Mingledorff's INC

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

TOSHIBA / CARRIER VRF INSTALLATION AND START UP.

MINGLEDORFF'S TECHNICAL SERVICES

Wednesday, May 3, 2023

DISCLAIMER

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NEED TECH SUPPORT?

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

<u>Call or email</u>

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

MINGLEDORFF'S TECHNICAL SERVICES NEWSLETTER

TECHNICAL SERVICES

NEWSLETTER

Do you receive our monthly newsletter?

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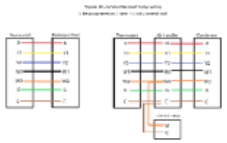
- Or request the link from anyone at Mingledorff's

MINGLEDORFF'S TECHNICAL SERVICES NEWSLETTER

Shop Now

TECH TIPS

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 > > >

DUCKT-Strip Wiring

DUCKT-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 > > >

MINGLEDORFF'S TECHNICAL SERVICES NEWSLETTER

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…

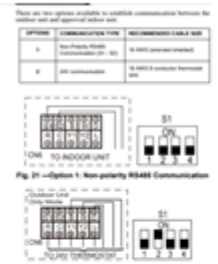
Read Full Article > > >

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

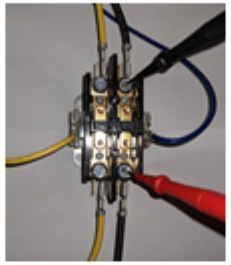


38MU/40MU 18/8 Low Voltage Wiring

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 > > >

TABLE OF CONTENTS

WHAT IS VRF?

FLEXIBILITY & ENERGY EFFICIENCY

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

WHAT IS VRF?

3 PHASE SYSTEM OPTIONS

- **Heat pump (2-pipe system: liquid and suction)**

  Fan coils are capable of providing either cooling **or** heating at any given time

- **Heat recovery (3-pipe system: liquid, suction and hot-gas)**

  Fan coils are capable of providing **simultaneous** heating or cooling at any given time

PRIMARY COMPONENTS OF A HEAT PUMP SYSTEM

Outdoor Unit

- Controls compressor speed
- Maintains operational mode

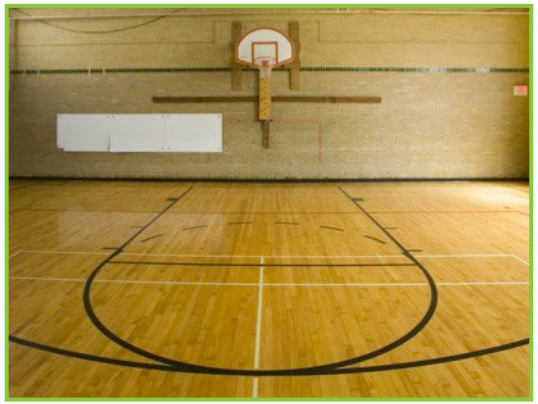
Indoor Units

- Transfers heating and cooling to space
- Allows for optimal zoning

Controls

- Controls space temperature and indoor unit fan
- Remote and/or central

APPLICATION EXAMPLES FOR A HEAT PUMP SYSTEM



Gyms

Lobbies

Churches

Large, Open Spaces – Single Common Zones

PRIMARY COMPONENTS OF A HEAT RECOVERY SYSTEM

Outdoor Unit

- Controls compressor speed
- Maintains operational mode

Flow Selector

- Reverses flow at 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 and/or central

APPLICATION EXAMPLES FOR A HEAT RECOVERY SYSTEM

Classrooms

Offices

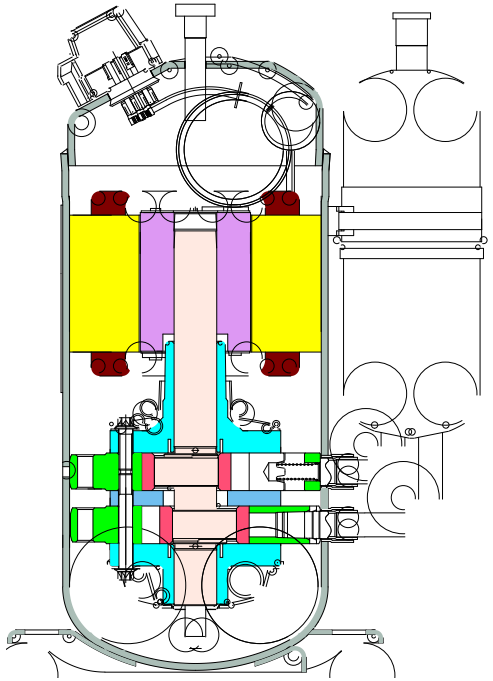
Assisted Living

Buildings with Diversity – Many Thermal Zones

VRF TECHNOLOGY

- A ***fixed speed compressor*** delivers 100% capacity when turned on—even if you don't need it

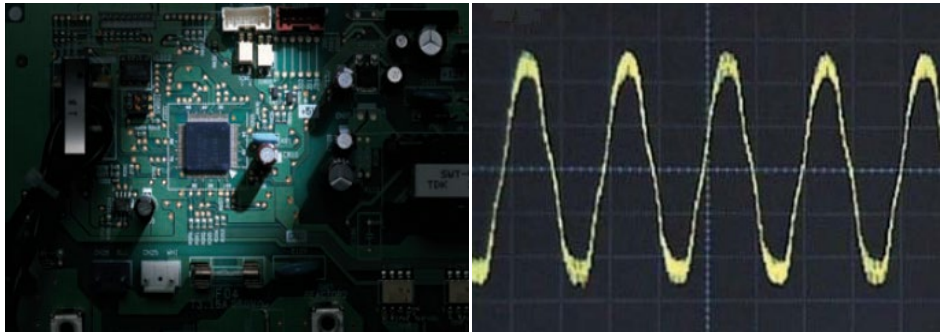
- An ***inverter-driven compressor*** is capable of delivering as low as 4800 BTUHs on any VRF system, making it more **ENERGY EFFICIENT**



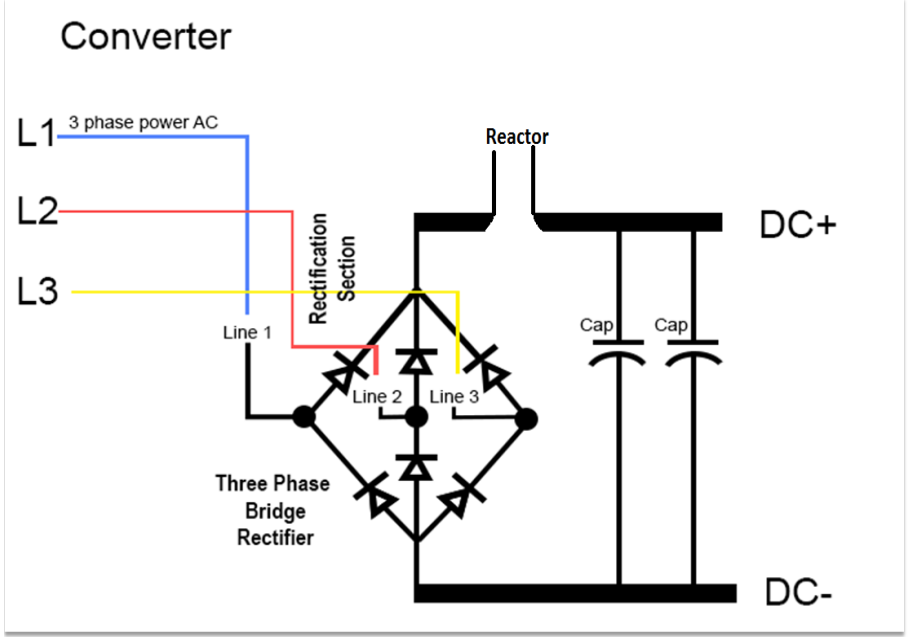
VRF TECHNOLOGY

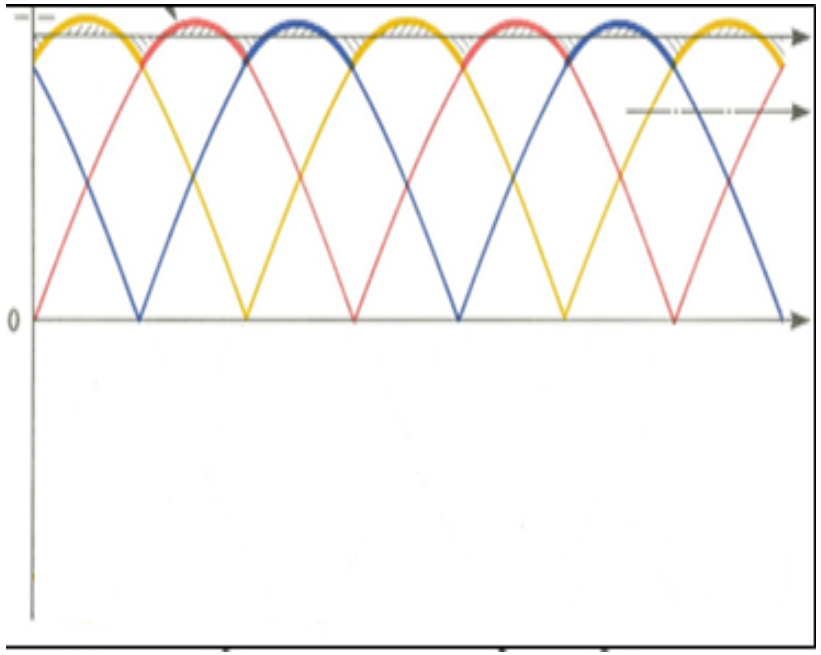
- A ***fixed speed compressor*** is susceptible to electrical damage

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



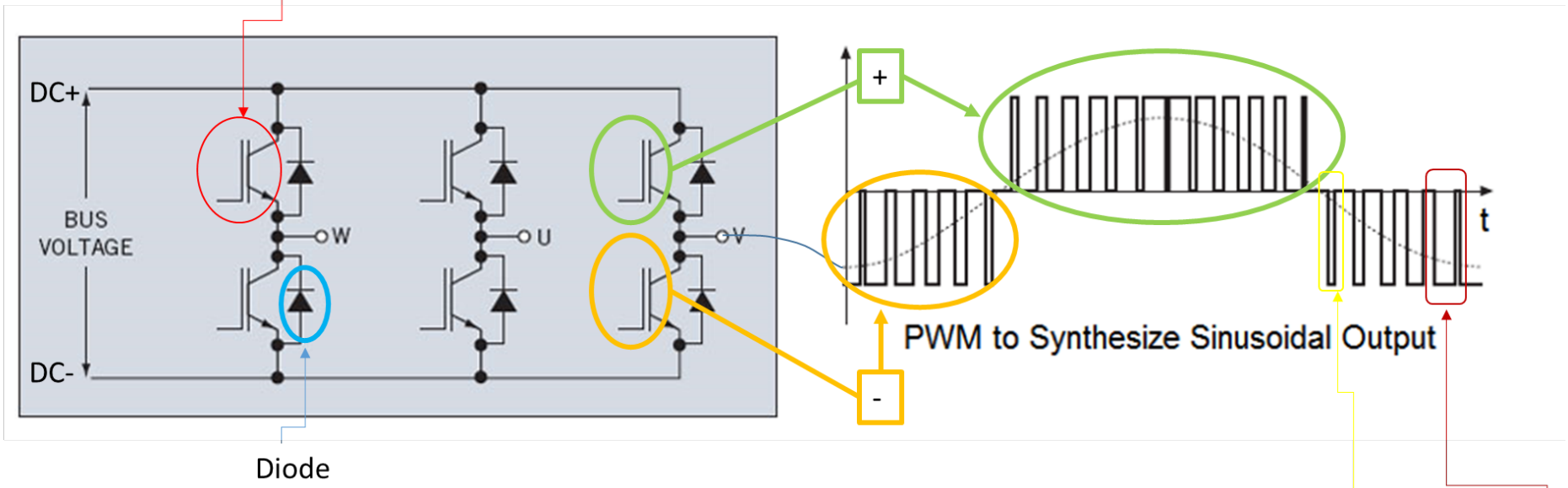
INVERTER CIRCUIT





INVERTER CIRCUIT

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

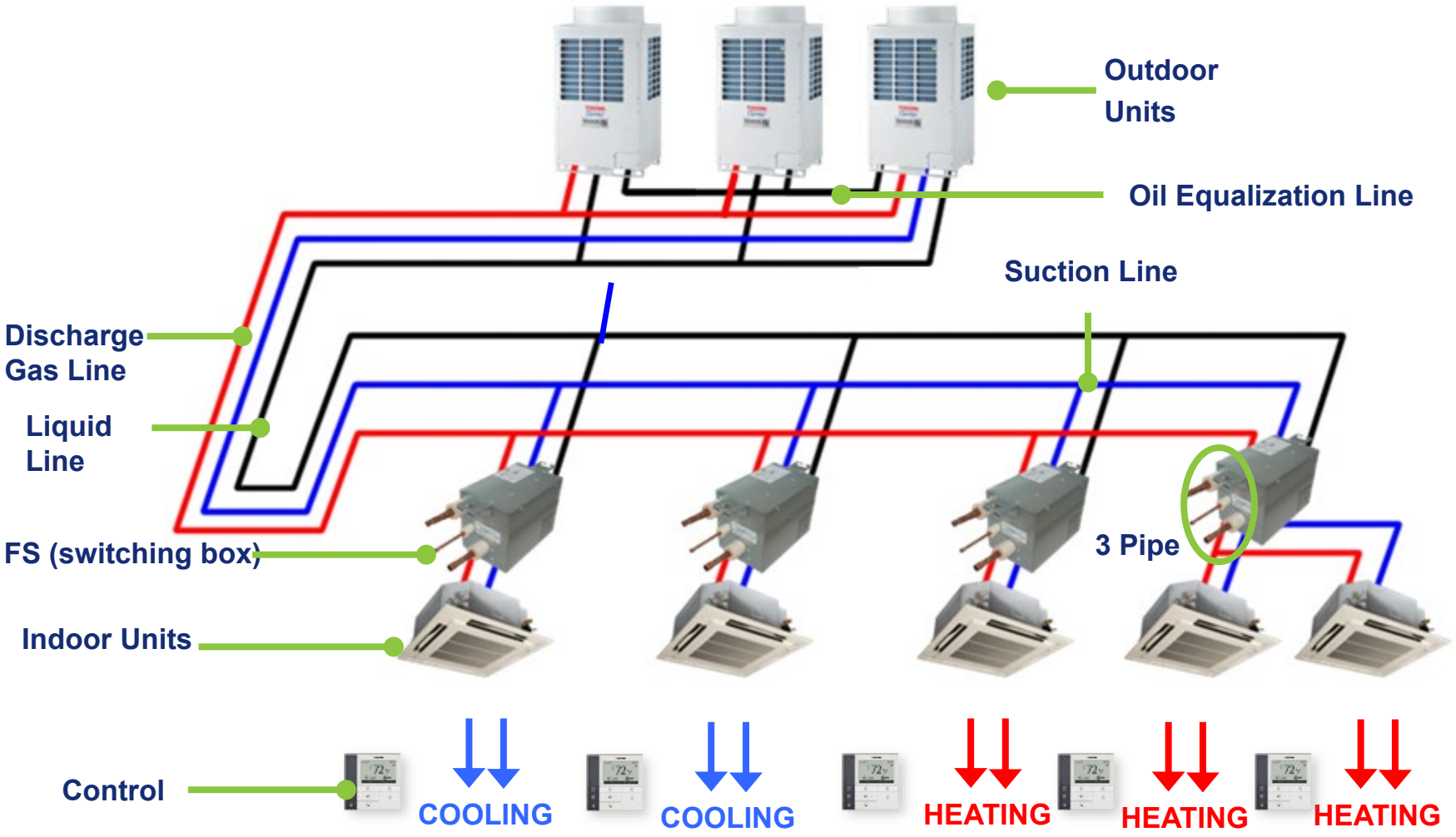


The faster the IGBT switches closed the shorter the DC sign wave

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

TYPICAL LAYOUT OF A VRF SYSTEM

SIMULTANEOUS OPERATION



PRODUCT

PRODUCT

SHRM
SUPER HEAT RECOVERY MULTI

SMMS
SUPER MODULAR MULTI SYSTEM

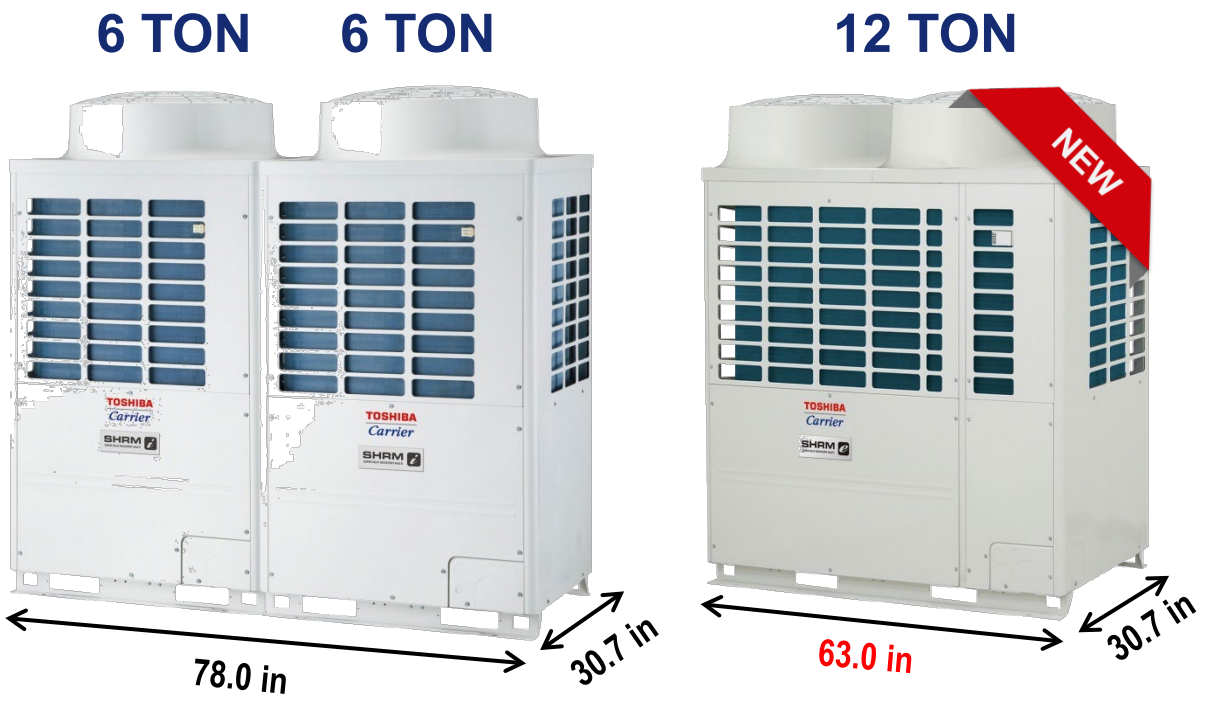
OUTDOOR UNIT LINEUP

HEAT PUMP

- Heat pump: 21 unit sizes
- Heat recovery: 21 unit sizes
- 72,000 – 456,000 Btu/h

- 208-230/3 and 460/3
- Two rotary compressors per outdoor unit

REDUCED FOOTPRINT



Previous Model	SHRM-e Model
Footprint	
16.6 ft^2	13.4 ft^2

Footprint example for a 12 ton system (all units are in mm)

SMMS-E 3,4,5 TON

Appropriate for Residential and light commercial single phase applications.

SINGLE PHASE HP

3 TON

4 TON

5 TON

SMMS-E 3,4,5 TON VRF GENERAL SPECIFICATIONS

Model Name(MCY-)	MAP0367HS-UL	MAP0487HS-UL	MAP0607HS-UL
Equivalent (ton)	3	4	5
Power Supply	208/230V/1ph/60Hz		
Cooling Capacity(kBtu/h)	36	48	60
Heat Capacity(kBtu/h)	40	54	66
Max. No. of connected indoor units	6	8	9
Operation Temp range (Cooling) (°FDB)	23 to 122	23 to 122	23 to 122
Operation Temp range (Heating) (°FWB)	-13 to 60	-13 to 60	-13 to 60

SMMS-E 3,4,5 TON VRF DIMENSIONS

The outdoor unit is compact and expels exhaust air to the side So it can be fit on your balcony, narrow street and any limited spaces as shown.

Dimension	SMMS-e 3，4，5 ton
Height (In)	61.0
Width (In)	39.8
Depth (In)	14.6
Weight (lbs)	310.6
Refrigerant R410A*(lbs)	14.8

Charged refrigerant amount:
The amount dose not consider extra piping length and indoor unit type.

SINGLE PHASE 208/230 VOLT HEAT RECOVERY ONLY

6 TON

12 TON

- **Heat recovery (3-pipe system: liquid, suction and hot-gas)**
  Fan coils are capable of providing **simultaneous** heating or cooling at any given time.

OUTDOOR UNIT NOMENCLATURE

EXAMPLE MODEL	M	M	Y	-	M	A	P	0	7	2	4	H	T	9	U	L

OUTDOOR UNIT
MM = Modular Multi type

STYLE
M = Individual Unit

REFRIGERANT
AP = R410A

COOLING CAPACITY
072 – 72,000 Btuh
096 – 96,000 Btuh
120 – 120,000 Btuh
144 – 144,000 Btuh
168 – 168,000 Btuh
192 – 192,000 Btuh
216 – 216,000 Btuh
240 – 240,000 Btuh
288 – 288,000 Btuh
336 – 336,000 Btuh

DEVELOPMENT NUMBER
4

UNIT TYPE
H = Heat Pump
F = Heat Recovery

UNIT FUNCTION
T = Inverter (Variable Speed)

POWER SUPPLY
9 = 208-230/3/60
6 = 460/3/60

DESTINATION
UL = North America

INDOOR UNIT LINEUP

- 8 Indoor Unit types
- 7,500 – 96,000 Btu/h
- 208/230-1-60
- Integral ventilation and condensate pumps – Most models

INDOOR UNIT NOMENCLATURE

EXAMPLE MODEL	M	M	C	-	0	1	8	1	M	H	2	U	L	-	-	-

INDOOR UNIT
MM = Modular Multi Type

STYLE
U = 4-Way Cassette
D = Duct
K = High Wall
C = Under Ceiling

COOLING CAPACITY
007 – 7,500 Btuh
009 – 9,500 Btuh
012 – 12,000 Btuh
018 – 18,000 Btuh
021 – 21,000 Btuh
024 – 24,000 Btuh
030 – 30,000 Btuh
036 – 36,000 Btuh
042 – 42,000 Btuh
048 – 48,000 Btuh
060 – 60,000 Btuh
072 – 72,000 Btuh
096 – 96,000 Btuh

DEVELOPMENT NUMBER
1

UNIT TYPE
H = 4-Way Cassette
MH = Compact 4-Way Cassette
BH = Concealed Duct
H = High Static Duct
SPH = Slim Duct

POWER SUPPLY
2 = 208/230-1-60

DESTINATION
UL = North America

NOT USED

VERTICAL FAN COIL 40TCQ NOMENCLATURE

EXAMPLE MODEL	40	TC	Q	0	2	4	-	3

EQUIPMENT TYPE
40 = Indoor Unit

PRODUCT TYPE
TC = VRF Vertical Fan Coil

MODEL TYPE
Q = Heat Pump

POWER SUPPLY
3 = 208/230- 1-60

CAPACITY
024 – 24,000 Btuh
030 – 30,000 Btuh
036 – 36,000 Btuh
042 – 42,000 Btuh
048 – 48,000 Btuh

PRODUCT

4-Way Cassette

Compact 4-Way Cassette

Nominal Cooling Capacity	Model Number MMU-	Features
7,500Btu/h (0.63 ton)	AP0072H2UL	• Integral condensate lift • Up to 26” lift • Outside air intake flange • Or outside air chamber • 33”x33” • 30-40 dB(A) (Mid-speed) • Flared Refrigerant Pipe connections
9,500Btu/h (0.79 ton)	AP0092H2UL	
12,000Btu/h (1 ton)	AP0122H2UL	
15,400Btu/h (1.25 tons)	AP0152H2UL	
18,000Btu/h (1.5 tons)	AP0182H2UL	
21,000Btu/h (1.75 tons)	AP0212H2UL	
24,000Btu/h (2 tons)	AP0242H2UL	
30,000Btu/h (2.5 tons)	AP0302H2UL	
36,000Btu/h (3 tons)	AP0362H2UL	
42,000Btu/h (3.5 tons)	AP0422H2UL	

Nominal Cooling Capacity	Model Number MMU-	Features
7,500Btu/h (.5 tons)	AP0071MH2UL	• Integral condensate lift • Up to 24” lift • Outside air intake • 24”x24” • 35-42 dB(A) (Mid-speed) • Flared Pipe connections
9,500Btu/h (.75 tons)	AP0091MH2UL	
12,000Btu/h (1 tons)	AP0121MH2UL	
15,000Btu/h (1.25 tons)	AP0151MH2UL	
18,000Btu/h (1.5 tons)	AP0181MH2U	

PRODUCT

High Wall

Nominal Cooling Capacity	Model Number MMK-	Features
7,500Btu/h (.5 tons)	AP0073H2UL	• External condensate pump • NO outside air knockout • 30-35 dB(A) (Mid-speed) • Flared Refrigerant Pipe connections • Wireless controller ships with unit
9,500Btu/h (.75 tons)	AP0093H2UL	
12,000Btu/h (1 tons)	AP0123H2UL	
15,400Btu/h (1.25 tons)	AP0153H2UL	
18,000Btu/h (1.5 tons)	AP0183H2UL	
24,000Btu/h (2 tons)	AP0243H2UL	

Underceiling

Nominal Cooling Capacity	Model Number MMC-	Features
18,000Btu/h (1.5 tons)	AP0181H2UL	• Integral pump kit – field installed • NO outside air knockout • 35-45 dB(A) (Mid-speed) • Flared Pipe connections
24,000Btu/h (2 tons)	AP0241H2UL	
36,000Btu/h (3 tons)	AP0361H2UL	
42,000Btu/h (3.5 tons)	AP0421H2UL	

PRODUCT

Slim Duct

Nominal Cooling Capacity	Model Number MMD-	Features
7,500Btu/h (.5 tons)	AP0074SPH2UL	• Integral condensate lift • 23” lift • Fresh Air mixed at return • 30-34 dB(A) (Mid-speed) • Flared Pipe connections • 0.2” Max ESP
9,500Btu/h (.75 tons)	AP0094SPH2UL	
12,000Btu/h (1 tons)	AP0124SPH2UL	
15,400Btu/h (1.25 tons)	AP0154SPH2UL	
18,000Btu/h (1.5 tons)	AP0184SPH2UL	

High Static Duct

Nominal Cooling Capacity	Model Number MMD-	Features
30,000Btu/h (2.5 tons)	AP0304H2UL	• External Pump • 45-47 dB(A) (Mid-speed) • Flared Pipe connections • 0.8”-1.1” Max ESP
36,000Btu/h (3 tons)	AP0364H2UL	
48,000Btu/h (4 tons)	AP0484H2UL	
72,000Btu/h (6 tons)	AP0724H2UL	
81,000Btu/h (8 tons)	AP0964H2UL	

PRODUCT

Concealed Duct (Mid-Static)

Nominal Cooling Capacity	Model Number MMD-	Features
7,500Btu/h (.5 tons)	AP0074BH2UL	• Integral condensate lift • 11” lift • Bottom return option • Outside Air mixed at return • 30-38 dB(A) (Mid-speed) • Flared Pipe connections • 0.5” ESP
9,500Btu/h (.75 tons)	AP0094BH2UL	
12,000Btu/h (1 tons)	AP0124BH2UL	
15,400Btu/h (1.25 tons)	AP0154BH2UL	
18,000Btu/h (1.5 tons)	AP0184BH2UL	
21,000Btu/h (1.75 tons)	AP0214BH2UL	
24,000Btu/h (2 tons)	AP0244BH2UL	
30,000Btu/h (2.5 tons)	AP0304BH2UL	
36,000Btu/h (3 tons)	AP0364BH2UL	
42,000Btu/h (3.5 tons)	AP0424BH2UL	
48,000Btu/h (4 tons)	AP0484BH2UL	

PRODUCT

Nominal Cooling Capacity	Model Number TCQ-	Features
24,000Btu/h (2 tons)	40TCQ024---3	• ECM (Electronically Commutated Motor) • High Duct Static Capability • Injection molding drain pan comes with primary & secondary drain connection. • Unit is Vertical or Horizontal Left Only • Pre-painted galvanized sheet metal cabinet
30,000Btu/h (2.5 tons)	40TCQ030---3	
36,000Btu/h (3 tons)	40TCQ036---3	
42,000Btu/h (3.5 tons)	40TCQ042---3	
48,000Btu/h (4 tons)	40TCQ048---3	

VERTICAL AIR HANDLER UNIT

PRODUCT

Floor Console Exposed

Nominal Cooling Capacity	Model Number MML-	Features
7,500 Btu/h (.5 tons)	AP0074H2UL	• Convertible top or side discharge • NO outside air knockout • Flared Refrigerant Pipe connections
9,500 Btu/h (.75 tons)	AP0094H2UL	
12,000 Btu/h (1 tons)	AP0124H2UL	
15,400 Btu/h (1.25 tons)	AP0154H2UL	
18,000 Btu/h (1.5 tons)	AP0184H2UL	
24,000 Btu/h (2 tons)	AP0244H2UL	

Floor Console Recessed

Nominal Cooling Capacity	Model Number MML-	Features
7,500 Btu/h (.5 tons)	AP0074BH2UL	• NO outside air knockout • Flared Refrigerant Pipe connections
9,500 Btu/h (.75 tons)	AP0094BH2UL	
12,000 Btu/h (1 tons)	AP0124BH2UL	
15,400 Btu/h (1.25 tons)	AP0154BH2UL	
18,000 Btu/h (1.5 tons)	AP0184BH2UL	
24,000 Btu/h (2 tons)	AP0244BH2UL	

PRODUCT

Outside Air Unit

Nominal Cooling Capacity	Model Number MMD-	Features
48,000 Btu/h (4 tons)	AP0484H2UL	• External Condensate Pump (accessory) • 45-47 dB(A) (Mid-speed) • Flared Refrigerant Pipe connections • 0.8”-1.1” Max ESP
72,000 Btu/h (6 tons)	AP0724H2UL	
96,000 Btu/h (8 tons)	AP0964H2UL	

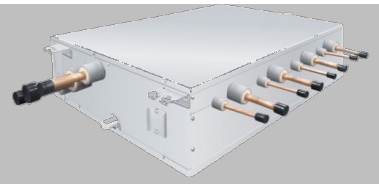
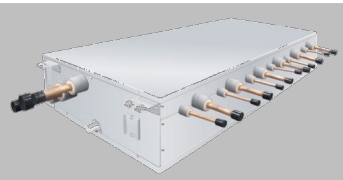
PRODUCT – SINGLE BOX FLOW SELECTOR

Connectable Capacity	Model Number	Connectable Indoor Units*
Below 38,000 Btu/h	RBM-Y0383FUL	5
38,000-61,000 Btu/h	RBM-Y0613FUL	8

Connectable Capacity	Model Number	Connectable Indoor Units*
61,000-96,000 Btu/h	RBM-Y0963FUL	8

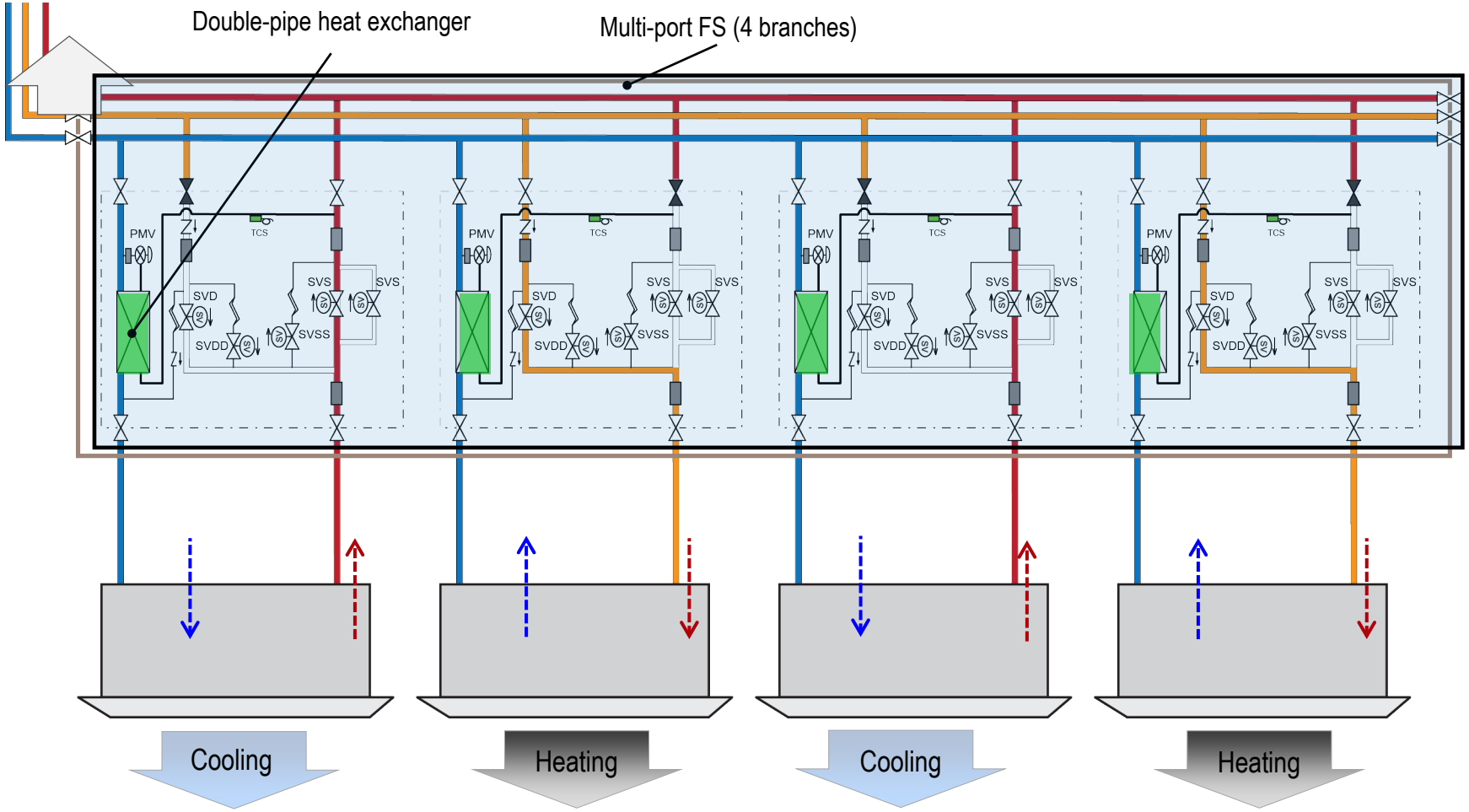
Operational power is received from the Indoor Units

PRODUCT - MULTI FLOW SELECTOR UNIT

Branches	4	6
Model name	RBM-Y0611F4PUL	RBM-Y0611F6PUL
Appearance		
Connectable FCU capacity(kBtu/h)	Below 61	Below 61
Connectable FCU number for each port	Max. 8*1,2	Max. 8*1,2
Dimension (Height/Width/Depth)	8.5 / 28.8 / 22.4 In	8.5 / 41.4 / 22.4 In
Weight(lbs)	84	117

- Group remote control or Individual remote control
- Same overall capacity and connectable units for both models
- Same piping connections as the single Flow selector unit

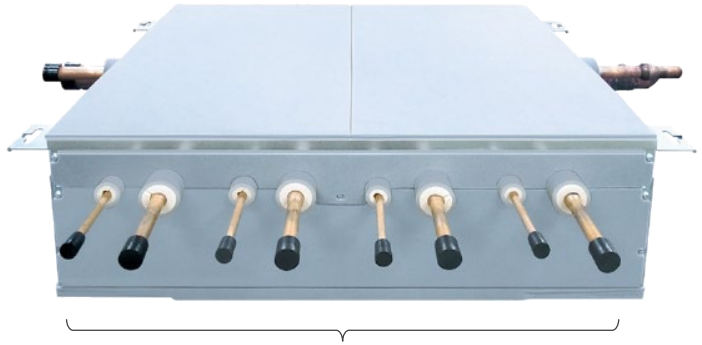
MULTI PORT FLOW SELECTOR UNIT

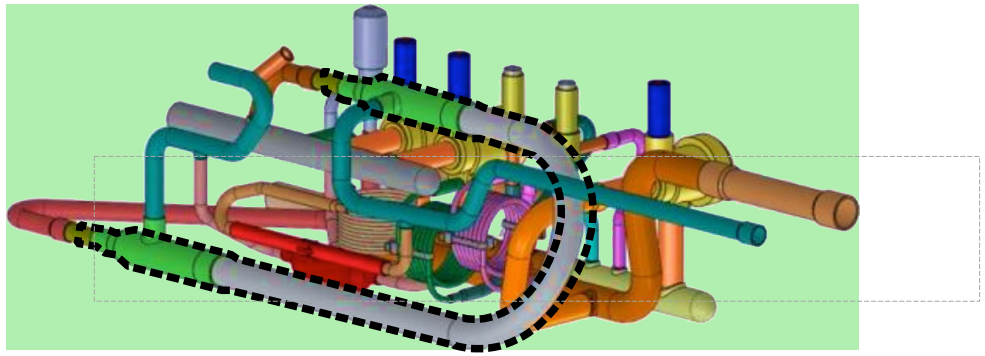


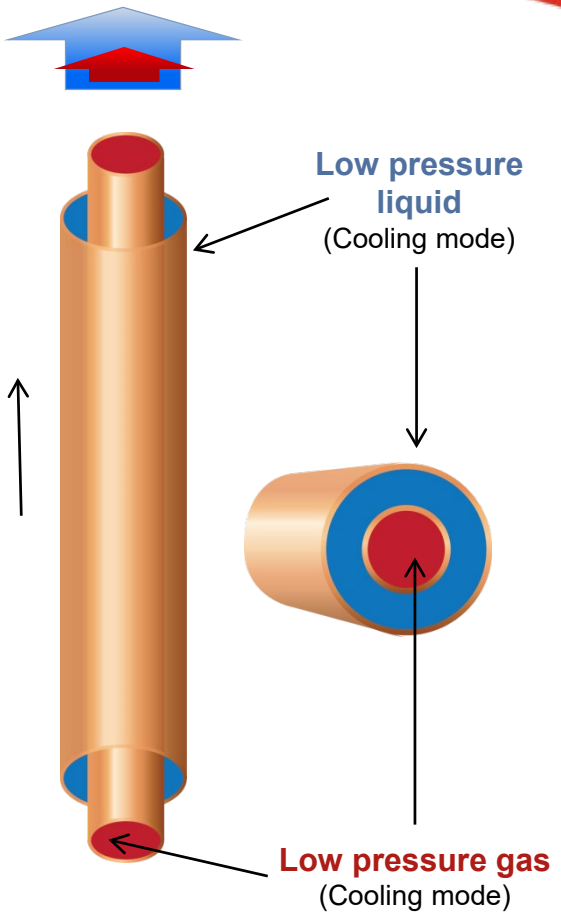
DOUBLE-PIPE HEAT EXCHANGER BYPASS CIRCUIT IN MULTI PORT FS UNIT

BENEFITS TO THIS SYSTEM:

- ☑ Increment from 30 ton to 38 ton
- ☑ Improved Maximum actual length between FS unit and FCU: 164 ft

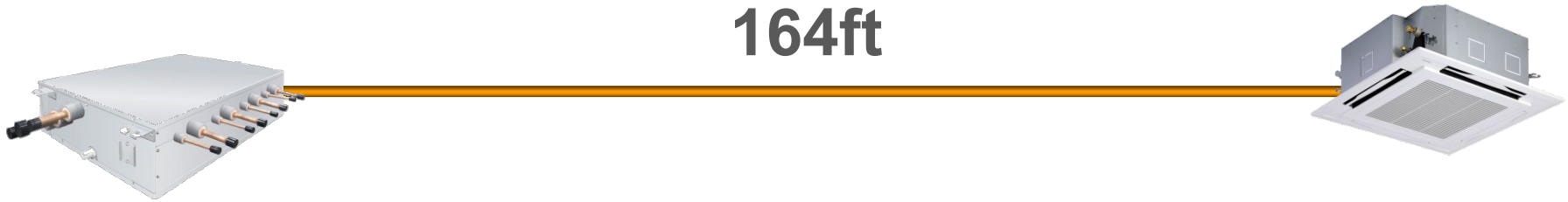






INSTALLATION FLEXIBILITY

IMPROVED MAXIMUM ACTUAL LENGTH BETWEEN FS AND FCU

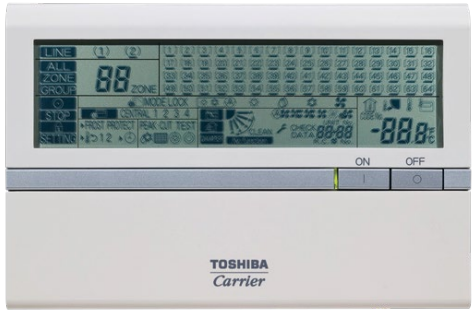


With the innovation introduced in the SHRM-e core technology (Double-pipes sub cool by-pass and double pipe heat exchanger) now is possible to reach a maximum total pipe length of 164 ft

VRF CONTROLS OVERVIEW

CONTROLS CAN BE CLASSIFIED INTO THREE PRIMARY CATEGORIES

Individual controls at the fan coils or **ZONE**



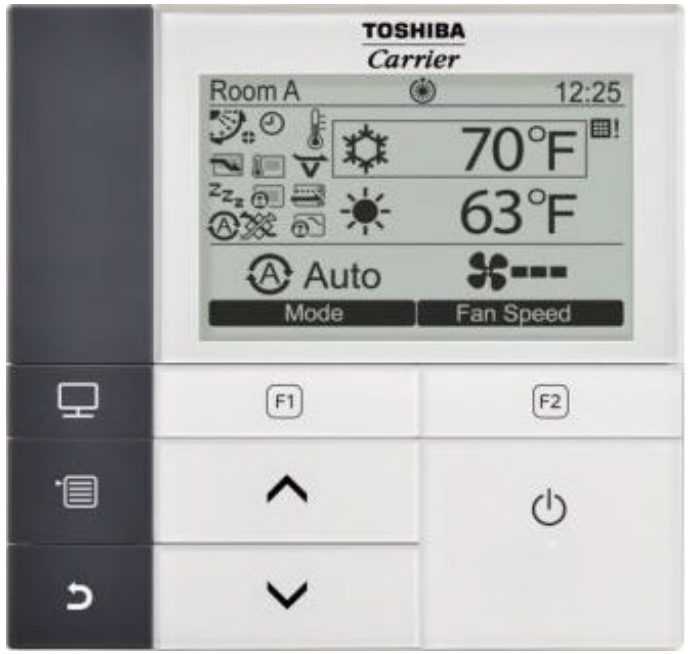
CENTRAL system control

Network control systems that integrate operation of Building Management Systems (**BMS INTERFACE**)

ZONE CONTROL OVERVIEW

REMOTE CONTROLLER

(RBC-AMS54E-UL)



FEATURES

- Simple, Easy to Use
- Back light
- Fan Speed
- Clock setting
- Schedule Timer
- Dual set-point
- Key lock
- Set temperature range limiting
- Service check mode
- Compatible with Toshiba Carrier RAV and VRF systems
- Multi Port Flow Selector Single Port Control

ZONE CONTROL OVERVIEW

SIMPLE WIRED REMOTE CONTROL

(RBC-AS41UL)

FEATURES

- Start / Stop
- Temperature setting
- Airflow changing
- Check code display

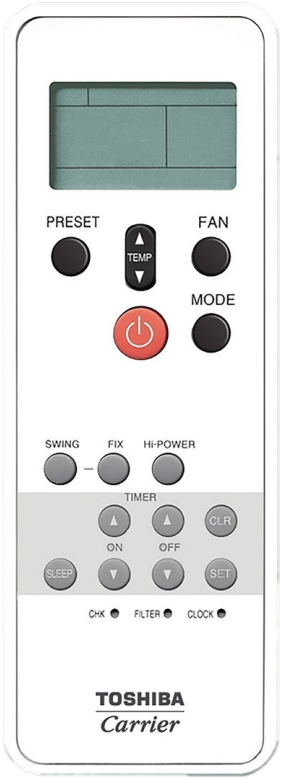
REMOTE SENSOR

(RBC-TC41LUL)

Install this sensor when outside air has been introduced or when overcooling and overheating are to be minimized

ZONE CONTROL OVERVIEW

WIRELESS REMOTE CONTROL KIT



FEATURES

- Start / Stop
- Changing mode
- Temperature setting
- Airflow changing
- Timer function
- Control by two remote controllers is available (Two wireless remote controller can operate one indoor unit.)
- Check code display

ZONE CONTROL OVERVIEW

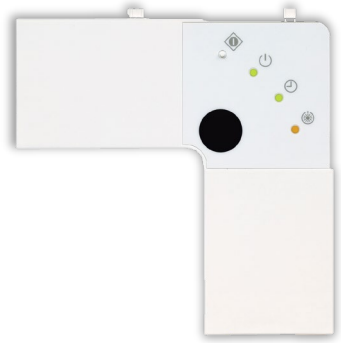
STAND-ALONE RECEIVER

(TCB-AX32UL)

- For 4-Way Cassette, Compact 4-Way Cassette, Underceiling, Concealed Duct, Slim Duct, Vertical AHU
- Includes Wireless Remote Control Kit

INTEGRAL RECEIVER

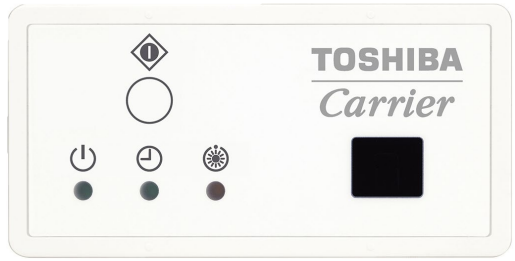
(RCB-AX33C-UL)



- For Underceiling
- Includes Wireless Remote Control Kit

INTEGRAL RECEIVER

(RCB-AX32U(W)-UL)



- For 4-Way Cassette
- Includes Wireless Remote Control Kit

ERV CONTROLLER

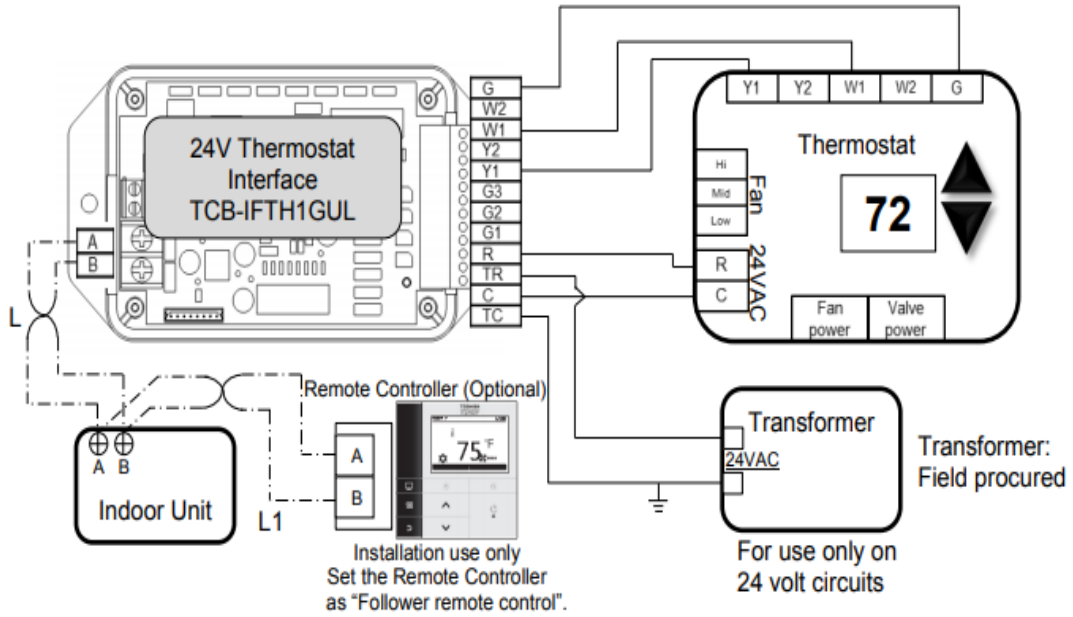
TCB-1FUN1UL

- Gives you the ability to control an 3rd party ERV (Energy Recovery Ventilation) unit from The Toshiba Carrier control network
- The remote control (RBC-AMT32UL) cannot change the fan speed of ERV.
- The remote control (RBC-AMS54E-UL) can control the fan speed of ERV.
- The remote control (RBC-AMS54E-UL, RBCAMT32UL) can operate ON/OFF control of ERV separately

CONVENTIONAL THERMOSTAT INTERFACE

TCB-1FTH1GUL

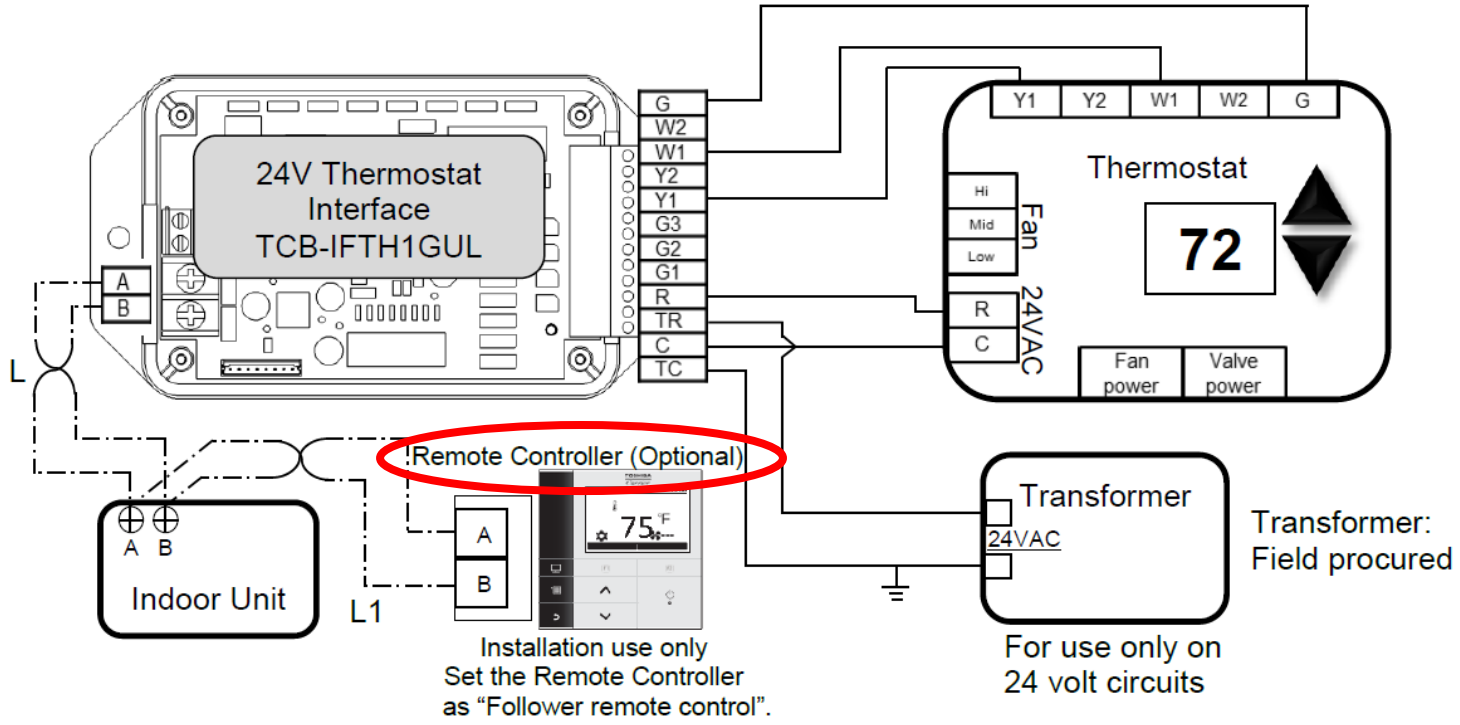
This 24v interface gives you the ability to control the VRF indoor unit with any thermostat.



THERMOSTATS CANNOT BE SETUP FOR HEAT PUMP

CONVENTIONAL THERMOSTAT INTERFACE

Basic wiring diagram: Single-stage Cooling and Heating

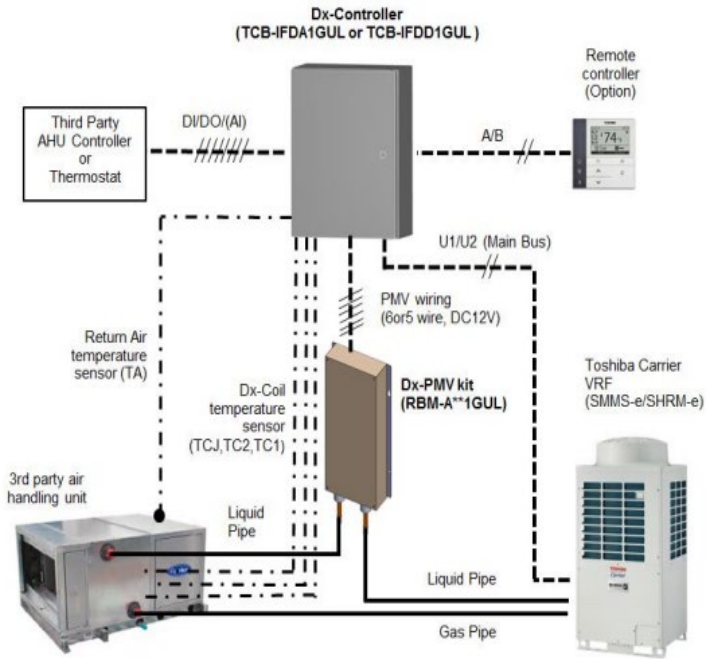


Compatibility notification: 24v thermostat interface is not compatible with central control devices.

DX CONTROLLER

2 SEPARATE DX CONTROLLERS

1. TCB-1FDD1GUL (0-10 VDC input controller)
2. TCB-1FDA1GUI (return air controller)

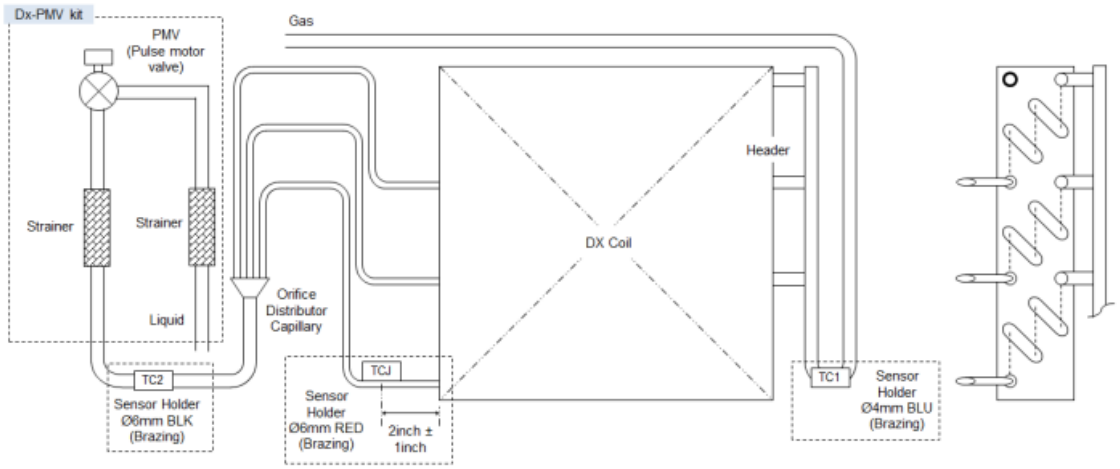


PMV CONTROLLER

ALLOWS CONTROL OF A THIRD PARTY COIL FROM 12 – 192 KBTU

RBM-A0121GUL Dx-PMV kit (012type)
RBM-A0301GUL Dx-PMV kit (030type)
RBM-A0601GUL Dx-PMV kit (060type)
RBM-A0961GUL Dx-PMV kit (096type)
RBM-A1921GUL Dx-PMV kit (192type)

- The Dx-PMV kit is installed as the external expansion valve between VRF refrigerant piping and 3rd party Dx-coil.



Central Control Overview

TOUCH SCREEN

(BMS-CT5120UL)

FEATURES

- Grouping based on floor, unit, area, tenant and level
- Operating mode, turning On/Off
- Enable or disable local remote control
- Master Scheduler – weekly, 5 special days, monthly
- Display alarm & provide history for alarms
- Web browser monitoring and control (for intranet PC)
- Up to 2 concurrent users can be connected
- Additional digital I/O device available
- Maximum of 512 indoor units per Touch Screen controller
- Selectable display language – English / French / Spanish

SPECIFICATIONS

- Power Supply: 120VAC, 60Hz
- Power Consumption: 28W
- Operating Temperature / Humidity: 32° F to 104° F / 10 to 90% RH

CENTRAL CONTROL OVERVIEW

(BMS-CT5120UL)

TCS-NET RELAY
BMS-IFLSV4UL

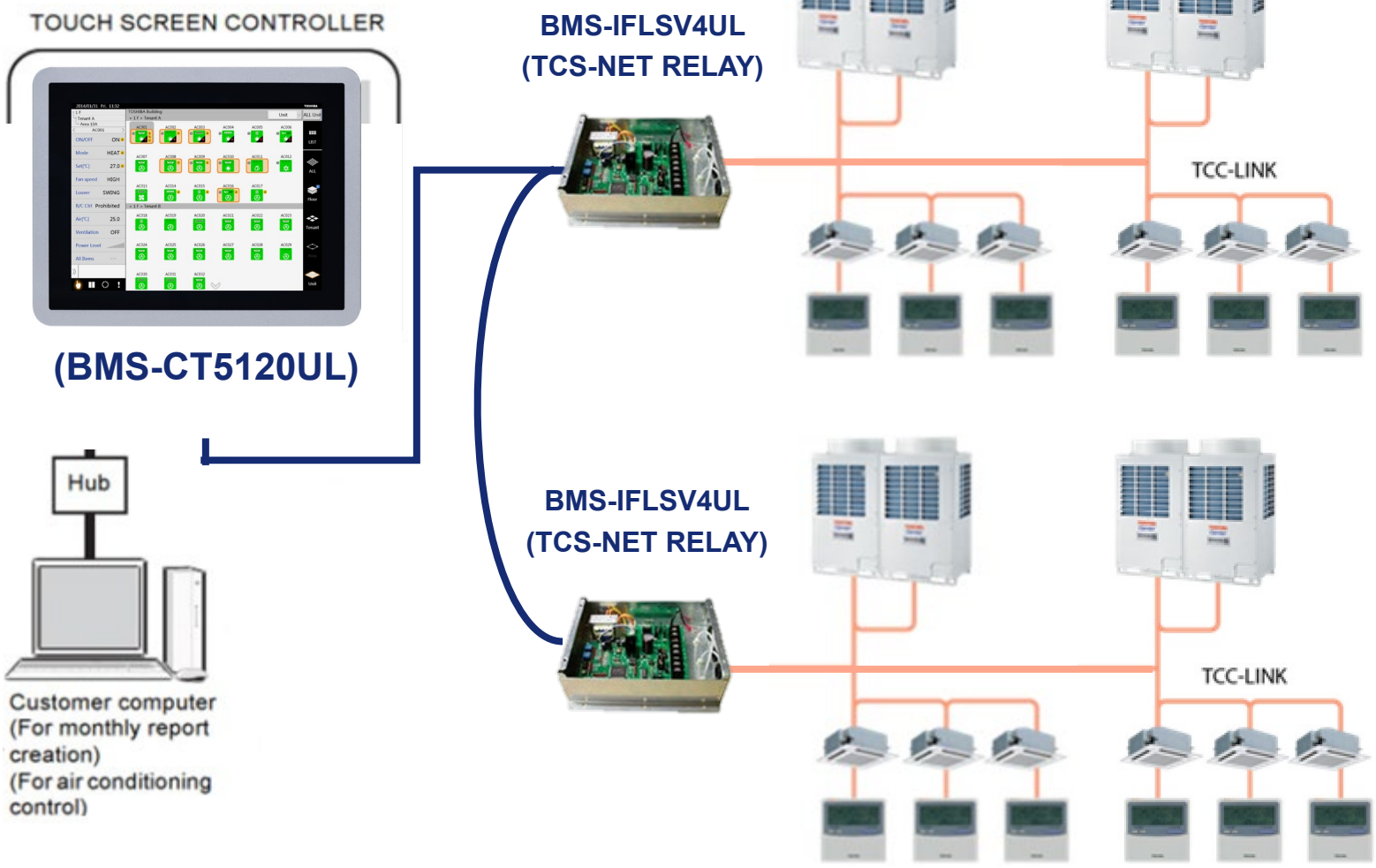
Header ODU

Basic components

NOTE: U3-U4 From Outdoor Unit to U1-U2 on TCS Net Relay

CENTRAL CONTROL OVERVIEW

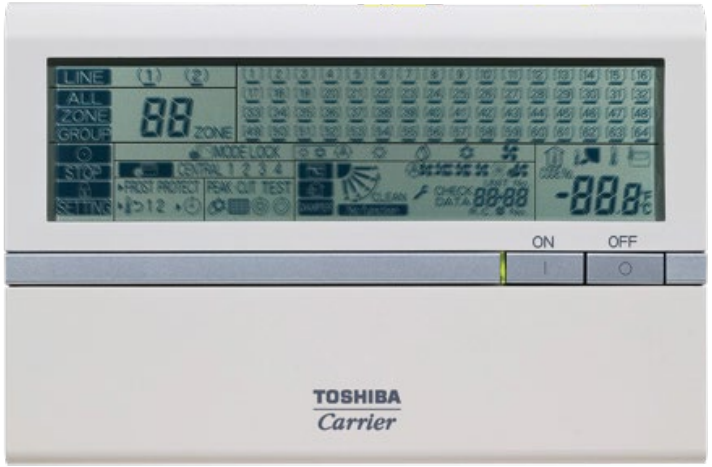
BASIC COMPONENTS



CENTRAL CONTROL OVERVIEW

CENTRAL REMOTE CONTROL

(BMS-CM1281TLUL)



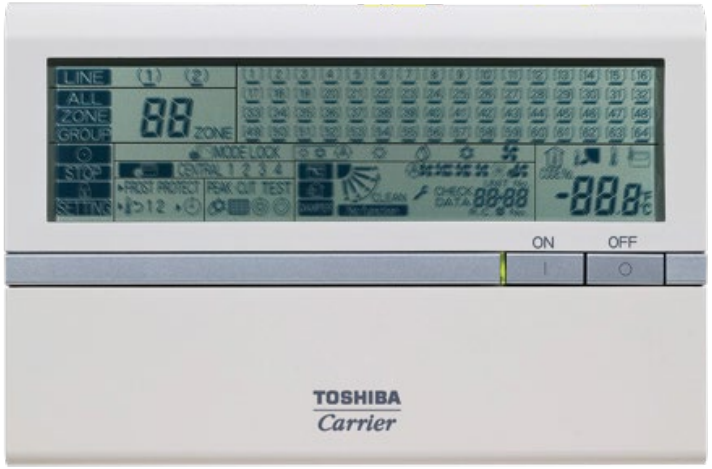
FEATURES

- Individual control (ON/OFF, Operating mode, etc.)
- Manages up to 128 units (Max: 2 x 64 indoor units)
- Flexible grouping in zones
- External input/output control
  - Input: ON/OFF signal
  - Output: Error signal

CENTRAL CONTROL OVERVIEW

SMART MANAGER

(BMS-SM1280HTLUL)



FEATURES

- List view available – Displays all indoor units in one screen
- Set view available – Shows basic indoor unit settings on main screen
- Advanced operation and master schedule functions
- Up to four concurrent users can be connected
- Up to 32 user accounts can be programmed with different levels of access (at least one must be administrator level)
- Energy monitoring and report creation functions
- Advanced operation and maser schedules can be set on a calendar
- Additional digital I/O device available
- Thin profile controller and separate power supply unit enables easy installation

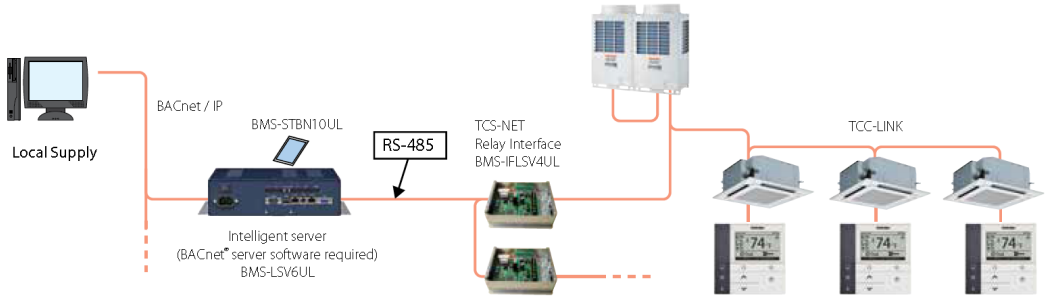
BMS INTERFACE OVERVIEW

BACnet® SYSTEM

Intelligent Server (BMS-LSV6UL)

TCS-NET Relay Interface (BMS-IFLSV4UL)

BACnet® Server Software (BMS-STBN10UL)



FEATURES

The BACnet® system operates in conjunction with the BACnet® server. Server uses object signals to provide the following functions:

CONTROL

- ON/OFF
- Operation mode
- Temperature setting
- Fan speed
- Louver
- Permit/prohibit local remote controller

MONITORING

- ON/OFF
- Operation mode
- Temperature setting
- Fan speed
- Louver
- Room temperature
- Permit/prohibit local remote controller
- Error code
- Error status

BMS INTERFACE OVERVIEW

BACnet® INTERFACE

(BMS-IFBN640TLUL)

FEATURES

- Full Scheduling Capabilities
- Adjusts:
  - Mode, Set-point,
  - Fan Speed,
  - Louvers,
  - Prohibits for each indoor unit

Section 3

FUNCTION AND OPERATION

Heat Pump System Change Over (SW11)
FOR HEAT PUMP ONLY

Heating Priority (Default)

Any Indoor Unit in heating mode will switch the system into heating mode
Units Calling for cooling will be in standby until all units are in cooling

Cooling Priority

Any Indoor Unit in cooling mode will switch the system into cooling mode
Units Calling for heating will be in standby until all units are in heating

Democratic Mode

Number of units in cooling or heating decides the mode of the system

Dictator Mode

One unit selected to decide the mode of the system

HEAT PUMP SYSTEM CHANGE OVER

Heat Pump System Change Over (SW11)
OUTDOOR UNIT (HEADER UNIT ONLY) SETUP
For Heat Pump ONLY

SW11		Operation
BIT 1	BIT 2	
OFF	OFF	Heating priority (setup at shipment)
ON	OFF	Cooling priority
OFF	ON	No. of operating units (priority is given to the mode with the most units operating in that mode)
ON	ON	Specific indoor unit priority (priority is given to the operation mode of the indoor unit that has been granted priority status)*

Setup (Note)*

In “Specific indoor unit priority” mode only, it is necessary to set up an indoor unit that you desire to have priority over every other indoor unit in the system

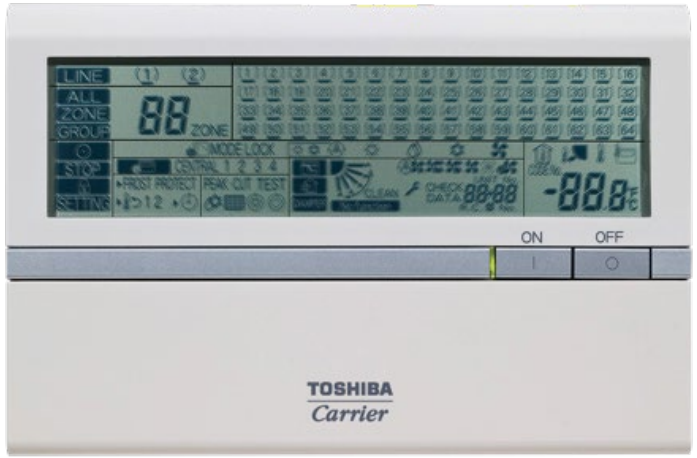
RECOMMENDED HEAT PUMP CHANGE OVER

SCHEDULED CHANGEOVER METHOD

For Heat Pump ONLY

- Prohibit mode change at the local remote controller.
- Schedule mode change at the central controller based on time of year.

CONSIDER HEAT RECOVERY SYSTEM WHERE COMFORT CONTROL IS A CONCERN



PART NAMES & FUNCTIONS

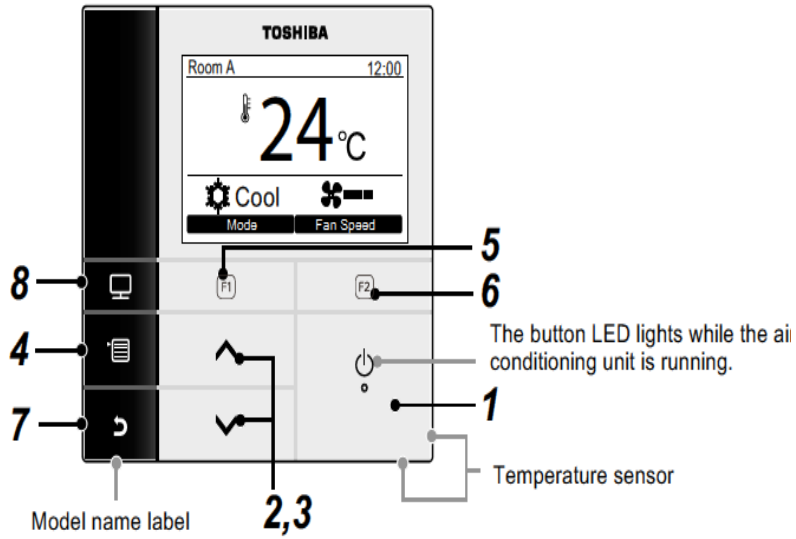
WIRED REMOTE CONTROL EXERCISE

1 **[ON/OFF] button**
(page 6)

2 **[∧] button**
During normal operation: adjusts the temperature.
On the menu screen: selects a menu item.
(page 6)

3 **[∨] button**
During normal operation: adjusts the temperature.
On the menu screen: selects a menu item.
(page 6)

4 **[MENU] button**
Displays the menu screen.
(page 8)



5 **[F1] button**
Varies its function according to the setting screen.
(page 6)

6 **[F2] button**
Varies its function according to the setting screen.
(page 6)

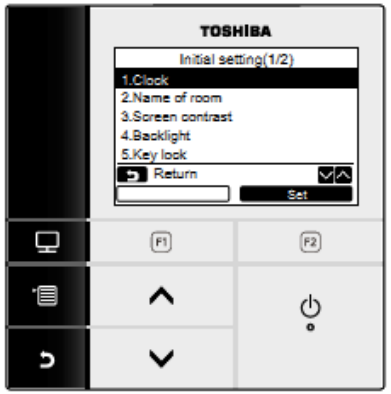
7 **[CANCEL] button**
Functions as indicated on the screen, such as returning to the previous menu screen.
(page 8)

8 **[MONITOR] button**
Displays the monitoring screen.
(page 7)

Switching between the normal display and detailed display

Push and hold the [CANCEL] button and [MONITOR] button at the same time for more than 4 seconds to switch the display mode.
The normal display mode is selected as a factory default setting.
Normal display mode (factory default)

INITIAL SETTINGS



1 Push the [∧ ∧] / [∨ ∨] button to select "10. Initial setting" on the menu screen, then push the "Set Set" [F2 F2] button.

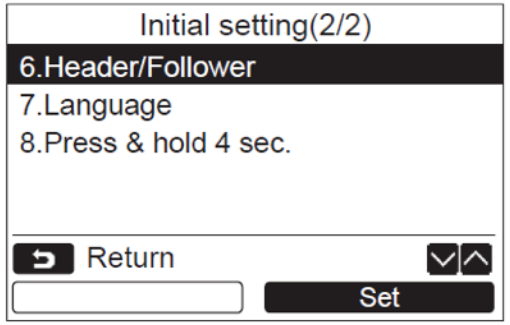
2 Push the [∧ ∧] / [∨ ∨] button to select the item to set.

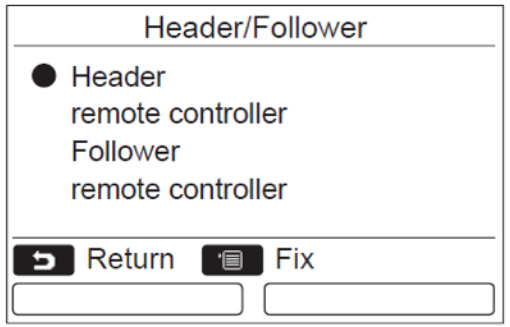
3 Push the "Set Set" [F2 F2] button.

Initial setting items

Item	Function
1. Clock	Settings for the clock (year, month, date, time)
2. Name of room	Refer to the Installation / Operation Manual supplied with the remote controller.
3. Screen contrast	Contrast adjustment of the LCD
4. Back light	Turning on / off the back light of the LCD
5. Key lock	Prohibiting the button operations
6. Header / Follower	Refer to the Installation / Operation Manual supplied with the remote controller.
7. Language	Setting for the language displayed on the remote controller.
8. Press & hold 4sec.	Setting for the "press and hold" operation for the [⏻ ON / OFF] key.

SETTING METHOD OF TWO REMOTE CONTROL





Control setting for RBC-AMS54E-UL

1. Push the Menu button to display the menu screen.
2. Use Up/Down buttons to select 6 Header/Follower
3. Press F2 to modify
4. Use Up/Down buttons to select setting
5. Press Menu to save selection
6. Press Return to exit

“Setting” appears on the screen, then the screen returns to the “Initial Setting” screen.

INSTALLATION

PRE-PLANNING

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

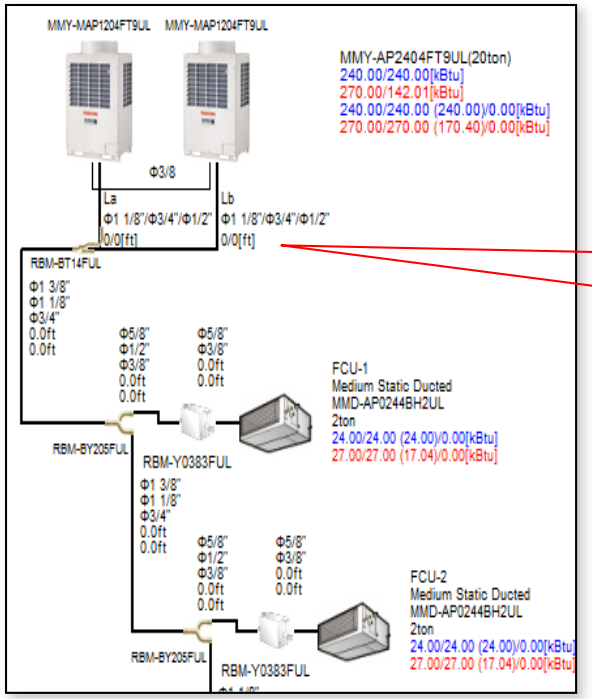
PRE-PLANNING

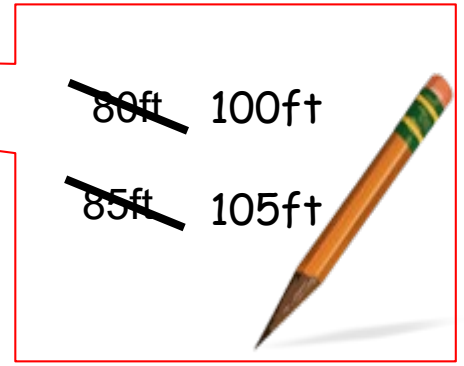
Must know where the ODU(s) and IDU(s) will be placed:

- Will they be placed on the ground?
- Will they be placed on the roof?
- Does the placement of the ODU(s) & IDU(s) match that of the selection software drawing?

PRE-PLANNING

- Walk the job and verify ODU and IDU placement.
- Make any changes in the selection software drawing.
- Deliver updated selection software drawing back to the designer for records.
- This is necessary to verify that piping rules haven't been broken and that actual distances haven't altered the corrected capacity of the equipment.



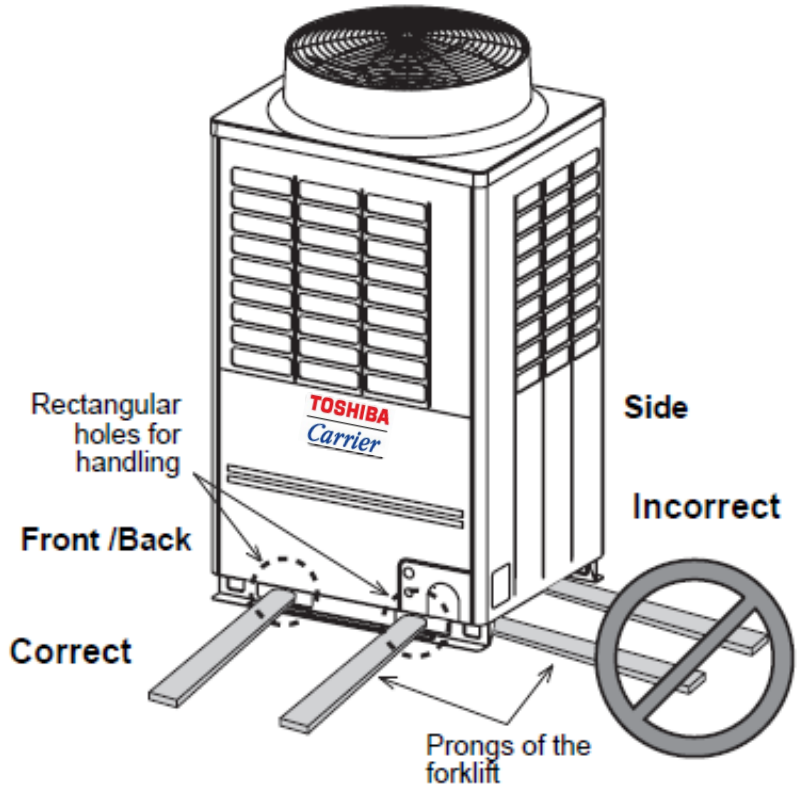


INSTALLATION PRE-PLANNING

WHEN USING A FORKLIFT

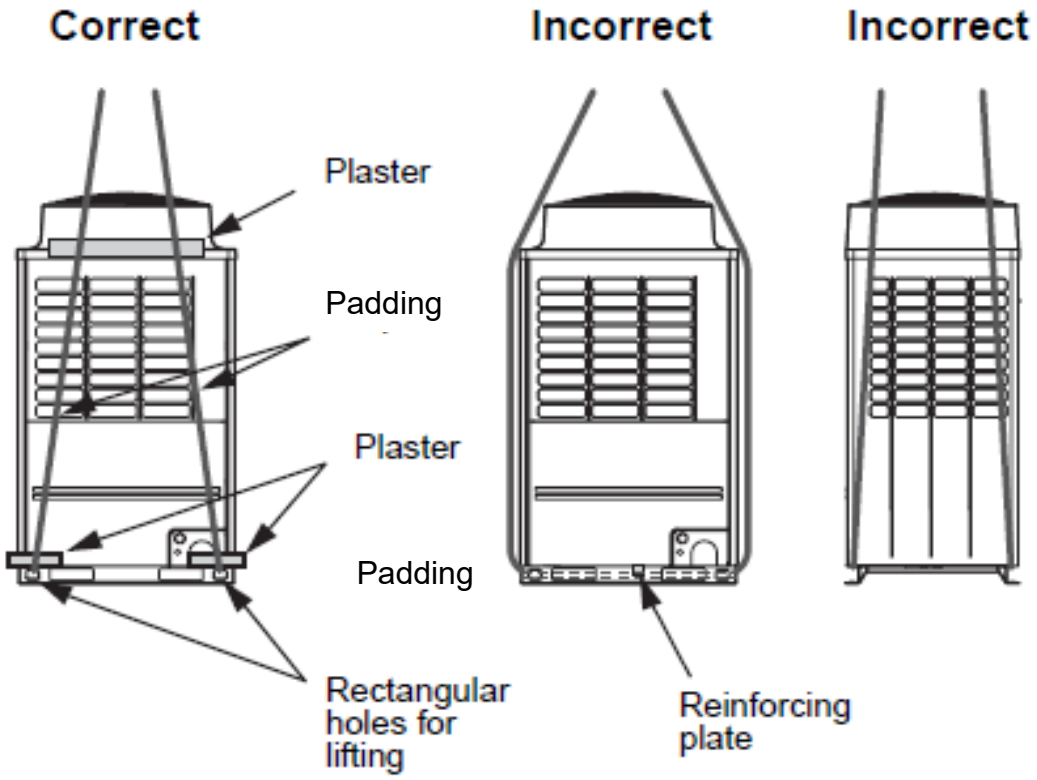
The forks **must** be inserted through the slots in the unit base rails as shown.

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



INSTALLATION PRE-PLANNING

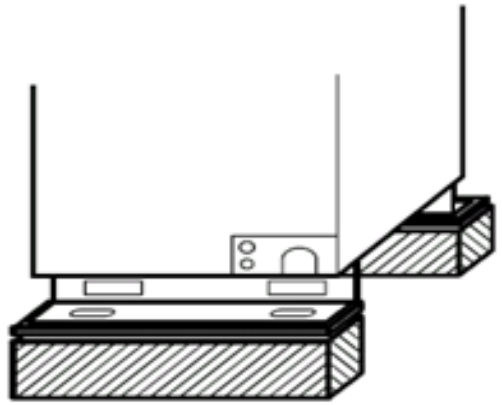
If lifting is required rig as shown to avoid damage



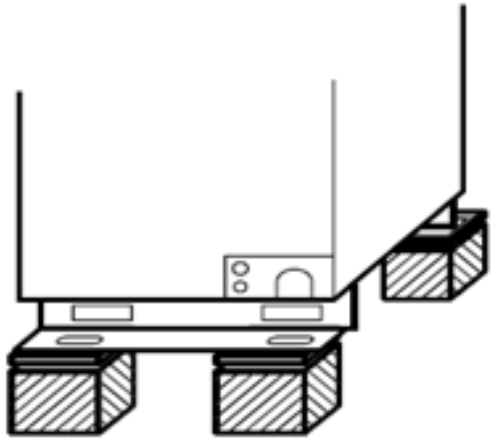
ANCHORING

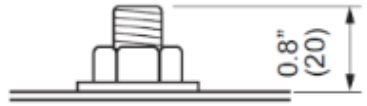
- Fix the outdoor unit with anchor bolts (4 positions/unit)
- Ensure entire surface of mounting feet are supported (not just the 4 corners)
  Do the same for applications requiring vibration insulators

CORRECT



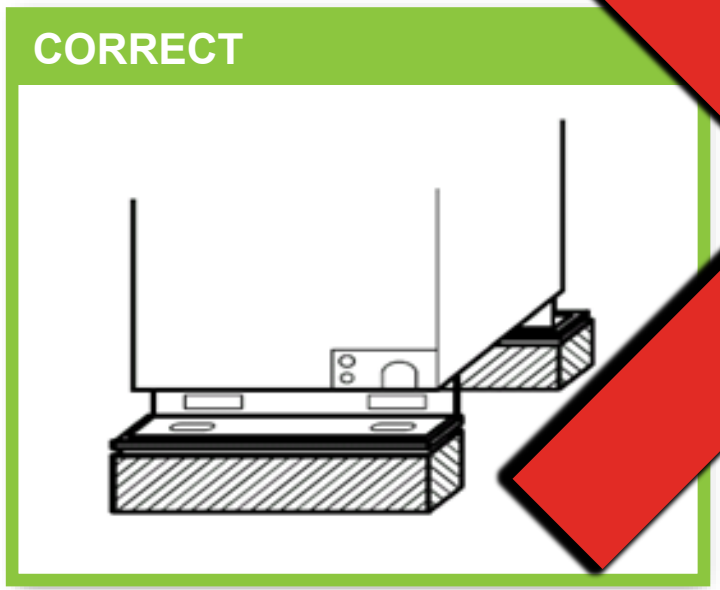
INCORRECT

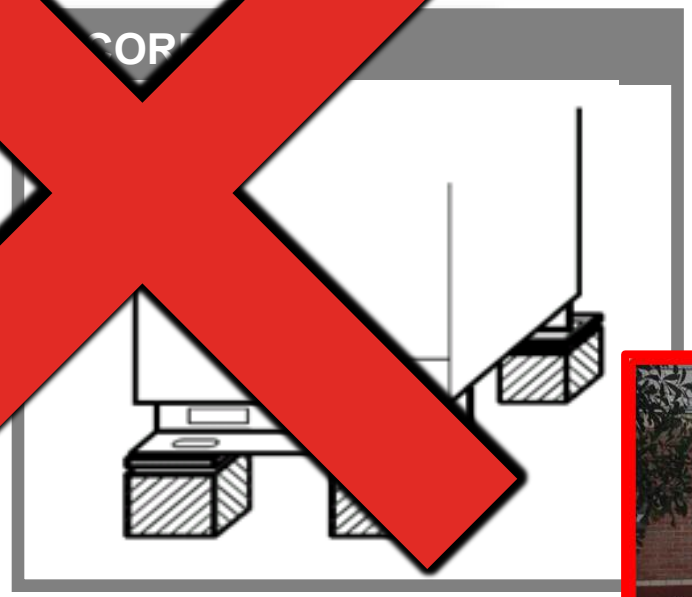


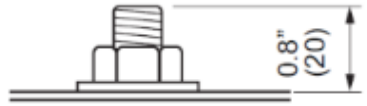


ANCHORING

- Fix the outdoor unit with anchor bolts (4 positions/unit)
- Ensure entire surface of mounting feet are supported (not just the 4 corners)
  Do the same for applications requiring vibration absorbers

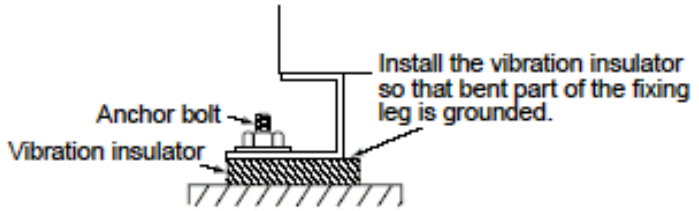


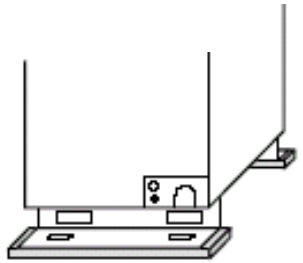




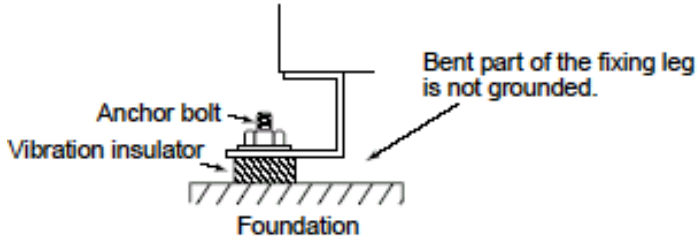
ANCHORING

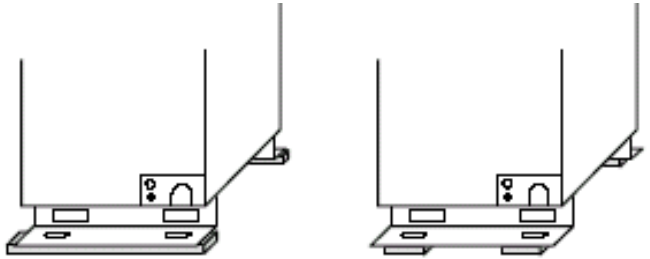
CORRECT





INCORRECT

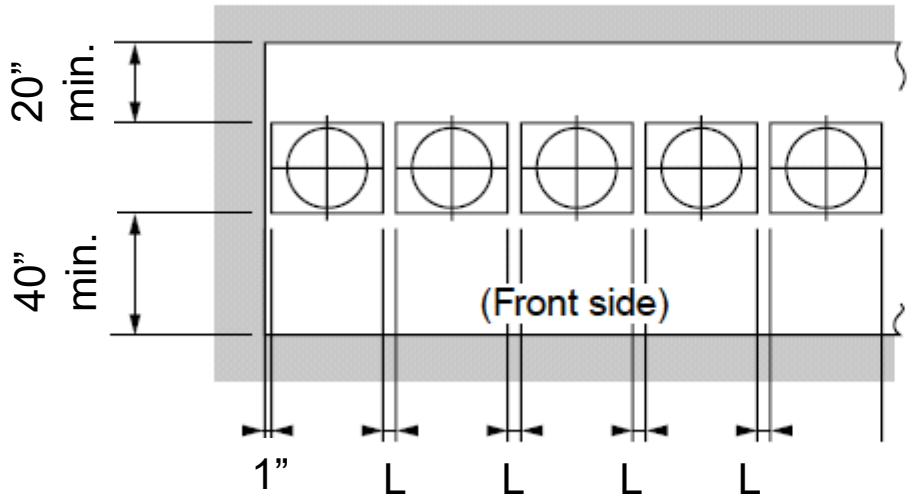




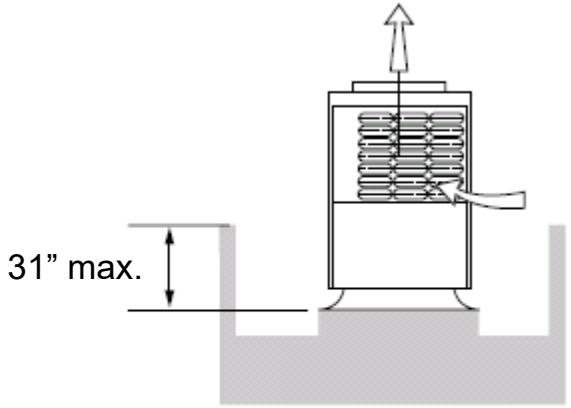
MULTIPLE UNIT INSTALLATION

IF A SURROUNDING WALL IS SHORTER THAN THE OUTDOOR UNITS

1. One-row installation:



min.

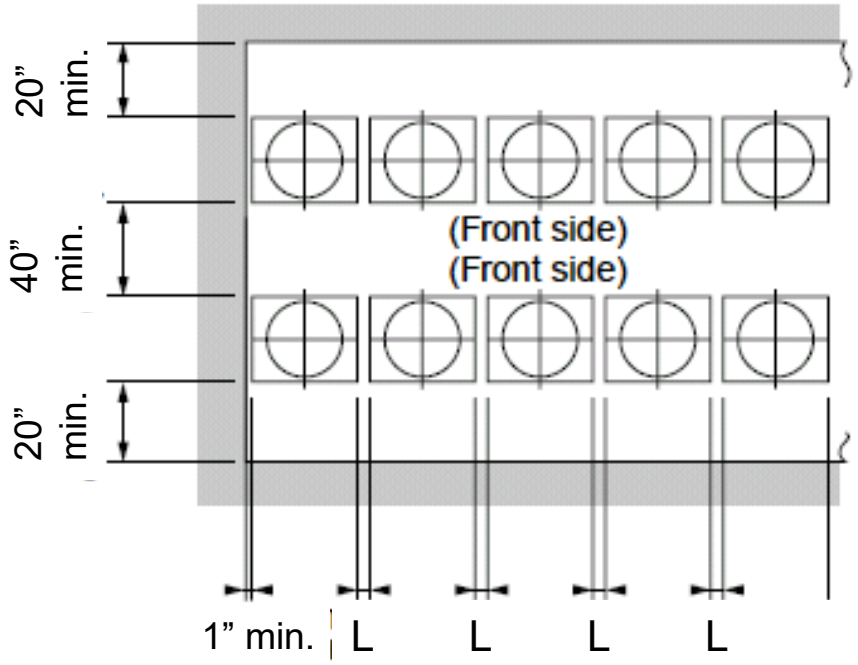


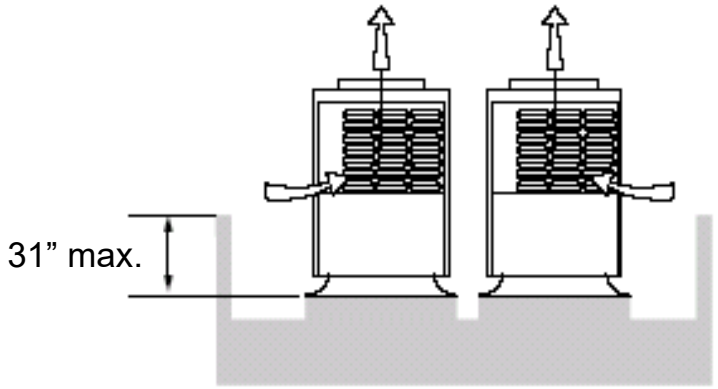
L= 8” recommended

MULTIPLE UNIT INSTALLATION

IF A SURROUNDING WALL IS SHORTER THAN THE OUTDOOR UNITS

2. Two-row installation:

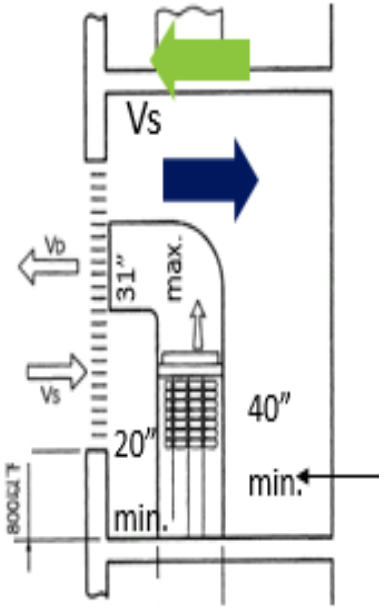


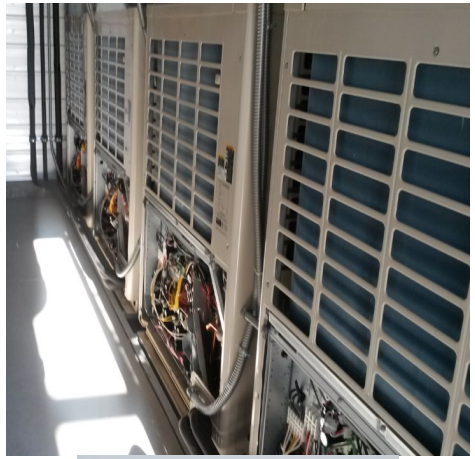


L= 8” recommended

MULTIPLE UNIT INSTALLATION

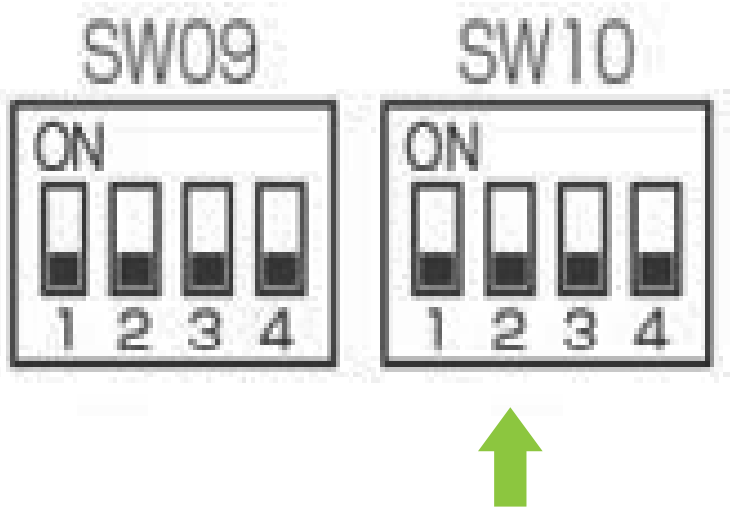
ODUs in a heated doghouse or penthouse





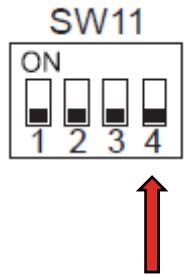
Outdoor Fan High Static Pressure Shift (SW10)

Turn “Bit 2” of the Dip switch (SW10) on the interface P.C. board of the outdoor unit to ON side.



SWITCH SETTING FOR FLOAT TROUBLE (SW11 BIT 4)

SW11	DIP SW 4 bit	bit 4	Operation switching when indoor water overflow trouble detected	OFF: Entire system stops ON : System operation continues (Room which trouble occurred only stops.)	OFF



Unless you prefer nuisance “System not working” calls for a float switch make sure to change this switch. It allows for system to run and only shut down problem IDU. Makes for quicker service.

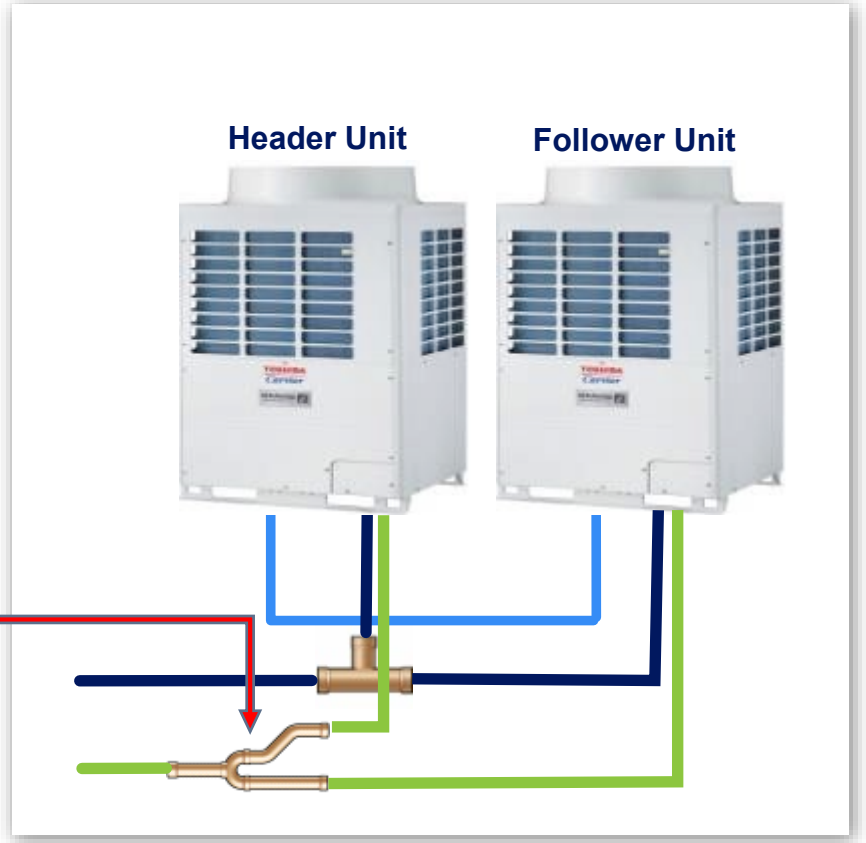
PIPING INSTALLATION

Heat Pump Outdoor Unit Piping Arrangement

Install the outdoor units in order of capacity

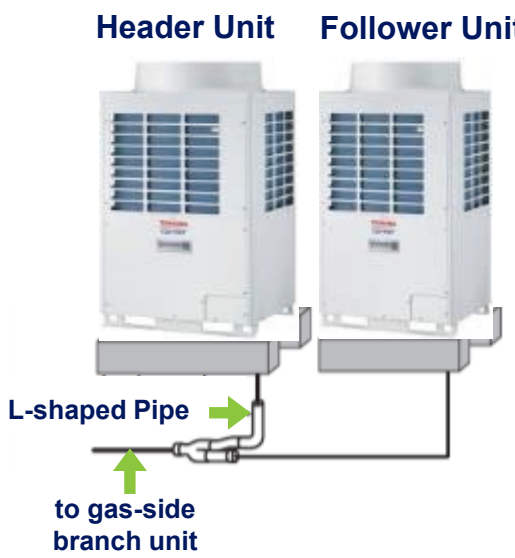
(Header Unit >= Follower Unit)

Crooked leg on suction fitting **ALWAYS** goes to header unit.
Y Branch is flat on horizontal plane not standing up on edge.

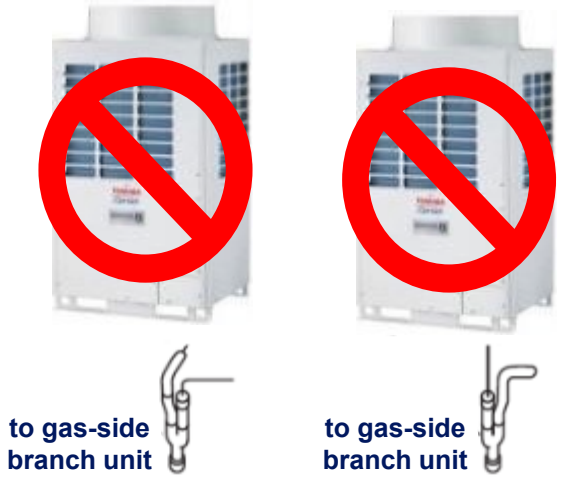


PIPING BASICS

CORRECT



INCORRECT

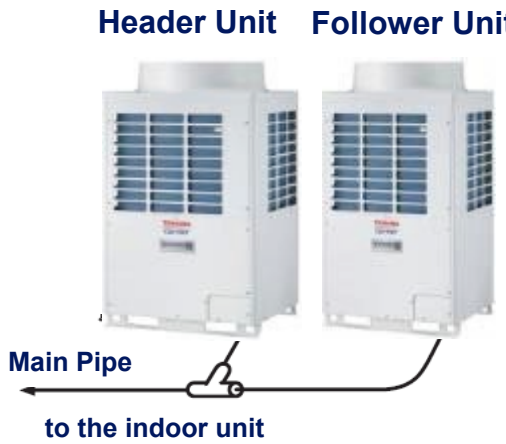


- Piping exit through unit bottom
- Y – branch must be installed **horizontally**

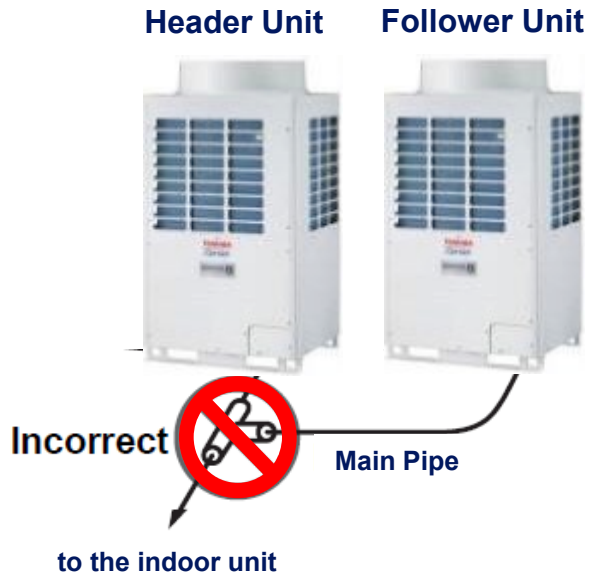
PIPING BASICS

LIQUID PIPE CONFIGURATION

CORRECT

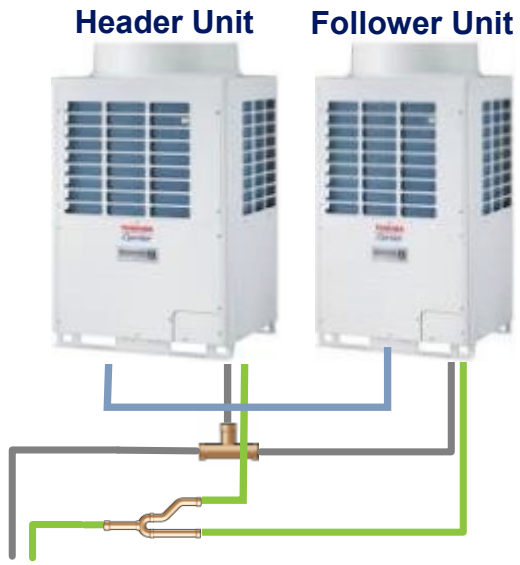


INCORRECT

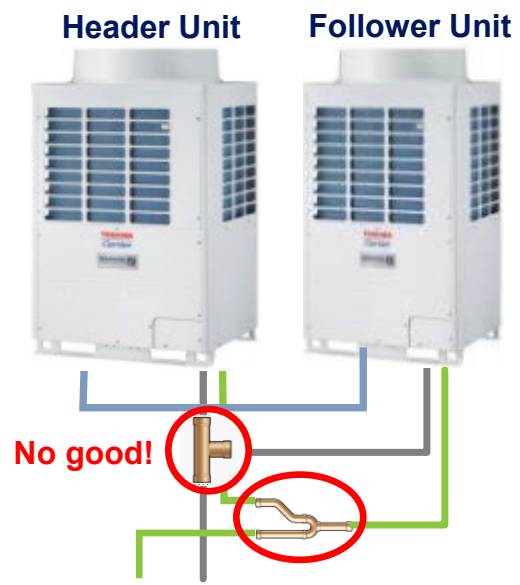


Heat Pump Outdoor Piping Arrangement

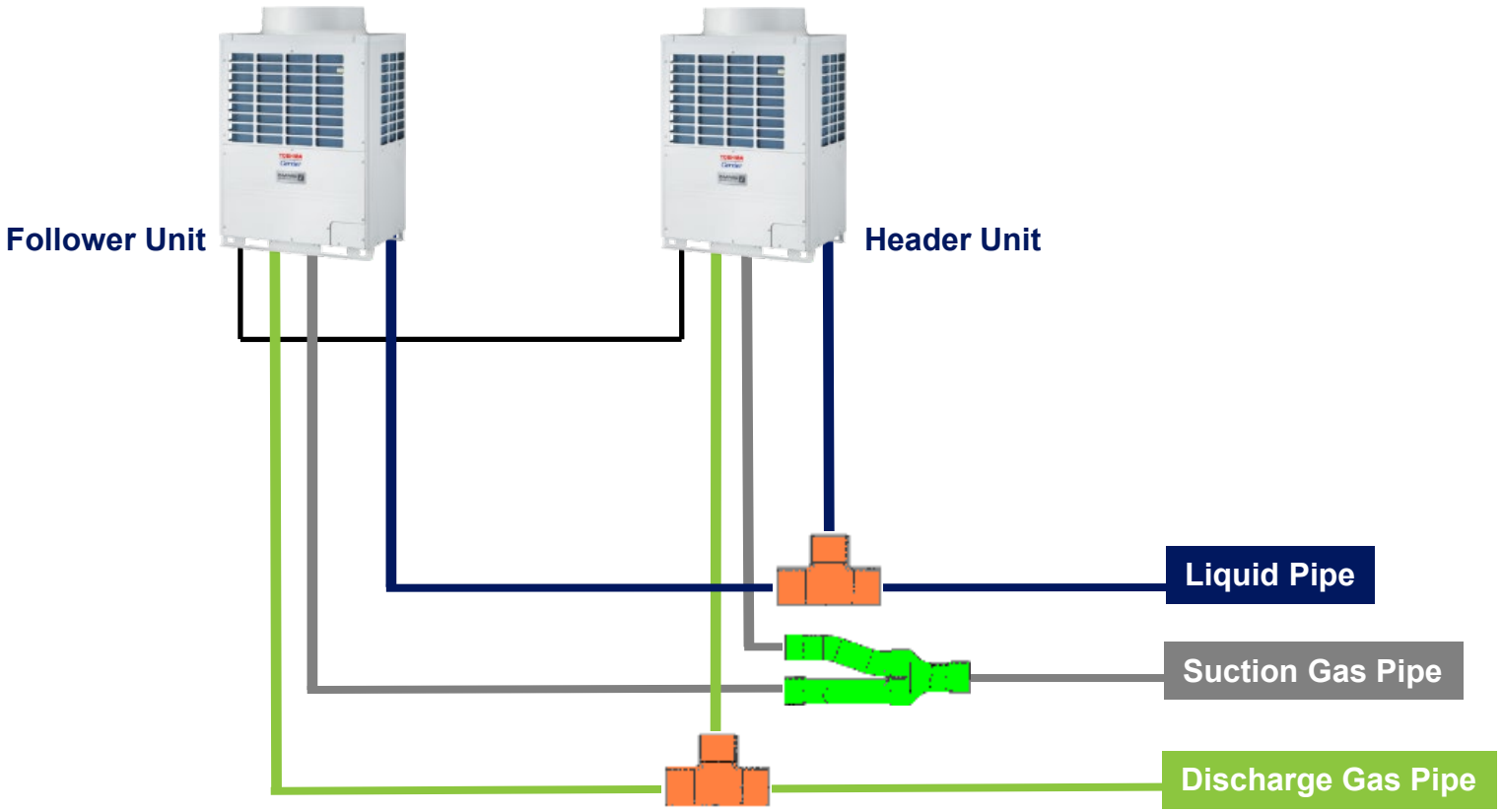
CORRECT



INCORRECT

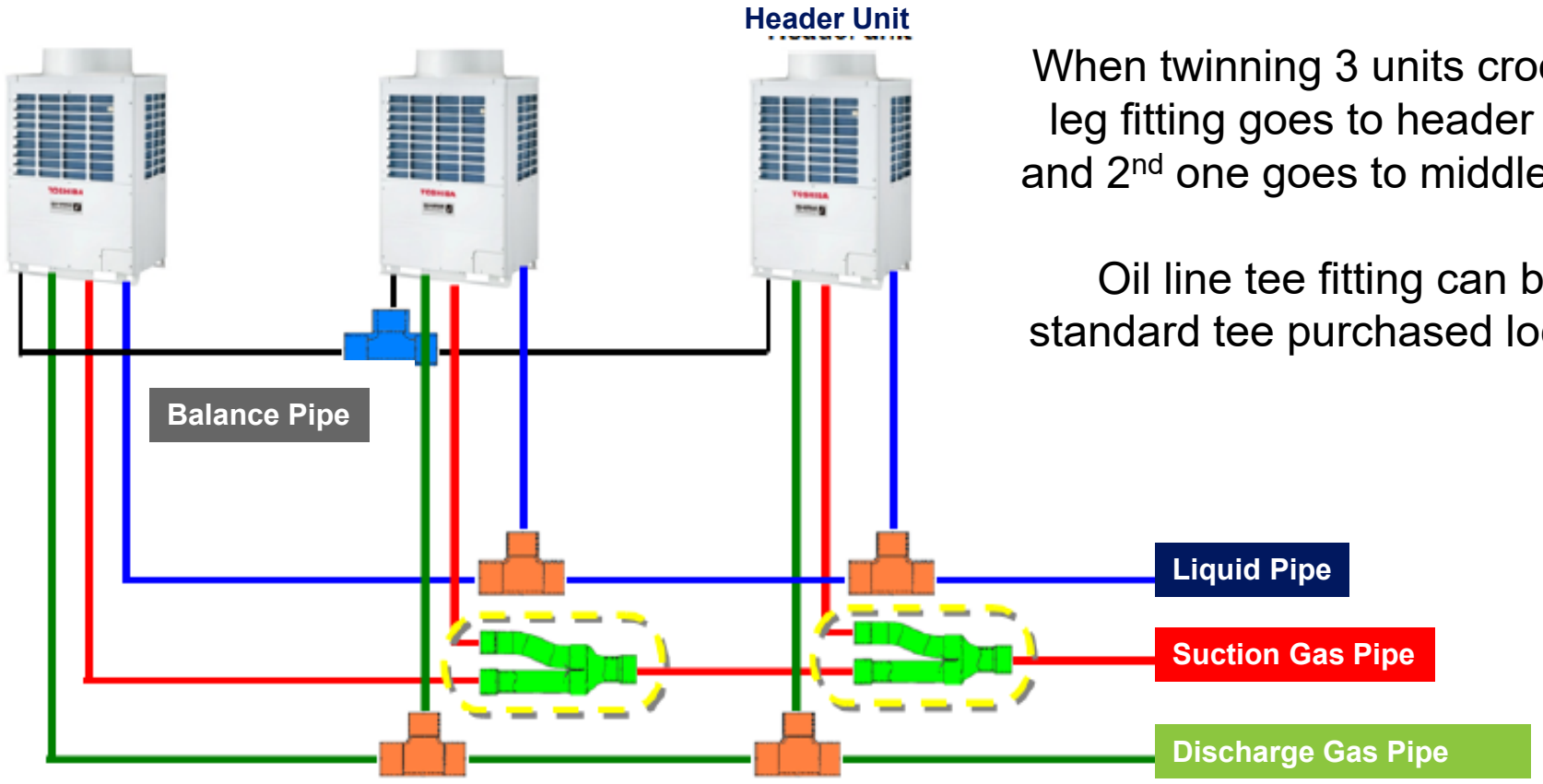


DUAL MODULE HEAT PUMP PIPING



Piping can enter from either side. Crooked leg goes to header unit and is flat not standing on edge. Short leg of tee fitting still goes to header unit.
Header unit the unit of highest capacity. If same capacity units are twinned then header unit is decided by piping.

TRIPLE MODULE PIPING



When twinning 3 units crooked leg fitting goes to header unit and 2nd one goes to middle unit.

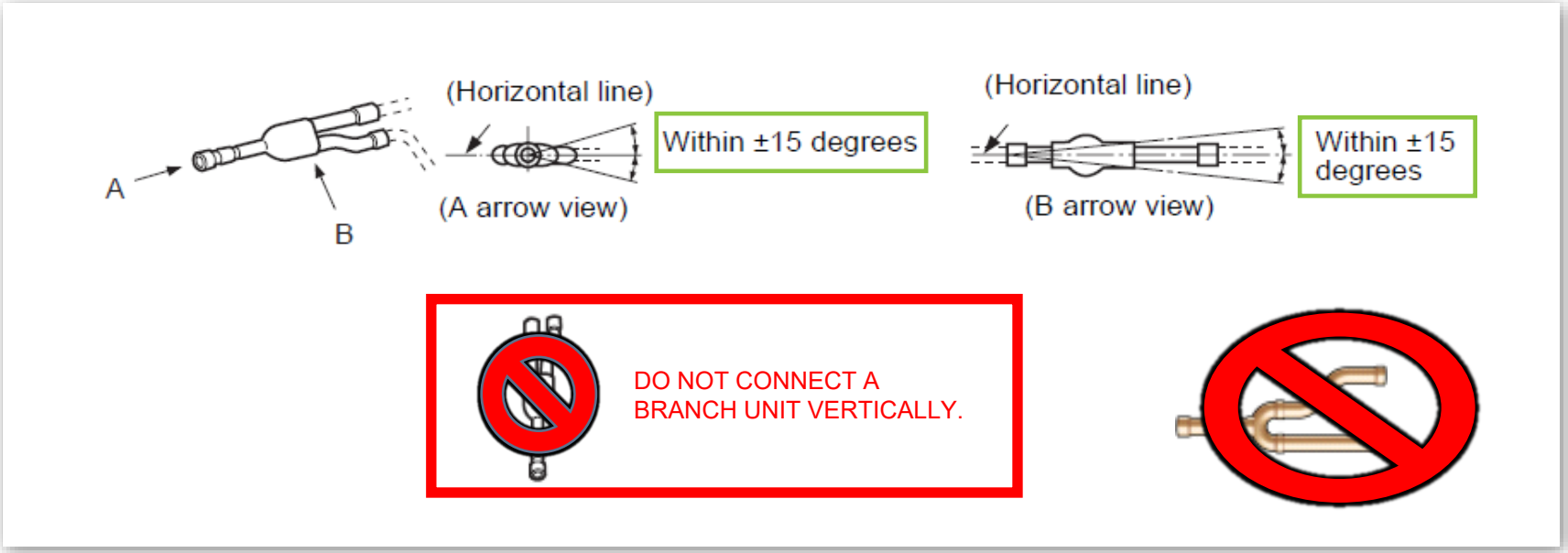
Oil line tee fitting can be standard tee purchased locally.

“Y” PIPING

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 +/- 15 degrees.

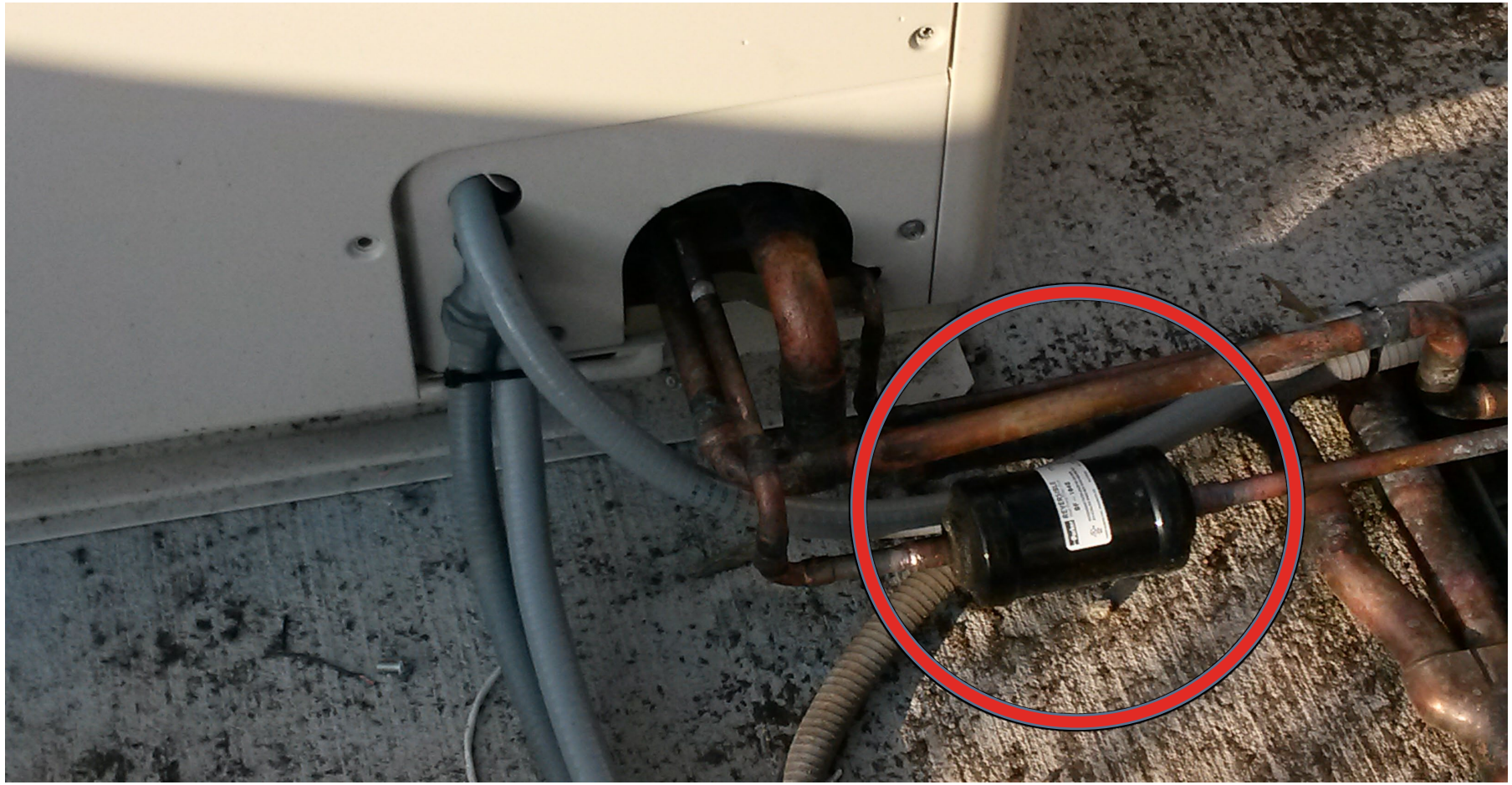


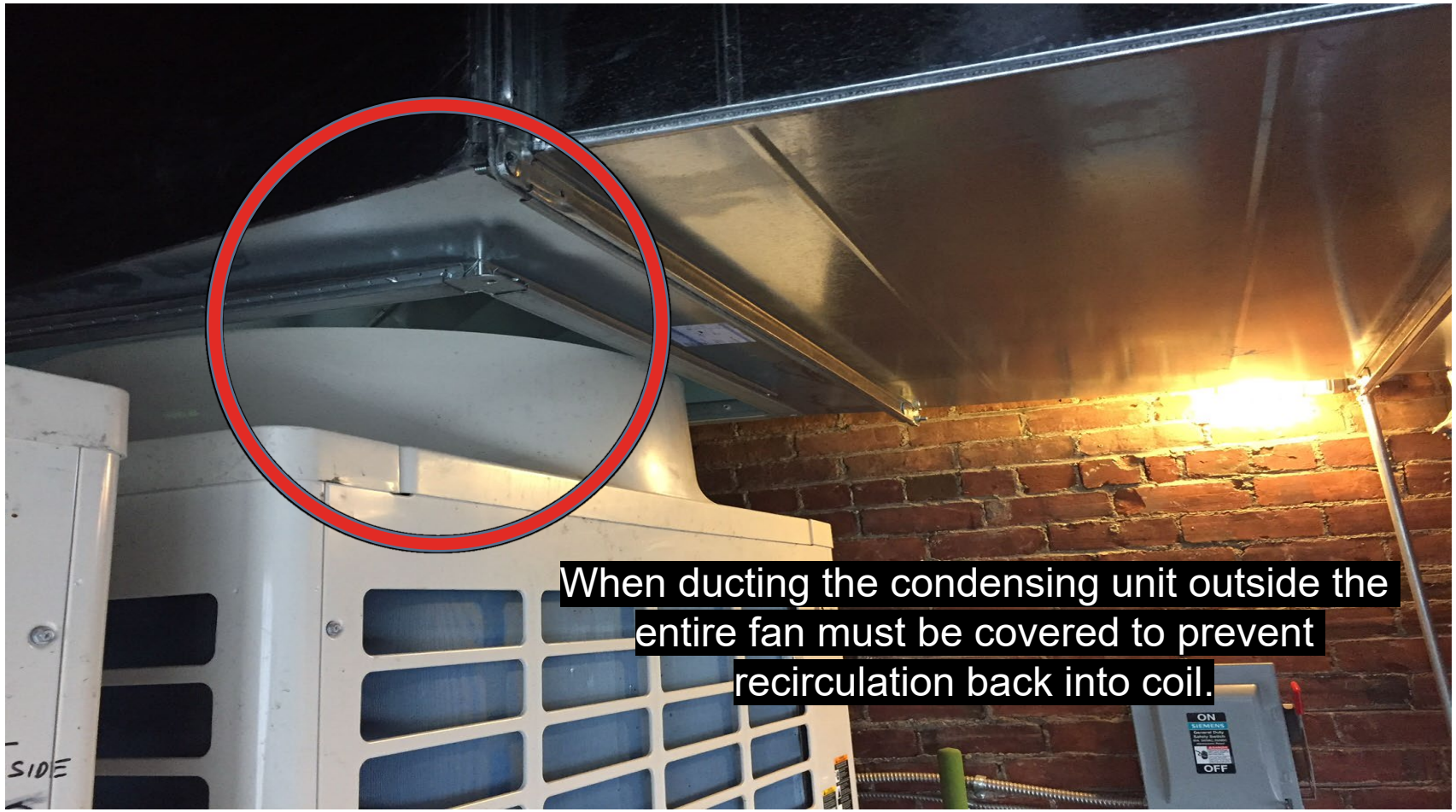
WHAT IS WRONG WITH THE FOLLOWING PICTURES?


L1
L2
L3
2 points of electrical contact must be made. Contacts must be even to prevent terminal damage.

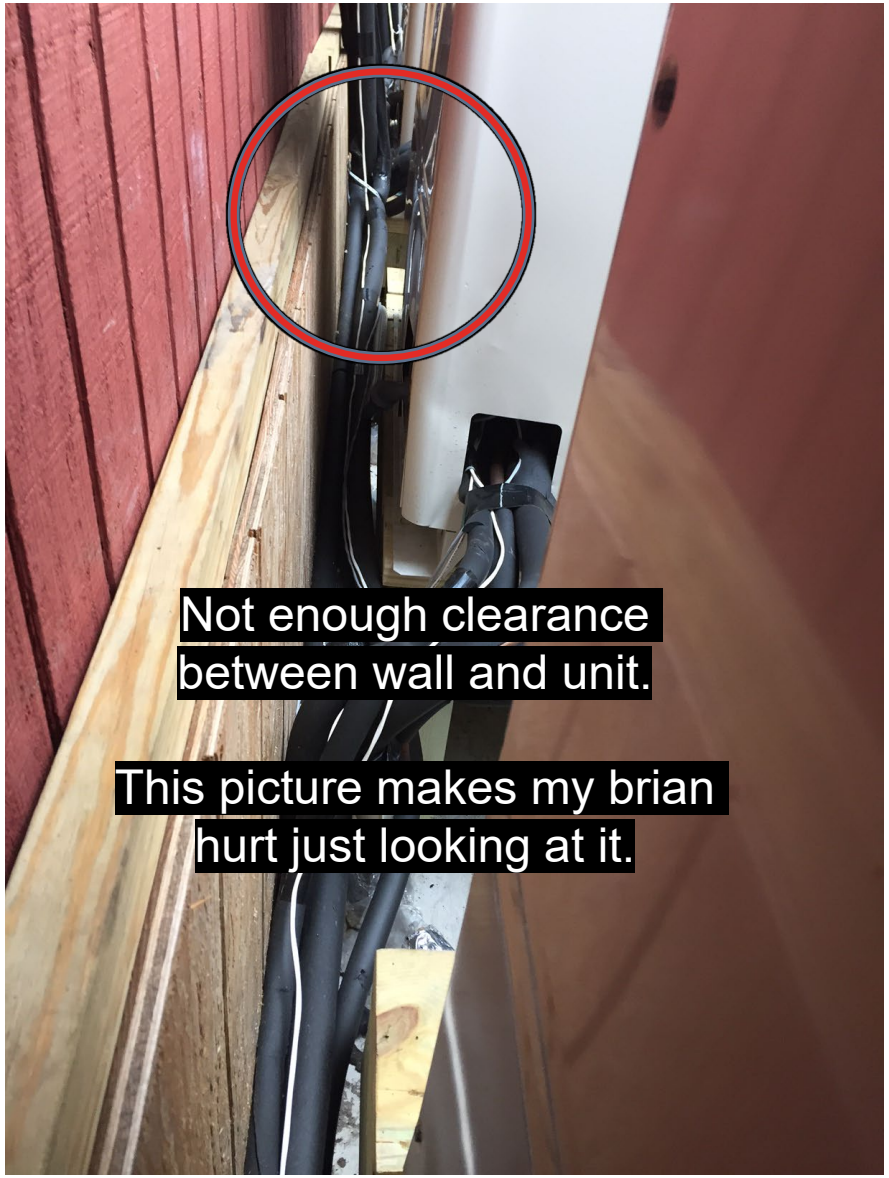
Line sets can’t be buried and must be insulated properly.

Filter driers, sightglasses, solenoids, and other accessories are prohibited unless otherwise stated by manufacture.




When ducting the condensing unit outside the entire fan must be covered to prevent recirculation back into coil.
SIDE
ON
OFF


FIXED
IT!


Not enough clearance
between wall and unit.
This picture makes my brian
hurt just looking at it.

Not enough
cl r ce
b ve top
n
sides……

RUN AWAY AS QUICKLY AS YOU CAN!!!!

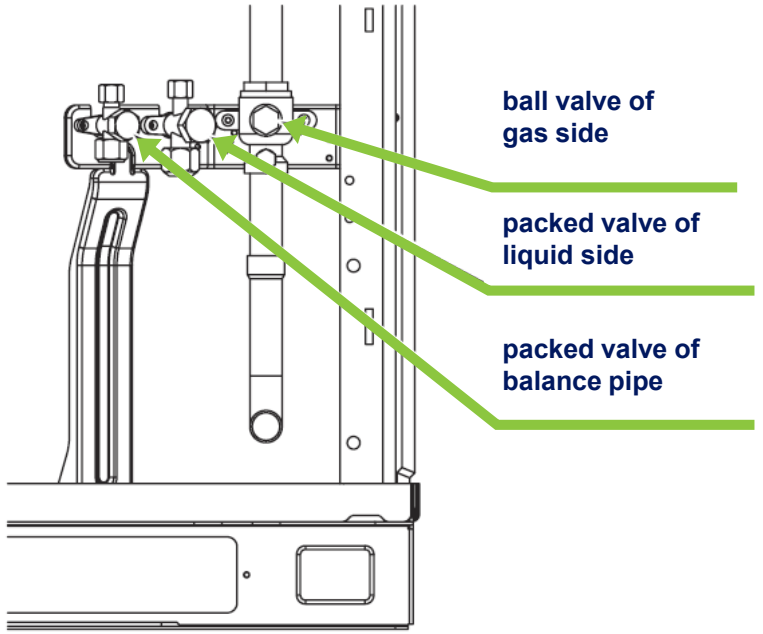
CONNECTION OF REFRIGERANT PIPING

072, 096, 114 type

Liquid 1/2” flare

Gas 7/8” brazing (114 type : 1-1/8”)

Balance 3/8” flare



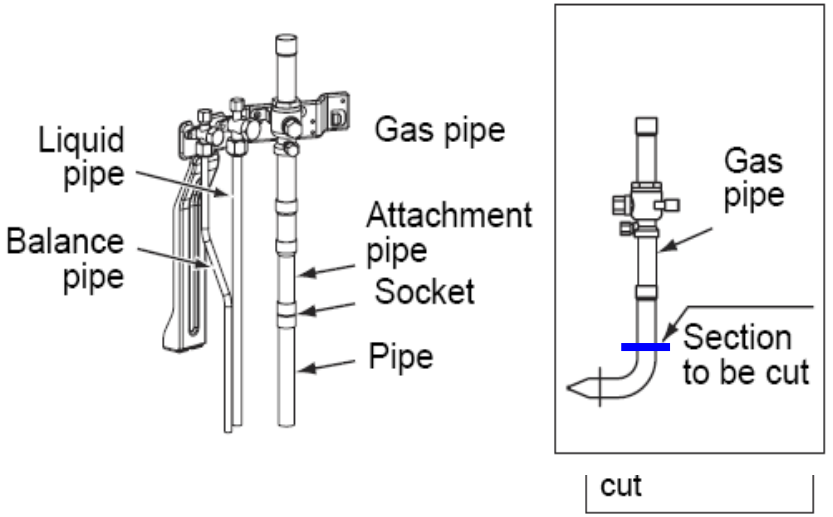
MMY-MAP0724*, MAP0964*, MAP1144*

OUTDOOR UNIT PIPING

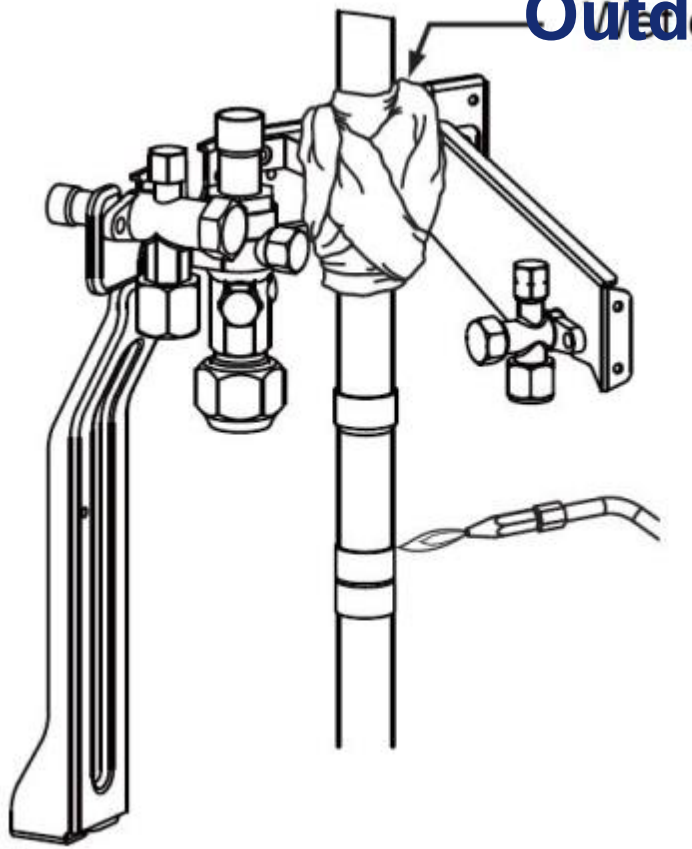
CONNECTING GAS PIPING

Pipe exit unit front

Cut the L-shaped pipe at the horizontal straight section, then braze the supplied attachment pipe and the socket and pipe procured locally.



Outdoor Unit Piping



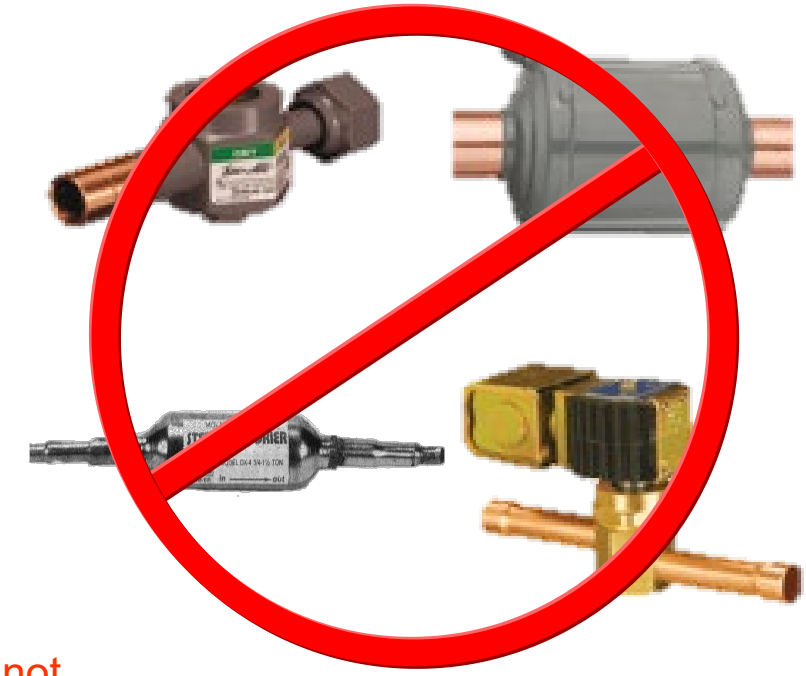
Wrap a wet cloth around the valve to keep it cool during brazing.

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



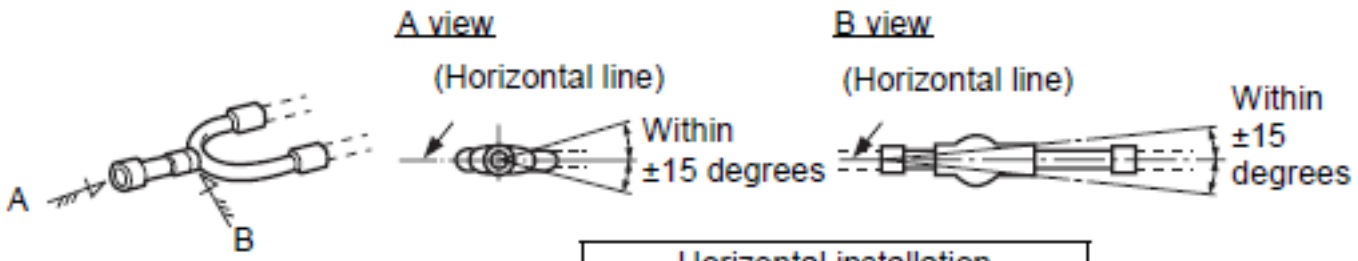
Please do not…

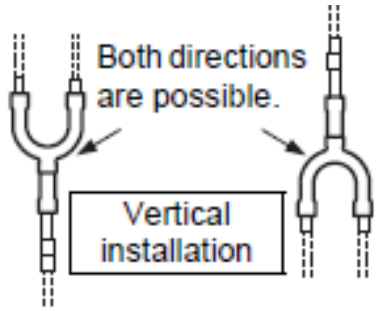
Install driers, sight glasses, solenoid valves, or any other components in the piping network.

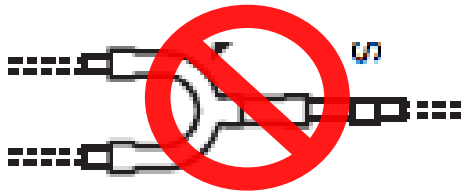
Ball valves are the only exception.

BRANCHING CONNECTORS

- When a branching pipe is installed horizontally, make its gradient within ± 15 degrees.







INDOOR UNIT PIPING

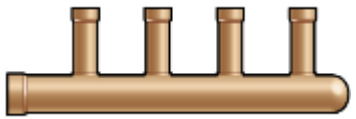
INDOOR UNIT PIPING

INDOOR UNIT PIPING

INDOOR UNIT PIPING

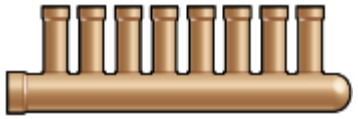
INDOOR UNIT HEADERS

4-BRANCHING HEADER

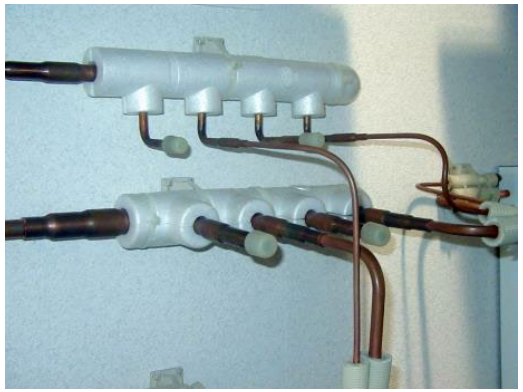


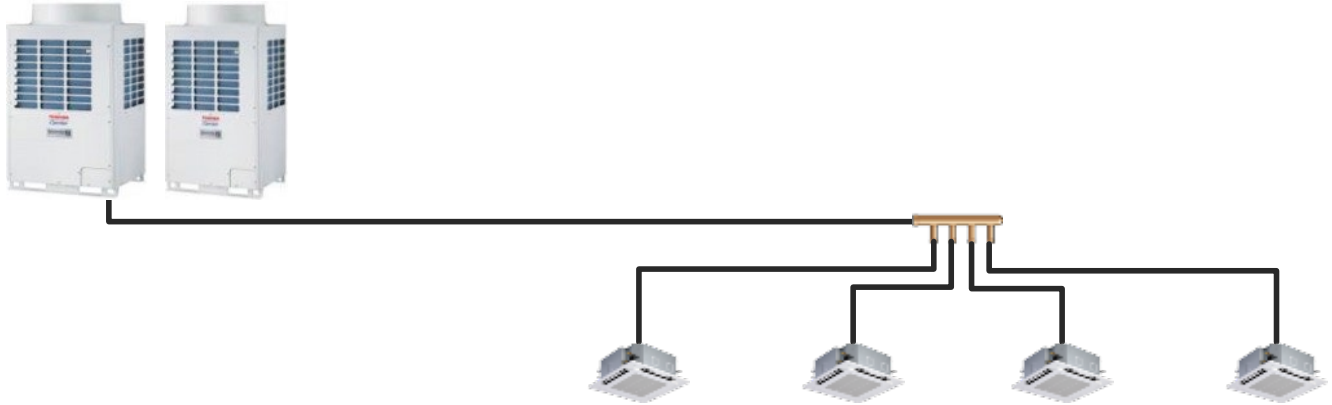
RBM-HY1043UL
RBM-HY2043UL

8-BRANCHING HEADER

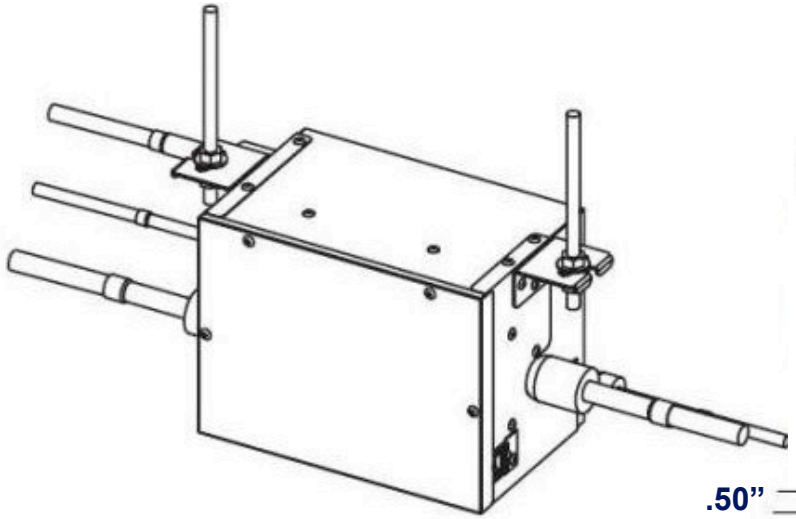


RBM-HY1083UL
RBM-HY2083UL

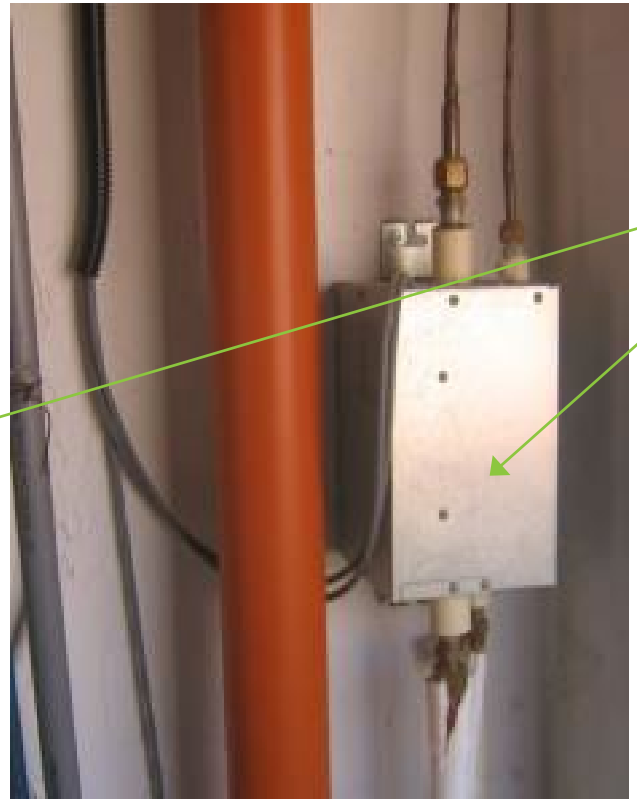




POSITIONING THE FLOW SELECTOR



INDOOR UNIT PIPING – FLOW SELECTOR



Vertical FS unit installation

(valve does not work / Flow noise)

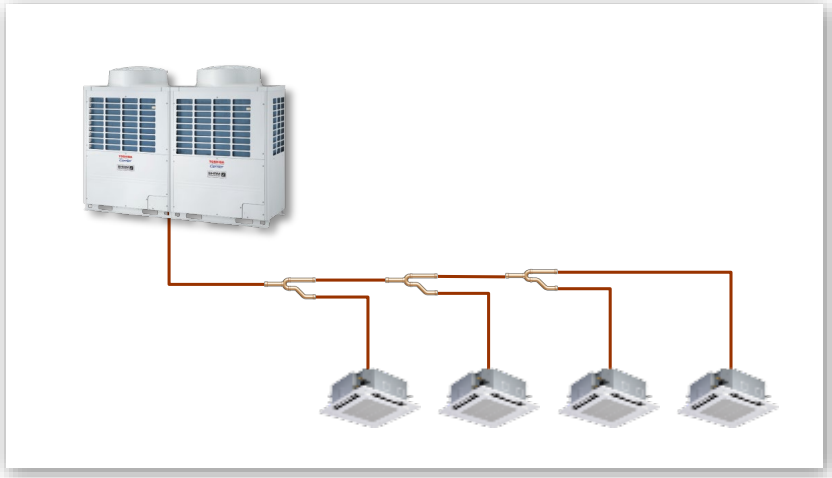
INDOOR UNIT PIPING – FLOW SELECTOR

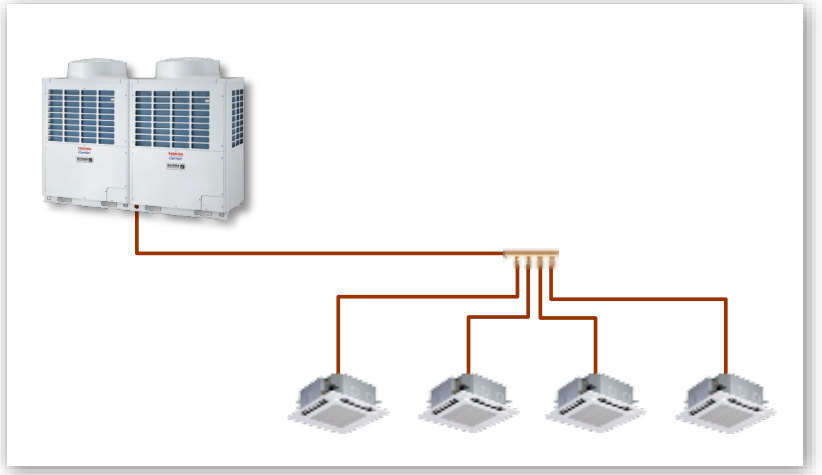
POOR INSTALLATION

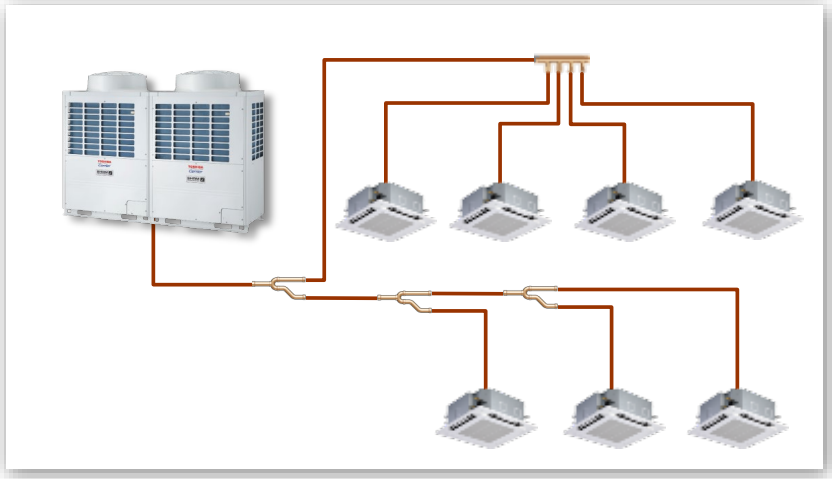
FS unit attached the ceiling

(Noise / service issue)

INDOOR UNIT PIPING



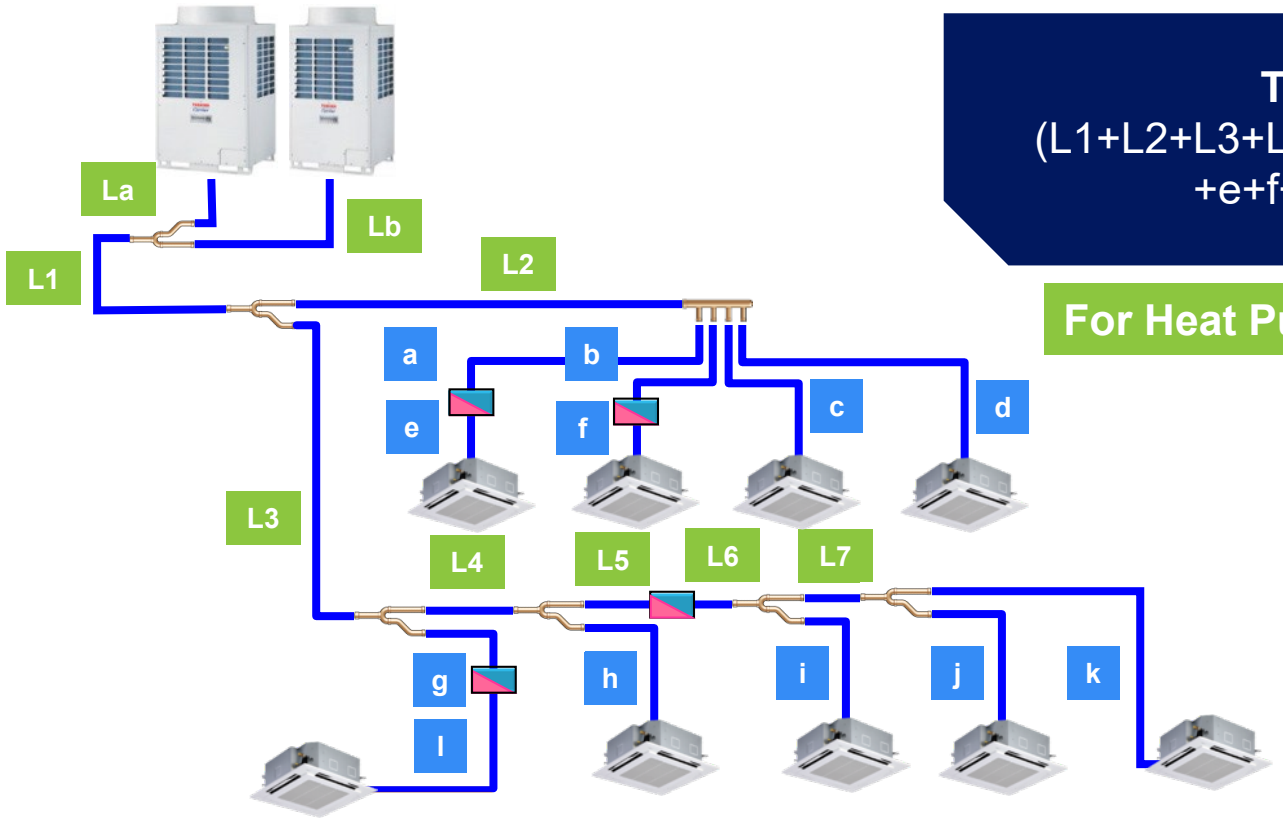




Determining the best piping strategy depends on the application and layout of the indoor units and the merits of each branching method.

For Heat Pump or Heat Recovery

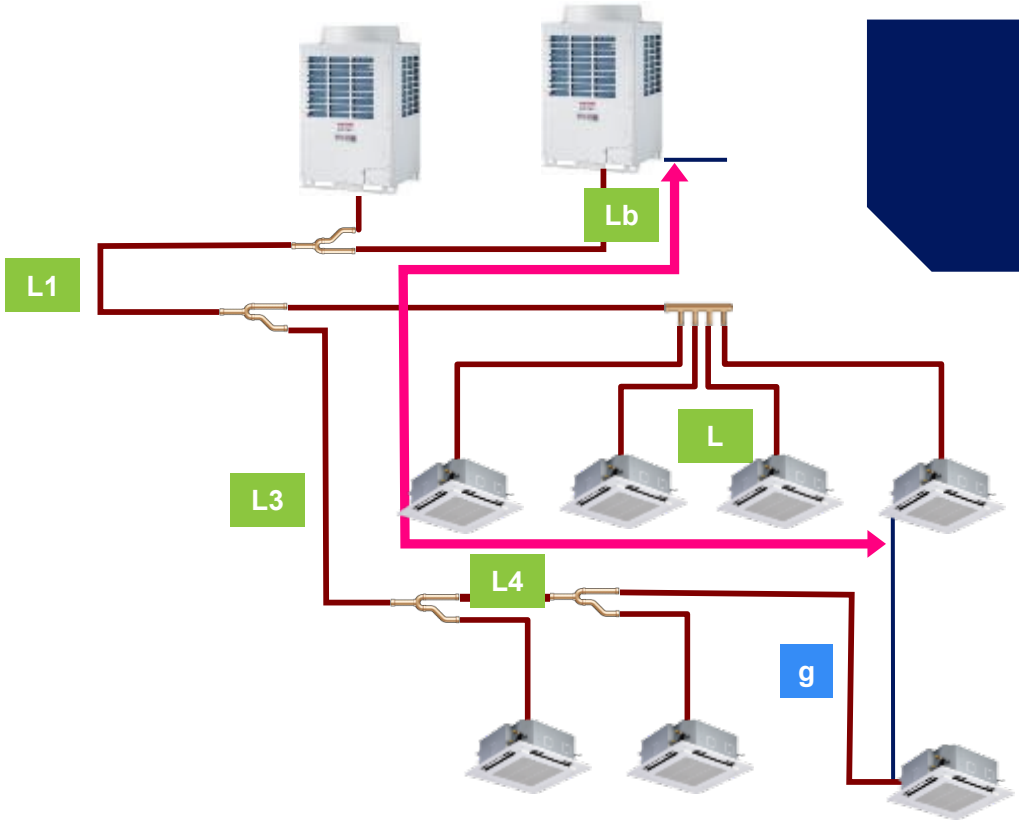
TOTAL EXTENSION OF PIPE (LIQUID PIPE, REAL LENGTH)



Total Length <= 3281ft.
(L1+L2+L3+L4+L5+L6+L7+a+b+c+d
+e+f+g+h+i+j+k+Lb+La+Lb)

For Heat Pump or Heat Recovery

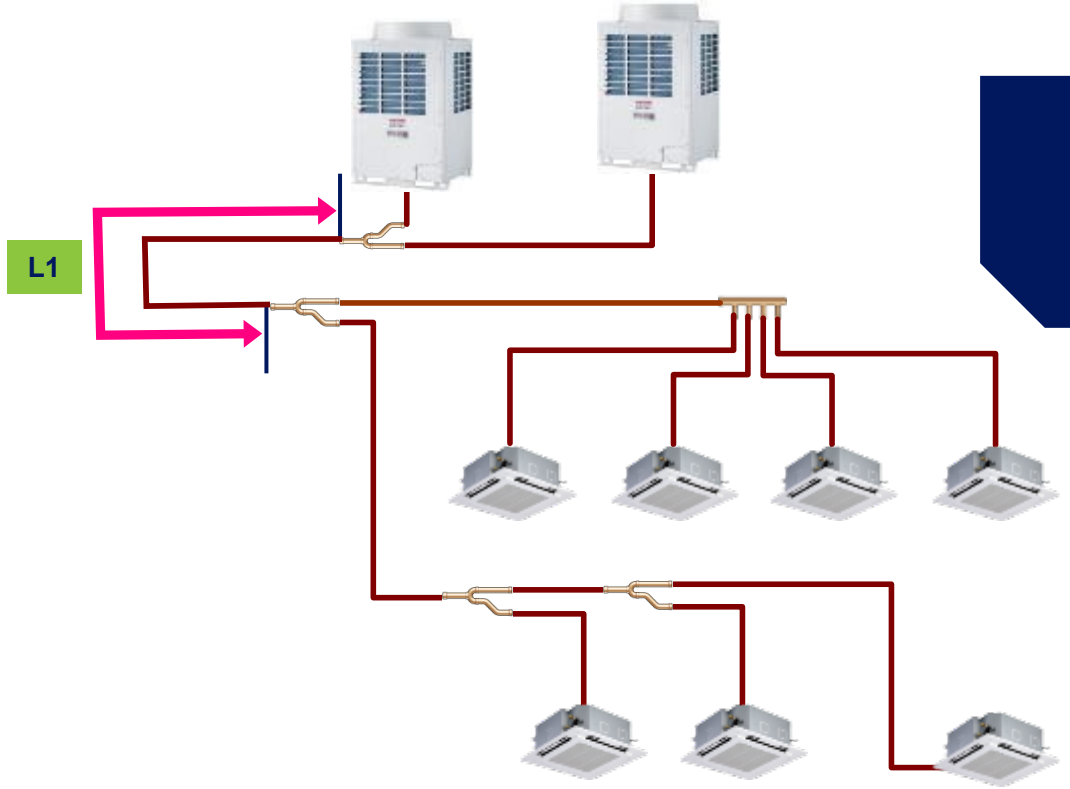
FARTHEST PIPING LENGTH (L)



Farthest equivalent length <=
771ft (235m)
(L1+L3+L4+g+Lb)

For Heat Pump ONLY

MAIN PIPING LENGTH (L1)

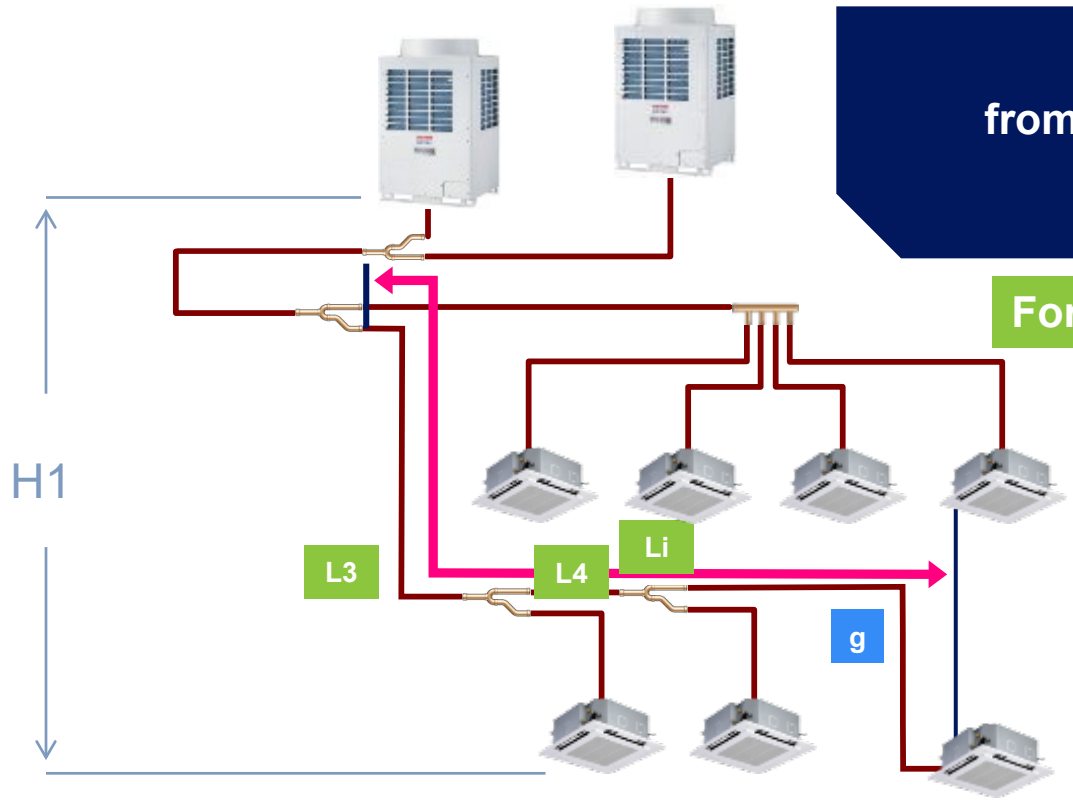


Main piping equivalent length
<= 394ft (120m)
Main piping actual length
<= 328ft (100m

For Heat Pump ONLY

Please note, lengths decrease when over 36T

FARTHEST EQUIVALENT PIPING LENGTH FROM 1ST BRANCH (LI)



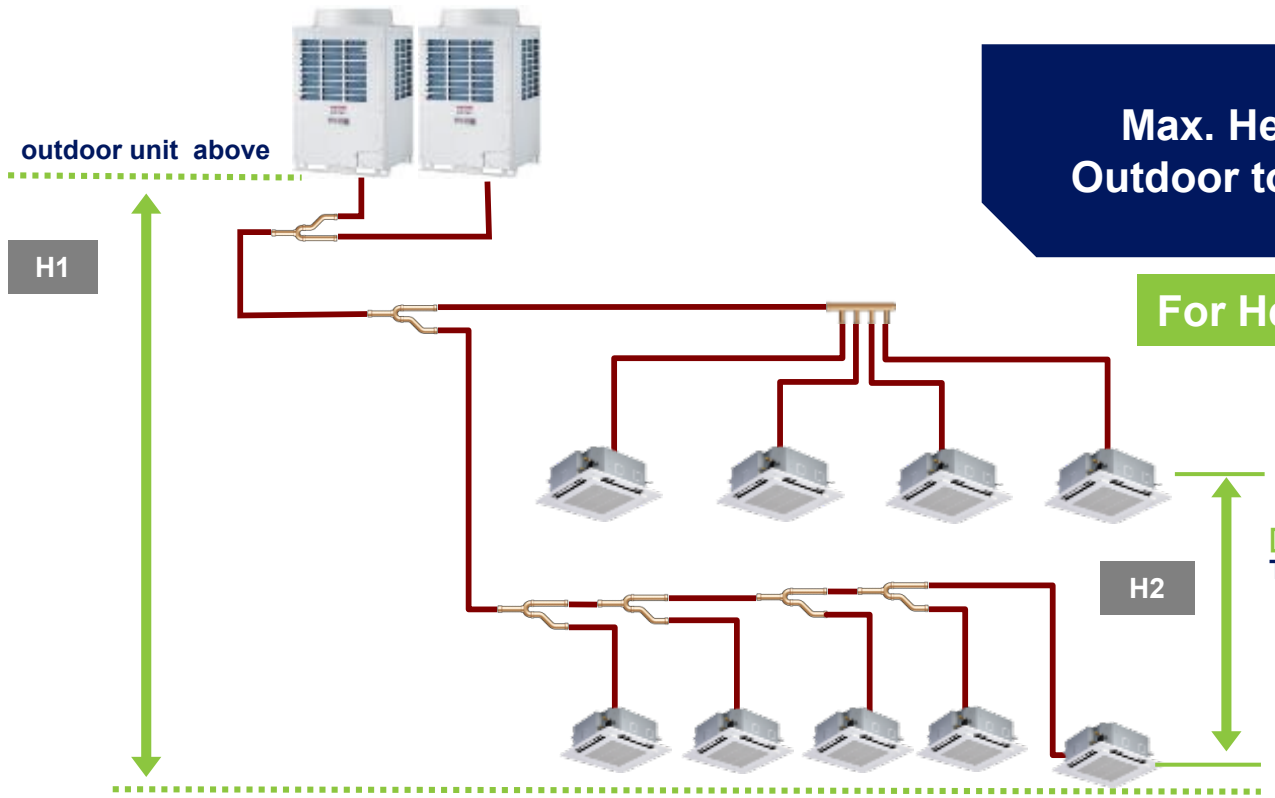
Farthest equivalent length from 1st branch <= 295ft (90m)

(L3+L4+g)

For Heat Pump ONLY

Please note, when H1 exceeds 9.8’ pipe length decreases to 213 (50m)’

HEIGHT DIFFERENCE BETWEEN OUTDOOR TO LOWER INDOOR



Max. Height difference between Outdoor to Lower Indoor <= 230 ft

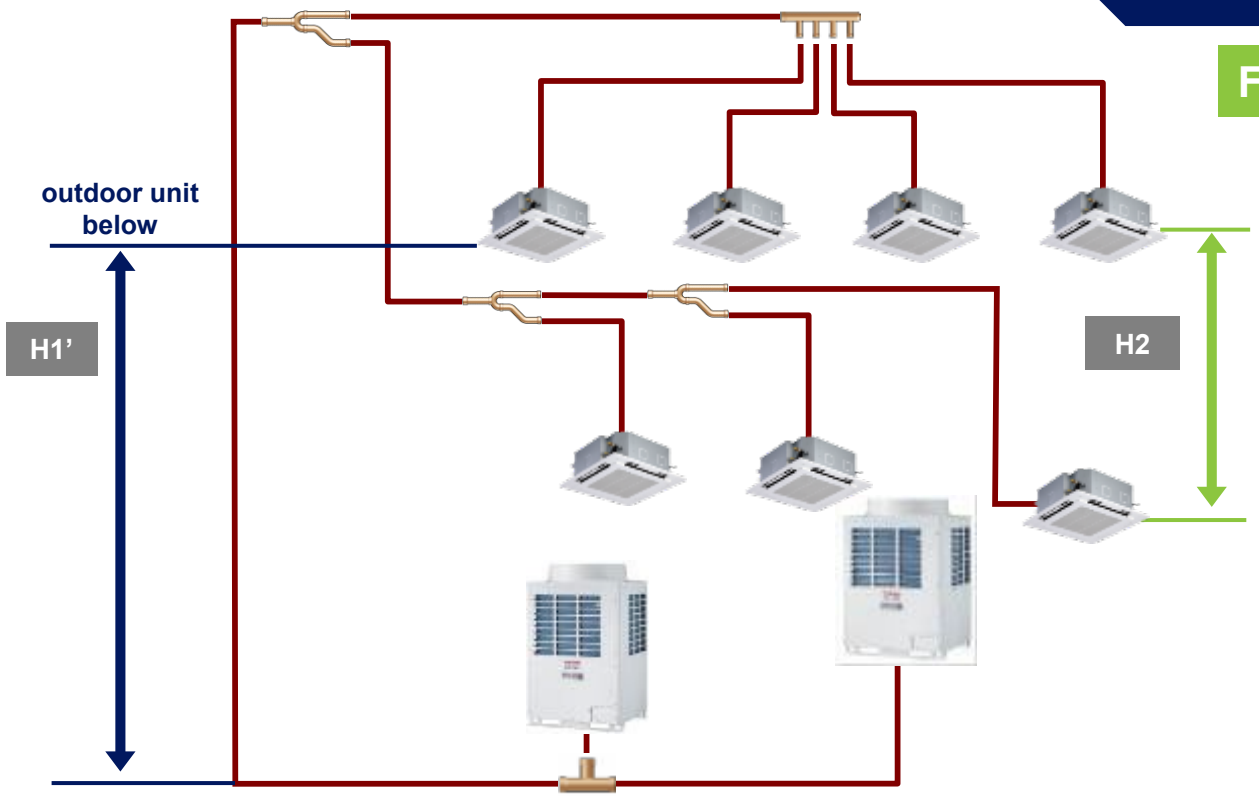
For Heat Pump ONLY

[NOTE] If H2 > 9.8'
Then H1 < 164'

HEIGHT DIFFERENCE BETWEEN OUTDOOR TO UPPER INDOOR

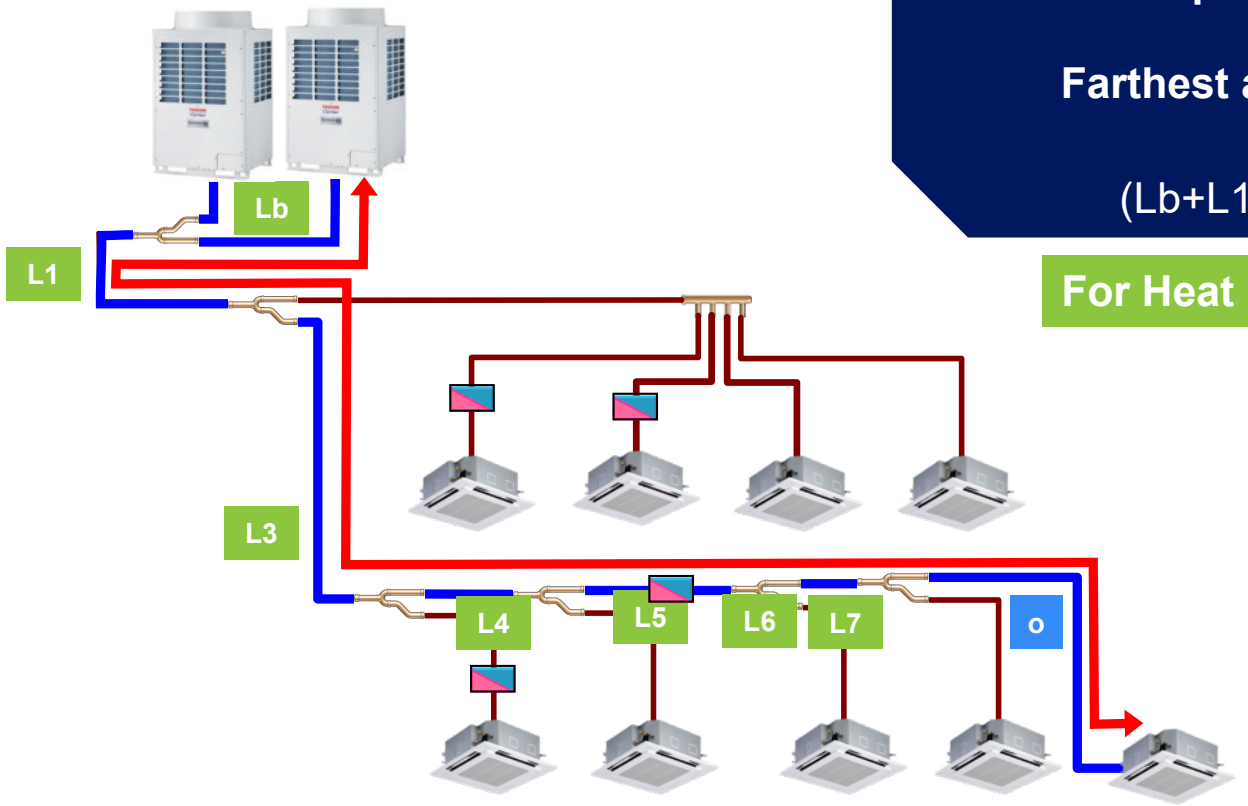
Max. Height difference between Outdoor to Upper Indoor <= 131ft (40m)

For Heat Pump ONLY



[NOTE]
If H2 > 9.8'
Then H1 < 98'

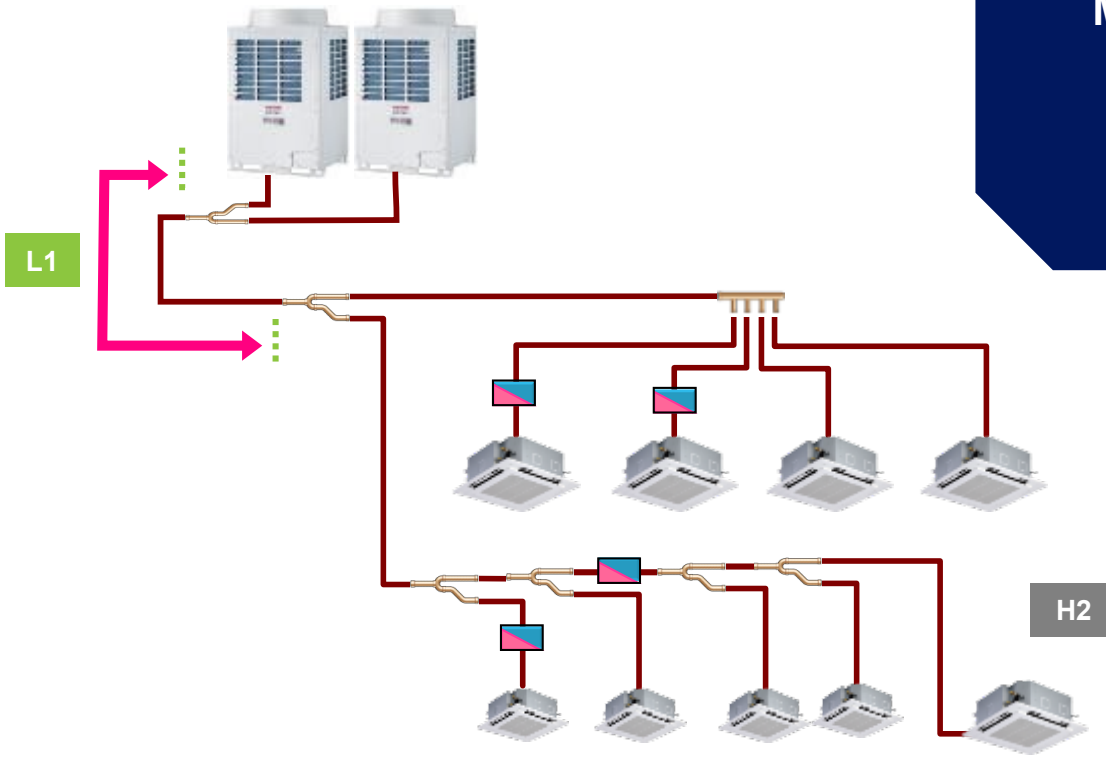
FARTHEST PIPING LENGTH (L)



Farthest equivalent length <= 656ft (195m)
Farthest actual length <= 591ft (175m)
(Lb+L1+L3+L4+L5+L6+L7+o)

For Heat Recovery ONLY

MAIN PIPING LENGTH



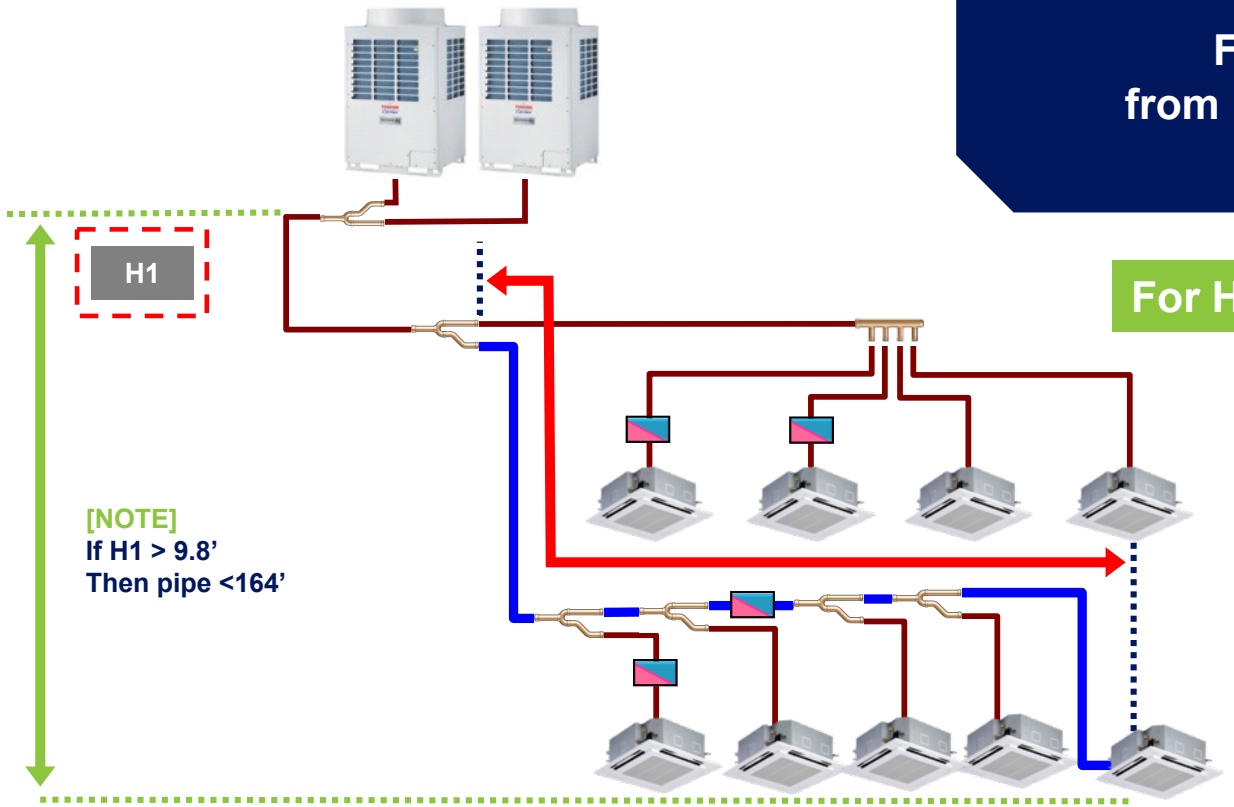
Main piping equivalent length <= 394ft (120m)

Main piping real length <= 328ft (100m)

For Heat Recovery ONLY

[NOTE]
If H2 > 9.8'
Then pipe < 328'[279]

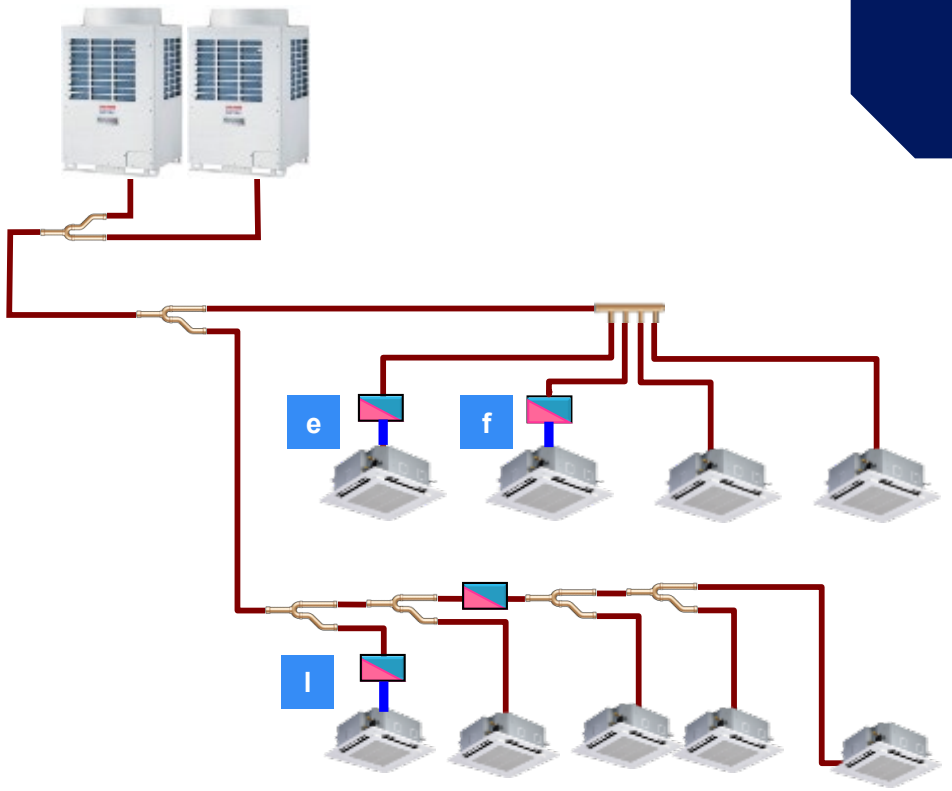
EQUIVALENT LENGTH OF FARTHEST PIPING FROM 1ST BRANCH



Farthest equivalent length from 1st branch <= 213ft (50m)
(L3+L4+L5+L6+L7+k)

For Heat Recovery ONLY

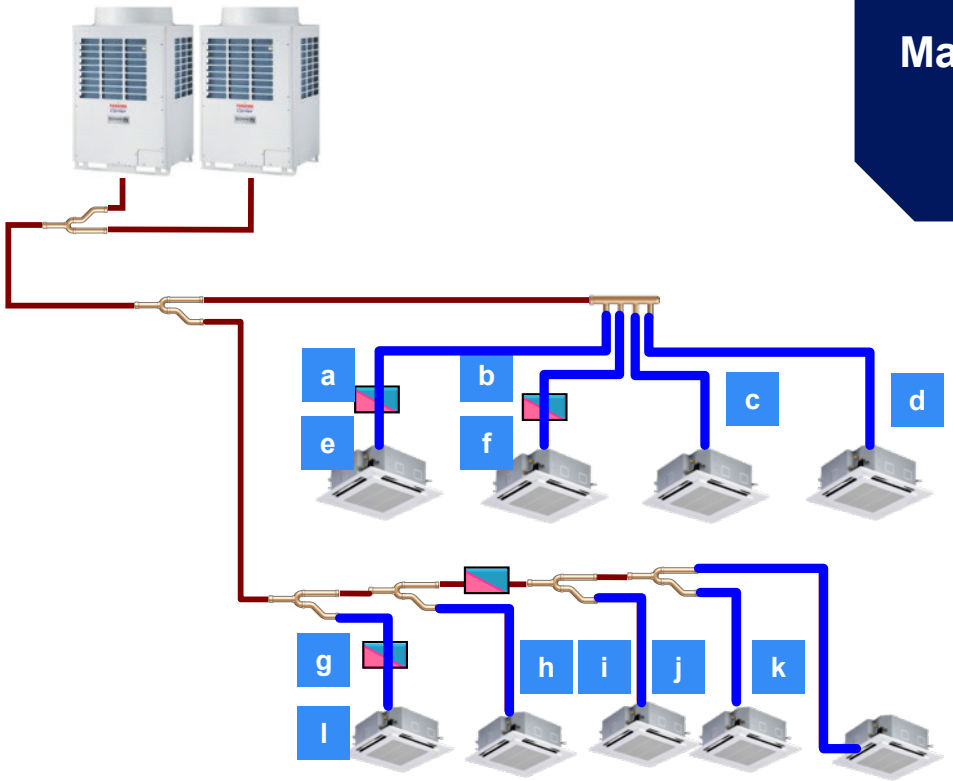
ACTUAL PIPING LENGTH BETWEEN FS BOX AND INDOOR UNIT



Max. real length between FS unit and indoor unit <= 49ft
(e,f,l)

For Heat Recovery ONLY

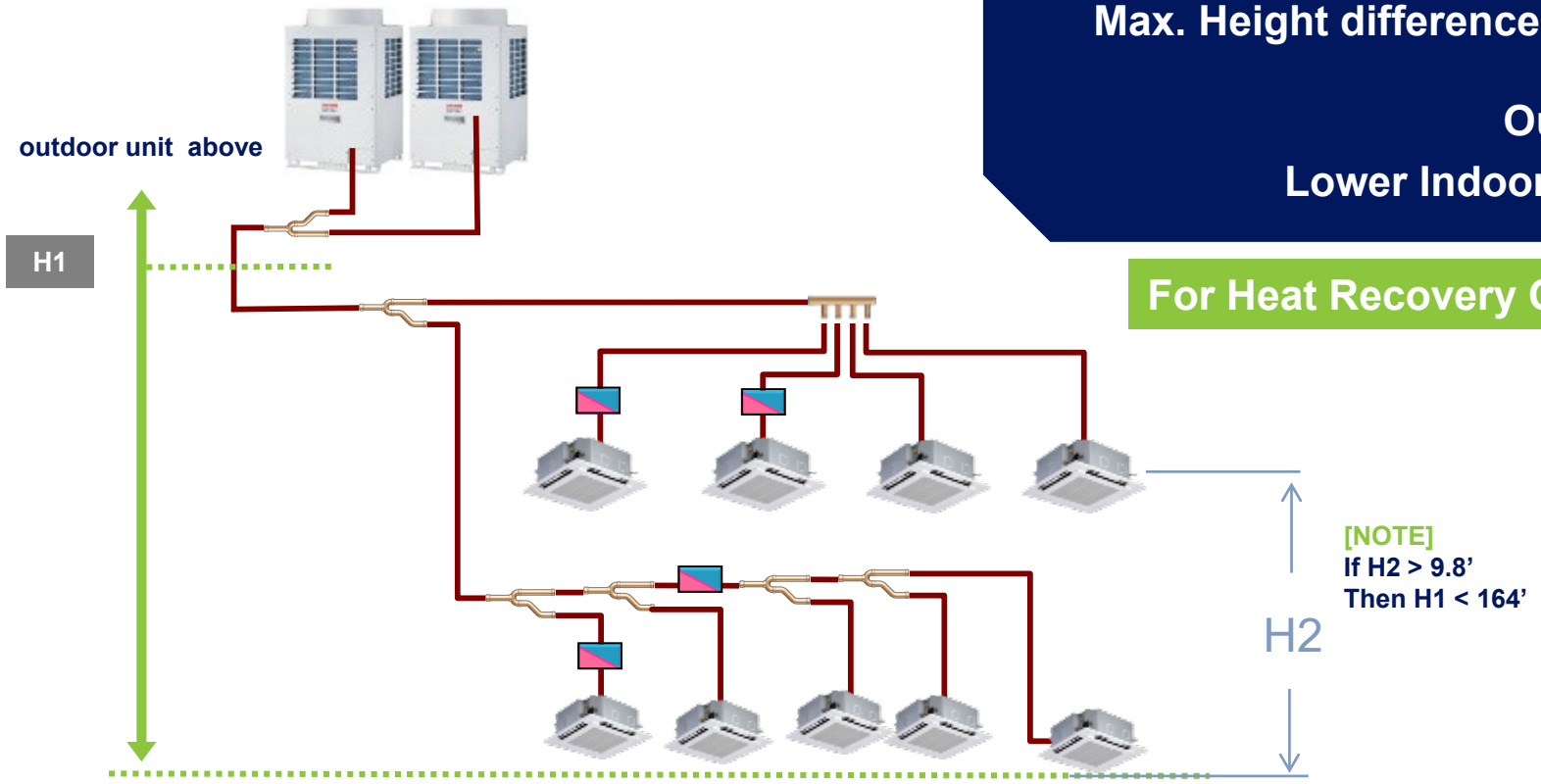
ACTUAL PIPING LENGTH FROM JOINT TO INDOOR UNIT



Max. pipe length between indoor unit and branching selection<= 164ft
(a+e,b+f,c,d,g+l,h,i,j,k)

For Heat Recovery ONLY

HEIGHT DIFFERENCE BETWEEN OUTDOOR TO LOWER INDOOR



Max. Height difference between

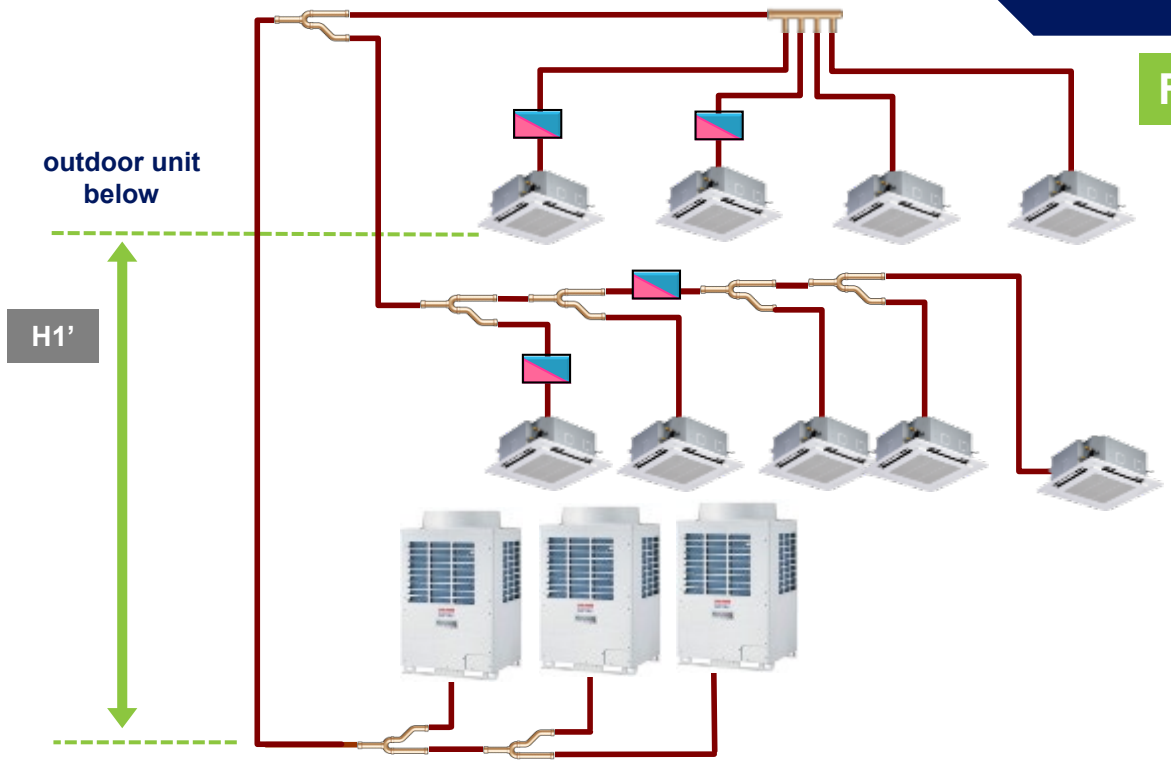
Outdoor to
Lower Indoor <= 230ft

For Heat Recovery ONLY

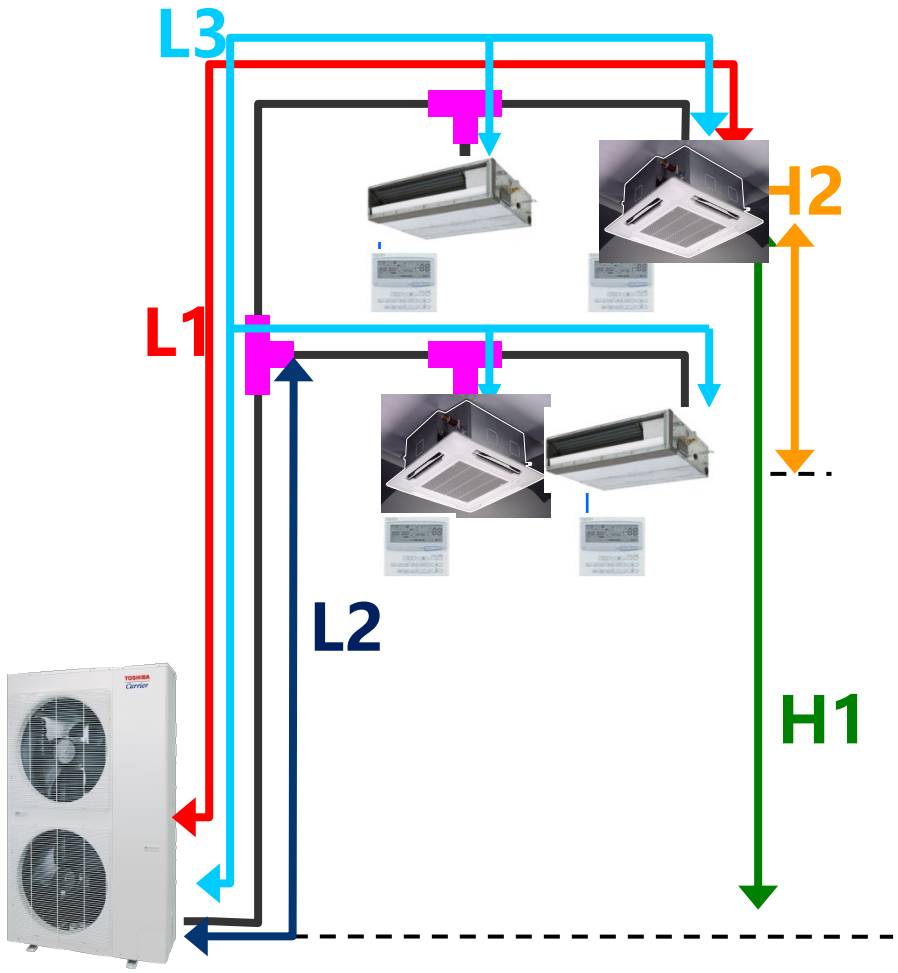
HEIGHT DIFFERENCE BETWEEN OUTDOOR TO UPPER INDOOR

Max. Height difference between Outdoor to Upper Indoor <= 98ft (30m)

For Heat Recovery ONLY



PIPING LENGTHS 3, 4, 5, TON SINGLE PHASE

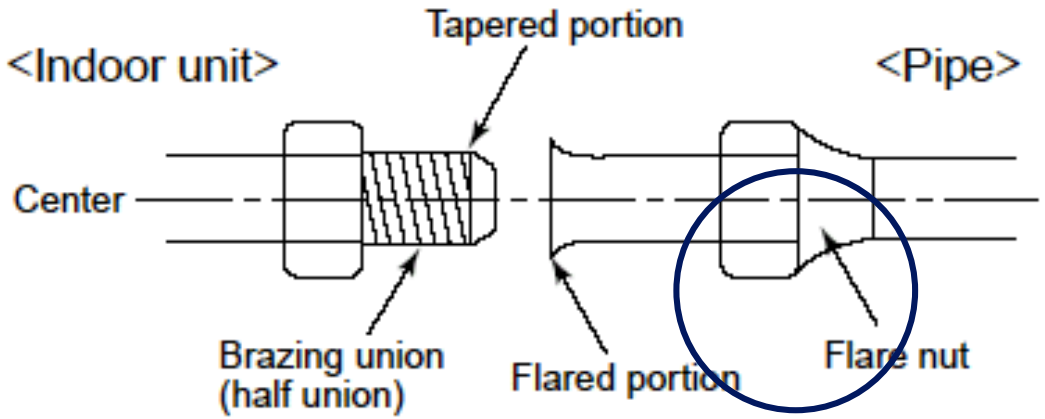


L1	Max length from CDU to FCU	591ft
L2	Max. equivalent length of main pipe	213ft
L3	Total piping length	410ft
H1	Max. height CDU to FCU	131ft
H2	Max. height FCU to FCU	49ft

49 ft as height indoor unit to indoor unit is better for the residential building

INDOOR UNIT PIPING

CONNECTING AND CENTERING



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

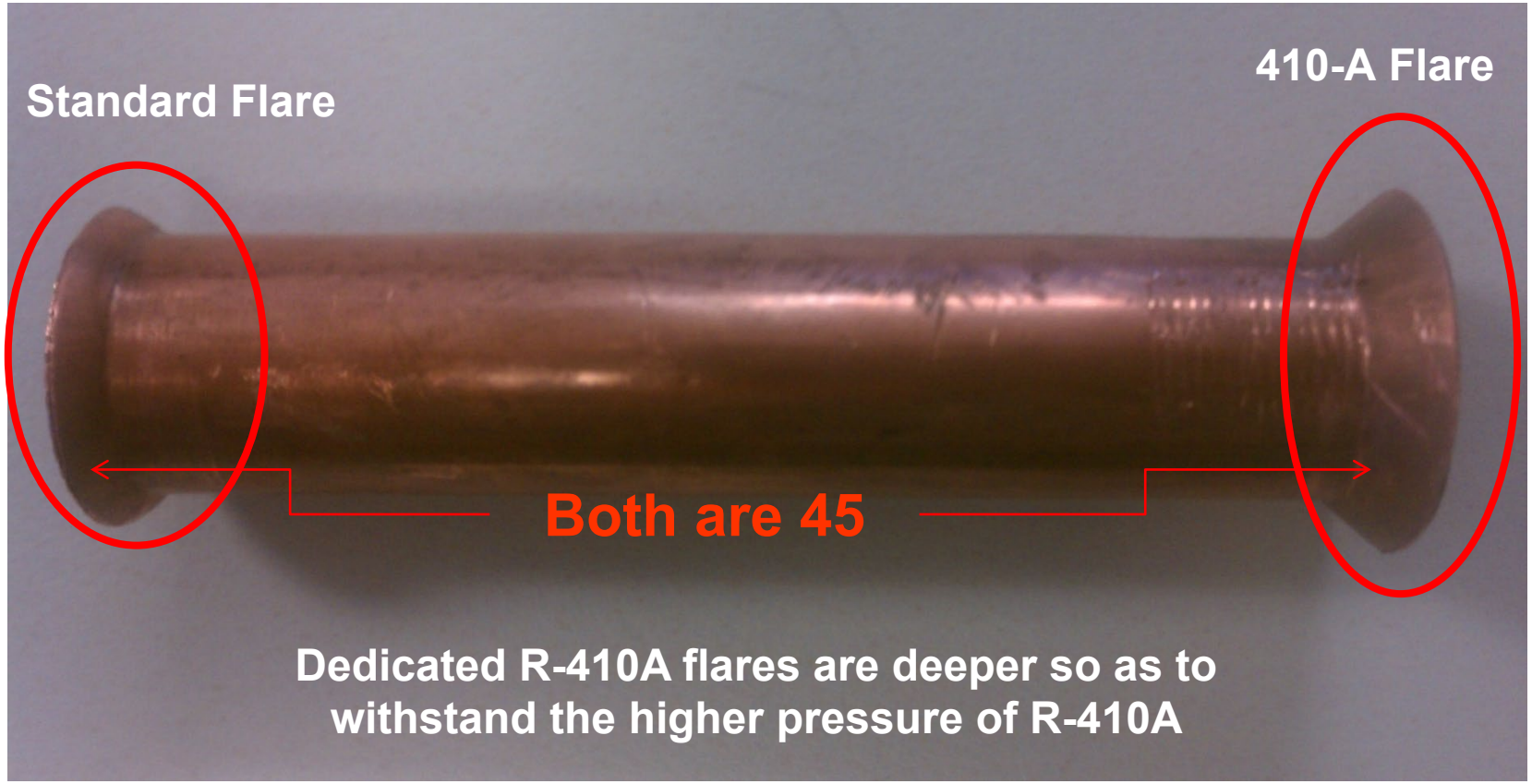
WHY A DEDICATED R410A FLARING TOOL?

✓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.

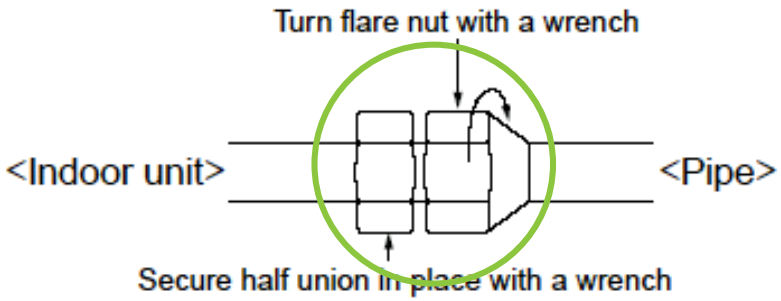
WHY A DEDICATED R410A FLARING TOOL?



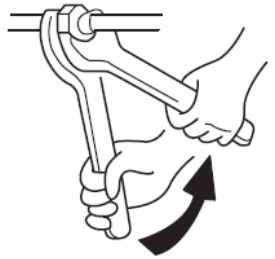
TIGHTENING THE FLARE NUT

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

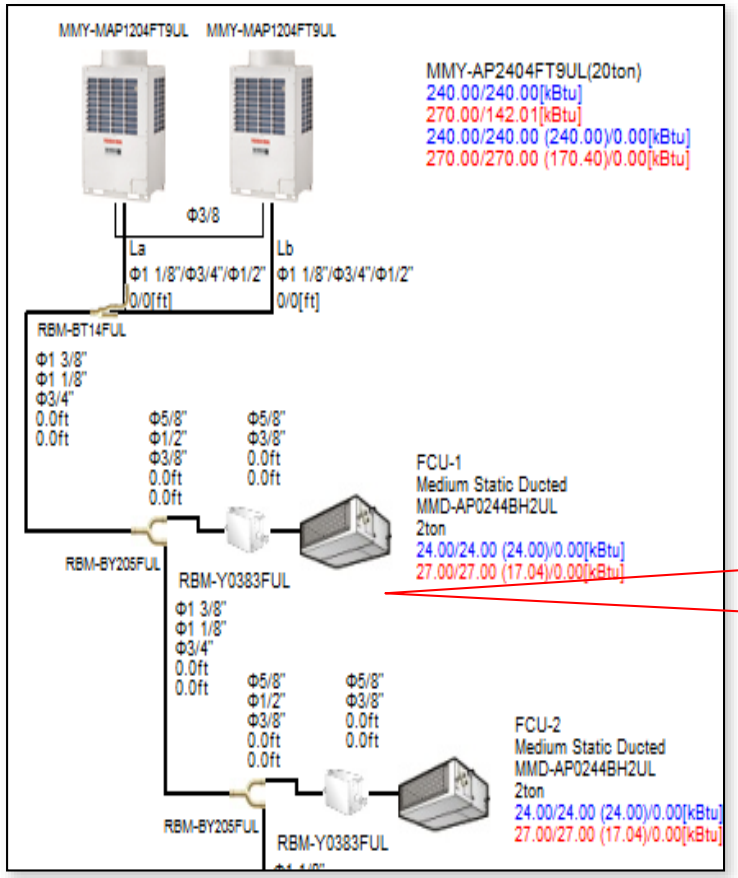
Torque wrench



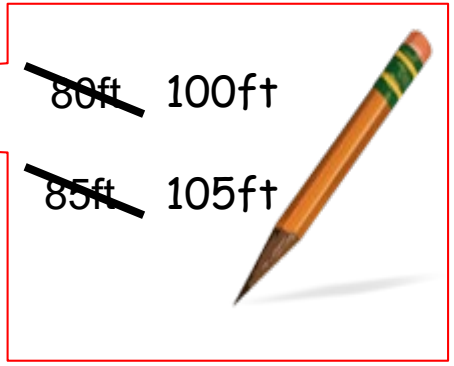
Use a backup wrench



AS-BUILT LINE LENGTHS



Keep track of installed Liquid refrigerant pipe lengths by size to ensure correct refrigerant charge



Section 4

INSULATION AND CONDENSATE

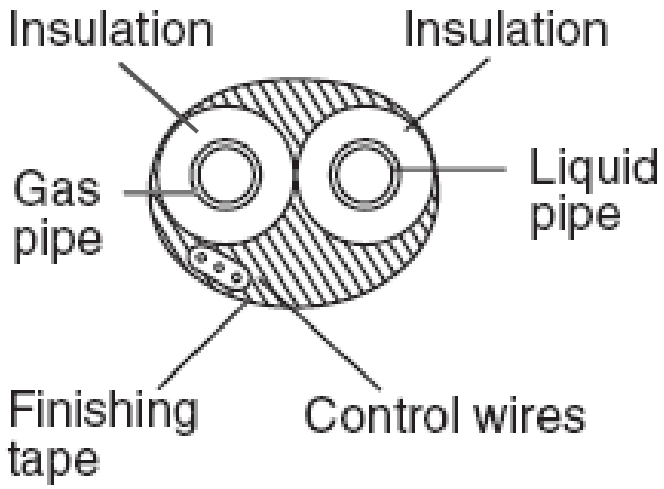
INSULATION WORK

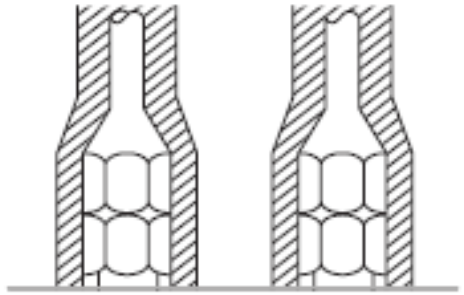
- **MATERIAL**

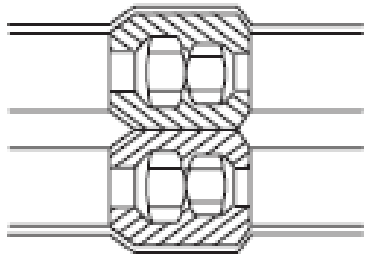
245° F Closed cell foam pipe insulation material as specified by local and national codes

INSULATION GUIDELINES

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



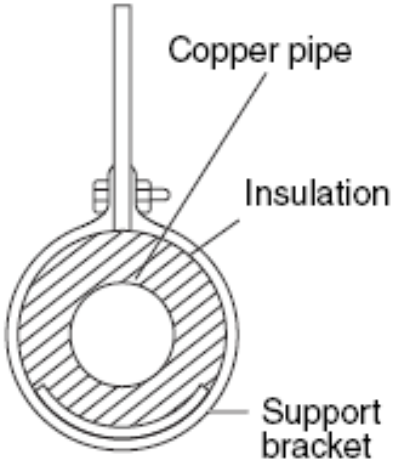




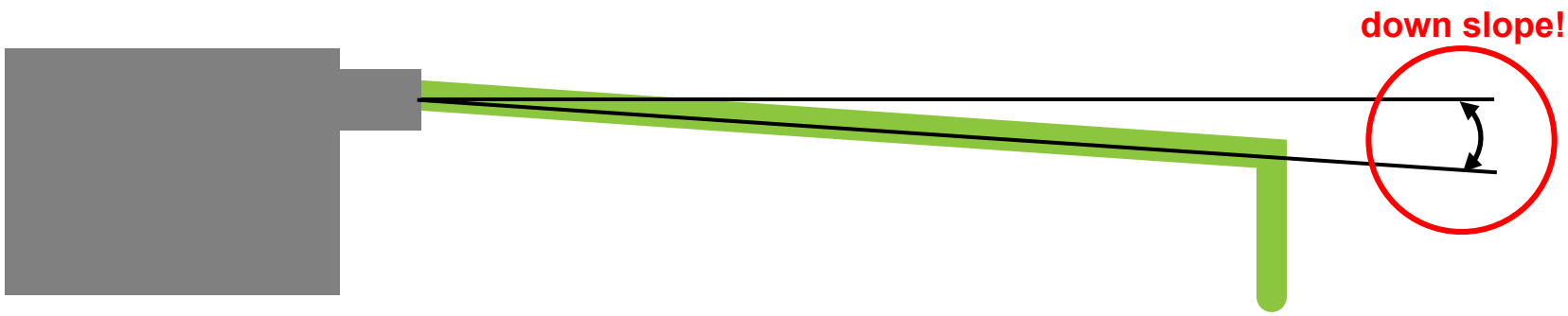
INSULATION GUIDELINES

When insulating a supported section:

the slit in the insulation should be on the top side of the pipe as shown

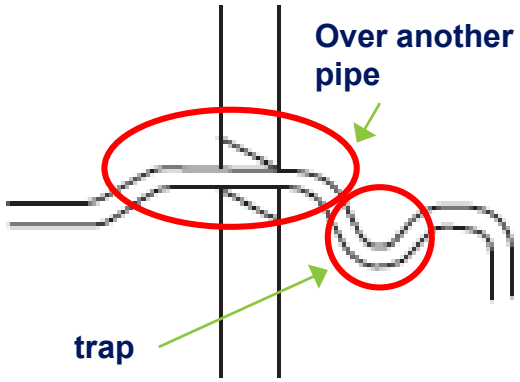


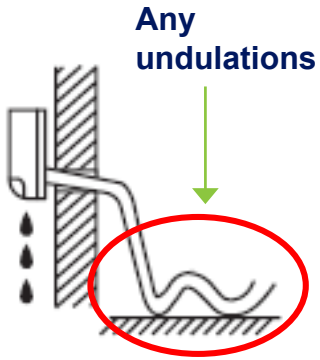
DRAIN PIPE PITCH

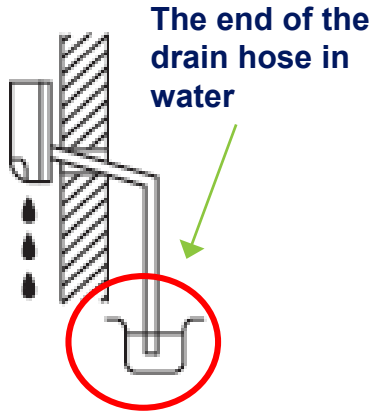


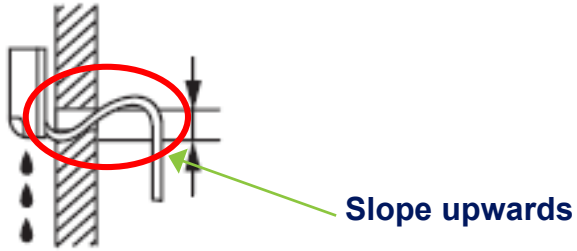
Minimum pitch to comply with local codes

DRAIN PIPING ERRORS



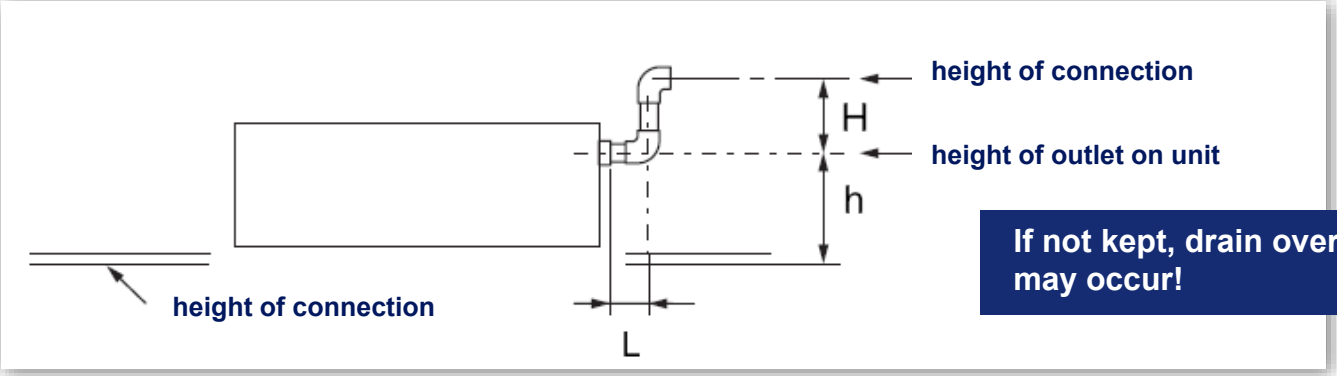






HEIGHT OF A HIGH DRAIN OUTSIDE OF THE UNIT

Indoor unit type	Allowable height of drain-up outside of unit (Condition)		
	Position of main unit drain port	**Allowable height of drain-up** (From drain port of main unit)	**L**
FCU with Factory Pump	h = 7.5	H = 26	12 or less
Compact 4-Way cassette type	h = 9	H = 25	12 or less



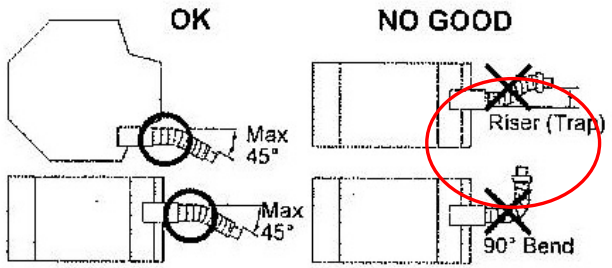
If not kept, drain over flow trouble may occur!

HEIGHT OF A HIGH DRAIN OUTSIDE OF THE UNIT

■ Flexible hose

Use the attached flexible hose to adjust center discrepancy of the hard vinyl chloride pipe or to adjust the angle.

- Do not use the flexible hose as stretched, or do not deform it more extent than that in the following figure.
- Fix the soft end of the flexible hose with the attached hose band.
- Use the flexible hose on a horizontal level.



ELECTRICAL

ELECTRICAL WORK

POWER SUPPLY SPECIFICATION

POWER WIRING

1. Outdoor units
2. Indoor units

CONTROL WIRING

1. Between outdoor and indoor unit
2. Between indoor units and remote controllers

ELECTRICAL WORK

OUTDOOR UNIT POWER SUPPLY

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

INDOOR UNIT POWER SUPPLY

ALL models of indoor units	Power supply	Wire size
	208/230-1-60	2 Conductors plus Ground (L1,L2 & Ground)

***must be independent from the outdoor unit power supply**

POWER WIRING FOR OUTDOOR UNIT

Power supply wiring shall be installed in compliance with NEC and local codes.

Model MMY-	Volts-Ph-Hz	MCA (A)	Recommended Fuse Size (A)
MAP0726HT9P-UL	208/230-3-60	27	30
MAP0966HT9P-UL	208/230-3-60	36	40
MAP1206HT9P-UL	208/230-3-60	45.4	50
MAP1446HT9P-UL	208/230-3-60	54	60
MAP1686HT9P-UL	208/230-3-60	69	80

MCA : Minimum Circuit Amps

POWER WIRING FOR OUTDOOR UNIT 3-PHASE

Power supply wiring shall be installed in compliance with NEC and local codes.

Model MMY-	Volts-Ph-Hz	MCA (A)	Recommended Fuse Size (A)
MAP0726HT6P-UL	460-3-60	12.9	15
MAP0966HT6P-UL	460-3-60	20	25
MAP1206HT6P-UL	460-3-60	23	25
MAP1446HT6P-UL	460-3-60	25	30
MAP1686HT6P-UL	460-3-60	31	35

MCA : Minimum Circuit Amps

POWER WIRING FOR OUTDOOR UNIT 1-PHASE

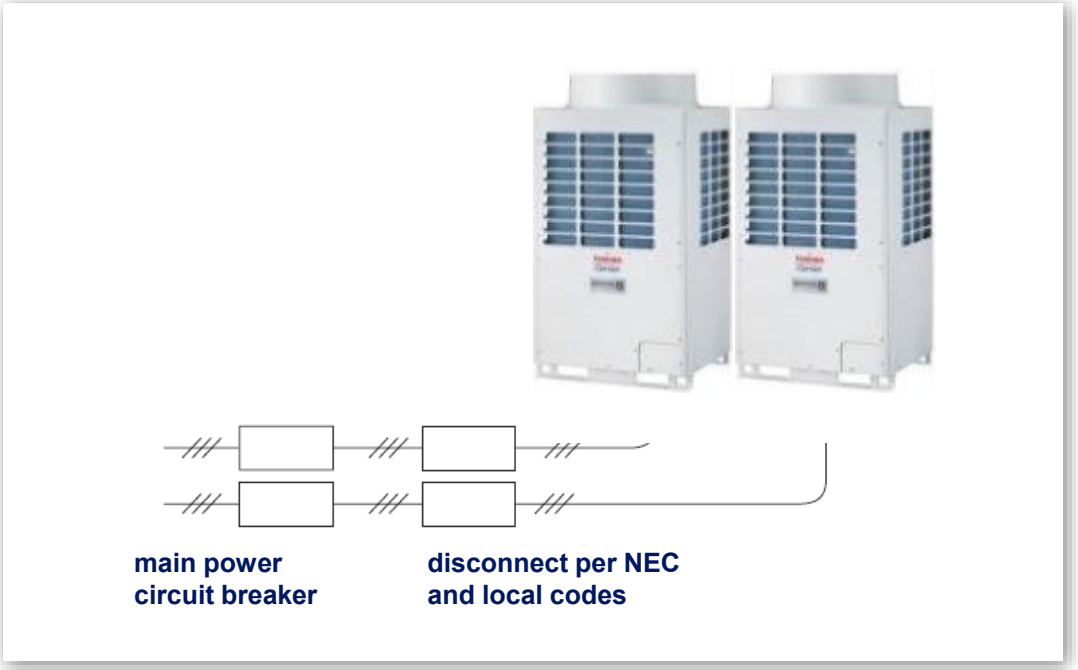
Power supply wiring shall be installed in compliance with NEC and local codes.

Tons	Volts-Ph-Hz	Recommended Fuse Size (A)	MOCP*2
3	208/230 - 1 - 60	40	60
4	208/230 - 1 - 60	40	60
5	208/230 - 1 - 60	40	60

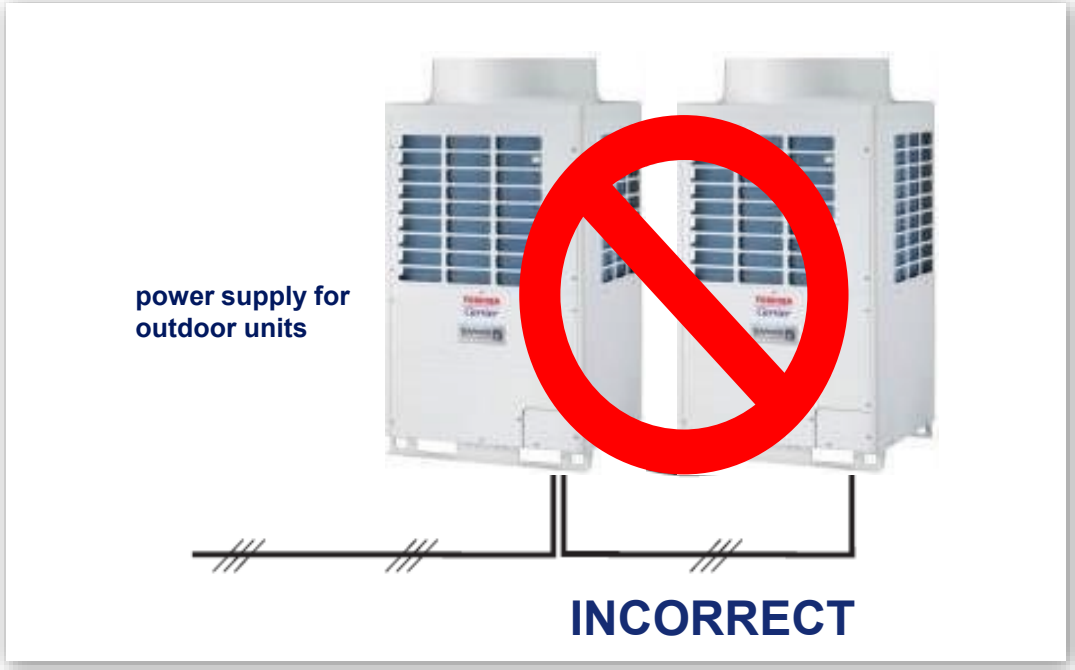
Recommended fuse size ：Select wire size base on the larger value of MCA.
MOCP*2:Maximum overcurrent protection (Amps)

POWER WIRING FOR OUTDOOR UNIT

ALL OUTDOOR UNIT FIELD POWER MUST BE WIRED INDIVIDUALLY



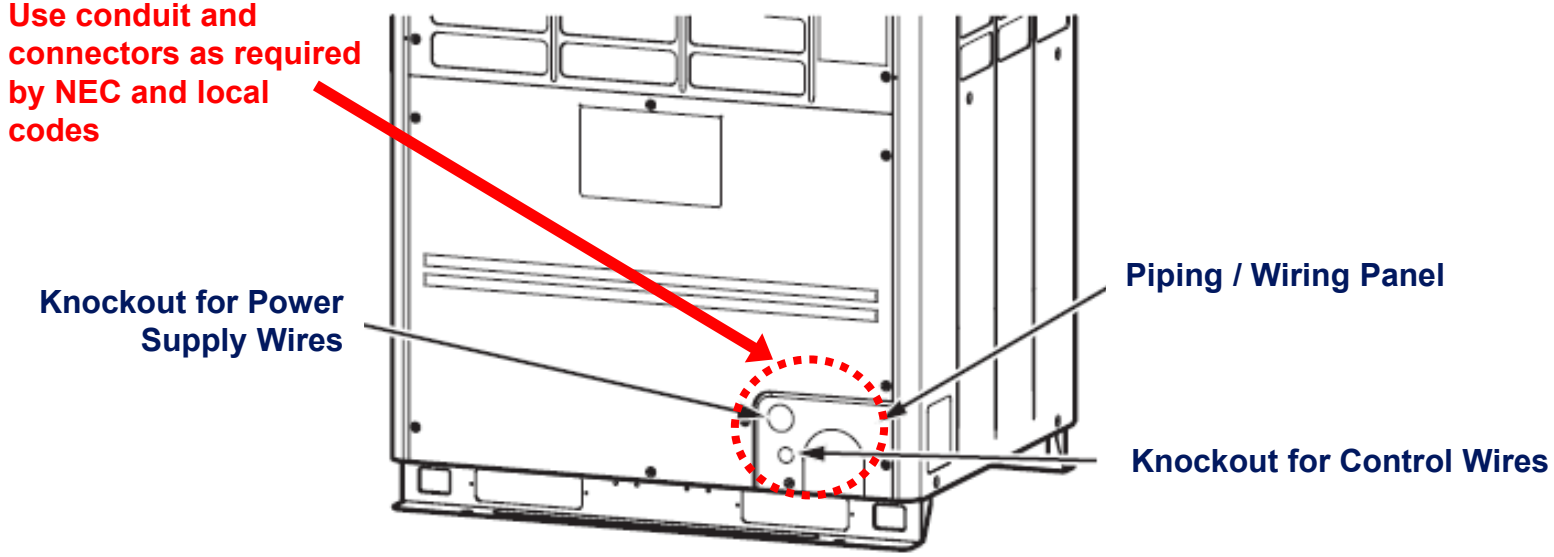
POWER WIRING FOR OUTDOOR UNIT



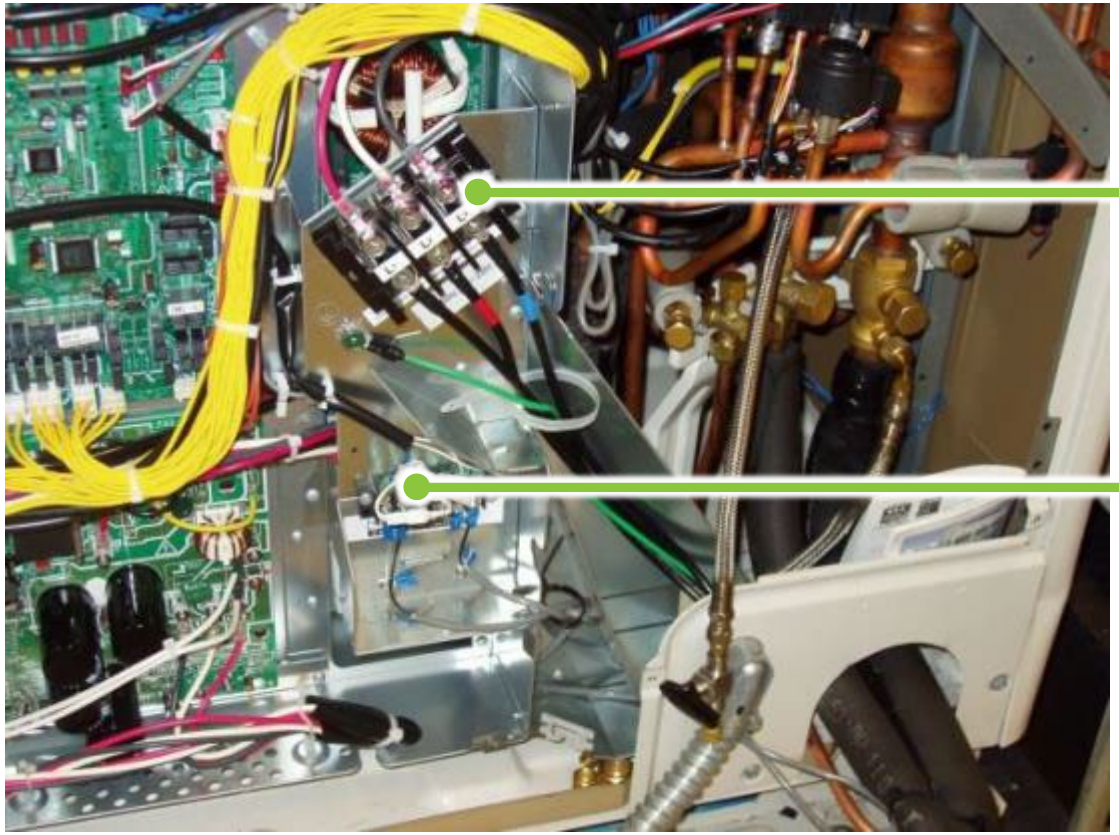
Do not connect field power wiring from unit to unit (No Daisy Chain)

CONNECTION OF POWER WIRING TO OUTDOOR UNIT

Keep power wires and control wires separate at all times.



POWER WIRING FOR OUTDOOR UNIT

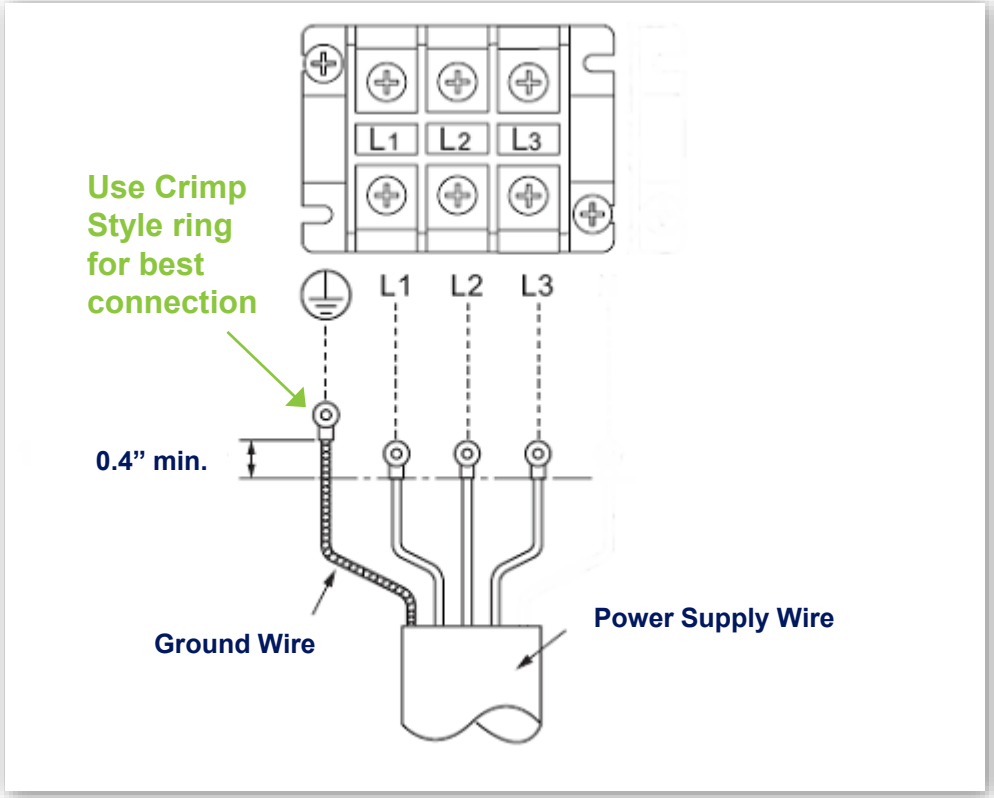


Power Supply
Terminal Block

Control Wire
Terminal Block

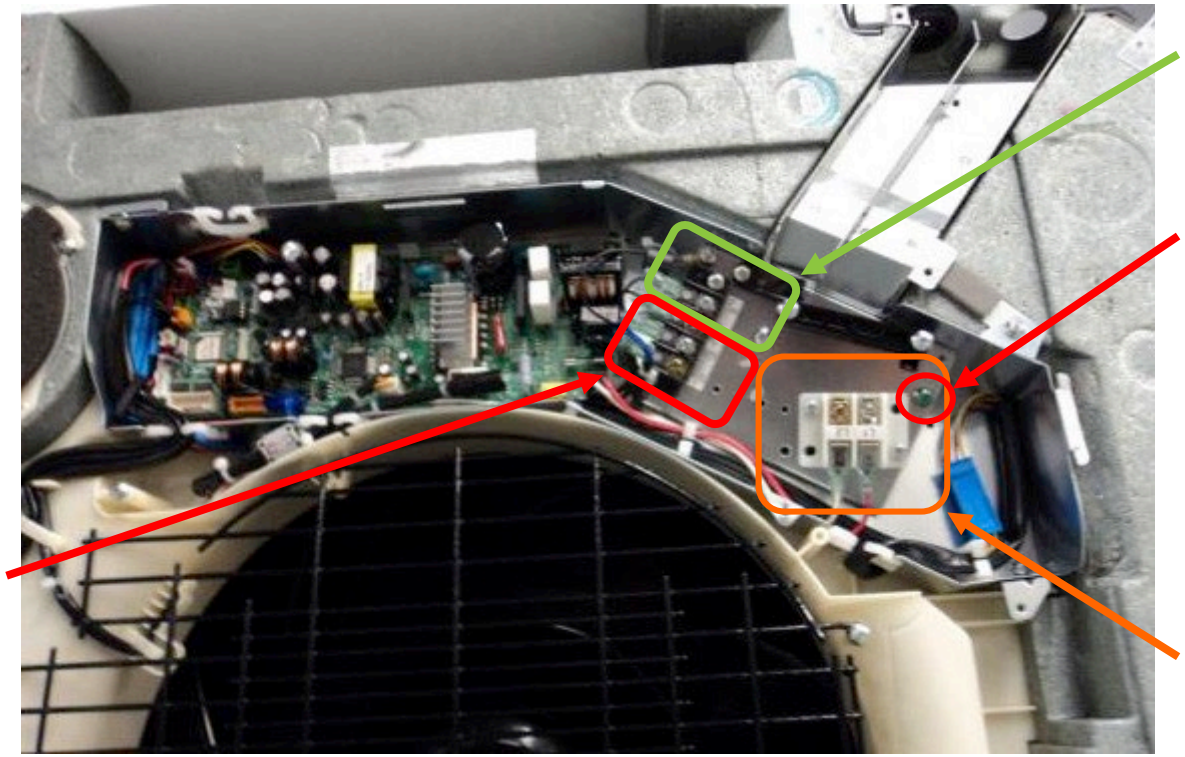
POWER WIRING FOR OUTDOOR UNIT

POWER SUPPLY TERMINAL BLOCK



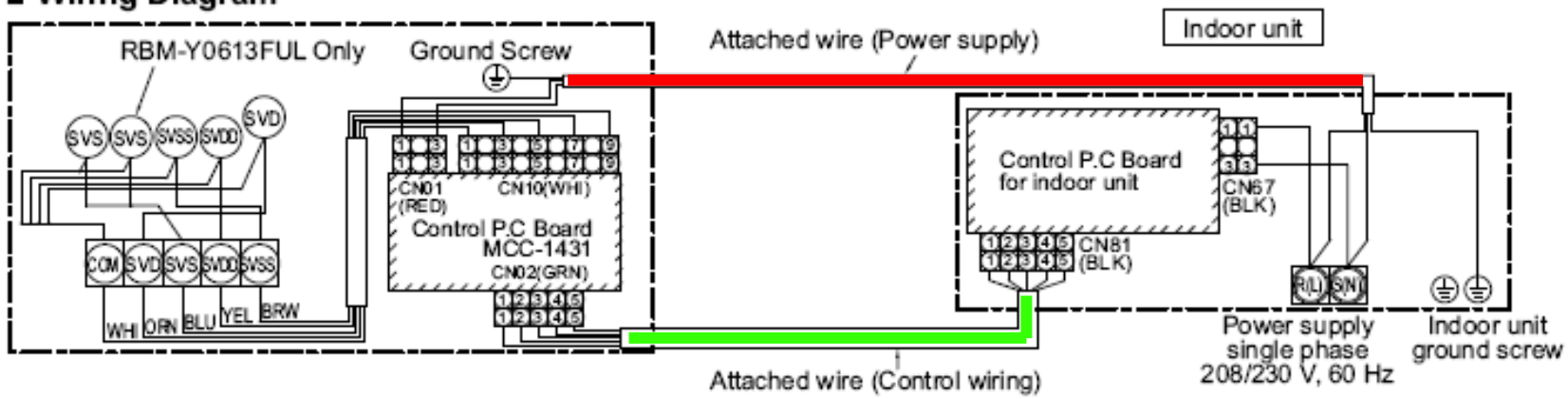
CONNECTION OF INDOOR UNIT TERMINAL

Sample: 4-way Cassette Type



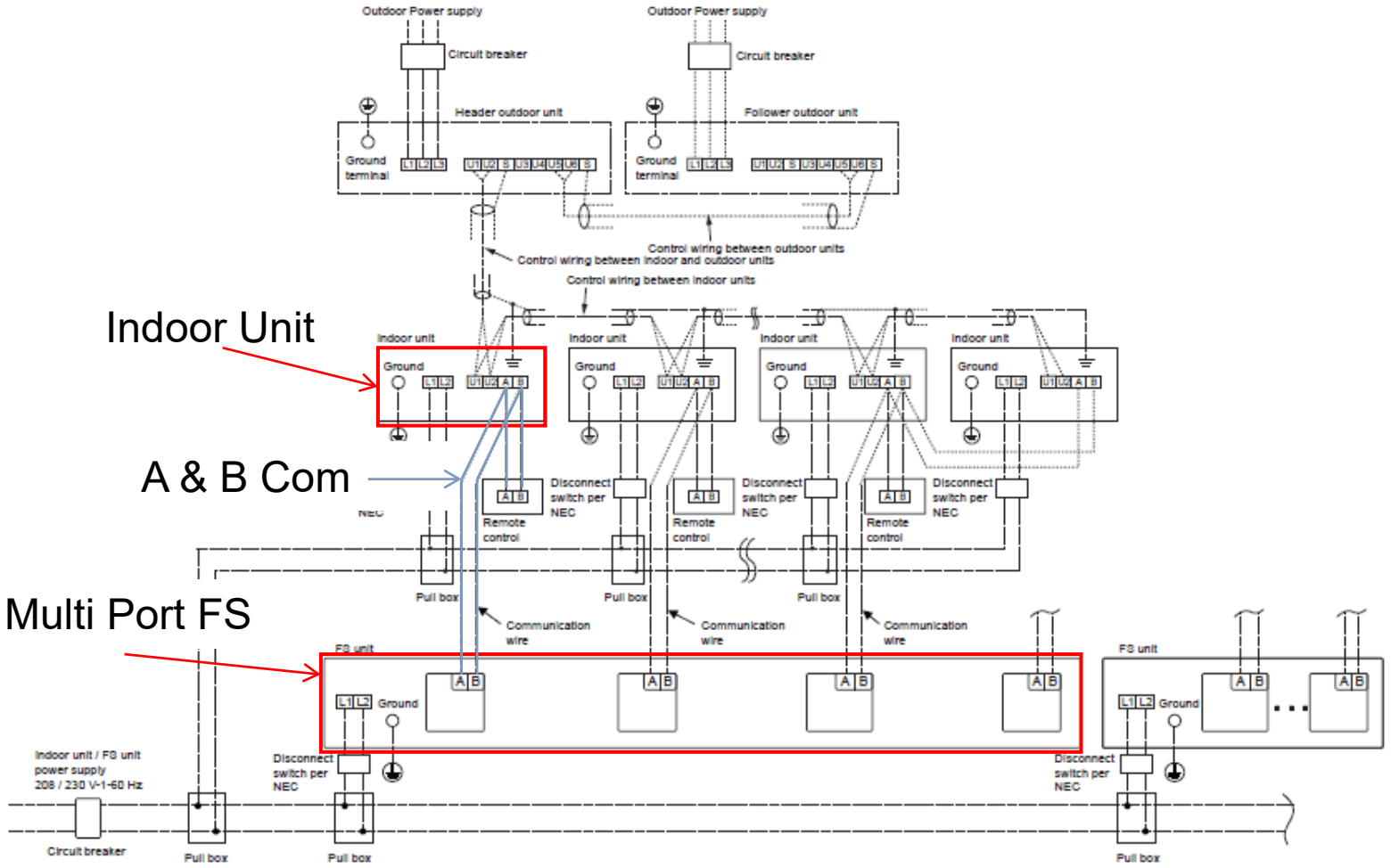
SINGLE PORT FLOW SELECTOR WIRING

■ Wiring Diagram



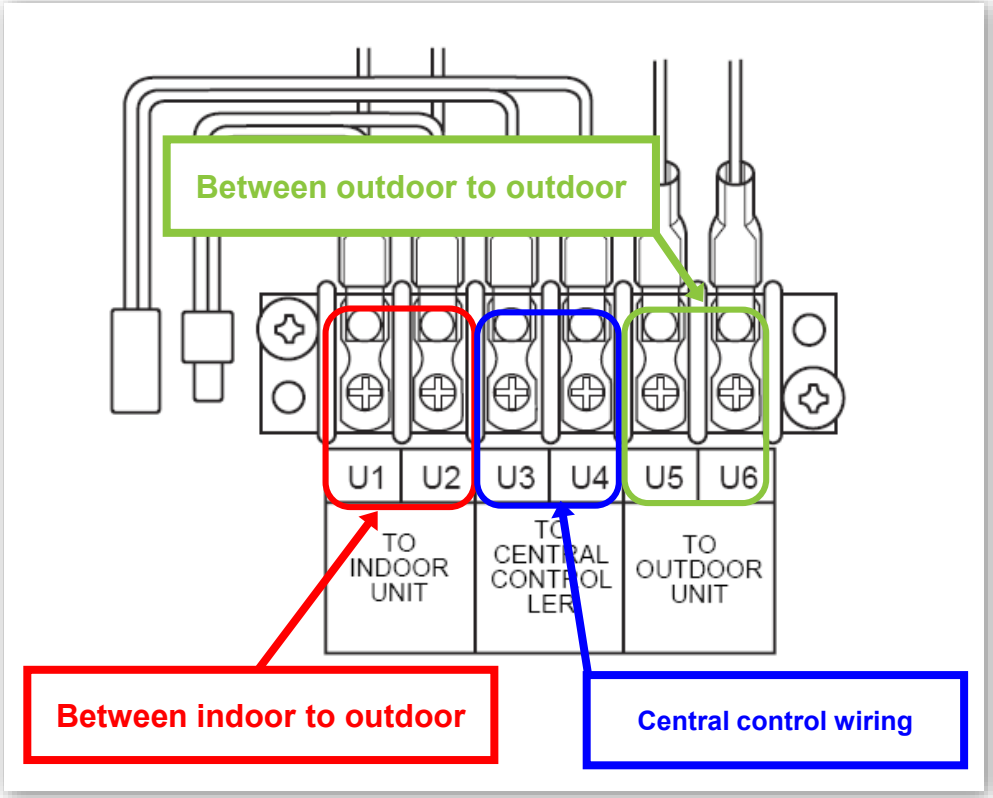
Power wiring must follow NEC and or Local Codes.

MULTI PORT FLOW SELECTOR WIRING



CONNECTION OF OUTDOOR UNIT TERMINAL

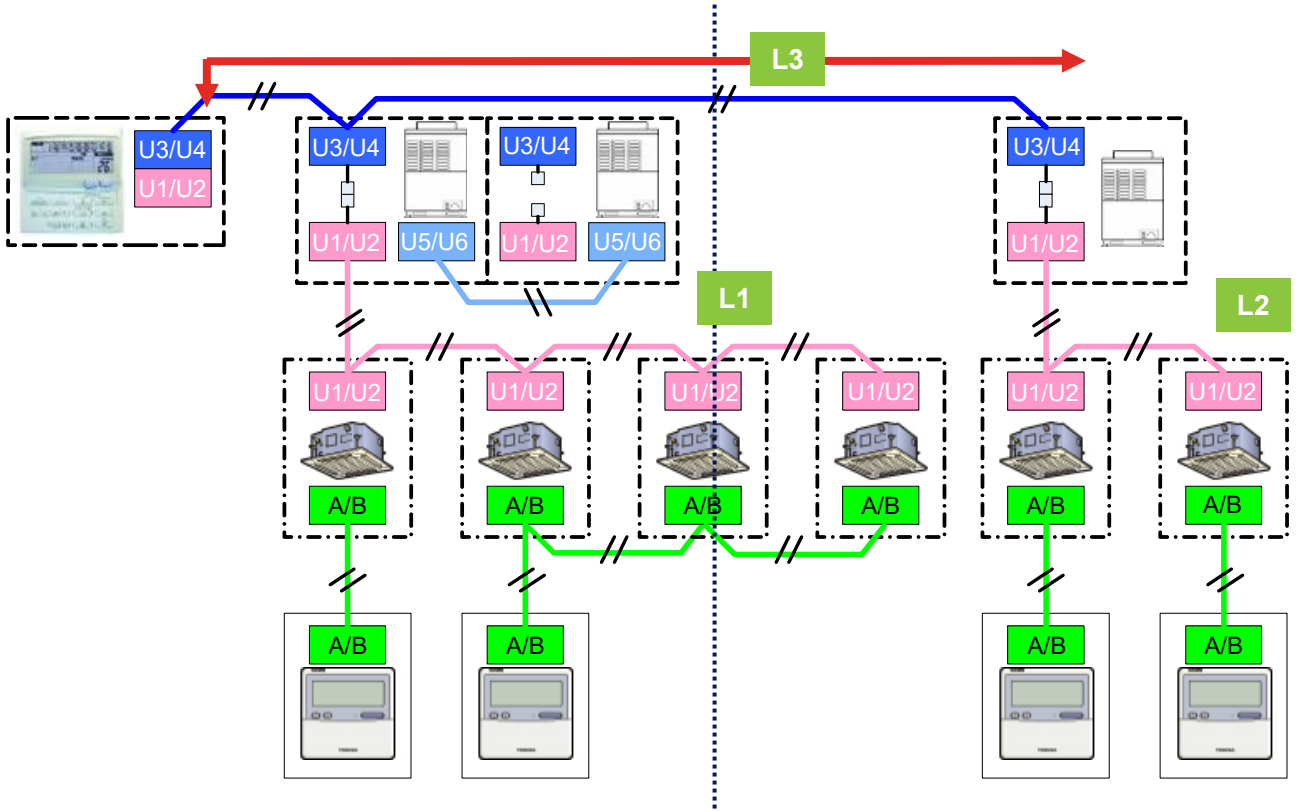
COMMUNICATION TERMINAL BLOCK



CONTROL WIRING

"Outdoor to Indoor , Indoor to Indoor , Central control"

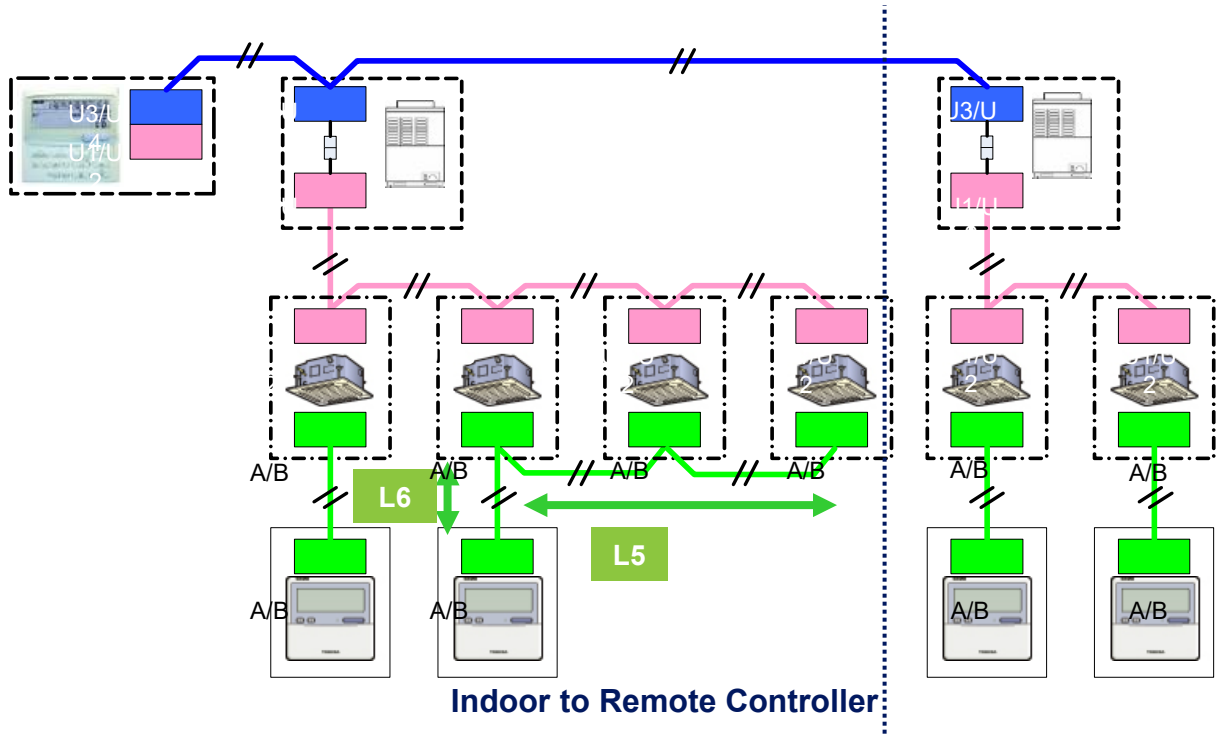
Type	-	2-core, Non-Polarity, Stranded Shielded wire
Length	-	L1 + L2 + L3
Size	-	16 AWG 3280 ft. max. , 14 AWG 6560 ft. max.



CONTROL WIRING

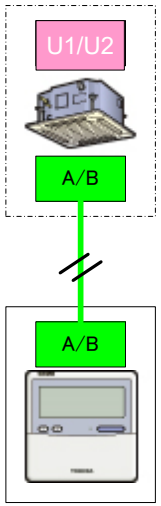
"Indoor to Remote Controller"

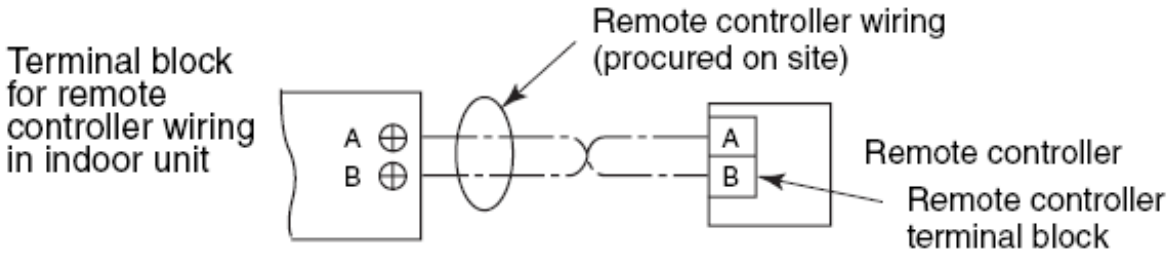
Type	-	2-core, Non-Polarity, Shielded wire
Length	-	L5+L6: 1640 ft. max., 1310 ft. when wireless control is used; L5: 660 ft. max.
Size	-	20 AWG to 14 AWG



CONNECTION OF REMOTE CONTROL

Individual Control (1:1)





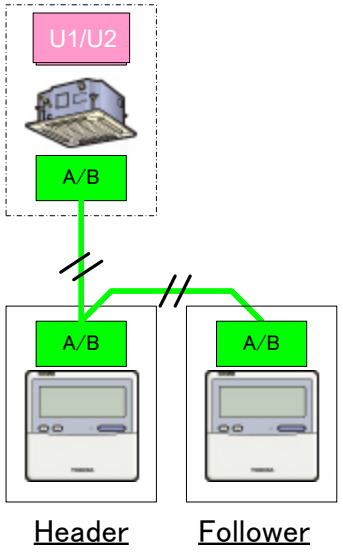
Terminals A and B are 2-core non-polarity

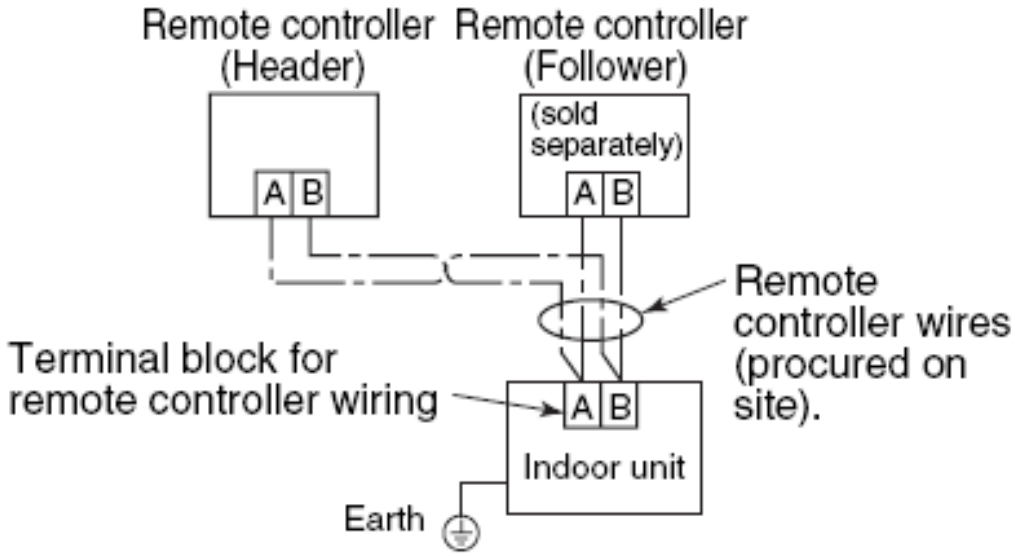
Group Control Wiring

Max. 8 indoor units connectable for one group control.

CONNECTION OF REMOTE CONTROL

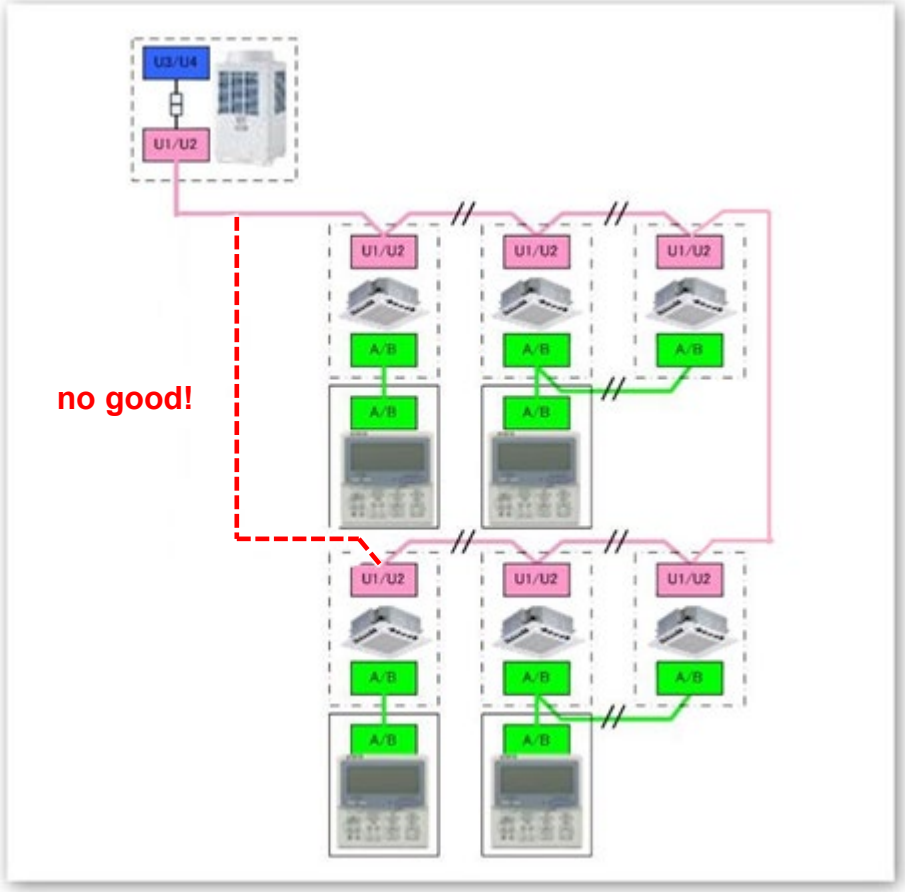
Two Remote Controls





A maximum of two remote controllers can be connected

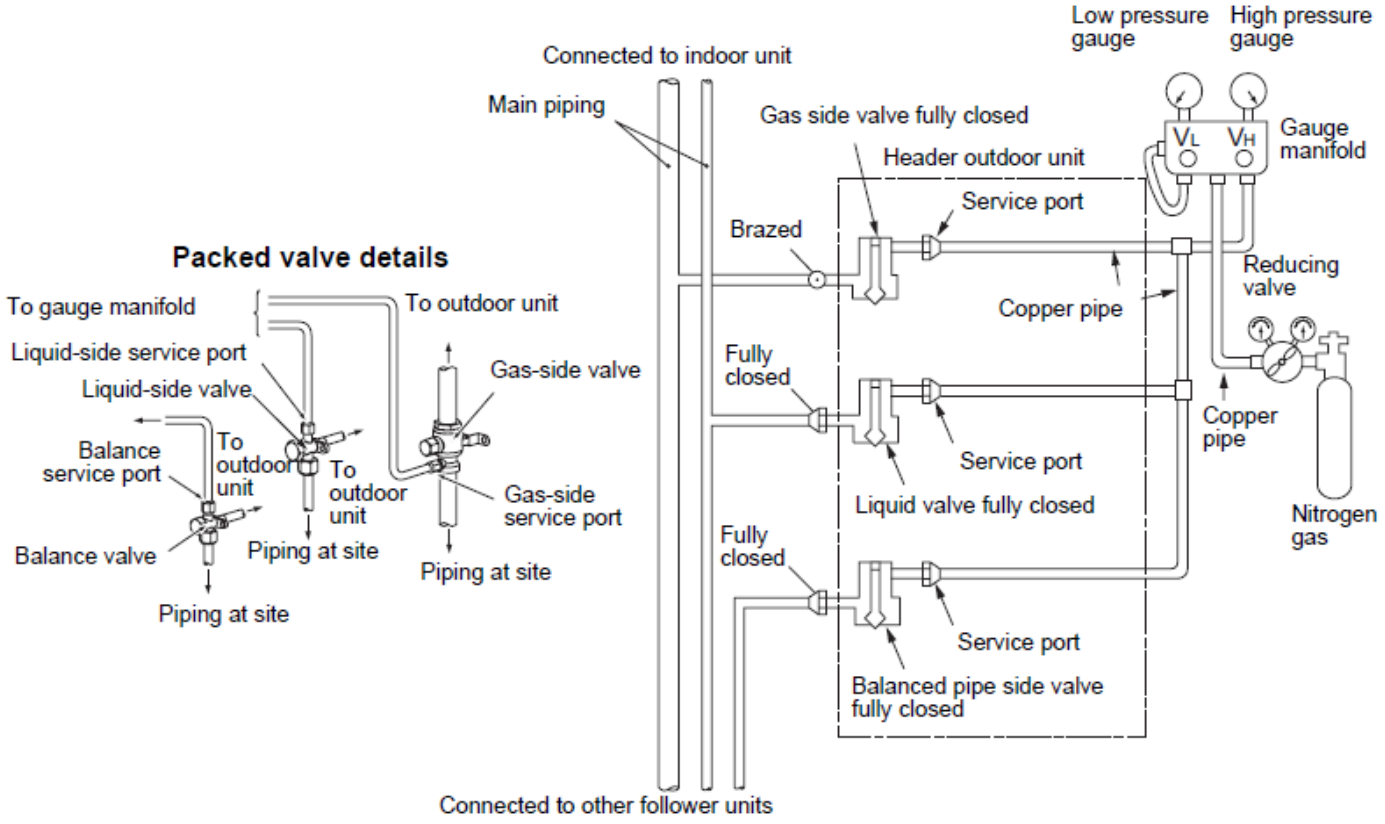
LOOP WIRING OF CONTROL WIRES IS PROHIBITED



Leak Test Procedure

LEAK TEST PROCEDURE

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



LEAK TEST PROCEDURE

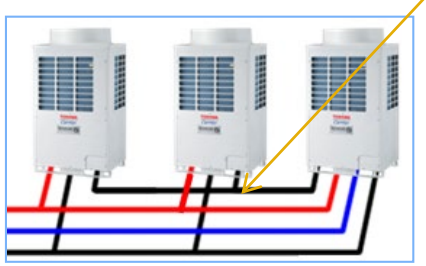
Step 1	50psi	at least 3 minutes	FOR LARGE GAS LEAKS
Step 2	200psi	at least 3 minutes	FOR LARGE GAS LEAKS
Step 3	500psi	at least 24 hours	FOR SLOW GAS LEAKS

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

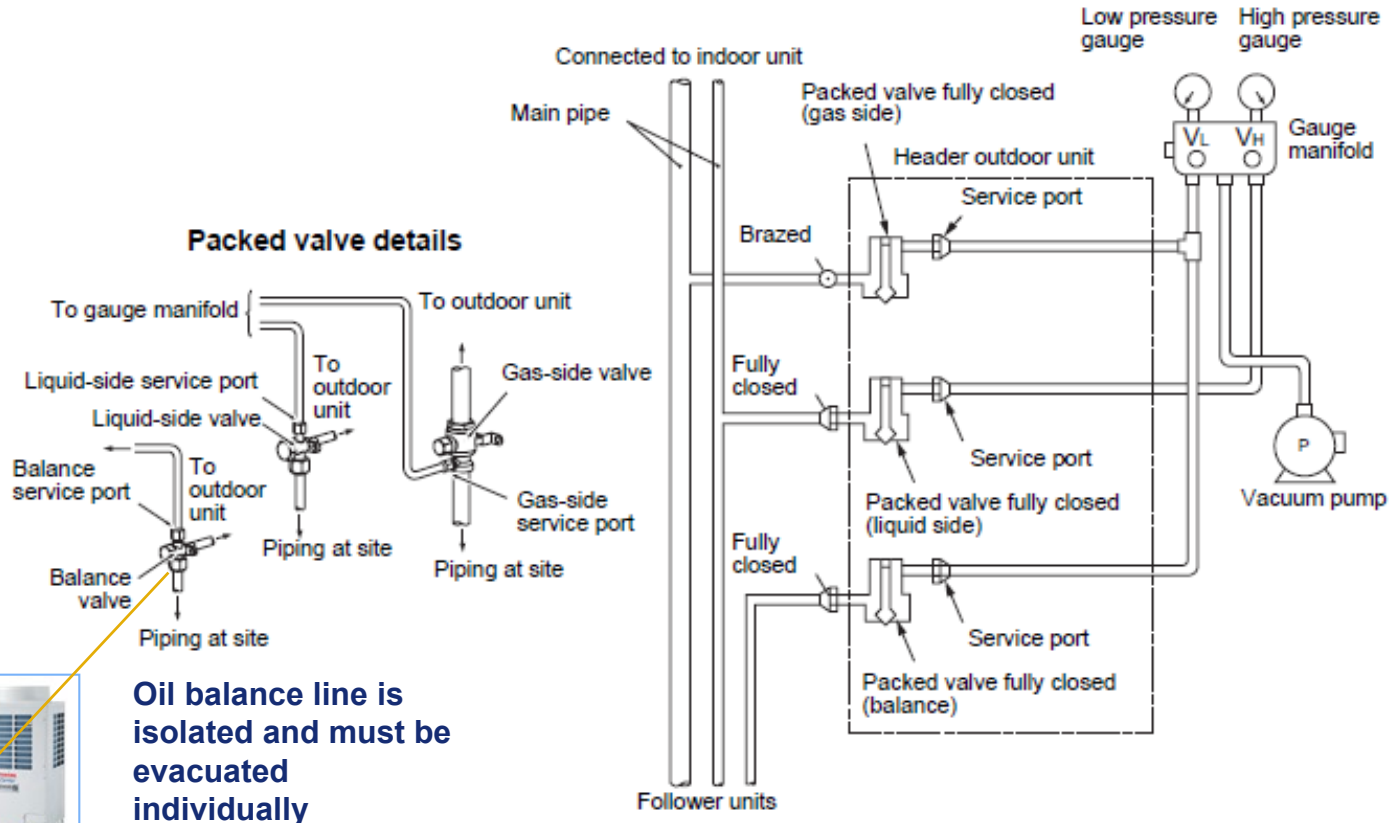
@ record time & temperature
@ compare start test data and adjust by temperature difference

VACUUM PROCEDURE

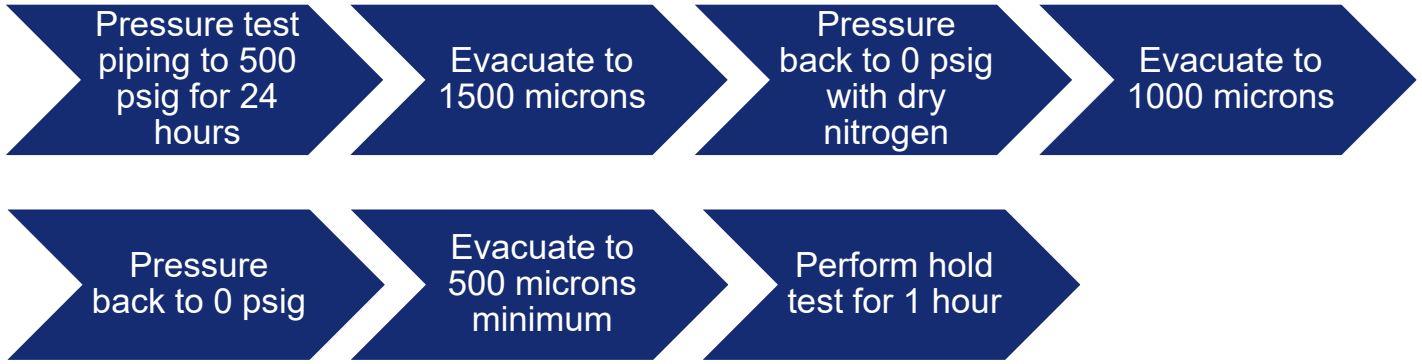
Be sure to perform vacuuming from the gas, liquid and balance sides



Oil balance line is isolated and must be evacuated individually



VACUUM PROCEDURE



OK!

No Micron Rise

Go to “addition of refrigerant”

no good!

Loss of Vacuum

Check for Leaks

ADDITIONAL REFIGERANT CHARGE

Additional refrigerant charge for SMMS-e

How to calculate

Additional Amount By Type of Outdoor Unit

\+ Additional Refrigerant Charge Based on Indoor Unit Type

\+ (Actual Length of Liquid Pipe X Additional Refrigerant Charge Amount Per Liquid Pipe 1ft.) x 1.2

= **Additional refrigerant charge**

Additional refrigerant charge for SMMS-e Indoor Unit Type

How to calculate

Standard Indoor Unit Type	lbs./Kbtu/h	0.095
Outside Air Indoor Unit	lbs./Kbtu/h	0.046
4 Way Cassette Type MMU-AP0072H2UL MMU-AP0122H-UL	lbs./Kbtu/h	0.181

Additional refrigerant charge for SMMS-e

How to calculate

Additional By Type of Outdoor Unit

\+ (Actual Length of Liquid Pipe X Additional Refrigerant Charge Amount Per Liquid Pipe 1ft.) x 1.3

= Additional refrigerant charge

ADDITIONAL REFRIGERANT CHARGE PER LIQUID PIPE

Liquid pipe diameter (in)	**Additional refrigerant amount lb./ft.**
1/4”	0.017
3/8”	0.037
1/2”	0.071
5/8”	0.108
3/4”	0.168
7/8”	0.235

ADDITION OF REFRIGERANT

ADJUSTMENT AMOUNT OF REFRIGERANT FOR SMMS-e HEAT PUMP

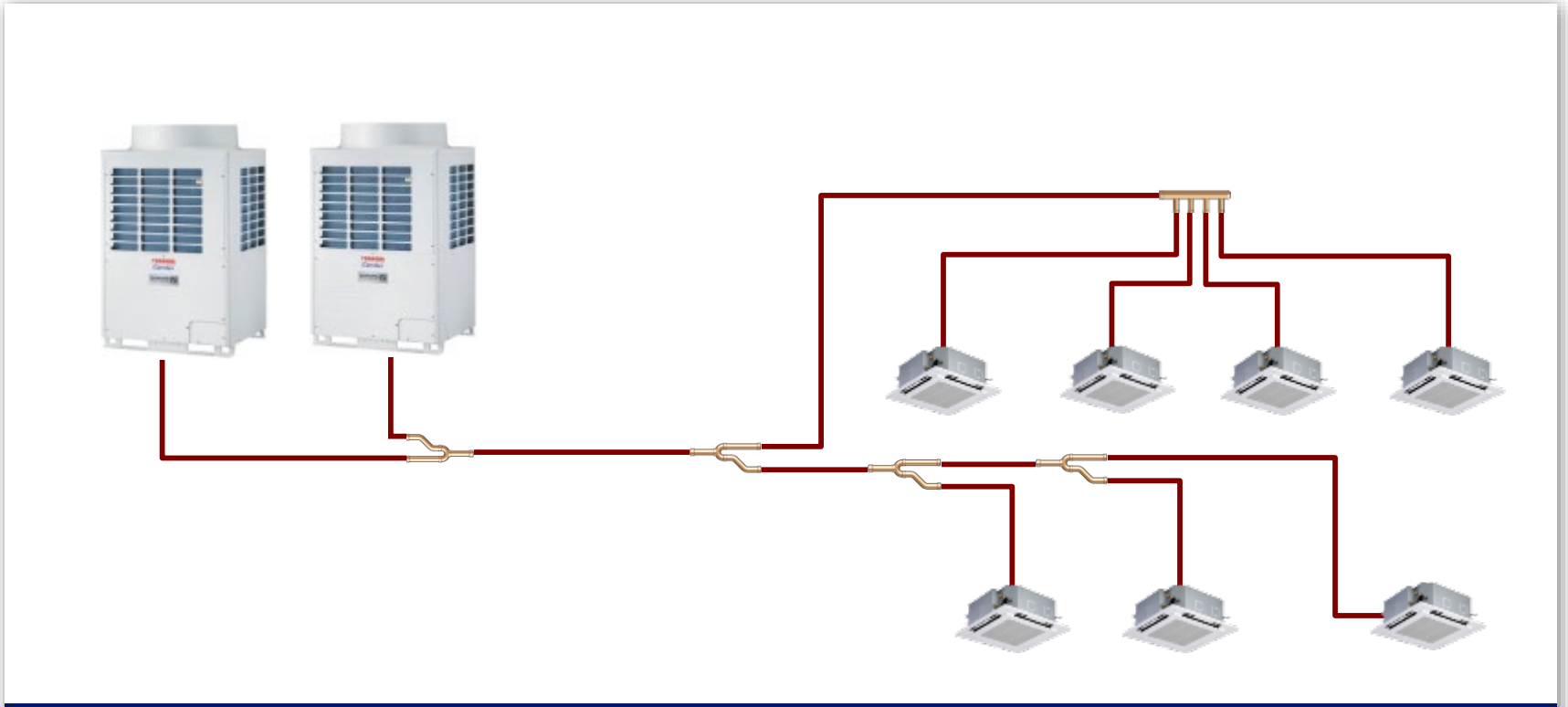
Outdoor Unit Capacity Type	Adjustment Amount of Refrigerant (lb.)	Outdoor Unit Capacity Type	Adjustment Amount of Refrigerant (lb.)
072	-7.7	288	6.6
096	-2.2	312	6.6
120	-2.2	336	6.6
144	7.7	360	-9.9
168	7.7	384	-3.3
192	-6.6	408	5.5
216	-6.6	432	5.5
240	0.0	456	5.5
264	0.0		

ADJUSTMENT AMOUNT OF REFRIGERANT FOR SHRM-e HEAT RECOVERY

Outdoor Unit Capacity Type	Adjustment Amount of Refrigerant (lb.)	Outdoor Unit Capacity Type	Adjustment Amount of Refrigerant (lb.)
072	4.4	288	30.9
096	6.6	312	33.1
120	17.6	336	13.2
144	24.3	360	24.3
168	30.9	384	28.7
192	8.8	408	30.9
216	13.2	432	33.1
240	22.1	456	37.5
264	26.5		

ADDITION OF REFRIGERANT

Each Outdoor Unit is shipped with 25.4 lbs. or 24.3 lbs. of charge. Additional charge is required.



Total Charge = (25.4 lbs.(SMMSe) (24.3 lbs.(SHRMe) X quantity outdoor units + additional charge.)

START UP

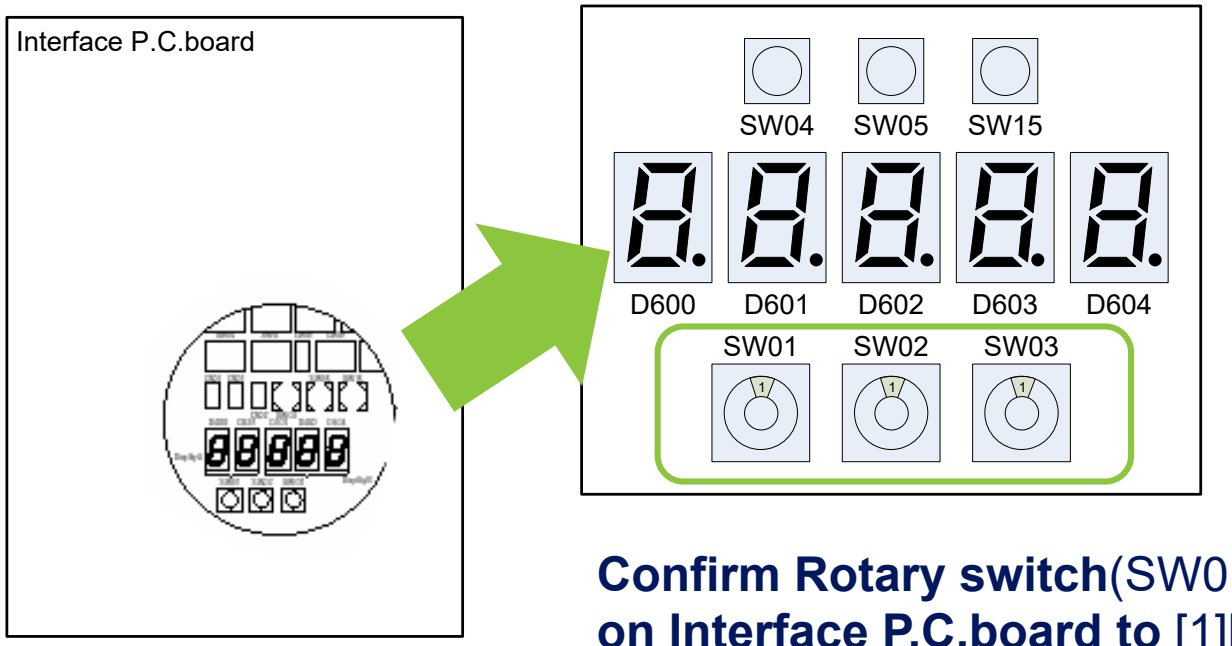
POWERING UP THE SYSTEM

CAUTION

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

ADDRESSING

CAUTION

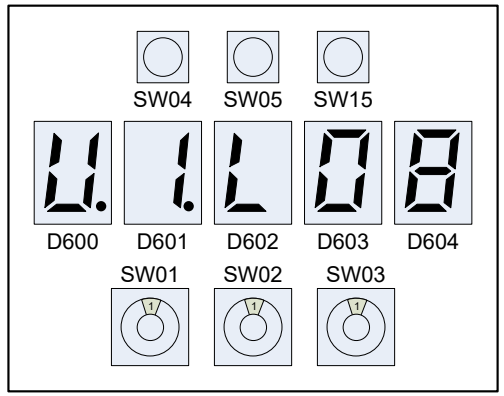


Confirm Rotary switch(SW01 to 03)
on Interface P.C.board to [1][1][1]

AUTOMATIC ADDRESS SETTING PROCEDURE 1

AUTOMATIC ADDRESS SETTING – PROCEDURE 1

STEP 1 ☑ Turn on the power of indoor units and VERIFY- Then cycle power on outdoor unit

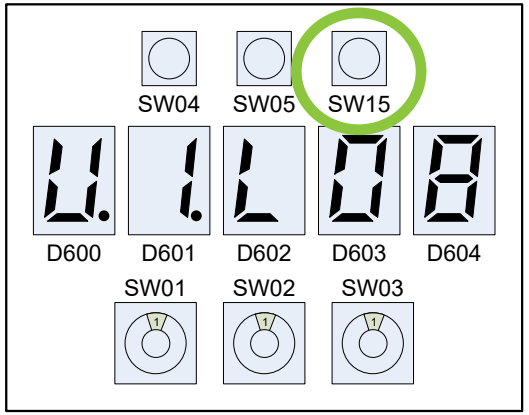


STEP 2 ☑ Check [U.1. L08] is displayed on 7-segment display on interface P.C. board of header unit.

AUTOMATIC ADDRESS SETTING – PROCEDURE 1

STEP 3 ☑ Push SW15! Start automatic address setting.

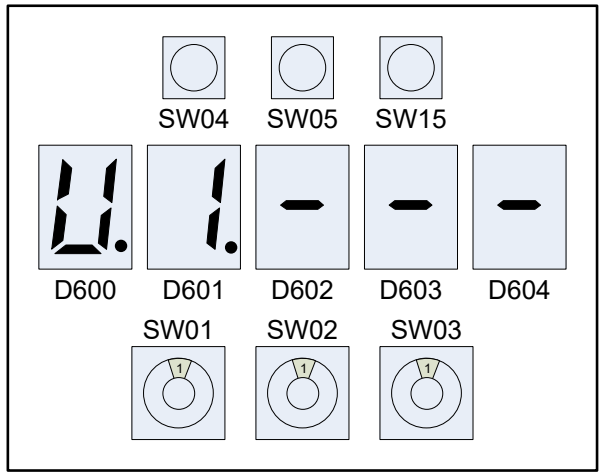
STEP 4 ☑ Auto 1➔Auto 2➔Auto 3 is displayed on 7-segment display during Automatic setting progress.



AUTOMATIC ADDRESS SETTING – PROCEDURE 1

STEP 5 ☑

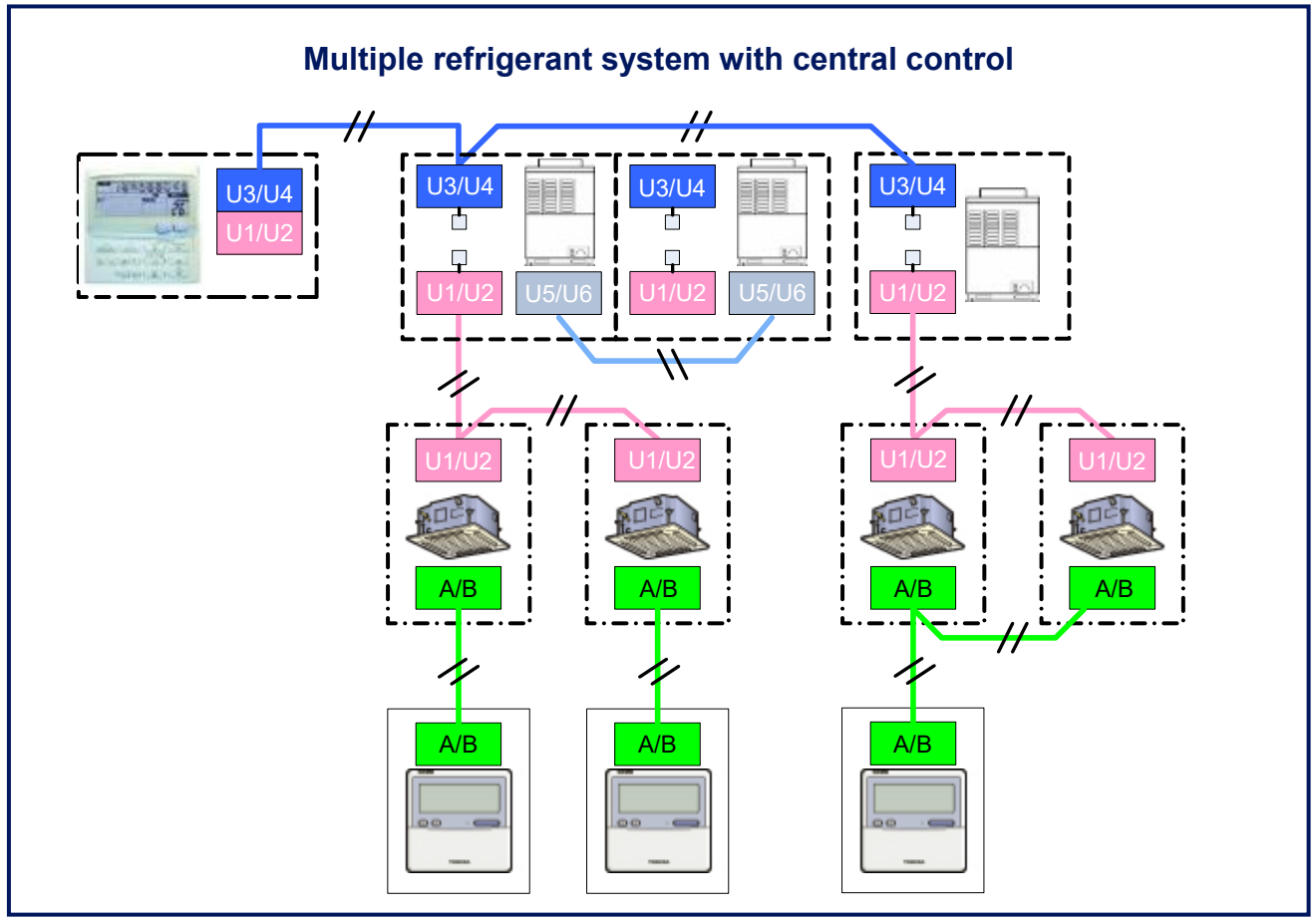
When 7-segment display changes from **[U.1. - - -]** **[U.1. - - -]** steady, Automatic setup finished.



AUTOMATIC ADDRESS SETTING PROCEDURE 2

ADDRESS SETTING

AUTOMATIC ADDRESS SETTING – PROCEDURE 2

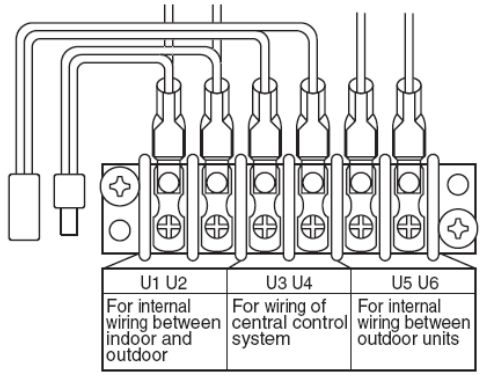


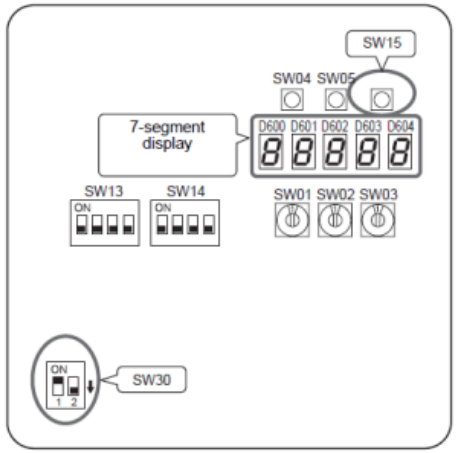
RELAY CONNECTOR AND SW30-2

CAUTION

- **Don't** connect relay connector and **Don't** set SW30-2 on P.C. board until address setup completes and Trial operation for all refrigerant system.

Otherwise, address can't be set correctly!

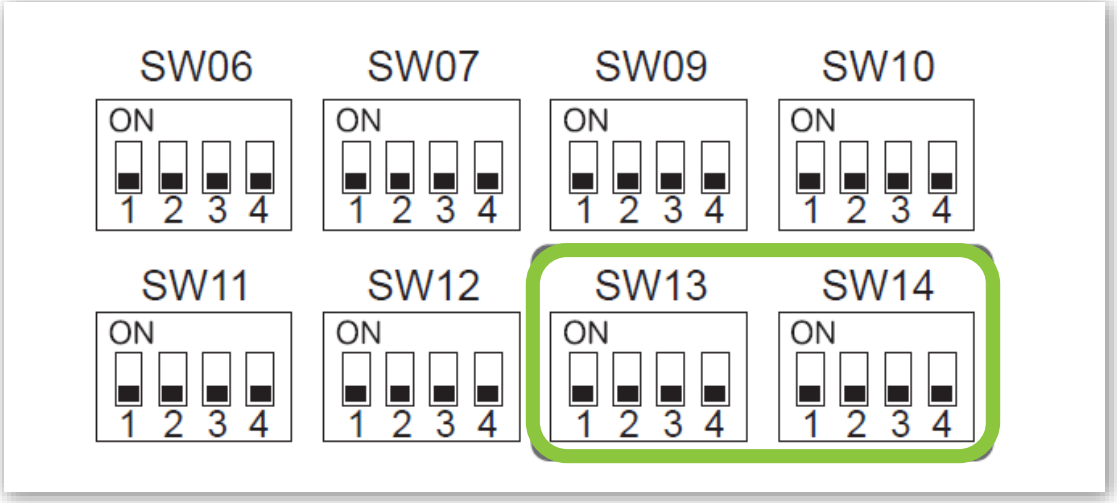




AUTOMATIC ADDRESS SETTING – PROCEDURE 2

Line Address

STEP 1 ☑ Set up line address by using SW13, SW14 on interface P.C.board



At shipment : Line Address is “1”

AUTOMATIC ADDRESS SETTING – PROCEDURE 2

STEP 1 ☑ Set up line address by using SW13, SW14.

Don't duplicate with other system.
Up to 28 can be selected for "Line Address".

Line address switches on the outdoor interface PC board (O : switch on, × : switch off)

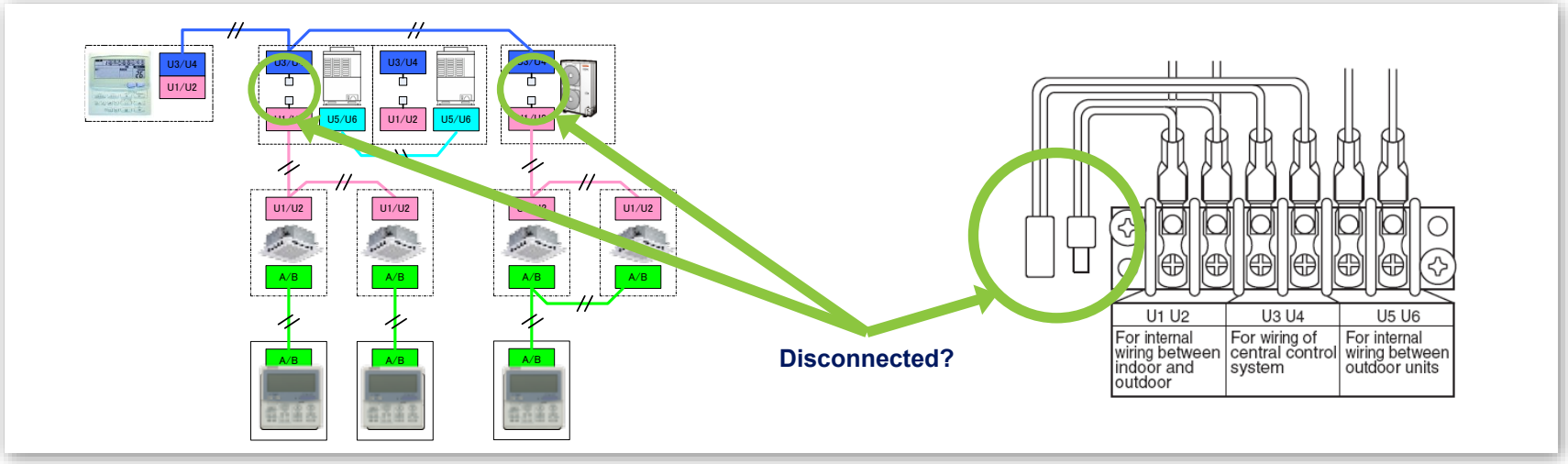
Line address	SW13				SW14			
	1	2	3	4	1	2	3	4
1				×	×	×	×	×
2				×	O	×	×	×
3				×	×	O	×	×
4				×	O	O	×	×
5				×	×	×	O	×
6				×	O	×	O	×
7				×	×	O	O	×
8				×	O	O	O	×
9				×	×	×	×	O
10				×	O	×	×	O
11				×	×	O	×	O
12				×	O	O	×	O
13				×	×	×	O	O
14				×	O	×	O	O

Line address	SW13				SW14			
	1	2	3	4	1	2	3	4
15				×	×	O	O	O
16				×	O	O	O	O
17				O	×	×	×	×
18				O	O	×	×	×
19				O	×	O	×	×
20				O	O	O	×	×
21				O	×	×	O	×
22				O	O	×	O	×
23				O	×	O	O	×
24				O	O	O	O	×
25				O	×	×	×	O
26				O	O	×	×	O
27				O	×	O	×	O
28				O	O	O	×	O

Not used for setup of line address (do not change setup.)

AUTOMATIC ADDRESS SETTING – PROCEDURE 2

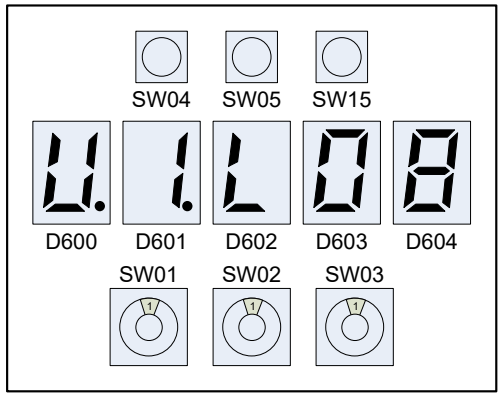
STEP 2 ☑ Check that relay connectors are disconnected in all outdoor units.



At shipment: Disconnected

AUTOMATIC ADDRESS SETTING – PROCEDURE 2

STEP 3 ☑ Turn on the power of **ALL** indoor units and VERIFY- then cycle power on outdoor unit.

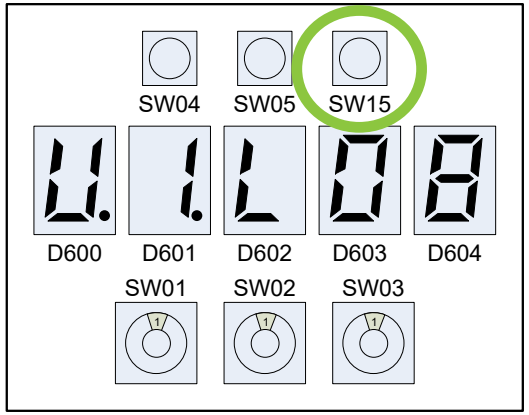


STEP 4 ☑ Check **[U.1. L08]** is displayed on 7-segment display on interface P.C. board of header unit.

AUTOMATIC ADDRESS SETTING – PROCEDURE 2

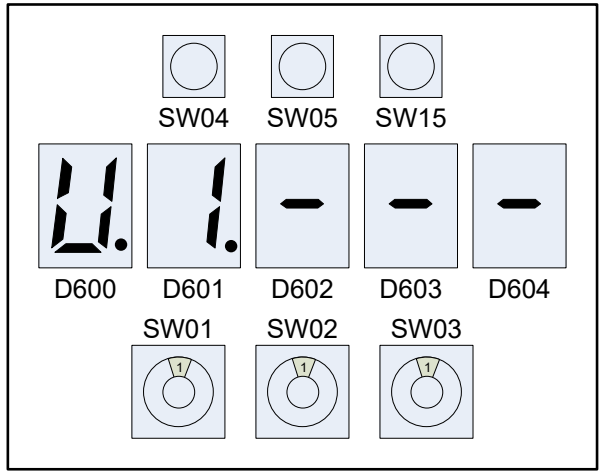
STEP 5 ☑ Push SW15! Start automatic address setting.

STEP 6 ☑ Auto 1 ➡ Auto 2 ➡ Auto 3 is displayed on 7-segment display during Automatic setting progress.



AUTOMATIC ADDRESS SETTING – PROCEDURE 2

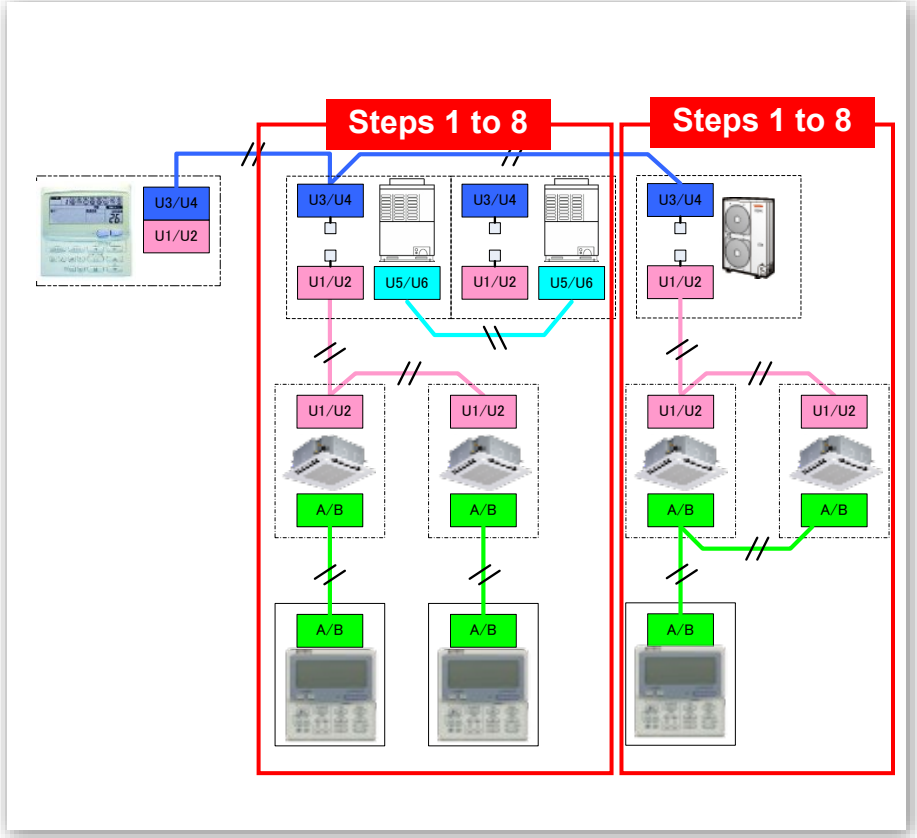
STEP 7 ☑ When 7-segment display changes from **[U.1. - - -]** **[U.1. - - -]** steady Automatic setup finished.



AUTOMATIC ADDRESS SETTING – PROCEDURE 2

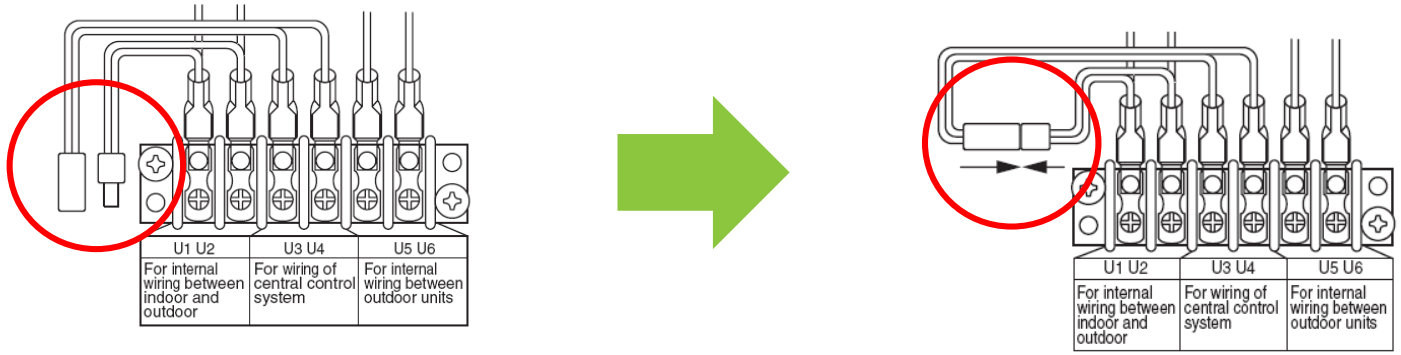
STEP 8 ☑

Step 1 to 8 are repeated for other refrigerant system.



AUTOMATIC ADDRESS SETTING – PROCEDURE 2

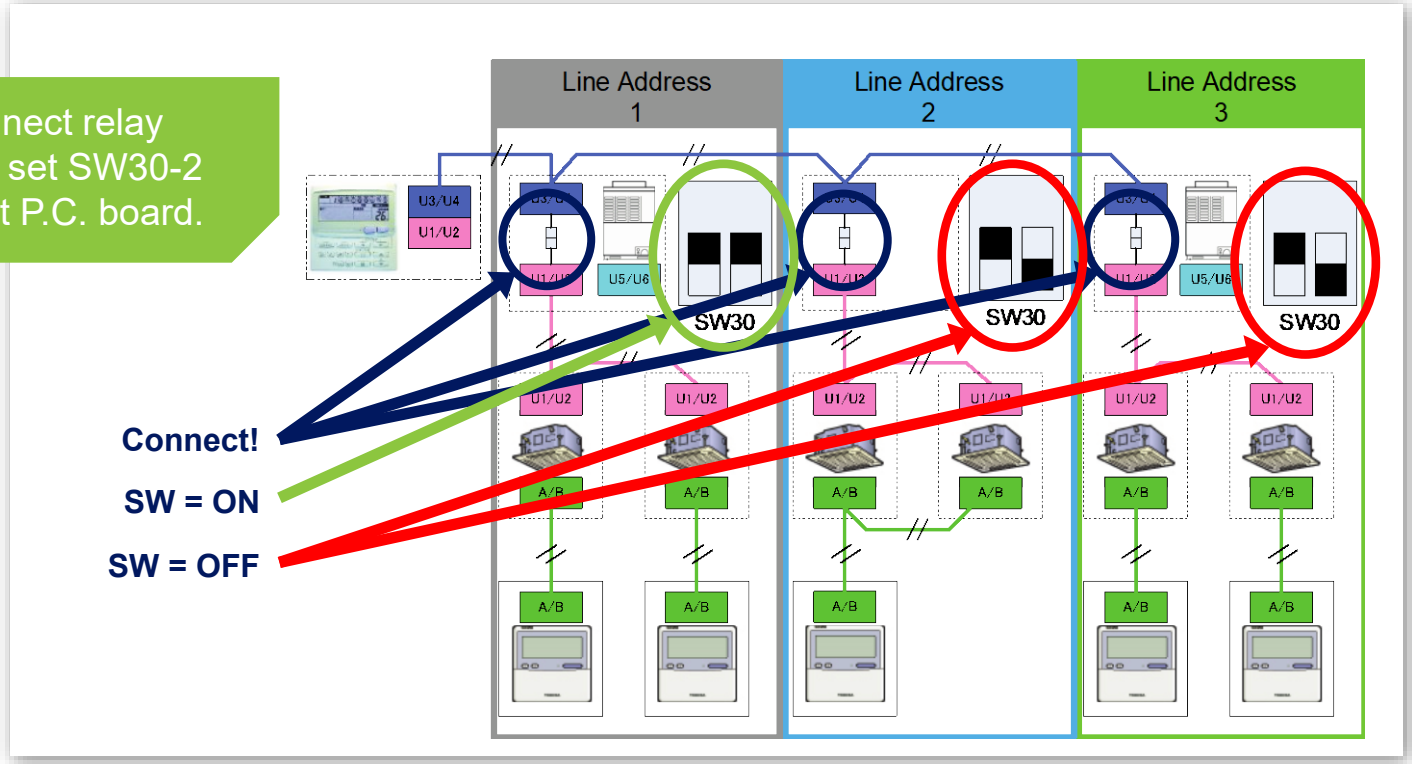
Connect control jumper between U1/U2 and U3/U4 terminal for all outdoor units.



Connect Control Jumper and set SW30-2 for all other refrigerant systems.

CENTRAL CONTROL ADDRESS SETTING CAUTION

Be sure to connect relay connector and set SW30-2 on outdoor unit P.C. board.



DN Code Setting

DN	Item	Description	At shipment
01	Filter display delay timer	0000: None 0001: 150H 0002: 2500H 0003: 5000H 0004: 10000H	According to type
02	Dirty state of filter	0000: Standard 0001: High degree of dirt (Half of standard time)	0000: Standard
03	Central control address	0001: No.1 unit to 0064: No.64 unit 0099: Unfixed	0099: Unfixed
04	Specific indoor unit priority	0000: No priority 0001: Priority	0000: Unfixed
06	Heating temp shift	0000: No shift 0001: +1°C(+1.8°F) 0002: +2°C(+3.6°F) to 0010: +10°C(+18°F) (Up to +6 recommended)	0002: +2°C(+3.6°F) (Floor type 0000: 0°C)
0d	Existence of [AUTO] mode	0000: Provided 0001: Not provided (Automatic selection from connected outdoor unit)	0001: Not provided
0F	Cooling only	0000: Heat pump 0001: Cooling only (No display of [AUTO] [HEAT])	0000: Heat pump
10	Type	0001: 4-way Air Discharge Cassette	Depending on model type
11	Indoor unit capacity	0000: Unfixed 0001 to 0034	According to capacity type
12	Line address	0001: No.1 unit to 0030: No.30 unit	0099: Unfixed
13	Indoor unit address	0001: No.1 unit to 0064: No.64 unit	0099: Unfixed
14	Group address	0000: Individual 0001: Header unit of group 0002: Follower unit of group	0099: Unfixed
19	Louver type (Air direction adjustment)	0000: No louver 0001: Swing only 0002: (1-way Air Discharge Cassette type, Under Ceiling type) 0003: (2-way Air Discharge Cassette type) 0004: (4-way Air Discharge Cassette type)	According to type
28	Automatic restart of power failure	0000: None 0001: Restart	0000: None
2A	Selection of option/error input (CN70)	0000: Filter input 0001: Alarm input (Air washer, etc.) 0002: None	0002: None

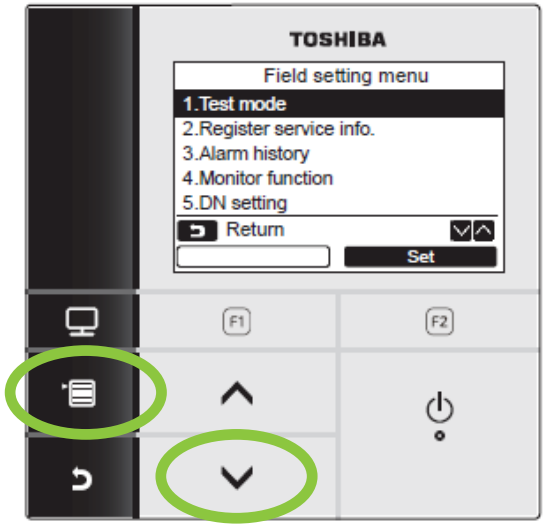
COMMON DN CODES FOR SMMSe AND SHRMe

- **DN-03** - Central Control / Group Address
- **DN-12** - Line Address
- **DN-13** - Indoor Unit Address
- **DN-14** - Group Address
- **DN-28** - Auto Restart
- **DN-2E** - CN61 for aux. drain safety
- **DN-32** - TA Sensor Location
- **DN-33** - Temperature Unit Select F vs C
- **DN-7A** - 1 degree F temperature Adjustment
- **DN-0E** - FS Box individual or multiple indoor units
- **DN-DB** - Diff T Secondary Heat
- **DN-DC** - Delta T Secondary Heat

Central Control Address Setting

STEP 1 ☑

1. Push the  button to display the menu screen.
2. Push and hold the  button and the ⌄ button at the same time to display the “Field setting menu”.

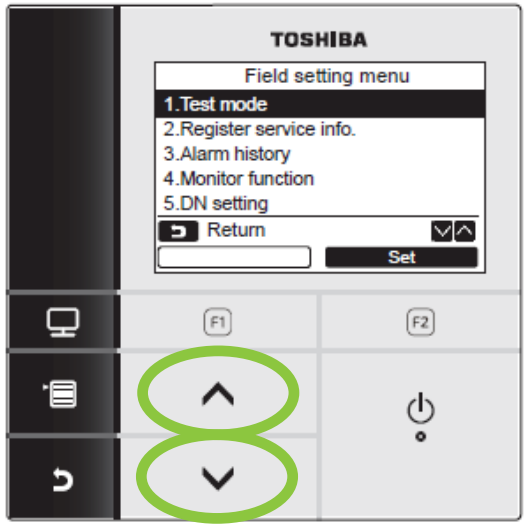


Central Control Address Setting

STEP 2 ☑

1. Push the ⌄ and ⌃ arrows and navigate to DN codes.

2. Push F2 to enter DN code settings

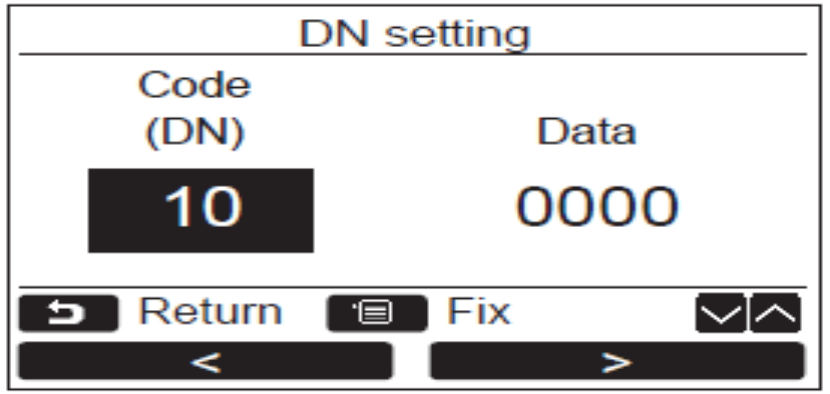


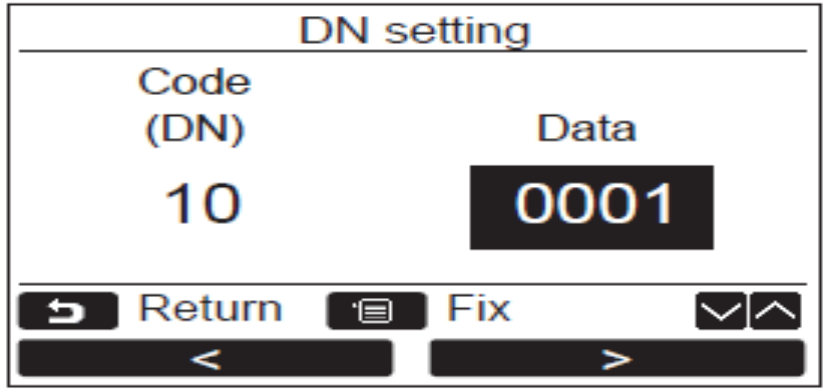
CENTRAL CONTROL ADDRESS SETTING

STEP 3 ☑ Using the ^ / v buttons, set to the item code ‘03’.

STEP 4 ☑ Press the F2 button, use the ^ / v to change line address.

STEP 5 ☐ Push [▤] button to fix the changed data.





MANUAL ADDRESS SETTING

STEP 5 ☑

Push  button to exit DN menu.

FINISH

QUESTIONS / DISCUSSION?

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THANK YOU