



This training seminar is dedicated to Mark "PIC" Pickren for the many years he devoted to passing his knowledge to the HVAC industry and beyond.

Mark "PIC" Pickren

June 17, 1951 – January 7, 2023



CARRIER VRF INSTALLATION AND START UP.

MINGLEDORFF'S TECHNICAL SERVICES

Wednesday, May 3, 2023

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What information do we need?

1. Equipment model/serial
2. Detailed description of the problem or question
3. Email or Telephone number (including area code)
4. Your Name
5. Your Company Name

Call or email

912-944-3910

SETechnicalServices@mingledorffs.com (quickest response)

SPRING SERVICE UPDATE



- 15 minutes of food and 4-hours of fun!! (no charge)
- Please complete the “sign-in sheet”...PLEASE PRINT
- Certificate for State of Georgia CEU’s available from TM at end of class.
- If you are NATE certified & want NATE credit hours, include your NATE ID on the sign in sheet.
- Please silence all cell phones, pagers, & radios.
- **Take any important calls but be respectful of others and take outside!**
- We will take breaks / No Smoking / Location of bathrooms



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MINGLEDORFF'S TECHNICAL SERVICES NEWSLETTER



**SAVE ON IAQ
AND STOCK UP
ON ESSENTIALS**
...while supplies last!

SEPT. 21ST - DEC. 11TH, 2021

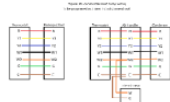
Save now, pay later.
Earn rewards along the way.
Registration is required. View catalog for full details.



Shop Now



Our Technical Services Group would like to share a few tips with you.



**Where Does the Orange
Wire Go On a Heat Pump?**

January 2023 Tech Tips



Flame Simulator

You go on a no heat call on a gas pack/ furnace. All the burners ignite, but then go out followed by the furnace showing an ignition failure code. After cleaning or replacing the flame rod, the furnace gives...

[Read Full Article >>>](#)



Totaline Slime Prevention & Removal

TIC2021-0006 states that a slime has been detected in condensate lines, traps, drains and pans. From TIC: "The slime is what is called a biofilm and it is a natural defense mechanism of many microorganisms or..."

[Read Full Article >>>](#)

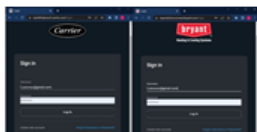


DUCT-Strip Wiring

DUCT-STRIP wire is a great product for ductless units when used properly. The wire is used to power and communicate between the indoor and outdoor units. It also can be used to solve E1 fault code problems, which I covered in previous...

[Read Full Article >>>](#)

February 2023 Tech Tips



How to Set Up and Access the Dealer Portal

We all know how complicated Infinity and Evolution systems can be; wouldn't it be nice if you could see operation data and fault codes without you actually being at the house? This is a real...

[Read Full Article >>>](#)



Late Friday Night

It's late one Friday night and you are on a call with a bad OFM (outdoor fan motor). The OFM has seized bearings and you don't have a replacement on your truck. What do you do? How can you get the customer going...

[Read Full Article >>>](#)

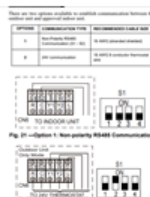


Dual Inlet Backward Curve Fan Installation

The models listed at the end of this newsletter are designed to meet federal Fan Energy Rating (FER) requirements and are scheduled to be released into production. These furnaces use...

[Read Full Article >>>](#)

March 2023 Tech Tips



38MU/40MU 18/8 Low Voltage Wiring

This month, I will be covering how to properly wire a 38MU/40MU for 24V operations and setting up the DIP switches.

I hate to say this, but the install manual is poorly written and many people get confused...

[Read Full Article >>>](#)



Voltage Drop on Contact Points

Most technicians know about checking capacitors under a load while a motor is running, but did you know that you can do the same thing with contact points!?

That's right, on contactors you...

[Read Full Article >>>](#)



Carrier/Bryant Service Tech App

When I instruct Nate Classes, I typically suggest the Carrier Service Tech App to techs that have not used it. I have them download it and install it. Then, I have them open it and they have a couple...

[Read Full Article >>>](#)

COURSE OBJECTIVES



- Understand VRF technology and application
- Explore the Carrier VRF product line features and specifications
- Examine Carrier VRF product functions and controls
- Review installation procedures, best practices, and testing
- Identify and review start-up procedures
- Participate in System start up



TABLE OF CONTENTS



Section 1 **WHAT IS VRF?**



Section 2 **PRODUCT**



Section 3 **FUNCTION AND CONTROL**



Section 4 **INSTALLATION**

- Moving the ODU
- Piping Installation
- Insulation and Condensate
- Electrical
- Leak test
- Additional Refrigerant Charge



Section 5 **START-UP**

WHAT IS VRF?

WHAT IS VRF?

Flexibility & Energy Efficiency

- Ability to control multiple rooms at different temperatures
- Refrigerant flows to the unit that is calling for heating or cooling
- System where multiple indoor units (up to 64, depending on model) can be connected to outdoor units
 - HP system 34/36Ton
 - HR system 26/28Ton
- Fan coils are controlled individually or by group controls



TWO PRIMARY SYSTEM TYPES

- **Heat Pump**

- Fan coils are capable of providing either cooling or heating based on outdoor unit mode.

- **Heat Recovery**

- Fan coils are capable of providing simultaneous heating or cooling, by thermal zone, when operation temperatures are permitted.



PRIMARY COMPONENTS OF A HEAT PUMP SYSTEM



Outdoor Unit

- Controls Compressor Frequency and Fan speed
- Maintains Operational Mode



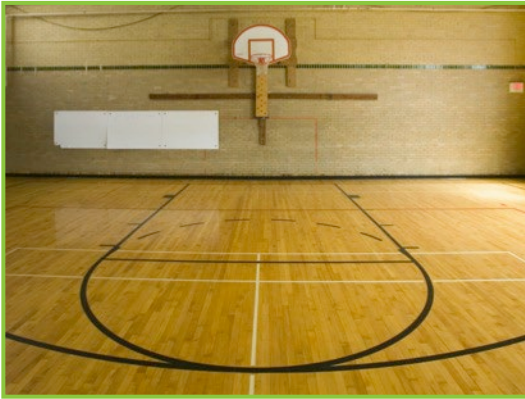
Indoor Units

- Transfers Heating and Cooling to Space
- Allows for Optimal Zoning



Controls

- Controls Space Temperature and Indoor Unit Fan
- Remote or Central



Gyms



Lobbies



Churches

Large, Open Spaces – Single Common Zones

PRIMARY COMPONENTS OF A HEAT RECOVERY SYSTEM



Outdoor Unit

- Controls Compressor Frequency and Outdoor Fan speed
- Maintains Operational Mode

Multiport distribution controller (MDC)

- Reverses Refrigerant Flow to Indoor Unit
- Simultaneous Cooling and Heating

Indoor Units

- Transfers Heating and Cooling to Space
- Allows for Optimal Zoning

Controls

- Controls Space Temperature and Indoor Unit Fan
- Remote or Central



Classrooms



Offices



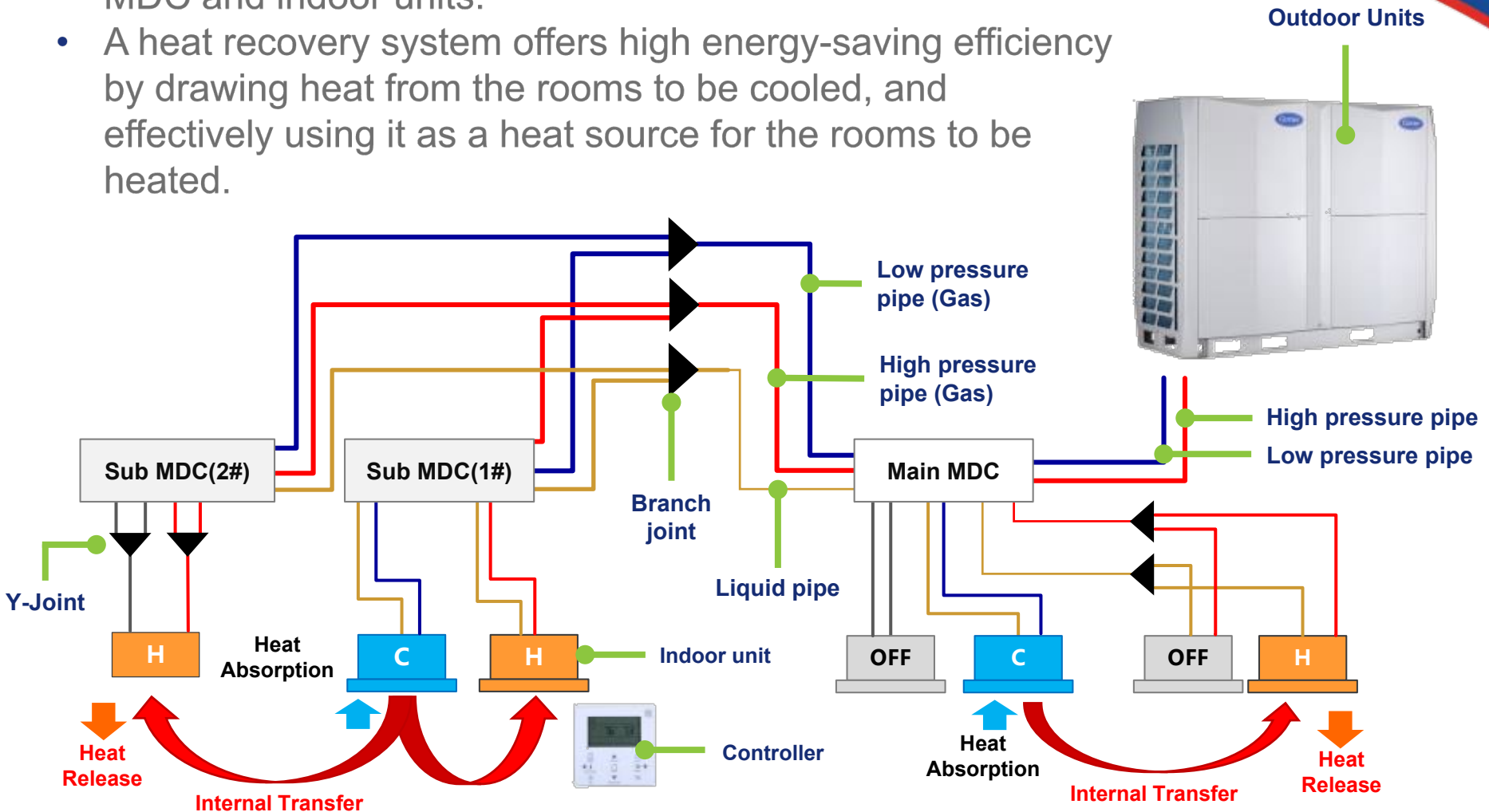
Assisted Living

Buildings with many thermal zones

TYPICAL LAYOUT OF A VRF SYSTEM



- A typical heat recovery system consists of outdoor units, MDC and indoor units.
- A heat recovery system offers high energy-saving efficiency by drawing heat from the rooms to be cooled, and effectively using it as a heat source for the rooms to be heated.

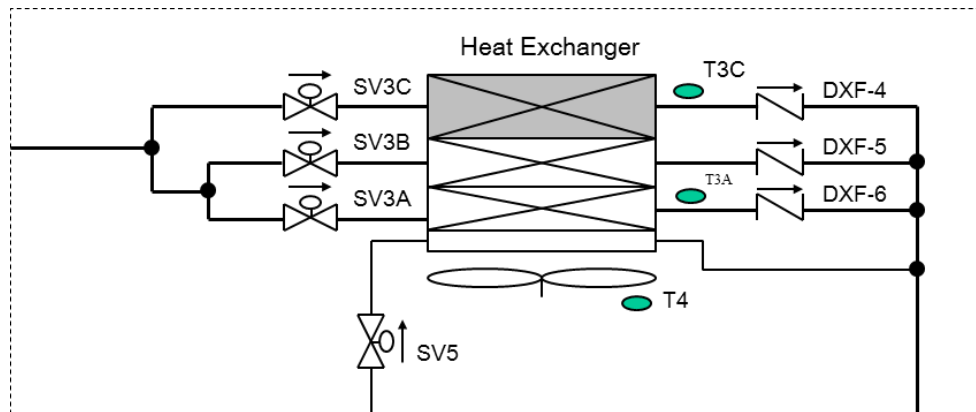


HOW DOES VRF WORK?



OUTDOOR UNIT

- DC inverter driven scroll compressors
- Compressors change speed based on target high and low pressure for heat recovery system
- Compressors change speed based on demand of indoor units for heat pump system
- Segmented heat recovery ODU Coil for efficient heat transfer



HR 6~10Ton

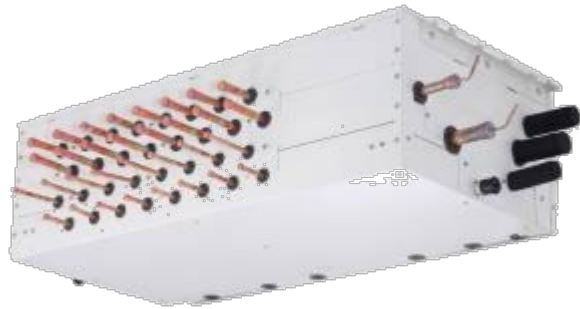
HOW DOES VRF WORK?



MULTIPORT DISTRIBUTION CONTROLLER

MDC for Heat Recovery Only

- Receives superheated gas and sub-cooled liquid
- Distributes refrigerant to indoor unit based on heating & cooling demand
- Allows individual indoor unit to be in either cooling or heating mode



HOW DOES VRF WORK?



INDOOR UNIT

- Transfers heating and cooling directly to the space
- Measures Return Air Temperature
- Electronic Expansion Valve (EEV) adjusts to meet set point
- Filters and distributes the air



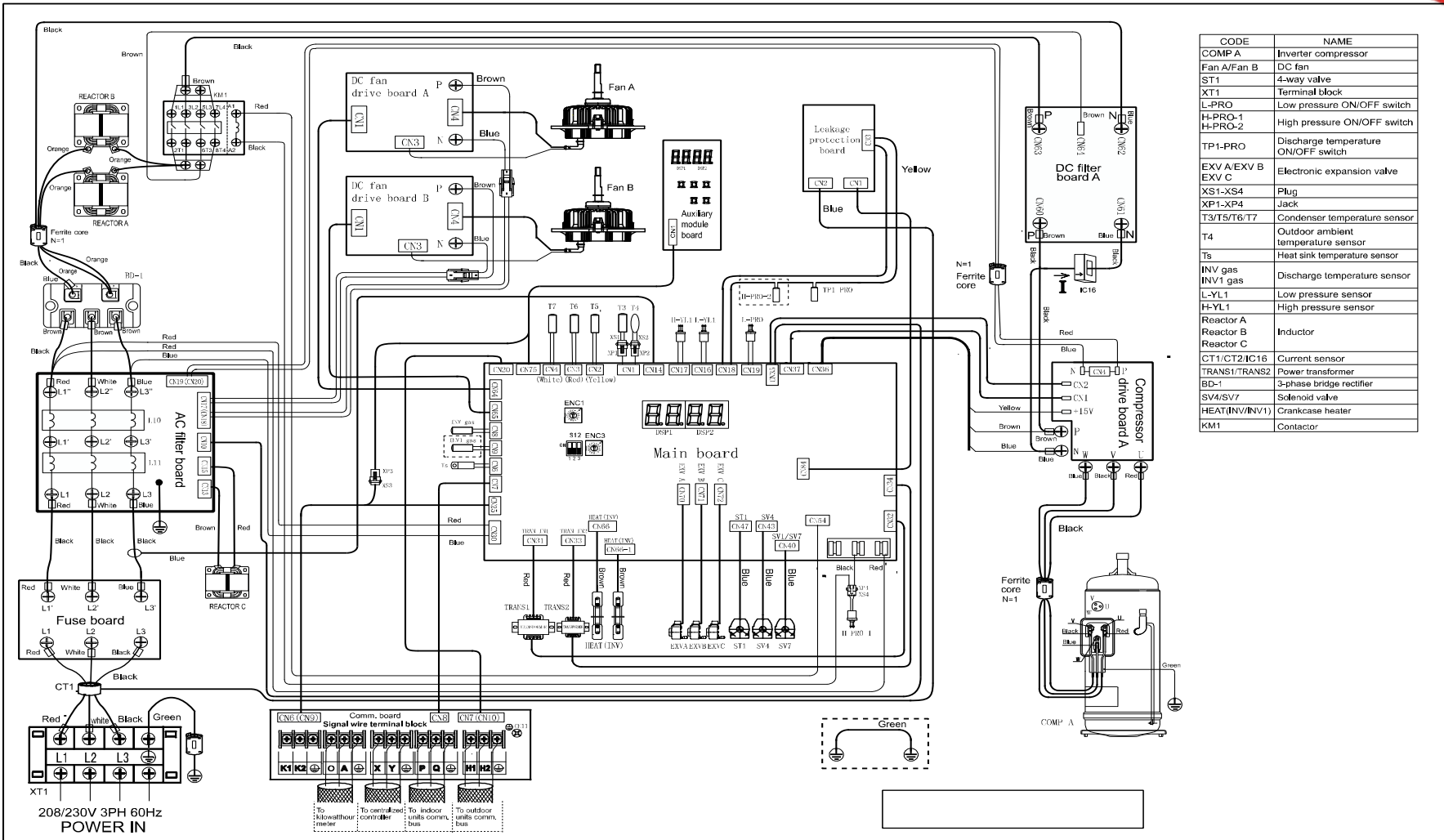
CONTROLLER



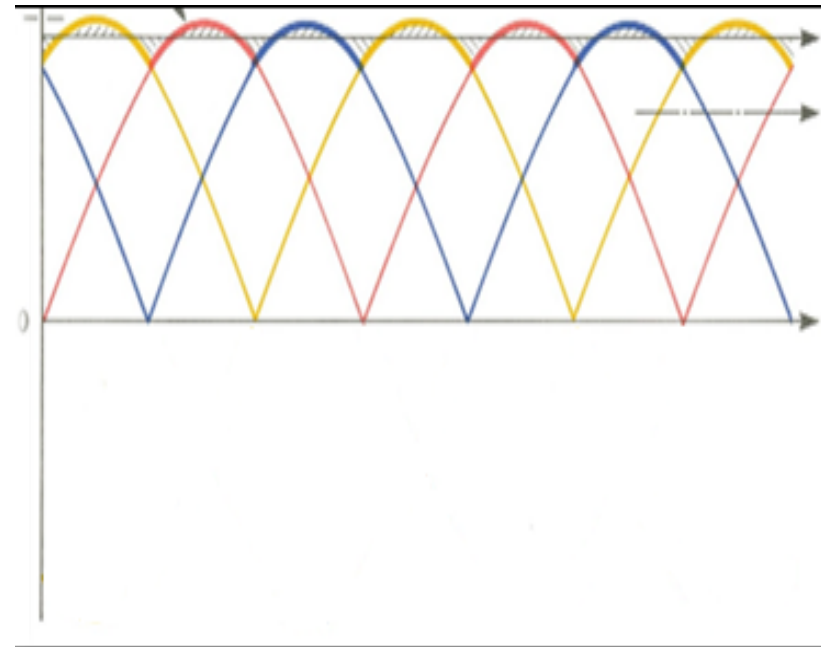
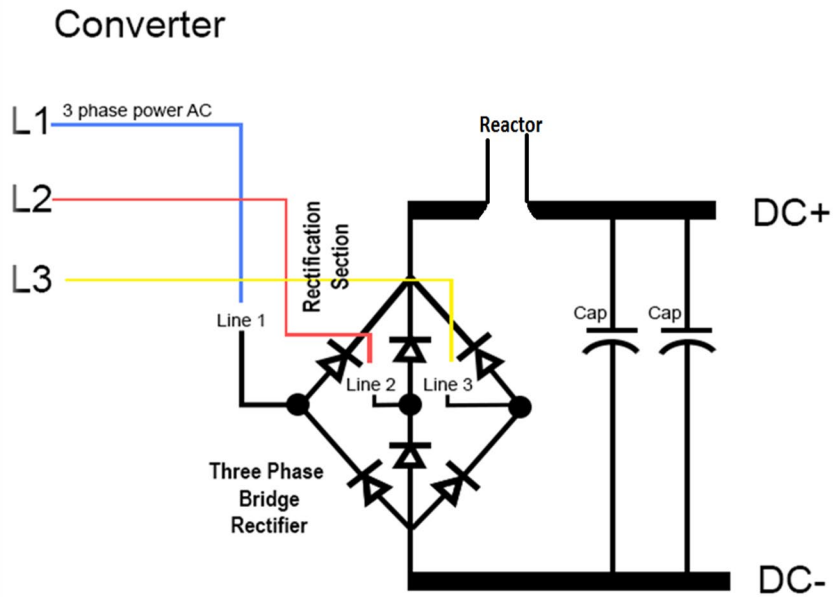
- Allows for individual or group control of indoor unit
- Takes user desired space set point, fan speed, mode selection
- Displays error and malfunction codes



BASIC ODU WIRING DIAGRAM

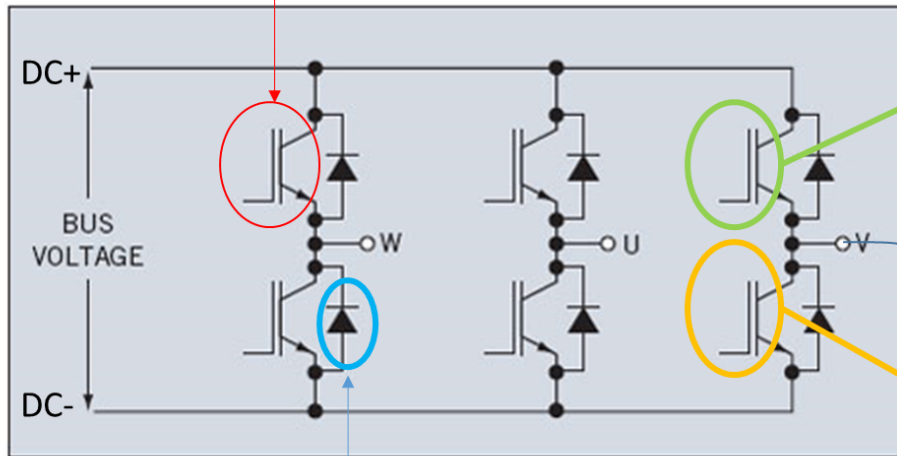


INVERTER CIRCUIT

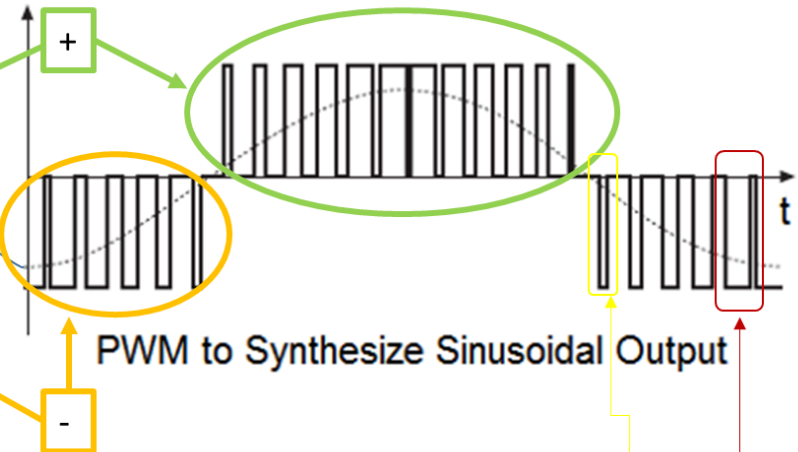


INVERTER CIRCUIT

IGBT – Insulated-gate Bipolar Transistor (“switch”)



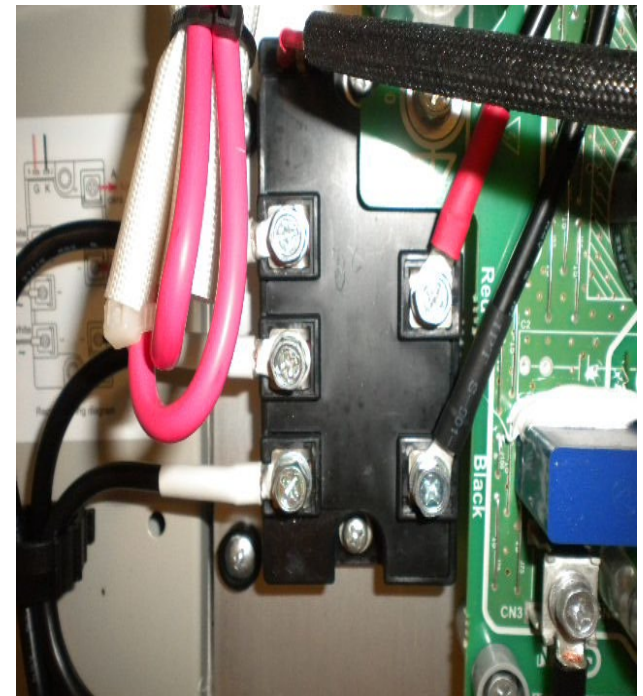
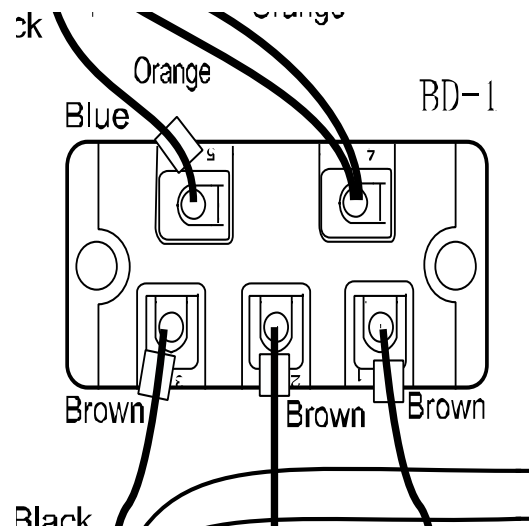
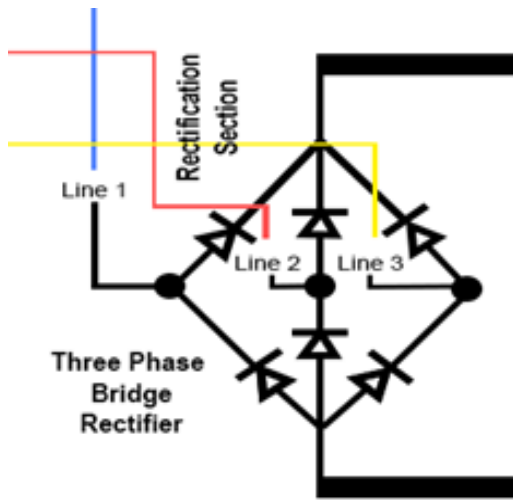
Diode



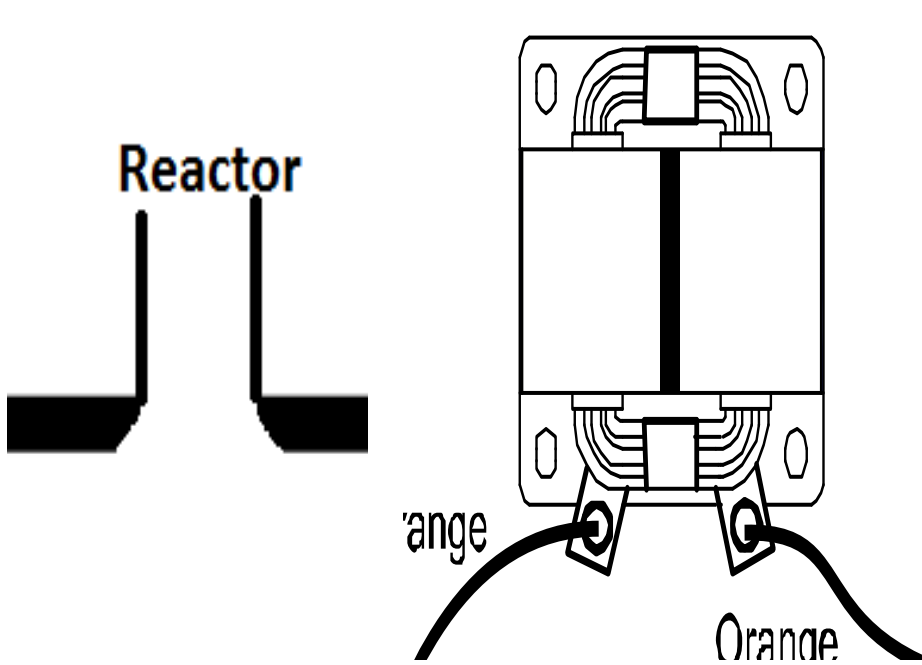
The faster the IGBT switches closed the shorter the DC sign wave

The longer the IGBT switches closed the wider the DC sign wave

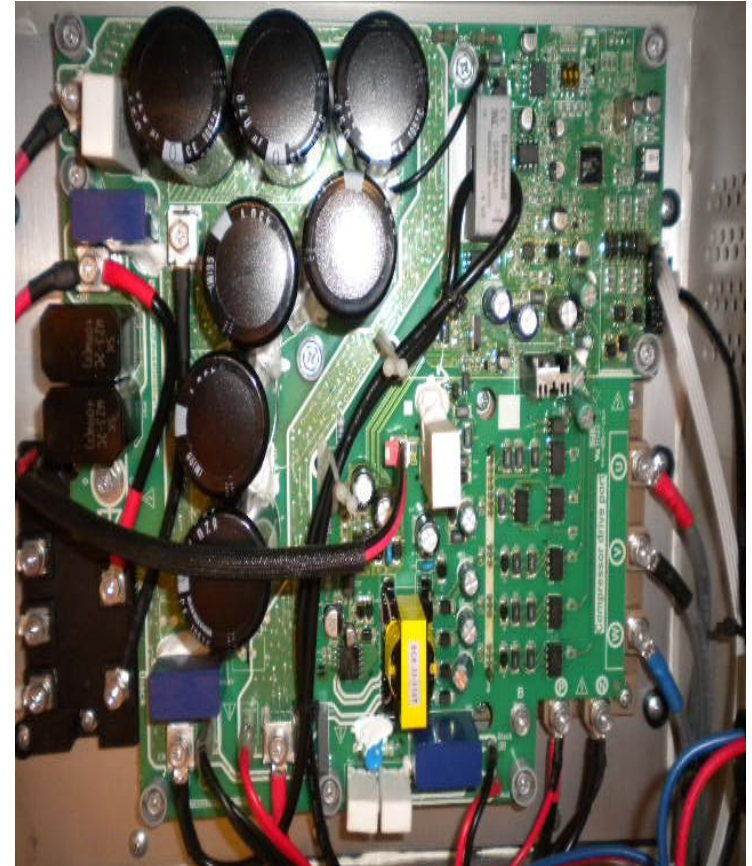
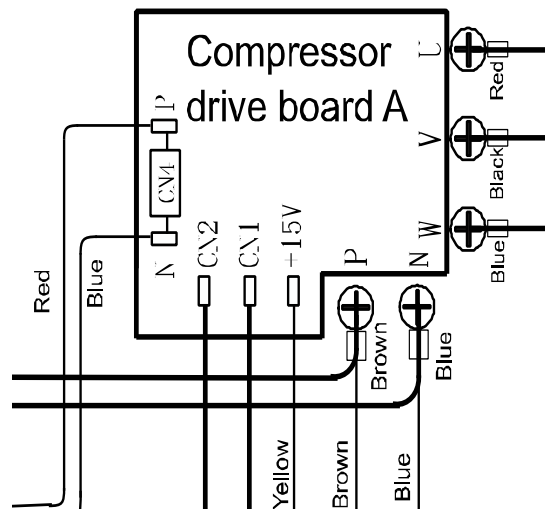
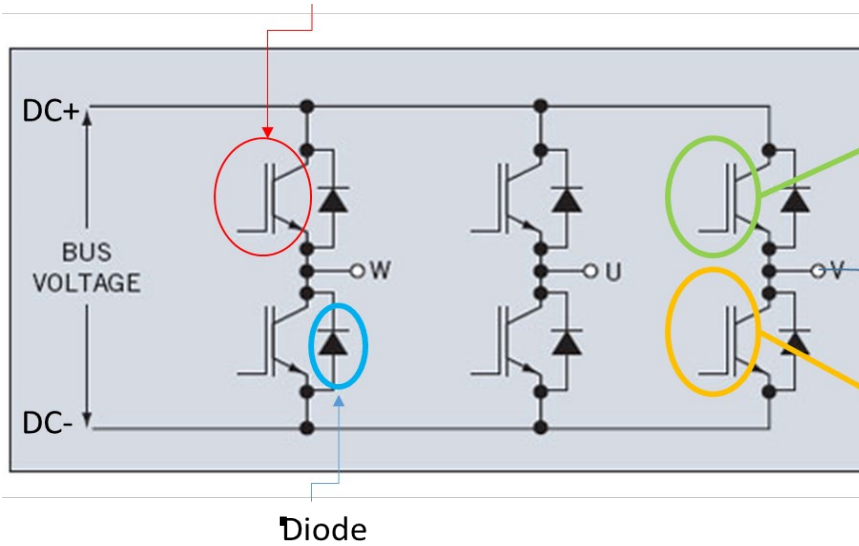
BRIDGE RECTIFIER



REACTOR



COMPRESSOR DRIVE BOARD

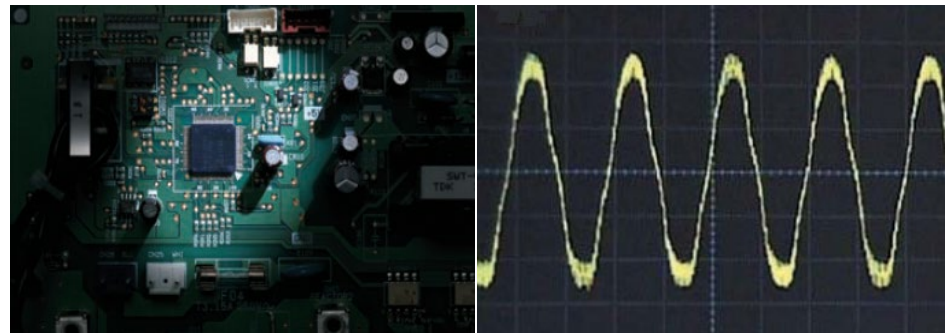


INVERTER DRIVEN COMPRESSOR



A fixed speed compressor is susceptible to electrical damage

An *inverter-driven compressor* is less likely to fail at start-up because it sees a soft-start, making it more **MORE RELIABLE**



PRODUCT



UNIT LINEUP



Ceiling & Floor



High Wall



**4-way
Cassette**



**Medium
Static duct**



**Vertical
AHU**



**Compact 4-way
Cassette**



**Recessed
Floor St.**



**Low Static
Duct**

**High Static Duct and Outside
Air Unit**



HEAT RECOVERY



- Heat Recovery: 3 Unit Sizes
- 72,000 – 336,000 Btu/h



- 208/230V-3phase and 460V-3phase
- INVERTER-driven scroll compressors

COMBINATION RATIO RESTRICTION FOR HEAT RECOVERY



Min. Combination Ratio	Max. Combination Ratio			
	40VMH *1 only, 40VMV only	When 40VMA and indoor units connected	Including 40VMH *1 or 40VMV at least one unit	Other indoor unit models
50%	100%	100% *3	130% *4	150%

***1** When 40VMH048, 054, 072, 096---3 is installed.

***3** When outside air processing units (40VMA) and standard indoor units are connected, the total capacity index of the 40VMA must be limited to **30% or less** of the capacity index of the outdoor unit.

***4** When the total capacity of 40VMH048, 054, 072, 096---3 or 40VMV exceeds 30%, the combination must not exceeds 100%.

HEAT RECOVERY OUTDOOR UNIT NOMENCLATURE



38 VM A 072 R D S 5 - 1

Product Series

38 – Outdoor Condensing Unit

Model Letters

VM – Carrier VRF

Model Number Modifier

A – Revision Number

Cooling Capacity (Btu/h)

072 – 72,000

096 – 96,000

.....

336 – 336,000

System Type

R – Heat Recovery

H – Heat Pump

Variations

D – Domestic

Packaging

1 – USA & Canada

Design Variation

– None

Electrical

5 – 208/230-3-60

6 – 460-3-60

Cabinet Size

S – Standard

L – Large

HEAT PUMP OUTDOOR – 3 PHASE



Single Module



Twinned Module



Triple Module

- Heat pump
 - Max 3 units in combined system
- 72,000 – 432,000 Btu/h
- 208/230V-3phase and 460V-3phase
- **50-135%*** connected capacity
- INVERTER driven scroll compressors

COMBINATION RATIO RESTRICTION



Min. combination ratio	Max. combination ratio			
	40VMH *1 only, 40VMV only	When 40VMA and indoor units connected	Including 40VMH *1 or 40VMV at least one unit	Other indoor unit models
50%	100%	100% *3	115% *4	135%

***1** When 40VMH048, 054, 072, 096---3 is installed.

***3** When outside air processing units (40VMA) and standard indoor units are connected, the total capacity index of the 40VMA must be limited to **30% or less** of the capacity index of the outdoor unit.

***4** When the total capacity of 40VMH048, 054, 072, 096---3 or 40VMV exceeds 30%, the combination must not exceeds 100%.

INDOOR UNIT LINEUP



- 10 Indoor Unit types
- 7,000 – 96,000 Btu/h
- 208/230V-1Ph-60Hz
- Integral ventilation and condensate lift mechanism – most models

HEAT RECOVERY INDOOR UNIT NOMENCLATURE



40 VM F 018 --- 3

Equipment Type

40 – Indoor Unit

Product Type

VM – VRF

Model Type

F – 4-way cassette
C – Compact 4-way cassette
W – High wall
M – Medium static duct
U – Ceiling/Floor
H – High static duct
V – Vertical AHU
L – Low static duct
R – Floor console recessed
A – Outside air

Voltage (V-Ph-Hz)

3- 208/230-1-60

Blank

--- None

Cooling Capacity (Btu/h)

007 – 7,000

009 – 9,000

.....

096 – 96,000

INDOOR UNIT



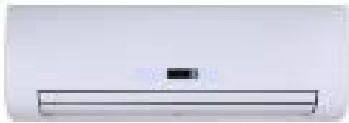
Rating Cooling Capacity	Model number	Features
9,000Btu/h	40VMF009---3	- Built in condensate lift - Outside air knockout 4 way air flow directions - Flared Refrigerant Pipe connections - Support MERV 13 filter with rack accessory
12,000Btu/h	40VMF012---3	
15,000Btu/h	40VMF015---3	
18,000Btu/h	40VMF018---3	
24,000Btu/h	40VMF024---3	
30,000Btu/h	40VMF030---3	
36,000Btu/h	40VMF036---3	
48,000Btu/h	40VMF048---3	



**Compact 4-Way Cassette
(40VMC)**

Rating Cooling Capacity	Model number	Features
7,000Btu/h	40VMC007---3	- Built in condensate lift 4 way air flow directions - Flared Refrigerant Pipe connections
9,000Btu/h	40VMC009---3	
12,000Btu/h	40VMC012---3	
15,000Btu/h	40VMC015---3	

INDOOR UNIT



High wall (40VMW)



High Static Duct (40VMH)

Rating Cooling Capacity	Model number	Features
5,000Btu/h	40VMW005---3	- Accessory condensate pump - Flared Refrigerant Pipe connections
7,500Btu/h	40VMW007---3	
9,500Btu/h	40VMW009---3	
12,000Btu/h	40VMW012---3	
15,000Btu/h	40VMW015---3	
18,000Btu/h	40VMW018---3	
24,000Btu/h	40VMW024---3	
30,000Btu/h	40VMW030---3	
Rating Cooling Capacity	Model number	Features
24,000Btu/h	40VMH024---3	- Flared Refrigerant Pipe connections 0.8"-1.0" Max ESP
30,000Btu/h	40VMH030---3	
36,000Btu/h	40VMH036---3	
48,000Btu/h	40VMH048---3	
53,500Btu/h	40VMH054---3	
72,000Btu/h	40VMH072---3	
96,000Btu/h	40VMH096---3	

INDOOR UNIT



Low Static Duct (40VML)

Rating Cooling Capacity	Model number	Features
7,000Btu/h	40VML007---3	- Built in condensate lift - Bottom return option - Flared Refrigerant Pipe connections 0.2" Max ESP
9,000Btu/h	40VML009---3	
12,000Btu/h	40VML012---3	
15,000Btu/h	40VML015---3	
19,000Btu/h	40VML018---3	



**Ceiling/Floor
(40VMU)**

Rating Cooling Capacity	Model number	Features
12,000Btu/h	40VMU012---3	- Convertible floor or ceiling installation - Flared Refrigerant Pipe connections - Outside air knockout
15,000Btu/h	40VMU015---3	
18,000Btu/h	40VMU018---3	
24,000Btu/h	40VMU024---3	
30,000Btu/h	40VMU030---3	
36,000Btu/h	40VMU036---3	
48,000Btu/h	40VMU048---3	

INDOOR UNIT



**Medium Static Duct
(40VMM)**

Rating Cooling Capacity	Model number	Features
7,000Btu/h	40VMM007---3	- Built in condensate lift - Bottom return option - Flared Refrigerant Pipe connections 0.32-0.6" ESP
9,000Btu/h	40VMM009---3	
12,000Btu/h	40VMM012---3	
15,000Btu/h	40VMM015---3	
19,000Btu/h	40VMM018---3	
24,000Btu/h	40VMM024---3	
30,000Btu/h	40VMM030---3	
36,000Btu/h	40VMM036---3	
48,000Btu/h	40VMM048---3	



Outside Air (40VMA)

Rating Cooling Capacity	Model number	Features
36,000Btu/h	40VMA036---3	- Built in condensate lift (Size 36/48/54) - Brazing Refrigerant Pipe connections 0.8"-1.1" Max ESP
48,000Btu/h	40VMA048---3	
53,500Btu/h	40VMA054---3	
72,000Btu/h	40VMA072---3	
96,000Btu/h	40VMA096---3	

INDOOR UNIT



Vertical AHU

Rating Cooling Capacity	Model number	Features
12,000Btu/h	40VMV012---3	• ECM (Electronically Commutated Motor) auto balance based on fan speed • High Static Capability (Max. 0.8" ESP) • Vertical or Horizontal Left Only • Pre-painted galvanized sheet metal cabinet • Brazing Refrigerant Pipe connections on 72 & 96K
18,000Btu/h	40VMV018---3	
24,000Btu/h	40VMV024---3	
30,000Btu/h	40VMV030---3	
36,000Btu/h	40VMV036---3	
48,000Btu/h	40VMV048---3	
53,500Btu/h	40VMV054---3	



Floor Console Recessed

Rating Cooling Capacity	Model number	Features
7,000Btu/h	40VMR007---3	• Recessed installation in wall • Flared Refrigerant Pipe connections • Adjustable filter rack up to 2" • Up to 0.15" ESP
9,000Btu/h	40VMR009---3	
12,000Btu/h	40VMR012---3	
15,000Btu/h	40VMR015---3	
18,000Btu/h	40VMR018---3	
24,000Btu/h	40VMR024---3	

MDC - MULTI PORT DISTRIBUTION CONTROLLER



Main MDC Type

Max. Connectable Indoor Unit Capacity	Model Number	Ports	Connectable Sub MDC
324,000 Btu/h	40VMD006M--3	6	40VMD006S--3
360,000 Btu/h	40VMD008M--3	8	40VMD006,008S--3
360,000 Btu/h	40VMD010M--3	10	40VMD006,008,010S--3
360,000 Btu/h	40VMD016M--3	16	40VMD006,008,010,016S--3
504,000 Btu/h	40VMD016ML-3	16	40VMD006,008,010,016S--3



Sub MDC Type

Max. Connectable Indoor Unit Capacity *	Model Number	Ports
126,000 Btu/h	40VMD006S--3	6
126,000 Btu/h	40VMD008S--3	8
126,000 Btu/h	40VMD010S--3	10
126,000 Btu/h	40VMD016S--3	16

- When two sub MDC are used, the total capacity must not exceeds 168,000Btu/h
- Maximum connected capacity for one branch is 54,000Btu/h

REMOTE CONTROLLERS



- Wireless remote controller (40VM900001)
- Wired remote controller – Non Programmable (40VM900002)
- Wired remote controller – Programmable (40VM900003)
- Touchscreen wired remote controller (40VM900005)



REMOTE CONTROLLER OVERVIEW



WIRED REMOTE CONTROLLER

Non Programmable (40VM900002)



- Simple, Easy to Use
- ON/OFF
- Group Control (Max 16 IDU)
- Mode Setting
- Fan Speed Setting
- Set-point Display
- Swing Setting
- Addressing Capability
- Back light
- Dual set-point control
- Set temperature range limiting
- Room Temperature Display
- Error Display
- Touch Button
- 1F temperature indication

REMOTE CONTROLLER OVERVIEW



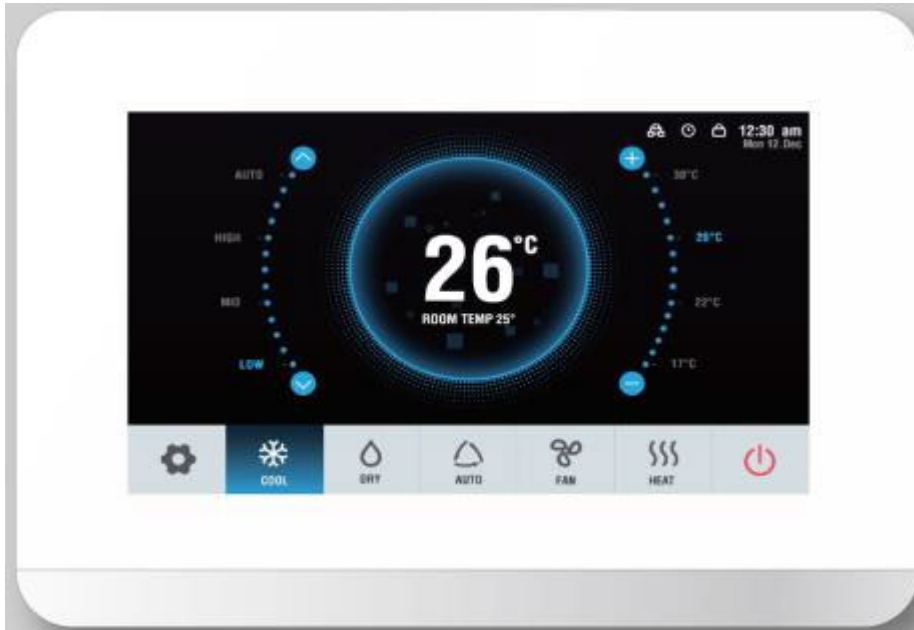
WIRED REMOTE CONTROLLER

Programmable (40VM900003)



- Simple, Easy to Use
- ON/OFF
- Group Control (Max 16 IDU)
- Mode Setting
- Fan Speed Setting
- Set-point Display
- Swing Setting
- Addressing Capability
- Back light
- Dual set-point control
- Set temperature range limiting
- Room Temperature Display
- Error Display
- Clock & Weekly Scheduling
- Touch Button
- 1F temperature indication

TOUCHSCREEN WIRED REMOTE CONTROLLER (40VM900005)



- Display is 800*480 resolution
- ON/OFF
- Group Control (Max 16 IDU)
- Mode Setting
- Fan Speed Setting
- Set-point Display
- Swing Setting
- Addressing Capability
- Back light
- Dual set-point control
- Set temperature range limiting
- Room Temperature Display
- Error Display
- Clock & Weekly Scheduling
- Touch Screen
- 1F temperature indication

CENTRAL CONTROLLERS

- Touchscreen Centralized Controller (40VM900006)
- Intelligent Manager (40VM900051)
- BACnet/IP (40VM900052)
- LONWORKS (40VM900053)



(40VM900006)



- 10.1 inch screen, 1200*800 resolution
- 3 level of account management ,can set up 20 users
 - 2 administrators and 18 normal users are included
- Remote access
- Alarm notification via email
- Fire alarm and interacting information, 4 path DI and DO
- Recognize units automatically
- Controls up to 384 IDU
- Mode Setting, Fan Speed Setting, Set-point Display
- Swing Setting
- Dual set-point control
- Set temperature range limiting
- Error Display
- Clock & Weekly Scheduling

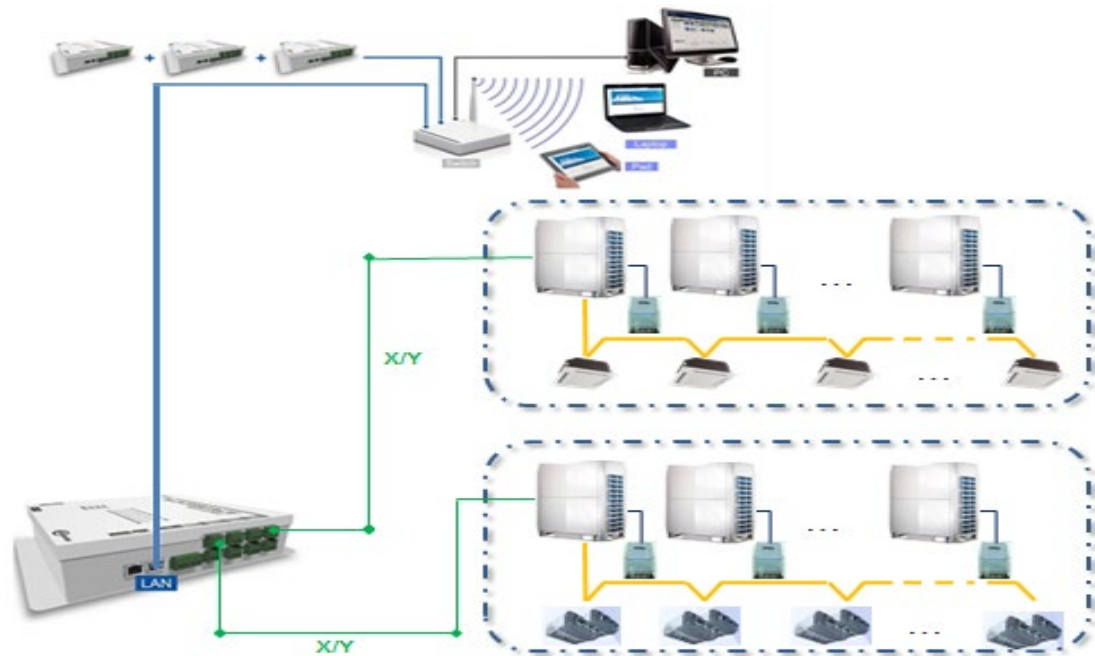
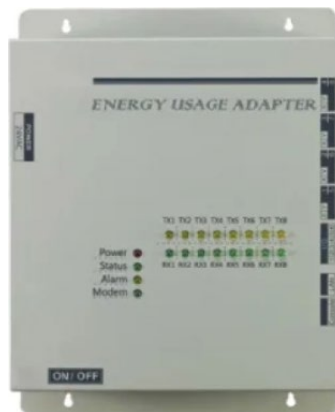
ENERGY MONITORING



ENERGY MONITORING MODULE

(40VM900051)

- 4 gateways in a group. Up to 128 refrigerant systems (1024 indoor units)
- Monitor both outdoor and indoor unit operation
- Scheduling (Daily / Weekly)
- Energy-saving management:
 - Set temperature range limit
 - lock mode etc.
- Group management
- Export Software log



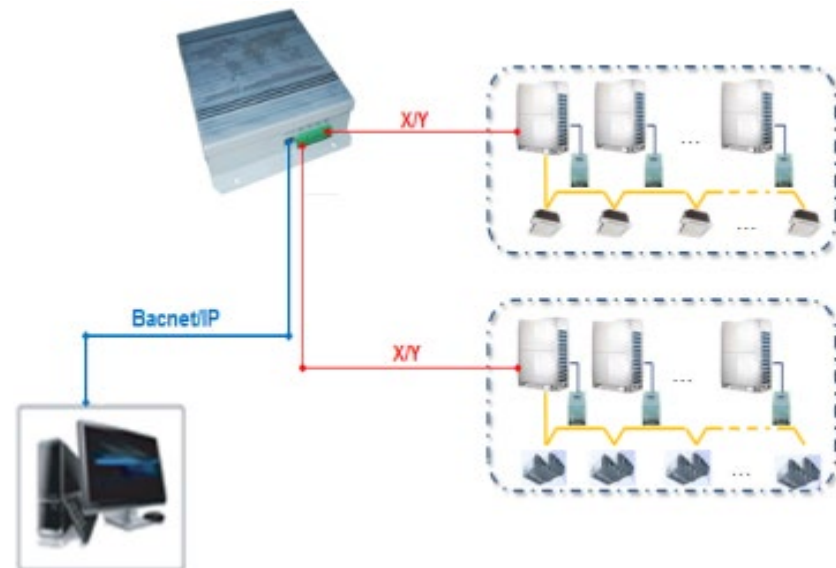
BAC-NET INTERFACE



BACnet/IP

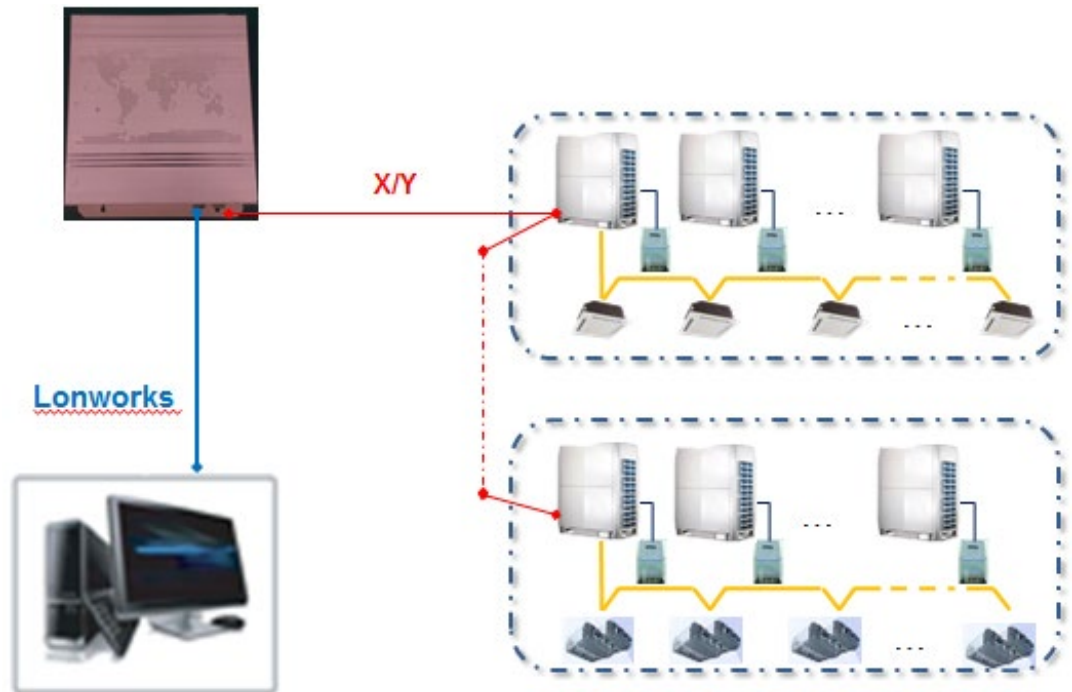
(40VM900052)

- Four 485 ports, each port can access 64 indoor units or 8 refrigeration system
- WEB service allows log in through web
- Indoor unit
 - Temperature set
 - Indoor temperature
 - Operate mode
 - Error code
 - Set mode
- Outdoor unit
 - Mode
 - Outdoor temperature
 - Error code



LONWORKS (40VM900053)

- Supports 64 indoor units
 - Indoor unit
 - Temperature set
 - Indoor temperature
 - Operate mode
 - Fault code
 - Outdoor unit
 - Mode
 - Outdoor temperature
 - Fault code



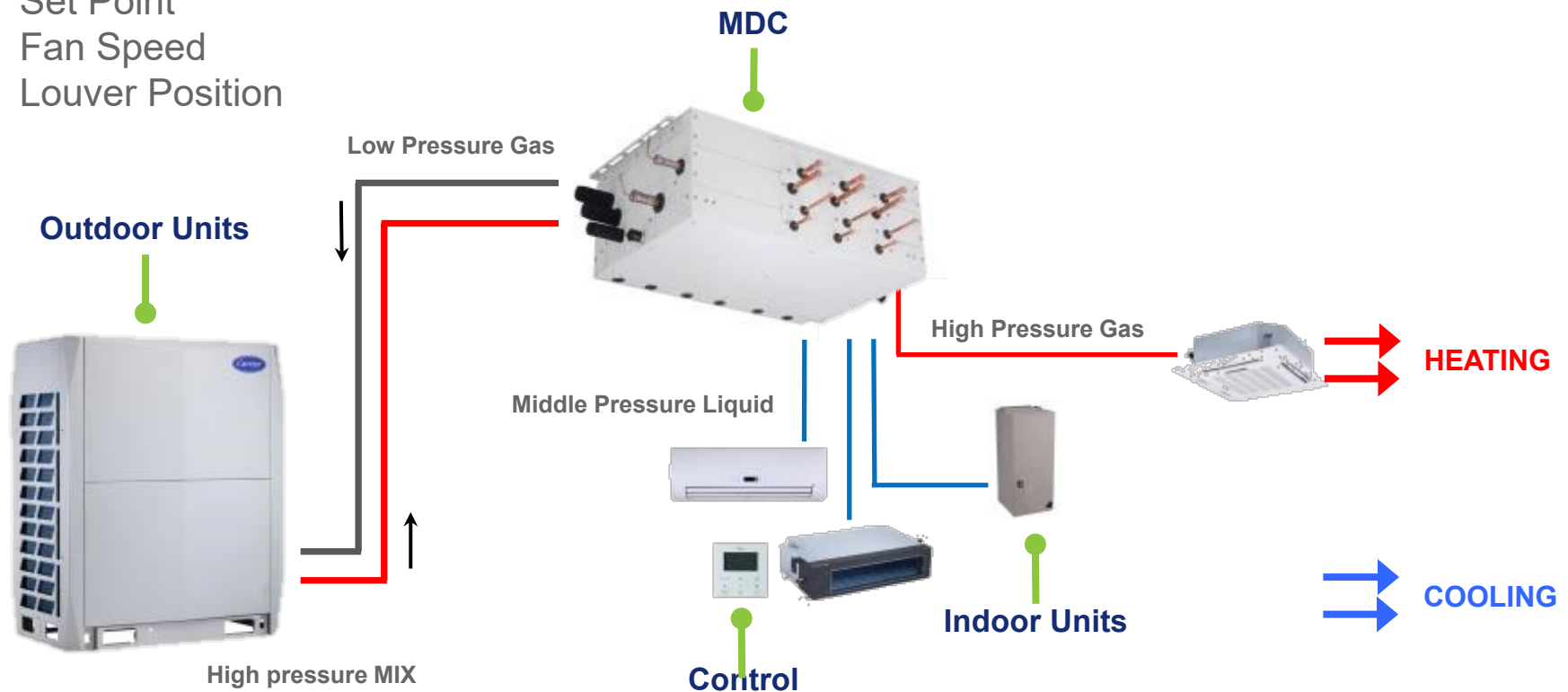
FUNCTION AND CONTROL

HEAT RECOVERY SYSTEM



EACH INDOOR UNIT CAN CONTROL THE FOLLOWING:

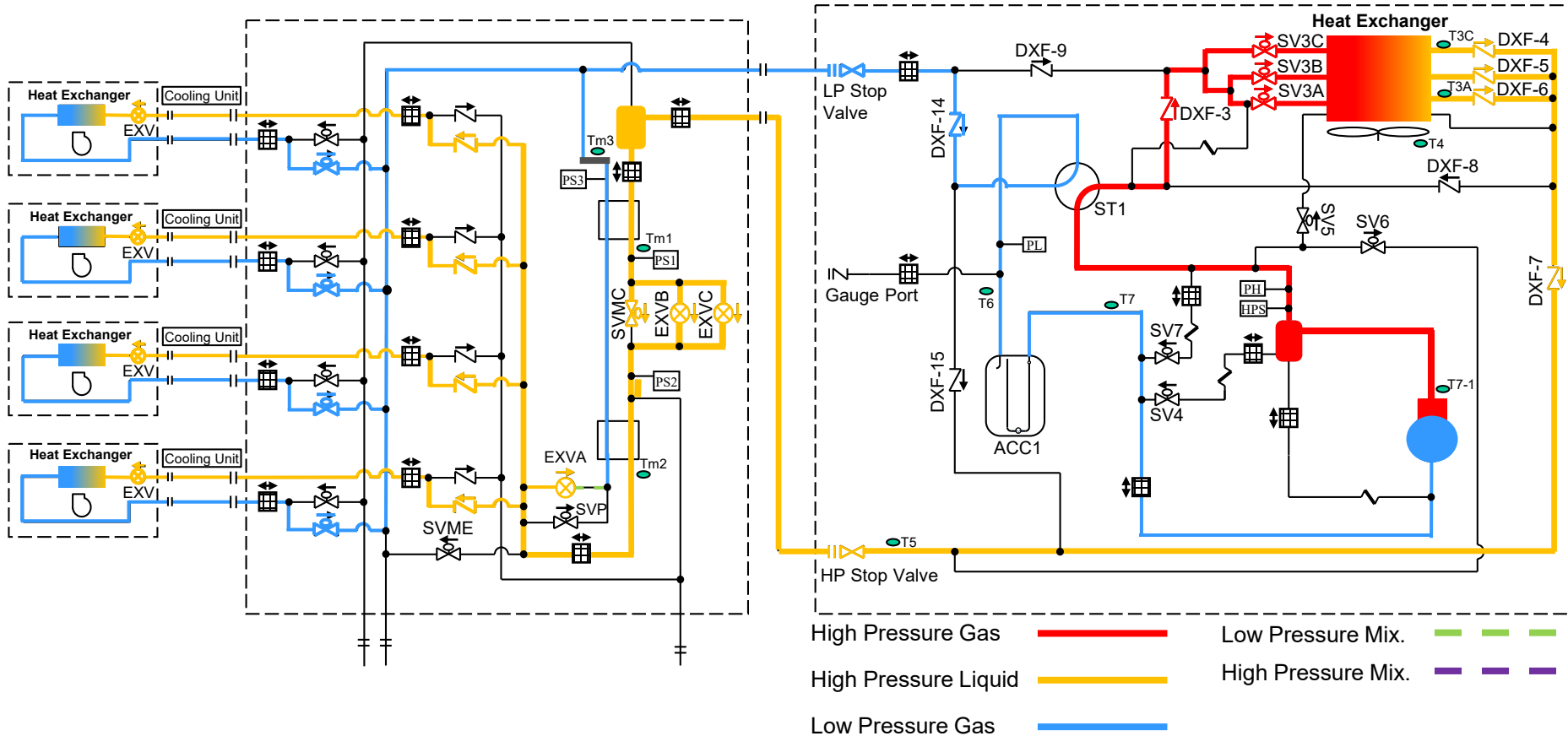
- On/Off
- Mode
- Set Point
- Fan Speed
- Louver Position



HEAT RECOVERY SYSTEM



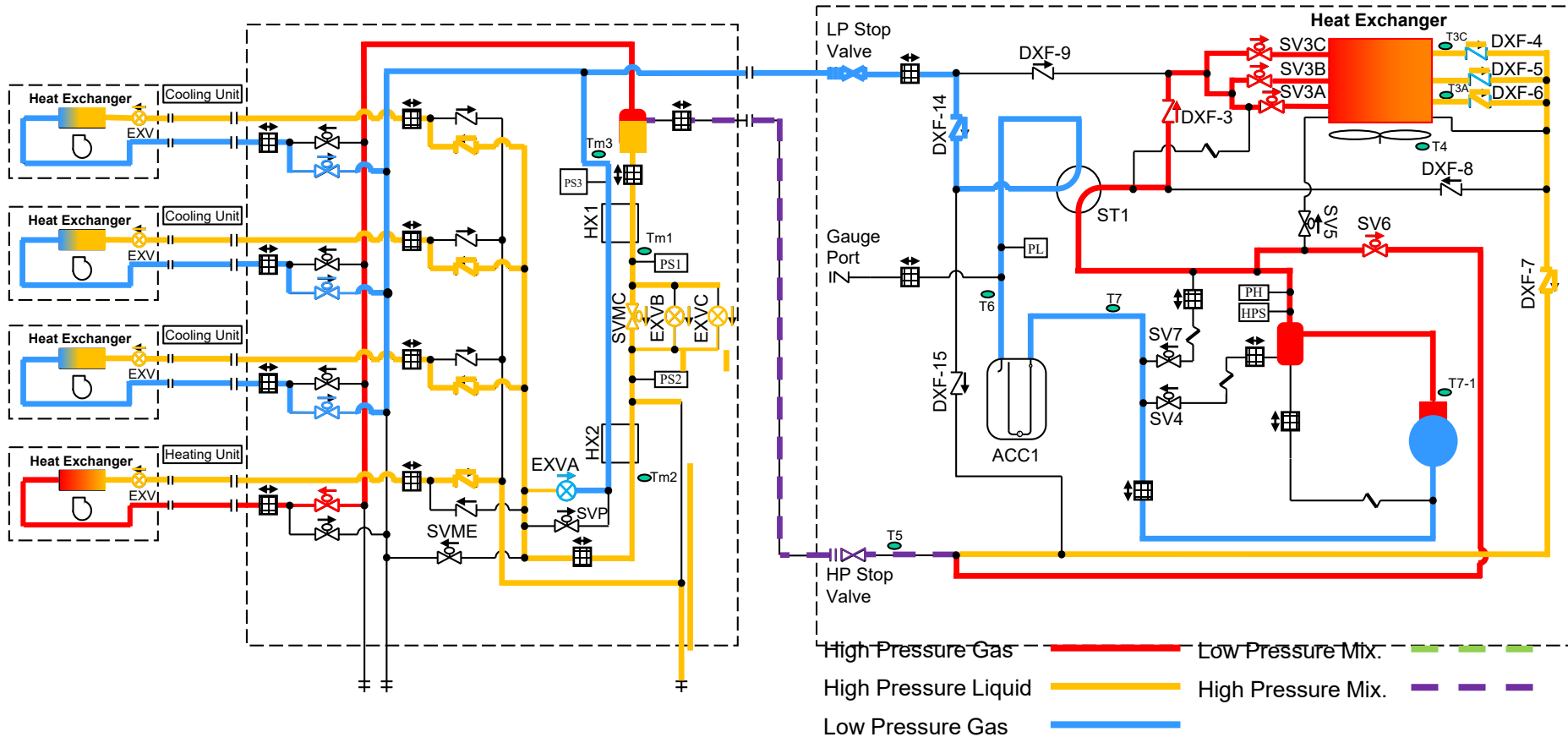
Cooling Only Mode



HEAT RECOVERY SYSTEM



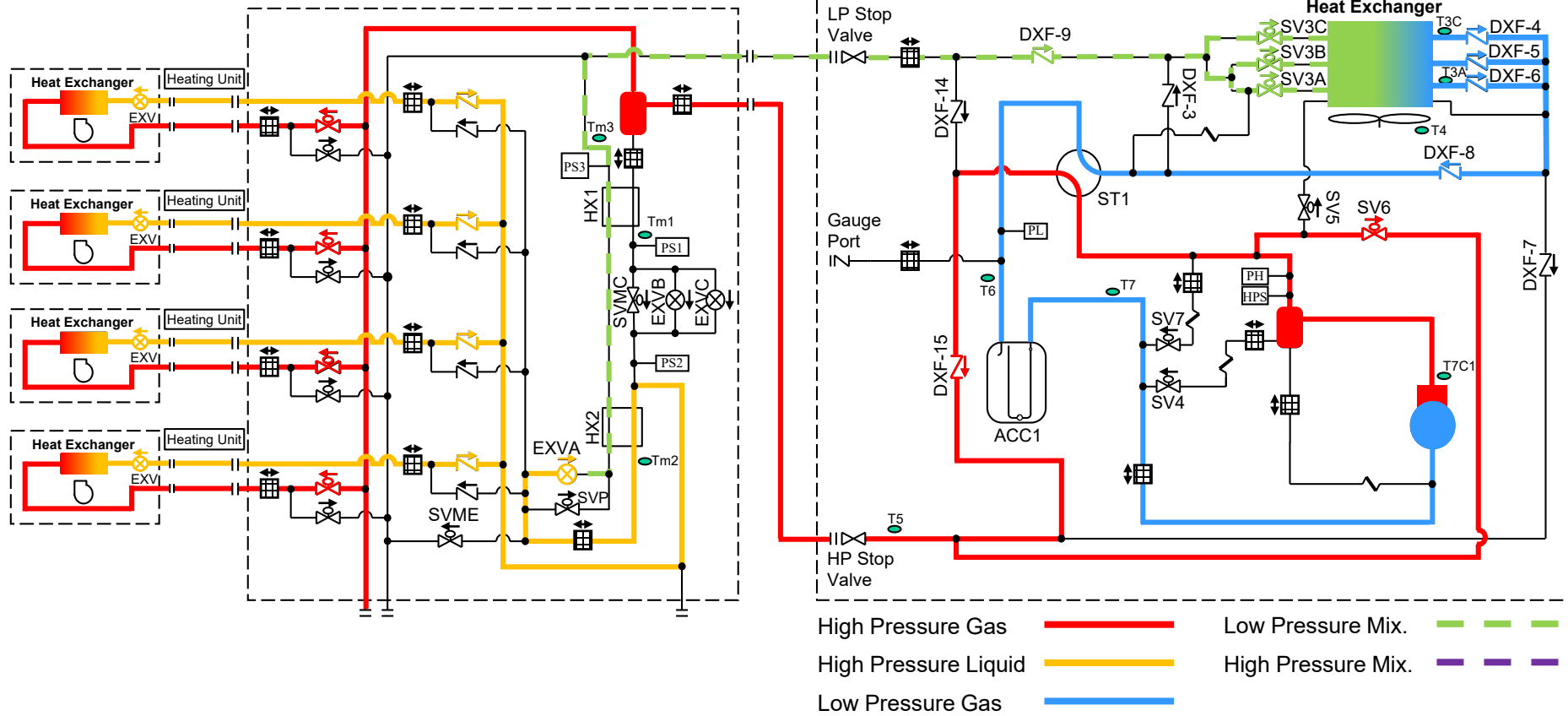
Cooling Main Mode



HEAT RECOVERY SYSTEM



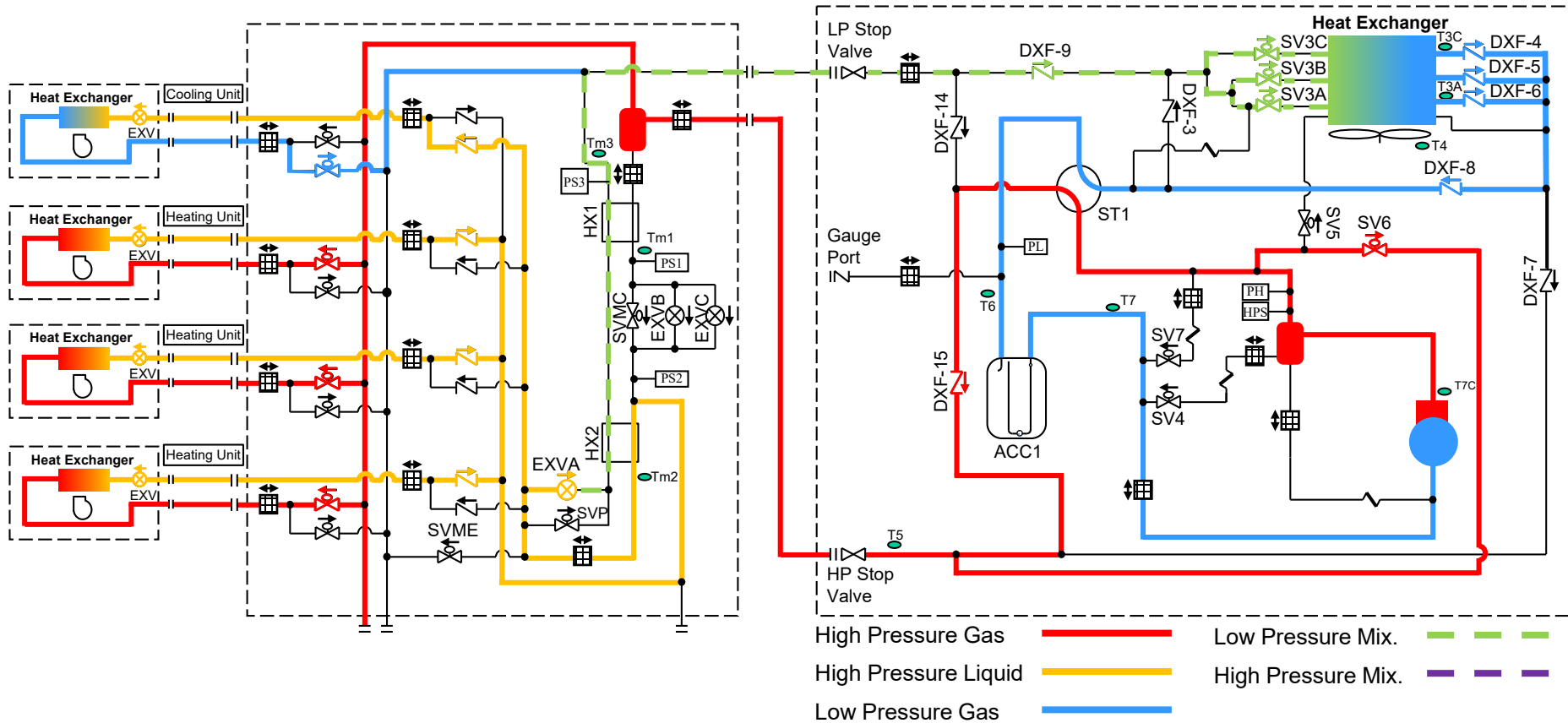
Heating Only Mode



HEAT RECOVERY SYSTEM

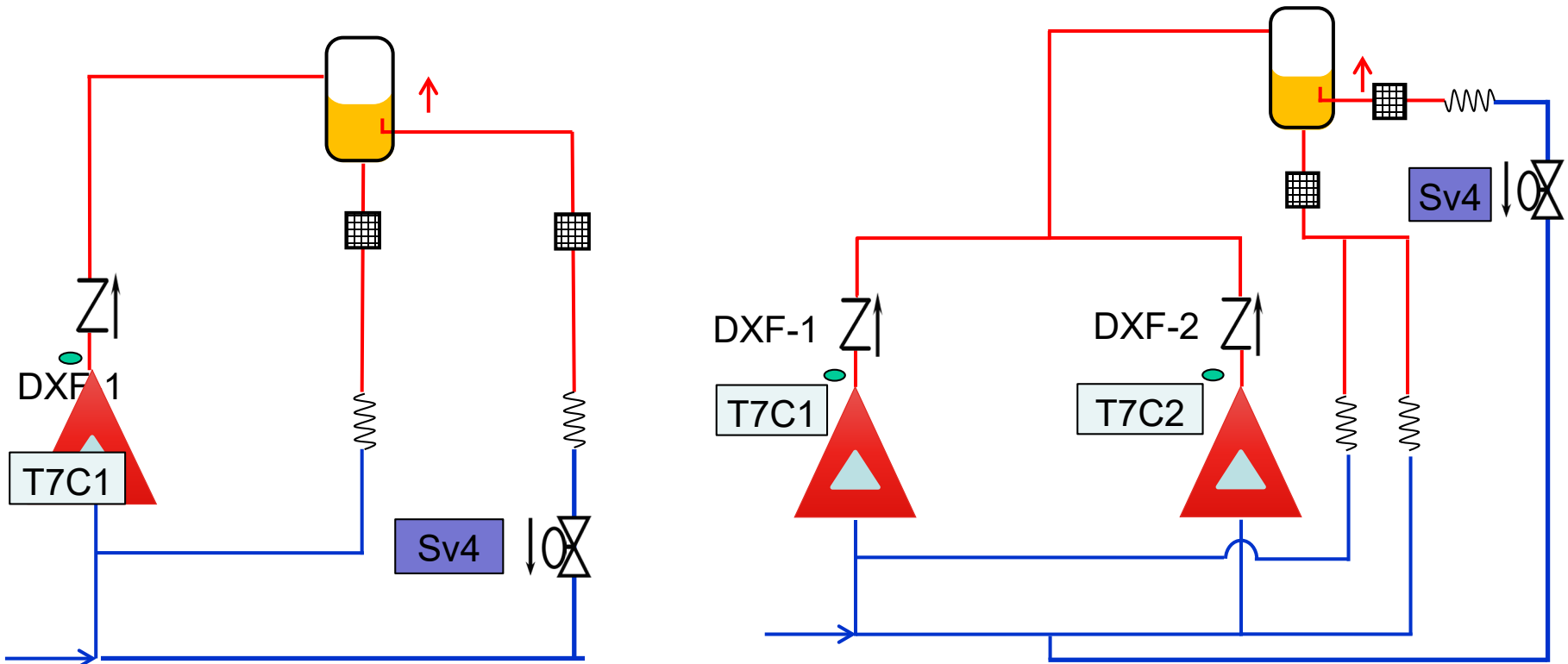


Heat Main Mode



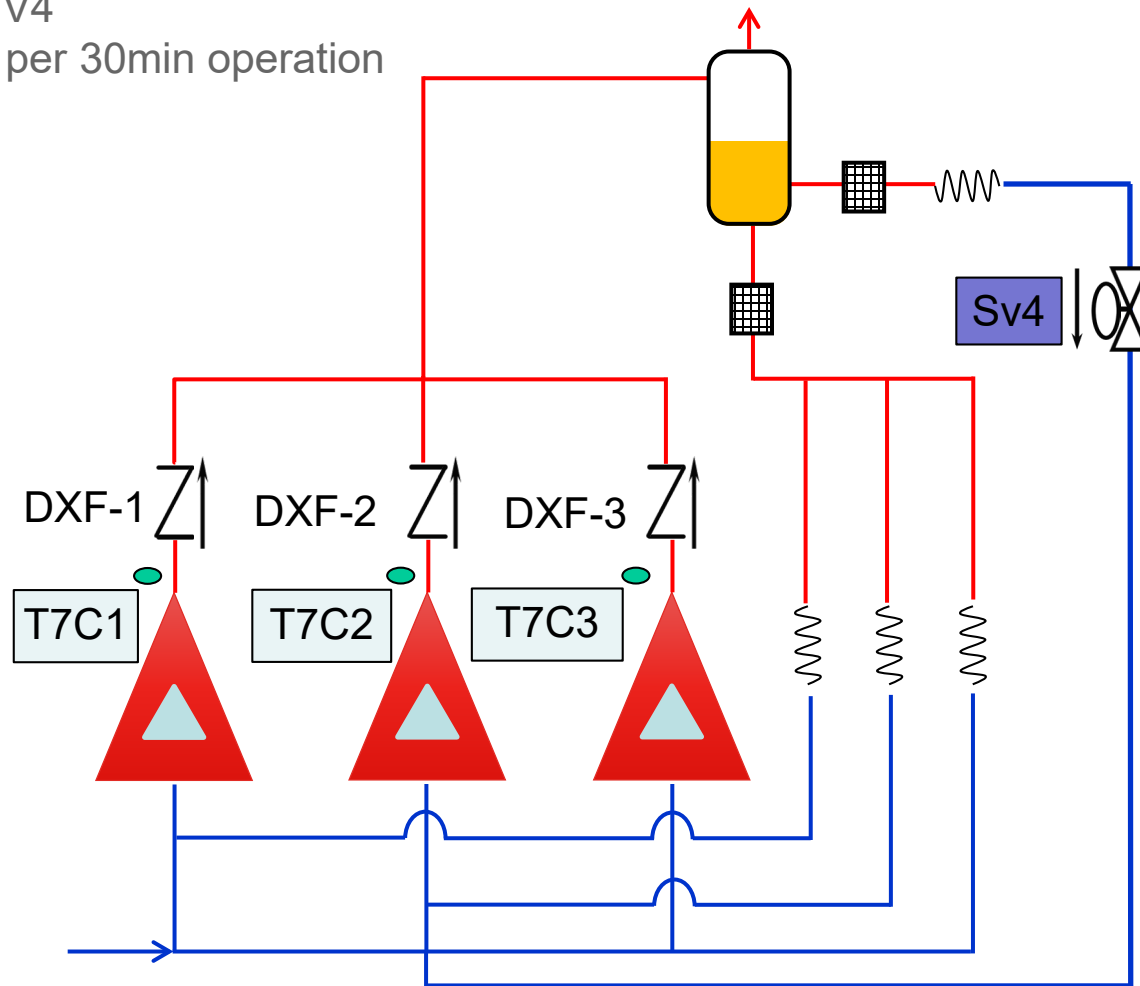
HEAT RECOVERY (6~20 TON)

- Constant oil return: Capillary
- Fast oil return: SV4
Open 1min per 30min operation



HEAT RECOVERY (20L, 22~28 TON)

- Constant oil return: Capillary
- Fast oil return: SV4
Open 1min per 30min operation



HOW DOES OIL RECOVERY INITIATE AND END?

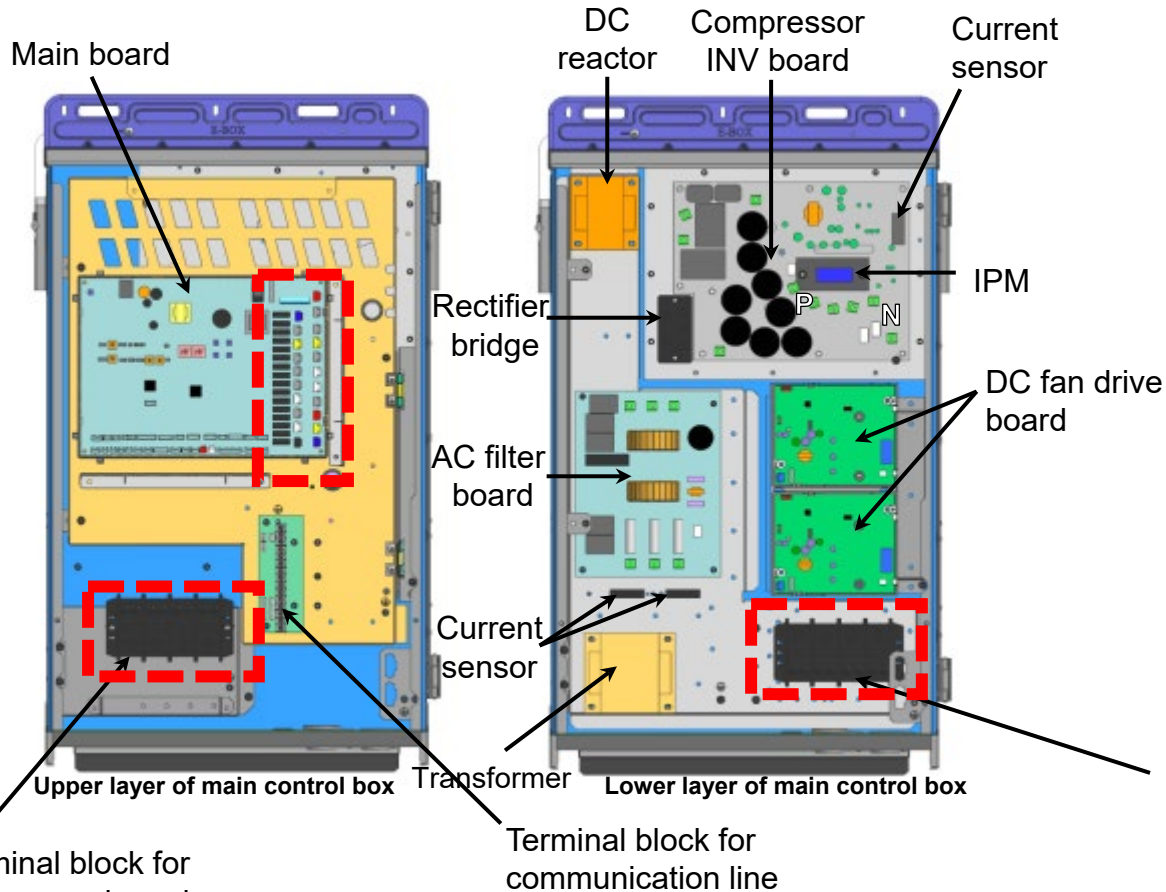
Initiating condition

- 1) PI 10 minutes and operating at normal mode
 - a. 120 minutes since the main power has been turned on.
 - b. 480 minutes after the latest oil recovery
(240 minutes if the latest one is unsuccessful)
 - c. Calculated oil discharge $\geq$ Target value
(Shortening a half once if the latest one is unsuccessful)
 - d. Lack of refrigerant in the system lasts for 5 minutes
- 2) Compulsive oil recovery set by hand

Ending condition

- 1) The discharge volume of the compressor $\geq$ target value for 4 minutes
- 2) 6 minutes limited, if it can't satisfy the condition above, then mark oil recovery unsuccessful

OUTDOOR UNIT CIRCUIT BOARD ARRANGEMENT (HR ONLY)



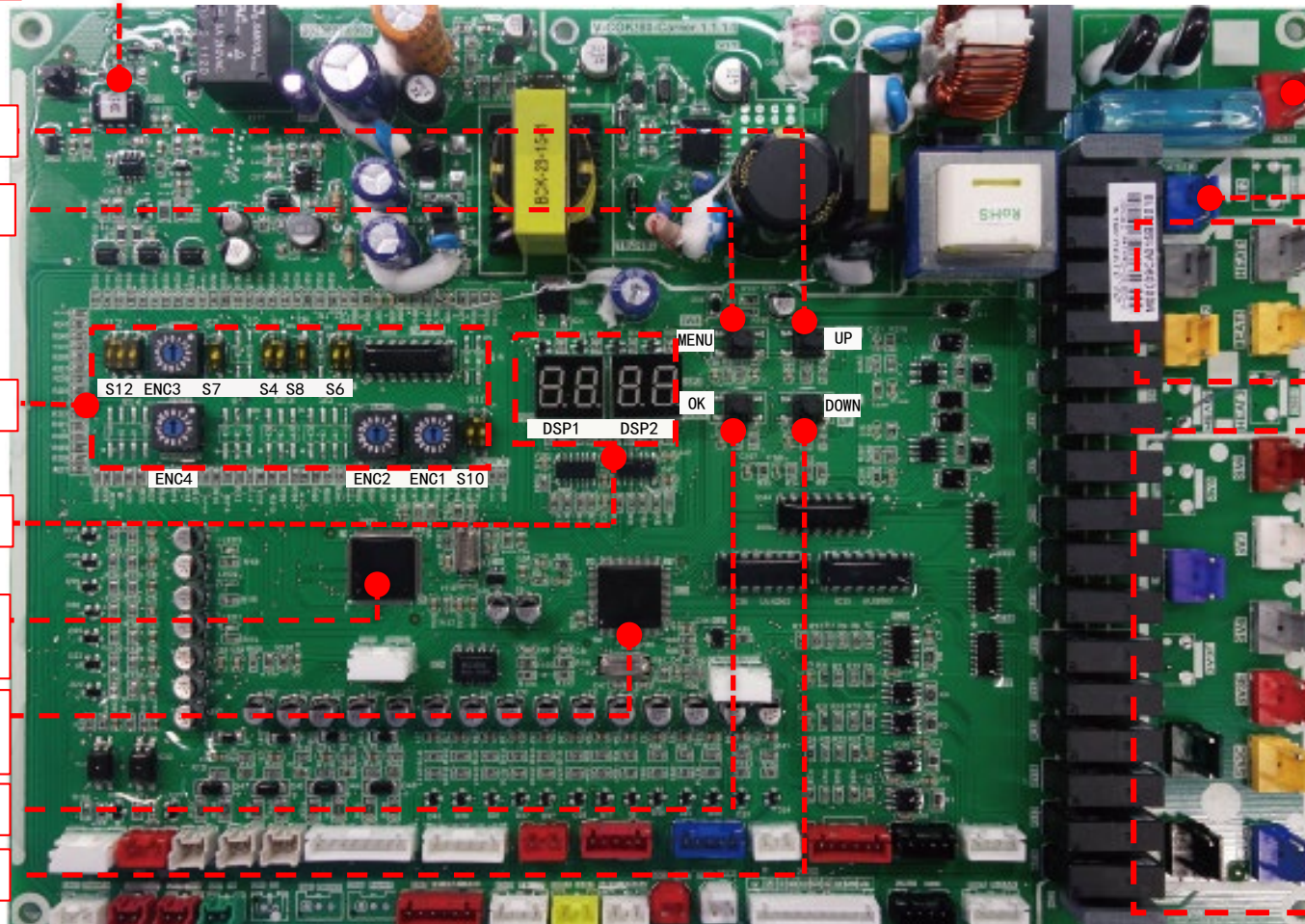
- Before inspecting the inside of the control box, disconnect all external power supplies for at least 10 minutes
- This control box contains high-voltage components

HR ODU MAIN CONTROL BOARD



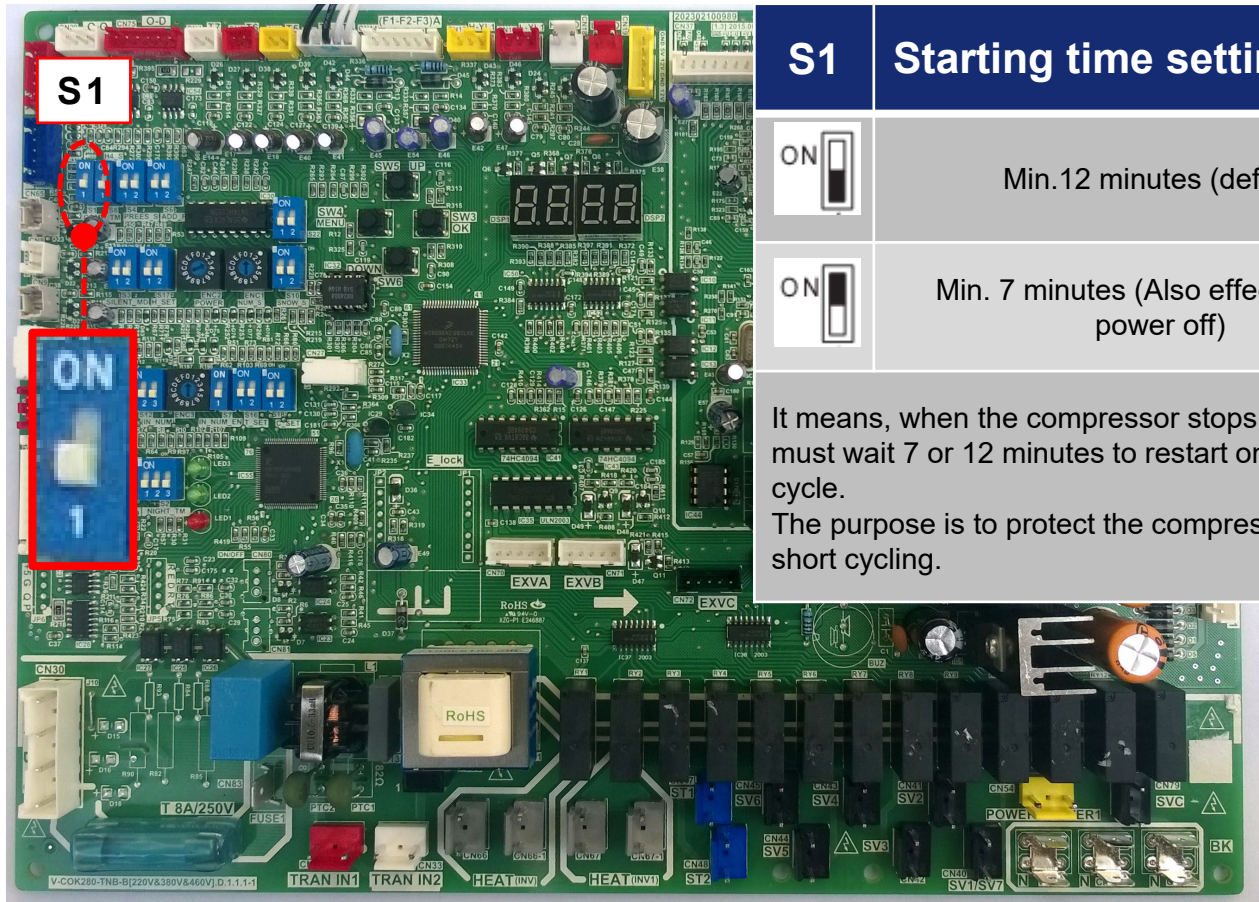
High voltage zone

- EEPROM
- SW5:UP
- SW4: MENU
- Dip Switch
- Display
- Communication chip
- Main Control Chip
- SW3:OK
- SW6: Down



- Power input port
- Output port for 4-Way valve
- Output port for crankcase heater of compressor
- Output port for solenoid valve

RESTART TIME HEAT PUMP ONLY SELECTION



S1

Starting time setting



Min. 12 minutes (default)



Min. 7 minutes (Also effective after power off)

It means, when the compressor stops, the unit must wait 7 or 12 minutes to restart on power cycle.

The purpose is to protect the compressor from short cycling.

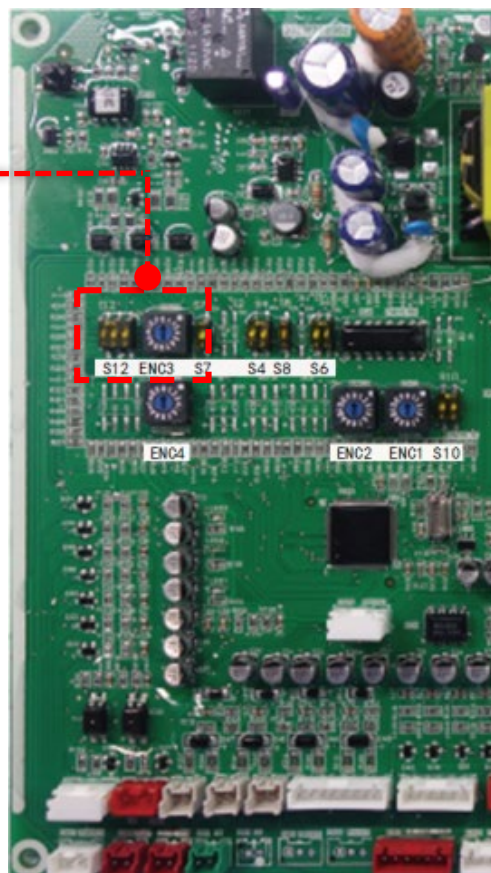
HR ODU MAIN CONTROL BOARD



BLACK IS DIPSWITCH POSITION.
EXAMPLE S12 IS ALL IN DOWN/OFF POSITION



S12+ENC3

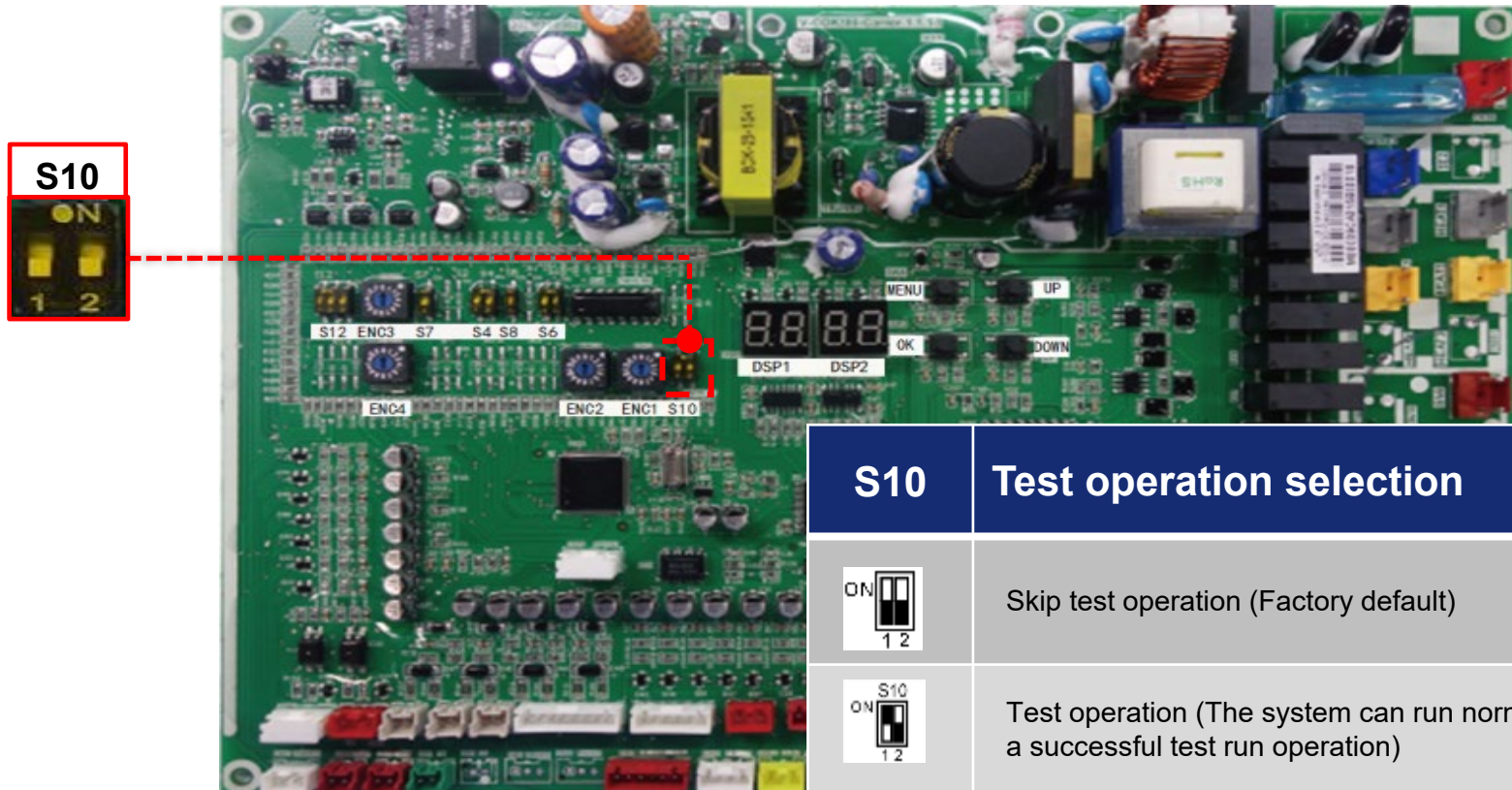


S12	ENC3	Indoor unit quantity setting
ON		Position 0 to F on ENC3 means Indoor unit quantity is between 0 and 15
ON		Position 1 to F on ENC3 means Indoor unit quantity is between 16 and 31
ON		Position 1 to F on ENC3 means Indoor unit quantity is between 32 and 47
ON		Position 1 to F on ENC3 means Indoor unit quantity is between 48 and 63

The IDU QYT setting S12 and ENC3 have to equal the actual QTY, the max. is **64** units in a system, otherwise system will error **H7**



HR ODU MAIN CONTROL BOARD



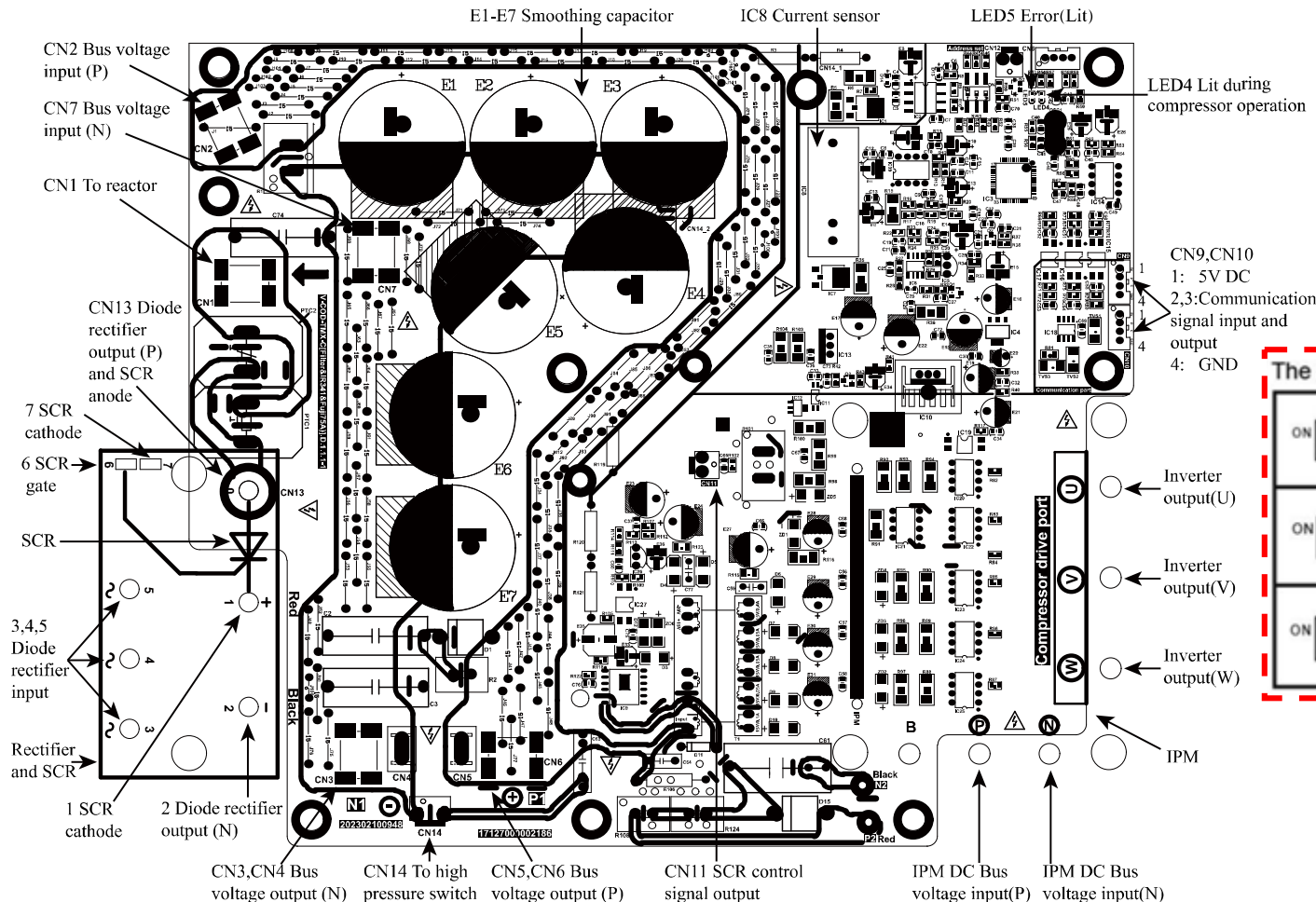
S10	Test operation selection
	Skip test operation (Factory default)
	Test operation (The system can run normally building on a successful test run operation)

- IDUs with addresses will not be reassigned.
- Each chip will be assigned two addresses.

Sub 2 MDC: Start at 64

-
- The diagram illustrates the system architecture, showing two main processing units. Each unit contains a central DSP (Digital Signal Processor) block, labeled DSP1 and DSP2. The DSPs are connected to various peripheral components, including transmitters (TRANS IN, TRANS OUT), receivers (TRANS IN, TRANS OUT), and memory modules (M-O). The units are connected to a central bus system. Red arrows indicate the data flow from the DSPs to the memory modules. The diagram is divided into two main sections, each representing a different chip configuration.
- Left Section (Chips 1-8):**
- Chip No.1:** 0/1# addr
 - Chip No.2:** 2/3# addr
 - Chip No.3:** 4/5# addr
 - Chip No.4:** 6/7# addr
 - Chip No.5:** 8/9# addr
 - Chip No.6:** 10/11# addr
 - Chip No.7:** 12/13# addr
 - Chip No.8:** 14/15# addr
- Right Section (Chips 9-10):**
- Chip No.9:** 16/17# addr
 - Chip No.10:** 18/19# addr

HR ODU COMPRESSOR INV BOARD (230V)

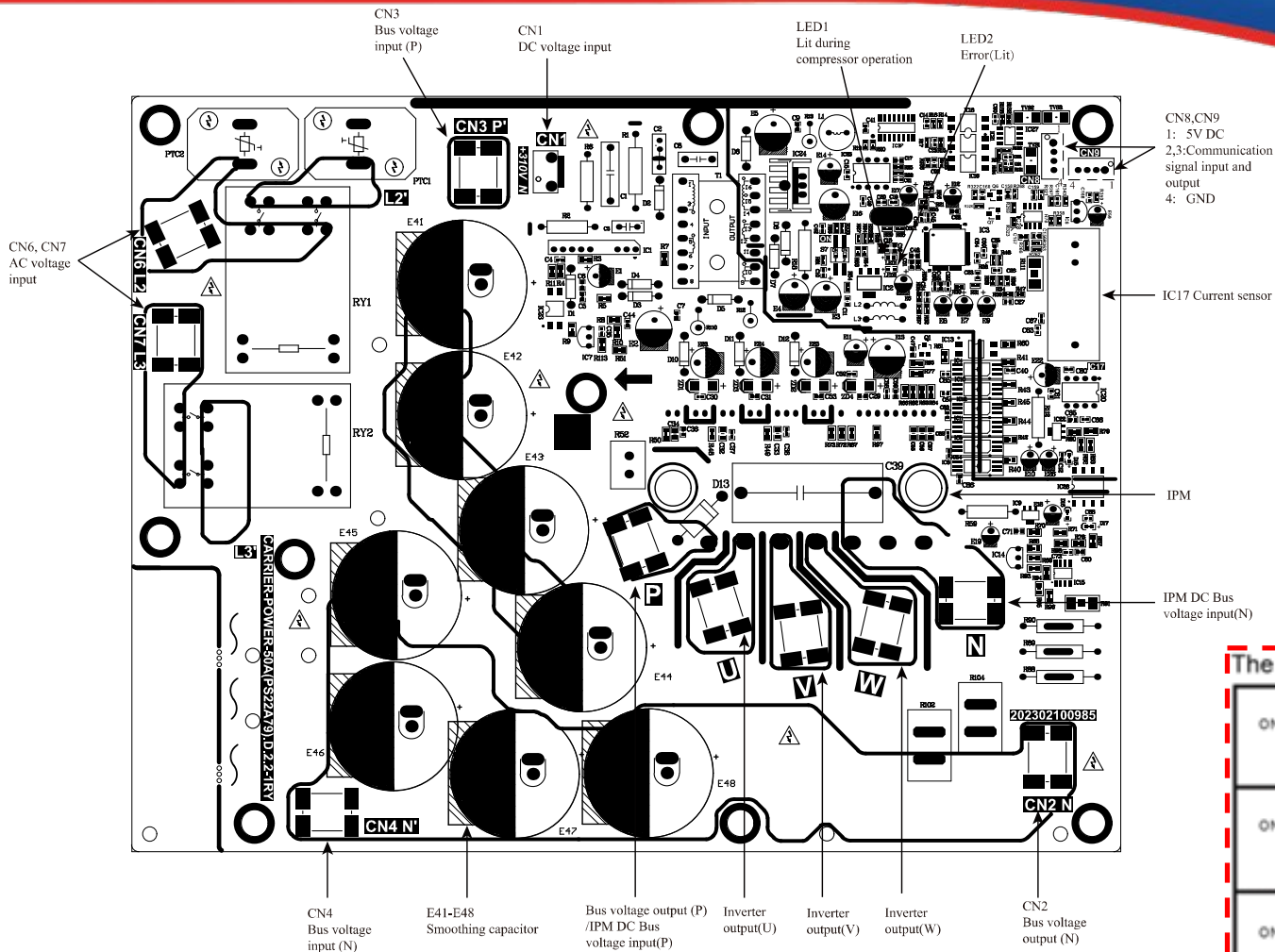


The address of compressor inverter board

ON SW1 123	The address of compressor inverter board is 0.
ON SW1 123	The address of compressor inverter board is 1.
ON SW1 123	The address of compressor inverter board is 2.

38VMA***RDS(L)5-1 (208/230V-3Ph-60Hz)

ODU COMPRESSOR INV BOARD (460V)



The address of compressor inverter board

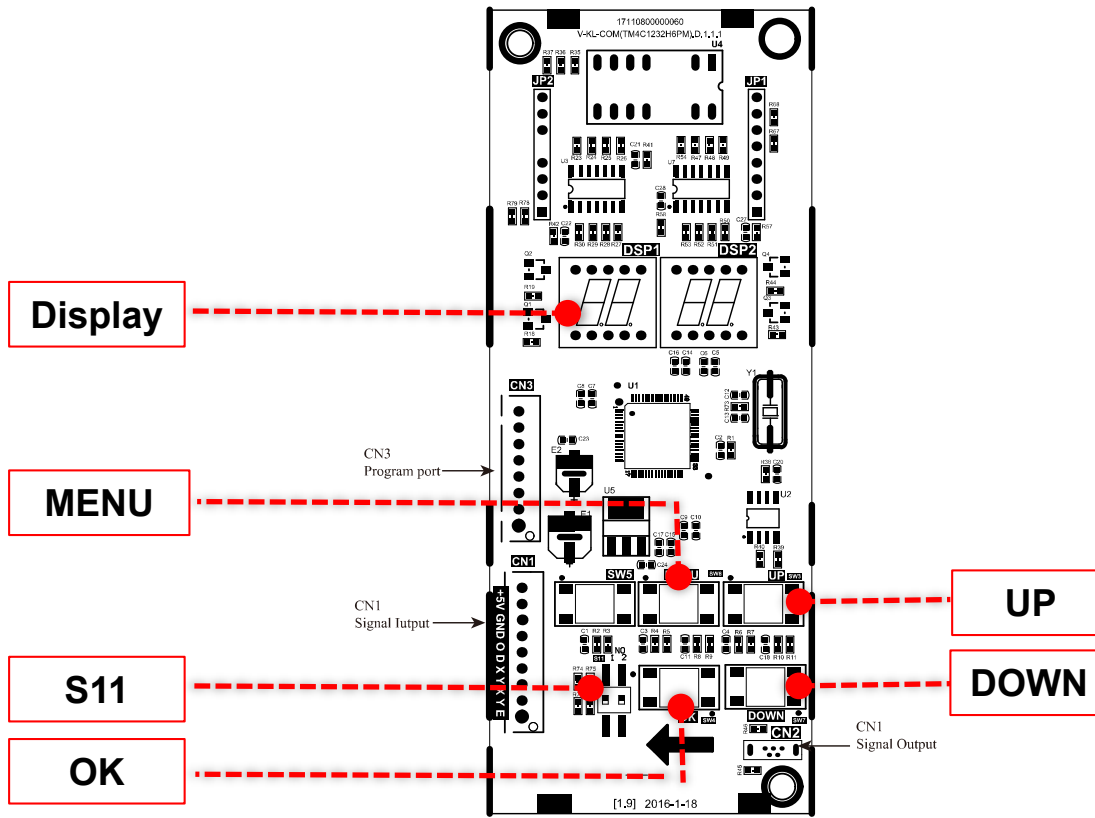
ON S7 1 2	The address of compressor inverter board is 0.
ON S7 1 2	The address of compressor inverter board is 1.
ON S7 1 2	The address of compressor inverter board is 2.

38VMA***RDS(L)6-1 (460V-3Ph-60Hz)

SPOT CHECK BOARD



- Spot Check function and parameter settings are identical with Main Control Board
- Snow-blowing function by SW5 and S11



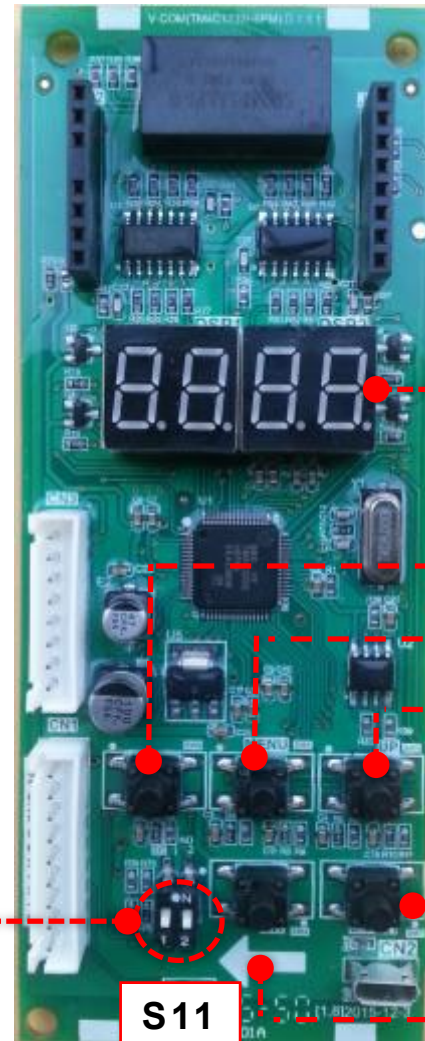
S11	Anti-snow time set
	15 minutes
	30 minutes



SPOT CHECK BOARD



S11	Anti-snow time set
	15 minutes
	30 minutes



Display

SW5: Snow

SW6: Menu button

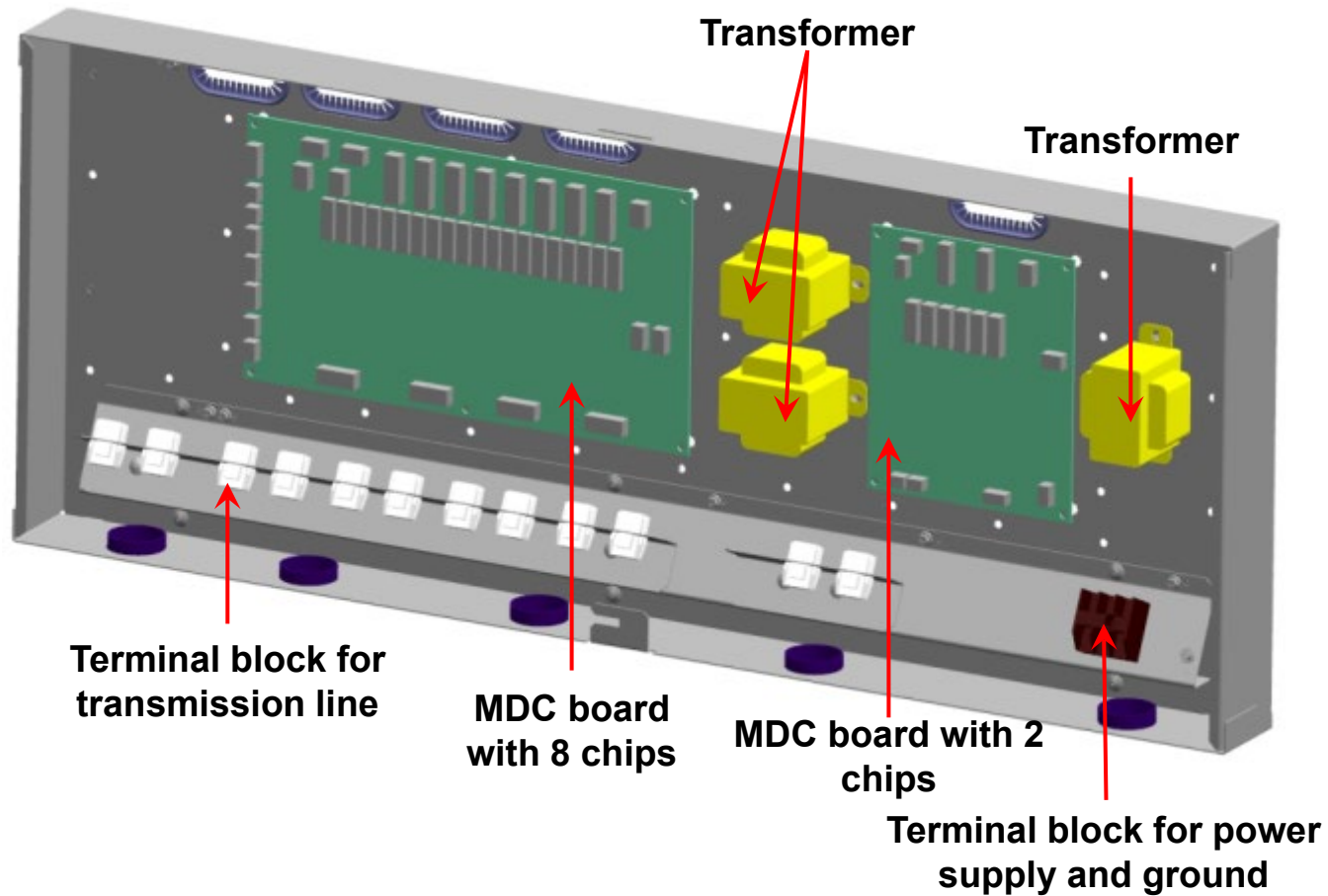
SW3: UP

SW7: down

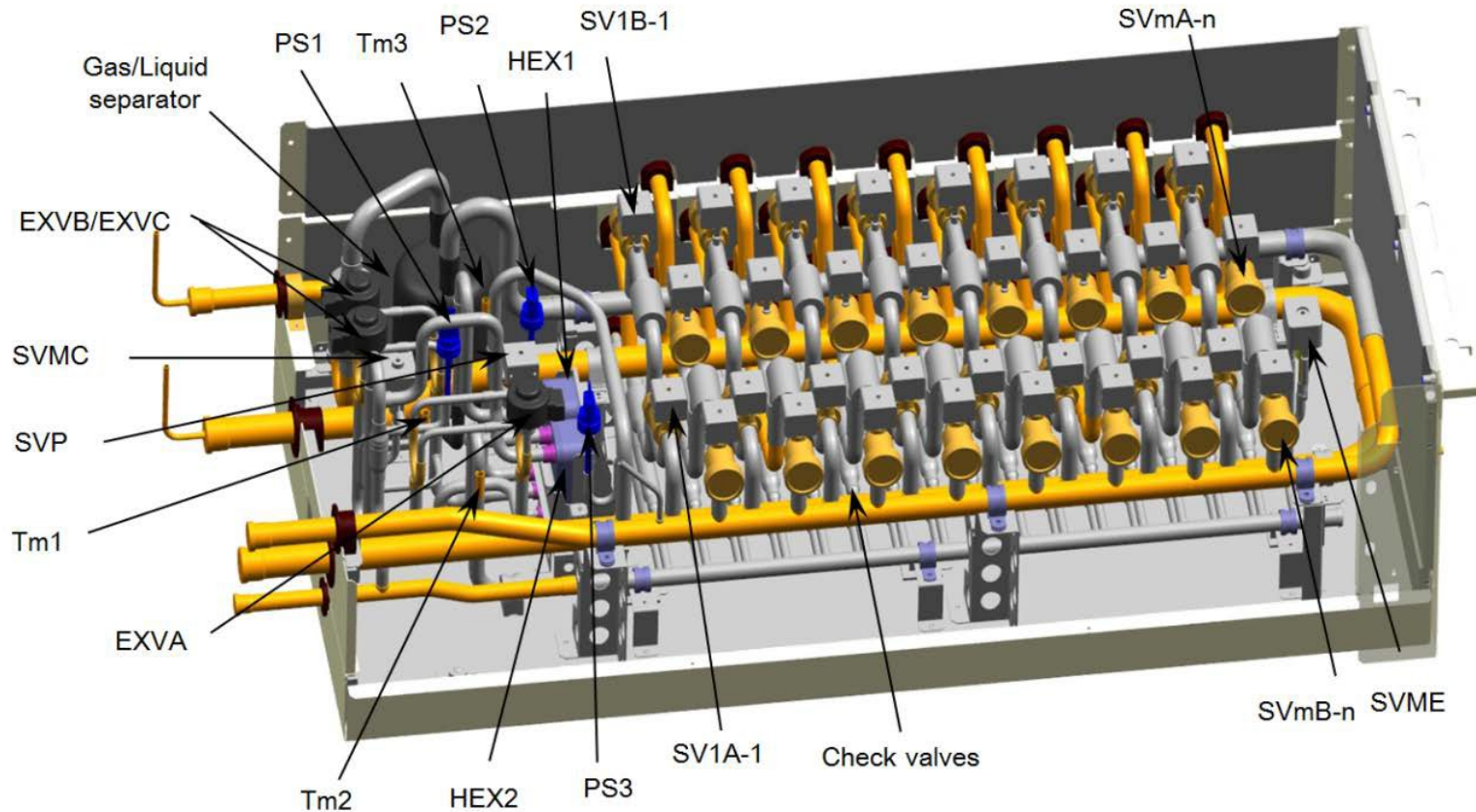
SW4: Confirm

S11

MDC UNIT CIRCUIT BOARD



MDC ARRANGEMENT



MDC UNIT MAIN CONTROL BOARD



MDC control board with 8 chips for 40VMD006, 008, 010, 016M(S)—3

Display

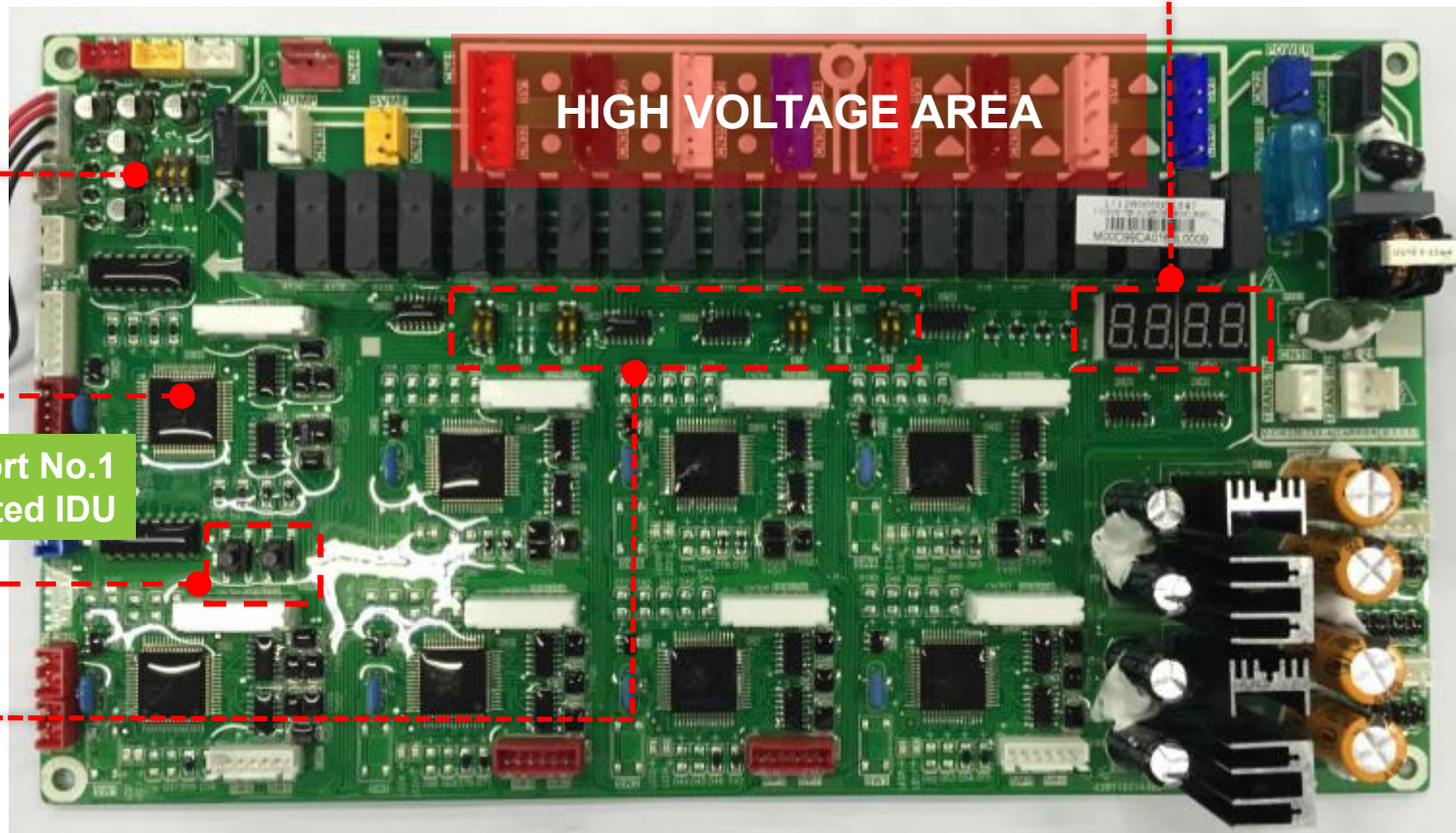
S8

Main Chip

Make sure that port No.1
has connected IDU

SW8/SW9

S1/S3/S5/S7





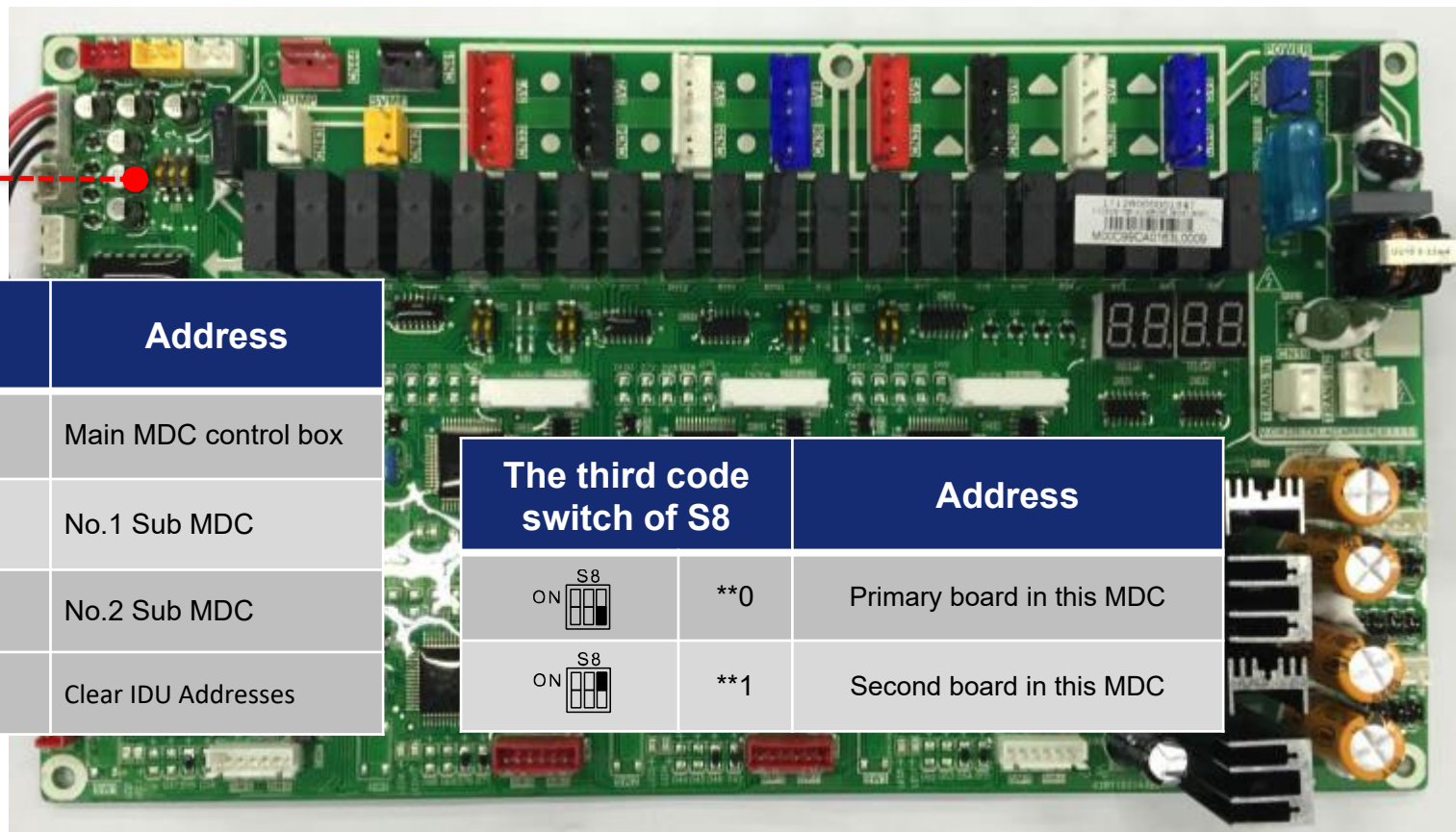
MDC UNIT MAIN CONTROL BOARD



MDC control board with 8 chips for 40VMD006, 008, 010, 016M(S)—3

S8

Address



The first two code
switch of S8

Address



00*

Main MDC control box



01*

No.1 Sub MDC



10*

No.2 Sub MDC

111

Clear IDU Addresses

The third code
switch of S8

Address



**0

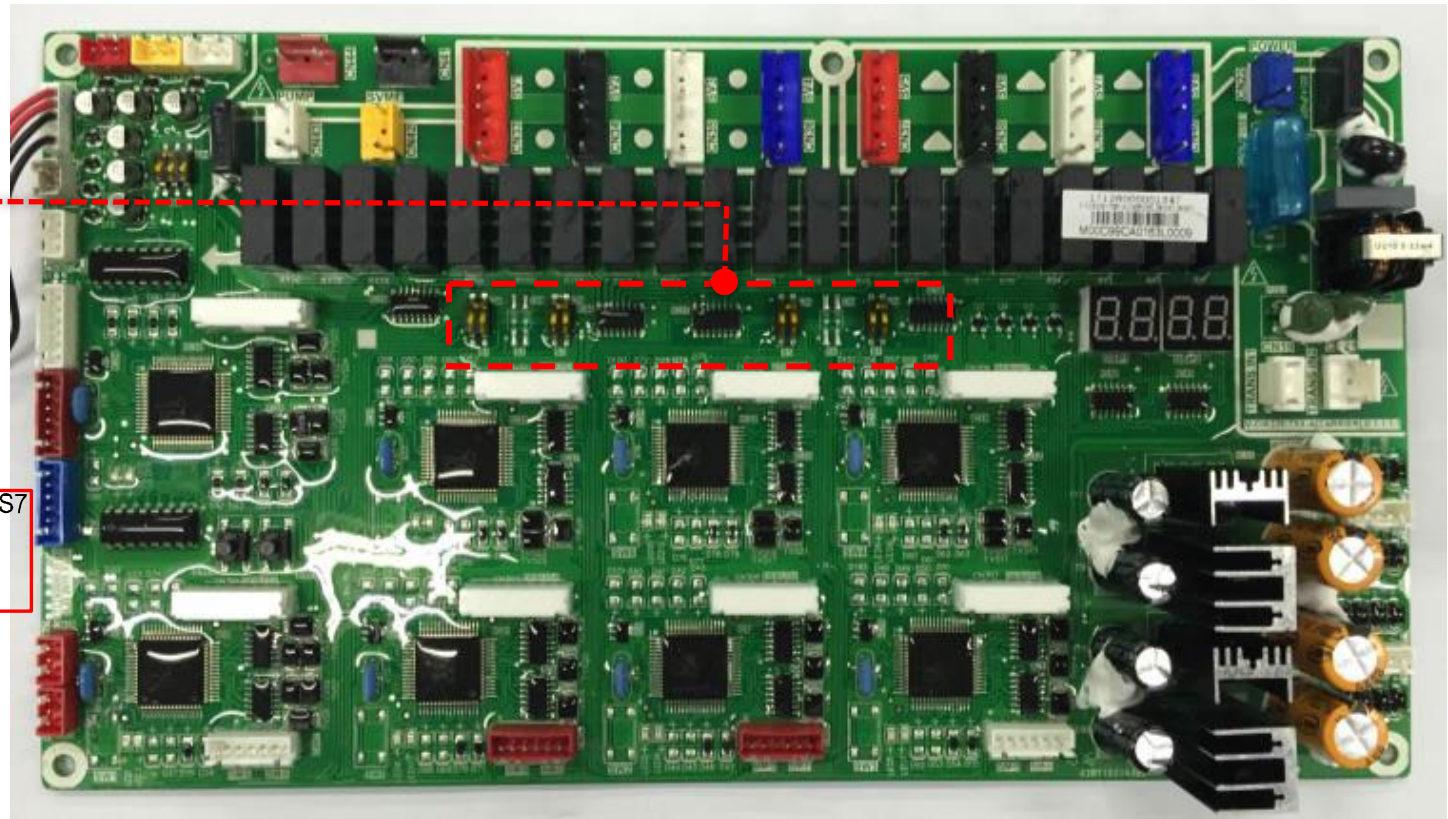
Primary board in this MDC



**1

Second board in this MDC

MDC UNIT MAIN CONTROL BOARD



S1/S3/S5/S7

Dip switch if two merged ports are used for 72K/96K IDU.

S1/S3/S5/S7

ON



(00 is default)

S1/S3/S5/S7

ON



MDC control board with 8 chips for 40VMD006, 008, 010, 016M(S)—3

MDC UNIT MAIN CONTROL BOARD



SW8 SW9



Spot check instructions:

Press **SW8 or SW9** button
First it will display the check number, 1sec later it will display check value

For example:

--05 240

Means the opening of EXVB is 240Pulse

Check	Display	
	The first two	The last two
Default	Amount of online micro processor	Amount of online IDU
--01	Amount of opening micro processor	Amount of opening IDU
--02	Amount of cooling IDU	Amount of heating IDU
--03	Operation mode of ODU	
--04	Opening of EXVA	
--05	Opening of EXVB	
--06	Opening of EXVC	
--07	Tm1	
--08	Tm2	
--09	Tm3	
--10	High pressure(PS1) Actual value=Display value *0.1MPa	
--11	Medium pressure (PS2) Actual value=Display value *0.1MPa	
--12	Low pressure (PS3) Actual value=Display value *0.01MPa	
--13	Ver. Of software	

MDC UNIT MAIN CONTROL BOARD* (AUXILIARY ONE)

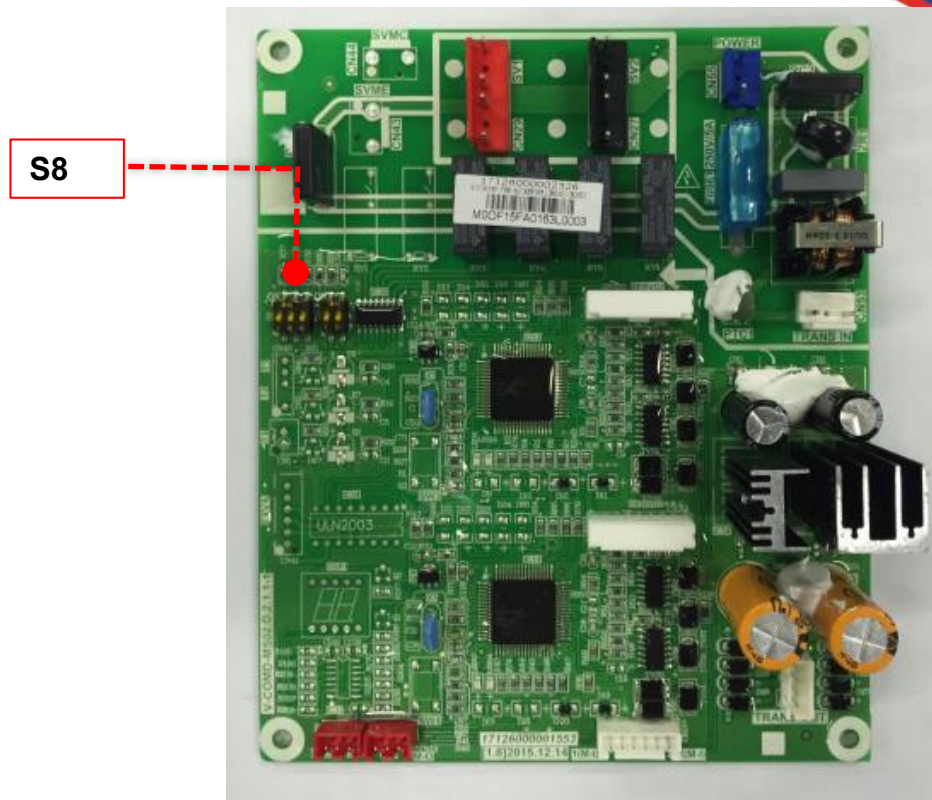


The first two code switch of S8		Address
ON 	00*	Main MDC control box
ON 	01*	No.1 Sub MDC
ON 	10*	No.2 Sub MDC

The third code switch of S8		MDC board
ON 	**0	Primary board in this MDC
ON 	**1	Second board in this MDC

ATTENTION:

This dip switch has been factory set. Don't change anything.



MDC control board with 2 chips for 40VMD008M(S)--3

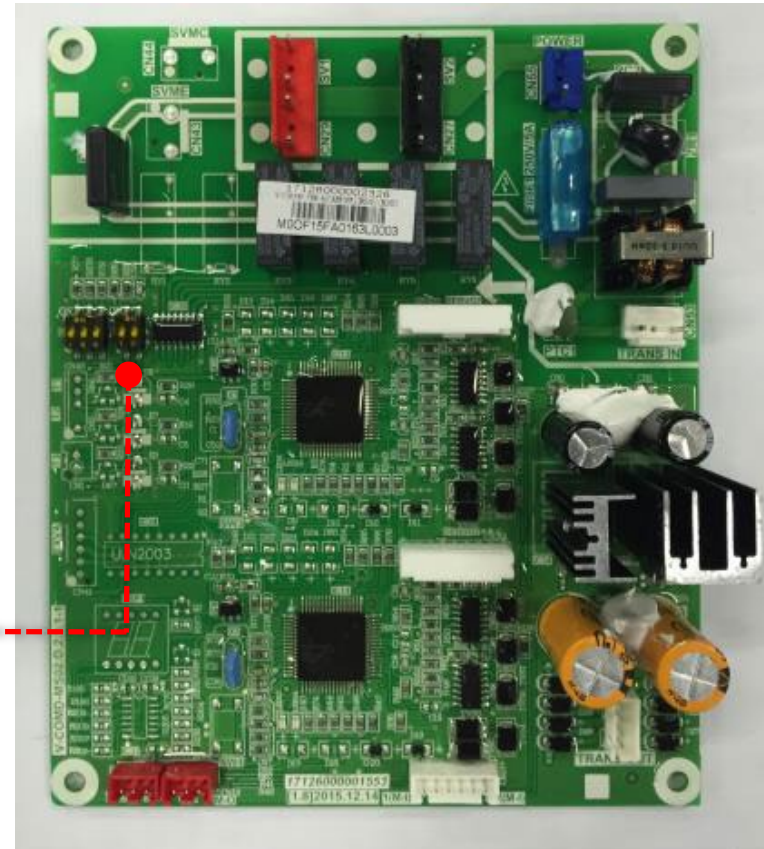
MDC UNIT MAIN CONTROL BOARD* (AUXILIARY ONE)



MDC control board with 2 chips for 40VMD008M(S)—3

Dip S3 from 00 to 11 if ports 9 & 10
are merged to connect 72K/96K IDU.

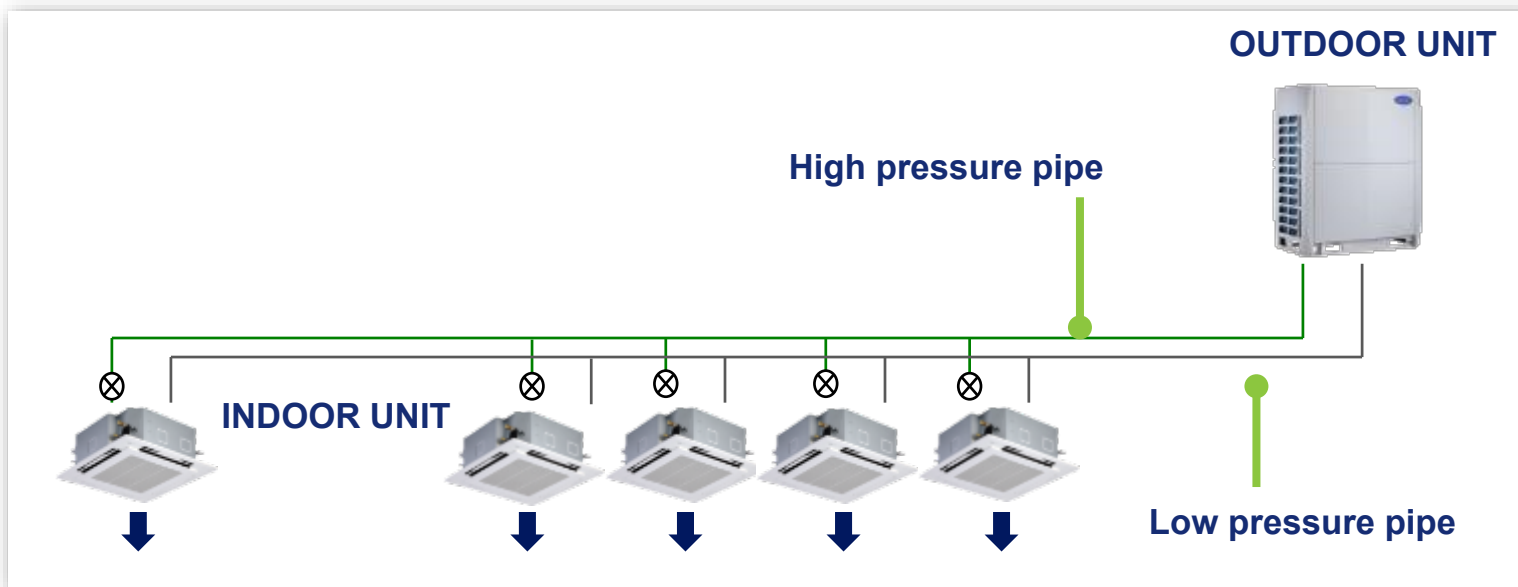
S3



HEAT PUMP SYSTEM



For Heat Pump ONLY



Each Indoor Unit can control the following:

- On/Off
- Set Point
- Air Volume
- Louver Position

Cooling: Expansion at Indoor Unit

Heating: Expansion at Outdoor Unit

HEAT PUMP SYSTEM

Abbreviations definition

T1: Room temperature

T2A: Temperature of evaporator inlet

T2B: Temperature of evaporator outlet

T2 average: Mean value of T2B or T2A

T3: Temperature of condenser outlet

T4: Ambient temperature

T5: Liquid Temperature

T6: Temperature of PHX outlet

T7: Return temperature

PT: Discharge temperature

PC: Discharge pressure

ST1: 4-way valve

EVM1-A/B: Electric expansion valve

EVM2: Electric expansion valve

SV4: Solenoid valve

SV7: Solenoid valve

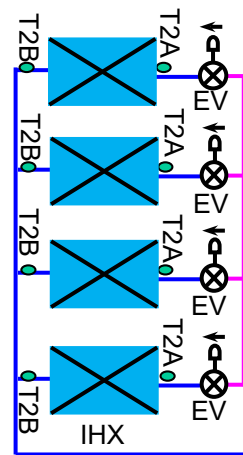
 : Cut off valve

 : Filter

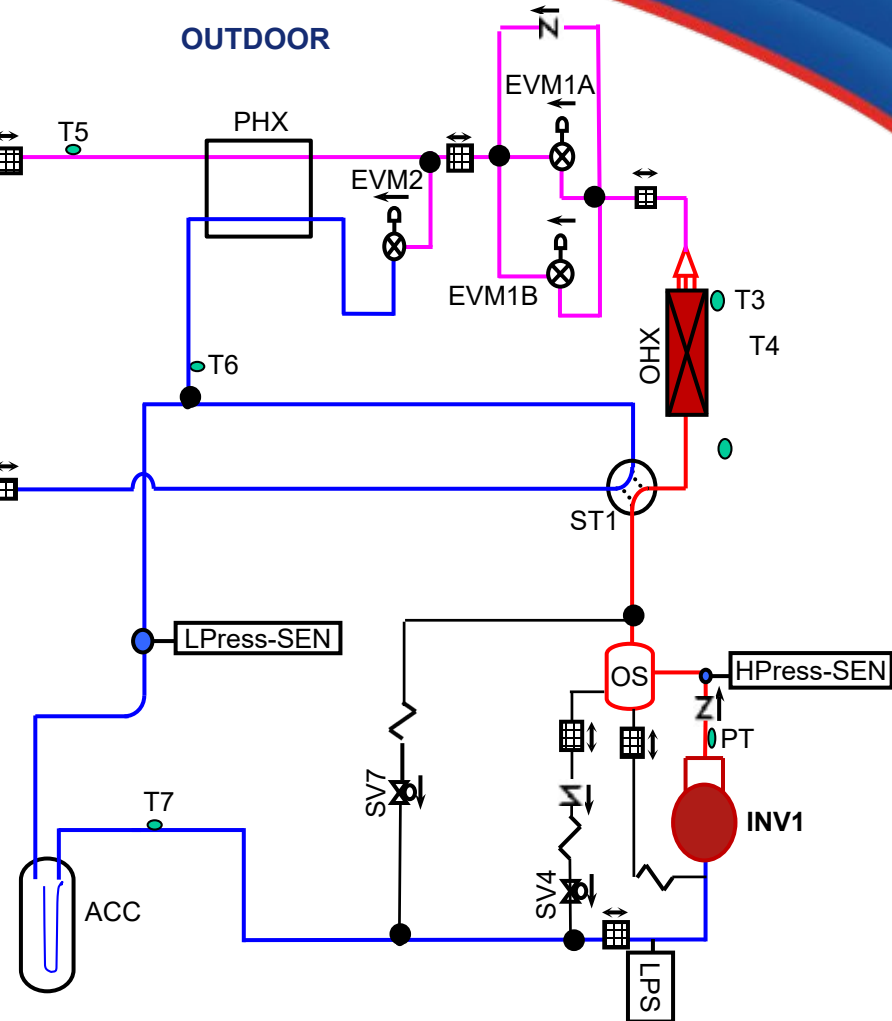
 : One way valve

 : Throttle pipe

INDOOR

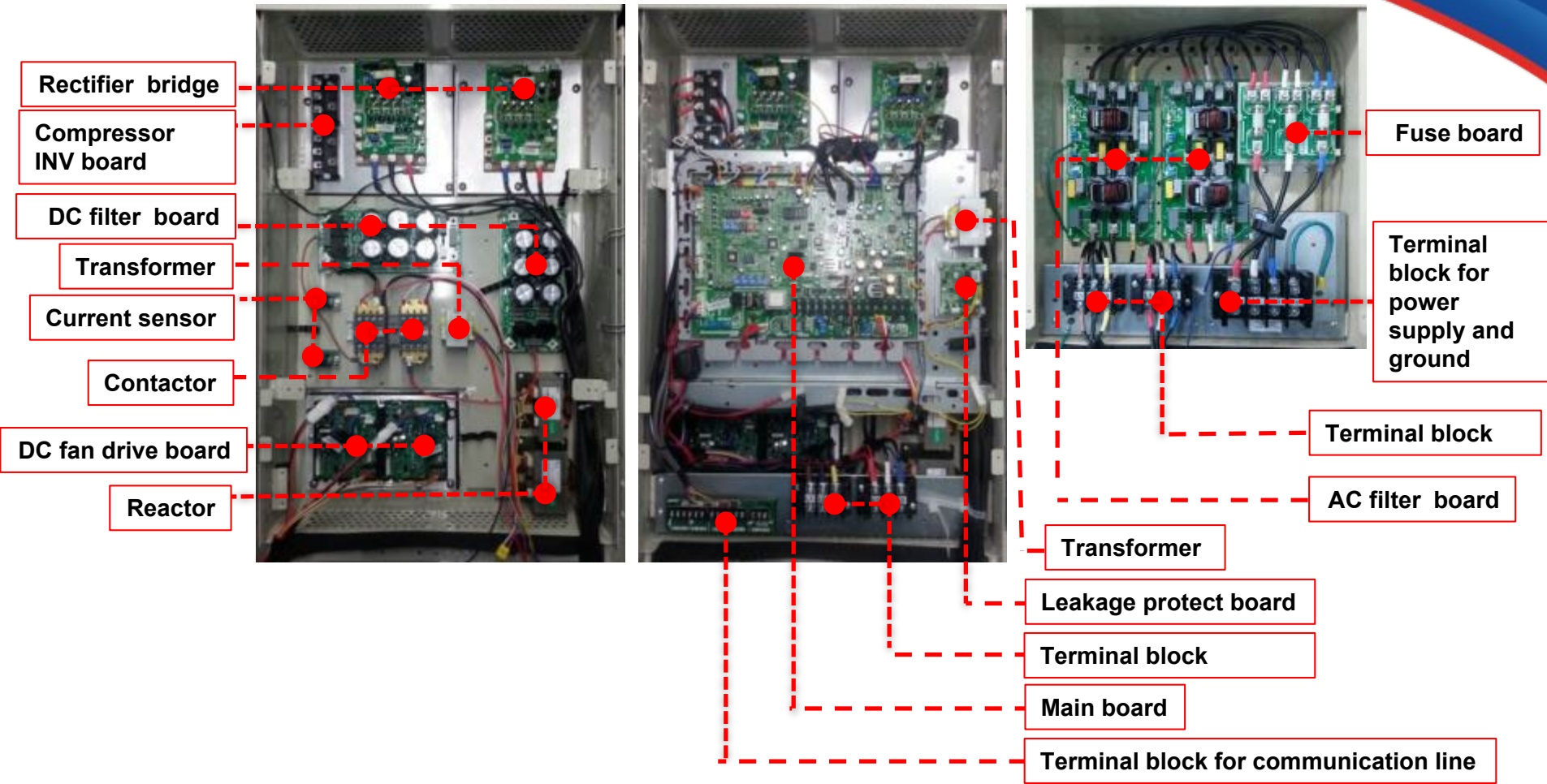


OUTDOOR



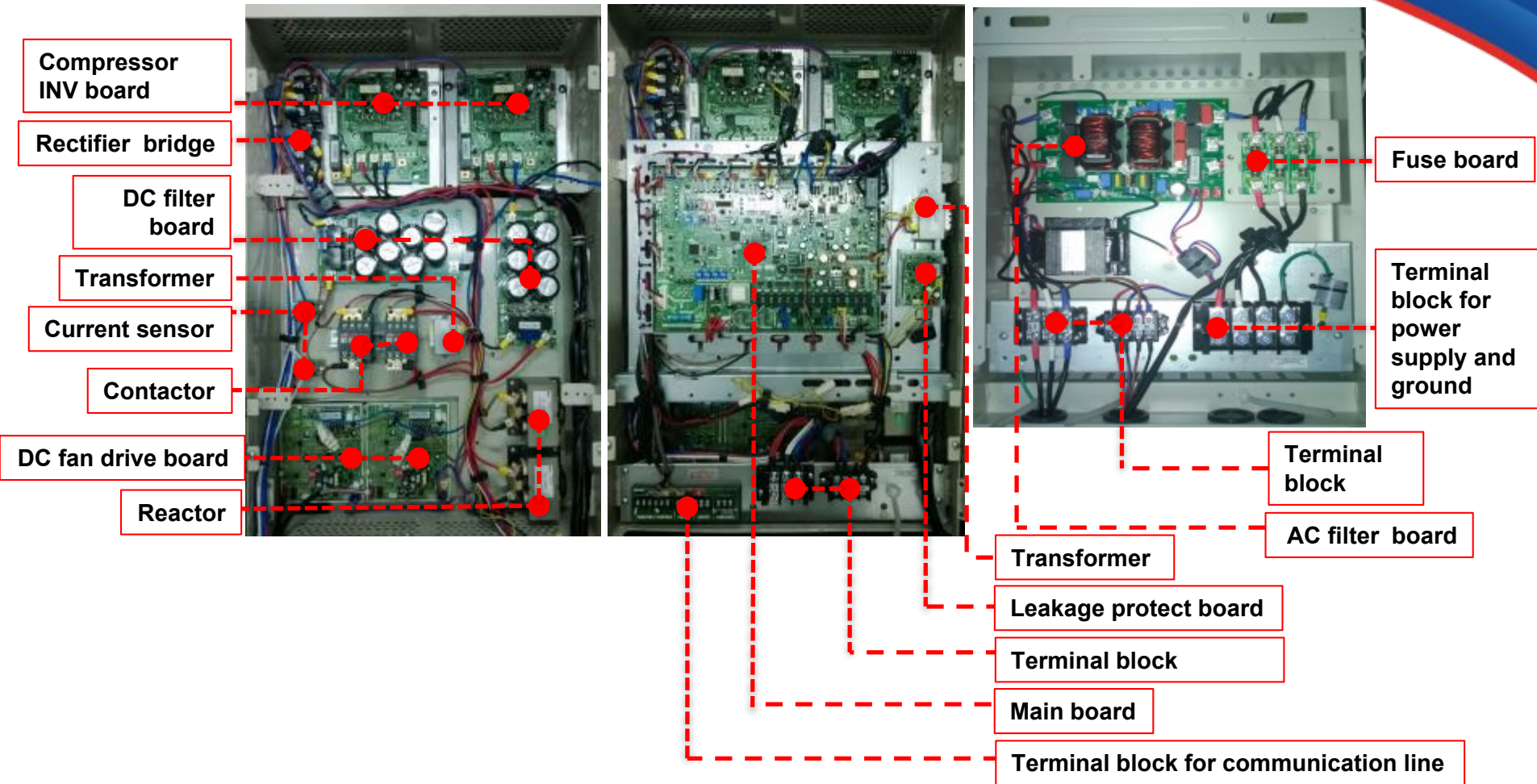
Cooling mode

HP OUTDOOR UNIT CIRCUIT BOARD ARRANGEMENT



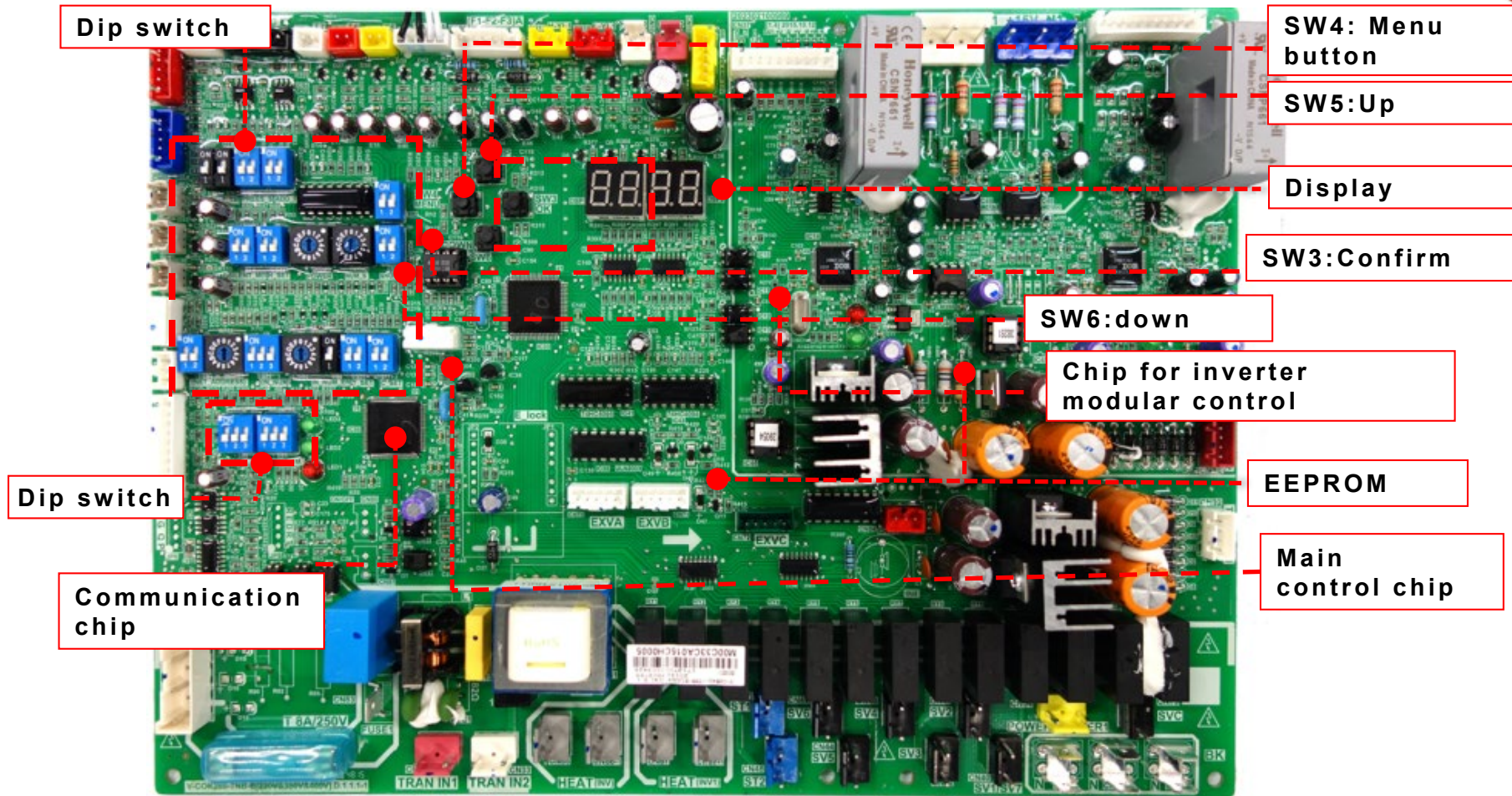
38VMA144HDS5-1 (208/230V-3Ph-60Hz)

HP OUTDOOR UNIT CIRCUIT BOARD ARRANGEMENT

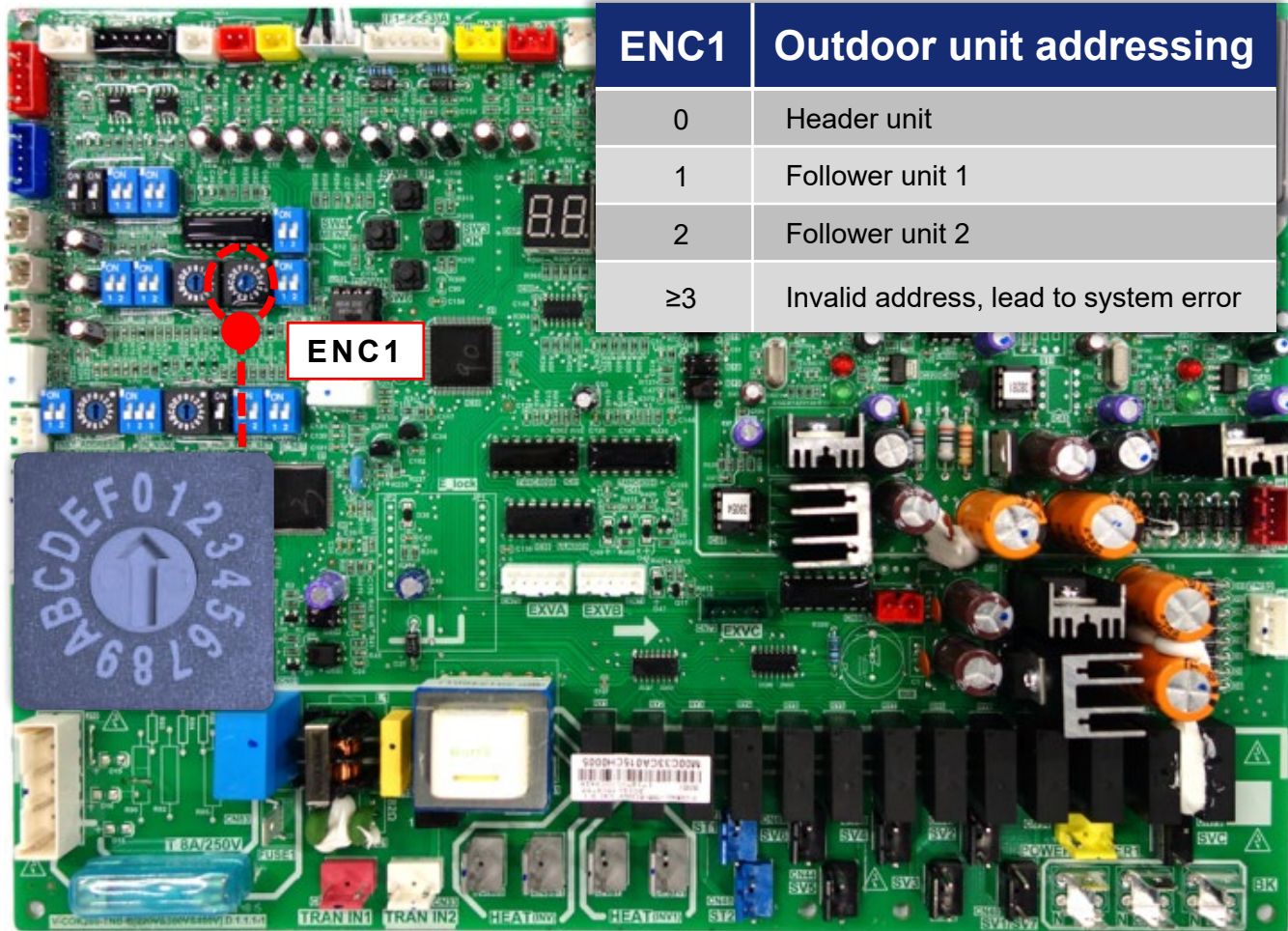


38VMA144HDS6-1 (460V-3Ph-60Hz)

HP OUTDOOR UNIT MAIN CONTROL BOARD

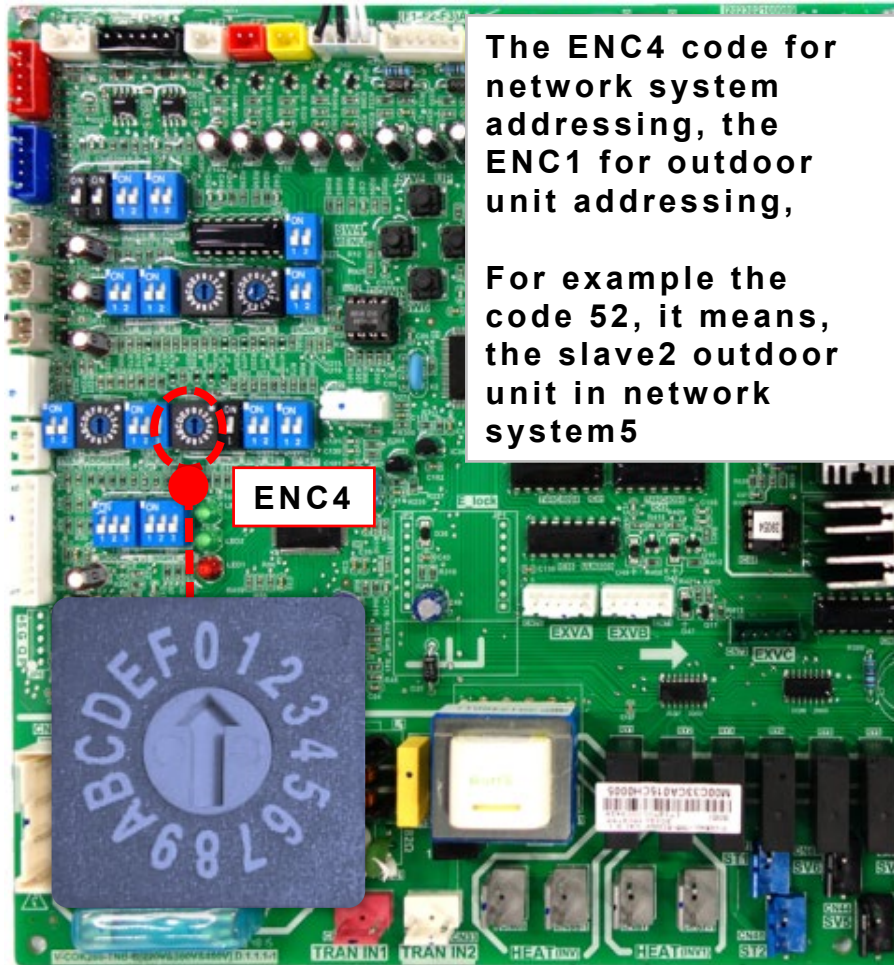


HP OUTDOOR UNIT MAIN CONTROL BOARD



ENC1	Outdoor unit addressing
0	Header unit
1	Follower unit 1
2	Follower unit 2
≥3	Invalid address, lead to system error

HP OUTDOOR UNIT MAIN CONTROL BOARD

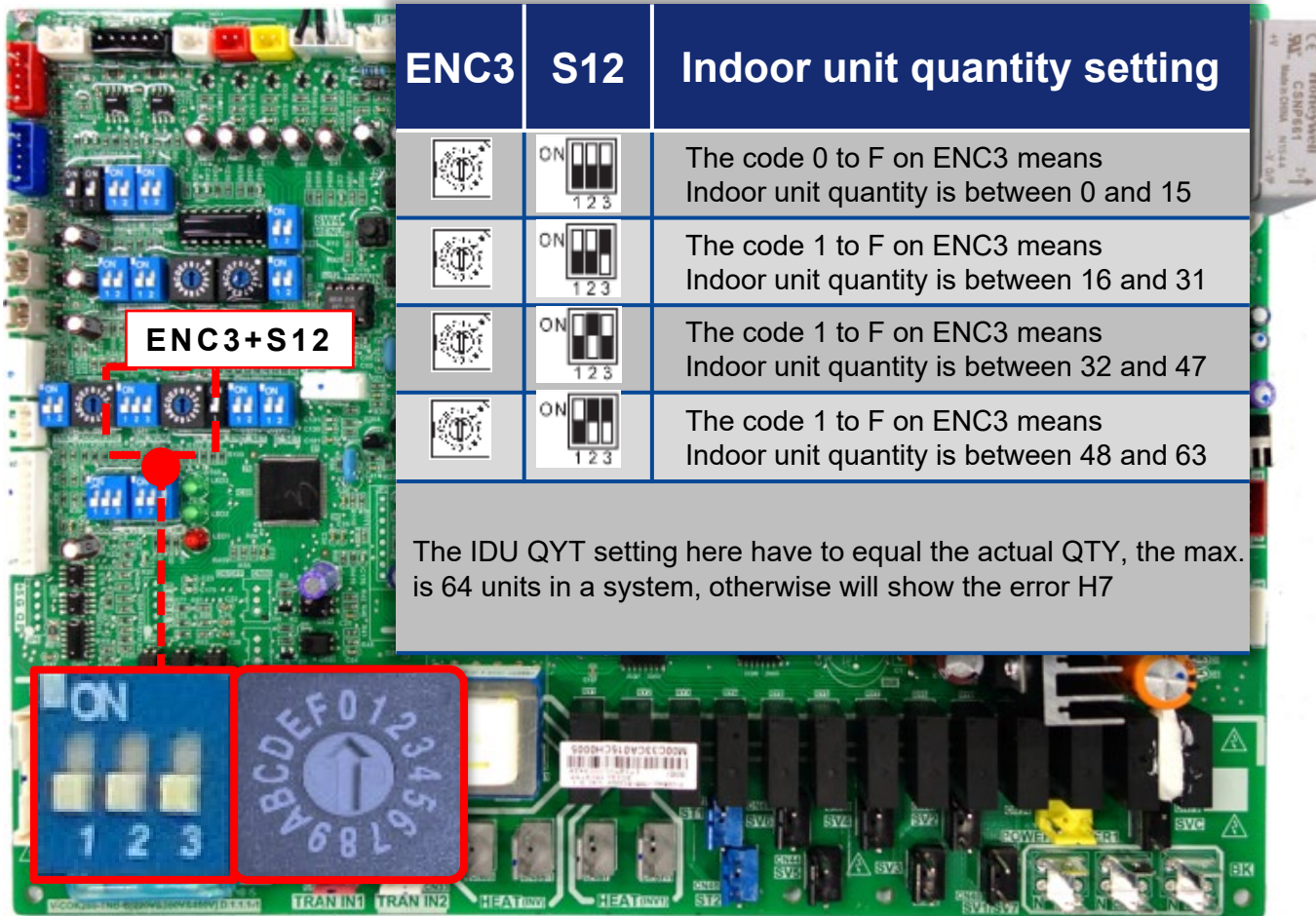


The ENC4 code for network system addressing, the ENC1 for outdoor unit addressing,

For example the code 52, it means, the slave2 outdoor unit in network system5

ENC4	ENC1	Address code
0	0	00
	1	01
	2	02
1	0	10
	1	11
	2	12
2	0	20
	1	21
	2	22
3	0	30
	1	31
	2	32
4	0	40
	1	41
	2	42
5	0	50
	1	51
	2	52
6	0	60
	1	61
	2	62
7	0	70
	1	71
	2	72

HP OUTDOOR UNIT MAIN CONTROL BOARD

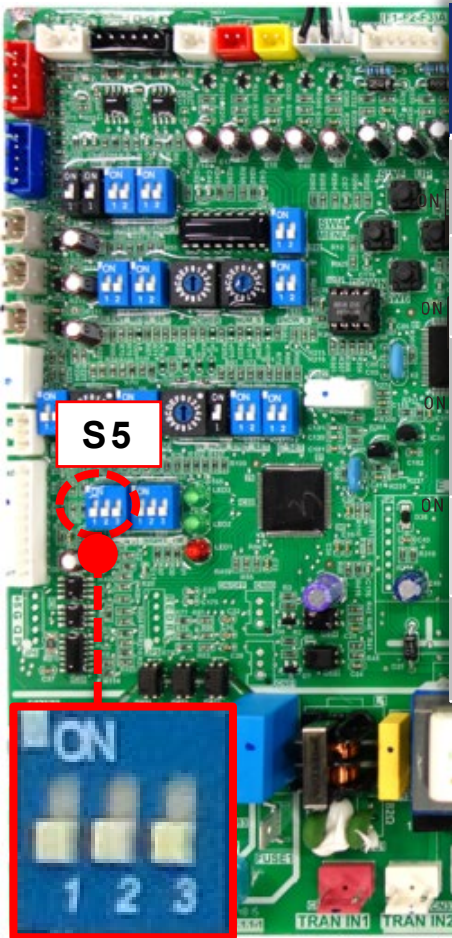


The image shows the HP Outdoor Unit Main Control Board. A red box labeled "ENC3+S12" points to a specific area on the board. Below this, a red box highlights the "ON" switch and the "ENC3" rotary switch. The "ON" switch is a blue slide switch with "ON" and "OFF" positions. The "ENC3" rotary switch is a blue circular switch with positions labeled 0 through F. A red arrow points from the "ENC3+S12" label to the "ENC3" switch.

ENC3	S12	Indoor unit quantity setting
		The code 0 to F on ENC3 means Indoor unit quantity is between 0 and 15
		The code 1 to F on ENC3 means Indoor unit quantity is between 16 and 31
		The code 1 to F on ENC3 means Indoor unit quantity is between 32 and 47
		The code 1 to F on ENC3 means Indoor unit quantity is between 48 and 63

The IDU QYT setting here have to equal the actual QTY, the max. is 64 units in a system, otherwise will show the error H7

HP OUTDOOR UNIT MAIN CONTROL BOARD



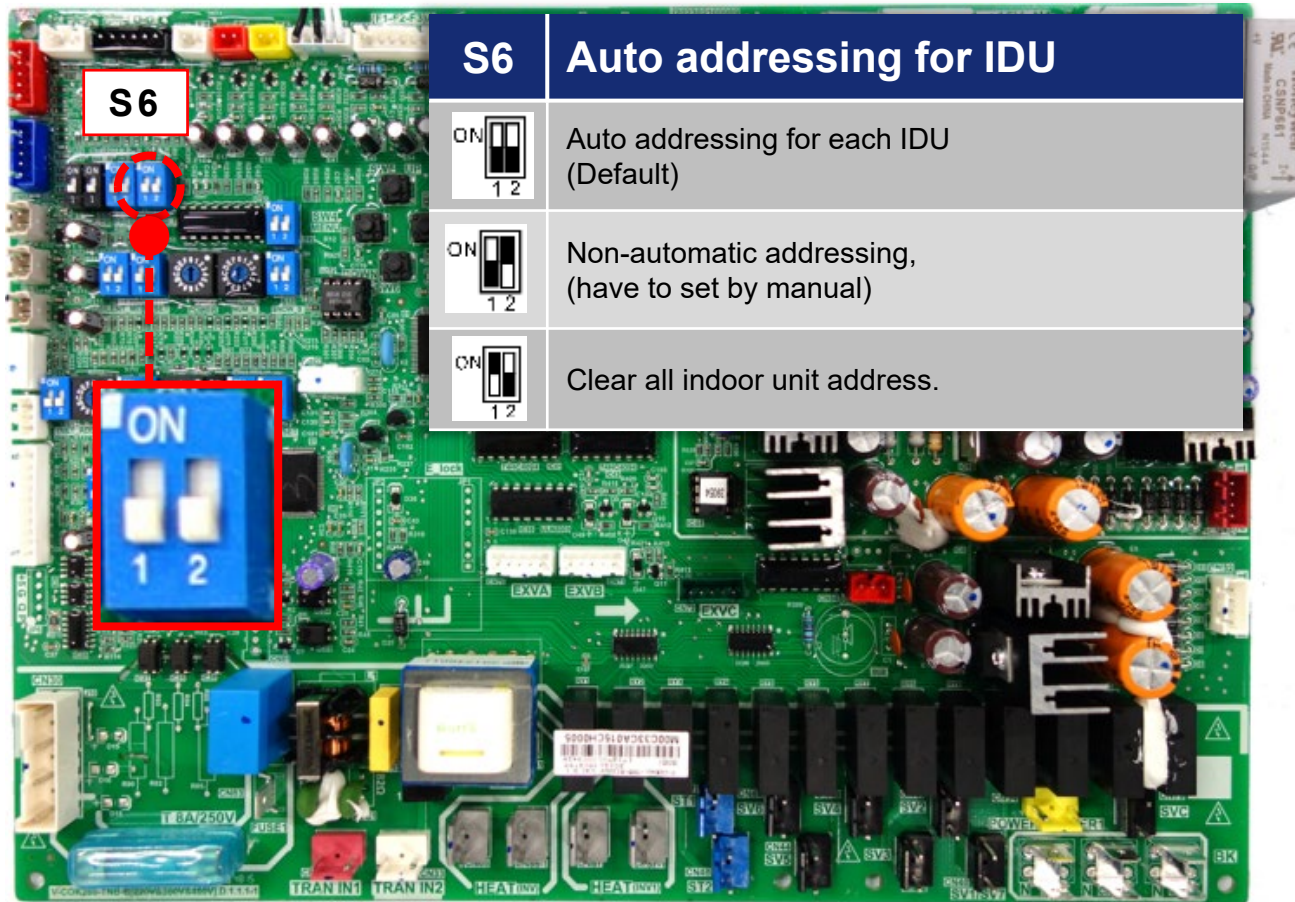
The image shows the HP Outdoor Unit Main Control Board. A red box highlights the S5 switch, which is a 3-position toggle switch. A red circle and arrow point to the switch, and a red line connects it to the S5 switch settings table on the right.

S5	Running mode priority setting for HP only
	Auto priority mode based on outdoor air temp (Factory default) 55 Heat 64 Cool
	Cooling priority mode
	1.) IDU No.63 Master IDU. 2.) If there is no IDU address 63 then the majority of the IDU modes determine ODU mode of operation.
	Heating mode available only
	Cooling mode available only



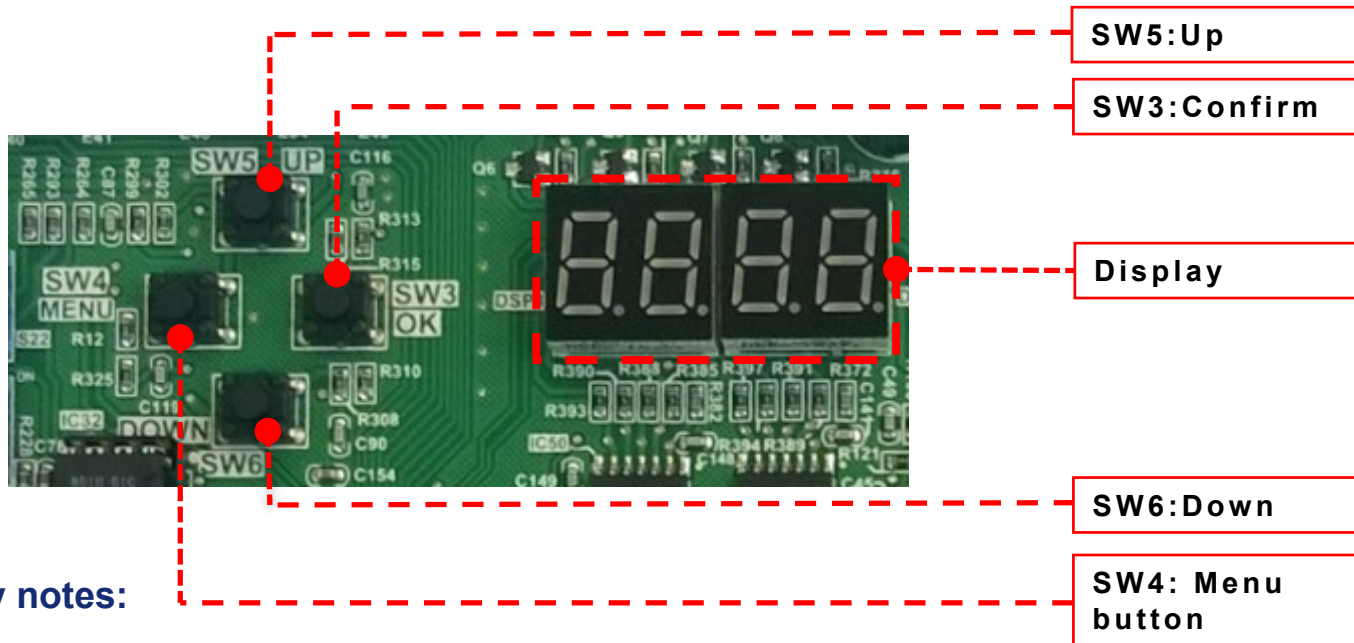
A close-up view of the S5 switch, showing the 'ON' label and the three positions (1, 2, 3). The switch is currently in position 1, where all three positions are set to 'ON'.

HP OUTDOOR UNIT MAIN CONTROL BOARD



S6	Auto addressing for IDU
	Auto addressing for each IDU (Default)
	Non-automatic addressing, (have to set by manual)
	Clear all indoor unit address.

HP OUTDOOR UNIT MAIN CONTROL BOARD



Key notes:

- 1) Menu key(SW4): long-press enter menu setting, short-press back to the upper level menu
- 2) Confirmation key(SW3): short-press enter the lower menu or confirm the function selected
- 3) Up key(SW5)/Down key(SW6)
 - a) select items
 - b) spot check

HP OUTDOOR UNIT MAIN CONTROL BOARD



SPOT CHECK N CODES

Symbol	Function	Item	Description
n1	Special function for debug	_n12	Forced cooling (17°C of IDU)
		_n13	Forced heating (30°C of IDU)
		_n14	Cooling test
		_n15	Heating test
n2	Refrigerant recycle function	_n21	Pump Down (to ODU)
		_n22	Pump Out (to IDU)
		_n23	Vacuum Mode
		_n26	Maintenance operation
n3	malfunction query	_n31	Historical malfunction query
		_n32	Clear the historical malfunction
n4	Night time setting	_n41	6/10H (Default)
		_n42	6/12H
		_n43	8/10H
		_n44	8/12H
n5	Silent mode setting	_n51	Night Silent mode
		_n52	Silent mode
		_n53	Super Silent mode
		_n54	None Silent mode (Default)

Symbol	Function	Item	Description
n8	Static pressure mode setting	_n81	Standard static pressure mode (Default)
		_n82	Low static pressure mode (Reserved)
		_n83	Medium static pressure mode (Reserved)
		_n84	High static pressure mode (Reserved)
nb	Temperature unit setting	_nb1	Temperature unit: °C
		_nb2	Temperature unit: ° F (Default)
nc	T4 value setting (under the heating mode)	_nc1	No limitation (Default)
		_nc2	5° F (-15°C)
		_nc3	15° F (-9°C)
		_nc4	25° F (-4°C)
		_nc5	35° F (2°C)
		_nc6	45° F (7°C)
		_nc7	55° F (13°C)
		_nc8	65° F (18°C)

INSTALLATION

UNIT PLACEMENT

INSTALLATION - PRE-PLANNING



- Unit placement
- Piping
- Refrigerant addition
- Electrical
- Sizing and connection



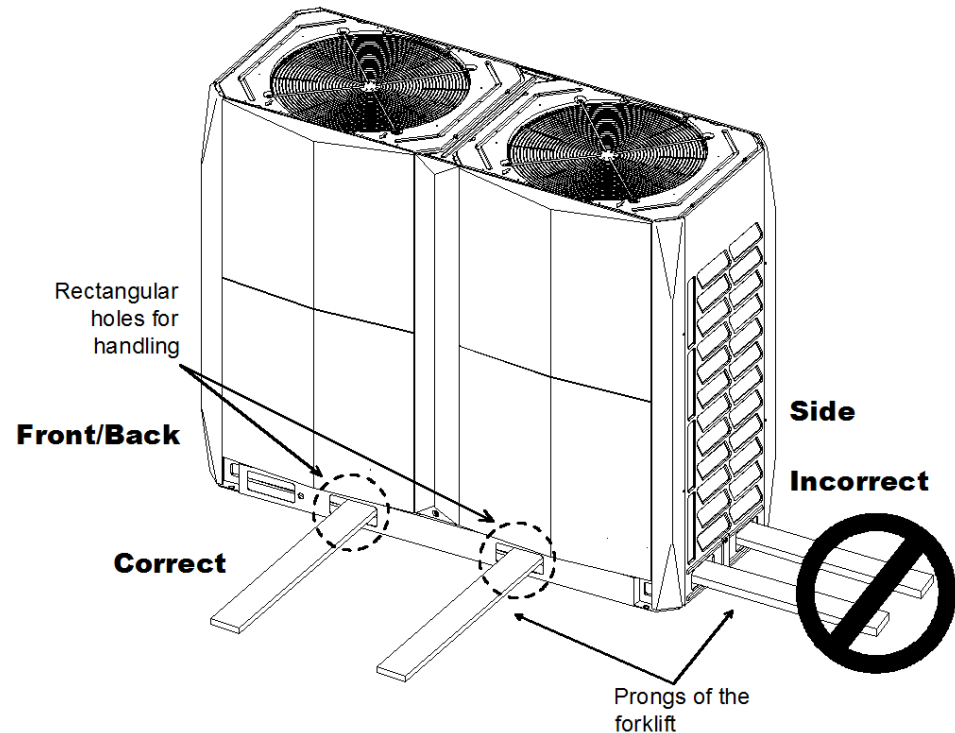
MOVING THE OUTDOOR UNIT



WHEN USING A FORKLIFT

The forks **must** be inserted through the slots in the unit base rails as shown.

Do Not lift the Outdoor unit with the forks directly against the base as this can cause damage to the equipment.

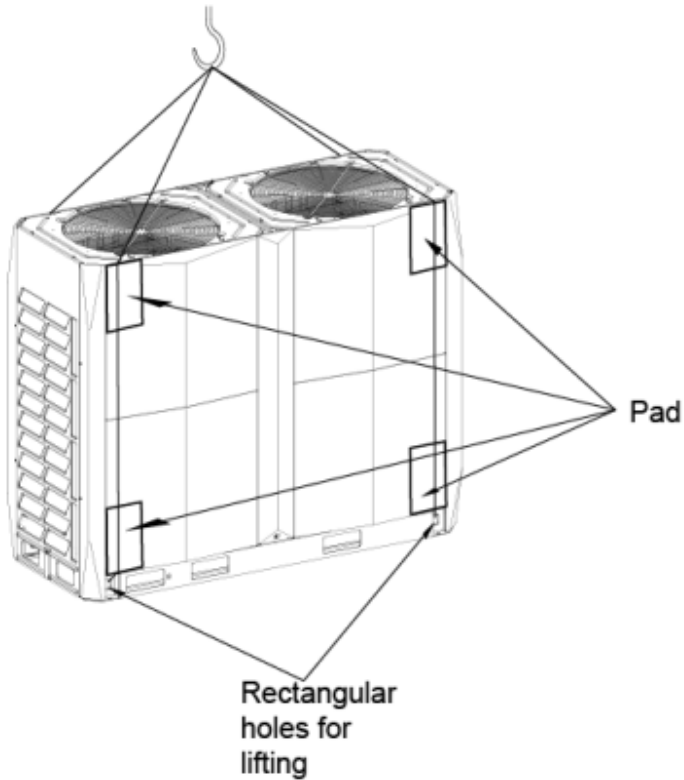


MOVING TO FINAL LOCATION

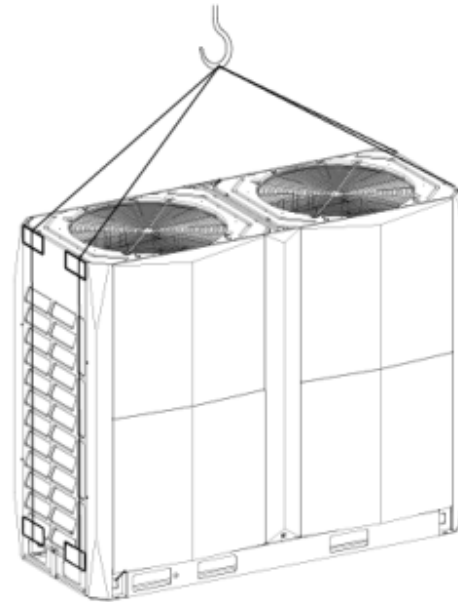


If lifting is required rig as shown to avoid damage

Correct



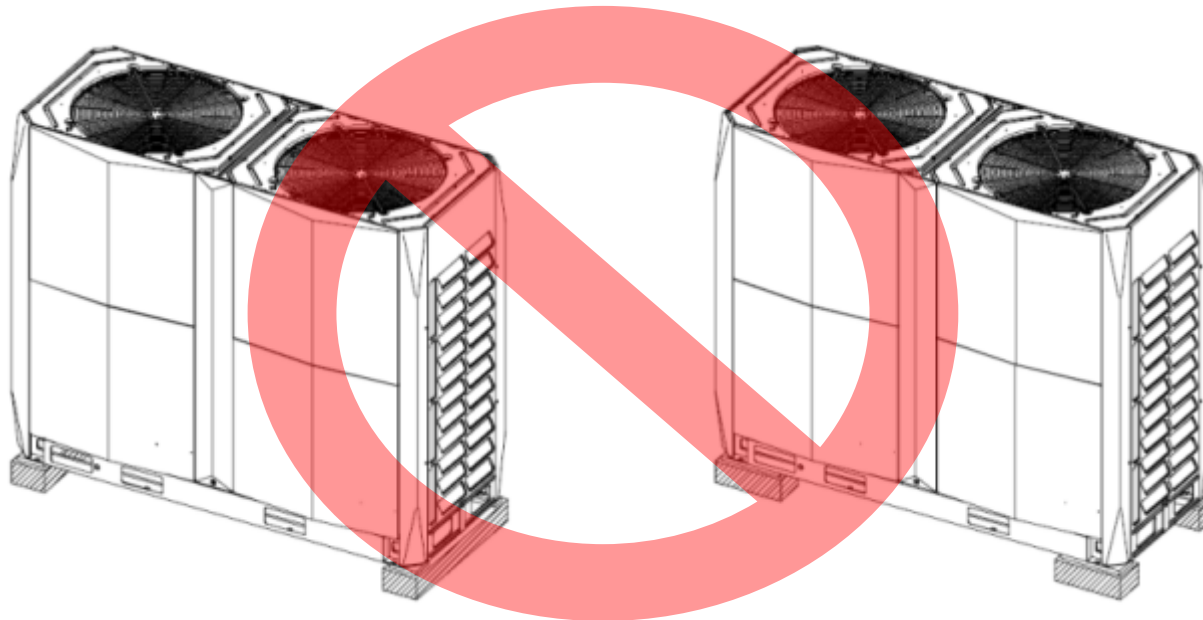
Incorrect



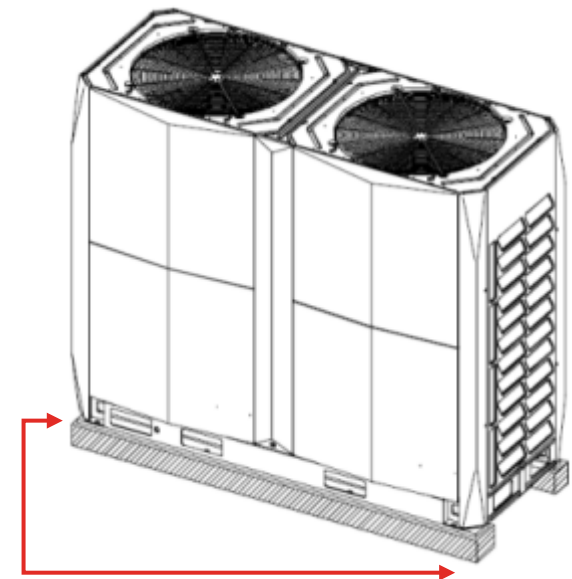
BASE OF OUTDOOR UNIT



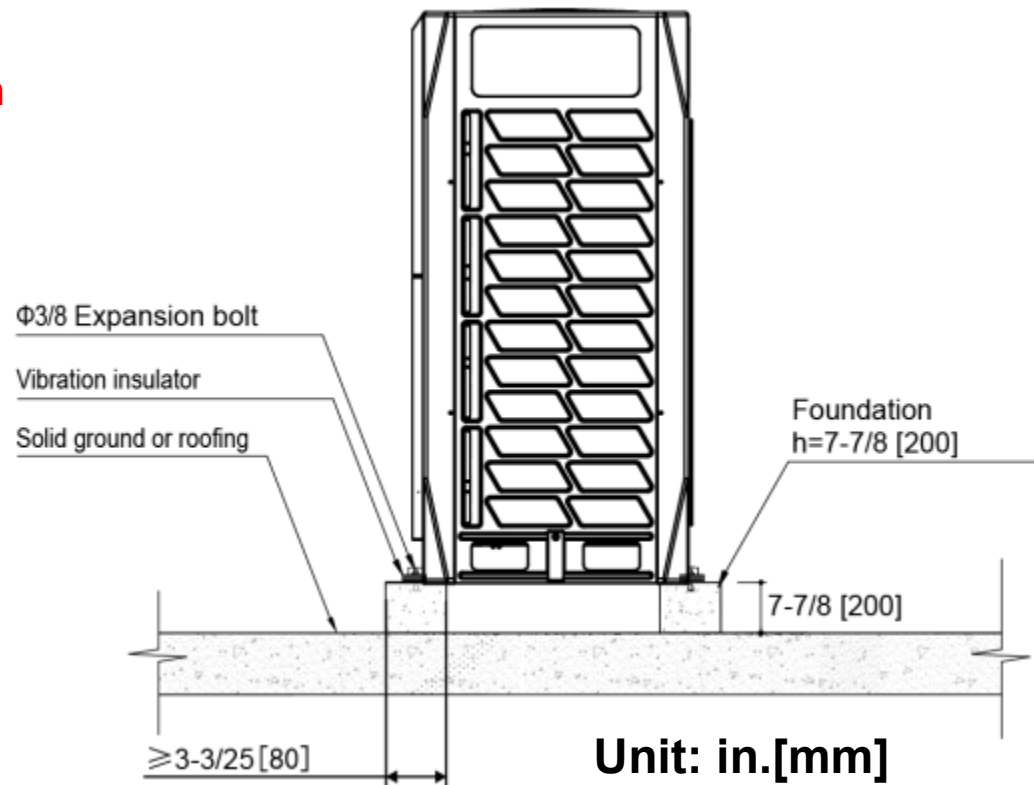
INCORRECT



CORRECT



- Fix the outdoor unit with anchor bolts. (4 positions/unit).

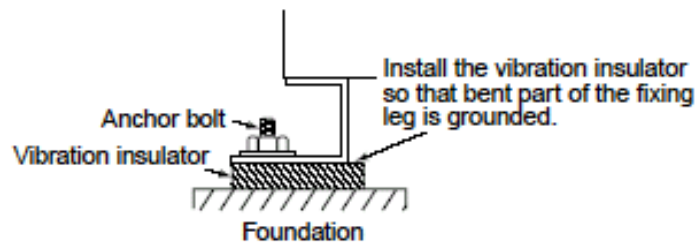


OUTDOOR UNIT INSTALLATION

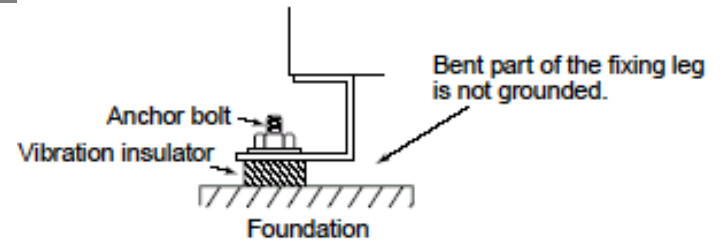


When installing vibration insulators you need to cover then entire foot of the unit in order to stabilize the base of the unit.

CORRECT



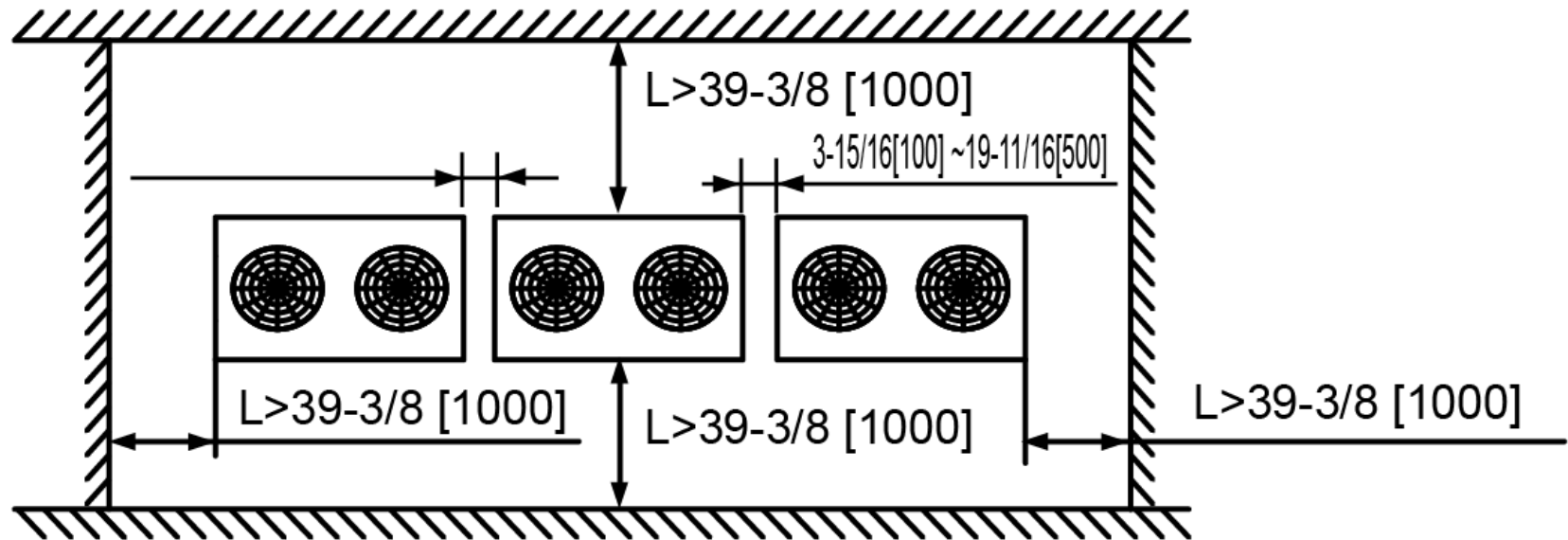
INCORRECT



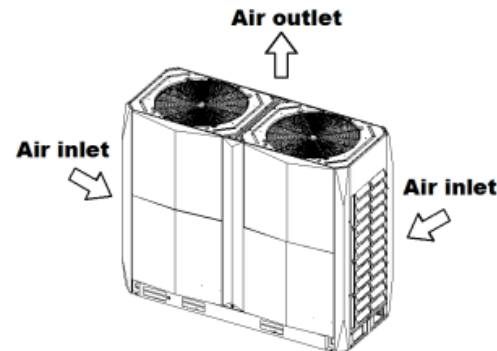
MULTIPLE UNIT INSTALLATION



ENSURE ENOUGH SPACE FOR MAINTENANCE



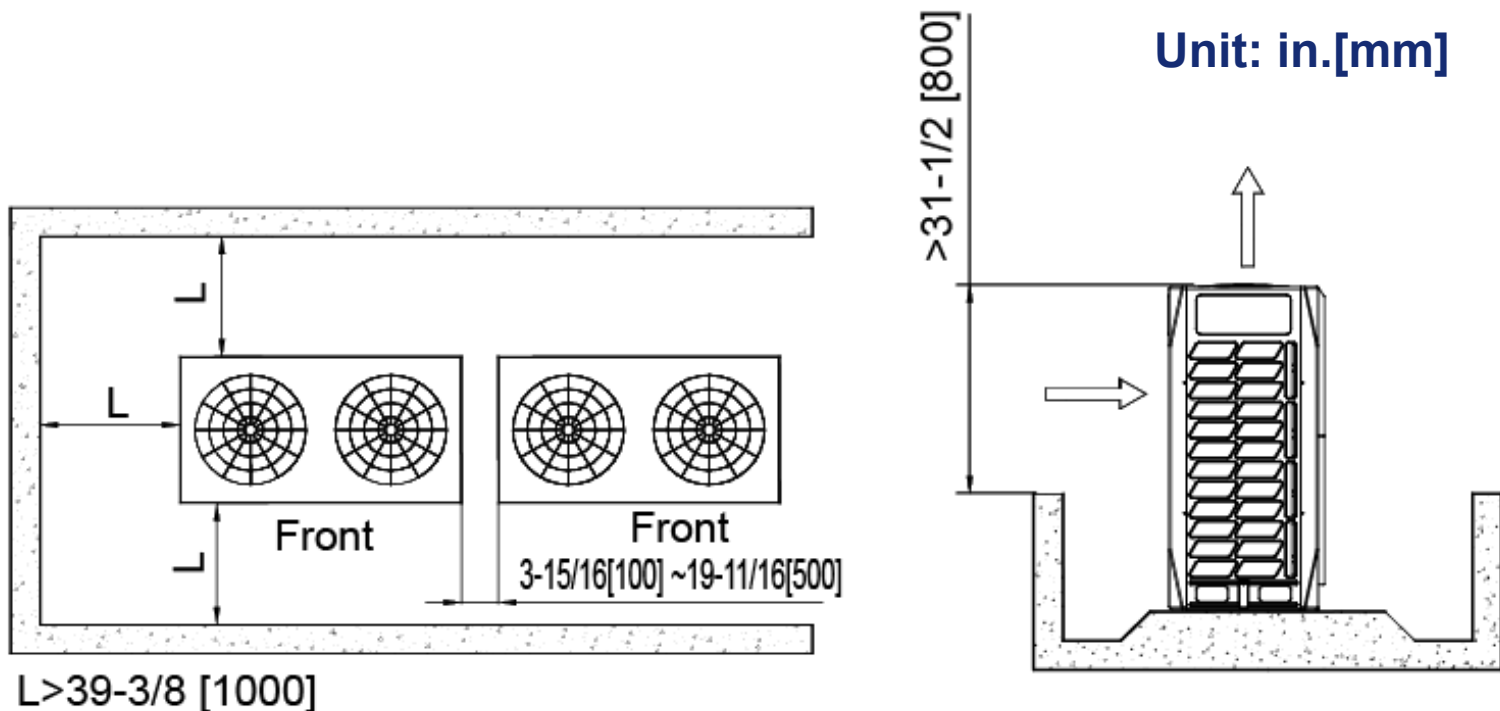
Unit: in.[mm]



MULTIPLE UNIT INSTALLATION



**IF A SURROUNDING WALL IS SHORTER THAN
THE OUTDOOR UNITS**

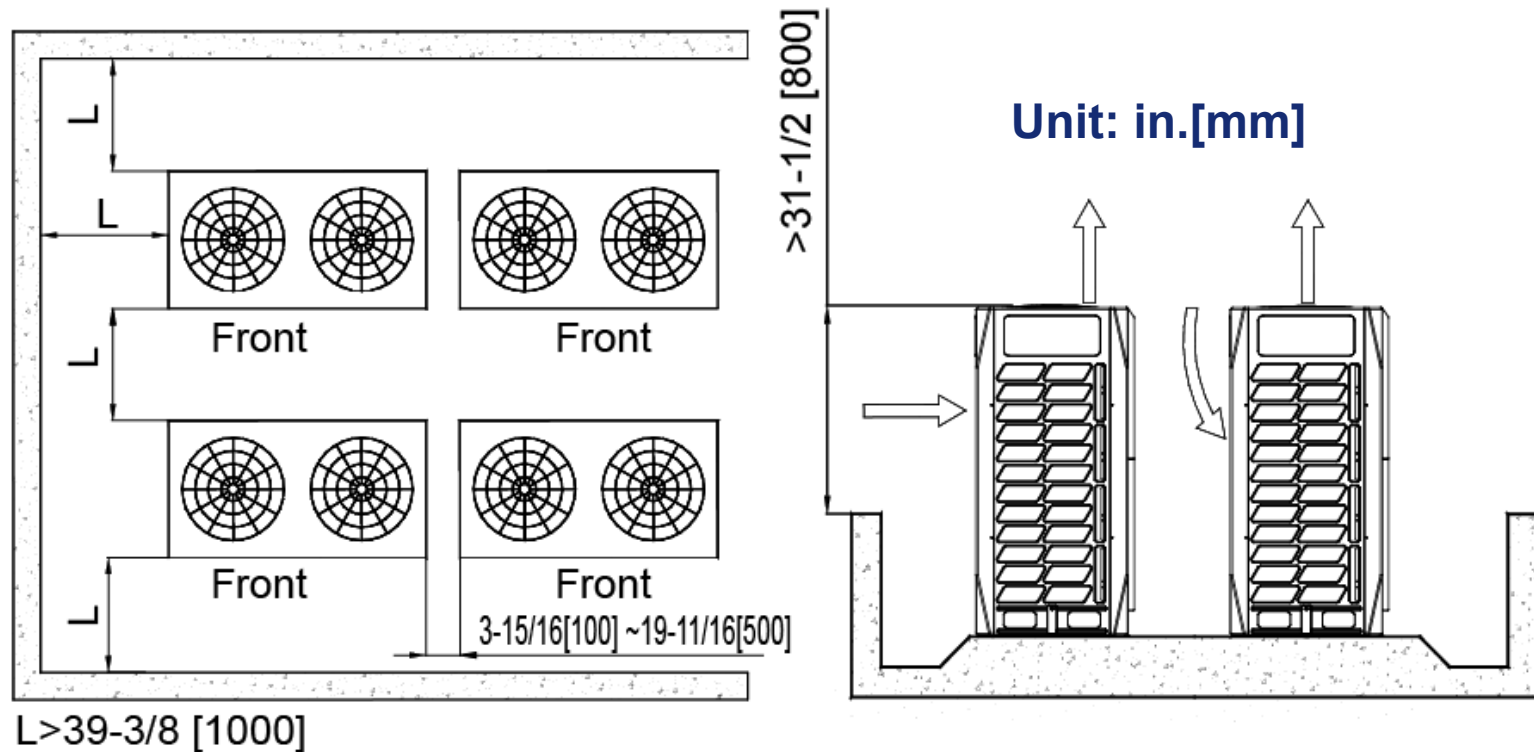


One-row installation

MULTIPLE UNIT INSTALLATION



**IF A SURROUNDING WALL IS SHORTER THAN THE
OUTDOOR UNITS**

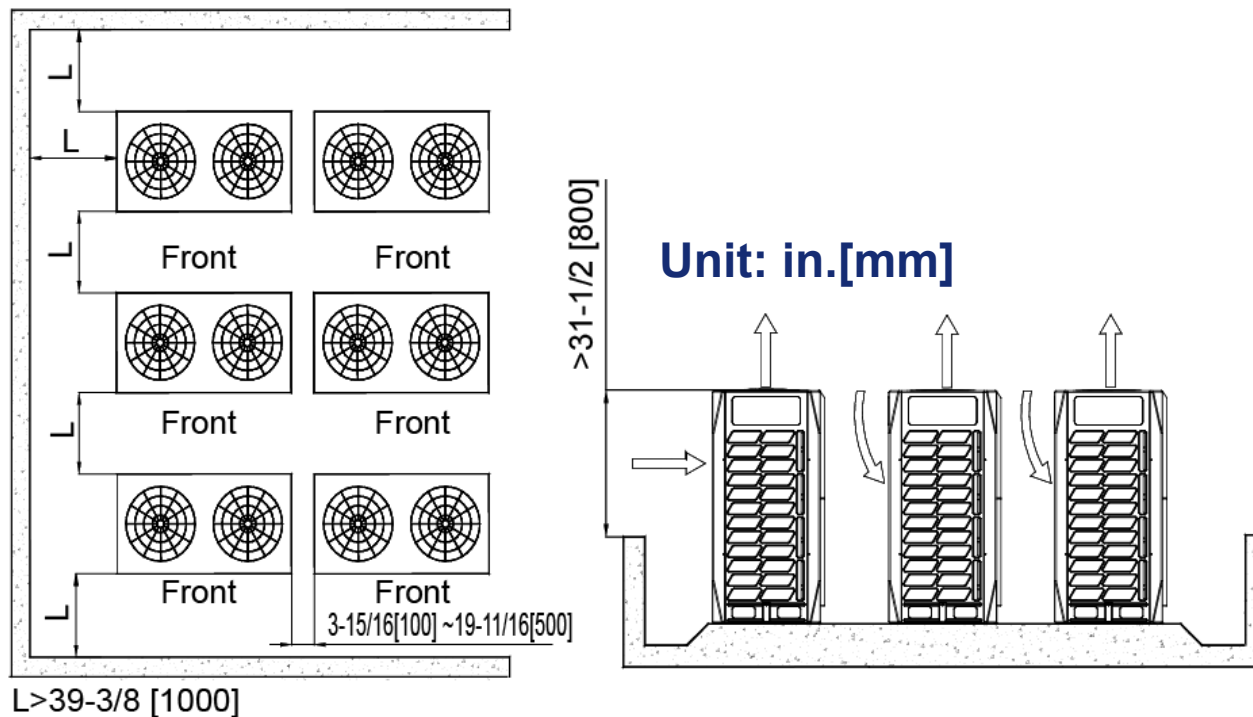


Two-row installation

MULTIPLE UNIT INSTALLATION



**IF A SURROUNDING WALL IS SHORTER THAN THE
OUTDOOR UNITS**



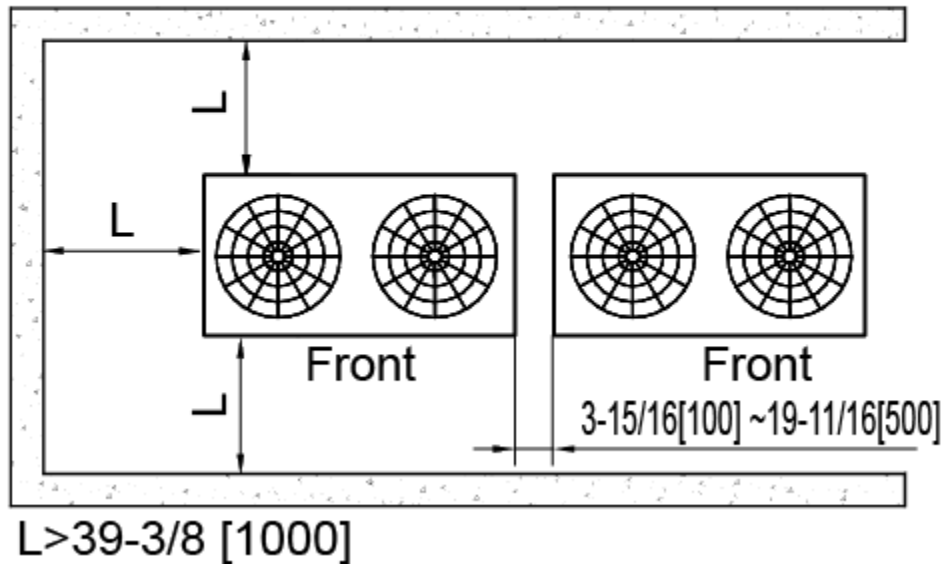
Three-row installation

MULTIPLE UNIT INSTALLATION

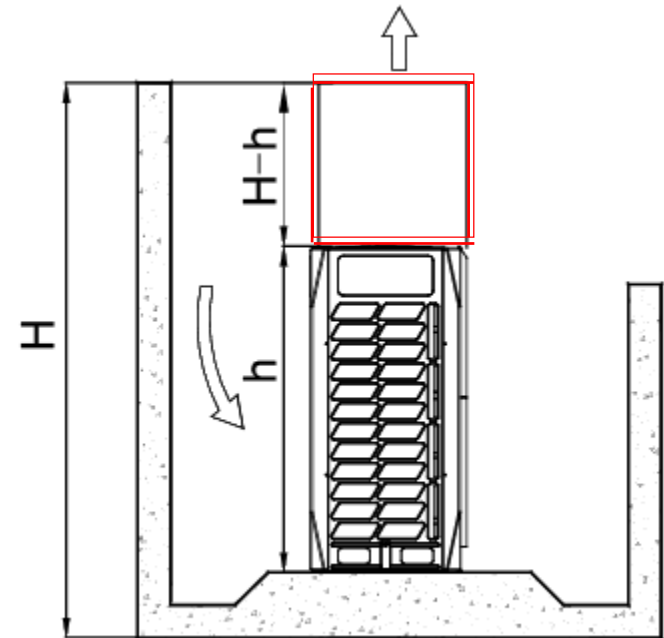


IF A SURROUNDING WALL IS TALLER THAN THE OUTDOOR UNITS

Height of duct needs to be at least the height of the wall. (H-h)



If outlet ducts are installed

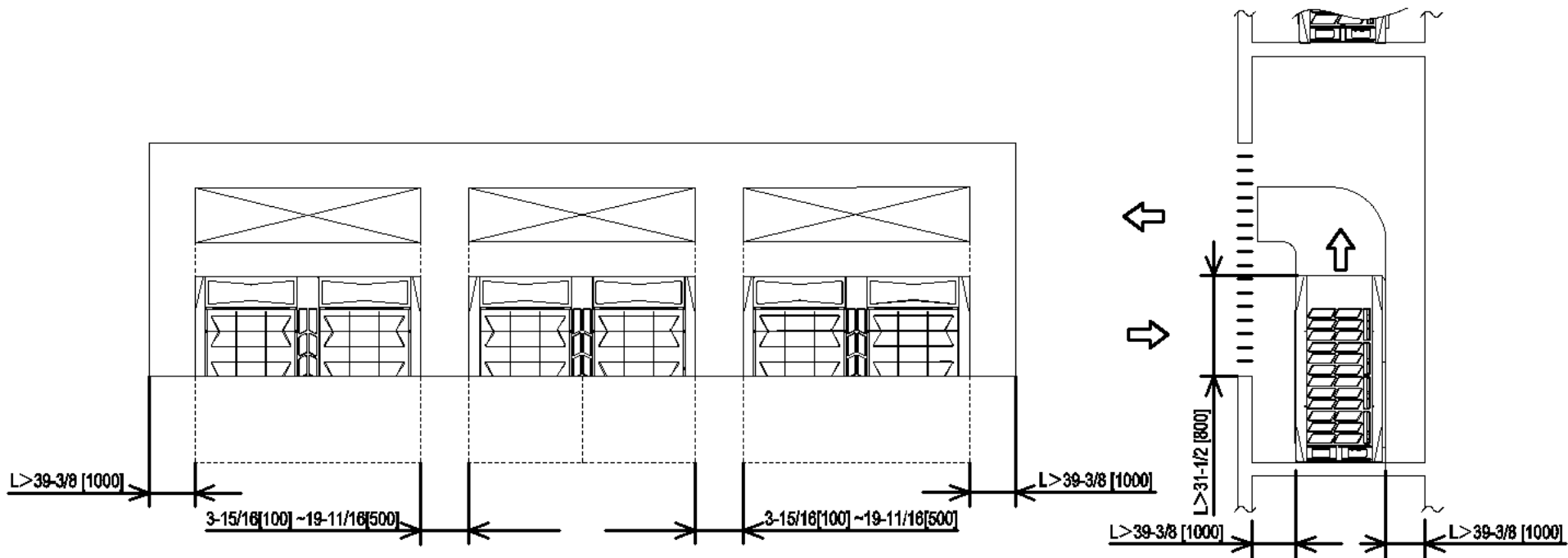


Unit: in.[mm]

MULTIPLE UNIT INSTALLATION



CONCEALED MOUNTING LOCATION

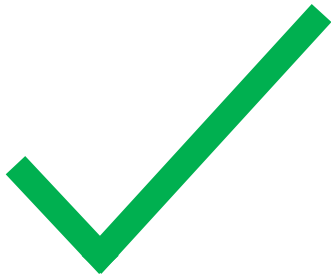


Unit: in.[mm]

INSTALLATION

PIPING INSTALLATION

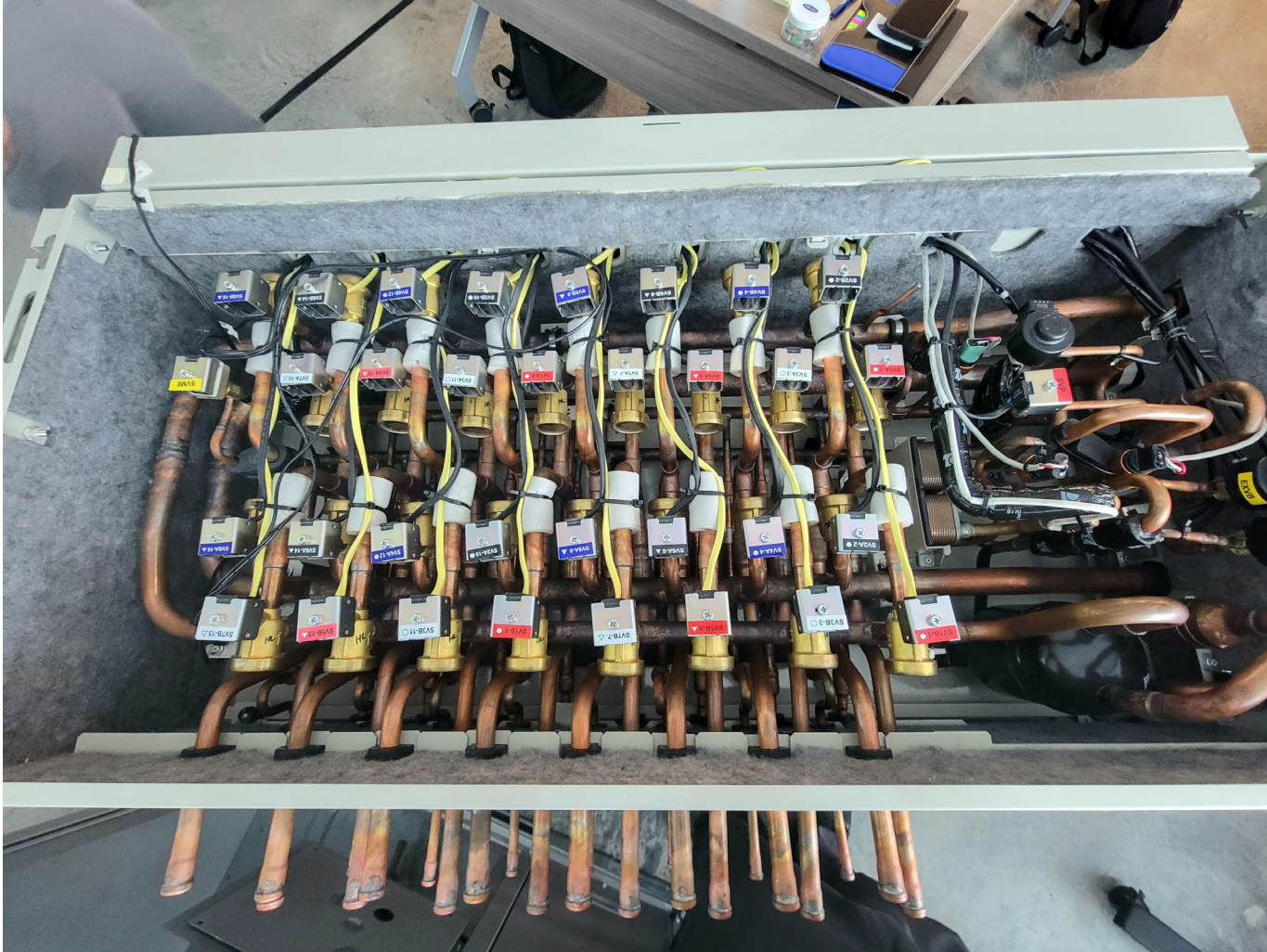
NITROGEN PURGING IS REQUIRED



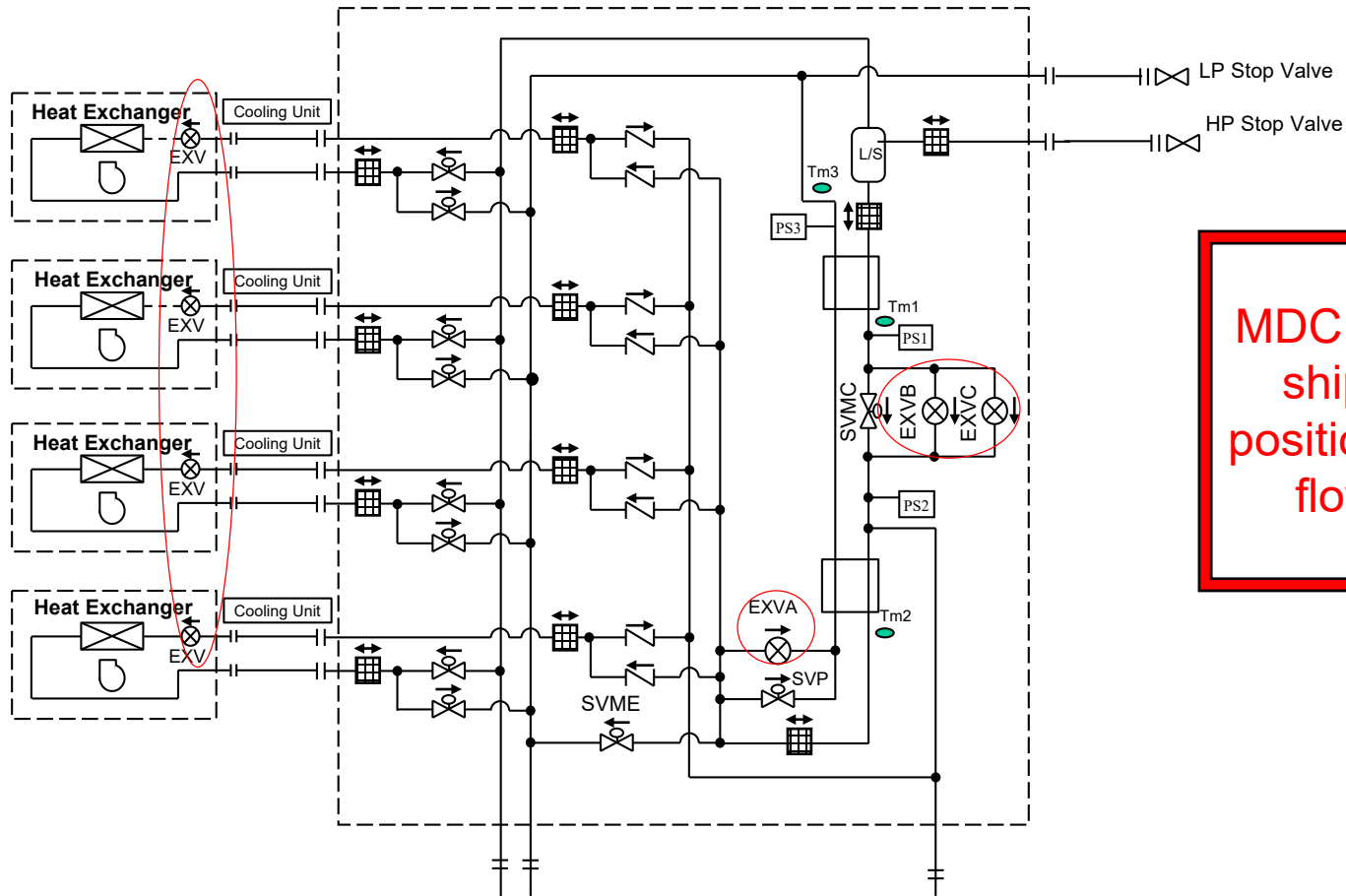
NITROGEN PURGE



NITROGEN PURGE UNLESS YOU WANT TO
CHANGE ONE OF THOSE EEVS, STRAINERS, AND
RISK VOIDING YOUR WARRANTY.



HEAT RECOVERY OUTDOOR PIPING ARRANGEMENT

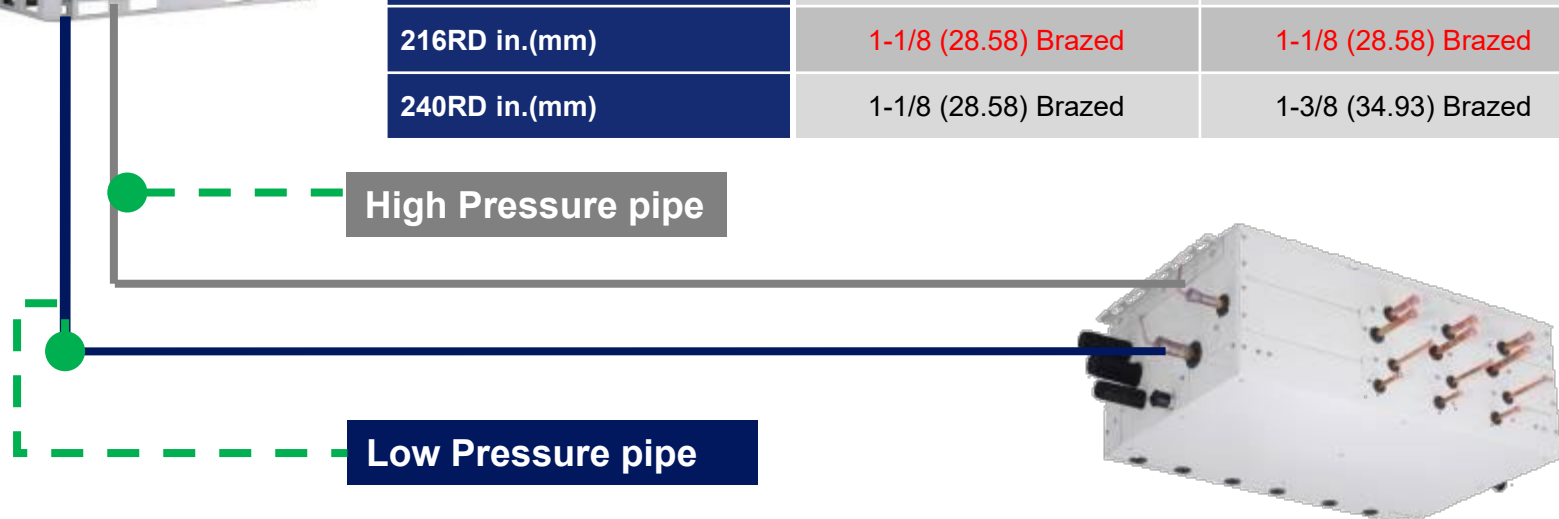


MDC and IDU EXVs are shipped in the open position to allow nitrogen flow while brazing.

HEAT RECOVERY OUTDOOR PIPING ARRANGEMENT



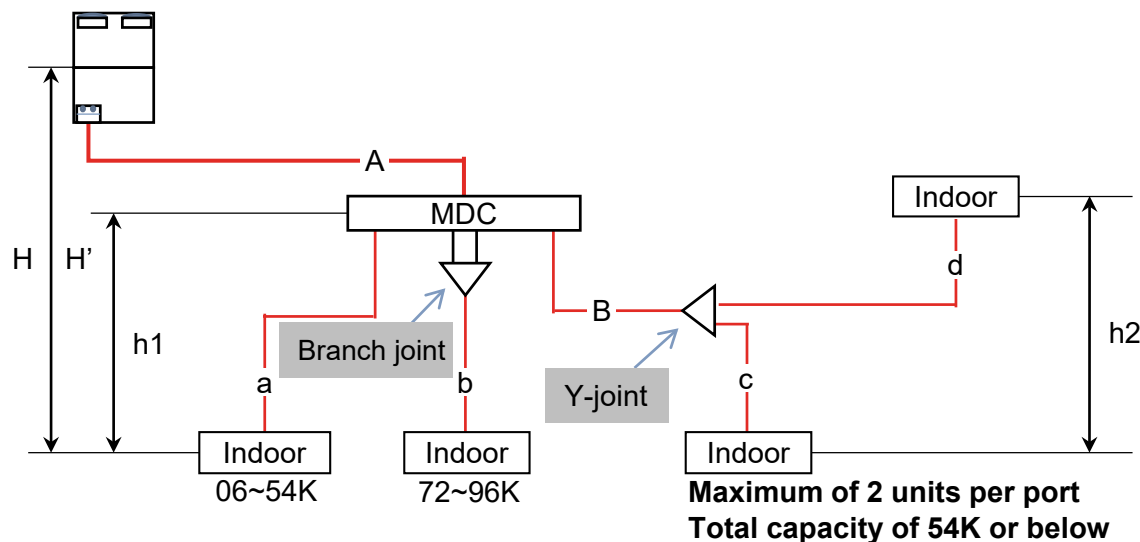
Capacity (KBtu/h)	High press. pipe	Low press. pipe
072RD in.(mm)	5/8 (15.88) Brazed	3/4 (19.05) Brazed
096RD in.(mm)	3/4 (19.05) Brazed	7/8 (22.2) Brazed
120RD in.(mm)	3/4 (19.05) Brazed	1-1/8 (28.58) Brazed
144~192RD in.(mm)	7/8 (22.2) Brazed	1-1/8 (28.58) Brazed
216RD in.(mm)	1-1/8 (28.58) Brazed	1-1/8 (28.58) Brazed
240RD in.(mm)	1-1/8 (28.58) Brazed	1-3/8 (34.93) Brazed



REFRIGERANT PIPE LENGTH AND HEIGHT



For Heat Recovery Only

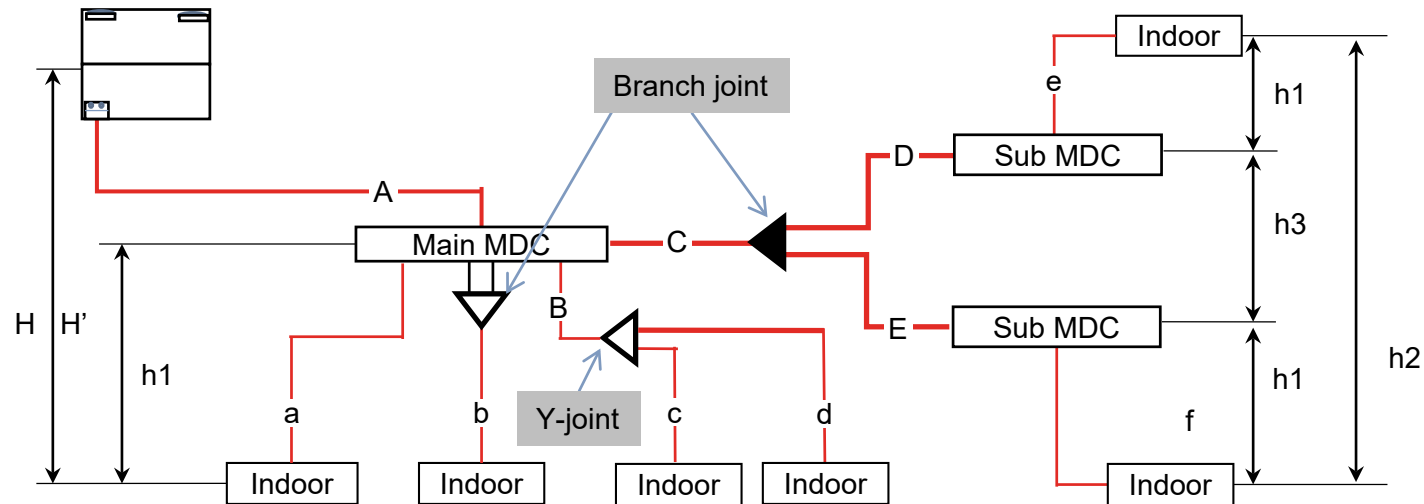


Operation			Piping in the figure	Allowable length of pipes (ft [m])
Length	Total pipe length		A+B+a+b+c+d	Refer to manual
	Total pipe length from the ODU to the farthest IDU		A+B+d	541' [165] or less (Equivalent length 190[623'] or less)
	Between ODU and Main MDC		A	360' [110] or less
	Between MDC and IDU		B+d	131' [40] or less
Height	Between ODU and IDU	ODU above IDU	H	164' [50] or less
		ODU below IDU	H'	131' [40] or less
	Between MDC and IDU		h1	49' [15] (32' [10]) or less
	Between IDU and IDU		h2	98' [30] (65' [20]) or less

REFRIGERANT PIPE LENGTH AND HEIGHT



For Heat Recovery Only



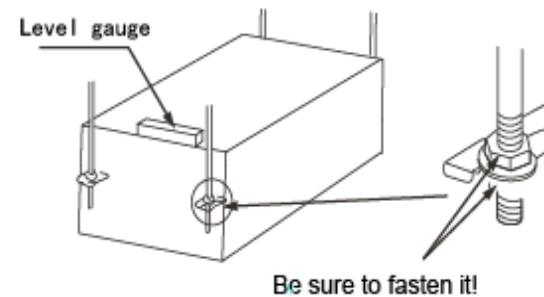
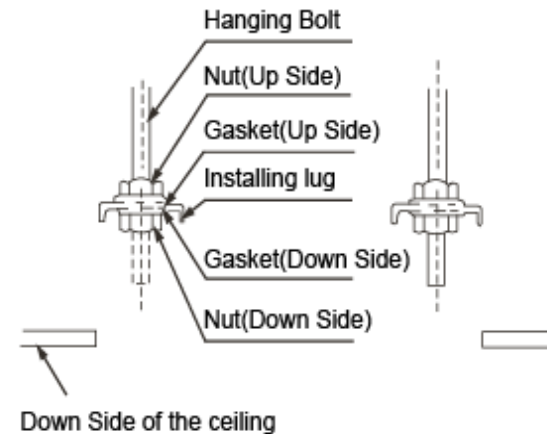
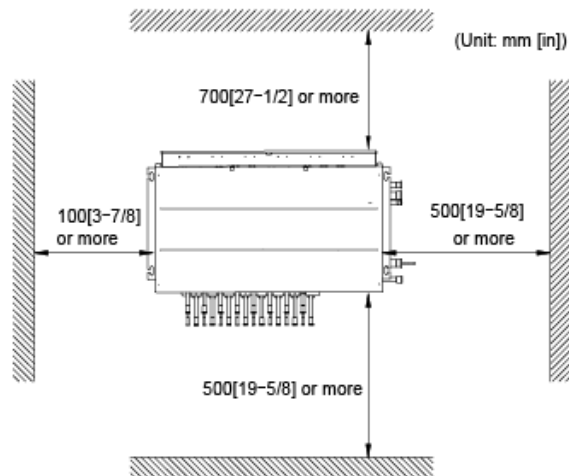
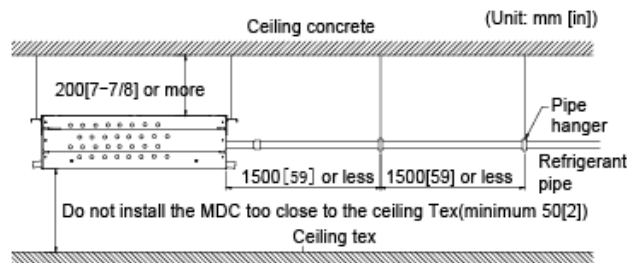
Operation		Piping in the figure	Allowable length of pipes(ft [m])
Length	Total pipe length	$A+B+C+D+E+a+b+c+d+e+f$	Refer to manual
	Total pipe length from the ODU to the farthest IDU	$A+C+D+e$ or $A+C+E+f$	541' [165] or less (Equivalent length 623[190] or less)
	Between ODU and Main MDC	A	360' [110] or less
	Between Main MDC and IDU	$B+d$ or $C+D+e$ or $C+E+f$	131' [40] or less
Height	Between ODU and IDU	ODU above IDU	164' [50] or less
		ODU below IDU	131' [40] or less
	Between MDC and IDU	h_1	49' [15] (32' [10]) or less
	Between IDU and IDU	h_2	98' [30] (65' [20]) or less
	Between MDC(main or sub) and sub MDC	h_3	49' [15] or less

MDC PLACEMENT



For Heat Recovery Only

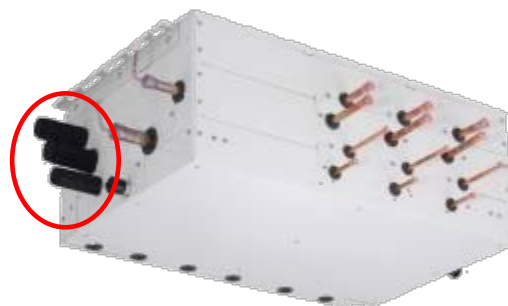
POSITIONING THE MDC



PIPE CONNECTION WITH MDC AND OUTDOOR UNITS



For Heat Recovery Only



Capacity (KBtu/h)	To Sub MDC controller		
	High press. pipe	Liquid pipe	Low press. pipe
to 72K in.(mm) O.D	5/8 (15.88) Brazed	3/8 (9.52) Brazed	3/4 (19.05) Brazed
73K to108K in.(mm) O.D	3/4 (19.05) Brazed	3/8 (9.52) Brazed	7/8 (22.2) Brazed
109K to 126K in.(mm) O.D	3/4 (19.05) Brazed	1/2 (12.7) Brazed	1-1/8 (28.58) Brazed
127K to 144K in.(mm) O.D	7/8 (22.2) Brazed	1/2 (12.7) Brazed	1-1/8 (28.58) Brazed
145K to 168K in.(mm) O.D	7/8 (22.2) Brazed	5/8 (15.88) Brazed	1-1/8 (28.58) Brazed

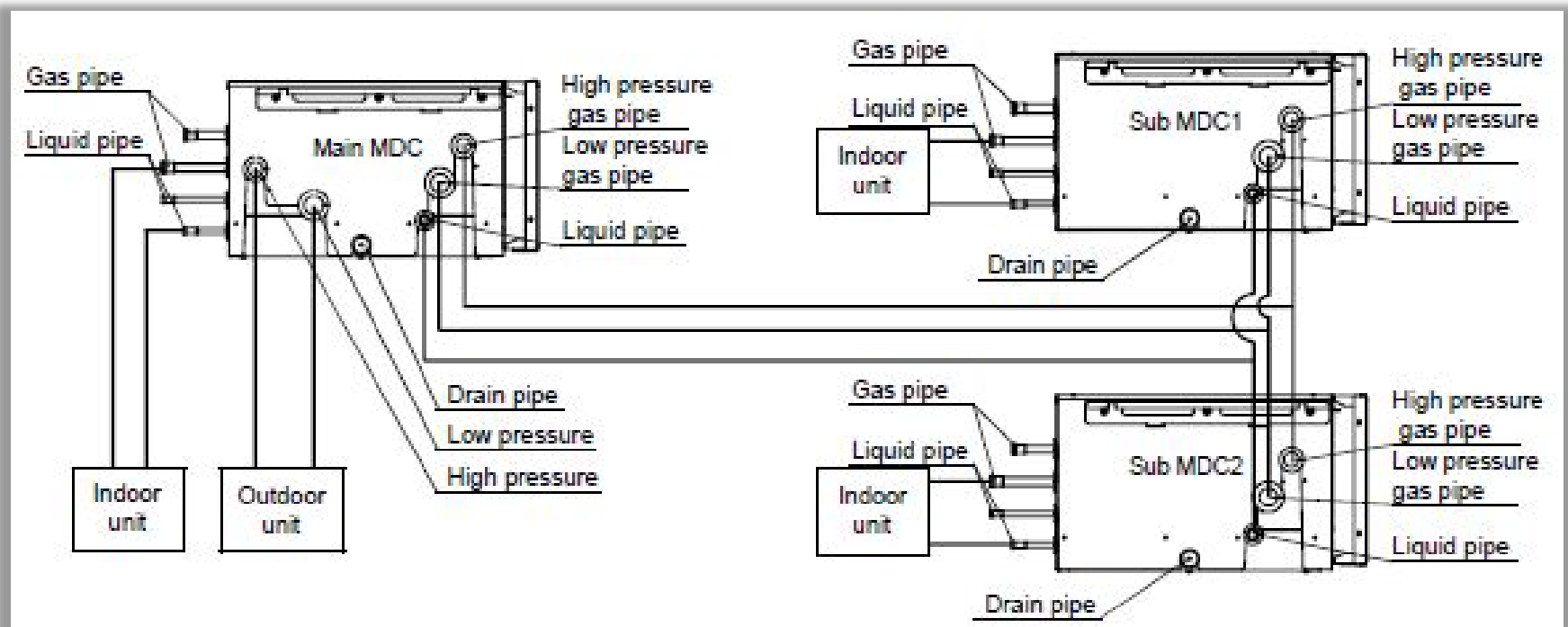
PIPE CONNECTION WITH MDC AND INDOOR UNITS



For Heat Recovery Only

Capacity of IDU(Unit:Kbtu/h)	Connecting diagram	Liquid pipe	Gas pipe	A MDC unit B Pipe accessories from ODU C~D Locally procured pipe E Cut here F Remove brazed cap
≤15		1/4 [6.35mm]	1/2 [12.7mm]	
18~54		3/8 [9.52mm]	5/8 [15.88mm]	

HOW TO CONNECT MAIN TYPE WITH SUB TYPE



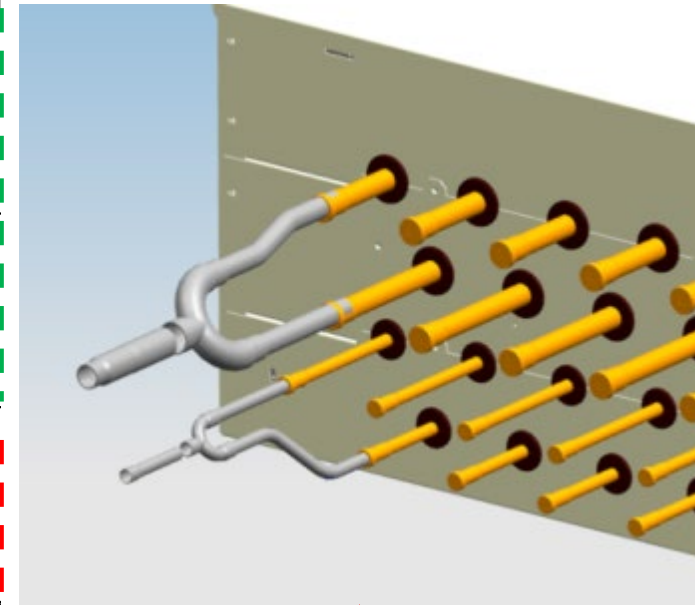
PIPE CONNECTION WITH MDC AND INDOOR UNITS



For Heat Recovery Only

BRANCH JOINTS ARE USED WHEN TWO SUB MDC ARE CONNECTED

Name	Low-pressure gas side joints	High-pressure gas side joints	Liquid side joints
40VM9000 41			
40VM9000 42			
40VM9000 43			

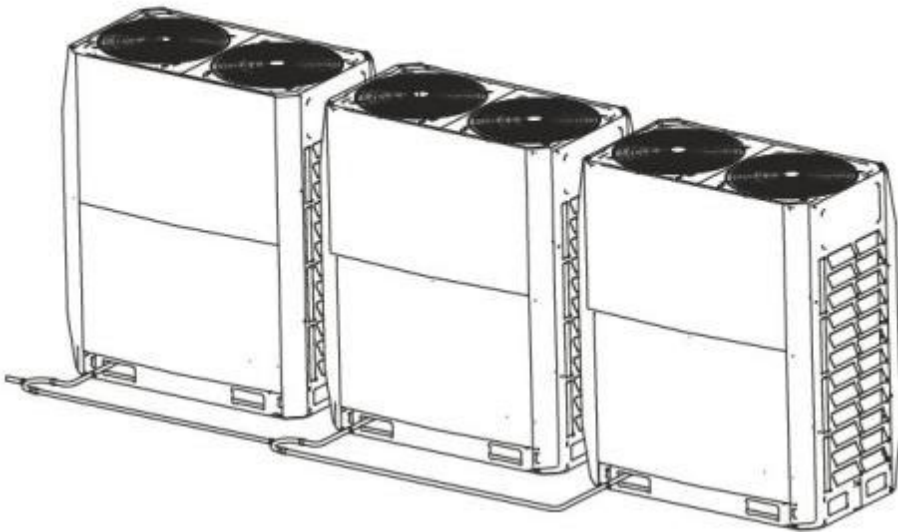


PIPING BASICS

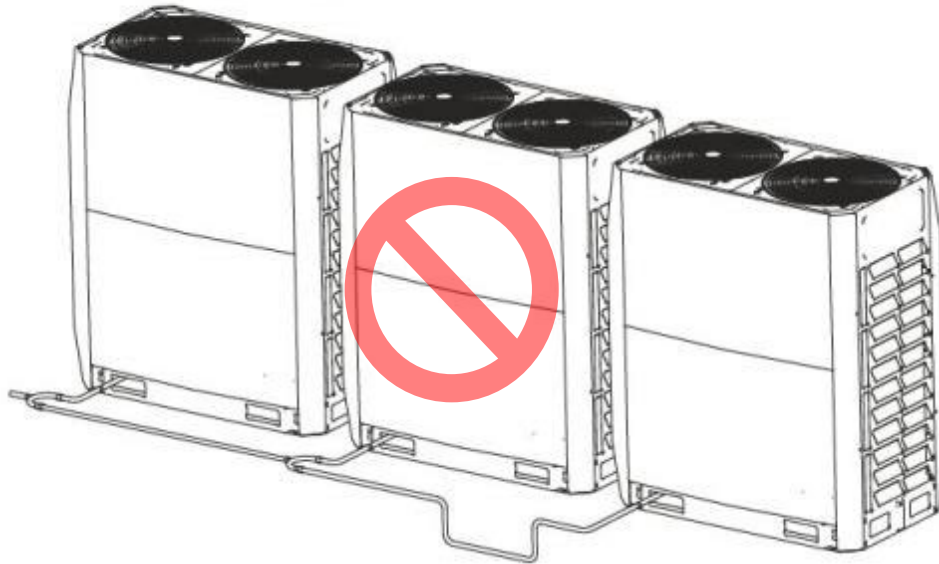


For Heat Pump Only

✓ Correct way



× Wrong way



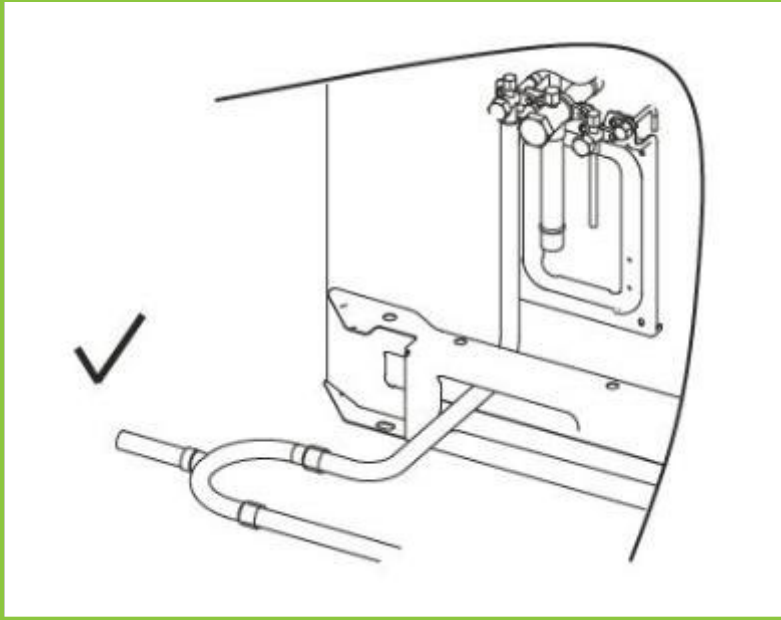
To prevent oil from accumulating in the pipe

PIPING BASICS

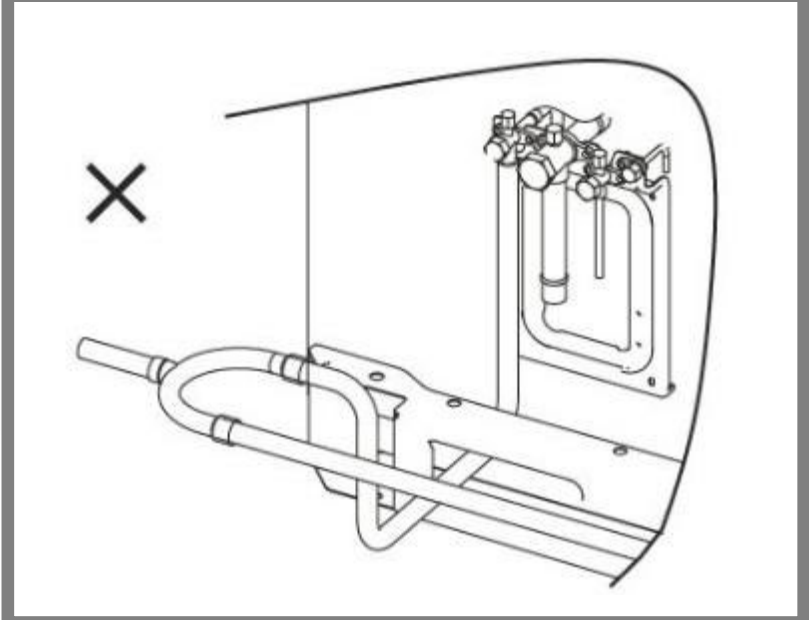


For Heat Pump Only

CORRECT



INCORRECT



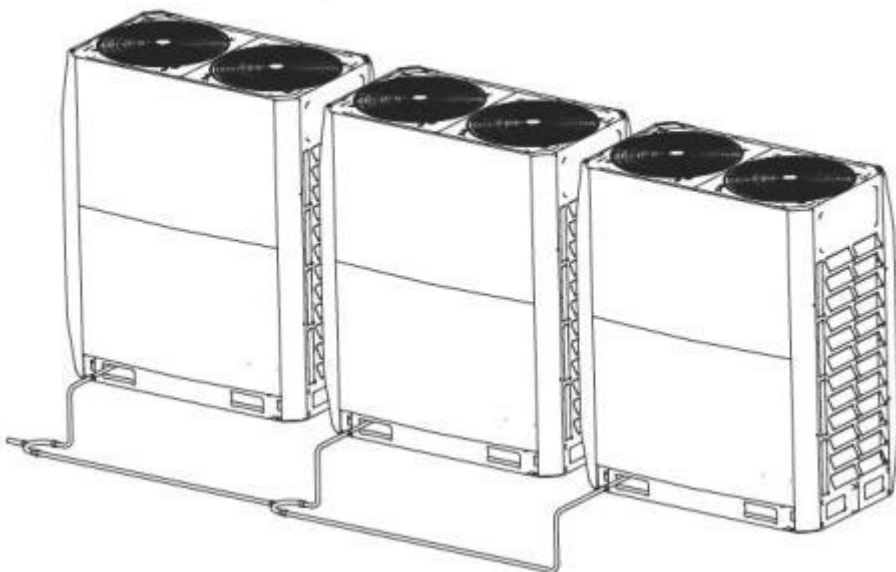
To prevent oil from accumulating in the pipe

PIPING BASICS

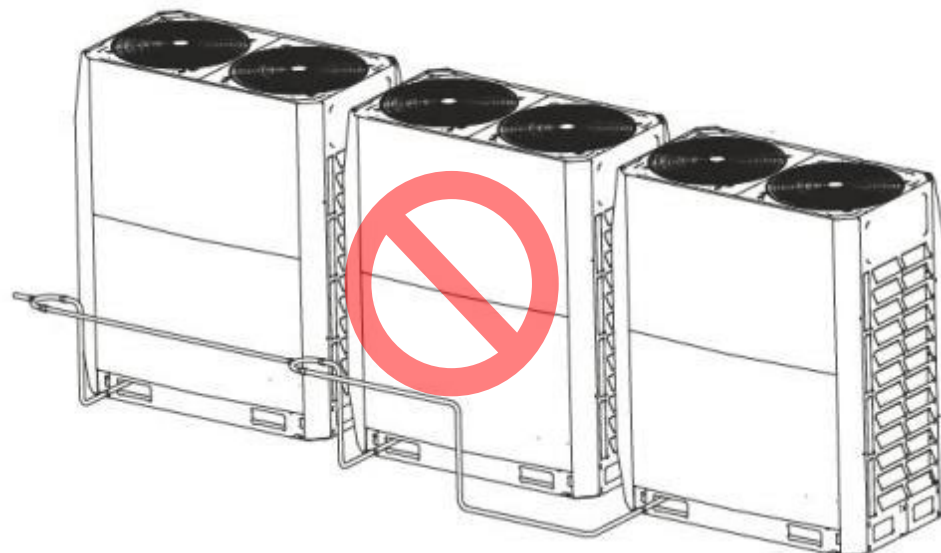


For Heat Pump Only

✓ Correct way



× Wrong way



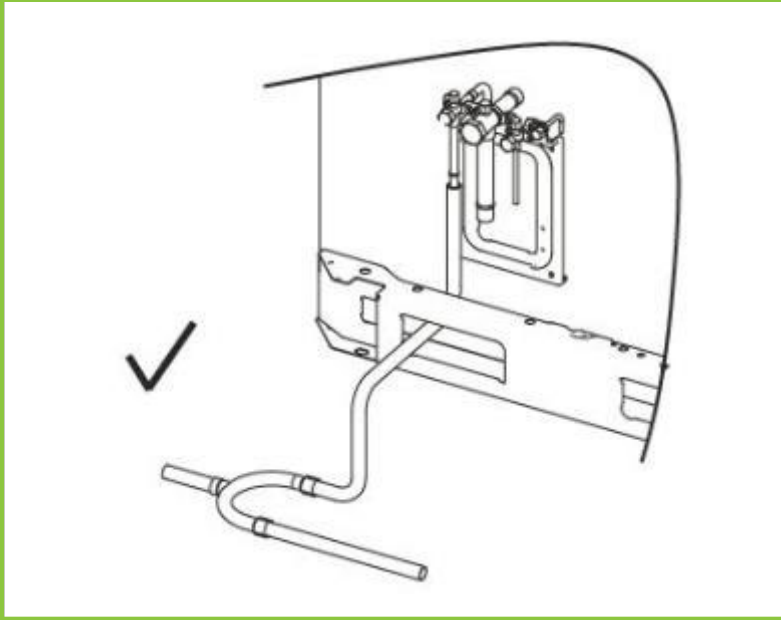
To prevent oil from accumulating in the pipe

PIPING BASICS

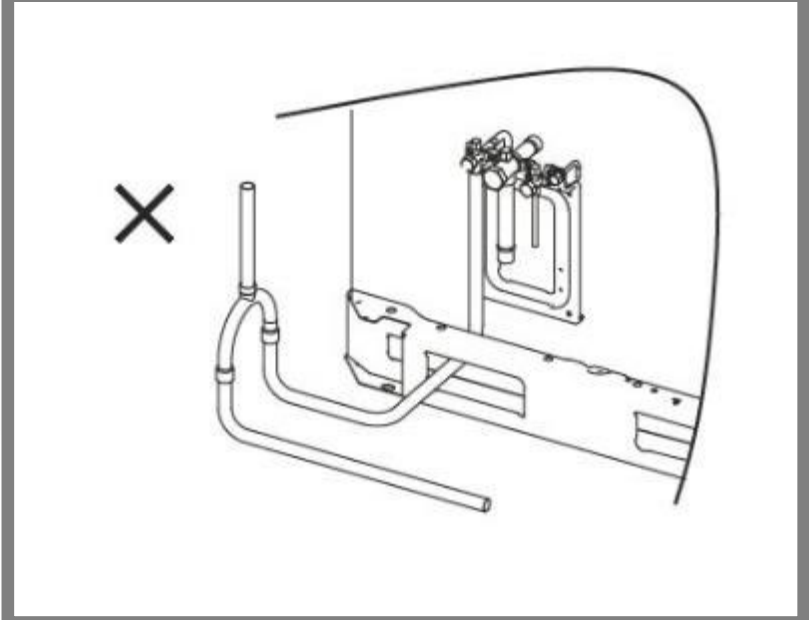


For Heat Pump Only

CORRECT



INCORRECT



To prevent oil from accumulating in the pipe

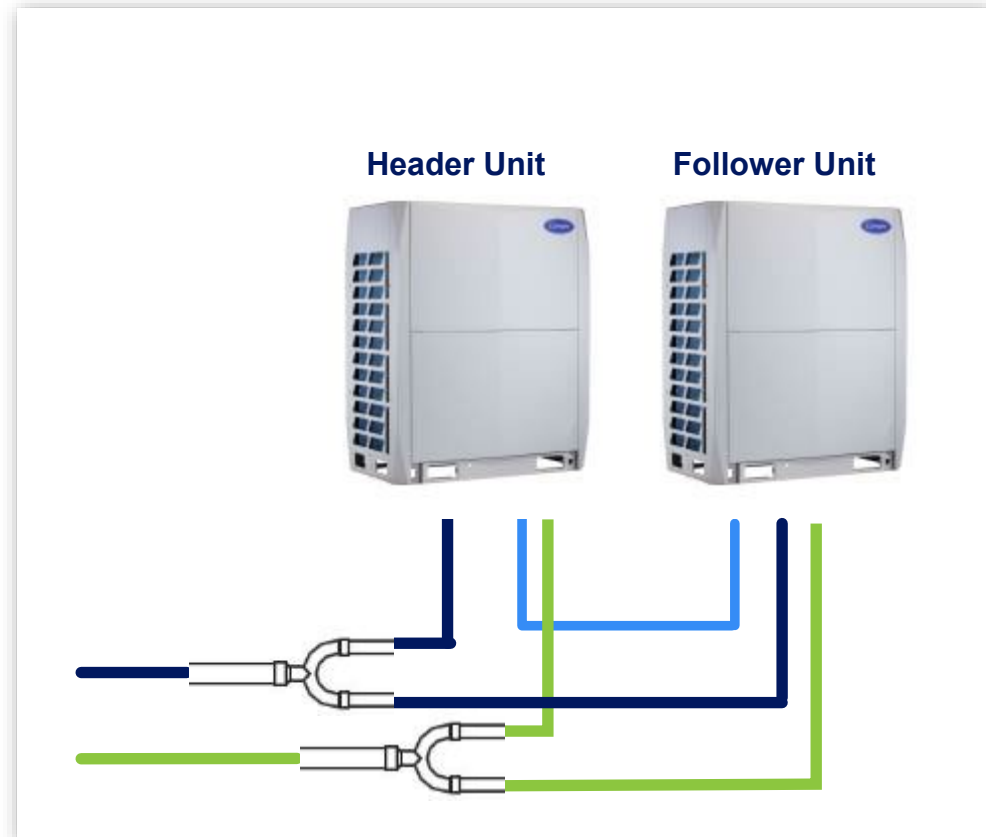
HEAT PUMP OUTDOOR UNIT PIPING



For Heat Pump Only

Install the outdoor units in order of capacity

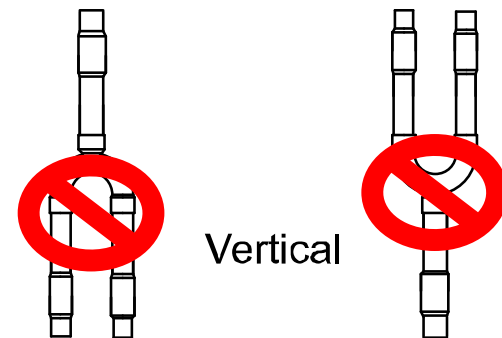
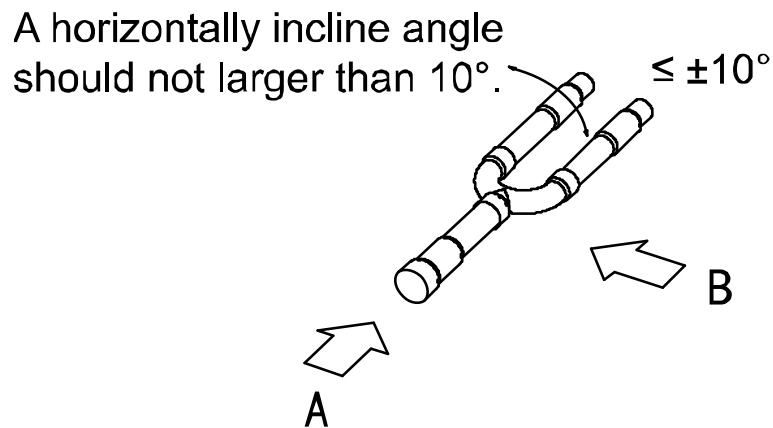
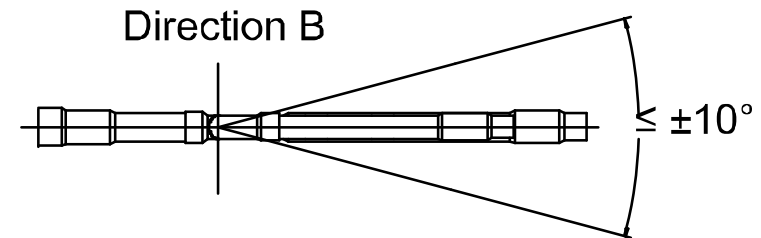
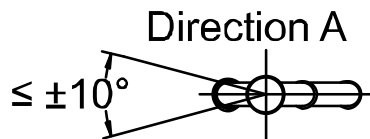
(Header Unit $\geq$ Follower Unit)



Y-SHAPED BRANCH UNIT FOR GAS SIDE OUTDOOR UNIT

When a Y-shaped branch unit for the gas-side is attached, attach it parallel with the ground.

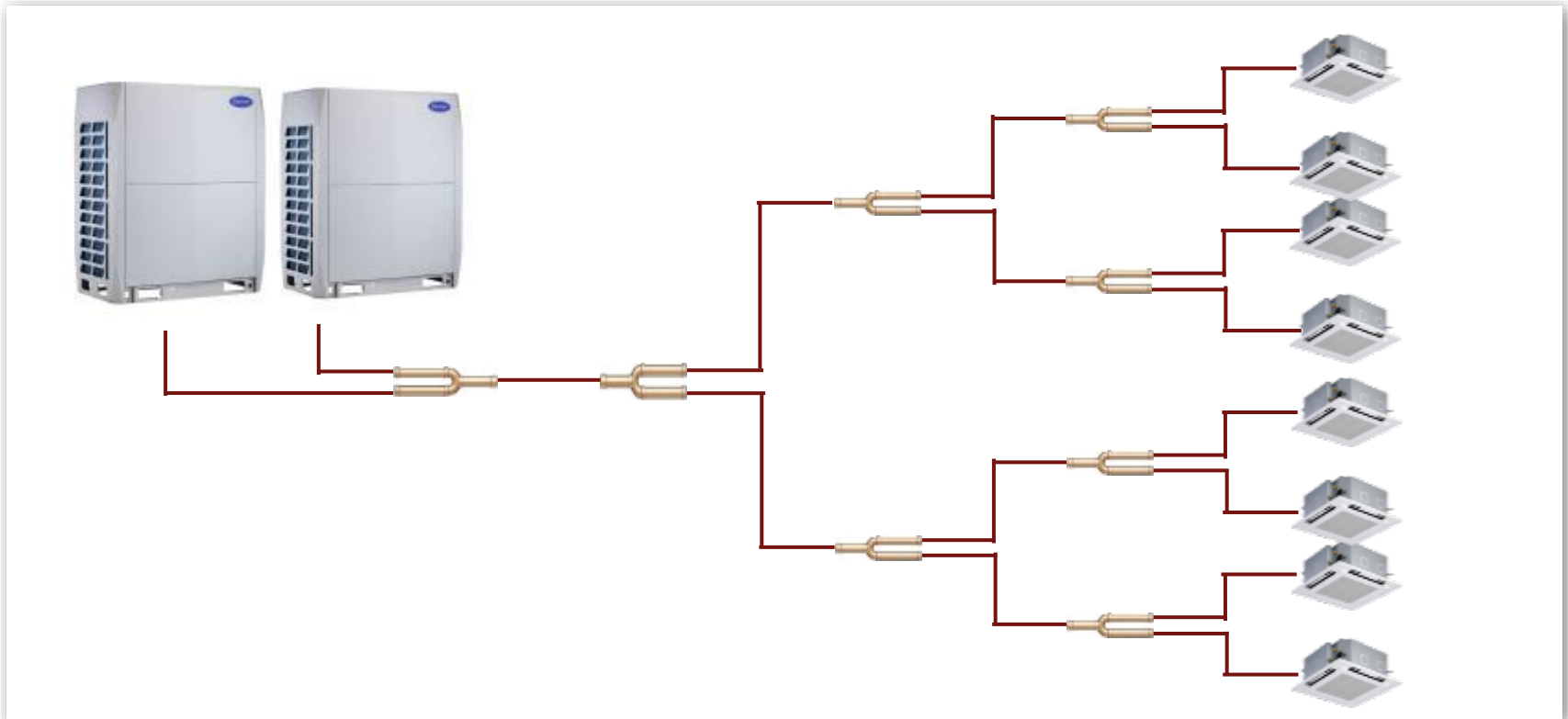
Do not exceed +/- 10 degrees.



Vertical

HEAT PUMP

For Heat Pump Only



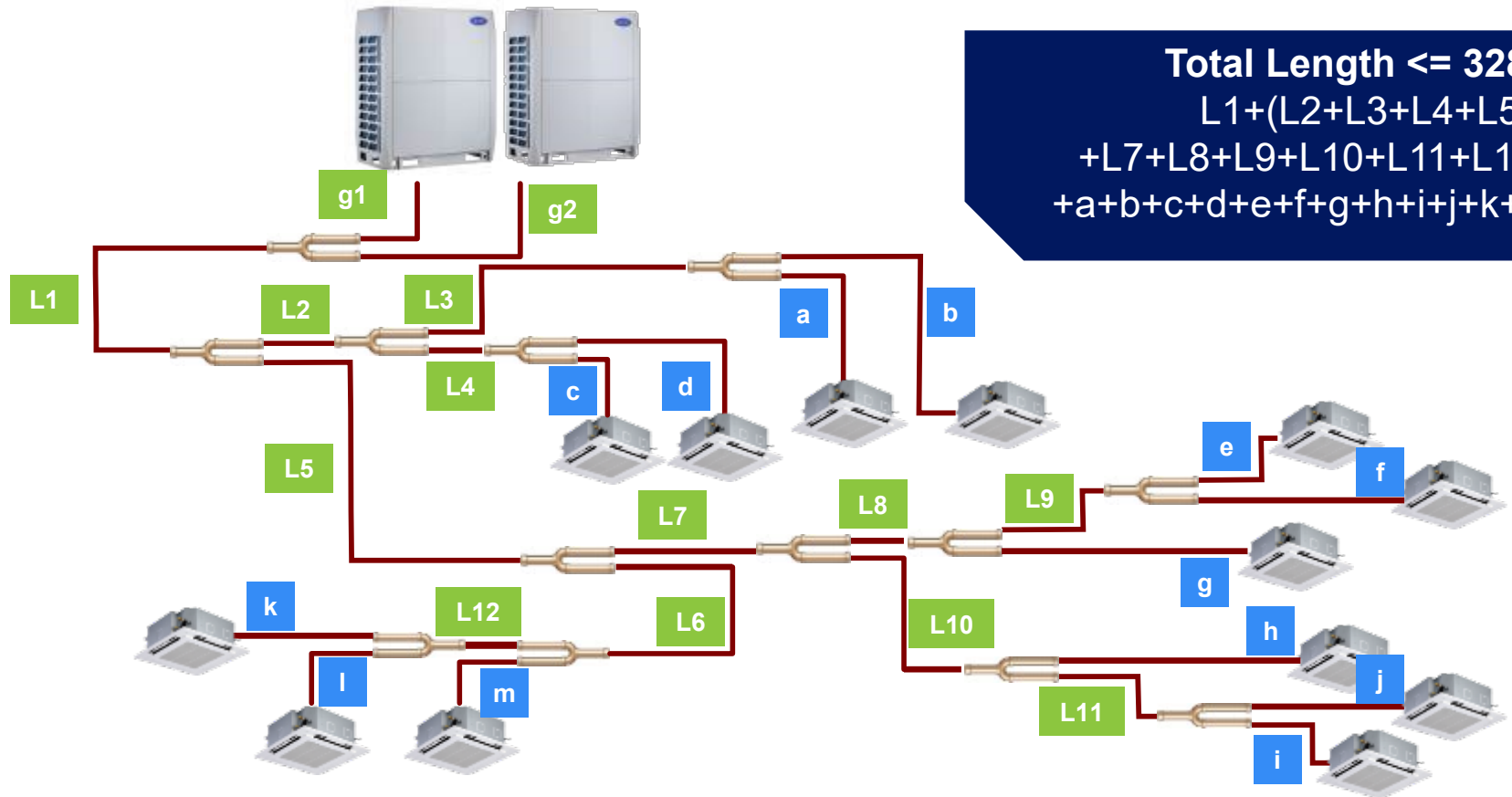
Suggestion:

It's better to connect similar downstream IDU capacity from each branch outlets.

TOTAL EXTENSION OF PIPE (LIQUID PIPE, REAL LENGTH)



For Heat Pump Only

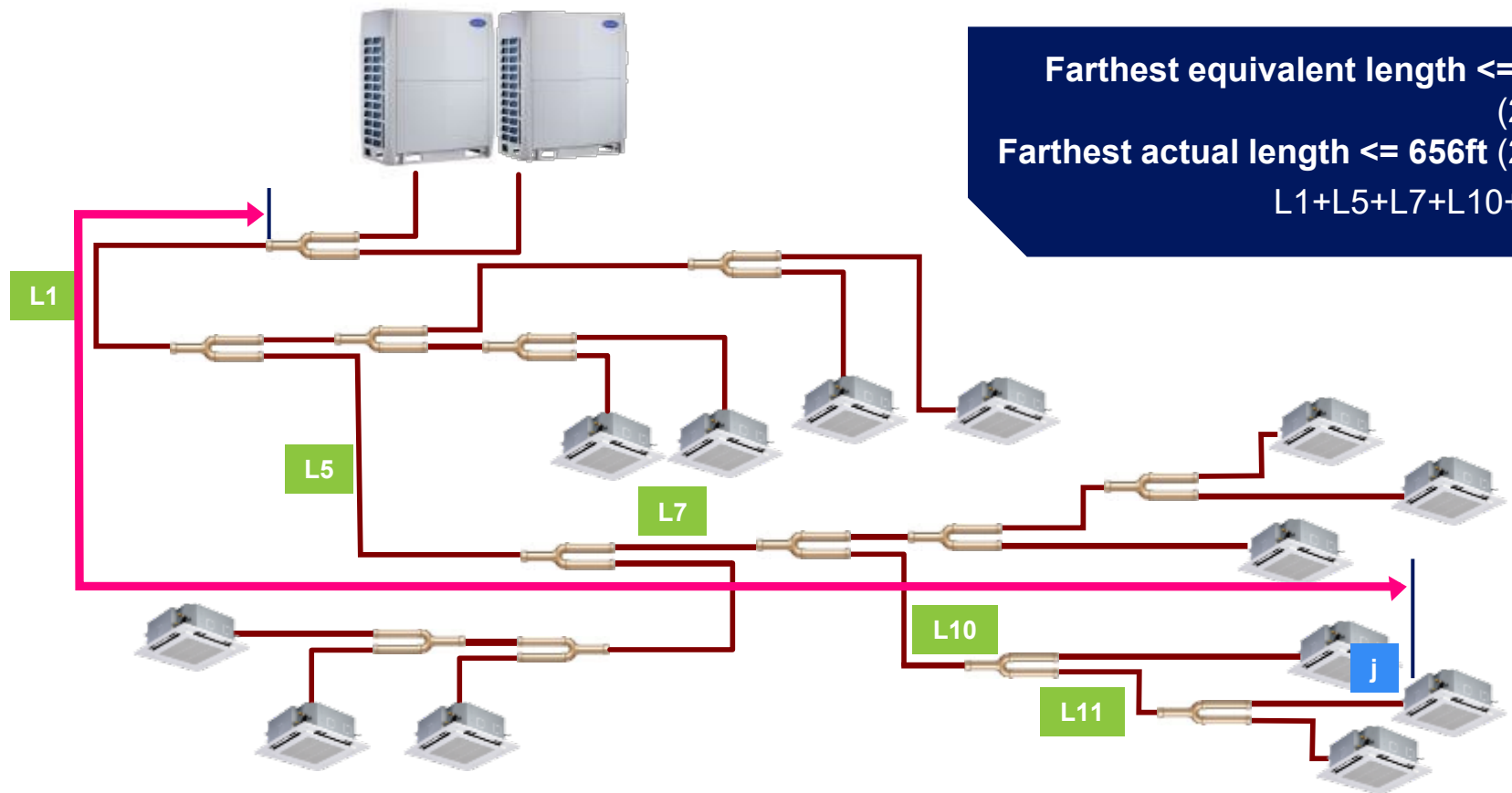


Total Length ≤ 3280 ft
 $L1 + (L2 + L3 + L4 + L5 + L6 + L7 + L8 + L9 + L10 + L11 + L12) * 2 + a + b + c + d + e + f + g + h + i + j + k + l + m$

FARTHEST PIPING LENGTH (L)



For Heat Pump Only



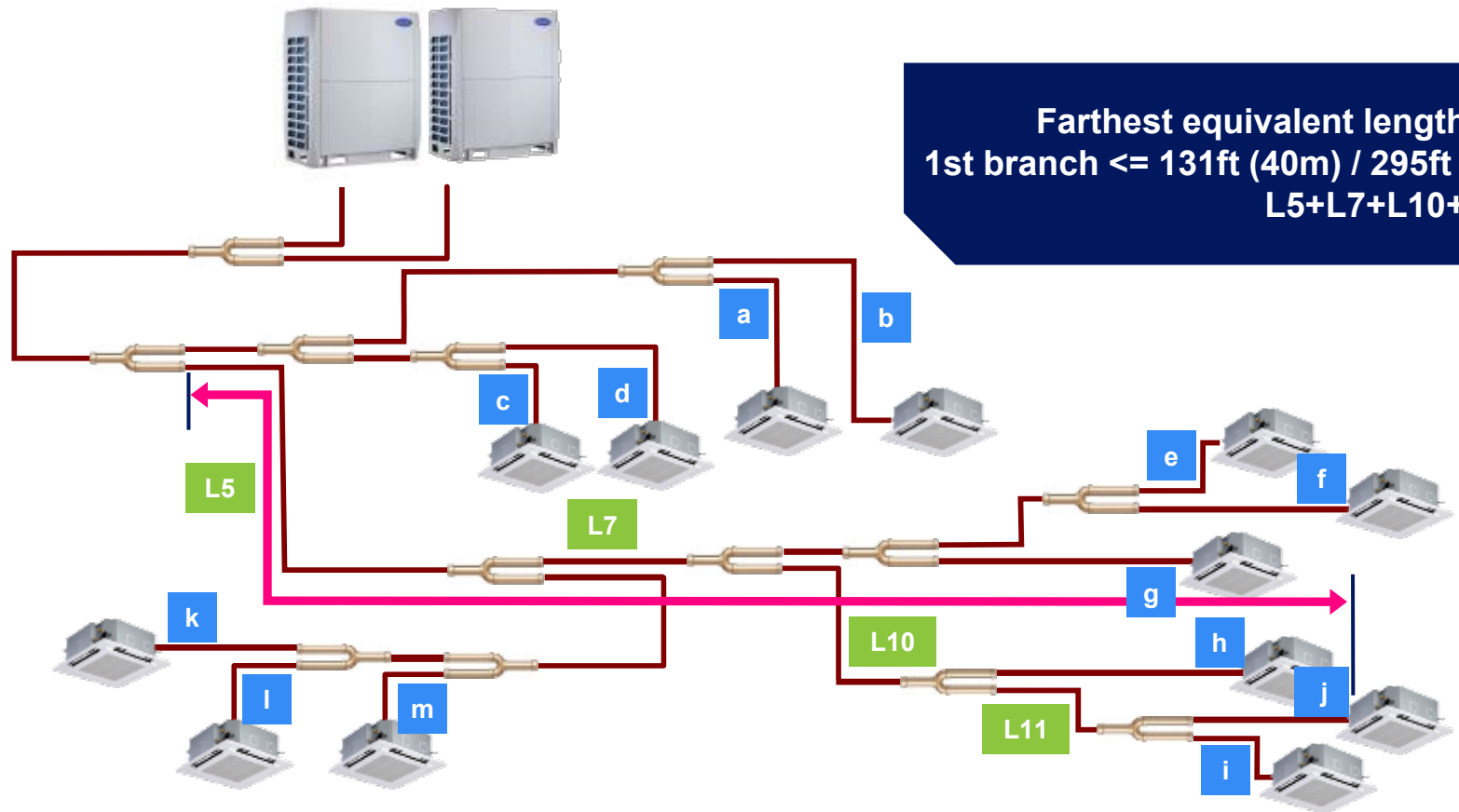
Farthest equivalent length $\leq 738\text{ft}$
(225m)

Farthest actual length $\leq 656\text{ft}$ (200m)
 $L1 + L5 + L7 + L10 + L11 + j$

FARTHEST PIPING LENGTH (L)



For Heat Pump Only

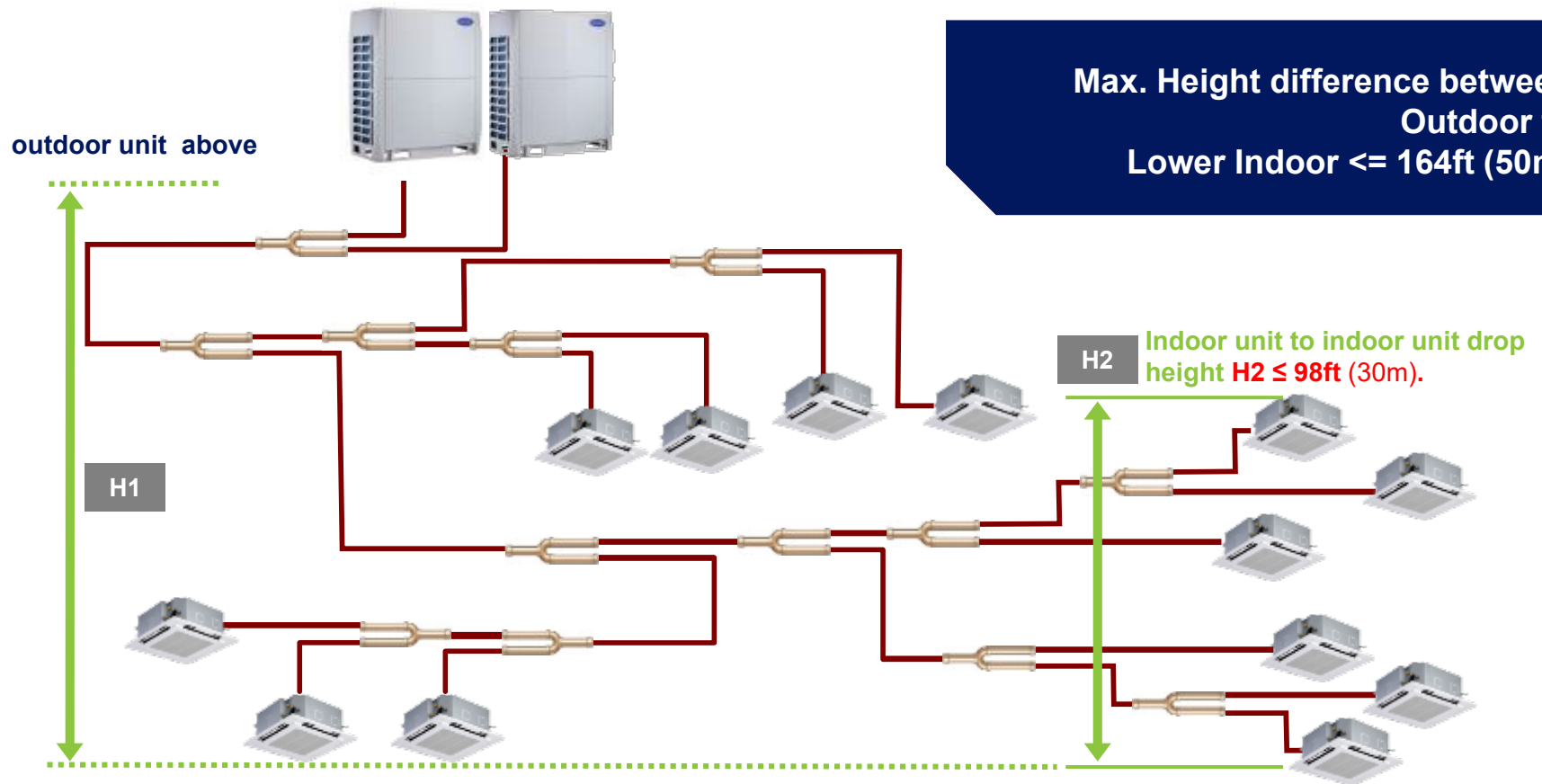


Farthest equivalent length from
1st branch $\leq 131\text{ft (40m)} / 295\text{ft (90m)}$
 $L5+L7+L10+L11+j$

FARTHEST PIPING LENGTH (L)



For Heat Pump Only

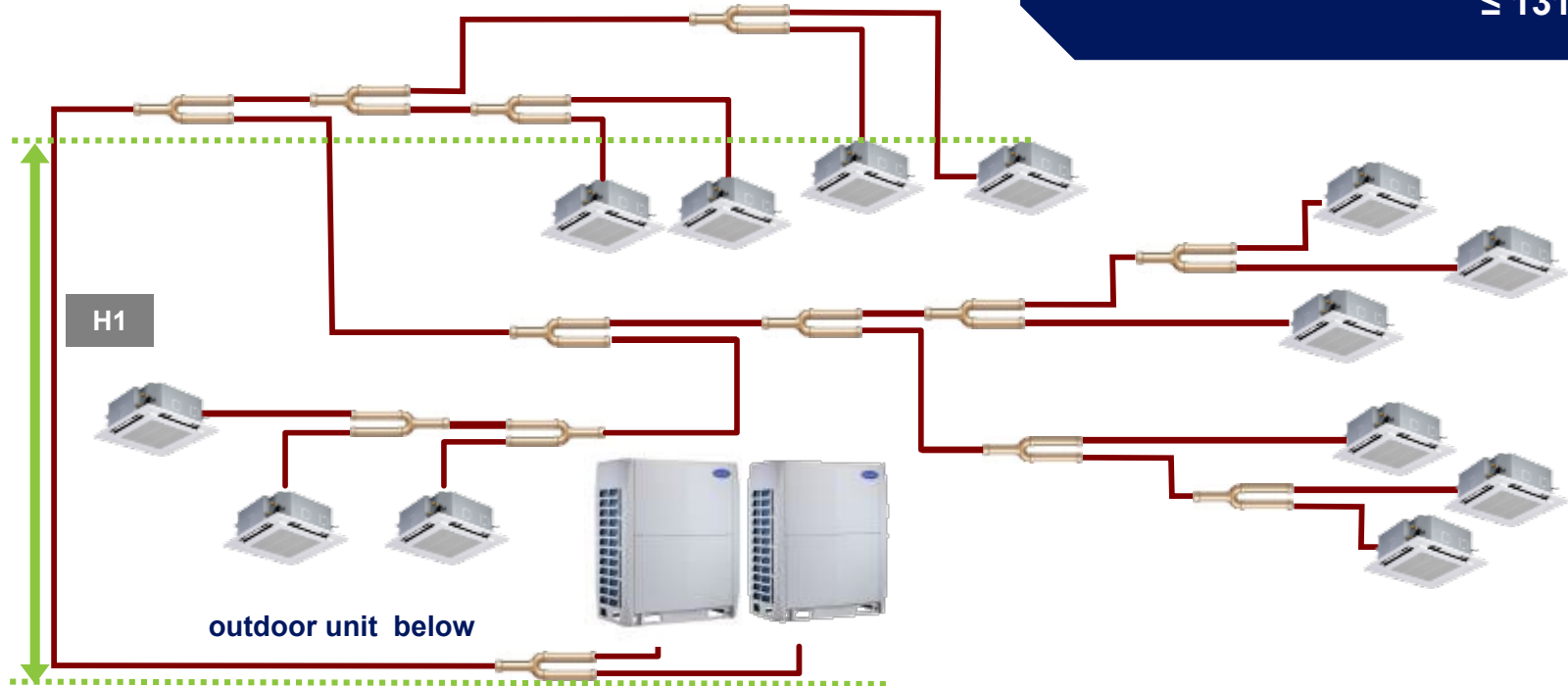


FARTHEST PIPING LENGTH (L)



For Heat Pump Only

Max. Height difference between
Outdoor to
 $\leq 131\text{ft (40m)}$

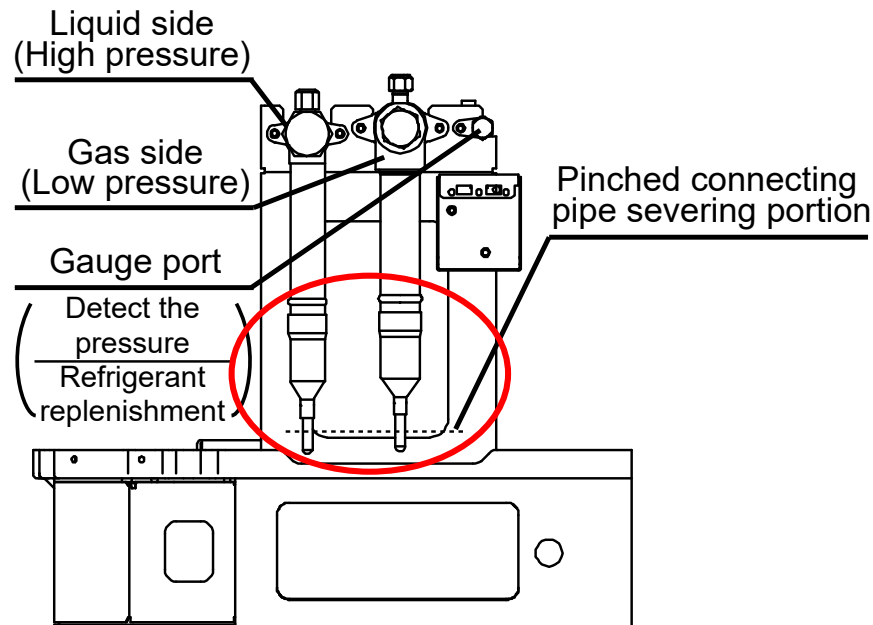


CONNECTION OF REFRIGERANT PIPE



PLEASE REMOVE THE PUNCHED CONNECTING PIPE BEFORE CONNECTING

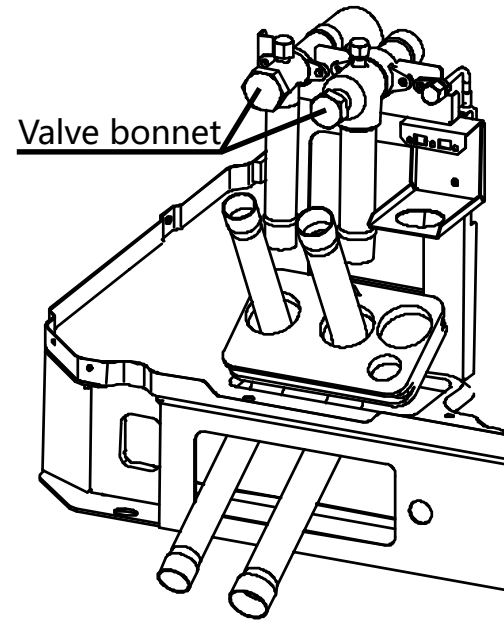
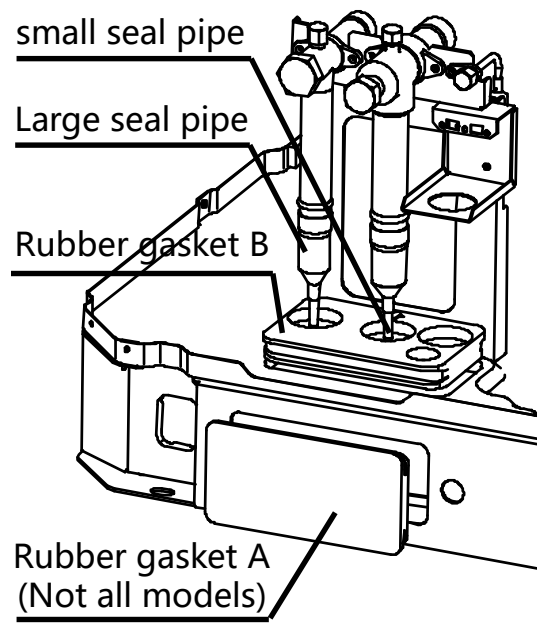
- 1) Check whether the refrigerant service valves are fully closed or not
- 2) Cut down the pinched connecting pipe at the location shown below
- 3) Heating the brazed section to remove the pinched connecting pipe
- 4) Wrap a wet cloth around the valve to keep it cool during brazing.



OUTDOOR UNIT PIPING



- Take out the rubber gasket A and B
- Please use an edge to puncture the thin film in the center of the rubber gasket B, and pass the connective pipe through.



OUTDOOR UNIT PIPING

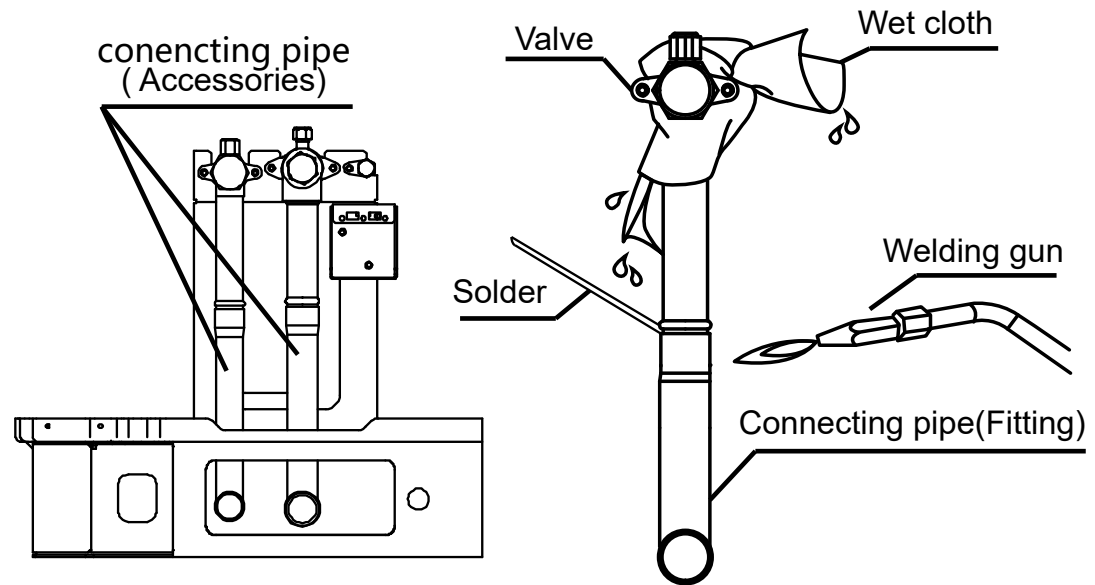


BRAZING WORK

Wrap a wet cloth around the valve to keep it cool during brazing.

If it is not cooled enough, the heat may affect the packing in the valve and cause a refrigerant leak.

Always use nitrogen when brazing.

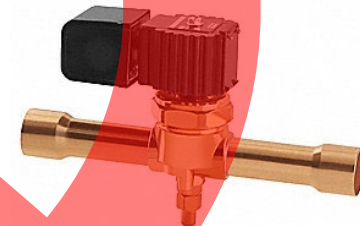
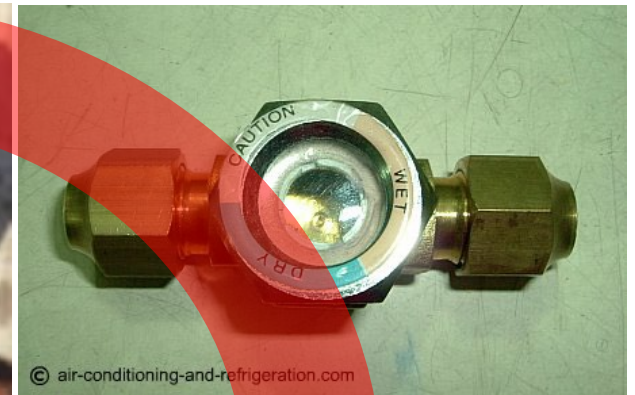


OUTDOOR UNIT PIPING

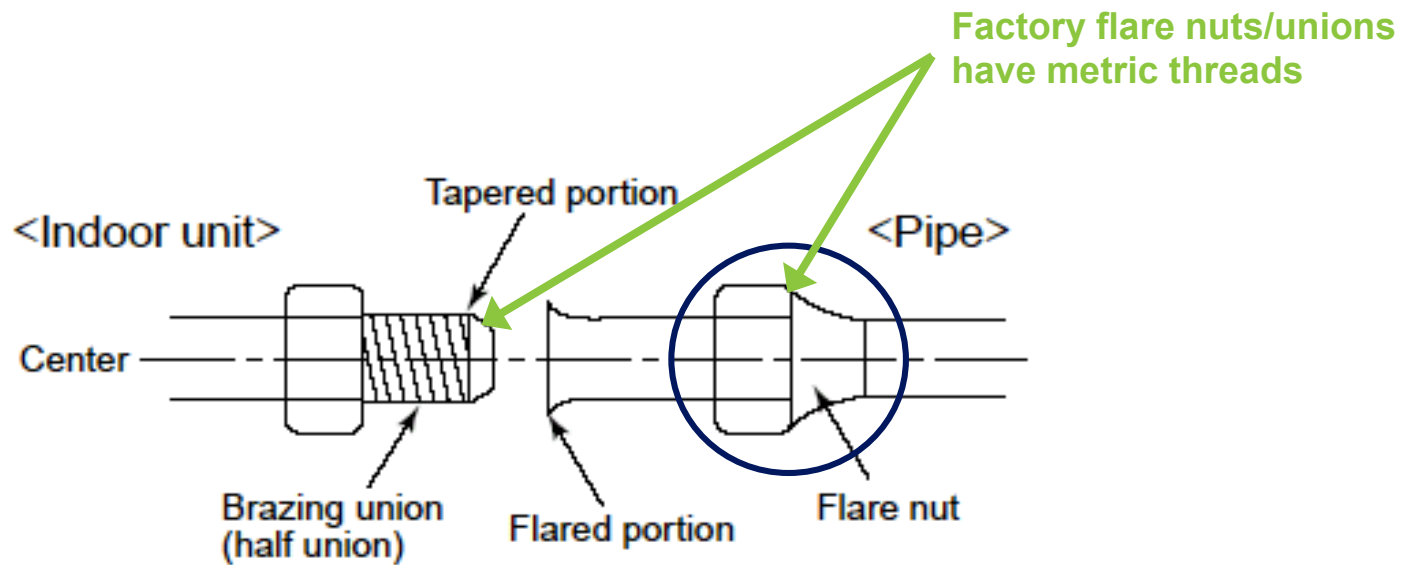


FILTER DRIERS:

DO NOT INSTALL unless you are specifically asked to do so by factory support staff.

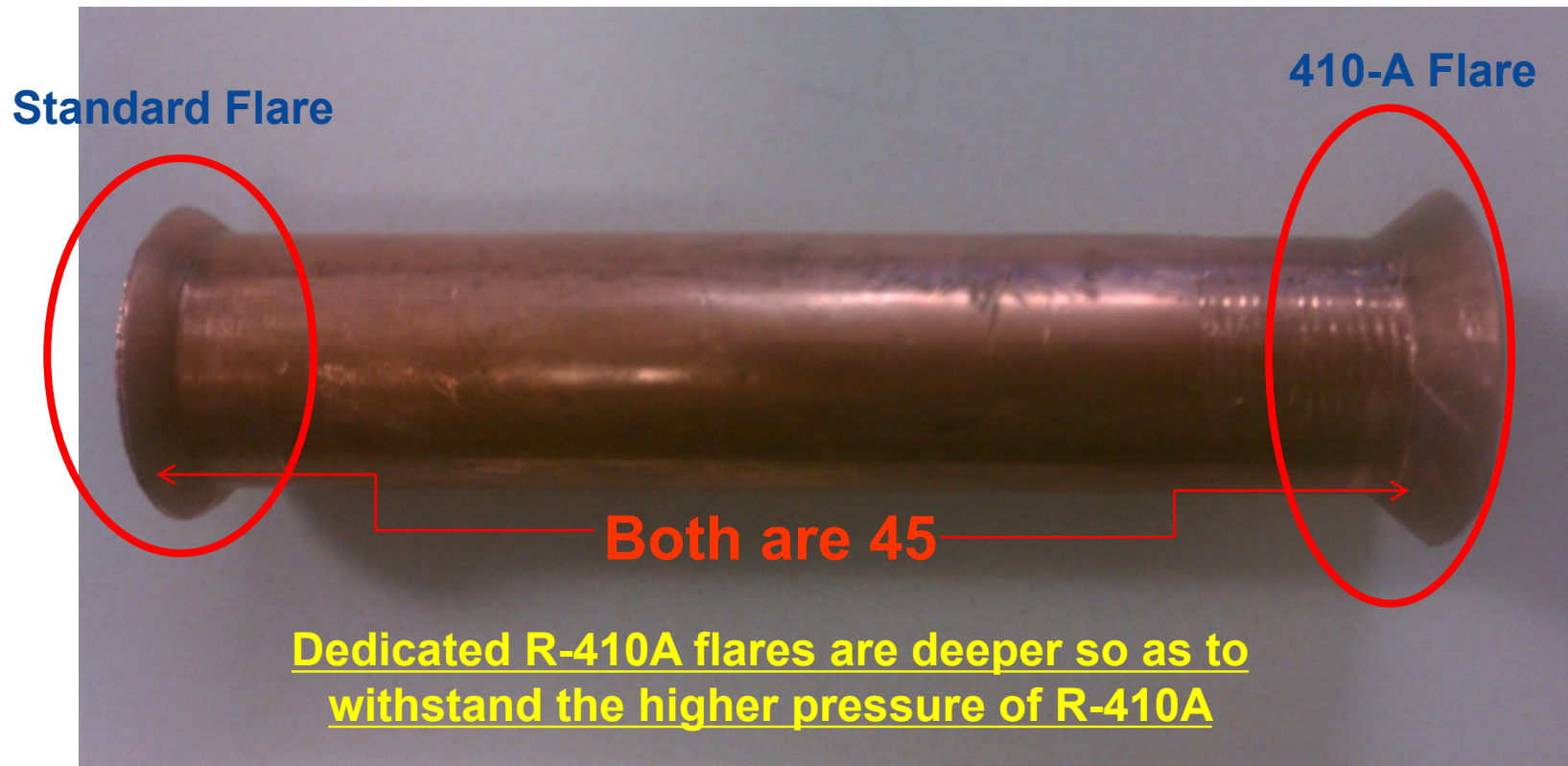


CONNECTION AND CENTERING



Flare is standard 45 degree flare used for R-410a

WHY A DEDICATED R410A FLARING TOOL?



WHY A DEDICATED R410A FLARING TOOL?

✓R-410a Flaring Tool



R410A systems operate at high pressures

- The clutched handle prevents the crushing of the copper tube at the point of the flare. This helps maintain the strength and integrity of the copper tubing so it will withstand the higher operating pressures.
- The concentric cone helps make a uniform flare and reduces the thinning of the tube wall, this also eliminates the need of oil on the inside of the flare which can result in contamination and acid formation within the operating system.

INDOOR UNIT PIPING

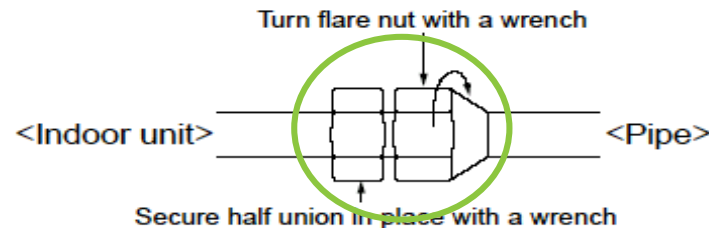


TIGHTENING THE FLARE NUT

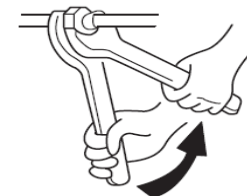
Connecting Pipe Outer Dia. (in)	Ft-lbs.
Ø1/4"	10 to 13
Ø3/8"	24 to 31
Ø1/2"	37 to 46
Ø5/8"	50 to 60



**Torque
wrench**



Use a backup wrench



WHAT IS WRONG WITH THIS PICTURE?



WHAT IS WRONG WITH THIS PICTURE?



WHAT IS WRONG WITH THIS PICTURE?



INSTALLATION

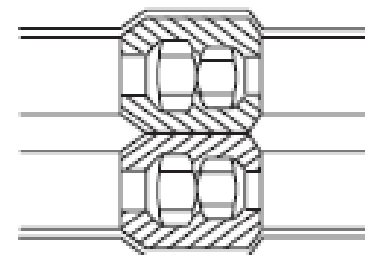
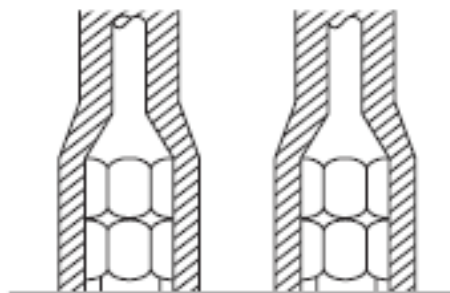
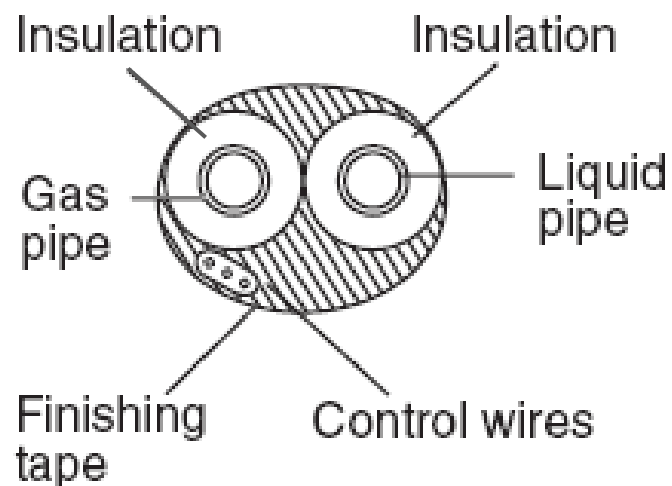
INSULATION AND CONDENSATE

MATERIAL

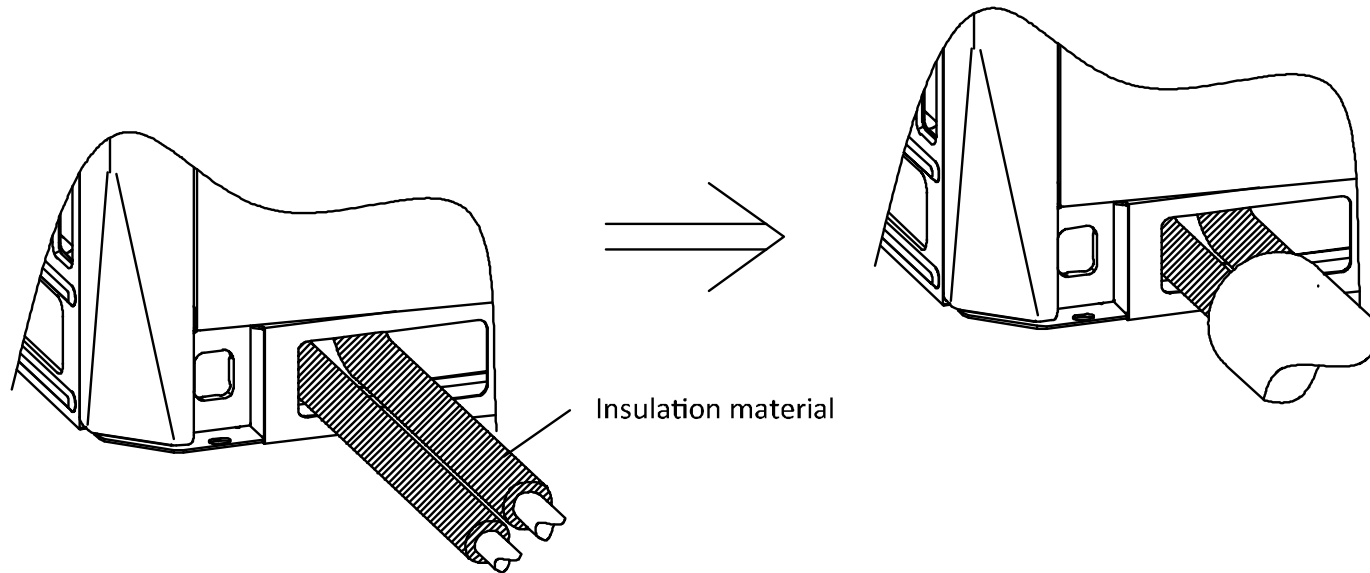
**245° F Closed cell foam pipe insulation
material as specified by local and
national codes**

INSULATION GUIDELINES

Insulating the gas pipe and liquid pipe individually, all piping joints must be insulated and sealed to the main pipe insulation.



INSULATION & CONDENSATE INSTALLATION

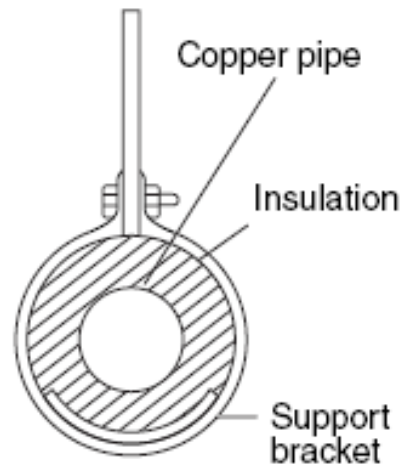


Pipe	
ODU to MDC	High pressure pipe
	Low pressure pipe

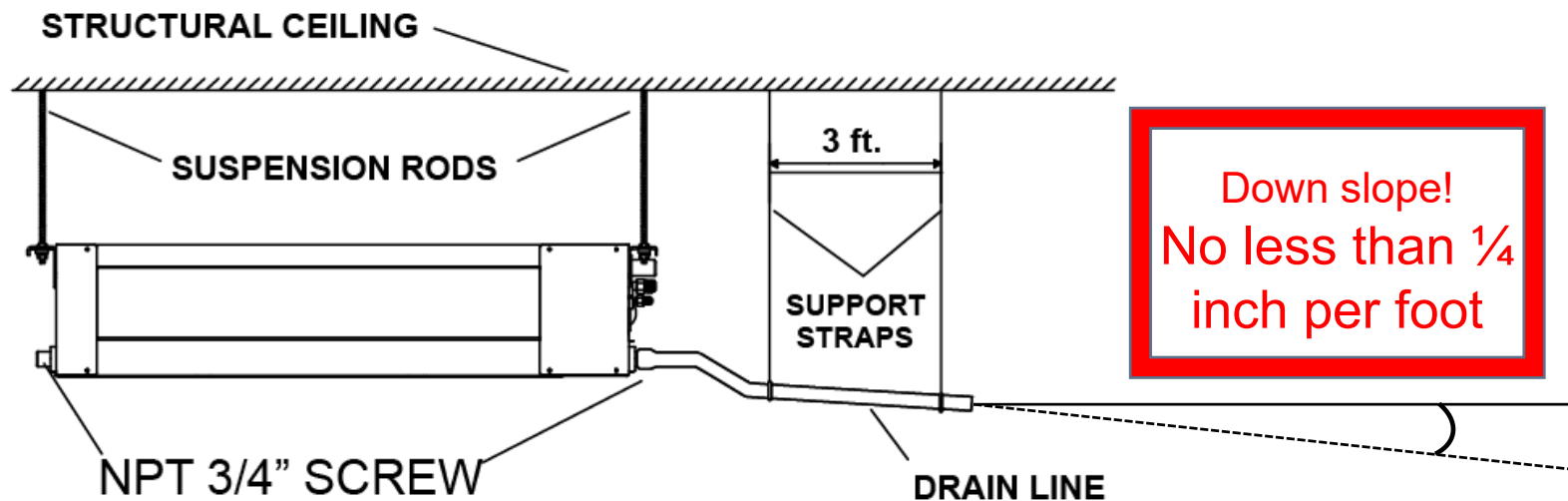
INSULATION GUIDELINES

When insulating a supported section pipe:

Insure pipe is insulated fully. Some support systems will require clamp to be insulated.

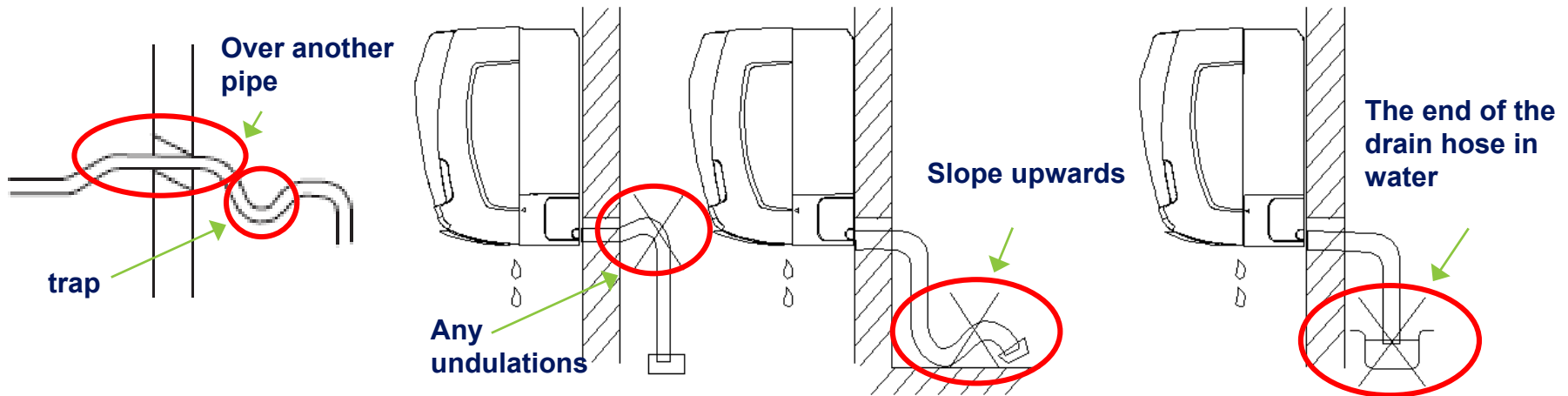


DRAIN PIPE PITCH

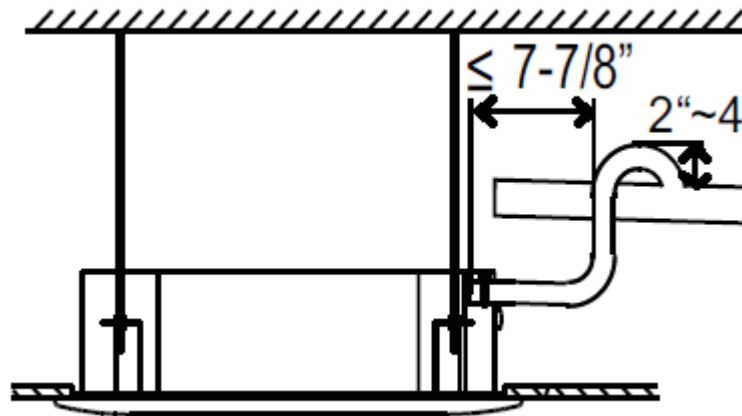
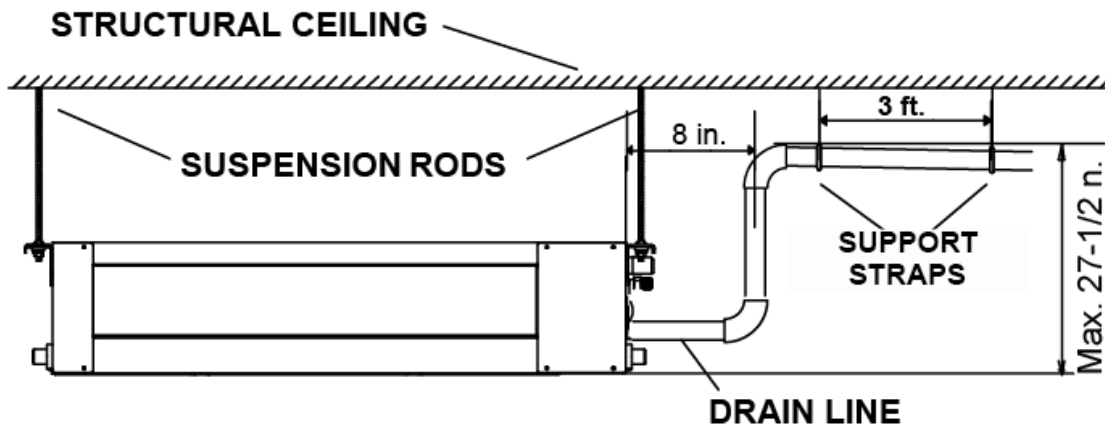


Please utilize sealing materials and pipe sheath when installing!

DRAIN PIPING ERRORS



DRAIN HEIGHTS



If not kept, drain over flow trouble may occur!

MDC and Sub MDC must have a condensate drain with no traps



Condensate Drain

INSTALLATION

ELECTRICAL

OUTDOOR UNIT POWER SUPPLY

Item	Specification
Wiring	3 Conductors plus Ground (L1,L2,L3 & Ground)
Volts, Phase & Hertz	208/230V-3Ph-60Hz 460V-3Ph-60Hz

MDC AND INDOOR UNIT POWER SUPPLY

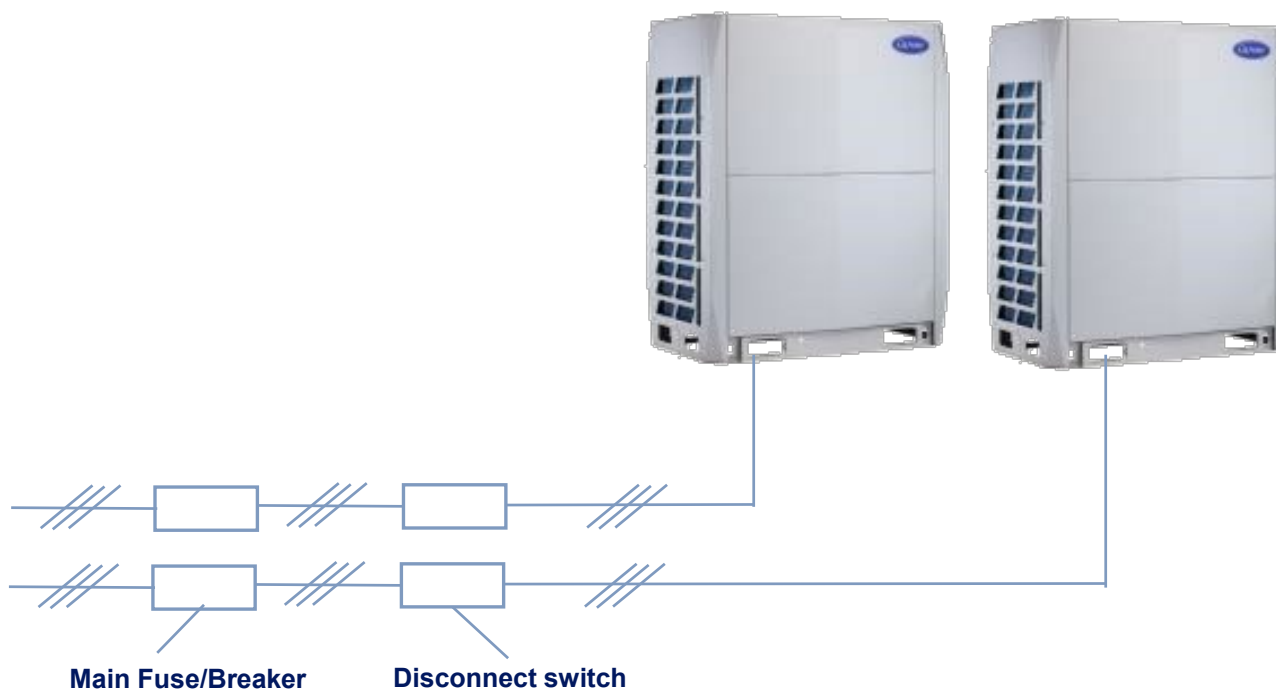
	Power supply	Wire size
MDC unit	208/230V-3Ph-60Hz	2 Conductors plus Ground (L1,L2 & Ground)
ALL models of indoor units	208/230V-3Ph-60Hz	2 Conductors plus Ground (L1,L2 & Ground)

Must be independent from the outdoor unit power supply.

POWER WIRING FOR HEAT PUMP OUTDOOR UNIT

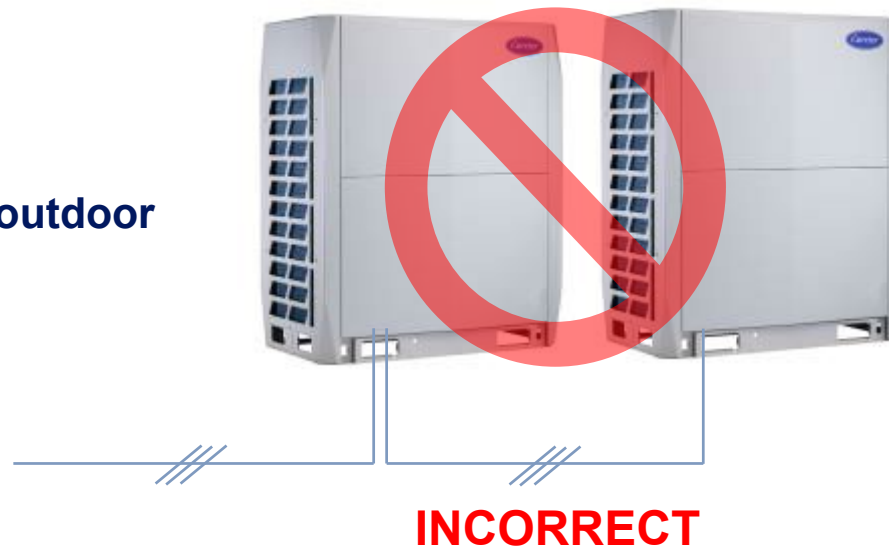


ALL OUTDOOR UNIT FIELD POWER MUST BE WIRED INDIVIDUALLY



POWER WIRING FOR OUTDOOR UNIT

Power supply for outdoor units



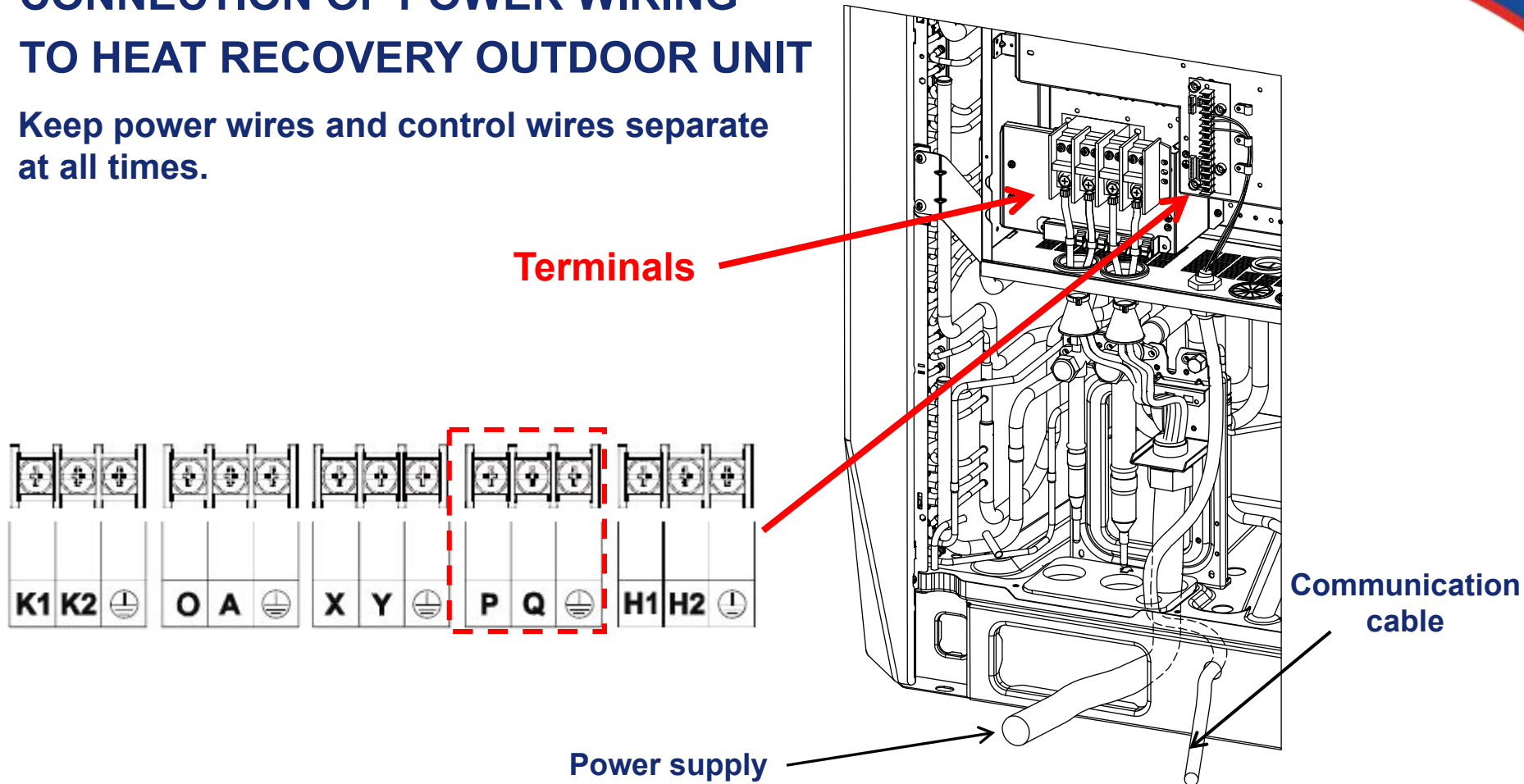
Do not connect field power wiring from unit to unit

POWER WIRING FOR OUTDOOR UNIT



CONNECTION OF POWER WIRING TO HEAT RECOVERY OUTDOOR UNIT

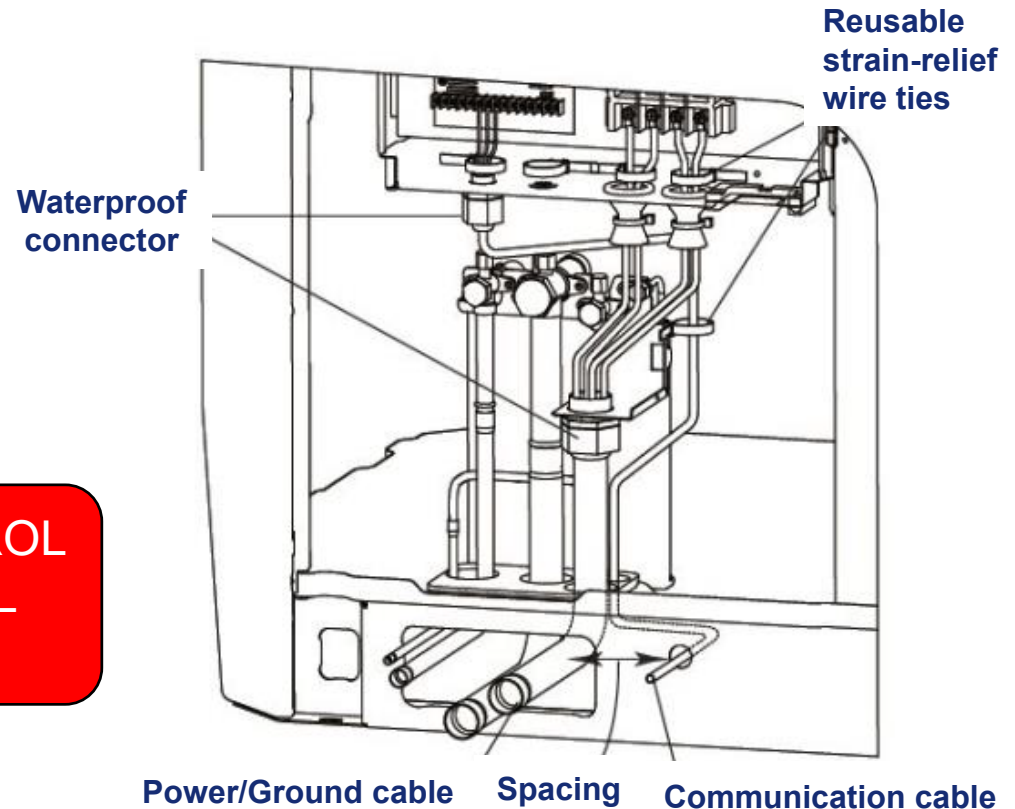
Keep power wires and control wires separate
at all times.



POWER WIRING FOR OUTDOOR UNIT



CONNECTION OF POWER WIRING TO OUTDOOR UNIT

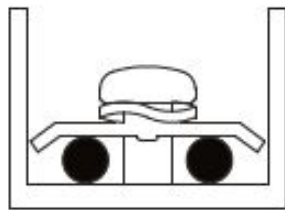


**KEEP POWER AND CONTROL
WIRES SEPARATE AT ALL
TIMES!**

POWER WIRING FOR OUTDOOR UNIT

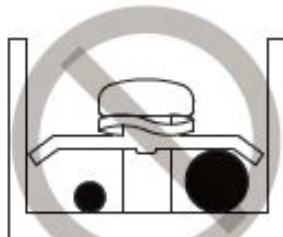
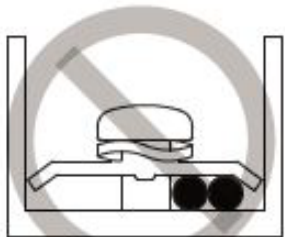


POWER SUPPLY TERMINAL BLOCK

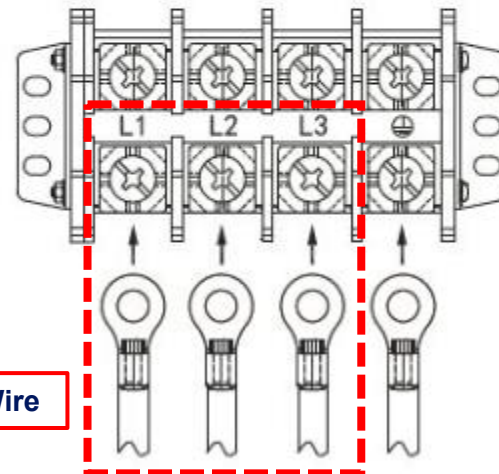
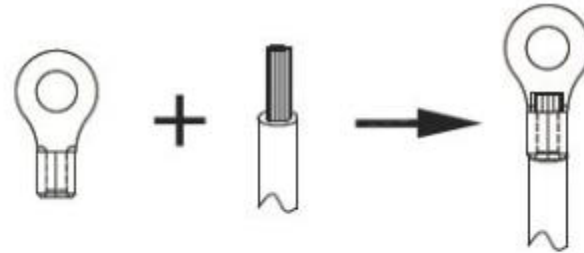


● : Copper wire

Proper power wiring connections



Improper power wiring connections



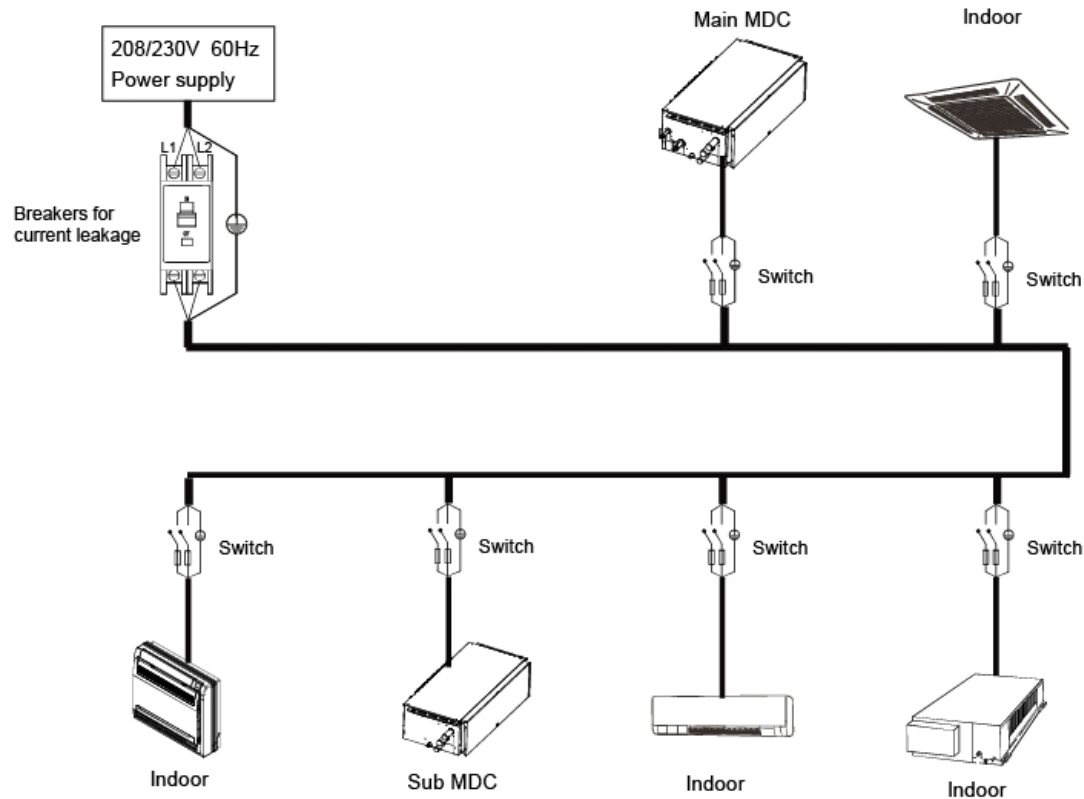
Power Supply Wire

Ground Wire

INDOOR UNIT WIRING



INDOOR UNITS AND MDC CAN SHARE THE SAME POWER SUPPLY

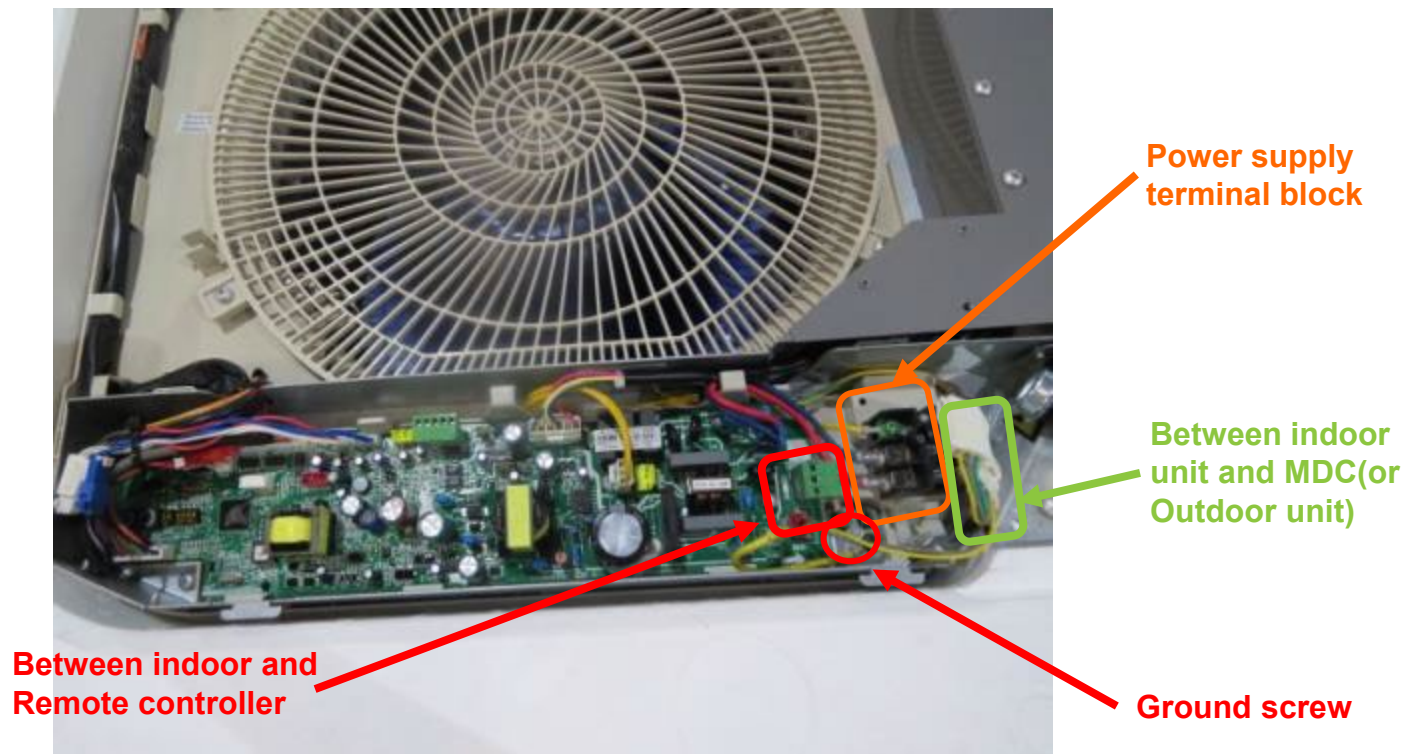


INDOOR UNIT WIRING



CONNECTION OF INDOOR UNIT TERMINAL

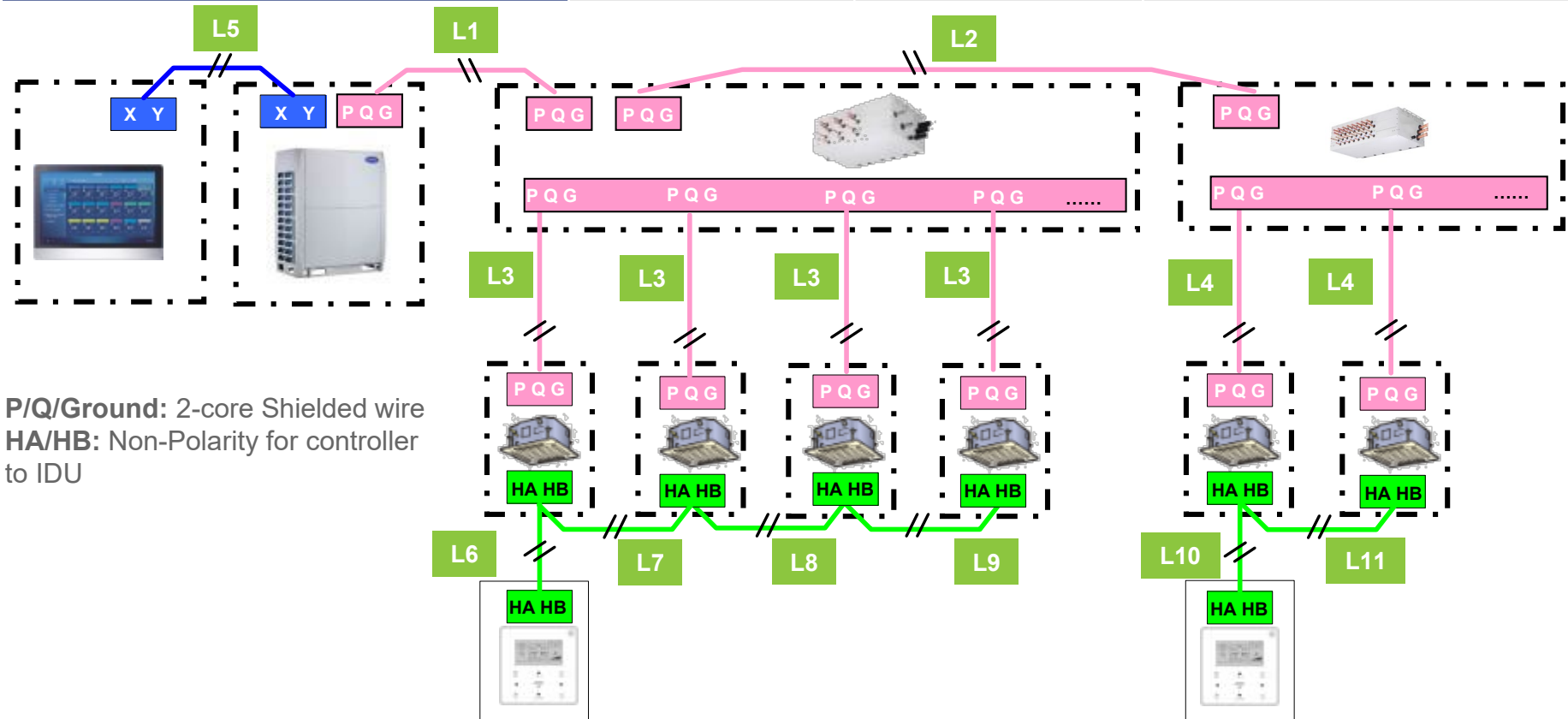
Sample : 4-Way Cassette Type



COMMUNICATION WIRING FOR HR



Max. length to Outdoor	L1+L2,L5	≤3937ft. [1200m]	AWG 18-16
Max. total length to Indoor units	L3, L3+L4	≤3937ft. [1200m]	AWG 18-16
Max. length from controller to indoor units	L6+L7+L8+L9, L10+L11	≤820ft. [250m]	AWG 20-16

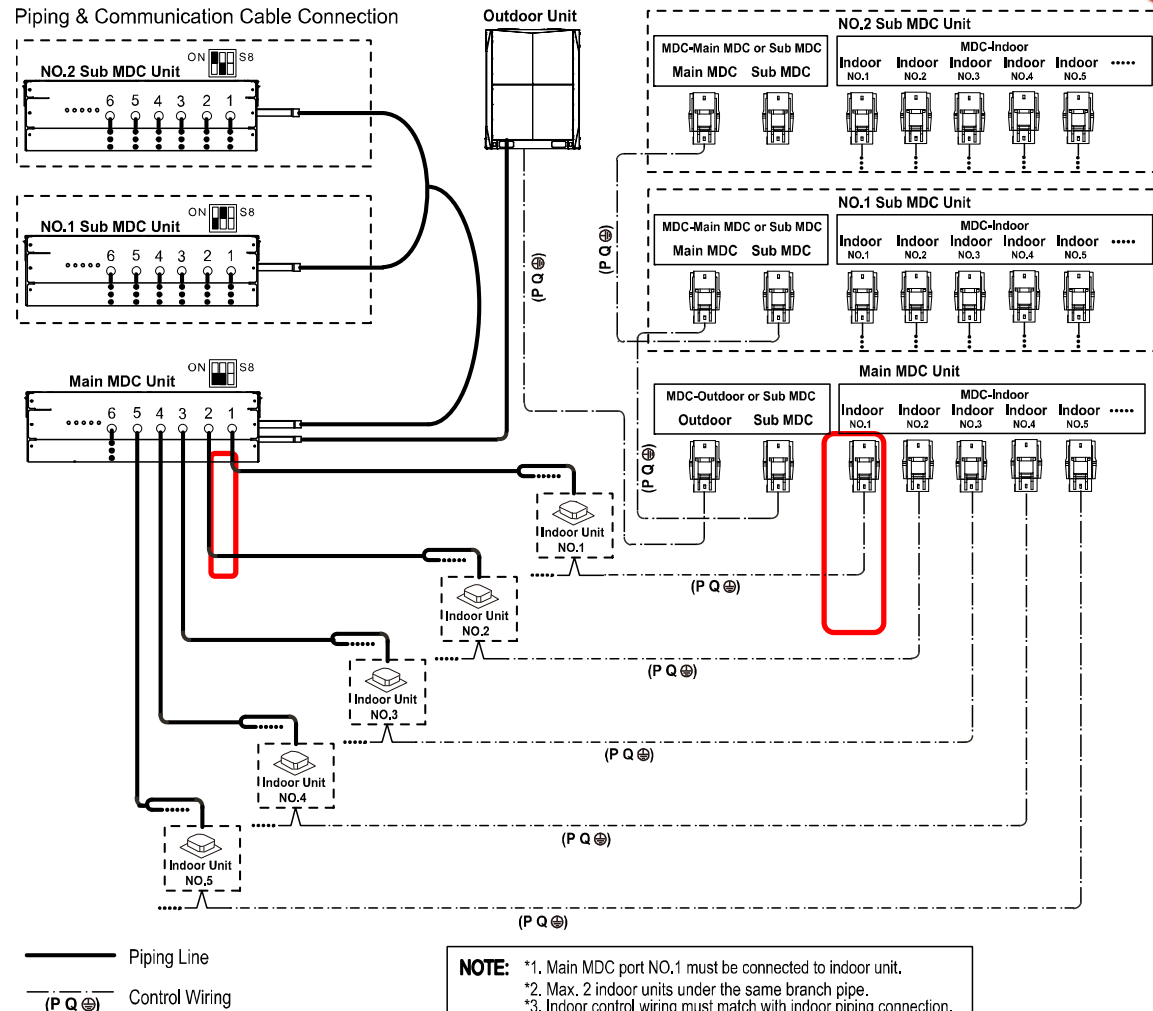
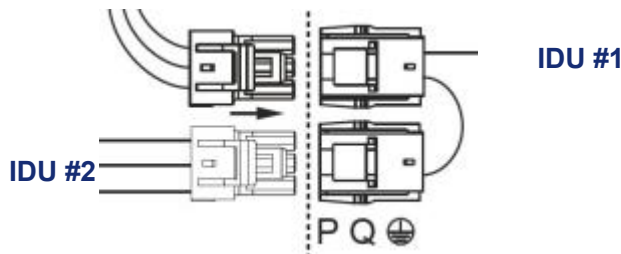


COMMUNICATION WIRING FOR HR

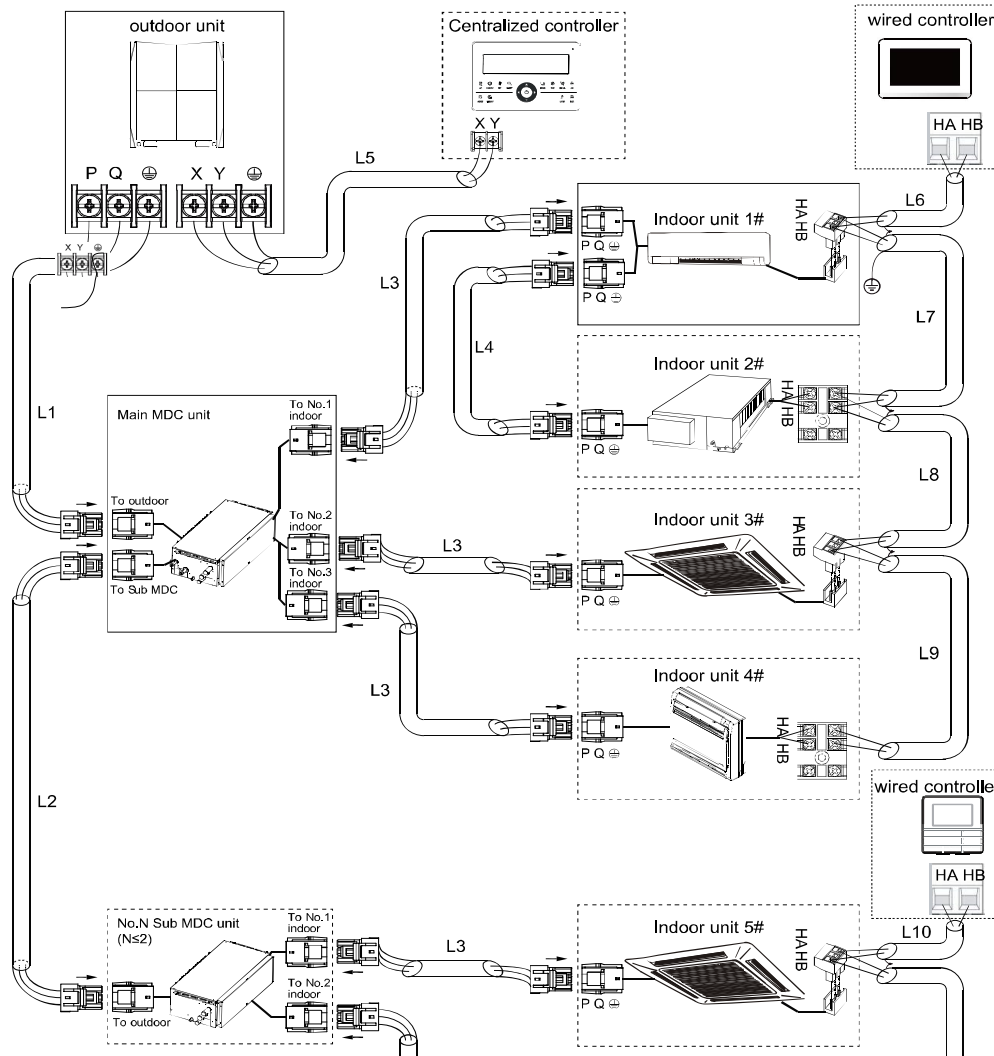


NOTE:

- Make sure that there is IDU connected to **Port 1** for proper communication.
- Use either communication terminal block if two ports have been emerged for 72/96K IDU
- Connect PQ+Ground from one IDU to another one if two IDU connected to one port



COMMUNICATION WIRING FOR HR



COMMUNICATION WIRING FOR HR

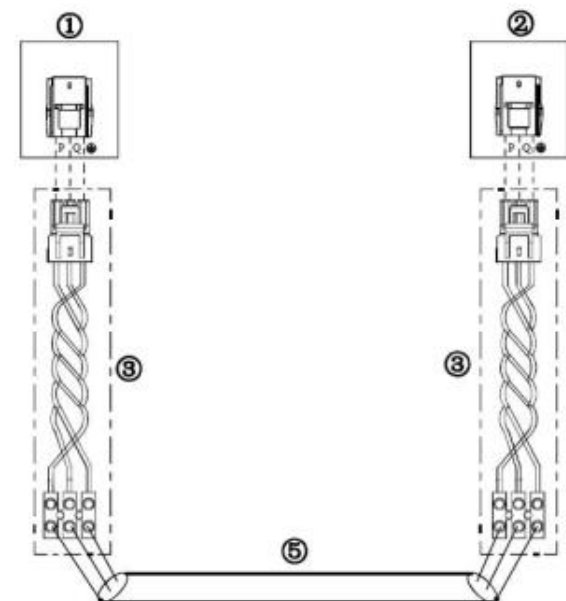


NOTE:

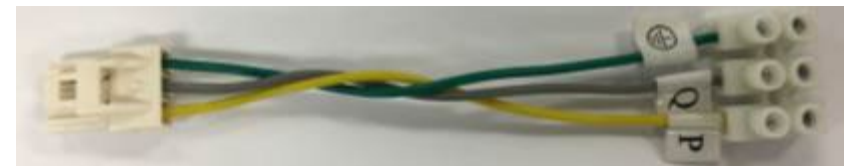
- Do not tie the communication cable together with the power wires.
- When parallel layout the power wire and communication cable, the distance should be over 12 inches, in case signal source interference.



Connector (Female to Female)
40VM900015



Connector (Pig Tail)
40VM900016

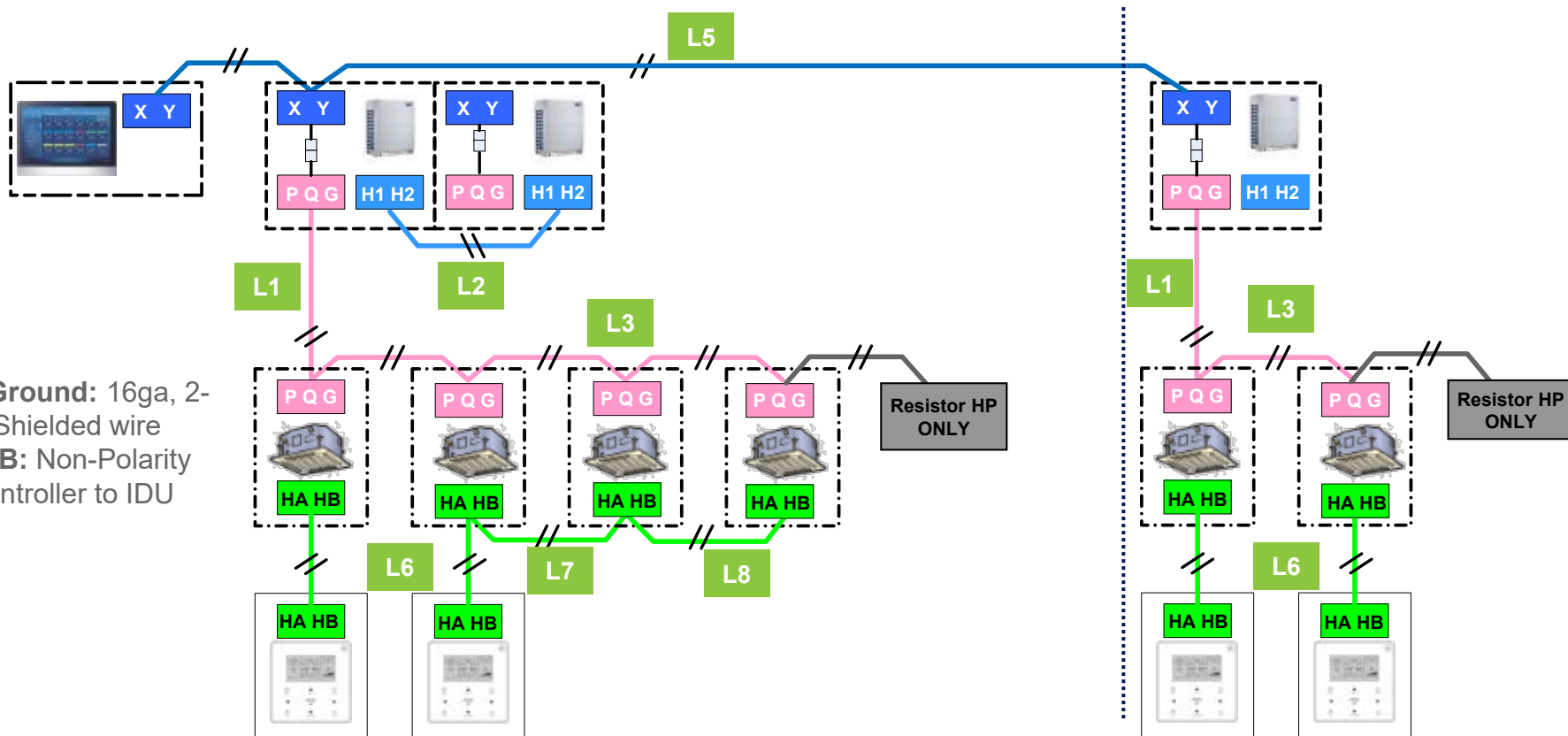


COMMUNICATION WIRING



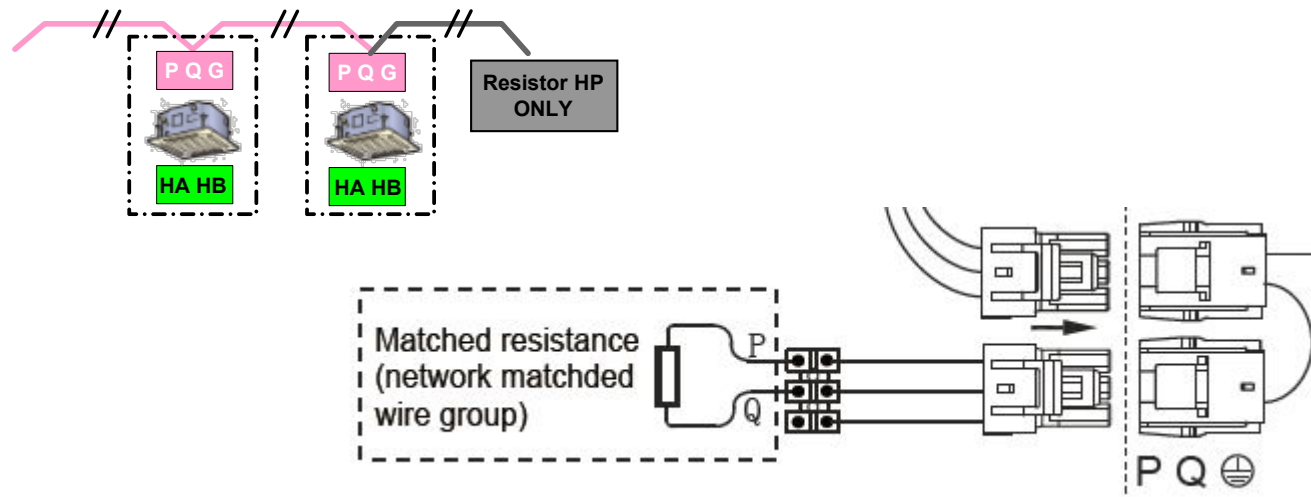
Max. length to Outdoor	L5	≤3937 ft. [1200m]	AWG 18-16
Max. total length to Indoor units	L1+L3, L3+L4	≤3937 ft. [1200m]	AWG 18-16
Max. length from controller to indoor units	L6, L6+L7+L8	≤820 ft. [250m]	AWG 20 to 16

P/Q/Ground: 16ga, 2-core Shielded wire
HA/HB: Non-Polarity for controller to IDU



For Heat Pump Only

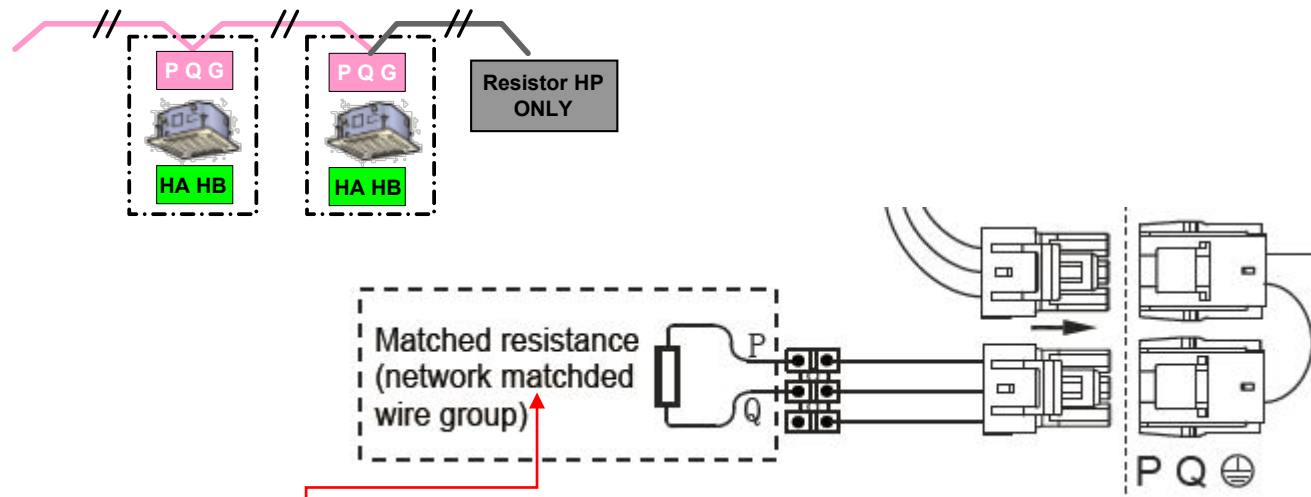
ENHANCE STABILITY OF COMMUNICATION



Please connect this 120 ohm resistor located in the outdoor unit accessory bag to the last IDU.

For Heat Pump Only

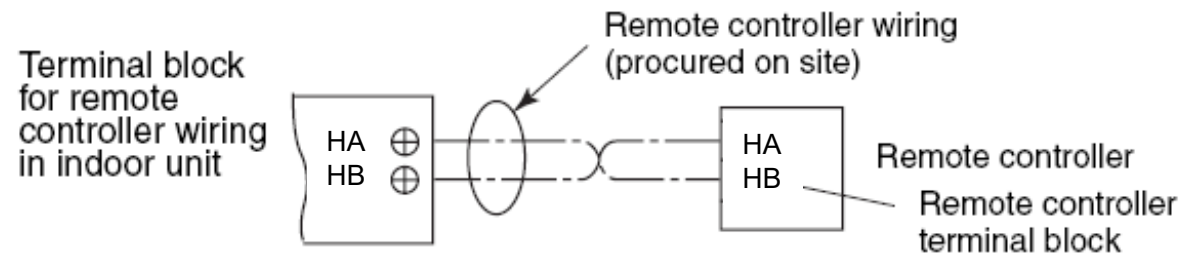
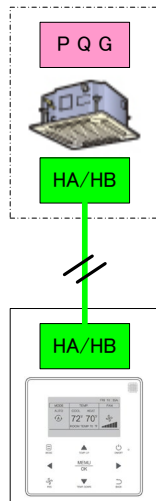
ENHANCE STABILITY OF COMMUNICATION



Please connect this 120 ohm resistor located in the outdoor unit accessory bag to the last IDU.

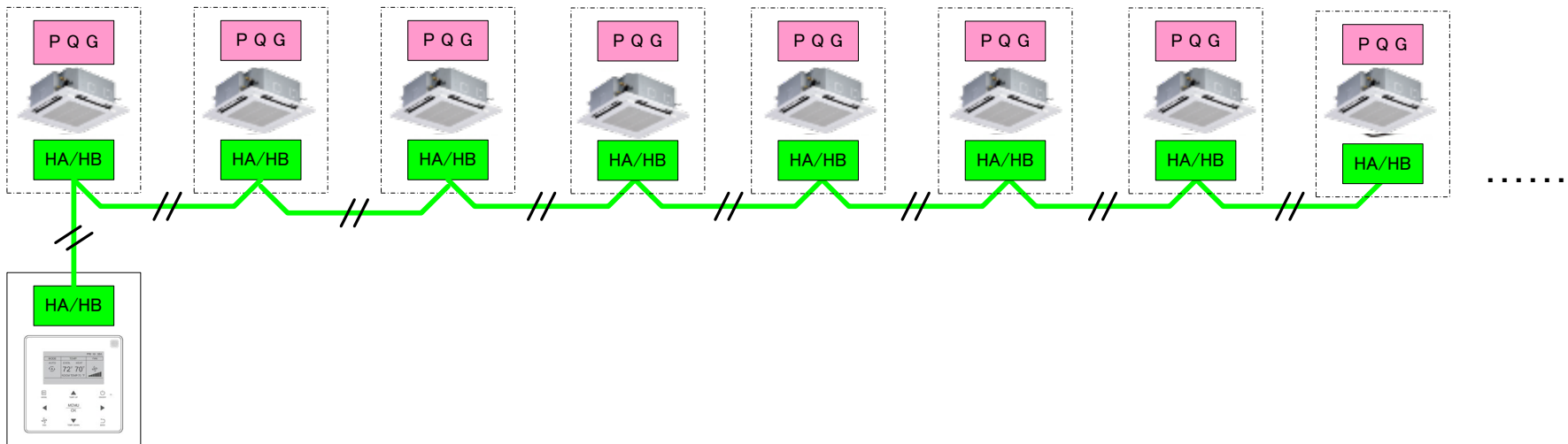
YES, THERE IS A TYPO FROM THE FACTORY MANUAL

CONNECTION OF REMOTE CONTROL Individual Control



Terminals A and B are 2-core non-polarity

COMMUNICATION WIRING



Max. 16 indoor units connectable for one group control.

INSTALLATION

LEAK TEST

LEAK TESTING



Sub MDC



MDC



MDC and Sub MDC must be powered on during pressure testing and evacuation.

EEV's are open 240 pulses before system is powered.

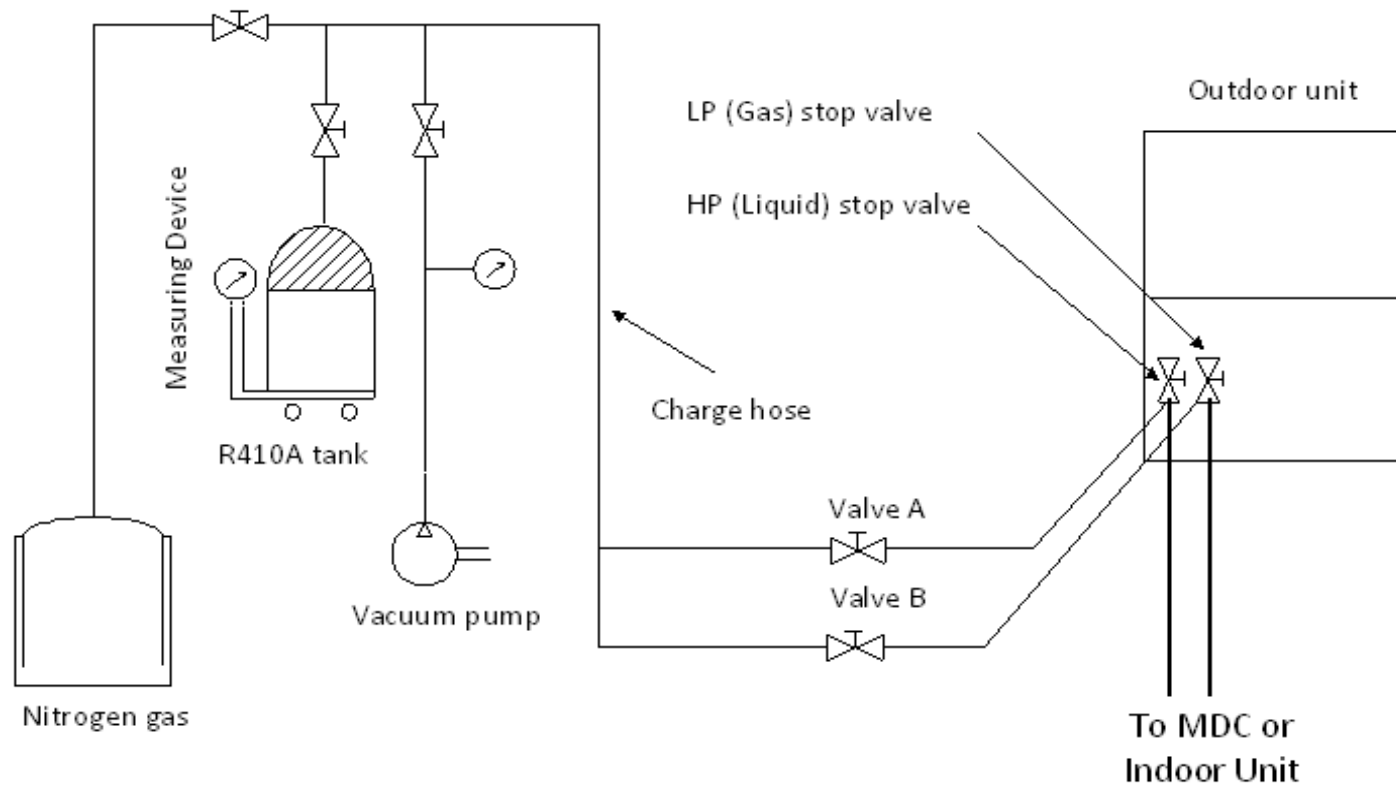
Once powered solenoid valves open for **5 minutes**.
EVX A/B/C open to 120p and hold position.

LEAK TESTING



LEAK TEST METHOD

Be sure to apply pressure to the gas, liquid, and balance piping



LEAK TESTING



Step 1	50psi	at least 3 minutes	FOR LARGE GAS LEAKS
Step 2	200psi	at least 3 minutes	FOR LARGE GAS LEAKS
Step 3	500psi	at least 24 hours	FOR SLOW GAS LEAKS

The pressure will change by approx. 2.6psi per 1 deg. F.

- Record time & temperature
- Compare start test data and adjust by temperature difference

VACUUM MODE ON SPOT CHECK BOARD

This control is used to open solenoid valves and electronic expansion valves in the whole system.

Make sure that the HP shutoff valve and LP shutoff valve are all fully **CLOSED** (*On the case that outdoor unit needs service, keep these shutoff valves open*).

Press **MENU** for 5sec. to the parameter setting interface, press “**UP/DOWN**” to select “n23” and **OK** to confirm.

The LED will display r003.

Remarks:

- During the vacuum mode, the high/low pressure sensor error and low pressure protection should be ineffective (Use short connectors instead the ones plugged in main board if not).
 - The 4-way valve is **OFF**, and compressors or fans are prohibited to run.
 - Power off the outdoor unit to exit this function.

VACUUM



Pressure test
piping to 500
psig for 24
hours

Evacuate to
1500 microns

Pressure
back to 0 psig
with dry
nitrogen

Evacuate to
1000 microns

Pressure
back to 0 psig

Evacuate to
500 microns
minimum

Perform hold
test for 1 hour



No Micron Rise

Go to "addition of refrigerant"



Loss of Vacuum

Check for Leaks

INSTALLATION

ADDITIONAL REFRIGERANT CHARGE IN THE FIELD

REFRIGERANT CHARGE HEAT RECOVERY



Additional refrigerant charge for 38VMA***RD R410A Series

High pressure pipe(ODU to MDC) diameter (in)	Additional refrigerant amount for high pressure pipe (lb/ft)
5/8	0.060
3/4	0.094
7/8	0.141
1-1/8	0.255

+

Liquid pipe diameter (in)	Additional refrigerant amount for liquid pipe (lb/ft)
1/4	0.015
3/8	0.038
1/2	0.074
5/8	0.114

+

Main MDC Model name	Charged amount for main MDC (lb)
40VMD006M--3	11.023
40VMD008M--3	
40VMD010M--3	
40VMD016M--3	

+

Sub MDC Model name	Charged amount for sub MDCs (lb)
40VMD006S--3	2.205
40VMD008S--3	2.205
40VMD010S--3	4.409
40VMD016S--3	4.409

+

Combination ratio	Additional for combination ratio
50% ~ 100%	0
>100% ~ <=120%	1.102
>120% ~ <=130%	2.205
>130% ~ <=150%	3.307

=

Additional refrigerant charge amount (lbs)

REFRIGERANT CHARGE HEAT PUMP



FOR HEAT PUMP ONLY

Additional refrigerant charge for 38VMA***HD R410A Series

How to calculate

**Actual length
of liquid pipe**

X

**Additional
refrigerant charge
per liquid pipe 1ft**

=

**Additional
refrigerant charge
per liquid pipe 1ft**

Calculate the added refrigerant according to the diameter and the length of the liquid side pipe of the outdoor/indoor unit connection.

Liquid pipe diameter (in)	Additional refrigerant amount (lb/ft)
1/4	0.015
3/8	0.040
1/2	0.080
5/8	0.120
3/4	0.181
7/8	0.255

STARTUP

POWERING UP THE SYSTEM



CAUTION

Prior to system start up ensure that the system has had power energized for at least 24 hours



SETTING BEFORE START UP



HR system (RD R410A Series)

- Set IDU quantity connected in the system (S12+ENC3)
- Address for Main MDC and sub MDC (S8) and dip switch for merged ports (S1/S3/S5/S7)
- Set address for all IDU
- Test operation selection (S10 dip switch)
- Service Software Port Verification

HP system (HD R410A Series)

- Set IDU amounts connected in the system (S12+ENC3)
- Set network address (Header and Follower)
- Auto address for all IDU(S6 in ODU) or by remote controller

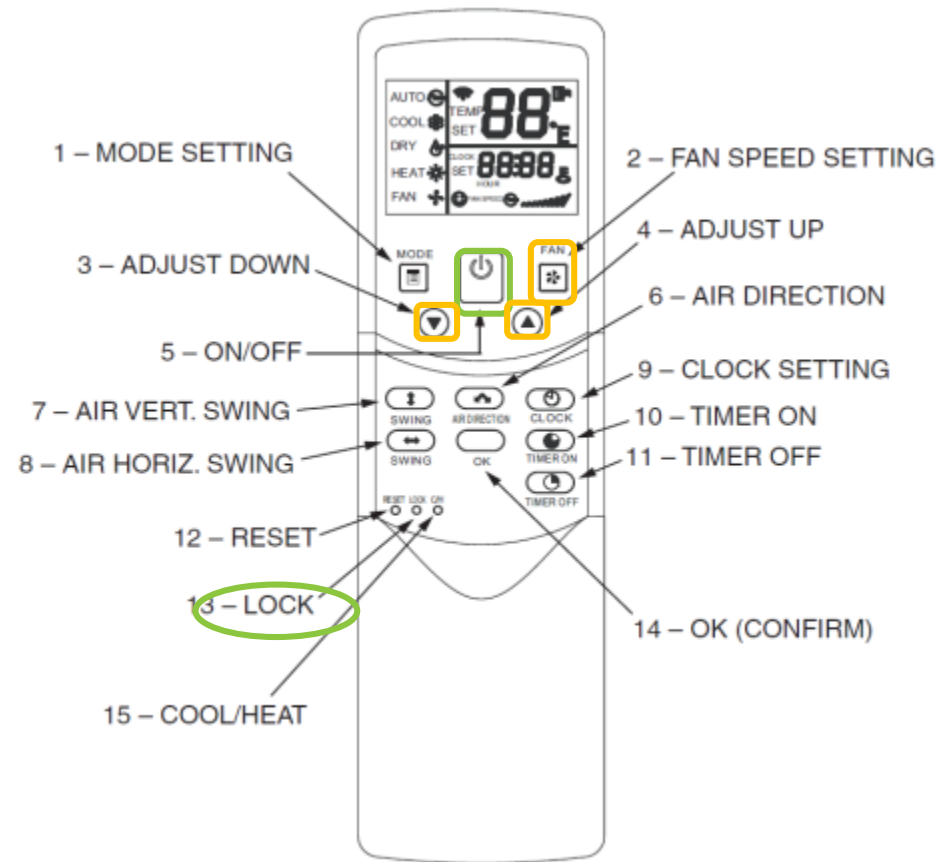
SETTING BEFORE START UP



REMOTE CONTROLLER

STEP 1

Use tool to press and hold the “LOCK” button for more than 10se and press  button to activate



STEP 2

Click  or  to select an address you want to set and press  to send the setting.

SETTING BEFORE START UP



NON-PROGRAMMABLE CONTROLLER

STEP 1

Press  and  together for 3sec into the right interface. It displays FE# 00 if there is no address for this indoor unit, otherwise displays current address of the indoor unit.

STEP 2

Click  or  to change 00 to address number you want to set. Then press **OK** to confirm and exit the setting interface.



SETTING BEFORE START UP



PROGRAMMABLE CONTROLLER

STEP 1

Press and simultaneously for 5sec to enter the interface for parameter settings.

STEP 2

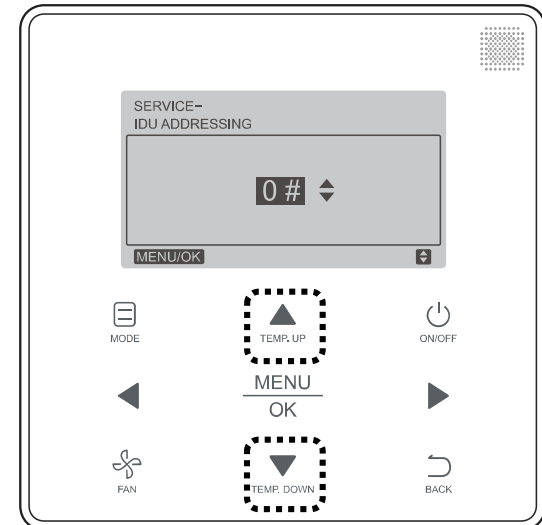
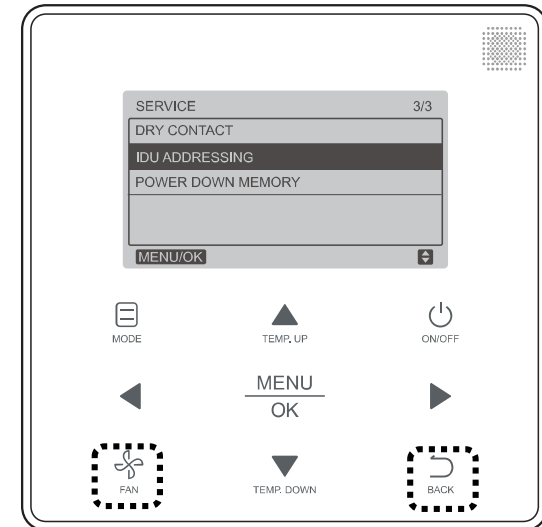
Press or to move the cursor down and choose IDU ADDRESSING, then to enter this setting.

STEP 3

Press or to choose the address No. you want to set, then to send this address to the IDU.

STEP 4

Press twice or wait 30sec to automatically exit the parameter settings menu.



THANK YOU!