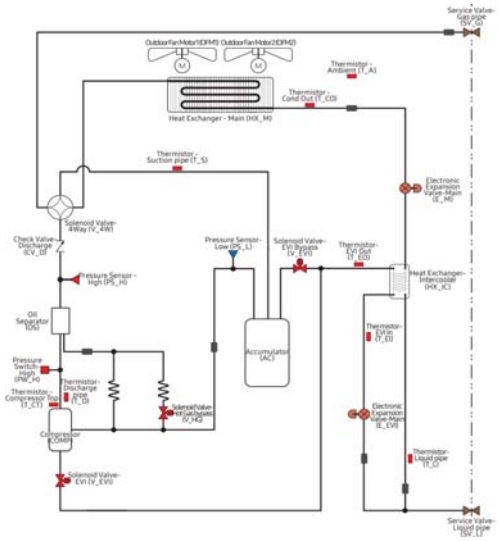
Eco 60MBtu Heat Pump Model

Flash Injection Scroll Compressor

Refrigerant Diagram



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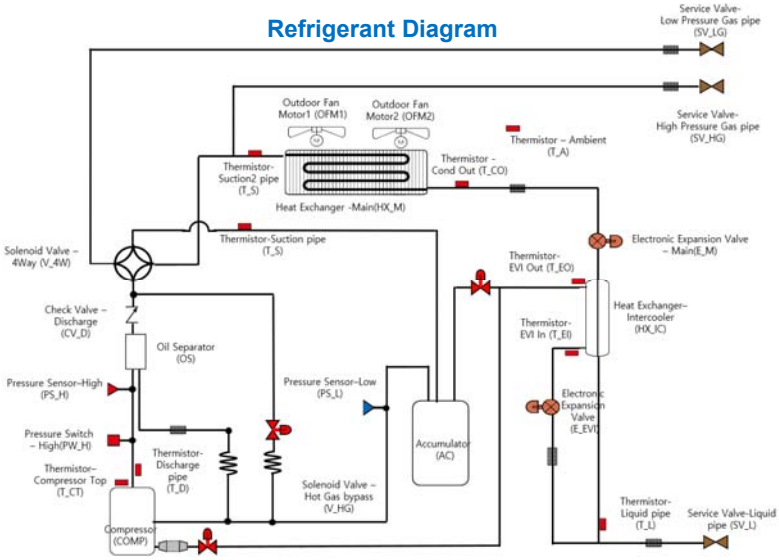
Eco 60MBtu Heat Recovery Model

Flash Injection Scroll Compressor

Refrigerant Diagram



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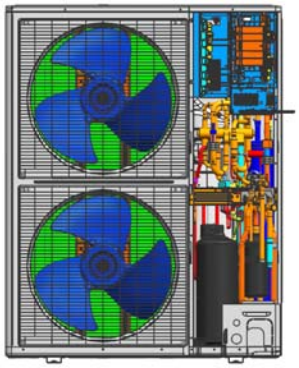
Flash Injection Scroll Compressor

60MBtu Heat Pump & Heat Recovery Models



Heating Performance Increased

- Two phase refrigerant injection (vapor + liquid)
- Heating performance under low ambient heating condition
- Mixed vapor and liquid refrigerant injection increase refrigerant flow
- Decrease discharge temperature while in high compression ratio conditions
- Increase refrigerant flow rate

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ODU Operating Temperature Range

Heat Pump and Heat Recovery Systems

Cooling: 23ºF – 118ºF (**0°F** w/optional wind baffles installed)
Heating: -13°F – 75°F

Low ambient controls are not necessary for cooling in low ambient conditions (down to 0ºF)

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ODU Main Control PCB

Outdoor unit option set, Indoor unit quantity set
Commissioning & Service modes
K1 K2 K3 K4 Tactile switches

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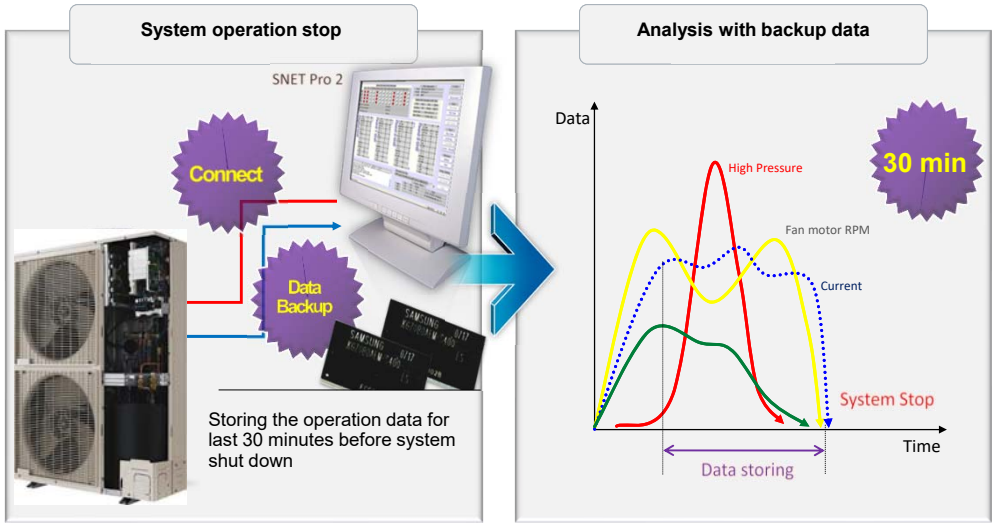
Built-in Operating Memory

Data Backup on main PCB



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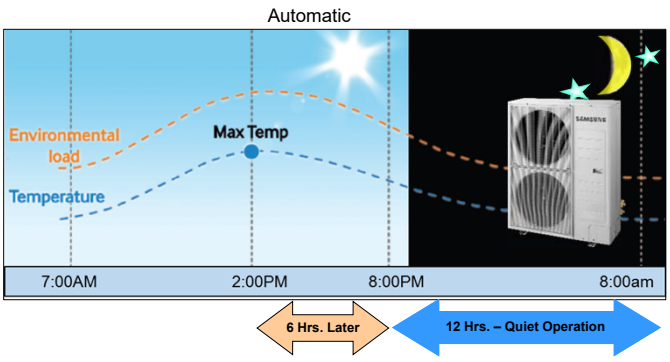
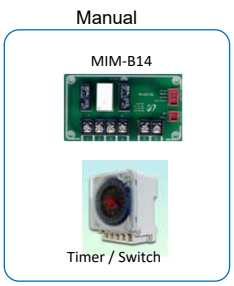
Night Quiet Mode

- Operation in “Night Quiet” mode has a noise reduction of up to 15dB(A)
- Feature automatic operation requires option setting at commissioning
- Can be configured for manual operation by external contact (MIM-B14)
- 6 hours after the hottest point in the day, the system will enter “night quiet” mode
- This mode reduces fan and compressor speeds thus reducing operating sound level
- 12 hours later, the outdoor unit will release from this mode and return to normal operation





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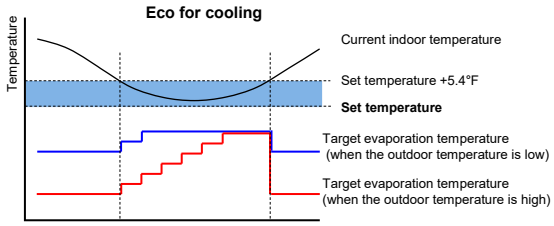
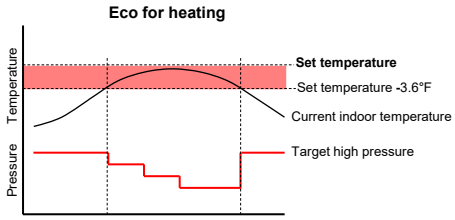
Energy Control Operation

- Reduce energy consumption by adjusting target evaporator & high side pressure based on indoor and outdoor ambient temperatures
  - As the room temperature approaches set point temperature, the target evaporator temperature or target refrigerant pressure is changed
- Function requires option setting at commissioning





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Indoor Unit Emergency Operation

Indoor Unit Communication Error

E201 IDU communication error – entire system shuts down

- Emergency Operation allows communicating indoor units to continue to operate for up to 12 or 24 hours
- Emergency Operation function is enabled through the ODU Main PCB option setting
- Function requires option setting at commissioning

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Current Control – Demand Limit

- DVM S Eco outdoor units have current limitation setting options
- This will allow setting of maximum outdoor unit operating current
- Settings will limit 2 to 8 amps below the maximum design current
- More details in the start up section

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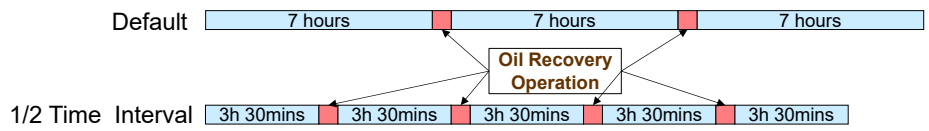
Oil Return Interval Option Setting

Oil Return Interval

- The outdoor unit starts the oil return operation after 7 hours of cumulated compressor run time (default).
  - The standard 7 hour interval can be changed to 3 ½ hours with the option setting

Optional item	Input unit	SEG1	SEG2	SEG3	SEG4	Function of the option	Remarks
Oil collection interval	Main	0	4	0	0	Factory default	
				0	1	Shorten the interval by 1/2	



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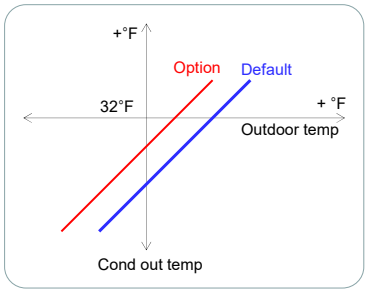
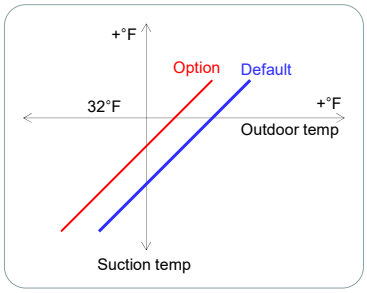
Defrost Temperature Option Setting

Temperature to trigger defrost operation setting

- Increase the temperature setting to initiate defrost operation in high humidity areas

Optional item	Input unit	SEG1	SEG2	SEG3	SEG4	Function of the option	Remarks
Temperature to trigger defrost operation	Main	0	5	0	0	Factory default	
				0	1	Apply setting when the product is being installed in humid area such as near river or lake	





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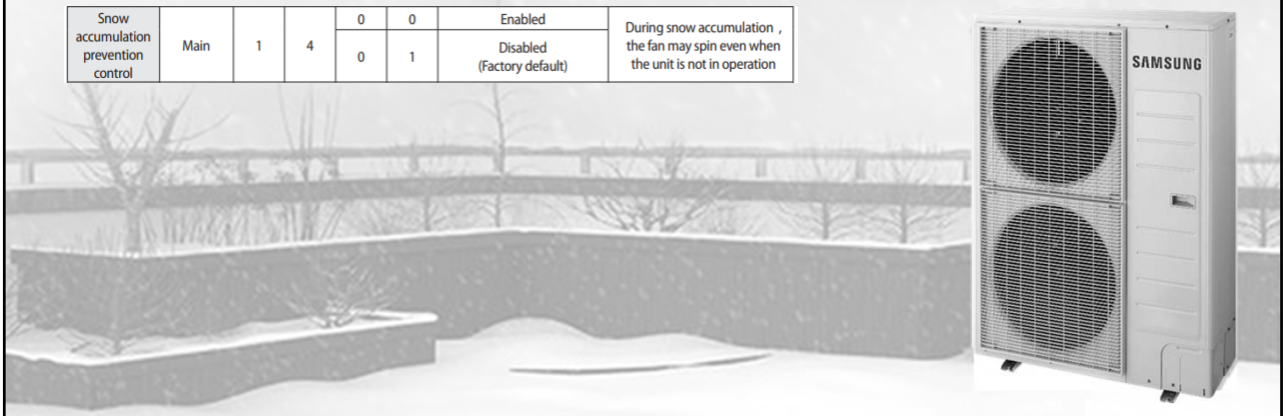
Snow Accumulation Prevention Option Setting

- When enabled, snow is prevented from accumulating on the outdoor unit fan discharge grills
- Function: the outdoor unit fans will run for 60 seconds once every 30 minutes if the outdoor ambient temperature drops below 41°F
  - NOTE: Outdoor unit fans may run when the system is not in operation

Snow accumulation prevention control	Main	1	4	0	0	Enabled	During snow accumulation , the fan may spin even when the unit is not in operation
				0	1	Disabled (Factory default)	



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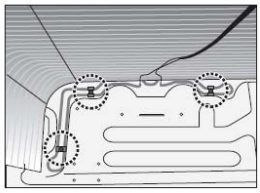
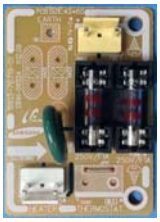
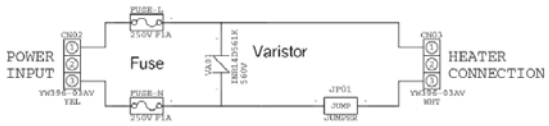
Optional Outdoor Unit Base Pan Heater

Base Pan Heater Kit – Heat Recovery Models

- Optional base pan heater kit is available to prevent condensate from freezing in the unit base pan
  - Heater operation is controlled from the outdoor unit main control PCB
  - Pan heater cycles on during system heat operation with ambient outside temperature ≤ 30°F
  - During Snow Accumulation Prevention operation







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Eco System Capacity Correction Settings

Capacity correction for cooling operation (Target IDU evaporator temperature)

- Option settings to alter indoor units operating evap temperature to accommodate certain performance conditions
  - Factory default target evap temp: 41°F ~ 45°F
  - Target evap temp can be changed with option settings in ranges from 45°F up to 59°F

Capacity correction for heating operation (Target high pressure gas – measured at ODU)

- Option settings to increase or decrease heating capacity of indoor units
  - Factory default target high pressure gas: 435psi
  - Target high pressure can be decreased or increased from 362psi up to 479psi

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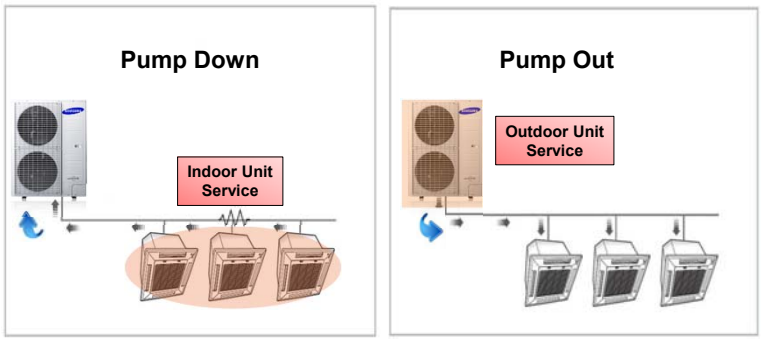
System Refrigerant Pump-down & Pump-out



If maintenance of the indoor units is necessary, the system refrigerant can be pumped into the outdoor unit to allow access to the indoor piping system

If maintenance of the outdoor unit is necessary, the refrigerant can be pumped out of the outdoor unit into the system piping and indoor units

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Heat Recovery
HR Changer & Sub MCU

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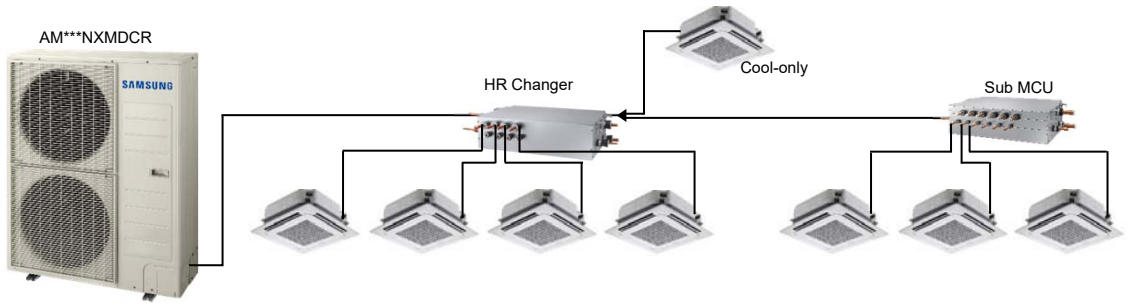
HR Changer & Sub MCU

DVMS Eco Heat Recovery Refrigerant Network



- **HR Changer**: Mandatory device for indoor unit mode changeover
- HR Changer is installed as the first device in the refrigerant piping network
- Cool-only indoor unit is connected to the HR Changer low pressure gas and liquid main pipes
- **Sub MCU** required for additional indoor unit zones after the HR Changer
- DVM Pro required for system design and layout

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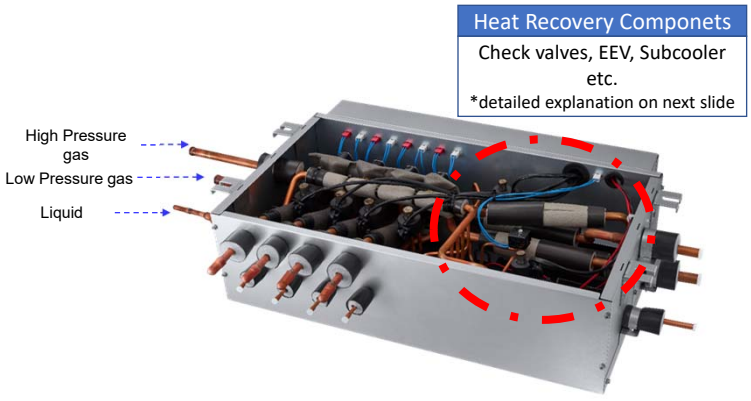
HR Changer – R4NEKON

- 208/230 vac
- NASA communications (F1 F2)
- Contains necessary componets for heat recovery applications
  - Check valves
  - Solenoid vales
  - Subcooler
- 4 Port
- Max. capacity per port: 19 MBtu
- Max. IDU connection per port: 3
- Auto pipe pairing
- All brazed pipe connections



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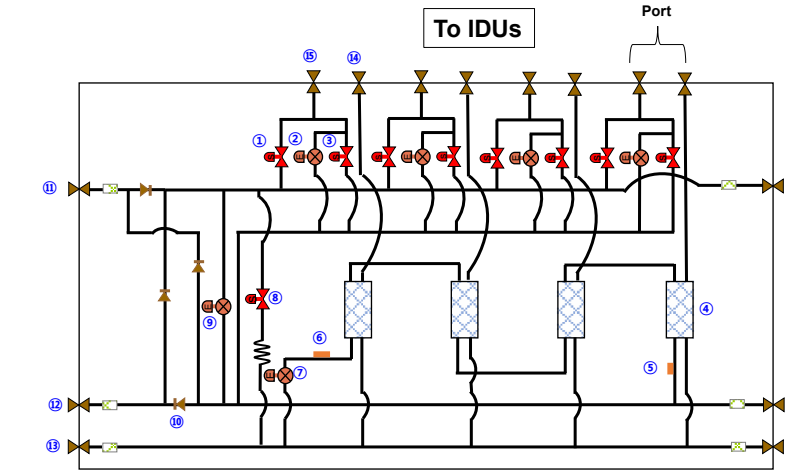
HR Changer – Refrigerant Diagram



No.	Abbrev.	Name
①	V_HT	Heating valve
②	E_MC	Mode Change EEV
③	V_CL	Cooling valve
④	SC	Subcooler(Intercooler)
⑤	T_SO	Subcooler Out Temp. sensor
⑥	T_SI	Subcooler In Temp. sensor
⑦	E_SC	Subcooler EEV
⑧	V_LQ	Liquid bypass valve
⑨	E_BY	Bypass EEV
⑩	-	Check vale
⑪	-	High pressure pipe (From outdoor unit)
⑫	-	Low pressure pipe (From outdoor unit)
⑬	-	Liquid pipe (From outdoor unit)
⑭	-	Liquid port (To indoor unit)
⑮	-	Gas port (To indoor unit)

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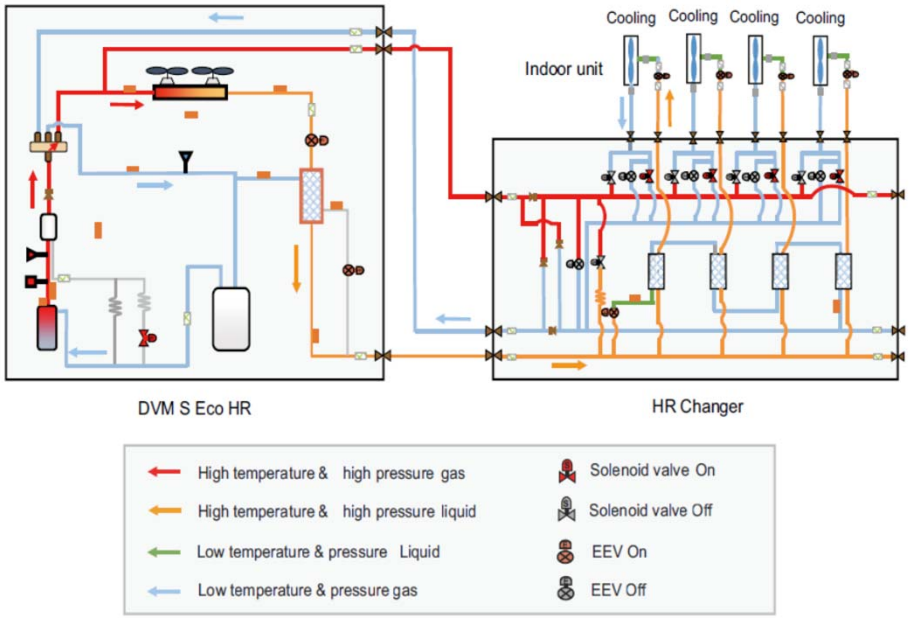
Refrigerant Cycle Diagram – Cool Mode



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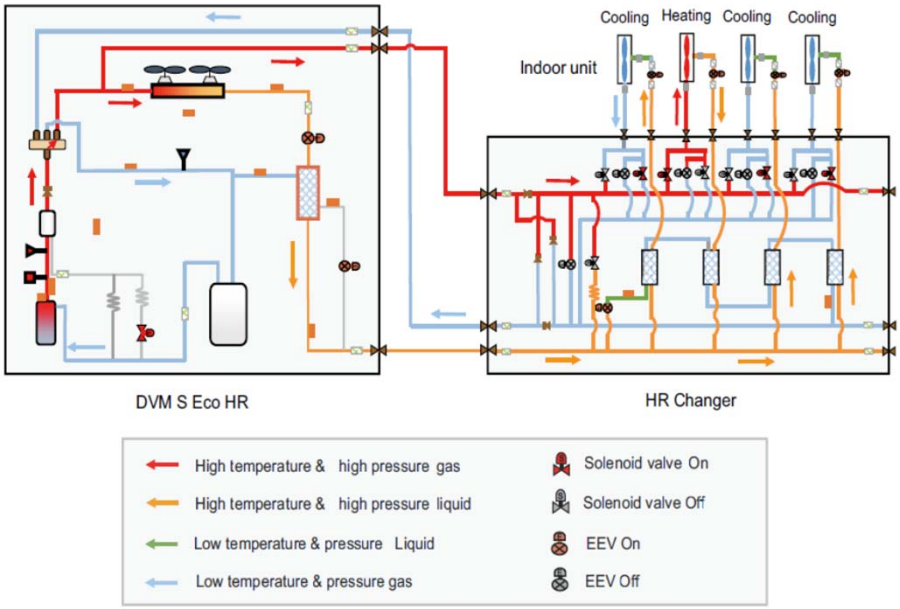
Refrigerant Cycle Diagram – Main Cooling



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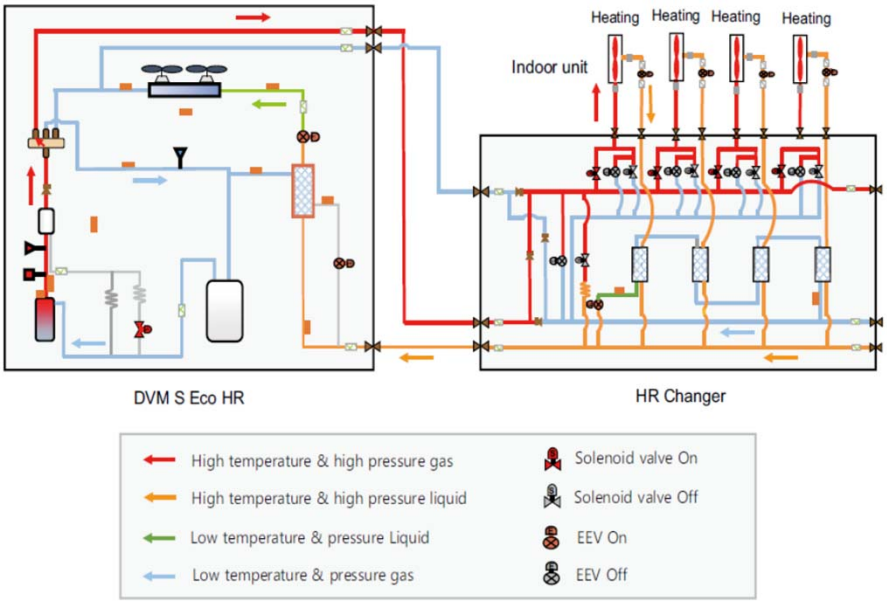
Refrigerant Cycle Diagram – Heat Mode



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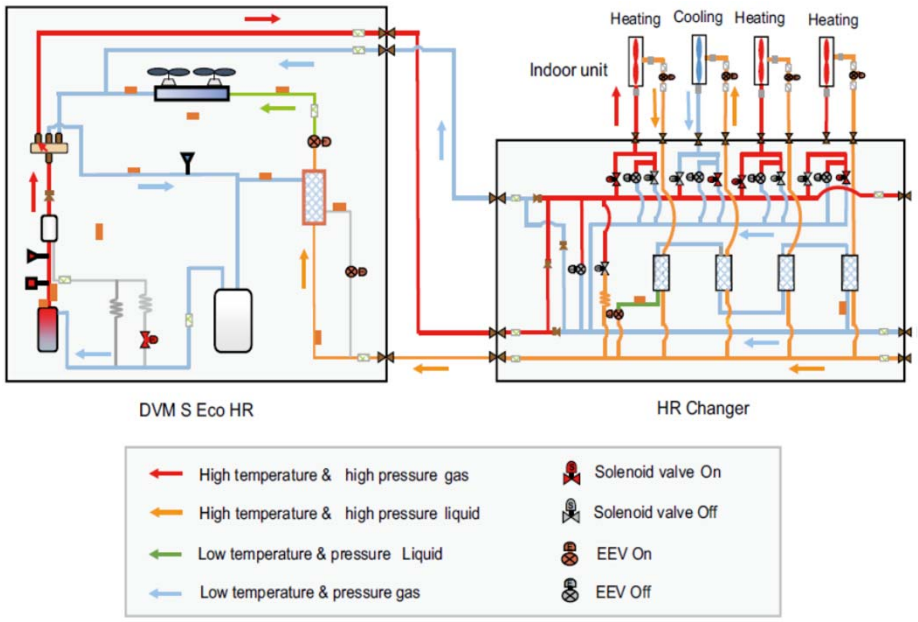
Refrigerant Cycle Diagram – Main Heating



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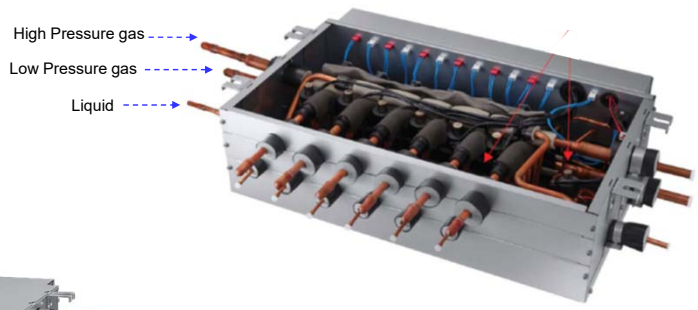
Sub MCU – S6NEK3N

- 208/230 vac
- NASA communications (F1 F2)
- 6 Port
- Max. capacity per port: 19 MBtu
- Max. IDU connection per port: 3
- Auto pipe pairing
- All brazed pipe connections



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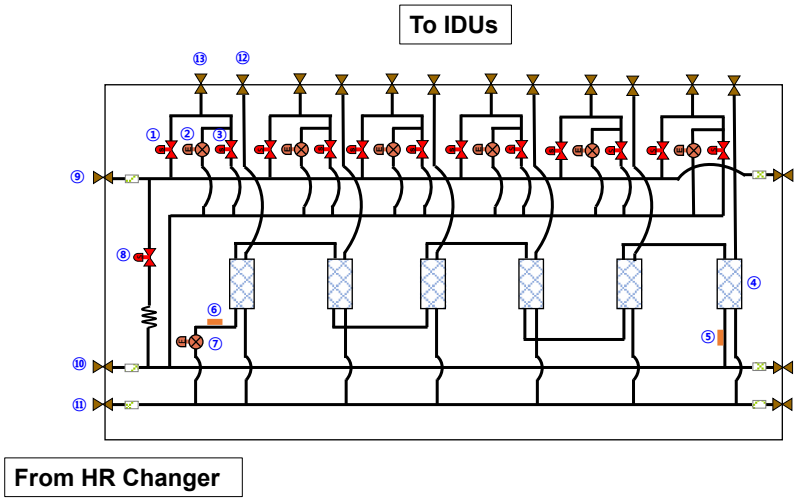
Sub MCU – Refrigerant Diagram



No.	Abbrev.	Name
①	V_HT	Heating valve
②	E_MC	Mode Change EEV
③	V_CL	Cooling valve
④	SC	Subcooler(Intercooler)
⑤	T_SO	Subcooler Out Temp. sensor
⑥	T_SI	Subcooler In Temp. sensor
⑦	E_SC	Subcooler EEV
⑧	V_LQ	Liquid bypass valve
⑨	-	High pressure pipe (From outdoor unit)
⑩	-	Low pressure pipe (From outdoor unit)
⑪	-	Liquid pipe (From outdoor unit)
⑫	-	Liquid port (To indoor unit)
⑬	-	Gas port (To indoor unit)

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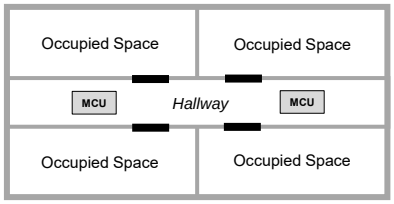
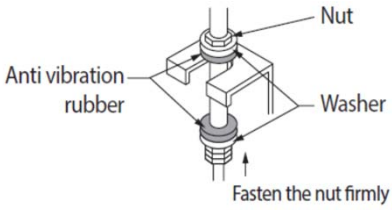
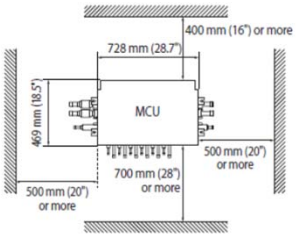
HR Changer & Sub MCU Installation

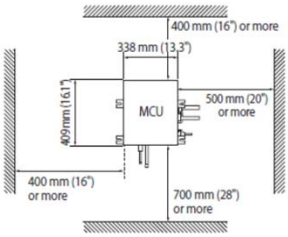
- HR Changer/ Sub MCU must be installed securely upright and level
- Avoid installation directly over occupied areas
- Support refrigerant piping properly:
- Refer to state and local code requirements
- Units must have proper service access space
- Unused ports must be brazed closed
- Condensate drain not needed

Preferred MCU Placement









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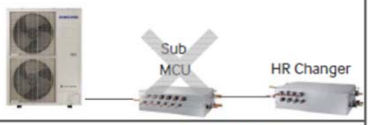
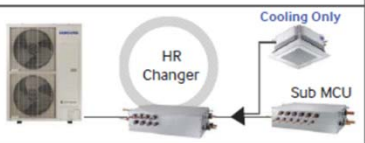
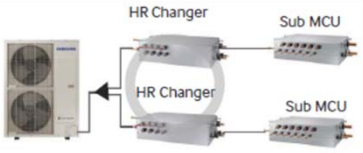
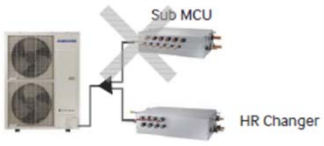
Heat Recovery HR Changer / Sub MCU Basic Layout

Case	Correct installation*	Incorrect installation
HR Installation (HR changer required)		
Serial Installation		
Cooling only Indoor unit Installation		
Parallel Installation		

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Digital Control Wiring

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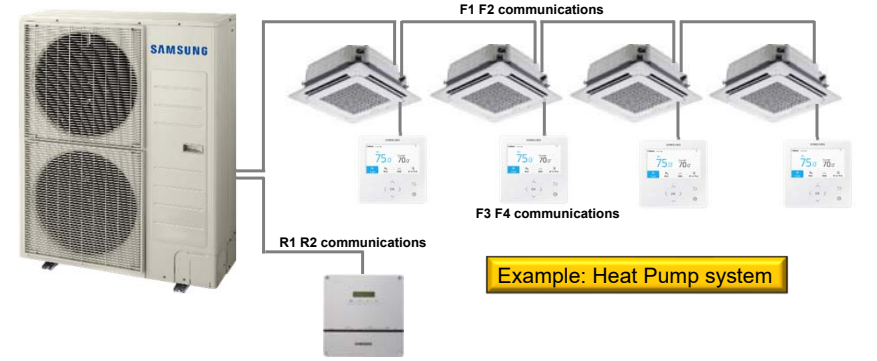
Samsung “NASA” Digital Communications



Integrated digital communications architecture sharing a common protocol (NASA)	Proprietary to all Samsung DVMS VRF systems	Basic 2-conductor control wire design simplifies installation	Reliable Daisy-chain communication wiring – 5vdc.

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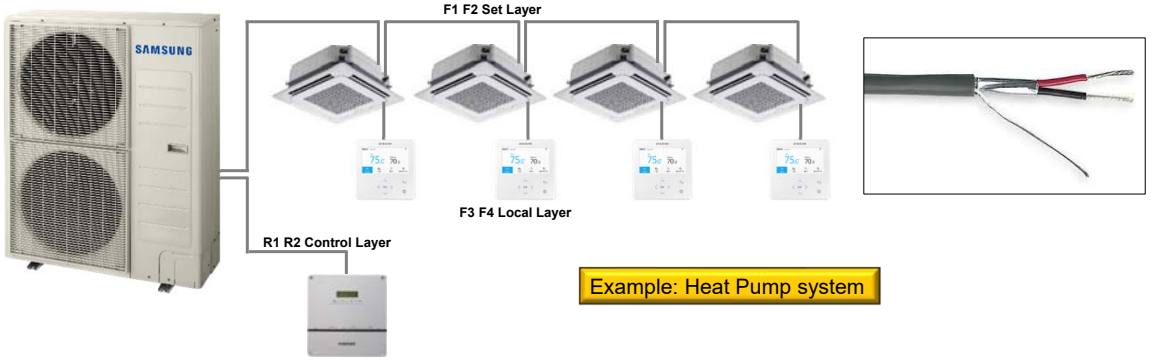
“NASA” Digital Control Layers

- **F1 F2 – Set Layer:** ODU to IDU’s (incl. EEV Kit & MCU’s) daisy chain connections
- **F3 F4 – Local Layer:** Wired Remote Controller to indoor unit
- **R1 R2 – Control Layer:** Outdoor Unit to DMS Centralized Control
- **Control Wire:** 16/2 AWG stranded with shield
- Never use solid core thermostat wire for digital communications



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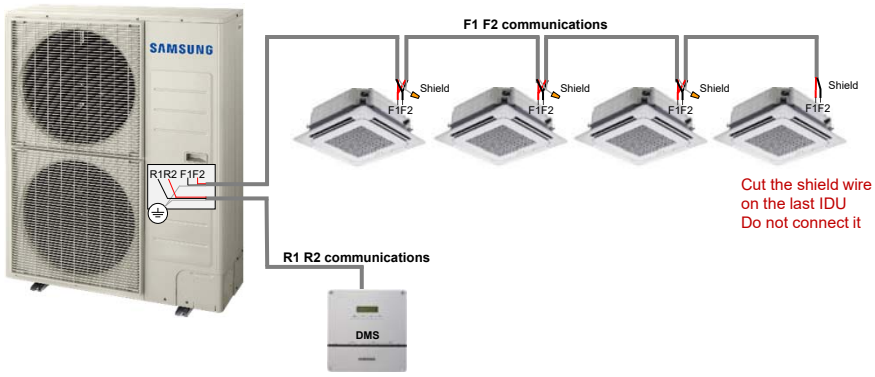
Control Circuit Grounding

- Bond the bare shield wire throughout the system (daisy chain)
  - Do not connect the shield wire to any indoor unit
- Ground the drain wire in the outdoor unit to a separate point other than the main line voltage electrical service ground



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HR Changer/Sub MCU F1/F2 Communications

- HR Changer and Sub MCU's communicate on the same F1 F2 buss as the indoor units
- Each MCU is connected to the F1 F2 buss via daisy chain connections
- Control wire shield is grounded at the Outdoor Unit only

Example: Heat Recovery system

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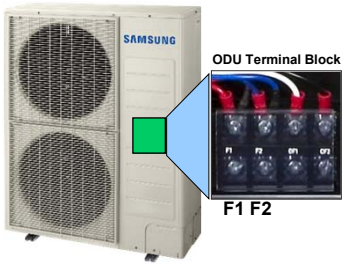
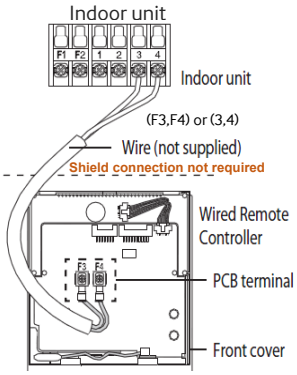
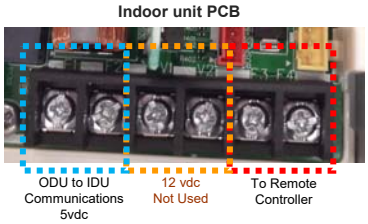
Control Wire Connections

- When installing the control wire in the building, avoid contact with conduit which contains ac voltage wiring
  - Fluorescent lights
  - Equipment that generates electromagnetic waves (maintain 10 ft. clearance)







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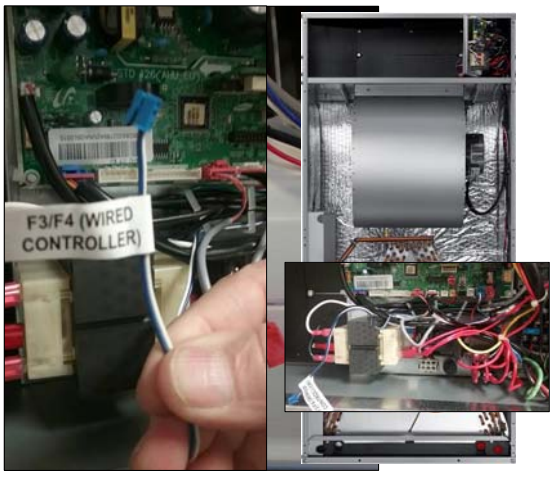
Remote Controller Wire Connections

- NOTE: The Whisper wallmount units, and the Multi-position AHU's do not have screw terminals for wired controller connection (F3/F4), 2-wire harnesses are used instead

- **Wallmount:** From the control box, locate the white harness connector with red and blue wires.
  - Cut the white connector off and connect the red wire to F3 and blue wire to F4 on the remote controller
- **Multi-position AHU:** Locate the tagged blue harness connector with white and blue tagged wires in the control box
  - Cut the blue connector off and connect the white and blue wires to F3 and F4 on the remote controller

2

Neo Forte Wallmount



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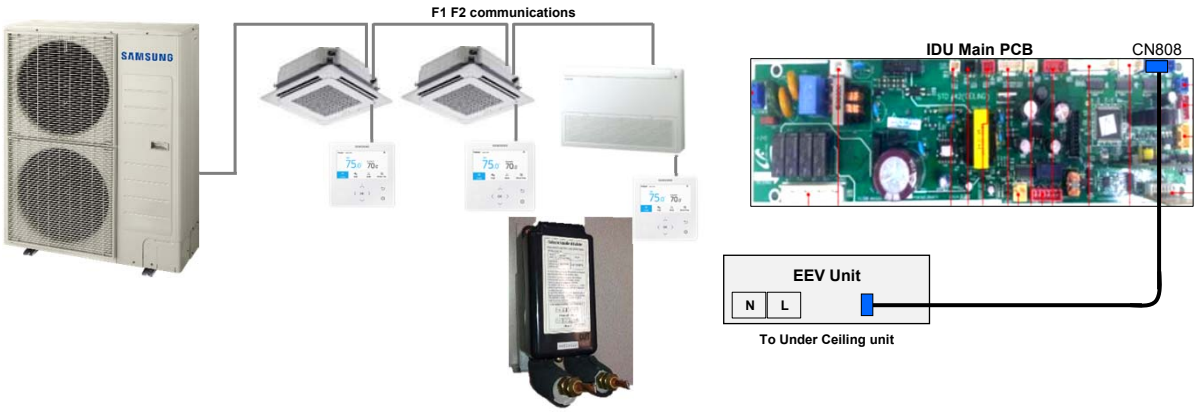
Under Ceiling Unit – Single Port EEV Kit

- **MEV-E24/32SA EEV kit** – Powered and controlled by the "Under Ceiling" main PCB
  - EEV unit includes the required wire harness to connect the EEV to the IDU control PCB on CN808



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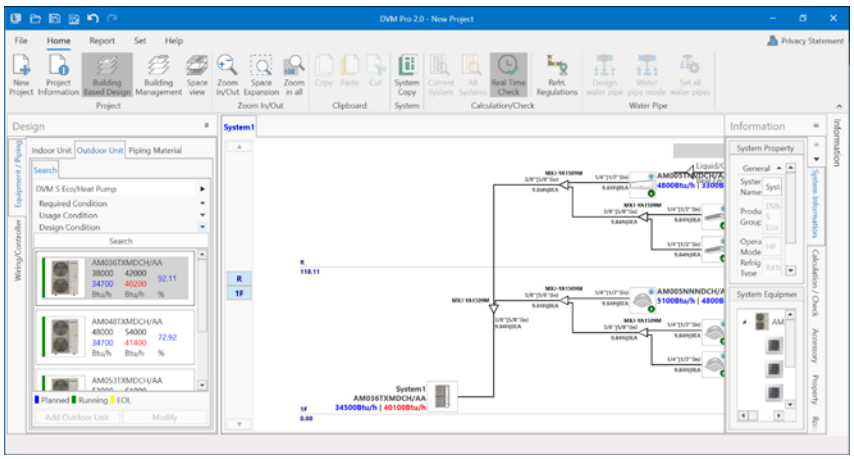
DVMS Eco System Wiring Layout

DVM Pro – Design Software Tool Power & Control Wiring Diagram



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Basic Controls Overview

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Basic Controls Overview

MR-EH00U
Simple schedule control

MWR-SH11UN – Simple Touch Wired Controller
- Touchscreen control
- Built-in room temperature sensor
- Built-in infrared receiver
- Wind-Free

MWR-WG00JN Advanced Wired Controller
- Built-in room temp sensor
- Dual Set Point (DSP) Setting (for supported indoor units)
- 4-Way, Mini 4-way
- 360 Cassette
- Wind Free
- Scheduling

MR-KH00U 360 Cassette
Simple schedule control
Air flow direction control

MRK-A10N – Wireless Signal Receiver
- Allows wireless control for concealed ducted units and the floor standing units
  - On/Off control button
  - Operation indication
  - Error indication
  - Filter replacement sign
  - Recessed installation
  - Includes interconnect cable

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Basic Controls Overview

- **MIM-A6UN**
  - Connects to the indoor unit F3/F4 “local layer” communication line
  - Supports 1 or 2 stages
  - 16 cooling mode and 16 heating mode set temperatures
  - External contact input to disable the unit when contact is opened
  - "Emergency Heat" output to enable an external heating source when the unit is in heating Thermal-ON while in error status.

MIM-H04UN – WiFi Adapter
- WiFi Adapter allows control and scheduling of the VRF system remotely through Android and Apple devices
- Configuration requires the Samsung “SmartThings” app.

MCM-C200 – Mode Selector Switch
- Manual system mode select – Heat Pump systems only
- Installed in outdoor unit or in building
- Max. 328ft of 3 conductor control wire from control to outdoor unit

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Basic Controls Overview

MRW-TA – External Room Temperature Sensor
- Remote sense of room temperature when
- unit is installed in high ceiling
- outside fresh air ducted into the return,
- using a remote controller with no built-in space sensor

Multi-Tenant Function Controller – MCM-C210N
Used to keep a DVM S system online in the event of a power loss to a indoor unit

MIM-B14 – External Contact Controller
- Direct indoor unit control by external contact signal
- Emergency control with simple contact input
- Indoor unit option setting must be set to enable external control operation

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Basic Controls Overview

Touch Controller MCM-A300N

Maximum:
• 64 indoor units, 1 system, and 16 MCU's when connected to F1/F2 (system/set layer)
• 128 indoor units and 16 systems when connected to R1/R2 (control layer)

DMS Data Management Server 2.5 MIM-D01AUN

Easy Control & Monitoring Through Web Browser
Schedule Control Function Through Web Browser
Advanced Programmable Control Logic
Advanced Heat Pump Auto Changeover Logic
External Contact Interface
Energy Management / Power Distribution Function
History Management

BACnet Gateway 2.5 MIM-B17BUN

DMS 2.5 + built in BACnet gateway

LonWorks Gateway 2.5 MIM-B18BUN

DMS 2.5 + built in LonWorks gateway

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Motion Detector Sensor

MCR-SMA – Motion Sensor Standard Mini 4-Way Cassette
MCR-SMD – Motion Sensor Wind-Free Mini 4-Way Cassette
MCR-SMC – Motion Sensor Wind-Free 4-Way Cassette

- Senses motion
- Detects temperature stratification throughout the room
- Function enable/disable via MWR-WE13N wired remote controller
- Snaps into the cassette facia panel corner
- Connection cable included – plugs into “human sensor” plug on PCB (CN401)
- “Learns” occupant schedule

Mode	Soft Off (minutes)	Hard Off (minutes)	Function Description
Standard	20	30	SOFT OFF: turns off indoor unit but can restart with motion detection before HARD OFF. HARD OFF: Turns unit off but will not turn back on after motion is sensed. Unit will need to be power ON with a unit controller.
	40	60	
	80	120	
	120	180	
Premium	20	30	SOFT OFF and HARD OFF are the same as Standard Mode. Samsung comfort functions are activated.
	40	60	
	80	120	
	120	180	

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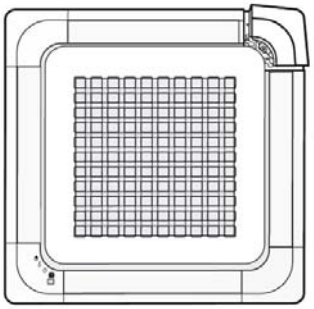
Motion Detector Sensor

- Samsung Comfort Logics (activated in “Premium” mode)
- **Comfort Flow:** MDS prevents the cassette from blowing air directly on occupants by changing air flow direction
- **Comfort Temperature:** When the temperature difference between the upper and lower parts of the room is large, the supply air louvers will lower to direct the air downward
- **Comfort Saving:** When no motion is detected the MDS will adjust the set temperature to reduce energy consumption
  - Max. +3.6°F cooling & -3.6°F heating



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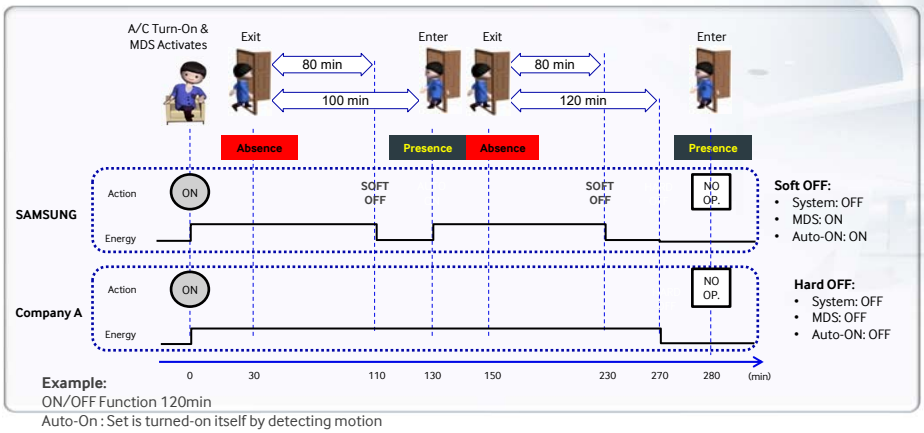
Motion Detector Sensor

Power On/Off



Soft OFF:
- System: OFF
- MDS: ON
- Auto-ON: ON

Hard OFF:
- System: OFF
- MDS: OFF
- Auto-ON: OFF

Example:
ON/OFF Function 120min
Auto-On : Set is turned-on itself by detecting motion

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Motion Detector Sensor

Indirect Air Flow

- People sensing O → avoid direct air flow
- People sensing X → direct air flow

⇒ Feeling comfortable

Floor Temperature sensing

Ceiling Temperatures sensing
→ Temperature
difference of Floor-Ceiling

Floor – Ceiling Temperatures sensing
→ Feeling comfortable

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WiFi Adapter MIM-H04UN

- WiFi Adapter allows control and scheduling of the VRF system remotely through Android and Apple devices
- Configuration requires the Samsung “SmartThings” app

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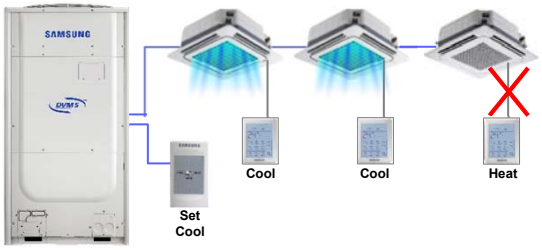
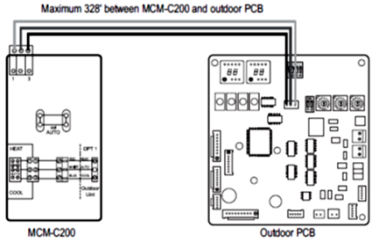
Mode Selector Switch – MCM-C200

- Manual system mode select – Heat Pump systems only
  - Selectable Cool only – Heat only – Auto settings
- Installed in outdoor unit or in building
- Allows manual operation mode change preventing mixed operation
- Max. 328ft of 3 conductor control wire from control to outdoor unit
  - Connects to **K5 Cool**, **AUTO** & **K6 Heat** terminals on the outdoor unit PCB





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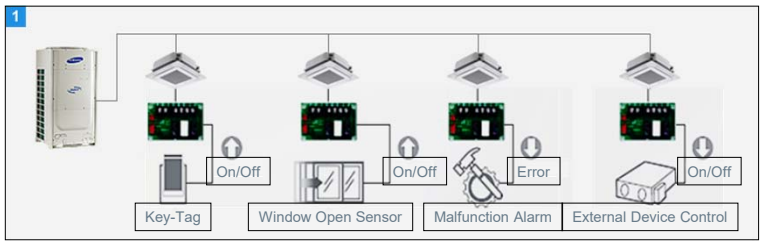
External Contact Controller MIM-B14

Direct indoor unit control by external contact signal

- Function examples: Hotel key card switch, door/window switch, occupancy sensor, On/Off ventilation control with indoor unit thermo-on/ thermo-off, external heat control, Indoor unit operation/error state output through relay contacts
- Emergency control with simple contact input
- Compatible with all DVM S indoor fan coil units

NOTE: MIM-B14 is factory installed as standard on the Multi-position AHU's



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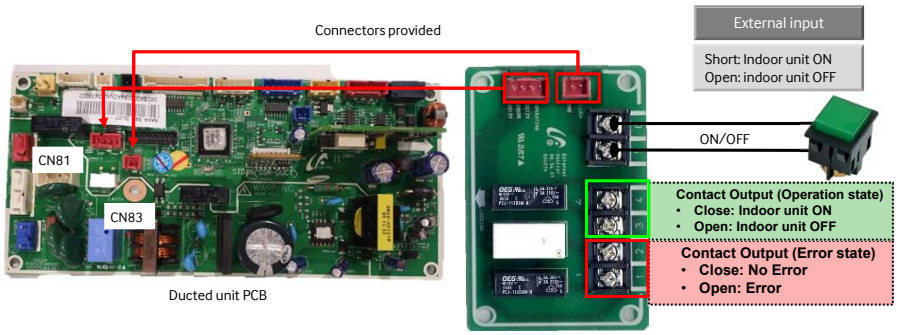
External Contact Controller MIM-B14

- To control the indoor unit providing synchronized control with other devices through the external contact input/output signal
- Indoor unit option setting must be set to enable external control operation
- External contact input load: 5vdc – 5mA
- Output terminals are open/close contacts 0 volts
- Maximum load rating on the Operation & Error terminals: 250vac, 3A



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Multi-tenent Function Controller MCM-C210N

- When supply voltage to an indoor unit is removed/off, MCM-C210N will provide auxiliary 12V DC and 5V DC power to the indoor unit PCB (see table for indoor unit operation details) to keep "awake".
- When supply voltage to an indoor unit is supplied normally, MCM-C210N will cut auxiliary power to the indoor unit PCB allowing normal operation.

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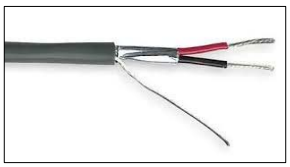
DVM S Control Wiring Review Quiz

1. What is the DVMS control wire specification?

   16/2 AWG stranded with shield



2. Indicate the communication terminal designations for the DVMS Eco outdoor unit.

   F1 F2 - R1 R2

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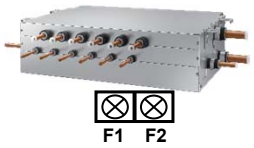
DVM S Control Wiring Review Quiz

3. Indicate the communication terminal designations for the HR Changer & Sub MCU

   F1 F2



4. Indicate the communication terminal designations for the Indoor Unit

   F1 F2 – V1 V2 – F3 F4

5. What is the function of the **V1 V2** terminals ?

   V1 V2 is a 12vdc power supply – not required for the "NASA" protocol wired remote controllers

6. Indicate the communication terminal designations for the MWR-WE13N "NASA" wired remote controller

   F3 F4

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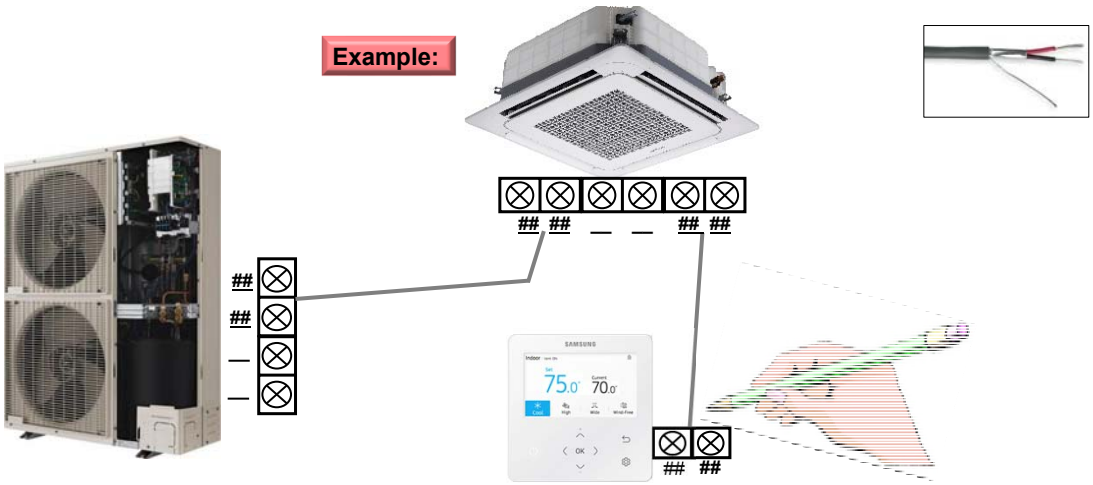
DVM S Control Wiring Review Exercises

Write in each device's communication terminal designations and then draw a single line to connect the specific communication circuit from one device to the other



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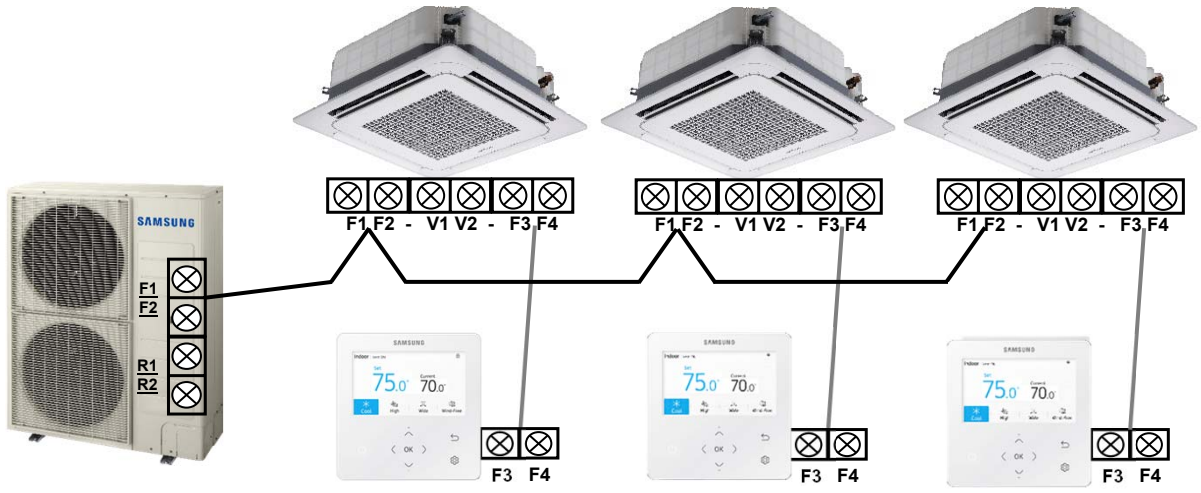
DVM S Control Wiring Review Exercises

Eco 3 Zone Heat Pump System



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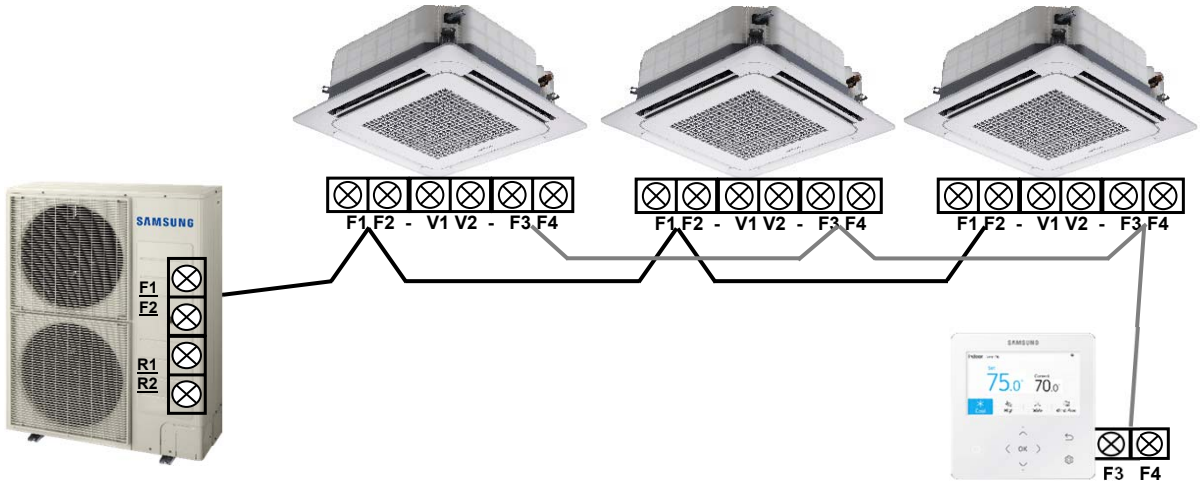
DVM S Control Wiring Review Exercises

Eco Single Zone Heat Pump System



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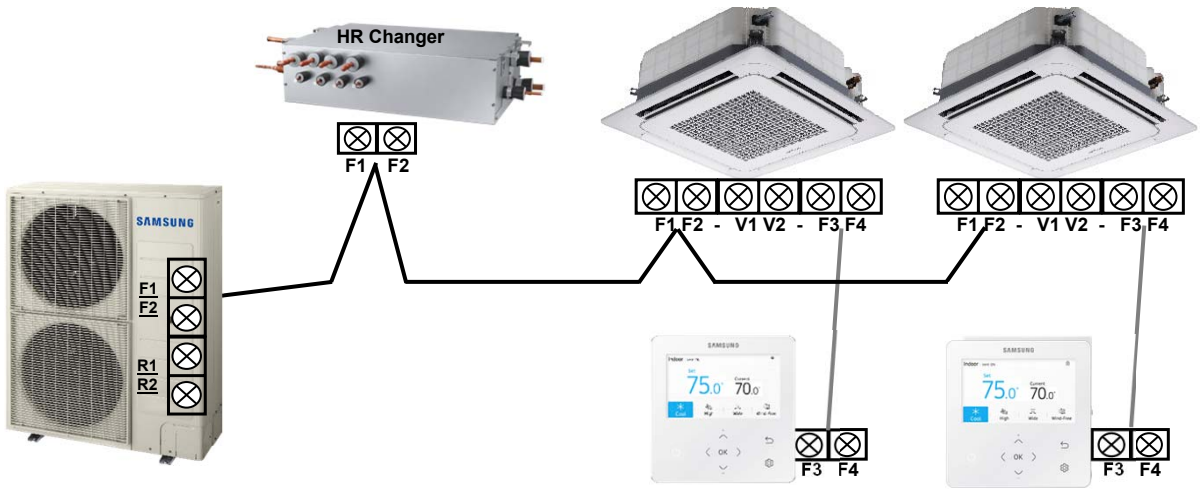
DVM S Control Wiring Review Exercises

Eco Heat Recovery System



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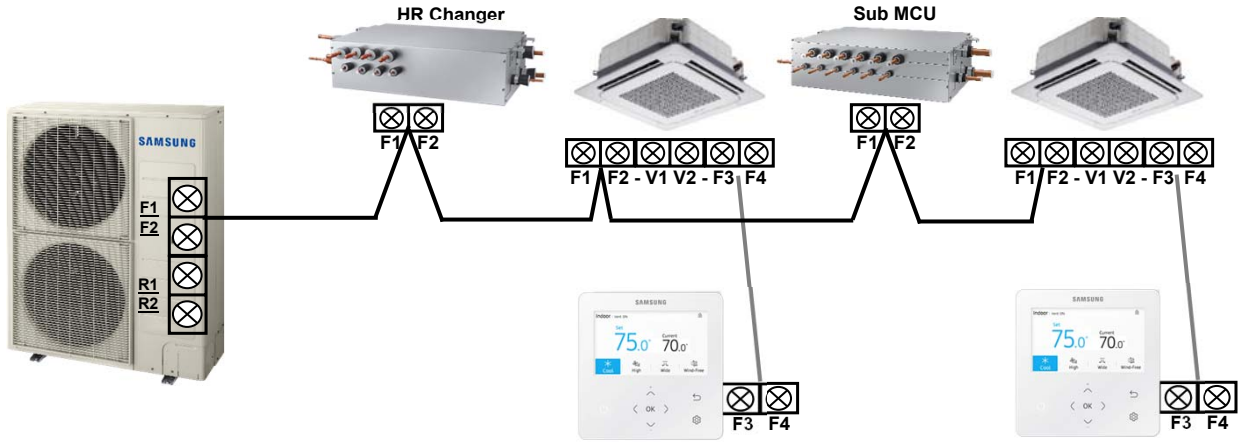
DVM S Control Wiring Review Exercises

Eco Heat Recovery Including HR Changer & Sub MCU



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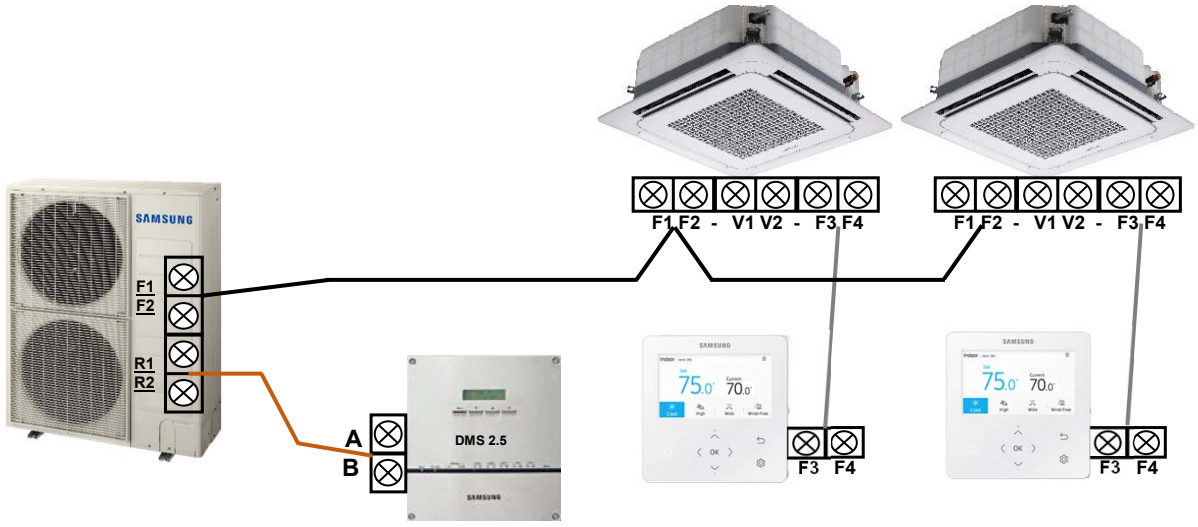
DVM S Control Wiring Review Exercises

Eco Heat Pump System & Centralized Control



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Refrigerant Piping Installation

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Refrigerant Piping Installation

- Samsung piping installation guidelines and restrictions must be strictly adhered to
- Failure to follow Samsung piping guidelines may result in poor system performance, premature component failure, and reduced system service life
- Always refer to the DVM Pro piping diagram and mechanical prints when laying out the refrigerant piping system

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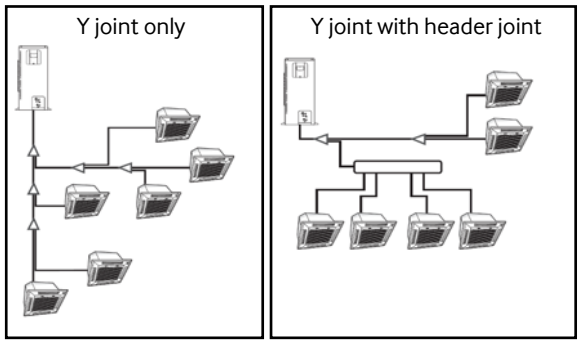
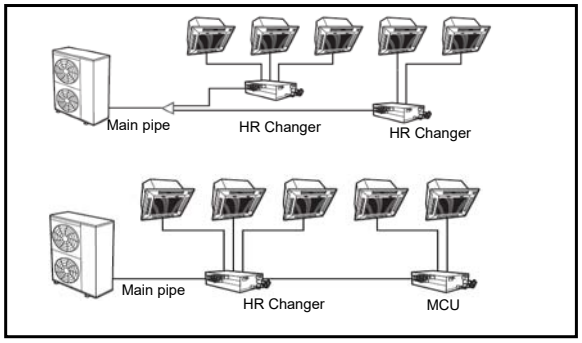
DVMS Eco Heat Pump & Heat Recovery Systems

Heat Pump Systems
- 2-Pipe refrigerant network
- Liquid & Dual pressure gas

Heat Recovery Systems
- 3-Pipe refrigerant network
- Liquid, Low & Dual pressure gas





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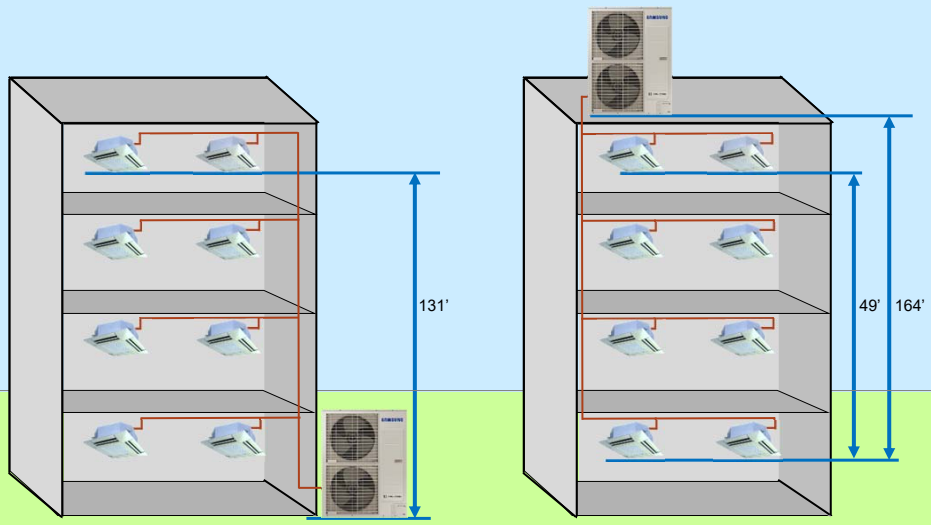
Eco Refrigerant Piping Specifications

Maximum Vertical Separation



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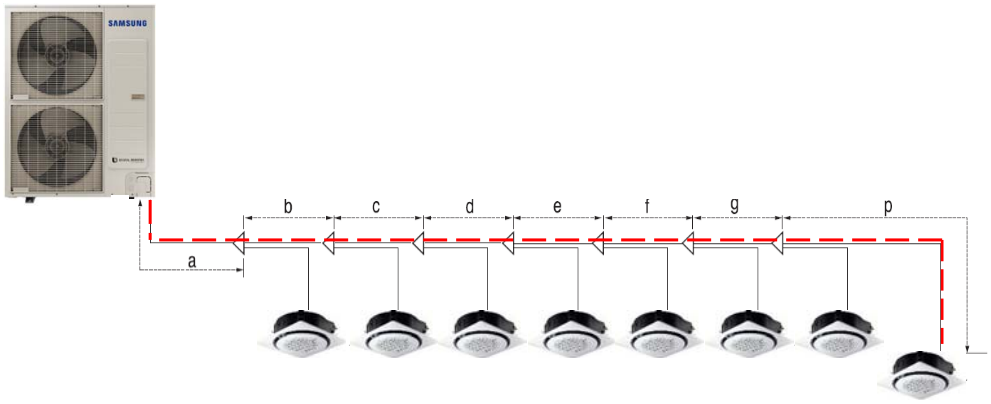
DVMS Eco Refrigerant Piping Specifications

Maximum Piping Lengths

- All piping specifications must be followed to insure that the system will operate properly
- Maximum of 492 ft. (574 ft. equiv.) length from the outdoor unit to the farthest indoor unit
  - (a+b+c+d+e+f+g+p)



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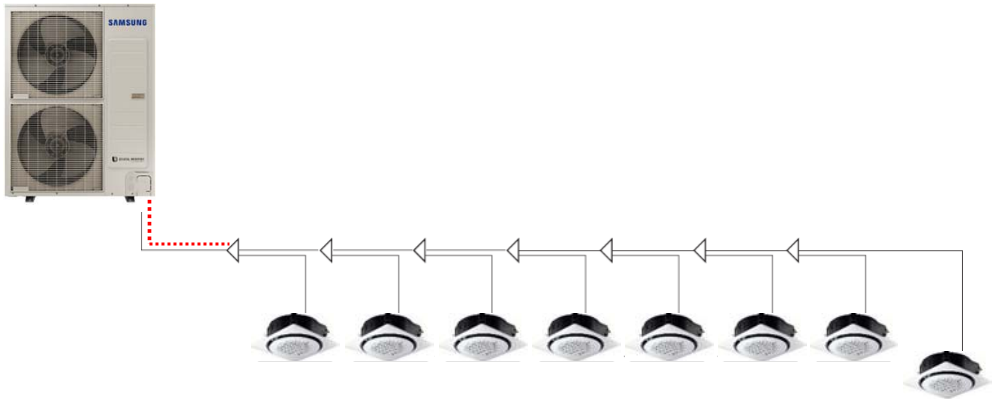
DVMS Eco Refrigerant Piping Specifications

Maximum Piping Lengths

- Maximum 361 ft. measured from the outdoor unit to the first Y-Joint
- Maximum cumulative piping length is 984 ft.



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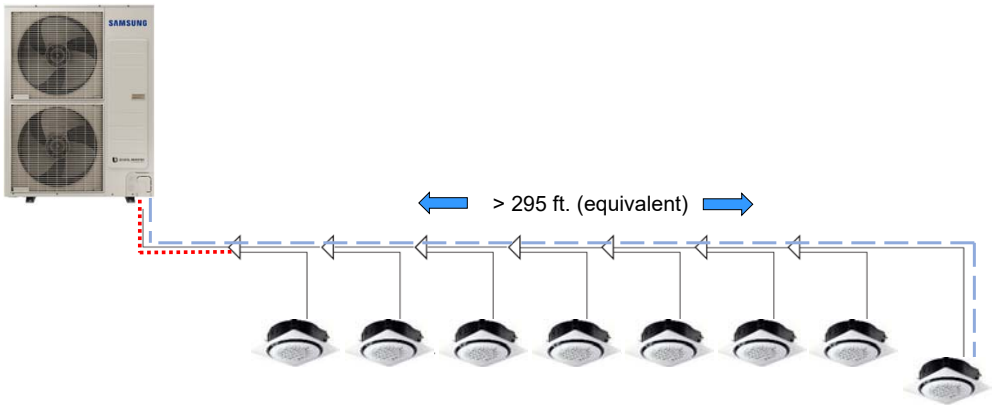
DVMS Eco Refrigerant Piping Specifications

Maximum Piping Lengths

Main pipe sizing between outdoor unit and first Y-Joint

- When the equivalent distance from the outdoor unit to the farthest indoor unit is over 295 ft. the main gas pipe must be increased one size (5/8" to 3/4" & 3/4" to 7/8")



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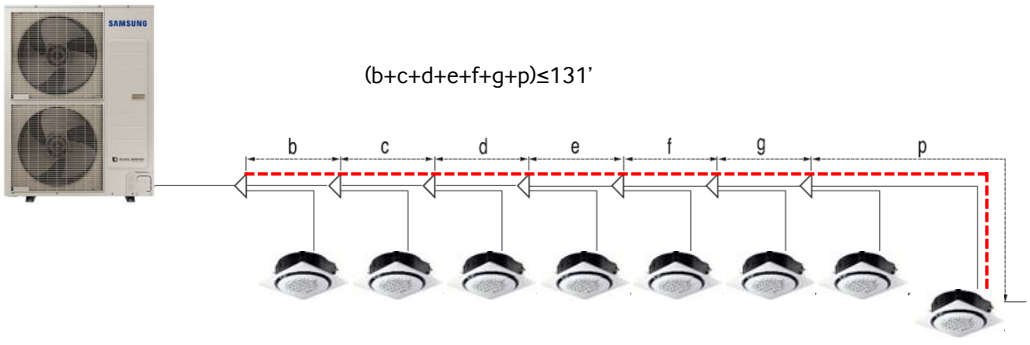
DVMS Eco Refrigerant Piping Specifications

Maximum Piping Lengths

- Maximum distance from the first Y-Joint to the farthest indoor unit is 131 ft.



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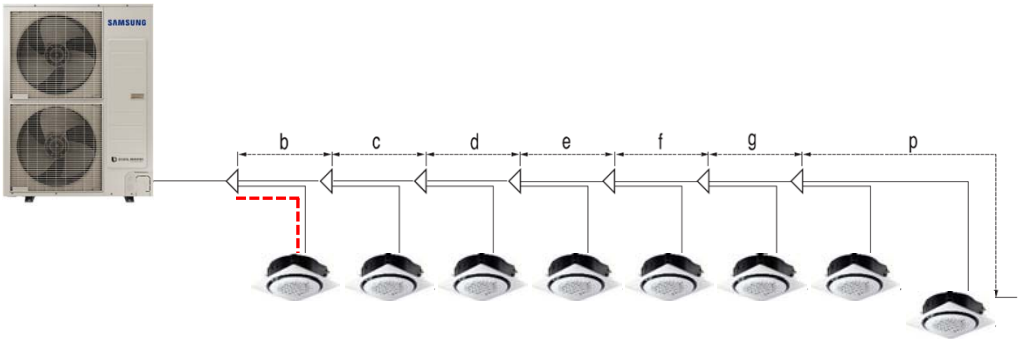
DVMS Eco Refrigerant Piping Specifications

Maximum Piping Lengths

- Maximum distance from a Y-Joint to an indoor unit is 131 ft.



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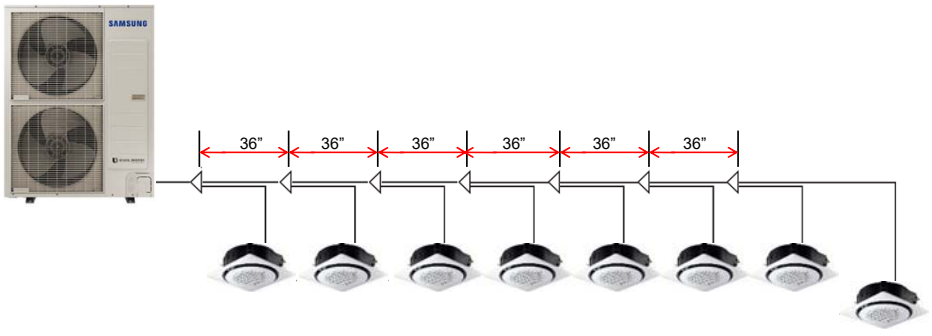
DVMS Eco Refrigerant Piping Specifications

Maximum Piping Lengths

- Maintain a minimum straight line distance: ≥ 20” before connecting to a Y-joint
  - Minimum 36” straight line between Y-joints reccomended



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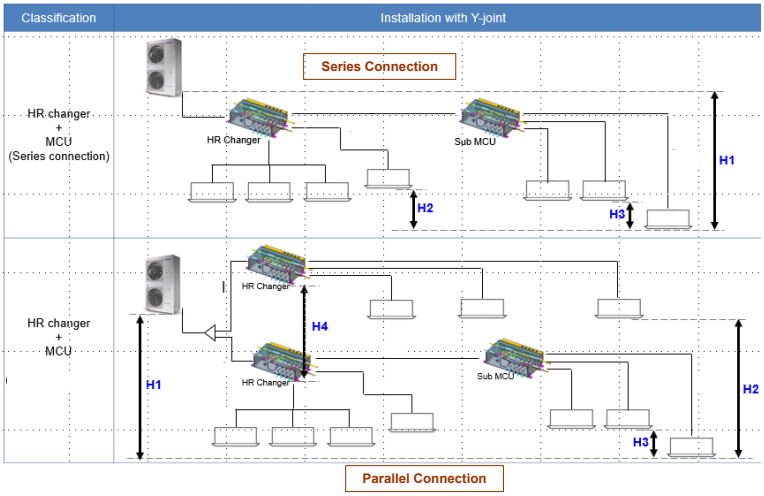
DVMS Eco Heat Recovery HR Changer & Sub MCU

Maximum Piping Lengths

- Total cumulative refrigerant piping: 984ft
- Outdoor unit to farthest indoor unit: 492ft
- HR Changer to farthest indoor unit: 131ft
- Outdoor unit to lowest indoor unit **H1**: 164ft
- Outdoor unit to highest indoor unit: 131ft
- Indoor unit vertical separation **H2**: 82ft (wallmount 49ft)
- Indoor units installed below HR Changer/Sub MCU **H3**: 49ft
- Vertical separation HR Changer (Sub MCU) to HR Changer (Sub MCU) **H4**: 66ft

- **NOTE: All refrigerant piping sizing and length requirements are processed through DVM Pro**



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Heat Recovery HR Changer / Sub MCU Basic Layout

Case	Correct installation*	Incorrect installation
HR Installation (HR changer required)	HR Changer	Sub MCU
Serial Installation	HR Changer, Sub MCU	Sub MCU, HR Changer
Cooling only Indoor unit Installation	Cooling Only, HR Changer, Sub MCU	Cooling Only, HR Changer, Sub MCU
Parallel Installation	HR Changer, Sub MCU, HR Changer, Sub MCU	Sub MCU, HR Changer

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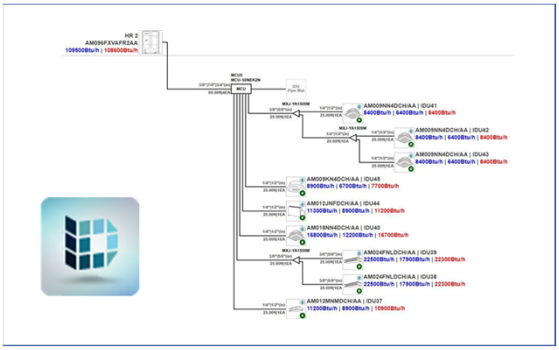
DVMS Eco Piping Design & Layout



DVM Pro Design Software

- Every DVM S project must be designed through DVM Pro
- Insures all system components are compatible
- Insures correct layout of all system components
- Calculates all piping sizes & additional refrigerant
- Insures that system will perform as designed

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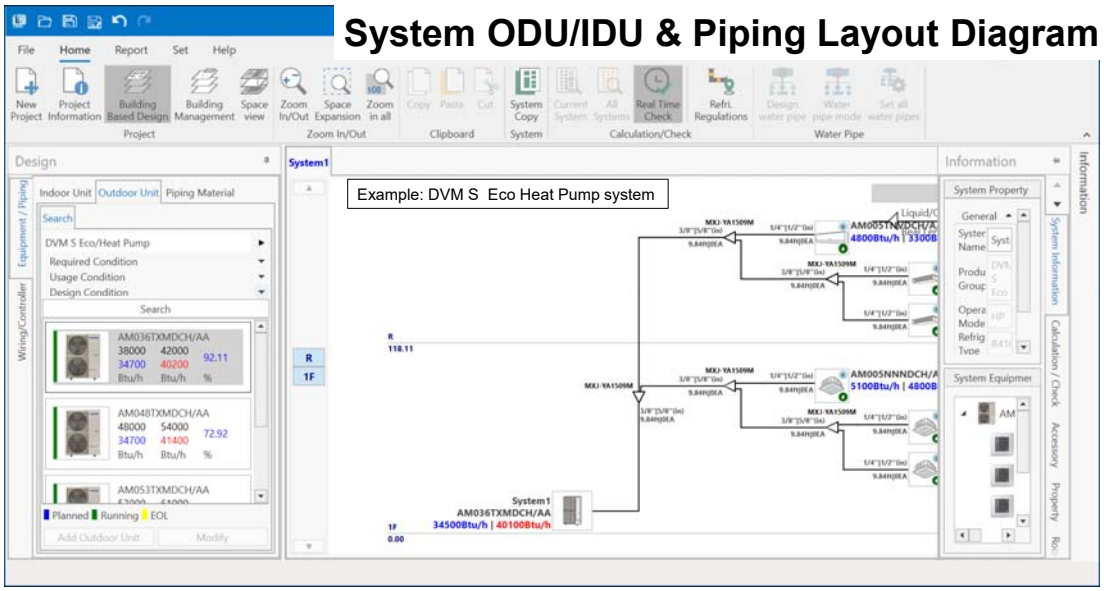
DVMS Eco System Design & Layout



System ODU/IDU & Piping Layout Diagram

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Field Piping Components

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Field Piping Components

Refrigerant Components Not To Be Used in DVM S Systems

- **Liquid line drier**

- **Liquid sight glass**

- **Copper Tee's**

- **Aluminum tubing**

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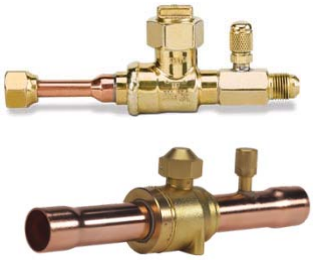
Field Piping Components

Recommended Refrigerant Components For DVM S Systems

Isolation Valves (Field supplied)

- Allows future indoor unit service, replacement or additional installation to be done easier
- May allow main system operation during IDU service or replacement



General Specifications
- Full port
- Bi-flow
- Service port
- Rated up to 750psi

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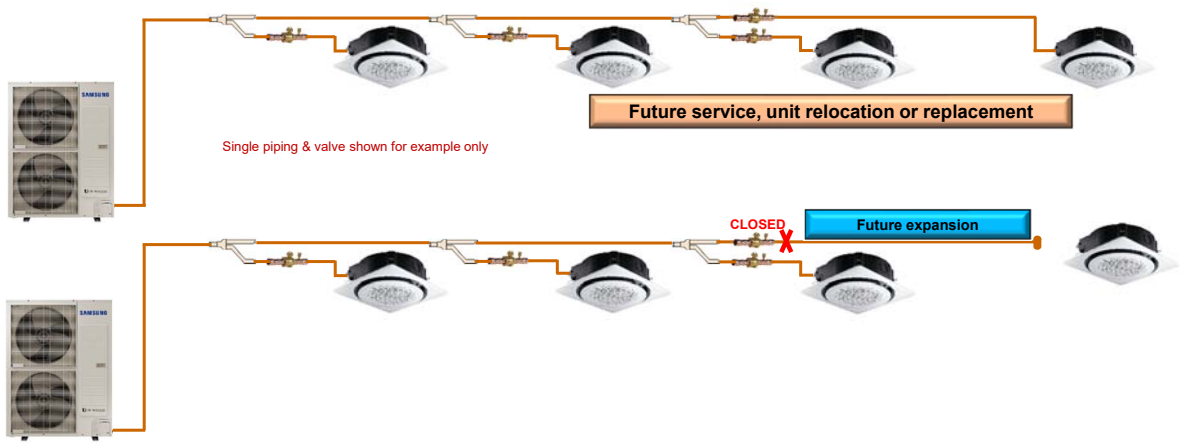
Field Piping Components

Isolation Valves – Placement

- To insure proper system oil return, Isolation valves must be installed directly after a Y-joint or Header port
- Isolation valve service port must be located on the indoor unit side



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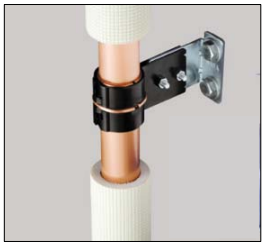
Field Piping Components

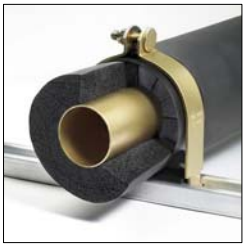
Required Refrigerant Components For DVM S Systems

Field Piping Support

- Horizontal support hangars and clamps should be secured around the piping insulation and not the copper pipe
- Vertical piping must be secured with the correct clamp specifically for that purpose
- Always follow state and local codes for proper pipe support



Vertical clamp example



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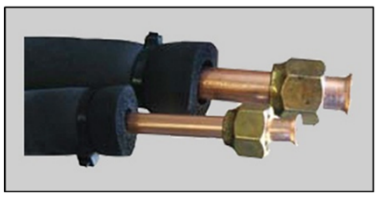
Required Refrigerant Components

- **ACR – dehydrated and sealed copper tubing – Soft & Hard drawn**

- **Field piping insulation – Wall thickness from 1/2" up to 1 ½"**
  NOTE: Refer to the indoor unit installation manual for specific requirements
- **Each pipe is to be insulated individually the entire length including the flare nut connections at the indoor units**
- Always follow state and local codes for insulation requirements



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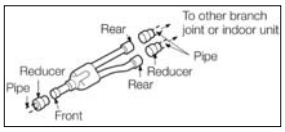
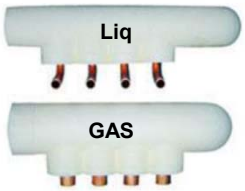
Field Piping Components

Indoor Piping – Y-Joint & Header Fittings

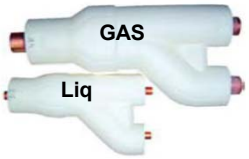


- **MXJ-Y** Y-joint (HR & HP) kits & **MXJ-H** Header kits (Heat Pump only)
  - Kits include liquid & gas fittings – Insulation – pipe reducers
  - Y-joint sizes based on system and indoor unit capacities
- Heat Recovery systems require the **MXJ-Y** Y-joint kit and one HR Hi pressure gas Y-joint
  - Headers are only used on heat pump systems

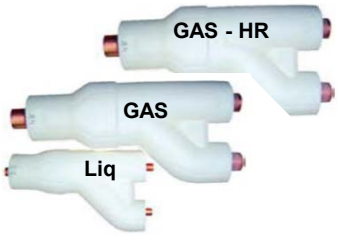
Heat Pump systems only



Heat Pump Y-joint kit



Heat Recovery Applications



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Piping Installation Tools

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R-410A Manifold Gauge Set

- Use a dedicated R-410A manifold set, for DVM S systems only
  - Oil Compatibility
    - PVE/POE
  - (5/16” flare recommended)
- Vacuum rated hoses recommended for system evacuation
- Maintain Hoses for dependability
  - replace as needed

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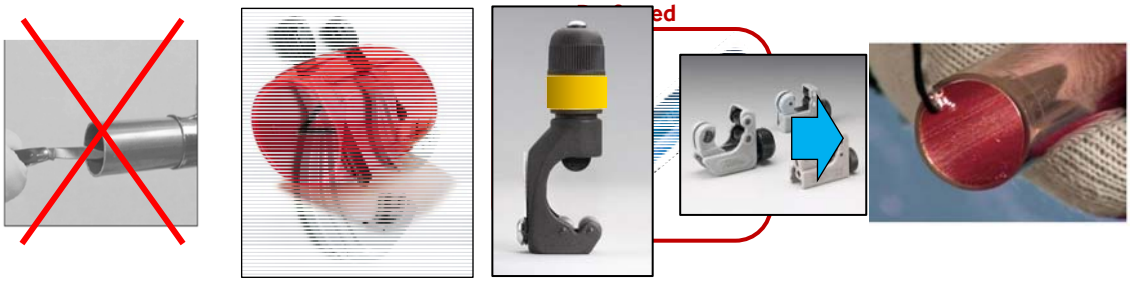
Required Installation & Service Tools

- Always use the appropriate size tubing cutters with a sharp cutting wheel
- When cutting copper tubing the cut ends must be de-burred to provide a square end to provide a perfectly flat and smooth surface for making good flares
- To properly remove the cut burrs, a “deburring” tool is preferred to provide a smooth and square cut end in the tubing



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Required Installation & Service Tools

- Use a burnishing or eccentric - burnishing type 45° R-410A rated flare tool for high quality flares
  - Burnished flare cones provide a superior seal
- Samsung DVMS indoor units provide the proper flare nuts

Preferred

Eccentric – Burnishing 45° Flare Tool
- Off-center cone rolls copper into a 45° burnished flare
- Handle clutch releases to avoid excessive torque on the tubing and flare
- 1/4” to 3/4” flares

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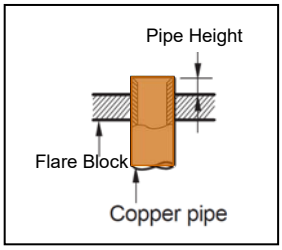
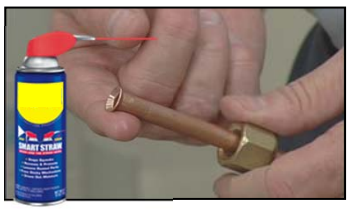
Making A Good R-410A Flare

- **After cutting and deburring the copper tube, place the flare nut onto the copper pipe**
- **Set the copper pipe into the flare block and adjust the height**
- **Apply any synthetic oil to the flare cone inner and outer surfaces only**
  - Pen style applicators allow better oil distribution
- **Run the flare handle in twice for a well polished flare cone**
  - Do not lubricate the flare threads
- **Verify correct flare diameter by using a flare gauge**
- **Do not use any type of thread sealant on the flare threads**
- **Always use a torque wrench with a backup wrench to properly tighten flare nut connections**
- **Refer to the unit Installation Manual for flare nut torque specifications by flare nut size**





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Required Installation & Service Tools

Digital Vacuum Gauge

- it is imperative to properly evacuate the system to remove all moisture
- All Samsung DVMS systems must be triple evacuated down to 500 microns or less
  - The moisture level can only be determined with an accurate micron gauge
  - Micron gauge should be connected to the system as far from the vacuum pump as possible for an accurate reading
- Never evacuate a refrigeration system without a micron gauge

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Required Installation & Service Tools

- A good quality digital scale must be used to properly weigh in the liquid R-410A refrigerant
- DVMS systems are charged with liquid R-410A refrigerant by weight based on the length of the liquid lines and the indoor unit models
- All liquid lines should be measured as accurately as possible during installation to insure the proper refrigerant charge calculation
  - Using accurate liquid line lengths, the DVM Pro Design tool will calculate the amount of additional refrigerant required for the system

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Required Installation & Service Tools

Vacuum Pump

- Pump capacity should be a minimum of 6 cfm
- Vacuum pump must have a built-in check valve
- Pump must be kept properly maintained
- Start the evacuation process with new pump oil
  - Large systems may require additional oil changes

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Required Installation & Service Tools

Metric Hex Keys

Adjustable Wrench or Wrench Set

High Pressure Nitrogen Regulator

Torque Wrench Set

¼ to 5/16 Adaptor

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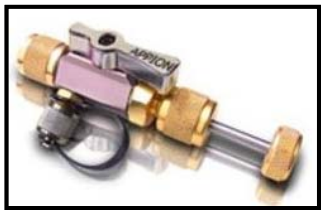
Required Installation & Service Tools



¼ to 5/16 core removable tool (vacuum rated)

Inverter checker

SNET converter

Tubing Swaging Kit

Low Pressure Nitrogen Regulator

Tubing Bender

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Field Piping Installation Guidelines

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DVM S Piping Y-joint Installation

- Samsung Y-Joint fitting kits will include the necessary reducers to connect to various pipe sizes
- All Y-Joint fittings are installed horizontal level
  - (± 15° of horizontal plane)
- Or vertical up / down

Improper Installation Using a electricians level this is 30° off level

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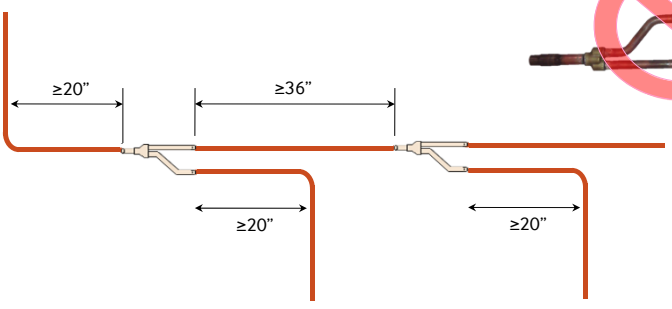
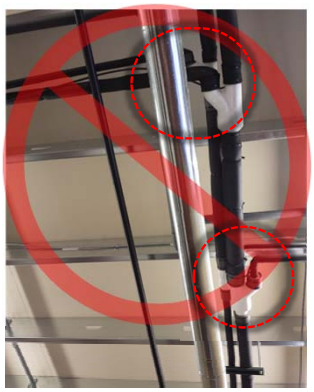
DVM S Piping Y-joint Installation

- Required
  - To avoid turbulence and potential noise in the Y-joint refrigerant piping, space 90° elbows at least 20” from the Y-Joint inlet,
  - Y-Joints are not to be connected together
- Recommended
  - maintain 36” between Y-Joint fittings
  - Allow a minimum of 20” on the branch side





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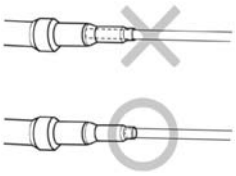
DVM S Piping Y-joint Installation

- Care must be taken to ensure that the refrigerant piping is not inserted too far into the Y-joint before brazing
- If the Y-joint fitting does not have a groove to stop the copper pipe from entering too far, measure and mark the pipe at 5/8” from the end
- If the pipe is inserted too far, turbulence is created and increase noise potential



- Some Y-joint fittings have selectable end segments to facilitate multiple pipe diameters
  - Cut the segment from 3/8” to 5/8” from the end

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DVM S Piping Y-joint Installation

- Install a support before and after each Y-joint to prevent sagging and stress on the brazed connections (within 18” of the inlets and outlets)

- Refer to state and local codes for piping support compliance

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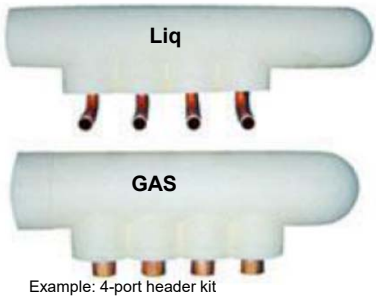
DVM S Piping – Header Fittings

- MXJ-H Header kits
  - Always connect the largest capacity unit to the first port on the header
  - Are used at the end of the line to distribute refrigerant to multiple indoor units
  - Y joints or additional headers may not be connected to the header
  - Includes fitting, cap and insulation
  - Headers sized based on system and indoor unit capacities
  - Headers are only used on heat pump systems

Heat Pump systems only
4,6&8 port models available



Example: 4-port header kit

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Header Installation

- Header branch off kits will include a liquid fitting, gas fitting, reducers and insulation
- The liquid fitting is open at both ends to allow left or right installation
- Braze the included plug on the open end after the incoming refrigerant pipe is connected

- Pinch and braze any unused ports
- The outlet ports (liquid and gas) can only connect to a single indoor unit, never a Y-joint or Multi-port EEV kit

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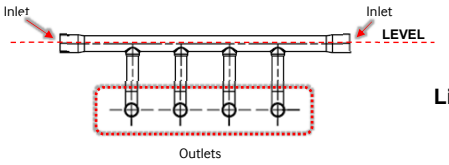
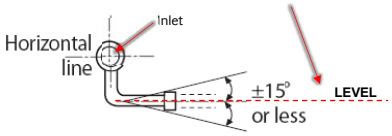
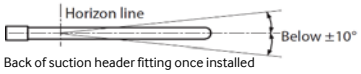
Header Installation

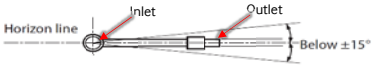


Liquid Header

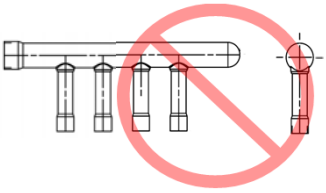


Both the liquid and gas headers must be installed level





Gas Header



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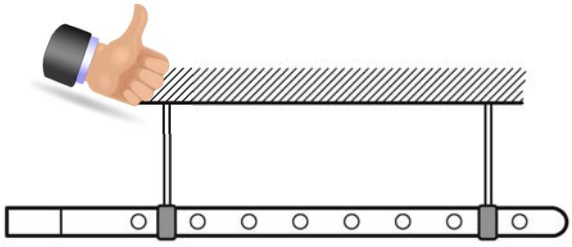
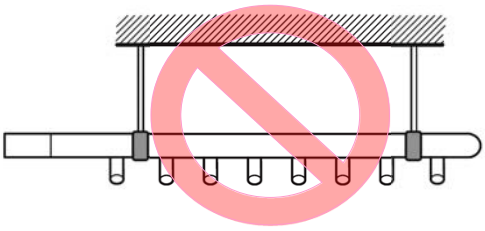
Header Installation

Liquid and gas headers must be supported to eliminate any stress on brazed connections





(Gas ports pointing down)

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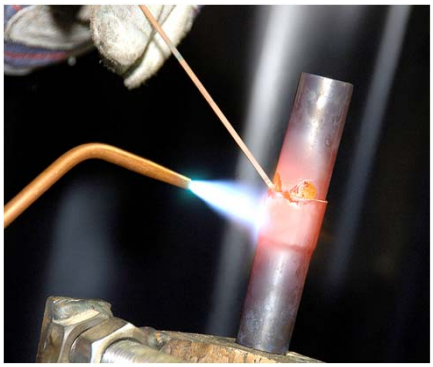
Required Piping Practices - Brazing



15% Silver-Phosphorus brazing rods are the recommended brazing material for all Samsung DVMS systems

Never use a brazing material that requires flux to be applied

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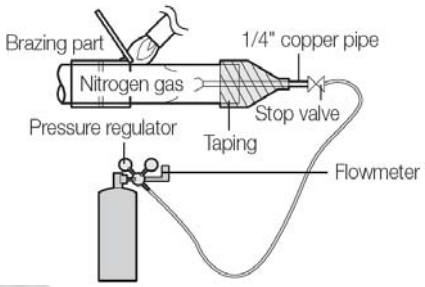
Required Piping Practices – Nitrogen Purge

- Using a flow regulator, maintain 2 – 3 PSI) of dry nitrogen pressure
- If you are having difficulty maintaining this, partially restrict the opposite end of the pipe with tape to maintain pressure
- If flow is too low, oxidation will still form within the tubing
- If flow is too high, it will be difficult to make quality brazed connections
- Maintain nitrogen flow after brazing is complete until piping cools



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Required Piping Practices – Nitrogen Purge

- The nitrogen purge displaces oxygen and prevents oxidation from forming inside the tubing preventing contamination of the refrigerant piping network
- Problems caused include:
  - Plugged up EEV's, filter screens & orifices
  - Contamination of compressor oil
  - Compressor damage

Ex) Restricted Filter

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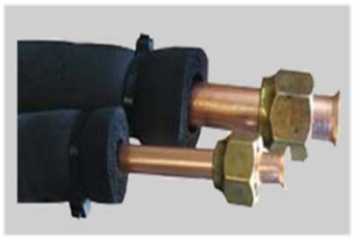
Field Piping Recommendations

- ACR – dehydrated and sealed copper tubing – Soft & Hard drawn
  - Piping should be closed off by pinching the pipe or use of tape.
    - This is to prevent moisture and debris from entering pipe.
    - Pipe that is left unfinshed longer than a month should be pinched.

Exposure Location	Exposure Time	Sealing Type
Outdoor	Longer than one month	Pipe pinch
	Shorter than one month	Tape
Indoor	-	Tape

*Information located in refrigerant pipe installation section of install manual.

- Field piping insulation – Wall thickness from 1/2" up to 1 ½"
- Always follow state and local codes for insulation requirements



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Required Piping Practices

- Do NOT cool off the joint immediately after brazing
- Allow joint to cool down naturally as to not stress the bonding of the fill metal.
- After checking with mirror and light, cool with wet rag
- Do Not Lap Fill Metal Over Holes

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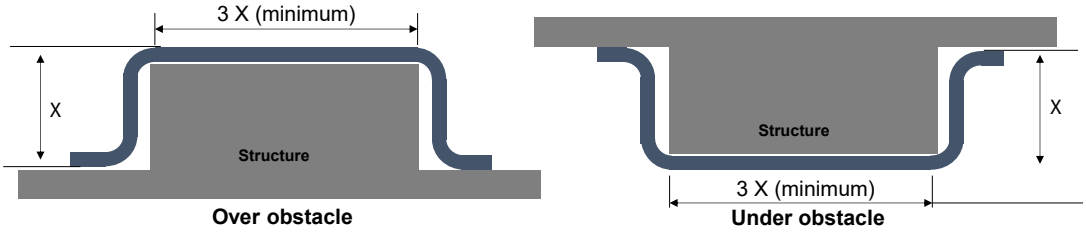
Required Piping Practices – Proper Pipe Routing

Piping around obstacles

- When an obstacle, such as a beam or concrete structure, is in the path of the planned refrigerant pipe run, it is best practice to route the piping over the obstacle or under.
- If adequate space is not available to route the insulated pipe over the obstacle, then route the pipe under the obstacle.
- In either case, it is imperative the length of the horizontal section of pipe above or below the obstacle be a minimum of three (3) times the longest vertical rise (or fall) at either end of the segment.



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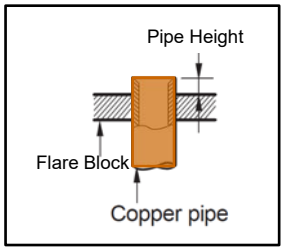
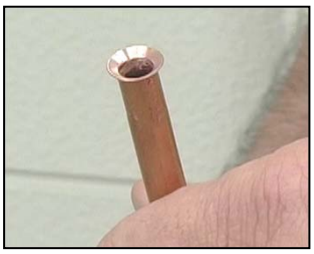
Making A Good R-410A Flare

- After cutting and deburring the copper tube, place the flare nut onto the copper pipe
- Set the copper pipe into the flare block and adjust the height
- Run the flare handle in twice for a well polished flare cone
- Verify correct flare diameter by slipping the flare nut over the flare cone





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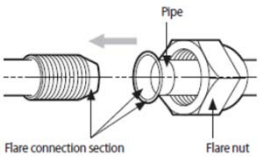
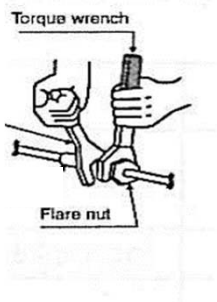
Making A Good R-410A Flare

- Apply any synthetic oil to the flare cone inner and outer surfaces only
- Do not lubricate the flare threads
- Do not use any type of thread sealant on the flare threads
- Always use a torque wrench with a backup wrench to properly tighten flare nut connections
  - Refer to the unit Installation Manual for flare nut torque specifications by flare nut size



Apply synthetic oil to the inner and outer flare surfaces only



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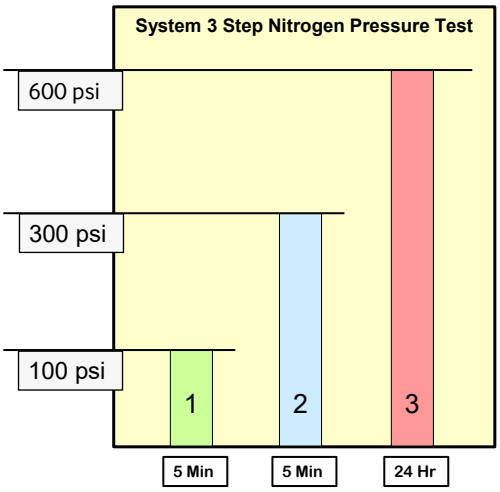
High Pressure Leak Test

- Samsung requires a 3 step high pressure nitrogen leak test on the completed system
- All field refrigerant piping is installed and connected to the Outdoor and Indoor units
  - ODU stop valves are closed

1. **Pressurize the system to 100 psi for 5 minutes**
2. **Increase the pressure to 300 psi for 5 minutes**
3. **Increase the pressure to 600 psi and hold for 24 hours**



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High Pressure Leak Test Pressure Drop

- Nitrogen pressure is subject to pressure fluctuation above 300 psi, based on ambient temperature changes
  - Use this formula to compensate for temperature changes from one day to the next when performing the 24 hour pressure test
- The following formula will determine system pressure drop caused by low ambient temperature change

Record the **T**emperature when the system is **p**ressurized (**Tp**)
Subtract the **T**emperature when the pressure is **c**hecked (**Tc**)
Multiply by a factor of 0.80 to get the **P**ressure **D**rop (**PD**)

(**Tp – Tc**) x 0.80 = **P**ressure **D**rop

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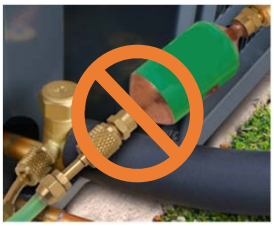
High Pressure Leak Test

To properly check for leaks in the piping network during the high pressure test, use only commercial liquid gas leak detector

- Never use household liquid soap for leak detection
- Never use a refrigerant dye for leak detection
- Never use an injectable refrigerant leak sealant



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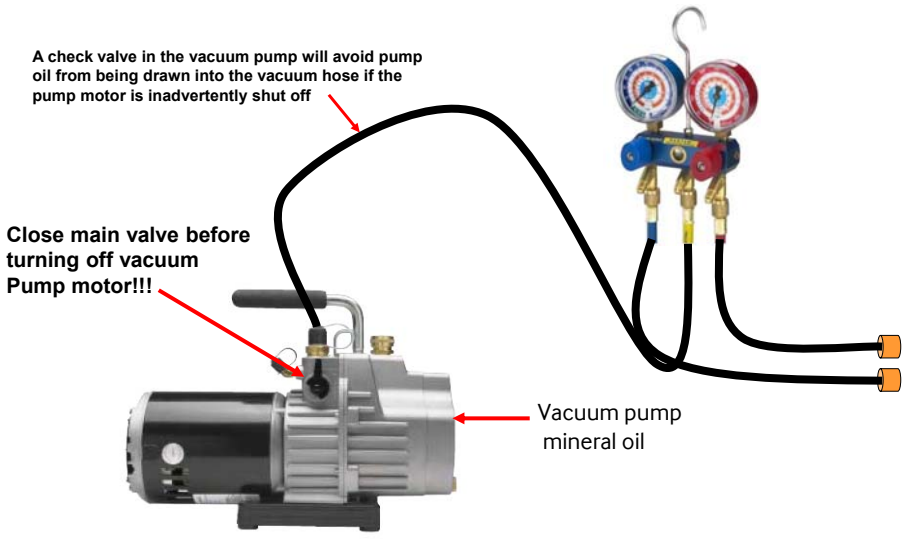
System Evacuation



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System Triple Evacuation

- **Evacuate the system down to 4000 microns**
  - Break vacuum with dry nitrogen – Hold for 15 minutes
- **Evacuate the system down to 1500 microns**
  - Break vacuum with dry nitrogen – Hold for 15 minutes
- **Evacuate the system down to 500 microns or less**
  - Hold the vacuum for 60 minutes
  - DO NOT remove manifold gauges with system under vacuum
  - DO NOT leave system under vacuum
- **Use the system vacuum to draw in the additional refrigerant charge as calculated by DVM Pro**

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Basic System Addressing

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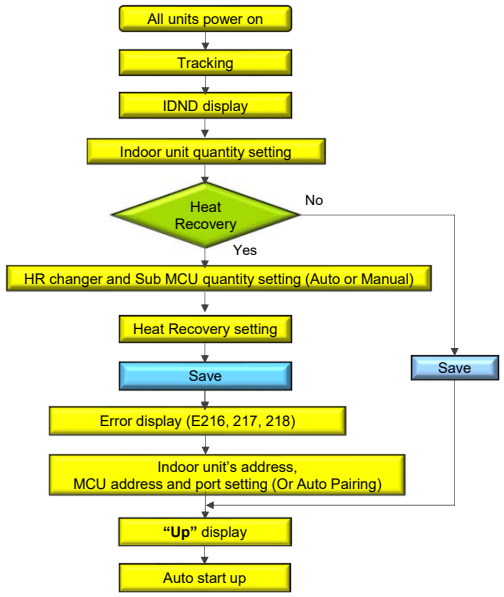
System Setting Procedure

Step	Description	Display	Remark
1	Power on		Indoor unit quantity setting required
2	Indoor unit quantity setting (Manual setting)		Press K1 + K2 for 2 seconds
			K2 x n times (Ten digit setting)
			K4 x n times (One digit setting)
	Or Auto setting		Press K4 for 2 seconds
	Save		Press K2 for 2 seconds (Heat Pump)
3	HR Changer MCU quantity setting		Press K1
			K2 x n times (Ten digit setting)
			K4 x n times (One digit setting)
	Or Auto setting		Press K4 for 2 seconds
4	Heat Recovery setting		Press K1
			Press K4, 01 : Heat recovery 00 : Heat pump(Factory default)
5	*Save		Press K2



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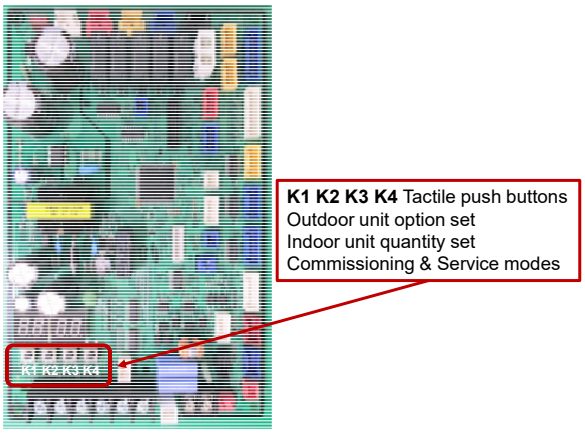
DVMS Eco Outdoor Unit Main PCB



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Startup – HP & HR Outdoor Unit

- Recommended for system commissioning – Power up the Indoor units before the outdoor unit
- Outdoor unit should be powered up for a minimum of 3 hours before operation to insure no liquid refrigerant in the compressor crankcase
  - When the outdoor temperature is low, power the outdoor unit at least 6 hours before operation
- When power is applied to the system, the outdoor unit will display basic tracking information
- If the outdoor unit is powered before the indoor units, error codes will appear but will go away once all the system components are fully powered up
- The number of indoor units communicating with the outdoor unit will be displayed

Sequence	Display	Check point
1		**Check display segment** ▪ Initial power up of outdoor unit & Indoor units ▪ Digit "**8**" blinks consecutively from left to right
2		**Starting Tracking** ▪ "**Ad**" (Addressing) means starting tracking ▪ Displays number of communicating indoor units

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Startup – Outdoor Unit

Outdoor unit communications with indoor units

Sequence	Display	Check point
3		**Communication between the outdoor and indoor units** ▪ Number: Indoor Unit addresses ▪ Scrolls "**A0****" connected indoor unit addresses
4		**HR Changer / Sub MCU Address Display** "**C**" = HR Changer (SEG1) "1" = Sub MCU (SEG2) Decimal Number (SEG3 & 4)

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HP & HR Outdoor Unit Main PCB

Set Indoor Unit Quantity

- Set the connected indoor unit quantity on the ODU Main PCB
  - **K1 K2 K3 K4** Tactile buttons
- When the ODU is powered up, the system will automatically address the IDU's

Step	Button	Display	Description	Note
Quantity of indoor units				
		Id nd	Setting required	
Step1	Press (K1+K2) for 2 seconds	Id 00	Ready to set	-
Step2	K2 x n times	Id X0	Tens digit (0 ~ 6)	Ex) 03 : 3 units 10 : 10 units
	K4 x n times	Id 0X	Ones digit (0 ~ 9)	
	* K4 : Press for 2 seconds - automatic detection of indoor units' quantity			
Step3	If it is heat recovery model, go to step 4. Otherwise, press K2 button for 2 seconds to save & exit. (system will be reset)			

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HP & HR Outdoor Unit Main PCB

All Heat Recovery Models Only

- Set the connected HR Changer & Sub MCU quantity on the ODU Main PCB
  - **K1 K2 K3 K4** Tactile buttons

Quantity of HR Changer and MCUs * Heat recovery model only				
Step4	Press K1	nC 00	Ready to set	-
Step5	K2 x n times	nC X0	Tens digit (0 ~ 6)	Ex) 03 : 3 units 10 : 10 units
	K4 x n times	nC 0X	Ones digit (0 ~ 9)	
	* K4: Press for 2 seconds - automatic detection of HR Changer and MCUs' quantity			
Step6	Press K1	ht 00	Ready to set	00 : Heat pump system 01 : Heat recovery system
Step7	Press K4	ht 0 1	Ones digit (0 ~ 1)	
Step8	K2 : long	Ad 00	Save	Restart
* Press K1 for 2 seconds to exit without save regardless of setting step.				

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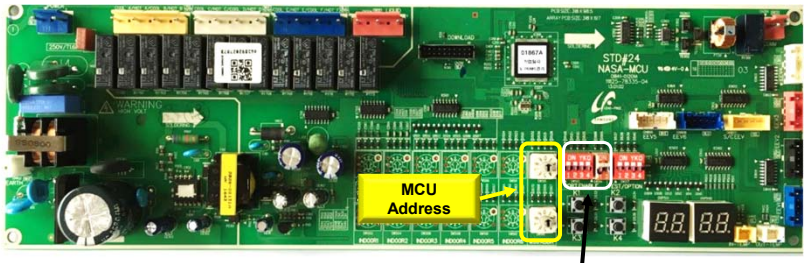
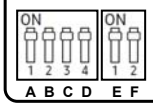
HR Changer/Sub MCU Port Assignment

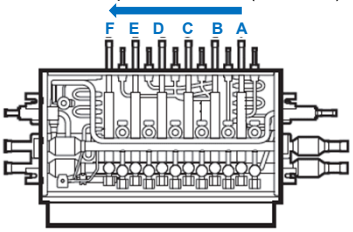


DIP Switches: Port Assign



On: Port Enable (default)
Off: Port Disable

Example: Sub MCU
Individual port connection (≤19 MBtu)



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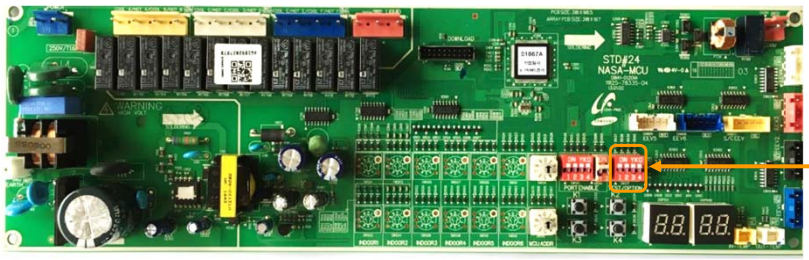
HR Changer / Sub MCU Assigning Dual Ports



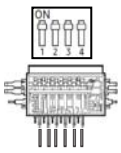
Example: Sub MCU
Assigning dual ports using Y-Joint to increase indoor unit capacity > 19 MBtu

S/W Option **DIP** Switches

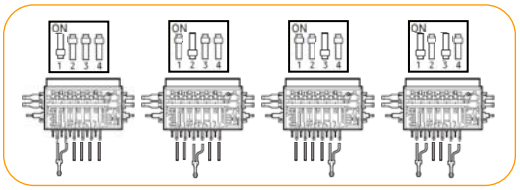
Y-Joint Dual Port Assign

S/W Option

S/W option DIP switch No.	ON(Default) (Individual connection)	OFF (Shared connection)
1	Each of ports A and B	Paring port A and B
2	Each of ports C and D	Pairing port C and D
3	Each of ports E and F	Pairing port E and F
4	N/A	N/A



Default Setting



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HR Changer / Sub MCU Auto Pipe Pairing

Note: MCU address and dip switch settings must be completed before Auto Pipe Pairing operation is initiated
The Indoor Unit MICOM firmware version must be “161222” or higher

You can use the Automatic pipe-address setting operation to automatically set the address of each MCU port that is connected to an indoor unit.

To run the Auto pipe pairing operation, take the following steps:

1.Press the **K2 button** 10 times on the main PBA of the outdoor unit to start the Auto pipe pairing operation. Display: H H 88

Temperature	Outdoor temperature < 75°F	75°F ≤ Outdoor temperature < 86°F	86°F ≤ Outdoor temperature
Avg. Indoor temperature < 75°F	Main heating operation	Main heating operation	Main cooling operation
Avg. Indoor temperature ≥ 75°F		Main cooling operation	

This operation takes about 25 to 55minutes normally depending on the number of indoor units connected.(Max. 2hours)

Step 1 (Start H H 0 1) → Steps 2 to 8 (Setup H H 0 8) → Step 9 (Check H H 0 9) → Step 10 (Confirmation H H 1 0)

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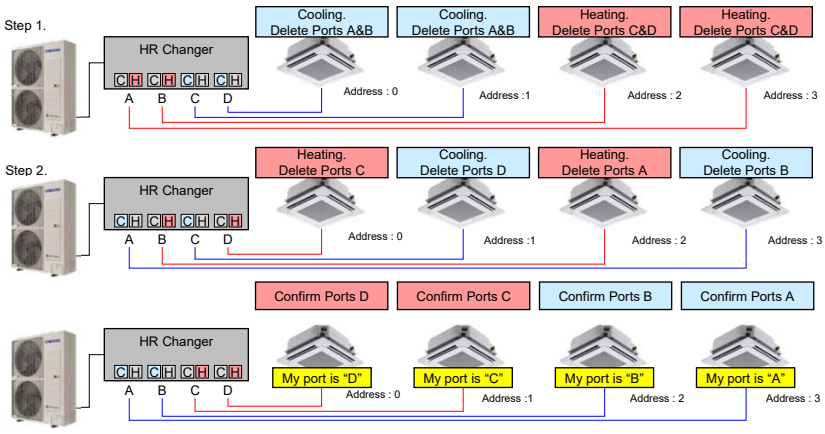
HR Changer Pipe Pairing

Basic logic
- Operate system in main cooling or main heating.
- Open the solenoid valve of MCU (some cool valve, the others heat valve) then check evap temperature for 5mins.
  : Evap temperature goes up → Delete cooling port number
  : Evap temperature goes down → Delete heating port number
- The cooling & heating valves in the MCU are alternately operated step by step until only one port remains for the indoor unit



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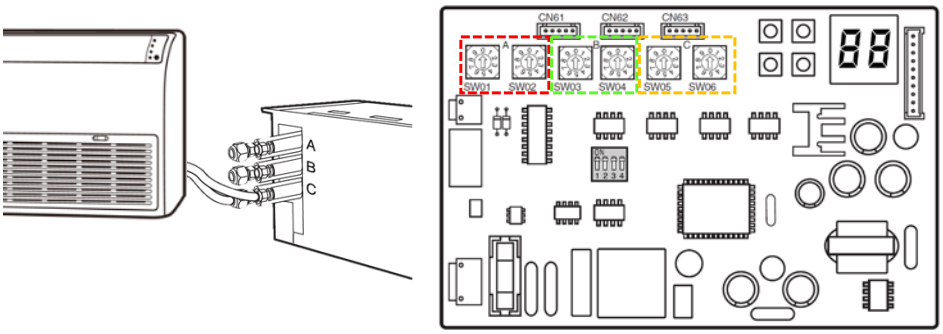
Multi-unit EEV Kit Addressing

- EEV Kits are designed for the DVMS Eco Heat Pump systems only
- Set the main address of the units connected to A, B, and C (C is only used with 3 zone EEV kits)
- EEV Kits require 208/230V AC power
- Also require connection of F1/F2 to system



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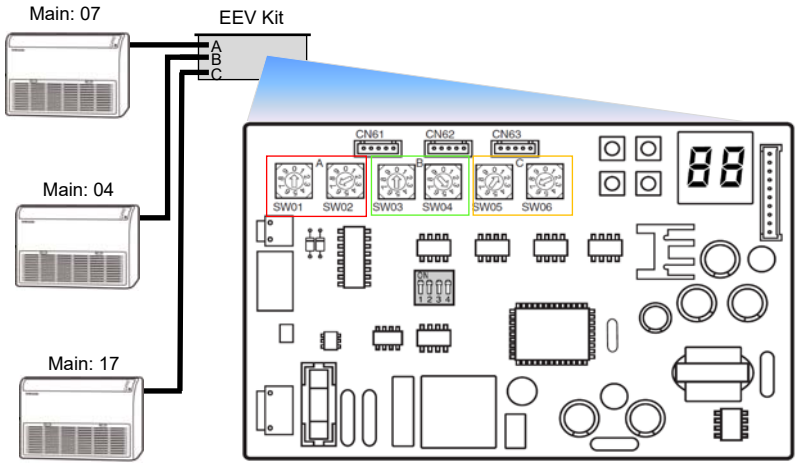
Multi-unit EEV Kit Addressing

Set the EEV kit dials according to the address of the connected indoor units



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Outdoor Unit Settings

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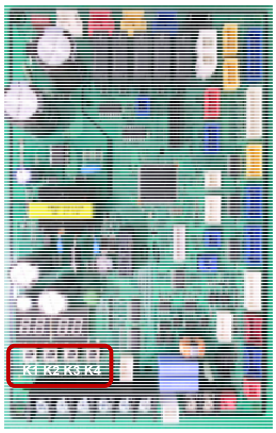
Outdoor Unit PCB Settings

Outdoor Unit PCB – "K" Tactile Buttons

- **K1, K2,** and **K4** tactile buttons are used to put the system into various service and commissioning modes
- Also used for system operation data view



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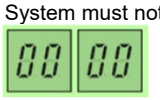
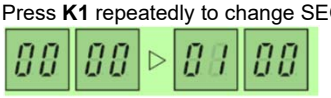
Set Outdoor Unit Option Settings

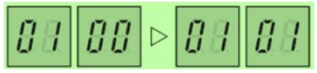
1. Press and hold the **K2** button to enter Option Settings mode
   System must not be in operation



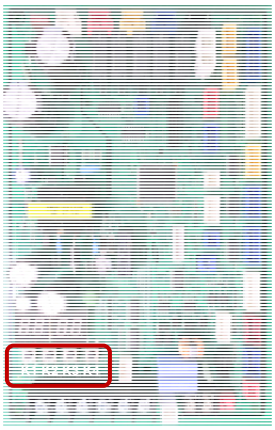
2. Press **K1** repeatedly to change SEG1, SEG2 option numbers



3. Press **K2** repeatedly to change SEG3, SEG4 option value



4. Press and hold **K2** to store the changed option code
   All of the segments blink to indicate the changed option has been stored



NOTE: During the option setting mode, the setting value can be reset to the previous setting by pressing and hold the **K1** button
To restore option setting to factory default press and hold **K4** during the option setting mode – Press and hold **K2** during tracking mode to save setting

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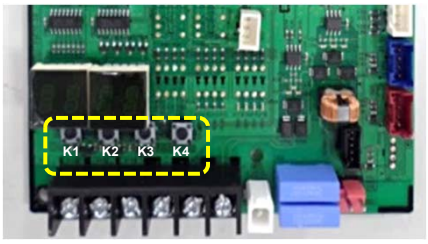
Outdoor Unit Option Settings – Snow Prevention

When an outdoor unit is idle and the outside temperature is below 41ºF, the fan will operate every 30 minutes for 1 minute, to prevent snow from drifting against the unit



Snow accumulation prevention control	Main	1	4	0	0	Enabled (Factory default)
				0	1	Disabled

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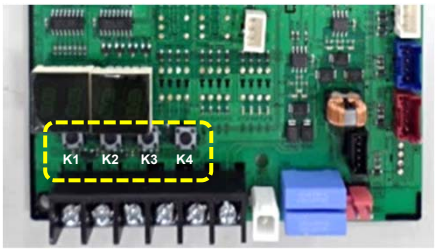
Outdoor Unit Option Settings – Cooling Capacity Calibration

- This changes the average target indoor unit evaporator inlet temperature
- A cooler coil temperature will increase capacity but may use more power
- This can also help improve performance at long pipe lengths



Cooling capacity correction	Main	0	1	0	0	45°F - 48°F Default
				0	1	41°F - 48°F
				0	2	48°F - 52°F
				0	3	50°F - 54°F
				0	4	52°F - 55°F
				0	5	50°F - 57°F
				0	6	55°F - 59°F

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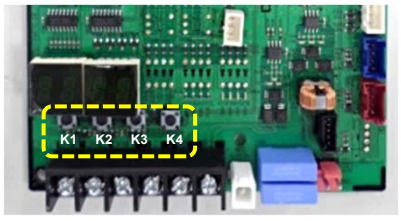
Outdoor Unit Option Settings – Heat Capacity Calibration

- Heating operation increases frequency when current high pressure is higher than the target high pressure; vise versa decreases frequency
- When Target high pressure is high, the discharge air temperature of an indoor unit will increase along with energy consumption
- Maintaining factory default status is recommended; note, when the target high pressure is decreased, the discharge air temperature of the indoor units decreases as well



Capacity correction for heating	Main	0	2	0	0	435 psi (Default)
				0	1	363 psi
				0	2	377 psi
				0	3	391 psi
				0	4	406 psi
				0	5	421 psi
				0	6	449 psi
				0	7	464 psi
				0	8	479 psi

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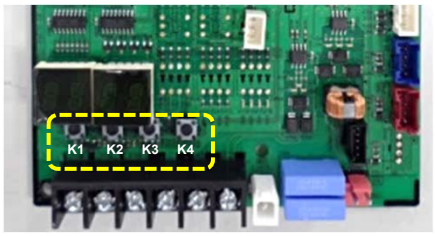
Outdoor Unit Option Settings – Night Quiet Mode

- Step 1: decrease maximum fan RPM
- Step 2: decrease maximum fan RPM and decrease compressor Hz
- Step 3: decrease maximum fan RPM and compressor Hz further
- NOTE: this operation can impact capacity



Silent mode for night-time	Main	0	7	0	0	Disabled (Factory default)	
				0	1	LEVEL 1	Enables the silent mode for night-time in cooling mode. (It operates automatically depending on the temperature.)
				0	2	LEVEL 2	
				0	3	LEVEL 3	
Silent mode for external contact	Main	1	5	0	0	-	If the external contact interface module (MIM-B14) is used, entering the silent mode is available with contact signal in cooling and heating mode.
				0	1	LEVEL 1	
				0	2	LEVEL 2	
				0	3	LEVEL 3	

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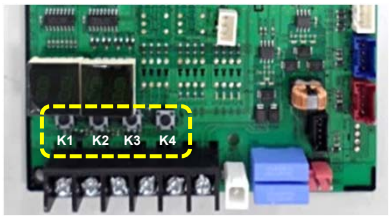
Outdoor Unit Option Settings – Current Limitation

- (for energy saving only, not electrical safety issues or code compliance)
- “Maximum current” = MCA on outdoor unit data tag
- NOTE: this operation can impact capacity



Current restriction rate	Main	0	3	0	0	100% (Factory default)
				0	1	95 %
				0	2	90 %
				0	3	85 %
				0	4	80 %
				0	5	75 %
				0	6	70 %
				0	7	65 %
				0	8	60 %
				0	9	55 %
				1	0	50 %

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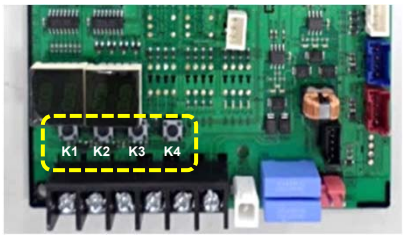
Outdoor Unit Option Settings – Defrost Interval Adjustment

- Defrost mode can start after 30 minutes of heat operation run time, and the suction temperature at the outdoor unit heat exchanger is less than 23°F, or there is a significant temperature difference between the heat exchanger suction gas and ambient.
- For installations with high humidity which creates too many defrost cycles, defrost interval can be changed
- Heating capacity is reduced in this operation



Temperature to trigger defrost operation	Main	0	5	0	0	Factory default	
				0	1	Apply setting when the product is being installed in humid area such as near river or lake	The defrost option shortens the starting time of the defrost operation

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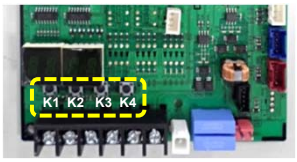
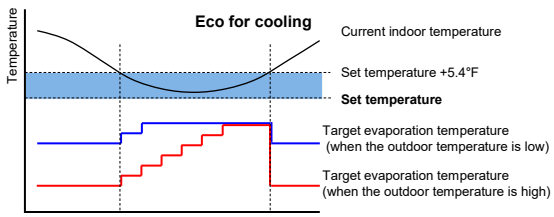
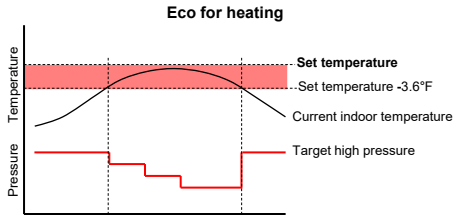
Outdoor Unit Option Settings – Energy Control Operation

- Reduce energy consumption by adjusting the indoor set temperature based on indoor and outdoor ambient temperatures
  - As the room temperature approaches set point temperature, the target evaporator temperature or target refrigerant pressure is changed



Energy saving setting	Main	1	0	0	0	Disabled (Factory default)
				0	1	Enabled





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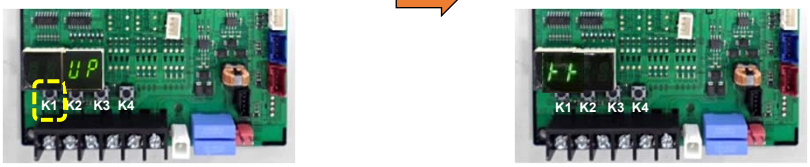
System Auto Trial Operation

To initiate Auto Trial operation: Press and hold **"K1"** on MAIN outdoor unit for 5 seconds

- "**UP**" = "UnPrepared"
- To clear **UP** status, hold **K1** button for 5 seconds
- The display will show "KK"
- The outdoor unit will run through various outdoor unit and system checks (service valves, sensors, EEV's, fan, reversing valve, etc.)
- The unit will also look at indoor unit sensors, outdoor temperature, etc.
- When complete, the unit will stop and display will scroll connected equipment addresses



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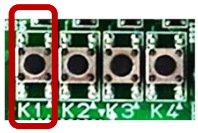
System Operation Key Mode

System Service Operations & Data View Using "K" Buttons

Display example: "K9"

Digital "K"



K1 press	Function	7-segment display
1	Refrigerant charging in heating operation	F1
2	Heating test run	F2
3	Pump-out operation (Main outdoor unit)	F3 1
4	Pump-out operation (Sub1 outdoor unit)	F3 2
5	Pump-out operation (Sub2 outdoor unit)	F3 3

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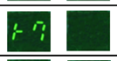
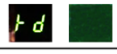
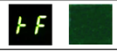
System Operation Key Mode

K2 press	Function	7-segment display
1	Refrigerant charging in cooling operation	
2	Cooling test run	
3	Pump down operation (All outdoor units)	
4	Piping check operation(HR) / Auto test run (Heat pump)	
5	Judgment of refrigerant amounts	
6	**Electric discharge**	
7	Forced defrost operation	
8	Forced oil recovery operation	
9	**Inverter compressor 1 checker** (It will be applied at May, 2013.)	
10	**Inverter compressor 2 checker** (It will be applied at May, 2013.)	
11	**Fan 1 checker** (It will be applied at May, 2013.)	

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System Operation View Key Mode

K3 press	Function
1	System reset

K4 Press	Function
1	Outdoor unit model
2	Order frequency
3	High pressure
4	Low pressure
5	Discharge temperature
6	IPM temperature
7	CT sensor value

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System Operation View Key Mode

K4 Press	Function
12	Outdoor temperature
13	EVI inlet temperature
14	EVI outlet temperature
15	Main EEV step
16	EVI EEV step
17	Fan step
18	Current frequency

K4 press & hold (3 seconds)	Function
1	Main micom version
2	Inverter micom version
3	EEPROM version
4	Automatically assigned address
5	Manually assigned address

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System Start-up Common Errors

	Display	Error Code – Resolution
1		**"E201" To check the number of indoor units connected with the outdoor unit** If the number of indoor units set does not match with those during tracking, "**E201**" is displayed ▪ Check for indoor unit address duplication ▪ Check communication wire installation
2		**"E202" Communication error between indoor and outdoor unit after tracking** ▪ Check for indoor unit address duplication ▪ Check communication wire installation

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System Start-up Common Errors

Outdoor Unit Error Display Details

First error code digit definition

E	P	U	A	C
• **101 ~ 700** • Displayed when an error is decided by self diagnosis	• **701 ~ 800** • Display an item that requires more than 2 detections for deciding whether it is an error or not during the 1st detection	Displays the outdoor unit address where an error has occurred. **U200:** Outdoor Unit	• Displays the indoor unit address where an error has occurred. • **Ex) A000:** An error has occurred at indoor unit address 00 • **Ex) A007:** An error is occurred at number 07 address indoor unit	• Displays the PCB code where a communication error has occurred. **C001** = Hub PCB **C002** = Fan PCB **C003** = Inverter1 PCB

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System Start-up Common Errors

Outdoor Unit Error Display Details – Cont.

Error display sequence

Classification	Error display method	Display example
Indoor unit error display	Error # → Indoor unit address → Error #, repeat display	E153 → A002 → E153 → A002
Outdoor unit error display	Error # → Outdoor unit address → Error #, repeat display	E438 → U200 → E438 → U200→ E206 → C002 → E206 → C002

VIDEO:
E296 = Refrigerant leakage
U200 = Error in outdoor unit

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Indoor Unit Option Settings

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Indoor Unit Option Setting Codes

02xxxx – 1xxxxx – 2xxxxx – 3xxxxx
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

- Samsung indoor units use a 24 segment code for indoor unit option programming
- Based on the indoor unit option settings, the 24 segment code may vary
- Installer option settings start with “02”

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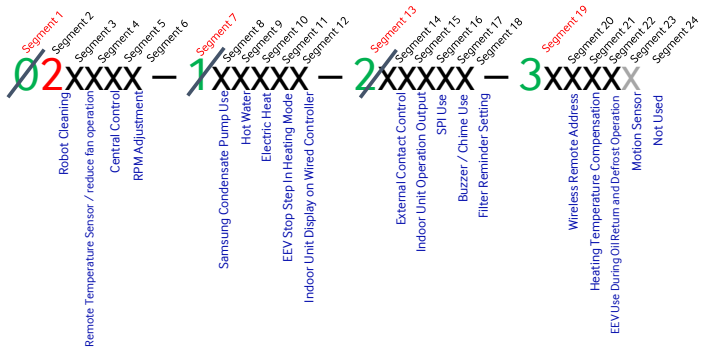
Indoor Unit Option Setting Codes



- Segments 1, 7, 13, and 19 are “page numbers” and are always “0”, “1”, “2”, and “3”
- Each segment represents a different indoor option (excluding segments: 1, 2, 7, 13, 19, and 24)
- These codes are available in the installation manuals

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Optional Indoor Unit Settings

Install option	Operation		Digit Setting	Details
Remote sensor / minimize fan operation (segment 4)	External room sensor	Minimize fan operation		Set to room sensor to “Use” when connecting MRW-TA external temperature sensor
	No use	Do not use	0	DEFAULT – HEAT AND COOL MODE – Use internal sensor, normal fan operation during THERMO-OFF [1]
	Use	Do not use	1	HEAT AND COOL MODE - Use an external sensor, normal fan operation during cooling THERMO-OFF [1]
	No use	Use	2	HEAT MODE - Use internal sensor, minimize fan operation during heating THERMO-OFF [2]
	Use	Use	3	HEAT MODE - Use external sensor, minimize fan operation during heating THERMO-OFF [2]
	No use	Use	4	COOL MODE - Use internal sensor, minimize fan operation during cooling THERMO-OFF [2]
	Use	Use	5	COOL MODE - Use external sensor, minimize fan operation during cooling THERMO-OFF [2]
	No use	Use	6	HEAT AND COOL MODE - Use internal sensor, minimize fan operation during heating and cooling THERMO-OFF [2]
	Use	Use	7	HEAT AND COOL MODE - Use external sensor, minimize fan operation during heating and cooling THERMO-OFF [2]
Central control (segment 5)	No use		0	Set to “not use” to remove from central control
	Use (default)		1	
RPM UP (segment 6)	No use (default)		0	DEFAULT – standard fan operation
	High ceiling mode		1	For cassette units installed in ceilings over 12’ high
	High ceiling kit		2	For 48,000 btu/h cassette units installed in ceilings up to 19’

[1] When the zone has satisfied, the fan will remain on to reduce stratification and to move air over the room temperature sensor in the return air cavity.
[2] Fan operation when the zone satisfies:
- When the zone satisfies, the fan will stop.
- If an external sensor is installed, the fan will remain off until room temperature drops below set temperature.
- If no external sensor is installed, the indoor fan will turn on every 5 minutes for 20 seconds to sense room temperature.

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Optional Indoor Unit Settings

Install option	Operation	Digit Setting	Details
Drain pump (segment 8)	No use (default)	0	DEFAULT
	Use (No delay)	1	Setting for duct units with Samsung condensate pump installed
	Use (3-minute off delay)	2	When unit is turned off, set to heat, or set to fan mode, the pump will run an additional 3 minutes.
Hot water (segment 9)	No use (default)	0	DEFAULT - Do not use
	Use	1	Use, fan operation is interlocked with auxiliary heat signal
	Use	3	Use, fan is OFF when auxiliary signal ON for cooling only indoor units (install MCM-C200 mode selector switch in the outdoor unit and set to cool mode for this option).
EEV stop step In heating (segment 11) [1]	Default (default)	0	Keeps EEV open slightly when unit has satisfied in heat mode
	Use	1	Closes EEV completely when unit has satisfied in heat mode. If the room is still above set temp, EEV will open momentarily every hour if unit is in a Thermo-OFF state to prevent refrigerant migration.
Indoor unit display on wired R/C (segment 12)	Sub	0	Low priority (default)
	Master	1	Will use unit's temperature on wired controller's that are sensing temperature at the indoor unit when there is more than one unit connected to a wired controller

[1] Only adjust if there are issues with overheating of a space

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Optional Indoor Unit Settings

External Contact Control

- Segment 14 of the indoor unit option settings is normally used to turn a unit ON/OFF based on a simple dry-contact input.
- Indoor units with software version 14/06/13 or newer can be configured to use input from MIM-B14 to either turn the unit ON/OFF or change operation settings for "unoccupied room control"
- Below are settings for standard unit control using MIM-B14 (applies to all DVM S indoor units and software versions).

Standard External Contact Control Settings (Segment 14)			
Install option	Operation	Digit setting	Description
External control when using MIM-B14 or CN83 connection (segment 14)	No use	0	Default
	ON/OFF control	1	Contact closed: unit ON, controller enabled. Contact open: Unit OFF, controller enabled.
	OFF-only control	2	• Contact closed: unit STANDBY, controller enabled. • Contact open: Unit OFF, controller disabled (ideal for condensate float switch use)
	Window ON/OFF	3	• Contact closed: unit STANDBY or ON (previous operation), controller enabled. • Contact open: Unit OFF, controller disabled.

- Unoccupied Room Control can be enabled and adjusted with SNET Pro 2 (1.2.0 or later) or DMS2.5 (with or without LON or BACnet)
- Unoccupied Room Control details on following page.

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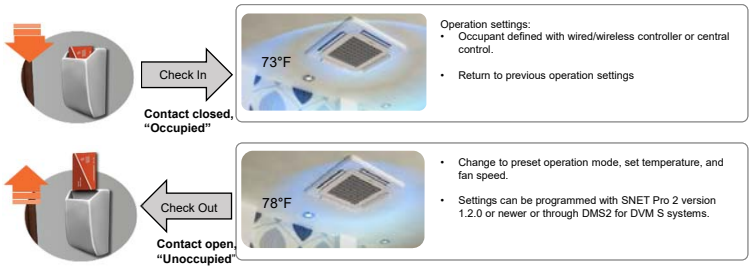
Optional Indoor Unit Settings

External Contact Control – Unoccupied Room Control When Unoccupied Room Control is enabled, the settings below apply.

External Contact Control – Unoccupied Room Control (Segment 14)				
Option / Setting	Dry contact state	Indoor	Remote controller usage [1]	Central controller usage
1	Close	Turn ON	Enable	Enable
	Open	Operate by unoccupied setting	Enable	Enable
2	Close	OFF, able to use remote controller	Enable	Enable
	Open	Operate by unoccupied setting	**Disable [2]**	**Disable [2]**
3	Close	Return to operation mode before ON	Enable	Enable
	Open	Operate by unoccupied setting	**Disable [2]**	**Disable [2]**

[2] No central control is possible for an indoor unit when in "Unoccupied Mode". Schedule control is interrupted until the MIM-B14 input is closed



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Optional Indoor Unit Settings

Install option	Operation	Digit setting	Description
Indoor unit operation output when using MIM-B14 (segment 15)	THERMO-ON/OFF	0	DEFAULT - Output terminals open/close based on standard THERMO-ON/OFF settings (1° C)
	Operation ON/OFF	1	Output terminals open/close based on indoor unit power ON/OFF
	Use [1]	2	Use, fan operation is interlocked with auxiliary heat signal
	Use [1]	3	Use, fan is OFF when auxiliary signal ON for cooling only indoor units (install MCM-C200 mode selector switch in the outdoor unit and set to cool mode for this option).
SPI (segment 16)	No use	0	DEFAULT – not installed
	Use	1	USE - Air cleaning option for future models
Buzzer (segment 17)	Enabled	0	Chime/buzzer enabled (default)
	Disable	1	Mute buzzer/chime
Filter time (segment 18)	1,000 hours	0	Filter reminder indicator on font of unit, wired controller, and central controllers ON after 1,000 hours of fan operation
	2,000 hours	6	Filter reminder indicator on font of unit, wired controller, and central controllers ON after 2,000 hours of fan operation (any setting other than "6")
Wireless remote control address (segment 20)	Indoor unit 1 (default)	0 or 1	• Wireless controller address to prevent "overlapping" of wireless controller signal when units are near each other • MR-D00U will allow indoor unit wireless controller specification
	Indoor unit 2	2	
	Indoor unit 3	3	
	Indoor unit 4	4	

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Optional Indoor Unit Settings

Install option	Operation	Digit setting	Description
Heating temperature Compensation (segment 21)	default	0	4- Way and Mini 4-Way cassette units: 5˚C, all other units: 2˚C
	2˚C	1	Compensation value
	5˚C	2	Compensation value
EEV opening of IDU stopped during oil return or defrost (segment 22)	Default	0	Standard
	Close	1	Close EEV during oil return and defrost to decrease noise after complaint
Motion detect sensor - for use with optional mini 4-way cassette motion sensor (segment 23)*	Do not use (default)	0	
	Standard mode - Auto set off 30 min.	1	Soft OFF 20 minutes, HARD OFF after 30 minutes without motion
	Standard mode - Auto set off 60 min.	2	Soft OFF 40 minutes, HARD OFF after 60 minutes without motion
	Standard mode - Auto set off 120 min.	3	Soft OFF 80 minutes, HARD OFF after 120 minutes without motion
	Standard mode - Auto set off 180 min.	4	Soft OFF 120 minutes, HARD OFF after 180 minutes without motion
	Premium mode - Auto set 30 min.	5	Soft OFF 20 minutes, HARD OFF after 30 minutes without motion, comfort logics enabled
	Premium mode - Auto set off 60 min.	6	Soft OFF 40 minutes, HARD OFF after 60 minutes without motion, comfort logics enabled
	Premium mode - Auto set off 120 min.	7	Soft OFF 80 minutes, HARD OFF after 120 minutes without motion, comfort logics enabled
	Premium mode - Auto set off 180 min.	8	Soft OFF 120 minutes, HARD OFF after 180 minutes without motion, comfort logics enabled

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Optional Indoor Unit Settings

MCR-SMA Motion Sensor – Mini 4-Way Cassette

Mode	Soft Off (minutes)	Hard Off (minutes)	Function Description
Standard	20	30	SOFT OFF: turns off indoor unit but can restart with motion detection before HARD OFF. HARD OFF: Turns unit off but will not turn back on after motion is sensed. Unit will need to be power ON with a unit controller.
	40	60	
	80	120	
	120	180	
Premium	20	30	SOFT OFF and HARD OFF are the same as Standard Mode. Samsung comfort functions are activated.
	40	60	
	80	120	
	120	180	

Samsung Comfort Logics (activated in "Premium" mode)

Comfort Flow:

- MDS prevents cassette from blowing directly on occupants by changing air flow direction

Comfort Temperature:

- When the temperature difference between the upper and lower parts of the room is large, the supply air louvers will lower to direct air downward

Comfort Saving:

- When no motion is detected, MDS will adjust set temperature to reduce energy consumption (maximum +3.6º F in cooling, and -3.6º F in heating)

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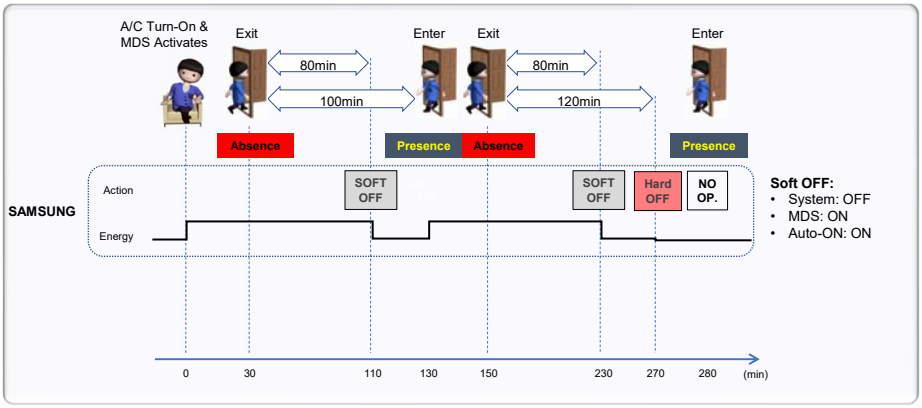
Optional Indoor Unit Settings

MCR-SMA Motion Sensor – Mini 4-Way Cassette

Power On/Off



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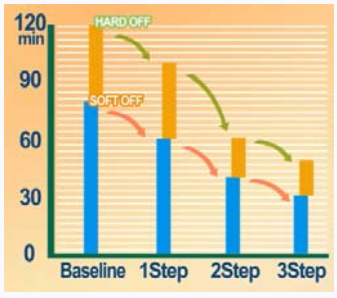
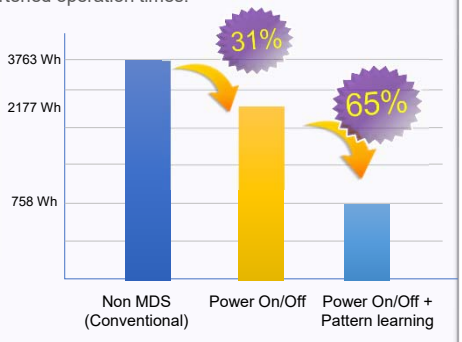
Optional Indoor Unit Settings

MCR-SMA Motion Sensor – Mini 4-Way Cassette

Pattern Learning Function Details

- Pattern Learning Function is implemented with ON/OFF function baseline (default OFF times)
- Pattern Learning Function is 3rd step
- If there is a pattern of leaving and not returning, the MDS will slowly decrease the amount of time for Soft OFF and Hard OFF saving energy with shortened operation times.





*ON/OFF Function 120min

*Cooling set point 64.4° F, 18,000 btu/h Mini 4way 1 set

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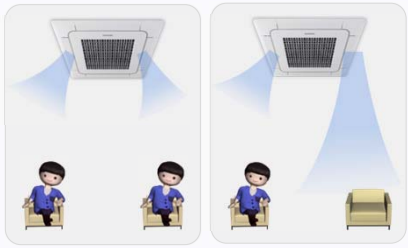
Optional Indoor Unit Settings

MCR-SMA Motion Sensor – Mini 4-Way Cassette

Indirect Air Flow

- People sensing O → avoid direct air flow
- People sensing X → direct air flow

⇒ Feeling comfortable



Floor Temperature Sensing

Ceiling Temperatures sensing - Temperature difference of Floor-Ceiling

Floor – Ceiling Temperatures sensing
Feeling comfortable

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Optional Indoor Unit Settings

Indoor Unit Programming Options

- To program indoor unit option settings, the following can be used:
  - SNET Pro 2 is the easiest and recommended method for programming indoor unit option settings

SNET Pro 2 service software **Preferred**

Wired controllers

Wireless controllers

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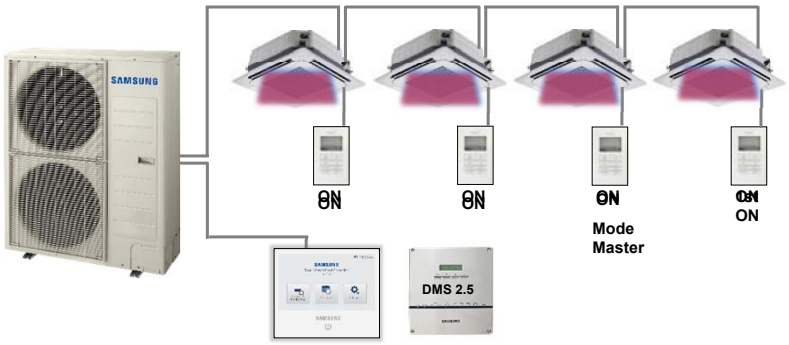
Heat & Cool Mode Changeover – Heat Pump

Heat & Cool Mode Changeover Control – Heat Pump

The DVMS Eco Heat Pump system controls Heat & Cool operation for all of the indoor units by one of three methods:

- During system commissioning the first indoor unit switched on, controls the mode of operation for all indoor units (factory default)
- Setting the "**Mode Master**" to one remote controller in the system
- Configuring the Samsung DMS centralized controller – Recommended when applicable



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Heat Pump Mode Master – Wired Remote Controller

Set the Mode Master: Press and hold the "Mode" button for 5 seconds

MWR-WE13N

Set the Mode Master: Program option setting

MWR-SH10N

Main menu	Sub menu	Function description		Value
	2	Mode master indoor unit setting/ checking	Mode master indoor unit checking	Indoor unit master address (Example : 20.02.1F)
7	3		Mode master indoor unit setting 6)*	0-No use, 1-Use, 2-Release 7)*

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External Controls

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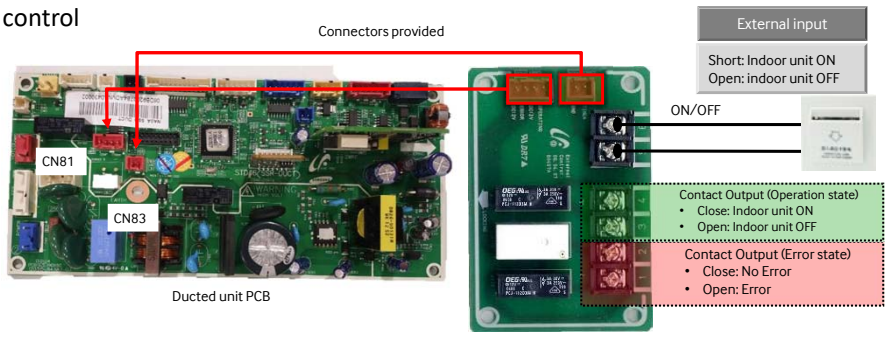
External Contact Controller – MIM-B14

- Direct indoor unit control by external contact signal
- External contact input load: 5v – 5,A
- Output terminals are open/close contacts 0 volts
- Maximum load rating on the Operation & Error terminals: 250vac, 3A
- Emergency control with simple contact input
- Compatible with all DVM S indoor fan coil units
- External heat control



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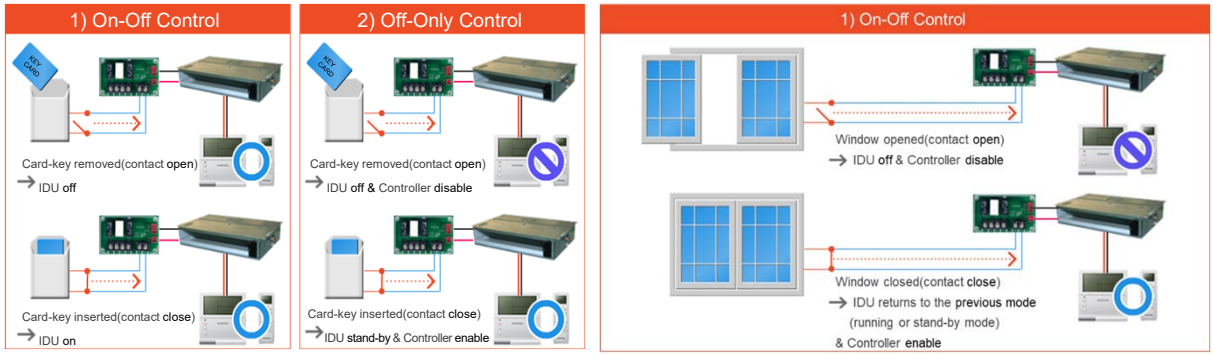
External Contact Controller – MIM-B14

Direct indoor unit On & Off control by external contact signal
02 Series Installation Options



Segment 14 set to 1 | Segment 14 set to 2 | Segment 14 set to 3

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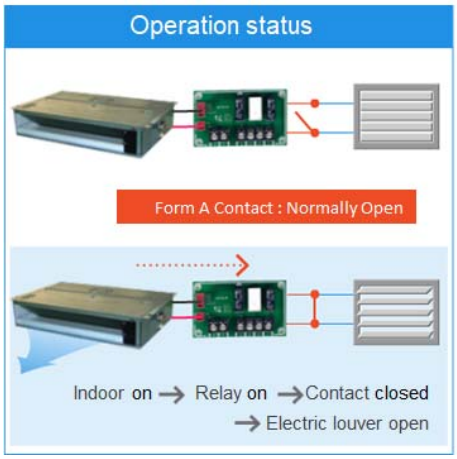
External Contact Controller – MIM-B14

Indoor unit operation state output through relay contacts

- 02 Series Installation Options Segment 15
  - (0) Thermo On/Off
    - Output based on connected indoor unit's current operation
    - Heating/Cooling trying to condition the space
    - Satisfied set point and in a "Thermo-Off" state
  - (1) Operation On/Off
    - Output based on power status of connected indoor unit
    - (On or Off including fan)
  - Fan mode – contact open



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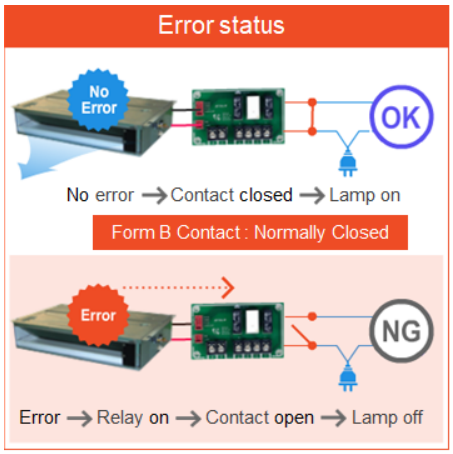
External Contact Controller – MIM-B14

- Error state output through relay contacts
  - Once the MIM-B14 is enabled terminal 1 & 2 will be active
  - When the system is active with no error code the contacts will be closed
  - When an error occurs the contact will open
  - Maximum load rating on the Error terminals: 250vac, 3A



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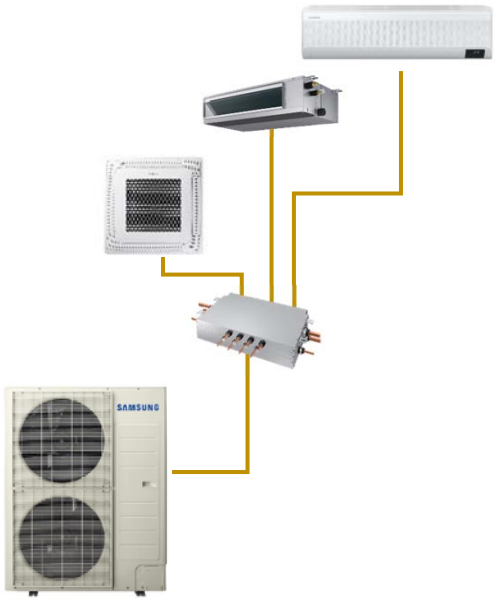
External Heat Control

- When a system is operating in heat mode and an indoor unit cannot reach or maintain desired set temperature, the indoor unit can activate supplemental auxiliary heat (EX: -12°F outside temperature).
- Although Samsung DVM S systems are designed to heat effectively at low ambient temperatures, some projects might require an additional heat source.



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External Heat Control

- This is not designed to be used as “emergency heat”. If the outdoor unit stops due to low ambient conditions but not an error code, the indoor unit will still operate its fan and auxiliary heat output connection (outdoor temperature must be -22°F or greater).
- If outside conditions are low enough to cause an error code, external heater control is not guaranteed (EX: low suction error code caused by low outside temperatures).
- When indoor units are configured to use the auxiliary heat control output, the outdoor unit compressor will still operate as this control option is simply supplemental heat control.

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External Heat Control

- All Multi-position air handlers models AM0**JNZDCH will have this firmware or newer and will have an electric heat accessory option.
- When using accessory VHK-*** electric heat kits, the indoor unit is configured using the HOT COIL output from the PCB.
- The heat kits will plug into the vertical air handler electric heat plug and will not require additional relays, etc.
- See details in the electric heat kit installation instructions.

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External Heat Control

ATTENTION

Samsung cannot guarantee indoor unit fan operation in the event of an error or fan issue. Samsung cannot guarantee sufficient airflow for heaters in the supply duct outlet as duct design, filter selection, and filter status will directly effect this. When controlling an auxiliary heat source with a Samsung indoor unit, make sure that all required thermal protection devices are present per national, local, and ASHRAE standards.

External heat control output is not designed to control electric heat options that were not provided by Samsung. Do not use Samsung indoor unit auxiliary heat control output to enable/disable electric heat in the supply duct.

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External Heat Control

Applicable Indoor Unit Firmware Versions

Indoor unit type	Indoor Model Number	Version / date code
Neo Forte (wall mount)	AM0**FNTDCH/AA	DB91-01508A, date code (14/06/13) and newer
	AM0**HNQDCH/AA	
Cassette	AM0**FN4DCH/AA	DB91-01507A, date code (14/06/13) and newer
	AM0**FN1DCH/AA	
	AM0**FNNDCH/AA	
Ducted	AM0**FNLDCH/AA	
	AM0**FNMDCH/AA	
	AM0**FNHDCH/AA	
Under Ceiling / Low-Wall	AM0**FNCDCH/AA	
Vertical Air Handler / AHU Kit	AM0**GNVQCH	DB91-01509A, date code (14/06/13) and newer
	MXD-K***AN	


Indoor Unit Installation Data

Address	Model	RMC	Location	Product Option	Installation Option	Installation Option2	Main Micom	MTFC
0	Duct	04	Slim Duct	[0]10054-[1]255D1-[2]01616-[3]31110	[0]20310-[1]21000-[2]10000-[3]00000	[0]50000-[1]000000-[2]00009-[3]00000	DB91-01507A 14/06/13	
1	Global 4Way	03	4 Way	[0]14047-[1]55097-[2]01A1A-[3]30000	[0]20310-[1]21000-[2]10000-[3]00000	[0]50000-[1]000000-[2]00009-[3]00000	DB91-01507A 14/06/13	
2	Duct	06	MSP Duct	[0]10054-[1]25E44-[2]06E6E-[3]31110	[0]20310-[1]21000-[2]10000-[3]00000	[0]50000-[1]000000-[2]00009-[3]00000	DB91-01507A 14/06/13	
3	Slim 1Way	02	1 Way	[0]17064-[1]180C8-[2]01616-[3]30010	[0]20310-[1]21000-[2]10000-[3]00000	[0]50000-[1]000000-[2]00009-[3]00000	DB91-01507A 14/06/13	

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External Heat Control

Connection

Depending on the model of unit that is installed, the indoor unit can connect to and control an auxiliary heat source one of two ways:

1. MIM-B14 external contact control (recommended method)
2. “HOT WATER” coil connection (ducted models only)

- When using MIM-B14, its operation output terminals will be used to control an external heat source. This connection provides a 0 volt switch to control the auxiliary heat source (maximum 250V, 3A at this terminal). Using MIM-B14 is the preferred method of external heat control.
- The HOT WATER terminal in a duct unit supplies a high voltage control signal. One terminal supplies 120 VAC constantly and the other terminal supplies an additional 120 VAC (same as supply voltage) to activate the auxiliary heat source. A field-provided, 230 VAC relay must be used. Never power a device from the HOT WATER output, only use to control external devices.

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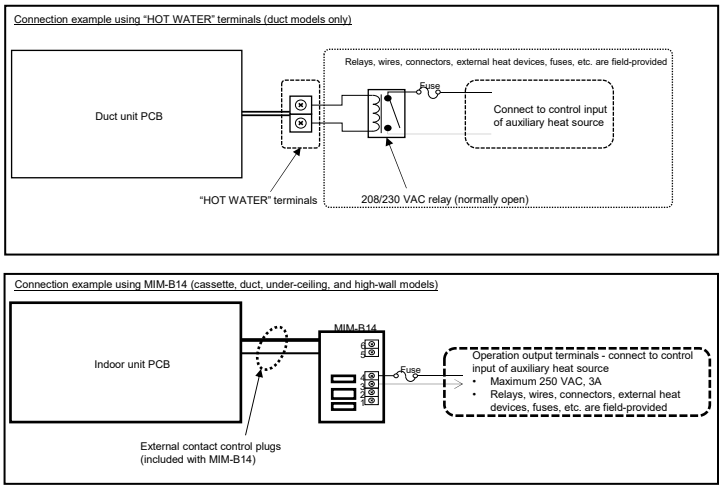
External Heat Control

External Heat Connection Example



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External Heat Control

External Heat Control Programming

If controlling auxiliary heat with the HOT COIL output, you must enable this function for that ducted unit.

02 Series Installation Options Settings (basic options), segment 09		
Use of HOT WATER output	Details	Segment 9 option setting
Do not use	DEFAULT - Do not use	0
Use	Use, fan operation is interlocked with auxiliary heat signal	1
Use	Use, fan is OFF when auxiliary signal ON for cooling only indoor units (install MCM-C200 mode selector switch in the outdoor unit and set to cool mode for this option).	3

If the external heat source is controlled by MIM-B14, indoor unit option 15 of the basic indoor unit option settings (02 series) must be enabled.

02 Series Installation Options Settings (basic options), segment 15		
External control output	Details	Segment 15 option setting
THERMO-ON/OFF	DEFAULT - Output terminals open/close based on standard THERMO-ON/OFF settings (1° C)	0
Operation ON/OFF	Output terminals open/close based on indoor unit power ON/OFF	1
Use*	Use, fan operation is interlocked with auxiliary heat signal	2
Use*	Use, fan is OFF when auxiliary signal ON for cooling only indoor units (install MCM-C200 mode selector switch in the outdoor unit and set to cool mode for this option).	3

* When this option is enabled, this output cannot be used for normal THERMO-ON/OFF, only auxiliary heat control.

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External Heat Control

External Heat Control Programming

- After programming the indoor unit for the desired auxiliary heat control output, you can specify how and when you would like to enable the external heat control signal.
- Below is a table that details the temperature difference between set temperature and room temperature and an optional 10 or 20 minute time delay.

05 Series Installation Options Settings (advanced options), segment 18			
Heater signal on (H)	Time delay (T)		
	No delay	10 minute delay	20 minute delay
THERMO-ON (1.8° F, 1° C, can vary depending on other settings)	0	1	2
2.7° F (1.5° C)	3	4	5
5.4° F (3° C)	6	7	8
8.1° F (4.5° C)	9	A	B
10.8° F (6° C)	C	D	E

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Start-up Tool – SNET Pro 2

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SNET Pro 2 – Eco System Start-up

System Startup Basic Operating Data

- Compressor discharge temperature
- Condenser outlet temperature
- High and Low pressure
- Compressor current
- Indoor unit EEV (cool)
- Indoor unit EEV (heat)
- Start-up report

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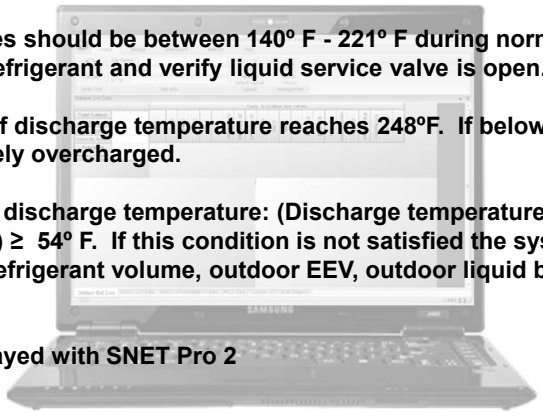
SNET Pro 2 – Eco System Start-up

Operation Data – Discharge Temperature

Compressor discharge temperature



- Discharge temperatures should be between 140º F - 221º F during normal operation. If over 221º F, check for low refrigerant and verify liquid service valve is open.
- Compressor will stop if discharge temperature reaches 248ºF. If below 140ºF for long periods, the system is most likely overcharged.
- Heating trial operation discharge temperature: (Discharge temperature - high pressure saturated temperature) ≥ 54º F. If this condition is not satisfied the system may be overcharged. Check refrigerant volume, outdoor EEV, outdoor liquid bypass valve, and EVI_EEV.
- All noted data is displayed with SNET Pro 2

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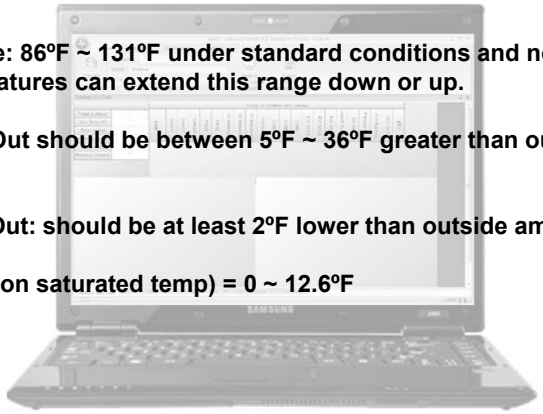
SNET Pro 2 – Eco System Start-up

Operation Data – Condenser Out Temperature

Condenser outlet temperature / Subcooler outlet temperature (Liquid Pipe Temp)



- Condenser Out range: 86ºF ~ 131ºF under standard conditions and normal operation. Low or high ambient temperatures can extend this range down or up.
- Cooling Condenser Out should be between 5ºF ~ 36ºF greater than outside ambient temperature.
- Heating Condenser Out: should be at least 2ºF lower than outside ambient temperature.
- (Suction temp - Suction saturated temp) = 0 ~ 12.6ºF

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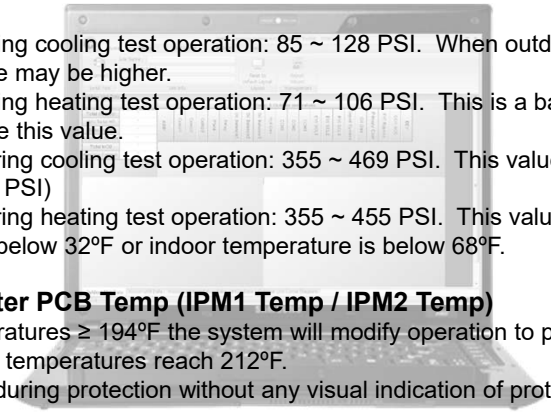
SNET Pro 2 – Eco System Start-up

Operation Data – High & Low Pressure



High / Low pressure

- Low pressure range during cooling test operation: 85 ~ 128 PSI. When outdoor temperatures and indoor loads are high, this value may be higher.
- Low pressure range during heating test operation: 71 ~ 106 PSI. This is a basic reference as ambient temperatures will change this value.
- High pressure range during cooling test operation: 355 ~ 469 PSI. This value can increase with ambient temperatures (max. 512 PSI)
- High pressure range during heating test operation: 355 ~ 455 PSI. This value can decrease when outside ambient temperature is below 32ºF or indoor temperature is below 68ºF.

IPM Temperatures – Inverter PCB Temp (IPM1 Temp / IPM2 Temp)

- When IPM board temperatures ≥ 194ºF the system will modify operation to prevent overheating.
- No errors will occur until temperatures reach 212ºF.
- Capacity can decrease during protection without any visual indication of protection occurring if below 212ºF.

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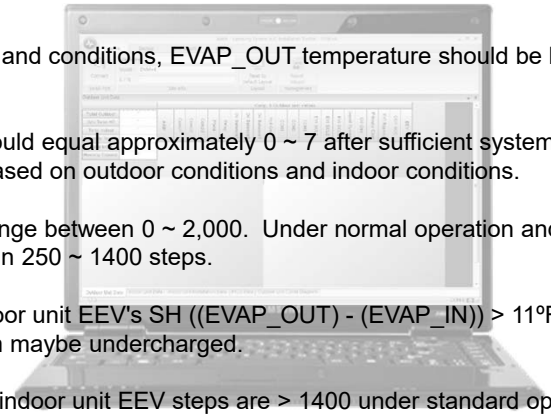
SNET Pro 2 – Eco System Start-up

Operation Data – Indoor Unit EEV (Cool)

Indoor Unit EEV (Cool mode)



- Under normal operation and conditions, EVAP_IN temperature should be between 45ºF - 57ºF for all indoor units.
- Under normal operation and conditions, EVAP_OUT temperature should be between 45ºF - 57ºF for all indoor units.
- (EVA OUT - EVA IN) should equal approximately 0 ~ 7 after sufficient system operation times. This value will vary initially based on outdoor conditions and indoor conditions.
- Indoor EEV steps will range between 0 ~ 2,000. Under normal operation and conditions the indoor unit EEV(s) should stay within 250 ~ 1400 steps.
- If more than 50% of indoor unit EEV's SH ((EVAP_OUT) - (EVAP_IN)) > 11ºF and EEV step of those units > 1400, the system maybe undercharged.
- If a small percentage of indoor unit EEV steps are > 1400 under standard operating and space conditions, verify the distance from the first Y-joint to each unit is within Samsung pipe limitations.

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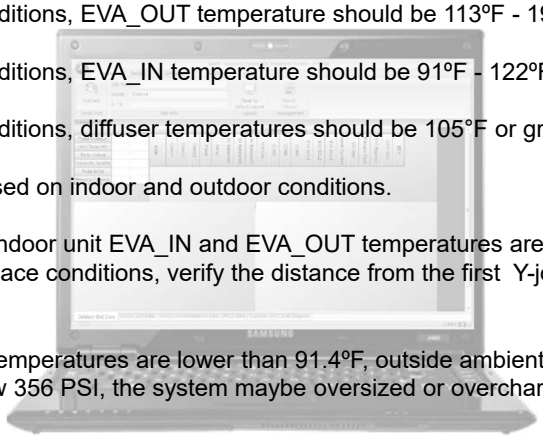
SNET Pro 2 – Eco System Start-up

Operation Data – Indoor Unit EEV (Heat)

Indoor Unit EEV (Heat mode)

- Normal operation and conditions, EVA_OUT temperature should be 113ºF - 194ºF for all indoor units.
- Normal operation and conditions, EVA_IN temperature should be 91ºF - 122ºF for all indoor units.
- Normal operation and conditions, diffuser temperatures should be 105°F or greater.
- EEV position will vary based on indoor and outdoor conditions.
- If only a small number of indoor unit EVA_IN and EVA_OUT temperatures are lower than normal under standard operating and space conditions, verify the distance from the first Y-joint to each unit is within Samsung pipe limitations.
- If all indoor unit EVA_IN temperatures are lower than 91.4ºF, outside ambient temperature is below 41ºF, and high pressure is below 356 PSI, the system maybe oversized or overcharged.



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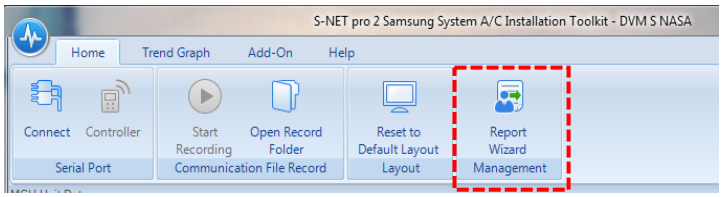
SNET Pro 2 – Eco System Start-up

Startup Report

1. Auto-report from SNET Pro 2



2. Recording file from the following operations:
   a. Auto-trial mode (clear “UP” mode)
   b. Cooling test mode (if temperatures allow)
   c. Heating test mode (if temperatures allow)
3. Commissioning checklist (available at www.DVMdownloads.com)
4. OPTIONAL – photos of outdoor unit installation and other installation photos

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Thank You !

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SAMSUNG HVAC Exclusive Dealer Features

Easy System Error Code Diagnostics & New System Registration

SAMSUNG HVAC Dealer Mobile App

Dealer support at your fingertips
Android or IOS devices

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Error Code Diagnostics

All Samsung Residential/Light Commercial and Commercial systems implement processor based self-diagnostics which generate error codes to identify specific operational and component issues

System error code lists are included in the Installation and Service Manuals & DVMS Error Code Booklet

There is an easy way to access the error code lists with descriptions by simply using the

SAMSUNG HVAC Dealer Mobile app on your Android or IOS devices

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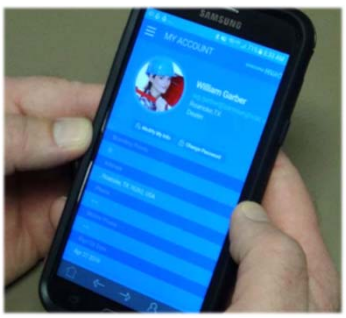
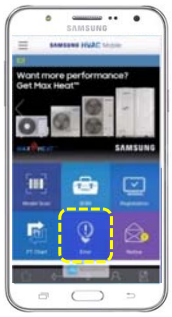
Error Code Diagnostics

The error code listing with descriptions for the complete Samsung product line is easily accessed through the Dealer Mobile App.



Launch the app and sign in



Select "Error" tab from Menu

Enter the error code or enter the type of error i.e. "Communication"

You can select the video description of the error code

Error codes greatly enhance the diagnostic procedures required to quickly and accurately analyze and resolve system component and operation issues

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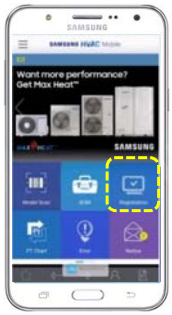
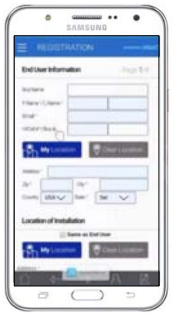
Samsung System Registration

New Samsung systems can be conveniently registered through the SAMSUNG HVAC Dealer Mobile App

Launch the app and sign in



Select the "Registration" tab from Menu



Enter the installation information including the end-user email address

Select the installation type:
Residential
Commercial (comfort cooling)
Commercial (non-comfort cooling)
Select installation date

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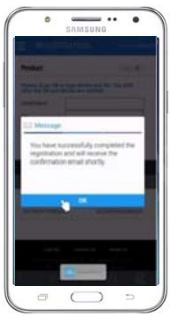
Samsung System Registration

System unit model and serial numbers can be typed in, however with the Dealer Mobile App, each unit's model and serial number can be easily scanned in – Multiple units can be scanned for each system

The product model & serial # will appear, then Select "ADD" to enter an additional unit
Select "Submit" when all units have been added for the system

Enter the confirming E-mail address
Select:
Installer/Servicer or
Customer (end-user)
Add any comments



When properly submitted, the registration is complete and confirming email will be sent

NOTE: Every new Samsung air conditioning system must be properly registered within 60 days of installation to activate the enhanced warranty on eligible products

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