1/23/17

VRF SERVICE TRAINING:

Installation and Troubleshooting

ABOUT THIS PROGRAM

VRF Service Training

COURSE OBJECTIVES

- Understand VRF technology and application
- Explore the Toshiba Carrier VRF product line features and specifications
- Examine Toshiba Carrier VRF product functions and operations
- Review installation procedures, best practices, and testing
- Identify and review start up procedures
- Discuss troubleshooting codes and best practices
- Participate in hands-on activities and practice

DURATION

- 8 Hour Course

TABLE OF CONTENTS

WHAT IS VRF?

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?

What is VRF?

TWO PRIMARY SYSTEM TYPES

- **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

WHAT IS VRF?

VRF Technology

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

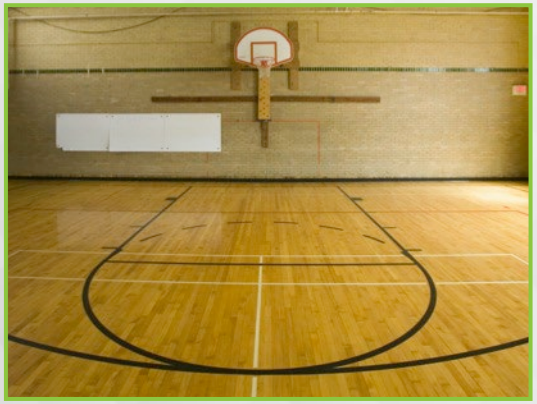
Controls

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

WHAT IS VRF?

VRF Technology

APPLICATION EXAMPLES FOR A HEAT PUMP SYSTEM



Gyms

Lobbies

Churches

Large, Open Spaces – Single Common Zones

WHAT IS VRF?

VRF Technology

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

WHAT IS VRF?

VRF Technology

APPLICATION EXAMPLES FOR A HEAT RECOVERY SYSTEM

Classrooms

Offices

Assisted Living

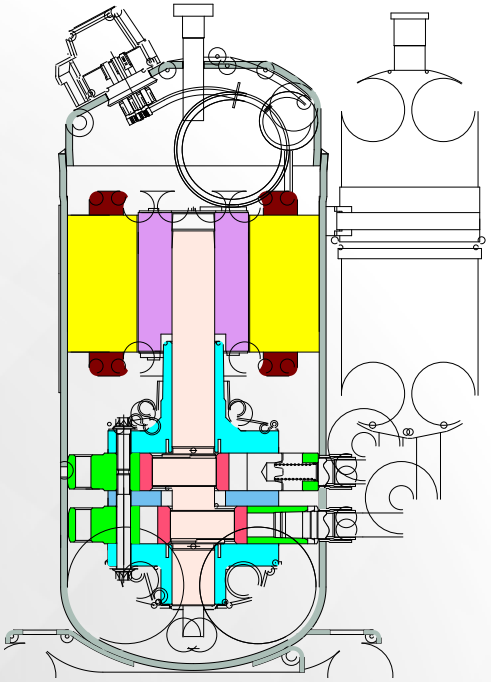
Buildings with Diversity – Many Thermal Zones

WHAT IS VRF?

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**



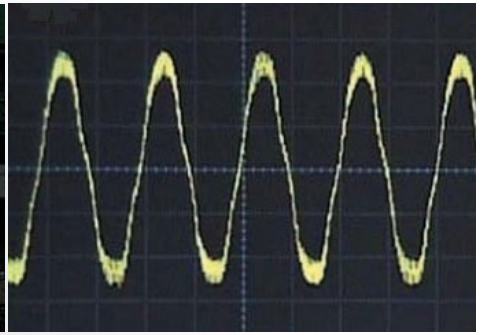
WHAT IS VRF?

VRF Technology

VRF Technology

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

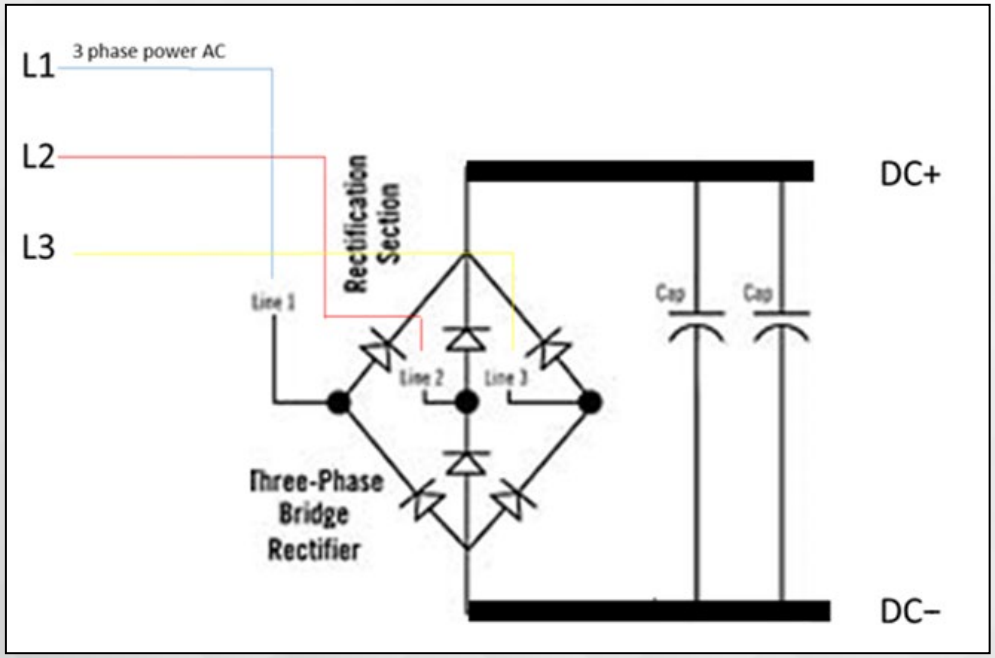
An ***inverter-driven compressor*** is less likely to fail at start-up because it sees a soft-start, making it more **MORE RELIABLE**

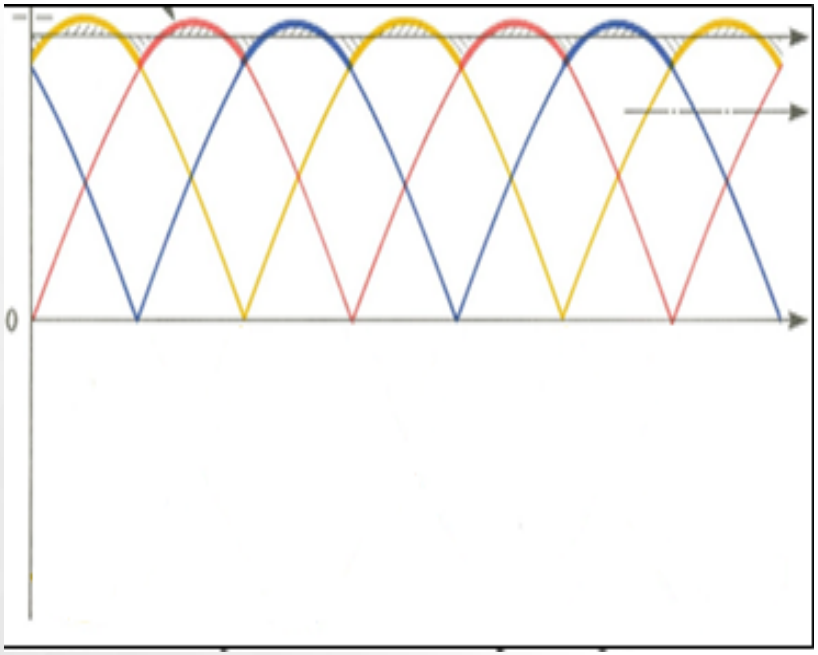


WHAT IS VRF?

VRF Technology

INVERTER CIRCUIT



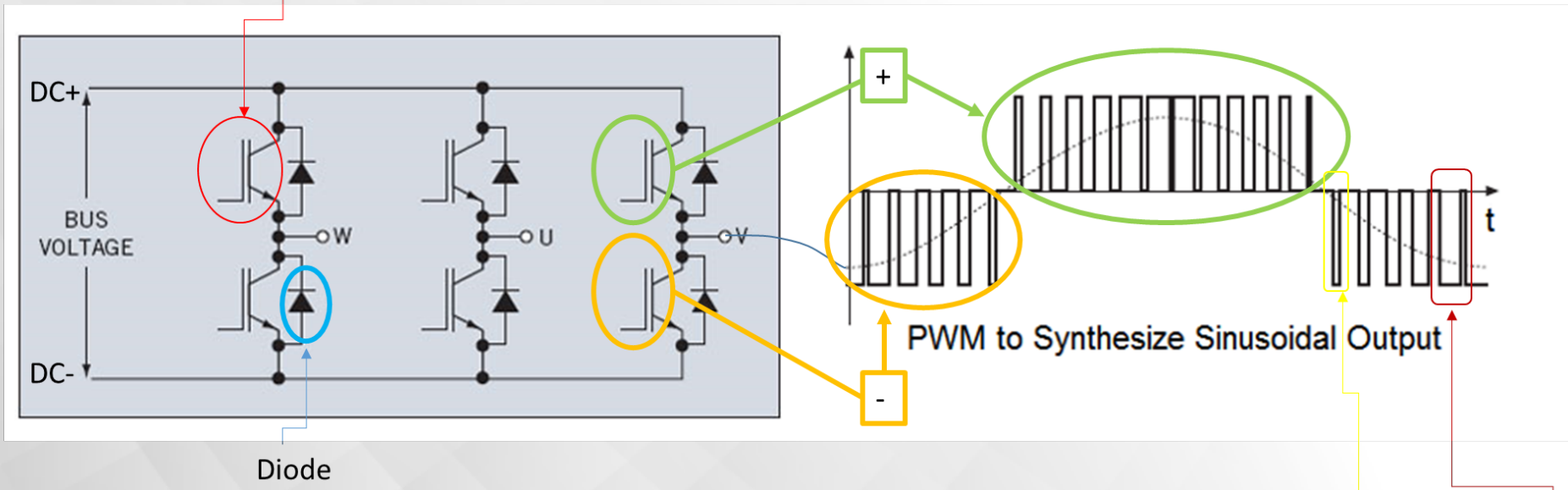


WHAT IS VRF?

VRF Technology

INVERTER CIRCUIT

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



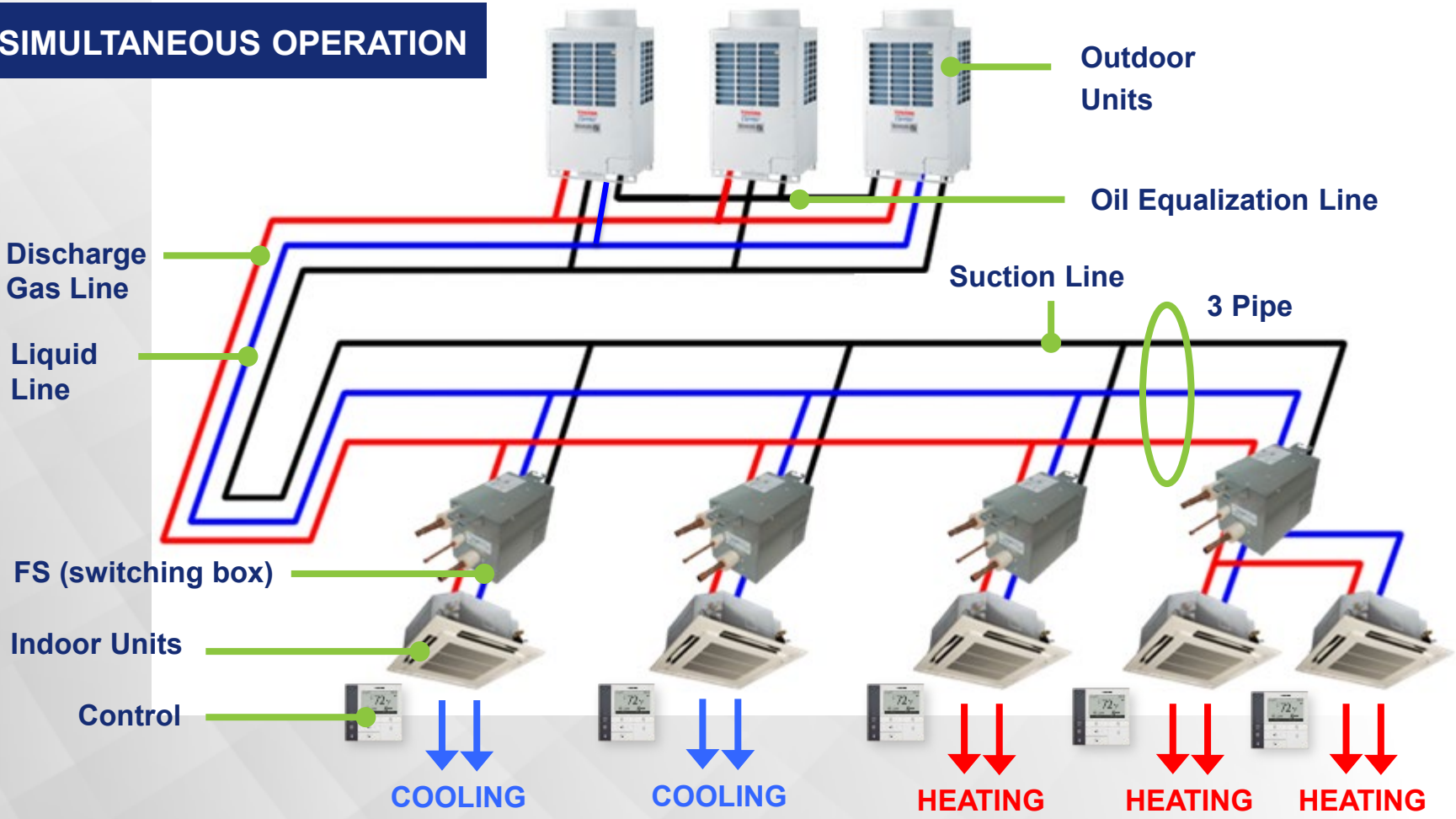
The faster the IGBT switches closed the shorter the DC sign wave

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

WHAT IS VRF?

Typical Layout of a VRF System

SIMULTANEOUS OPERATION



PRODUCT

PRODUCT

SHRM
SUPER HEAT RECOVERY MULTI

SMMS
SUPER MODULAR MULTI SYSTEM

PRODUCT

Outdoor Unit Lineup

PRODUCT

Heat Pump

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

- 208-230/3 and 460/3
- 50-130% Connected capacity (150% with engineering approval)
- Two rotary compressors per outdoor unit

PRODUCT

Heat Pump

Nominal Cooling Capacity
72,000 Btu/h (6 tons)
96,000 Btu/h (8 tons)
120,000 Btu/h (9 tons)
144,000 Btu/h (12 tons) NEW
168,000 Btu/h (14 tons)

Nominal Cooling Capacity
192,000 Btu/h (16 tons)
192,000S Btu/h (16S tons)
216,000 Btu/h (18 tons)
240,000 Btu/h (20 tons)
240,000S Btu/h (20S tons)
264,000 Btu/h (22 tons)
288,000 Btu/h (24 tons)
288,000S Btu/h (24S tons)
312,000 Btu/h (26 tons)
336,000 Btu/h (28 tons)

Nominal Cooling Capacity
360,000 Btu/h (30 tons)
384,000 Btu/h (32 tons)
408,000 Btu/h (34 tons)
408,000S Btu/h (34S tons)
432,000 Btu/h (36 tons)
456,000 Btu/h (38 tons)

PRODUCT

Heat Recovery

Nominal Cooling Capacity
72,000 Btu/h (6 tons)
96,000 Btu/h (8 tons)
120,000 Btu/h (9 tons)
144,000 Btu/h (12 tons)
168,000 Btu/h (14 tons)

Single Module

Nominal Cooling Capacity
192,000 Btu/h (16 tons)
192,000S Btu/h (16S tons)
216,000 Btu/h (18 tons)
240,000 Btu/h (20 tons)
240,000S Btu/h (20S tons)
264,000 Btu/h (22 tons)
288,000 Btu/h (24 tons)
288,000S Btu/h (24S tons)
312,000 Btu/h (26 tons)
336,000S Btu/h (28S tons)

Dual Module

Nominal Cooling Capacity
336,000 Btu/h (28 tons)
360,000 Btu/h (30 tons)
384,000 Btu/h (32 tons)
408,000 Btu/h (34 tons)
432,000 Btu/h (36 tons)
456,000 Btu/h (38 tons)

Triple Module

PRODUCT

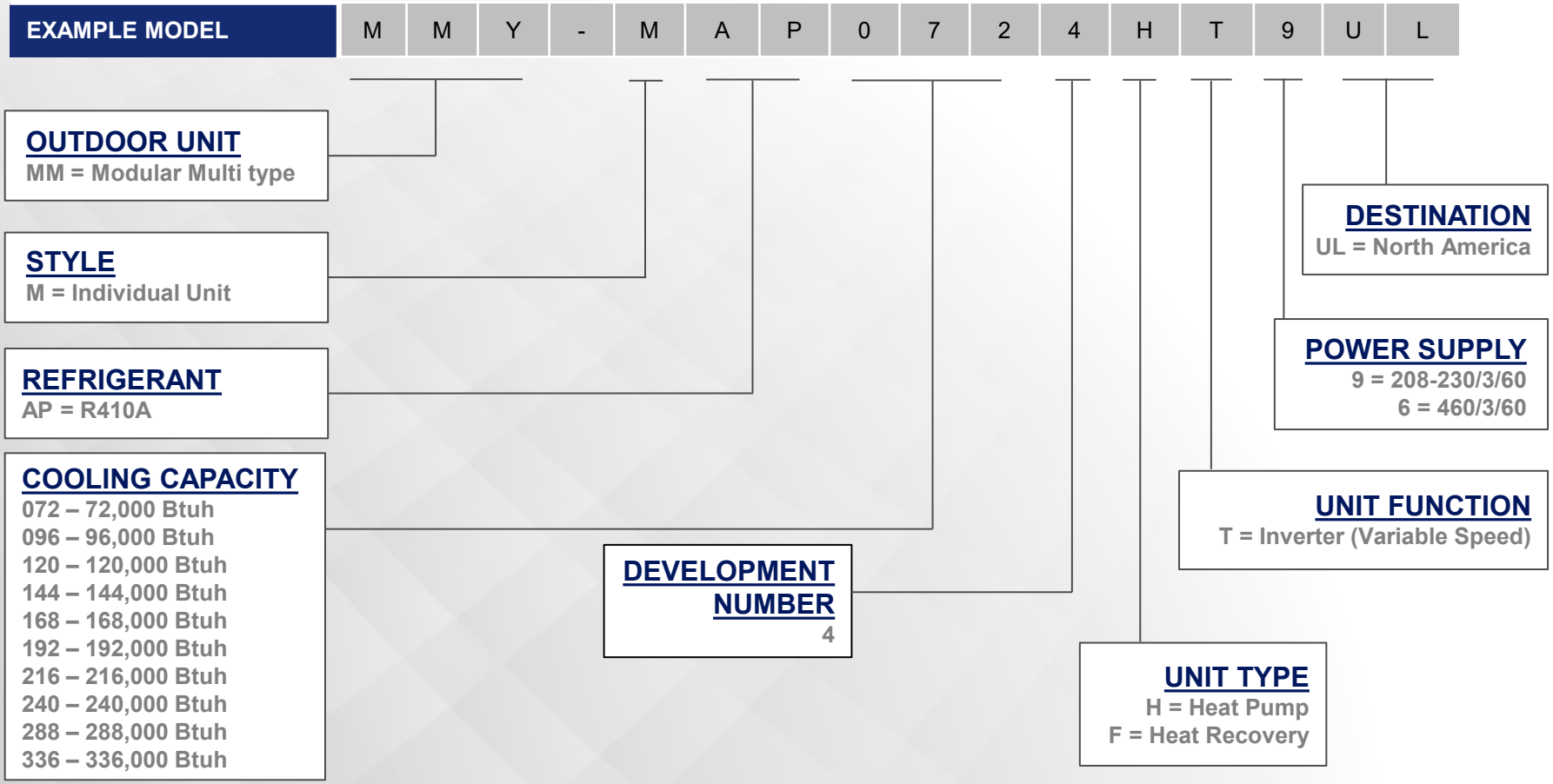
Reduced Footprint

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)

PRODUCT

Outdoor Unit Nomenclature



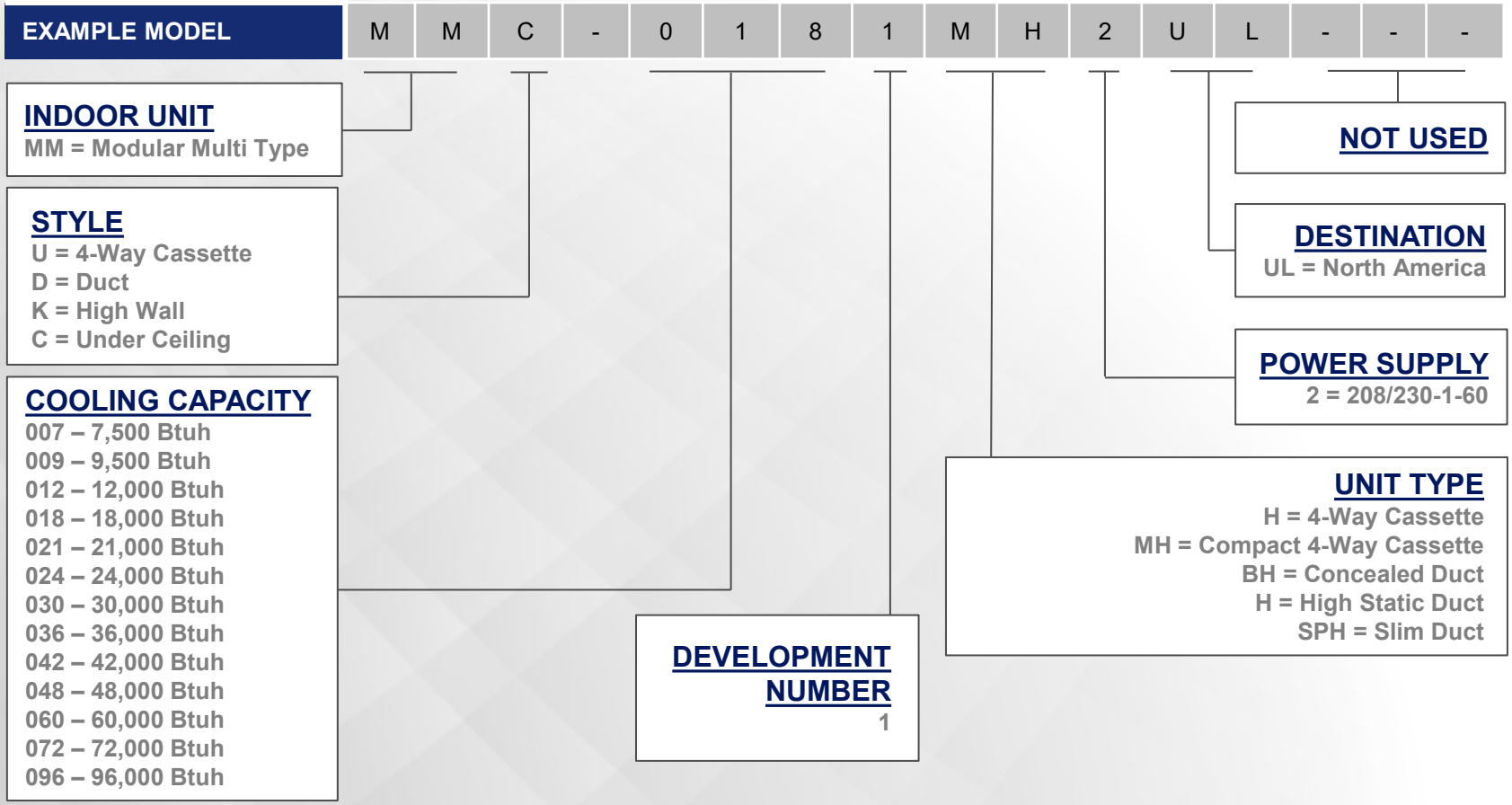
PRODUCT

Indoor Unit Lineup

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

PRODUCT

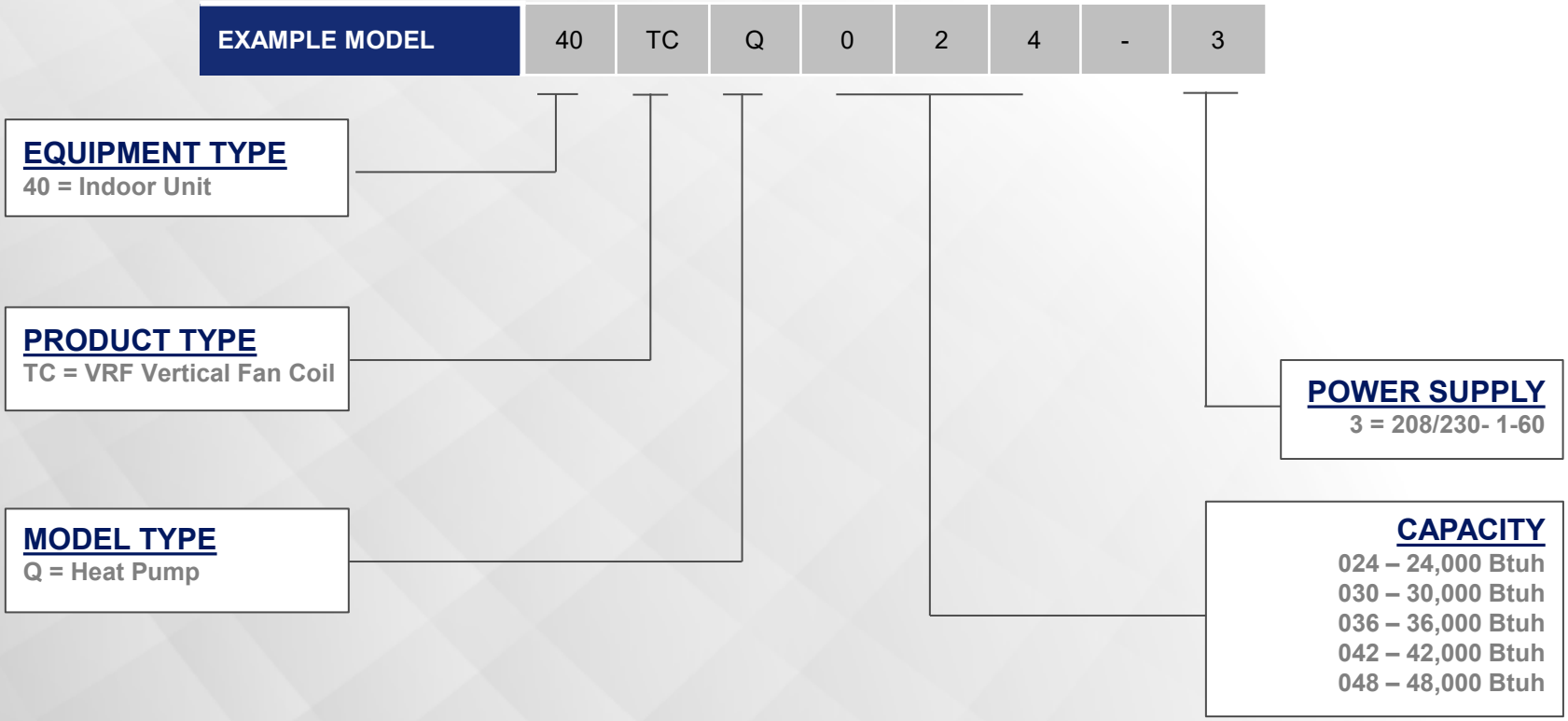
Indoor Unit Nomenclature



PRODUCT

Indoor Unit Nomenclature

VERTICAL FAN COIL 40TCQ



PRODUCT

Indoor Unit

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	

Compact 4-Way Cassette

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

Indoor Unit

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

Indoor Unit

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

Indoor Unit

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

Indoor Unit

Vertical AHU

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	

PRODUCT

Indoor Unit

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

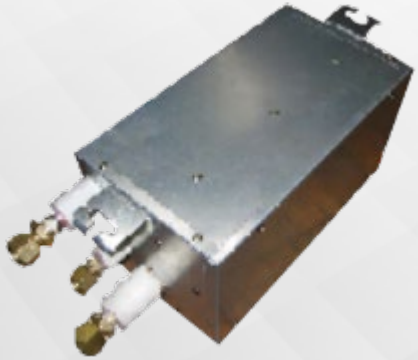
Indoor Unit

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

Flow Selector



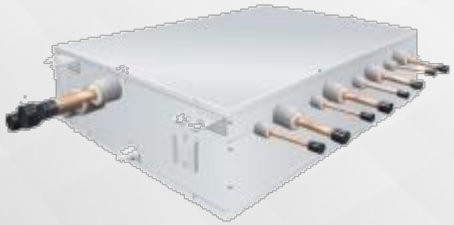
Connectable Capacity	Model Number	Connectable Indoor Units*
Below 38,000 Btu/h	RBM-Y0383FUL	5
38,000-61,000 Btu/h	RBM-Y0613FUL	8

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

Flow Selector Box



Multiport Flow Selector Box (4 Port)

Connectable Capacity	Model Number	Model of ports	Connectable Indoor Units*
61KBTU/port	RBM-Y0613F4PUL	4	10

Multiport Flow Selector Box (6 Port)

Connectable Capacity	Model Number	Model of ports	Connectable Indoor Units*
61KBTU/port	RBM-Y0613F6PUL	6	10

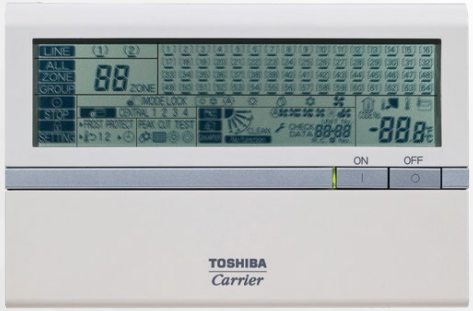
Units are powered seperately

PRODUCT

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**)

PRODUCT

Zone Control Overview

LITE-VISION WIRED REMOTE CONTROLLER

(RBC-AMS51E-ES)

FEATURES

- Simple, Easy to Use
- Back light
- 1° F temperature indication
- Set temperature range limiting
- Compatible with Toshiba Carrier RAV and VRF systems

PRODUCT

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

PRODUCT

Zone Control Overview

SIMPLE WIRED REMOTE CONTROL

(RBC-AS41UL)

REMOTE SENSOR

(RBC-TC41LUL)

FEATURES

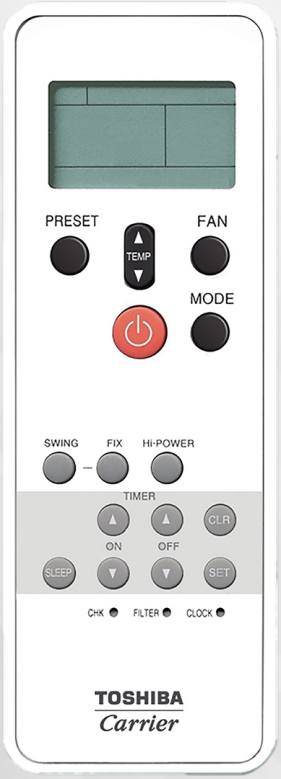
- Start / Stop
- Temperature setting
- Airflow changing
- Check code display

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

PRODUCT

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

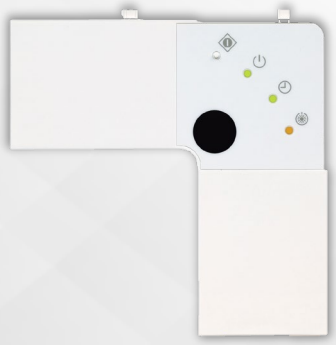
PRODUCT

Zone Control Overview

STAND-ALONE RECEIVER
(TCB-AX32UL)

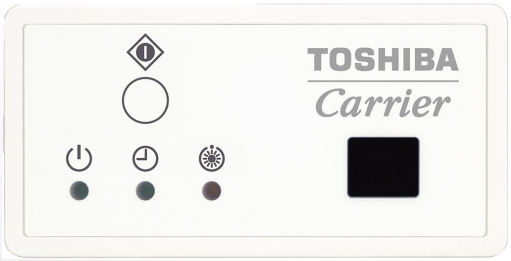
- For 4-Way Cassette, Compact 4-Way Cassette, Underceiling, Concealed Duct, Slim Duct, Vertical AHU
- Includes Wireless Remote Control Kit

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

PRODUCT

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

PRODUCT

Central Control Overview

(BMS-CT5120UL)

Basic components

TCS-NET RELAY
BMS-IFLSV4UL

Header ODU

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

PRODUCT

Central Control Overview

BASIC COMPONENTS

TOUCH SCREEN CONTROLLER

(BMS-CT5120UL)

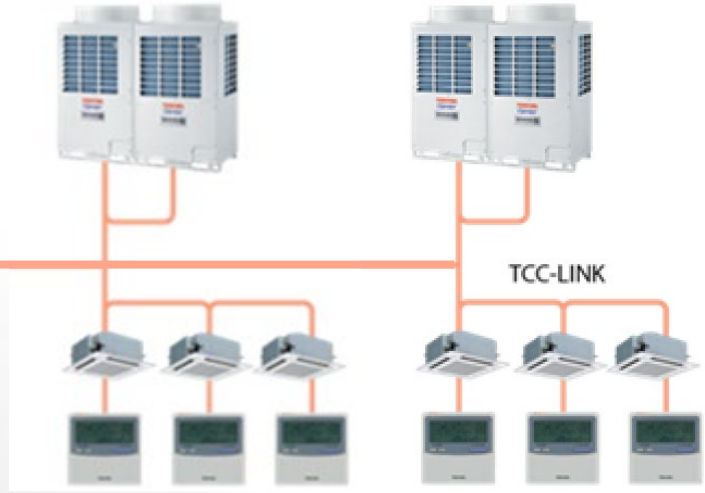
LAN1 COM1

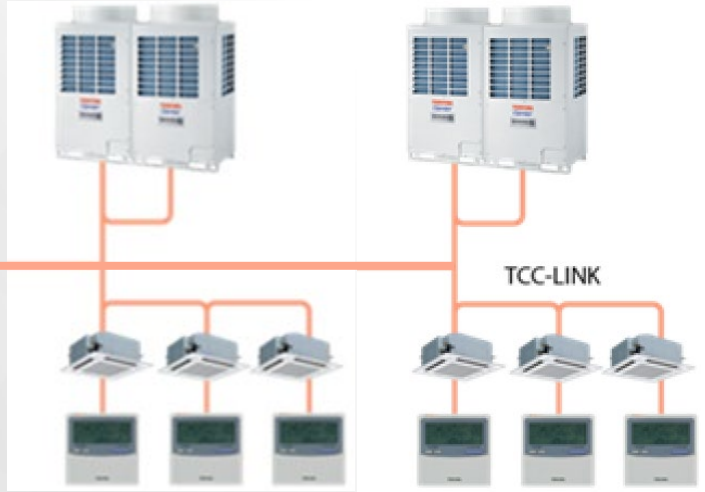
Hub

Customer computer
(For monthly report creation)
(For air conditioning control)

BMS-IFLSV4UL
(TCS-NET RELAY)

BMS-IFLSV4UL
(TCS-NET RELAY)



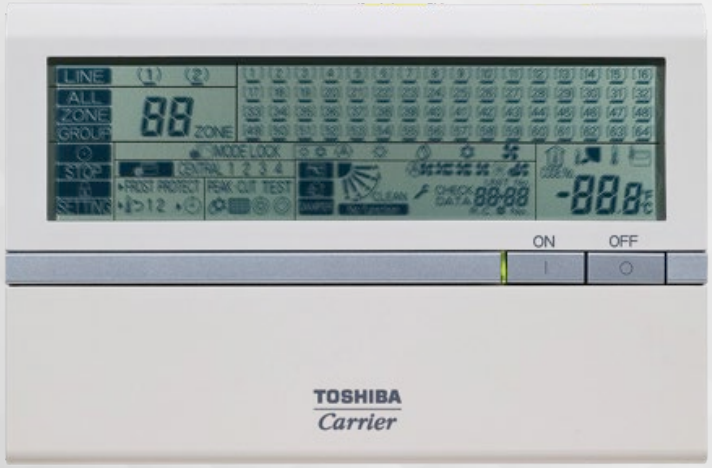


PRODUCT

Central Control Overview

SMART MANAGER

(BMS-SM1280HTLUL)



FEATURES

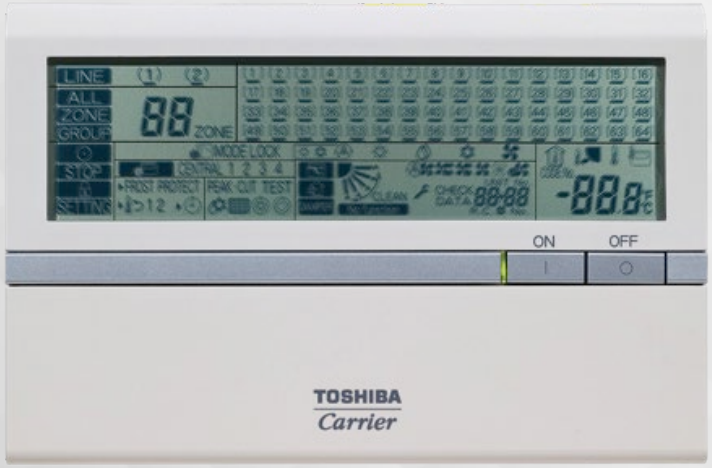
- List view available – Displays all indoor units in one screen
- Set view available – Shows basic indoor unit settings on main screen
- Advanced operation and master schedule functions
- Up to four concurrent users can be connected
- Up to 32 user accounts can be programmed with different levels of 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

PRODUCT

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

PRODUCT

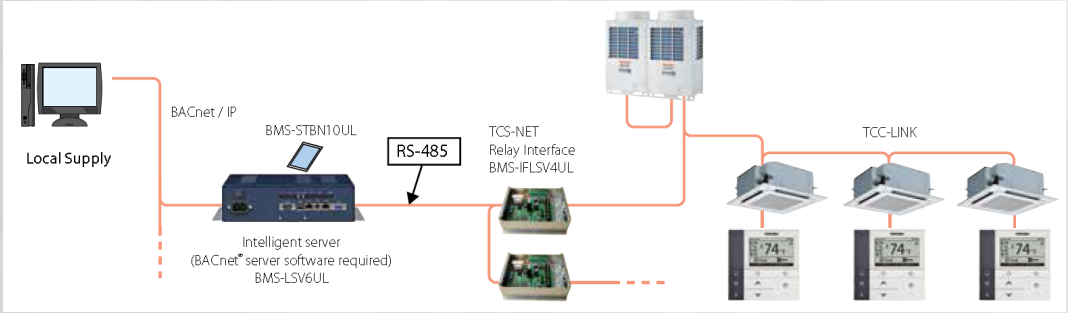
BMS Interface Overview

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

PRODUCT

BMS Interface Overview

BACnet® INTERFACE

(BMS-IFBN640TLUL)

FEATURES

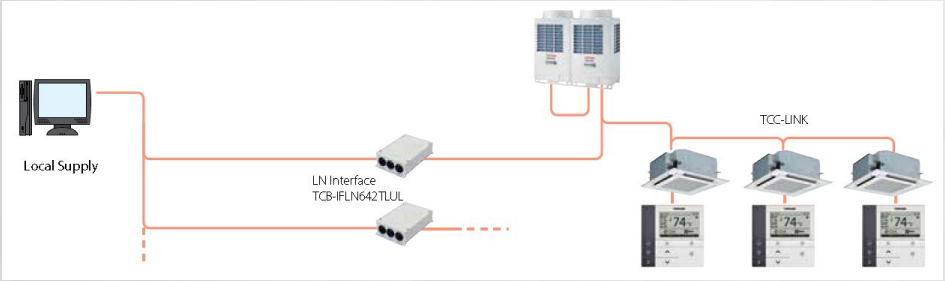
- Full Scheduling Capabilities
- Adjusts:
  - Mode, Set-point,
  - Fan Speed,
  - Louvers,
  - Prohibits for each indoor unit

PRODUCT

BMS Interface Overview

LONWORKS® SYSTEM

LN Interface
(TCB-IFLN642TLUL)



FEATURES

The LonWorks® interface manages the SMMS-i/SDI air conditioning system as a Lon device to communicate with the customer's Building Management System and to monitor operational status. A maximum of 64 units are controllable per interface.

SNVT Signal

Signals and provides the following functions:

CONTROL

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

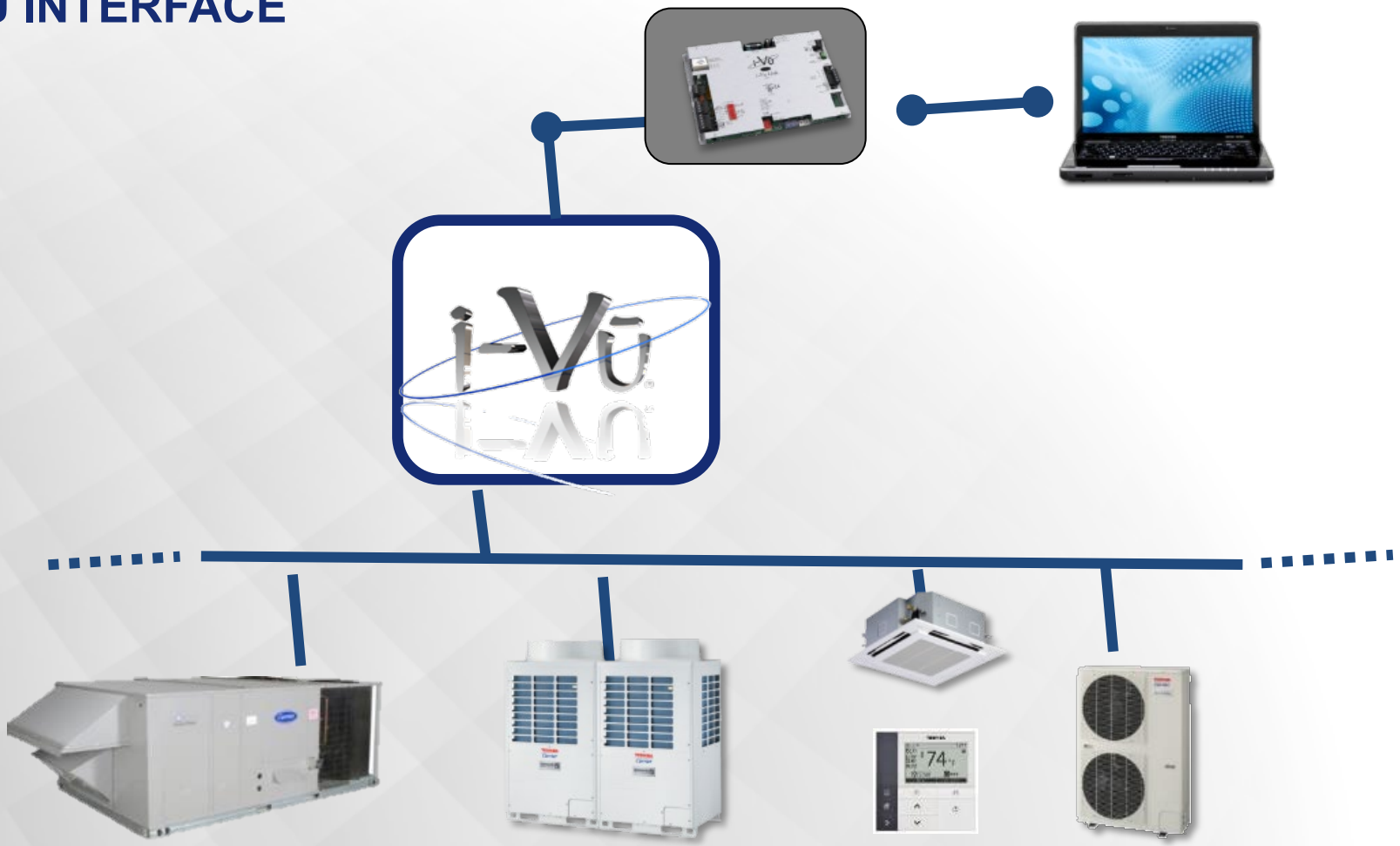
MONITORING

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

PRODUCT

i-Vu Interface Overview

i-VU INTERFACE



PRODUCT

Controls Combination

SPECIFICATIONS FOR CO-EXISTENCE OF EACH SYSTEM ON THE SAME TCC-LINK BUS LINE

	Central Remote Control BMS-CM1281TLUL	Smart Manager BMS-SM1280HTLUL	Touch Screen Controller BMS-CT5120UL	BACnet System Intelligent Server BMS-LSV6UL	BN Interface BMS-IFBN640TLUL	LonWorks LN Interface TCB-IFLN642TLUL	i-Vu Interface TCB-PCVU640TLUL
Central Remote Control BMS-CM1281TLUL	OK	OK	OK	OK	OK	OK	OK
Smart Manager BMS-SM1280HTLUL	OK	-	-	OK	OK	-	-
Touch Screen Controller BMS-CT5120UL	OK	-	-	OK	OK	-	-
BACnet System Intelligent Server BMS-LSV6UL	OK	OK	OK	-	-	-	-
BN Interface BMS-IFBN640TLUL	OK	OK	OK	-	-	-	-
LonWorks LN Interface TCB-IFLN642TLUL	OK	-	-	-	-	-	-
i-Vu Interface TCB-PCVU640TLUL	OK	-	-	-	-	-	-

FUNCTION AND OPERATION

FUNCTION AND OPERATION

Outdoor Accessory Board and Feature

Control	Optional PC Board
Power peak-cut control (standard)	TCB-PCDM4UL
Power peak-cut control (expand)	TCB-PCDM4UL
Error/Operation output control	TCB-PCIN4UL
Compressor operation output	TCB-PCIN4UL
Operation rate output	TCB-PCIN4UL
Snowfall fan control	TCB-PCMO4UL
External master ON/OFF control	TCB-PCMO4UL
Night Operation (sound reduction) control	TCB-PCMO4UL
Operation mode selection control	TCB-PCMO4UL
Outdoor fan high static pressure	*
Cooling priority or heating priority setting	*
Indoor unit optional control	TCB-IFCB-4UL

FUNCTION AND OPERATION

Power Peak-cut Control (TCB-PCDM4UL)

FEATURE

The upper limit capacity of the outdoor unit is restricted based on the demand request signal from outside.

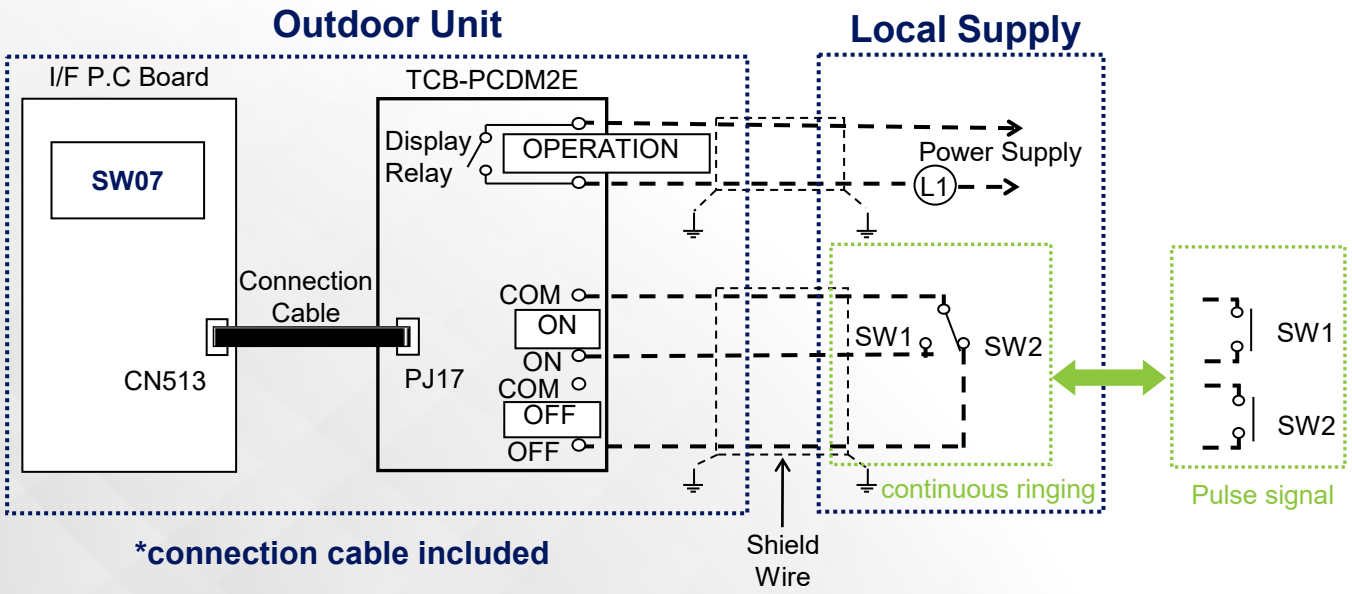
Power Peak-cut control has two versions:

1. Standard (2 stages)
2. Expansion (4 stages)

FUNCTION AND OPERATION

Power Peak-cut Control (TCB-PCDM4UL)

STANDARD FUNCTION



SW07-Bit2 OFF

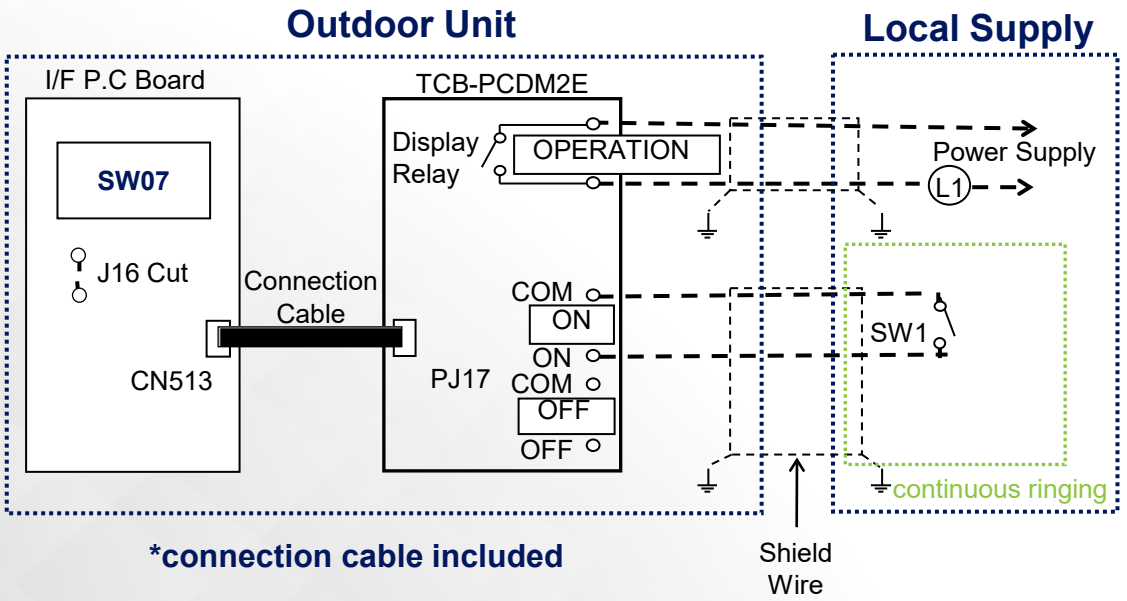
L1:Display lamp surging power peak-cut control

Input		SW07-Bit 1 OFF	SW07-Bit 1 ON	Display relay (L1)
SW1	SW2	Capacity	Capacity	
OFF	ON	100% (normal)	100% (normal)	OFF
ON	OFF	0% (stop)	Up to 60%	ON

FUNCTION AND OPERATION

Power Peak-cut Control (TCB-PCDM4UL)

STANDARD FUNCTION (FOR ONE INPUT FUNCTION)



SW07-Bit2 OFF

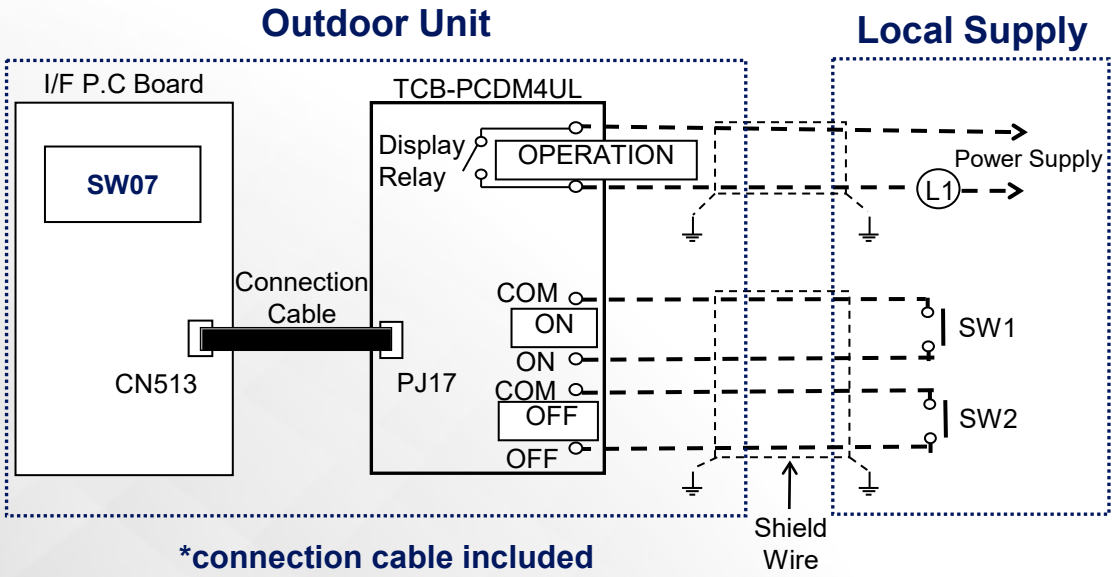
L1:Display lamp surging power peak-cut control

Input SW1	Jumper Lead J16	SW07-Bit 1 OFF Capacity	SW07-Bit 1 ON Capacity	Display relay (L1)
OFF	Cut	100%	100%	OFF
ON	Cut	0% (forced stop)	Up to 60%	ON

FUNCTION AND OPERATION

Power Peak-cut Control (TCB-PCDM4UL)

EXPANDED FUNCTION



*connection cable included

SW07-Bit2 ON

Input		SW07-Bit 1 OFF	SW07-Bit 1 ON	Display relay (L1)
SW1	SW2	Capacity	Capacity	
OFF	OFF	100% (normal)	100% (normal)	OFF
ON	OFF	Up to 80%	Up to 85%	ON
OFF	ON	Up to 60%	Up to 75%	ON
ON	ON	0% (forced stop)	Up to 60%	ON

FUNCTION AND OPERATION

Error / Operation Output Control (TCB-PCIN4UL)

FEATURE

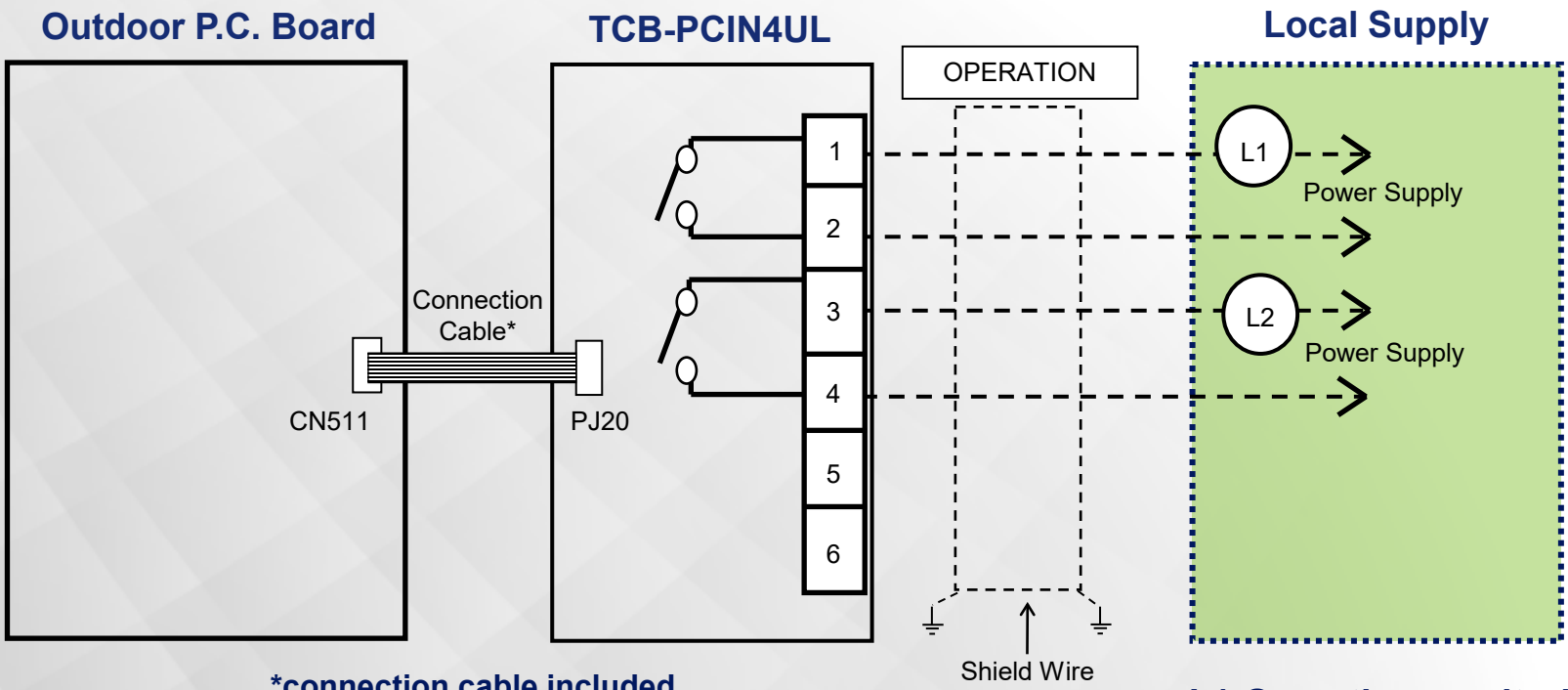
Operation and error monitoring is possible

FUNCTION AND OPERATION

Error / Operation Output Control (TCB-PCIN4UL)

OPERATION MONITORING: Display relay is ON when more than one indoor unit is operating

ERROR MONITORING: Display relay is ON when the system is in error status



*connection cable included

L1:Operation monitoring lamp
L2:Error monitoring lamp

Note: Be sure to connect TCB-PCIN4UL to header of outdoor unit

FUNCTION AND OPERATION

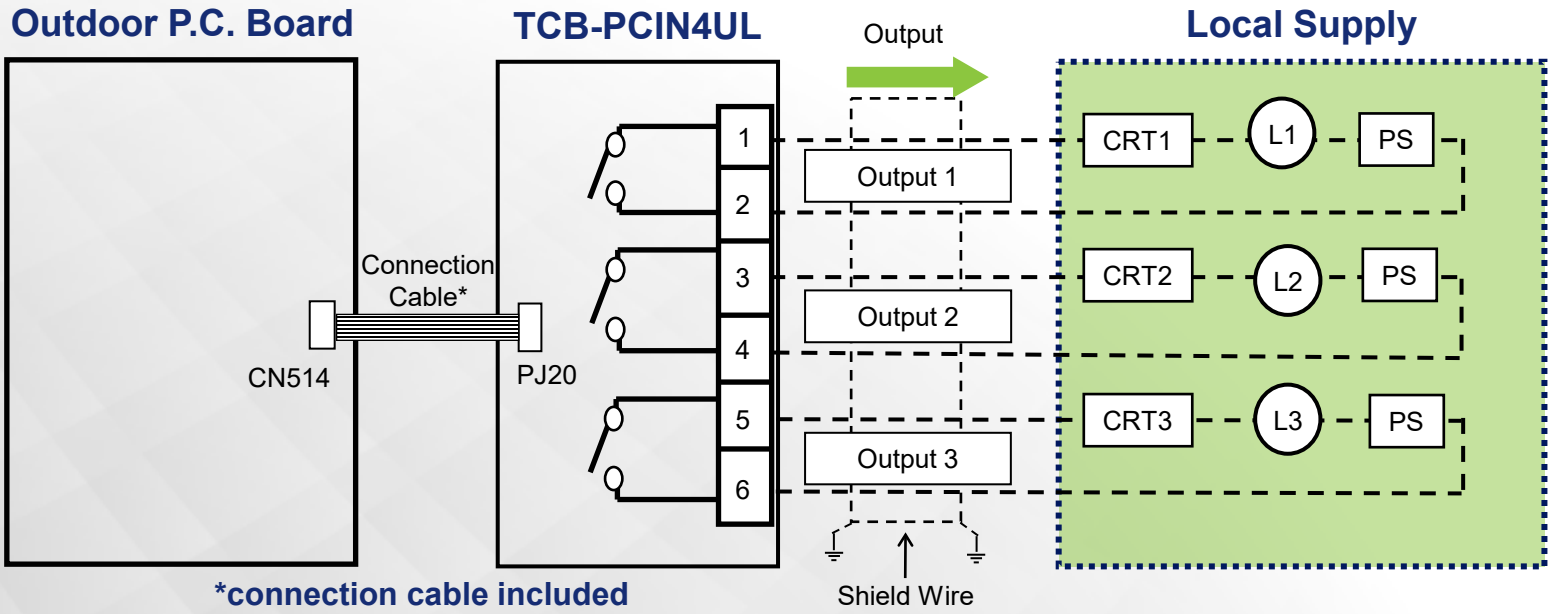
Compressor Operation Output (TCB-PCIN4UL)

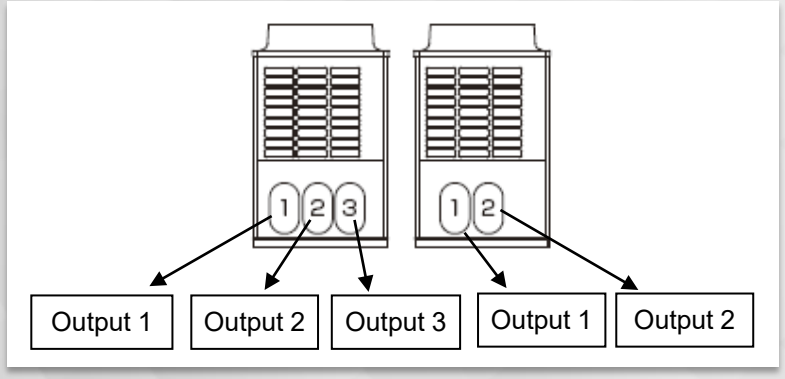
FEATURE

Operation and error monitoring is possible

FUNCTION AND OPERATION

Compressor Operation Output (TCB-PCIN4UL)





Note: Be sure to ground shielded wire at both ends

Note: Be sure to connect TCB-PCIN4UL to header of outdoor unit

CRT: Operation hour meter
L1~L3: Operation display lamp
PS: Power-supply unit

FUNCTION AND OPERATION

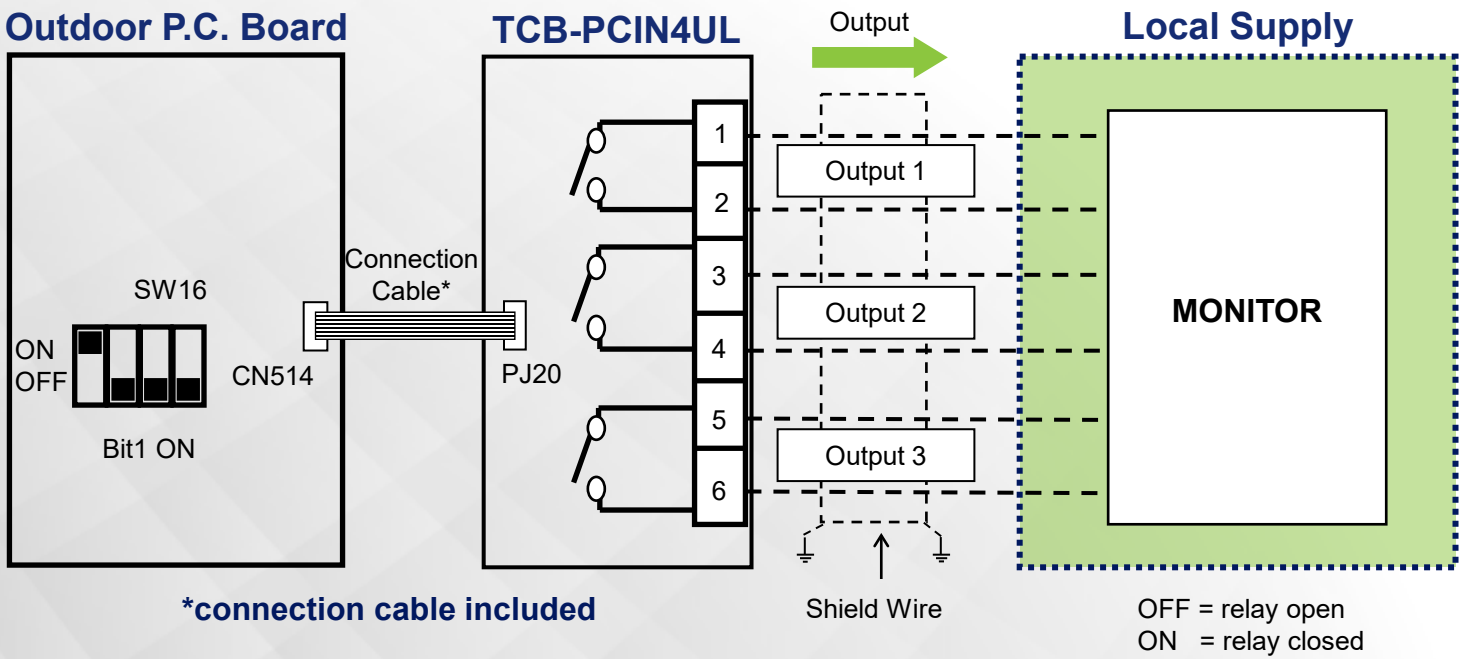
Operation Rate Output (TCB-PCIN4UL)

FEATURE

Operation monitoring is possible

FUNCTION AND OPERATION

Operation Rate Output (TCB-PCIN4UL)



FUNCTION AND OPERATION

Operation Rate Output (TCB-PCIN4UL)

	OUTPUT Signal			SW16 bit1:ON
	OUTPUT 1	OUTPUT 2	OUTPUT 3	Operation Rate FA _0-100%)
System Operation Output	OFF	OFF	OFF	FA=0%
	ON	OFF	OFF	0%<FA<20%
	OFF	ON	OFF	20%<FA<35%
	ON	ON	OFF	35%<FA<50%
	OFF	OFF	ON	50%<FA<65%
	ON	OFF	ON	65%<FA<80%
	OFF	ON	ON	80%<FA<95%
	ON	ON	ON	95%<=FA

FUNCTION AND OPERATION

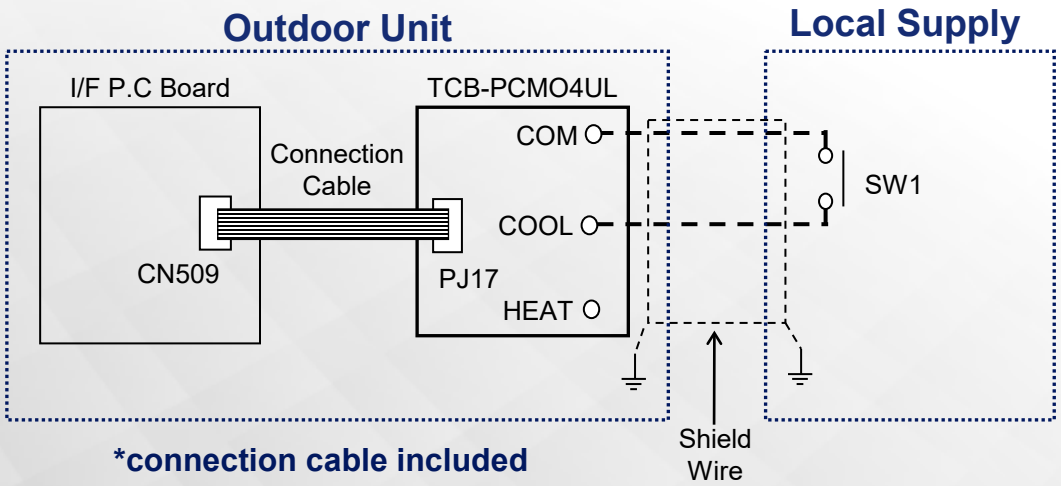
Snowfall Fan Control (TCB-PCMO4UL)

FEATURE

The outdoor unit fan operates when a Snowfall signal is received

FUNCTION AND OPERATION

Snowfall Fan Control (TCB-PCMO4UL)



*connection cable included

Note: Be sure to ground shielded wire at both ends

Teminal	Input Signal	Operation
COOL (SW 1)	ON → OFF	Snowfall fan control (operate outdoor unit fan)
	ON → OFF	Usual operation (releases control)

SW1:Snowfall detection switch (snowfall sensor)

The Snowfall function is initiated by a 100 millisecond or more **ON** pulse and when terminated returns to normal operation.

Note: Be sure to connect TCB-PCMO4UL to header of outdoor unit

FUNCTION AND OPERATION

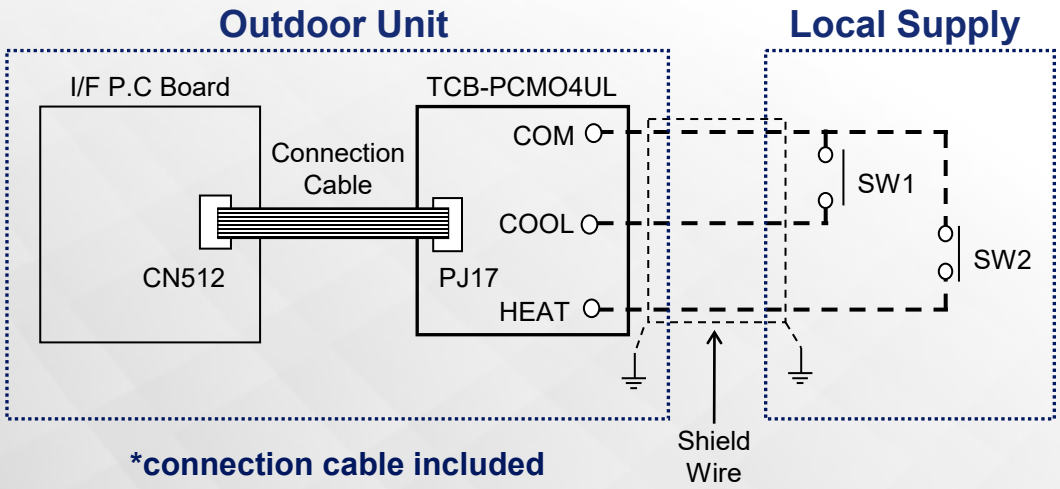
External Master ON/OFF Control (TCB-PCMO4UL)

FEATURE

The outdoor unit starts or stops the system

FUNCTION AND OPERATION

External Master ON/OFF Control (TCB-PCMO4UL)



*connection cable included

Teminal	Input Signal	Operation
COOL (SW 1)	ON / OFF	All indoor units operate together
HEAT (SW 2)	ON / OFF	All indoor units stop together

Note: Be sure to connect TCB-PCMO4UL to header of outdoor unit

FUNCTION AND OPERATION

Night Time Operation (Sound Reduction) Control (TCB-PCMO4UL)

FEATURE

Sound level can be reduced by restricting compressor and fan speed

FUNCTION AND OPERATION

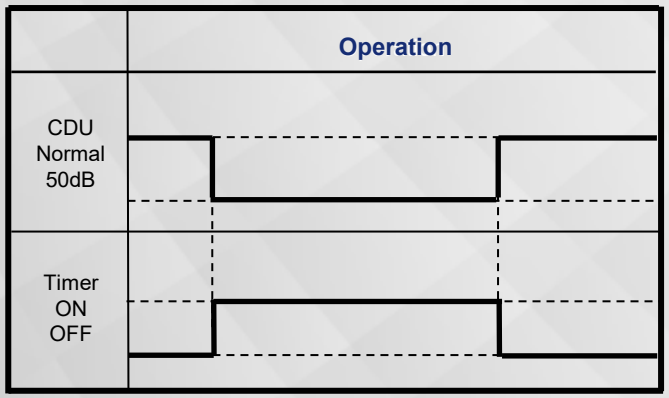
Night Time Operation (Sound Reduction) Control (TCB-PCMO4UL)

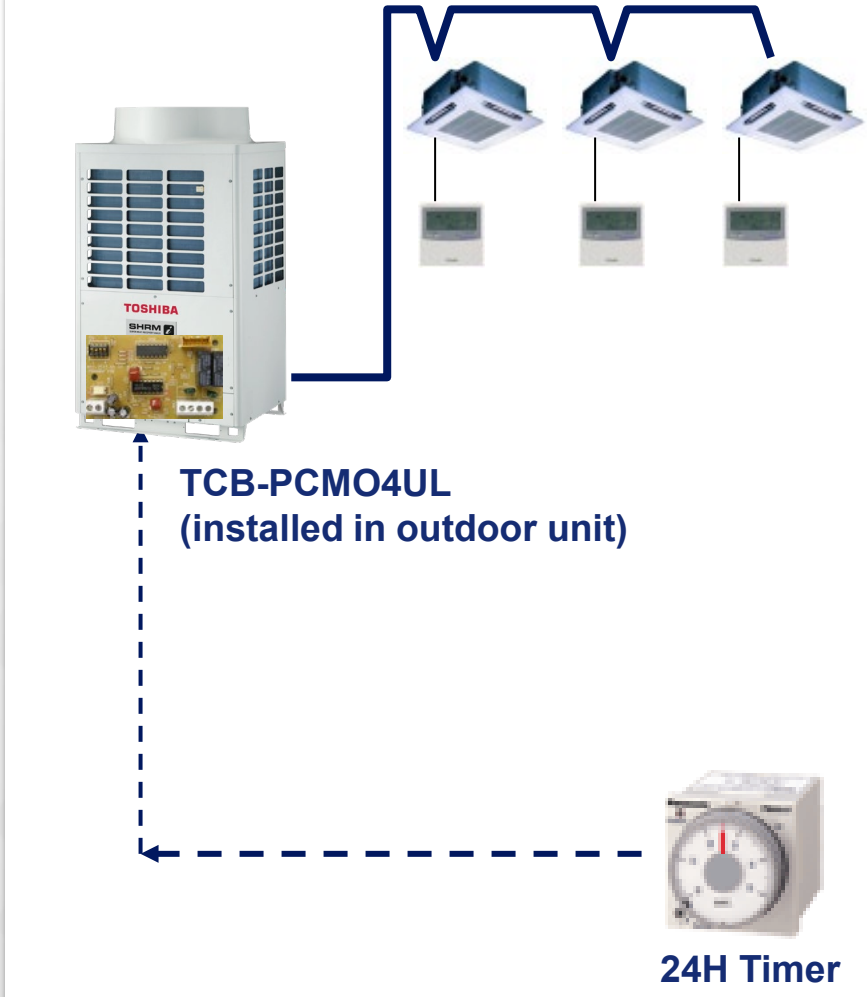
EQUIPMENT LIST

Equipment	Model Name
PCB	TCB-PCMO4UL
Timer (24hr)	Local Supply

Control Description

Sound level can be reduced by connecting this device to the Outdoor Interface PCB. This operates by the restricting compressor and fan speed. Noise will be reduced during the night time operation.





FUNCTION AND OPERATION

Operation Mode Selection Control (TCB-PCMO4UL)

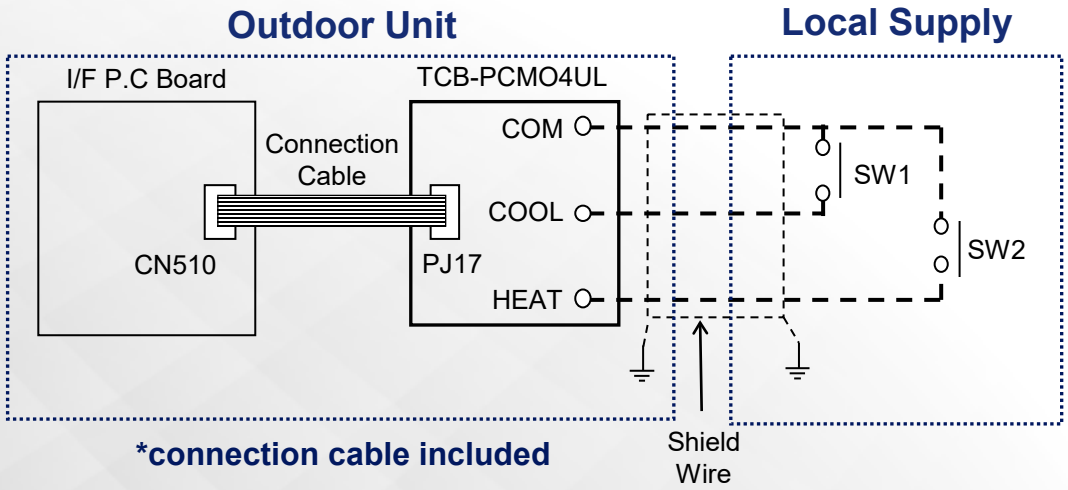
FEATURE

This control can select operation mode

- Cooling mode permitted
- Heating mode permitted

FUNCTION AND OPERATION

Operation Mode Selection Control (TCB-PCMO4UL)



Equipment		Selection Operation Mode	Note
COOL (SW1)	HEAT (SW2)		
ON	OFF	Only cooling permitted	*1
OFF	ON	Only heating permitted	*1
OFF	OFF	Normal operation	

***1:** ”Mode select control” mark is indicated on the remote controller display.

Note: Do not turn on SW1 and SW2 at the same time

FUNCTION AND OPERATION

Outdoor Fan High Static Pressure Shift (SW10)

FEATURE

This function is set when connecting a duct to discharge port of the outdoor unit

Specifications

If installing a discharge duct (Below 0.14 In WG (35Pa)) and exceeding a duct resistance of 0.06 In WG (15Pa), make this change on the P.C. board of the outdoor unit.

Discharge air volume in each outdoor unit is described in the following table:

Capacity Rank (MMY-MAP)	0724HT9UL	0964HT9UL	1144HT9UL
Max. Outside Static Pressure (In WG)	0.20	0.20	0.20
Standard Air Volume of Outdoor Unit (CFM)	5800	6600	7060

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

FUNCTION AND OPERATION

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

FUNCTION AND OPERATION

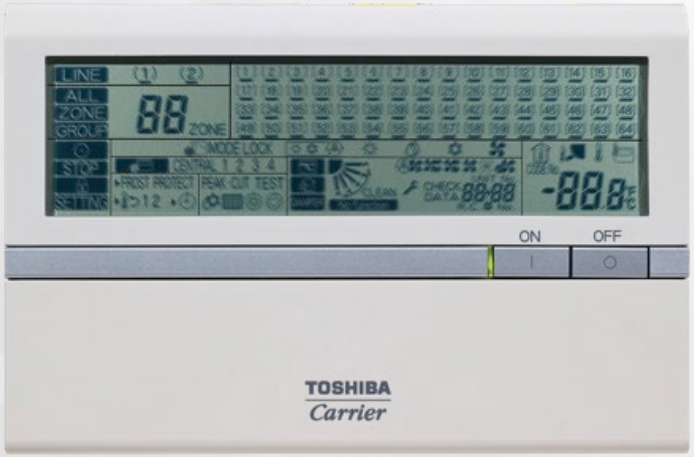
Recommended Heat Pump Change Over

SCHEDULED CHANGEOVER METHOD

For Heat Pump ONLY

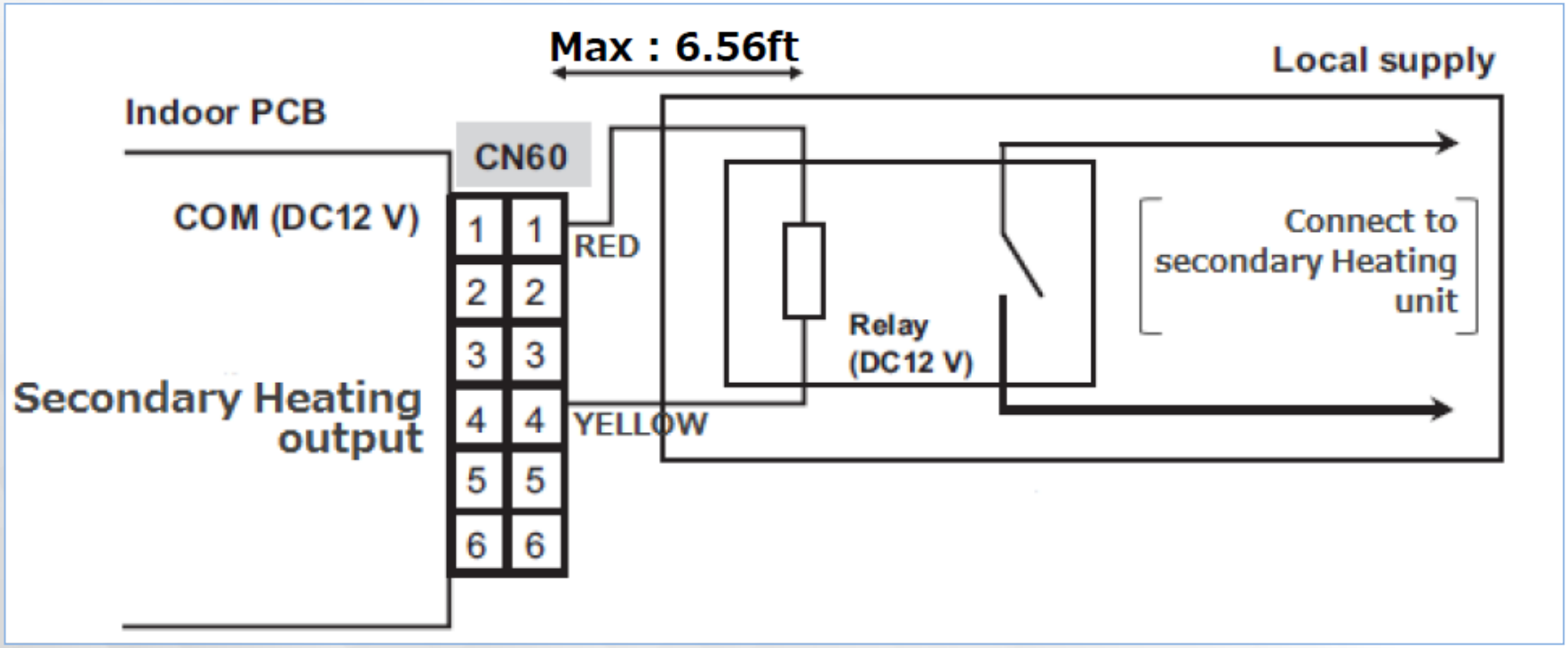
- Prohibit mode change at the local remote controller.
- Schedule mode change at the central controller based on time of year.

CONSIDER HEAT RECOVERY SYSTEM WHERE COMFORT CONTROL IS A CONCERN



FUNCTION AND OPERATION

Supplemental Heat Control

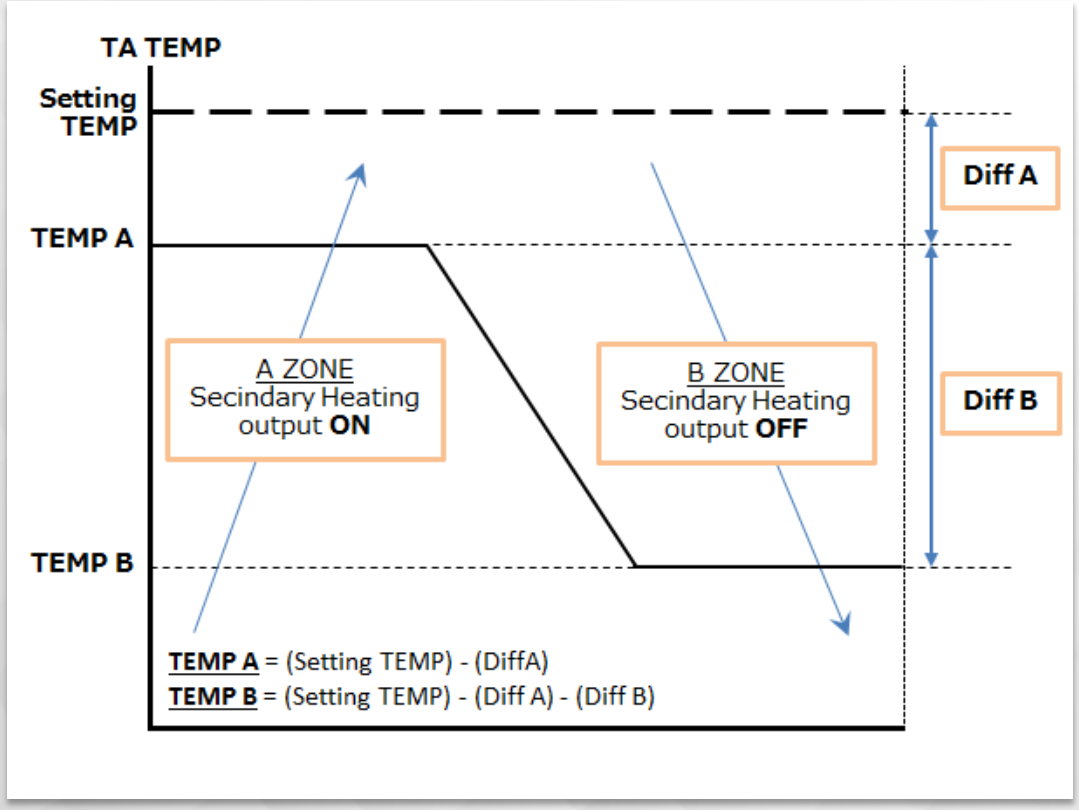


Current Limits for CN60 (12VDC):

DC motor models (4way cassette, ceiling, compact 4way, etc.) : **75mA***
AC motor models (Current high static duct, floor standing, etc.) : **16mA***

FUNCTION AND OPERATION

Supplemental Heat Control



setting data	DN[DC] Diff A	DN[DB] Diff B
0000	Normal operation (Factory setting)	-
0001	1°F	1°F
0002	2°F	2°F
0003	3°F	3°F
0004	4°F	4°F
0005	5°F	5°F
0006	6°F	6°F(Factory setting)
0007	7°F	7°F
0008	8°F	8°F
0009	9°F	9°F
0010	10°F	10°F

Wired Remote Control Exercise

WIRED REMOTE CONTROL EXERCISE

Lite Vision

1. Enter Initial Settings
2. Set correct date and time
3. Set control to Follower and record what happens

LITE VISION 51 WIRED WALL CONTROLLER

Lite Vision

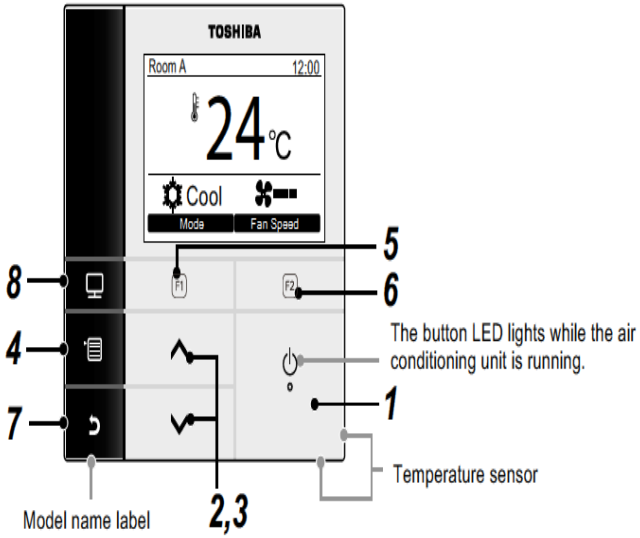
PART NAMES & FUNCTIONS

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)

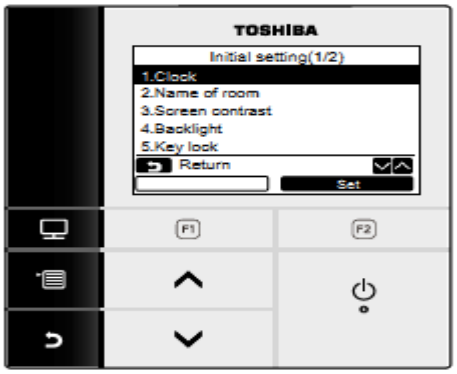
Switching between the normal display and detailed display

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)

LITE VISION 51 WIRED WALL CONTROLLER

Lite Vision

INITIAL SETTINGS



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

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

3 Push the "Set" [F2] button.

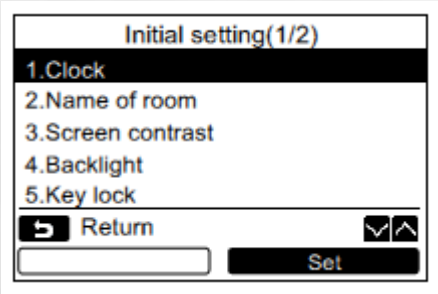
Initial setting items

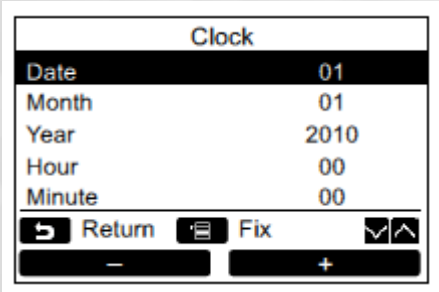
Item	Function
1. Clock	Settings for the clock (year, month, date, time)
2. Name of room	Refer to the Installation / Operation Manual supplied with the remote controller.
3. Screen contrast	Contrast adjustment of the LCD
4. Back light	Turning on / off the back light of the LCD
5. Key lock	Prohibiting 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.

LITE VISION 51 WIRED WALL CONTROLLER

Lite Vision

CLOCK SETTINGS





Set the year, month, date, and time.

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

2 **Push the [∧ ∧] / [∨ ∨] button to select the year, month, date, and time.**

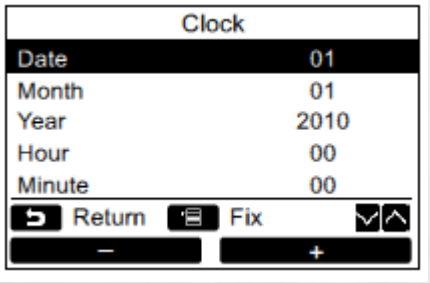
→Push the "–" [F1] / "+" [F2] button to set the value.

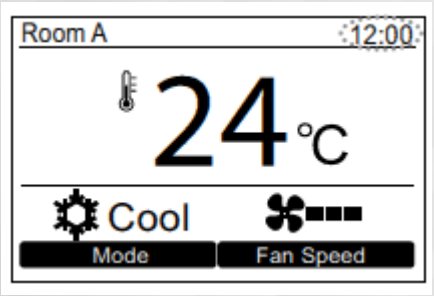
3 **Push the [MENU] button.**

LITE VISION 51 WIRED WALL CONTROLLER

Lite Vision

TO ADJUST CLOCK





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

2 **Push the [∧ ∧] / [∨ ∨] button to select the year, month, date, and time.**

→Push the "– -" [F1 F1] / "+ +" [F2 F2] button to set the value.

3 **Push the [MENU] button.**

→The screen returns to the "Initial setting" screen.

The clock display appears on the upper right of the screen.

- The clock display blinks if the clock setting has been reset due to power failure or other cause.

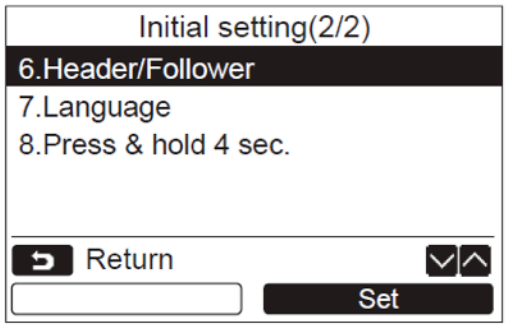
NOTE

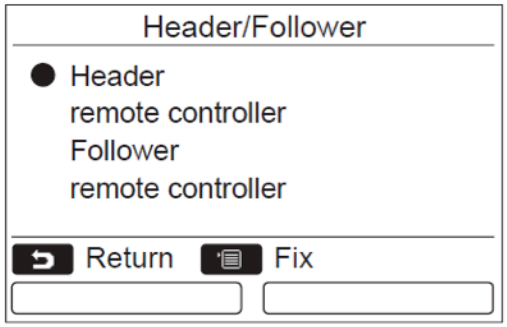
The available date range is from January 1st, 2010 to December 31st, 2099.

LITE VISION 51 WIRED WALL CONTROLLER

Lite Vision

SETTING METHOD OF TWO REMOTE CONTROL





Control setting for RBC-AMS51E-EN

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

INSTALLATION

Pre-Planning

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

INSTALLATION

Pre-Planning

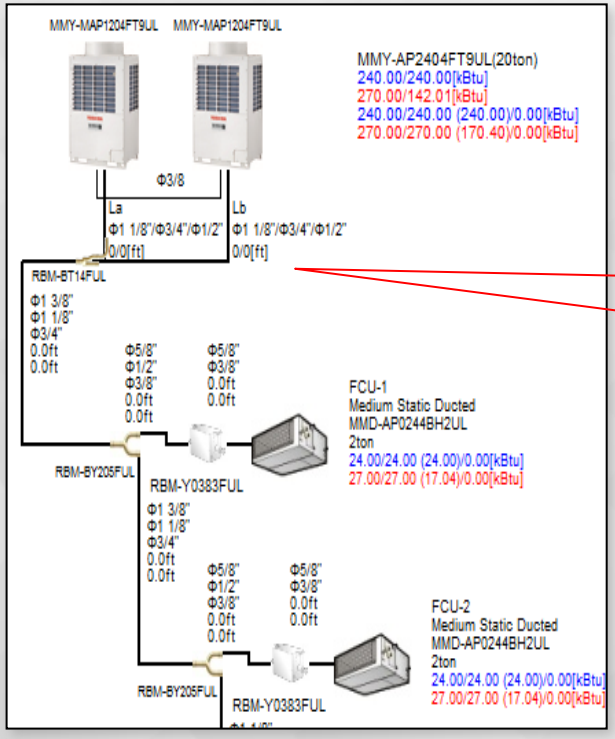
Must know where the ODU(s) and IDU(s) will be placed:

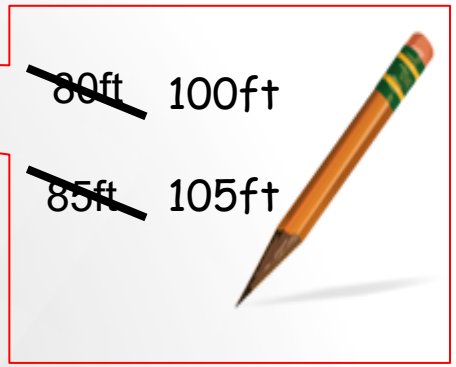
- Will they be placed on the ground?
- Will they be placed on the roof?
- Does the placement of the ODU(s) & IDU(s) match that of the selection software drawing?

INSTALLATION

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.





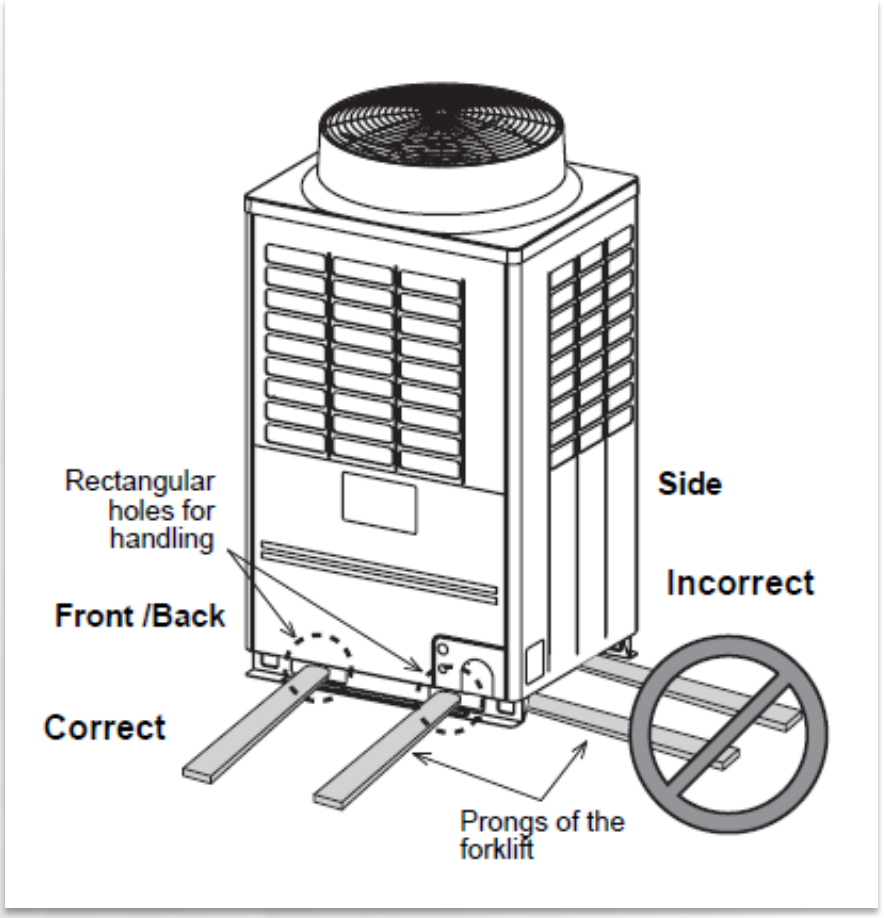
INSTALLATION

Moving the Outdoor Unit

WHEN USING A FORKLIFT

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

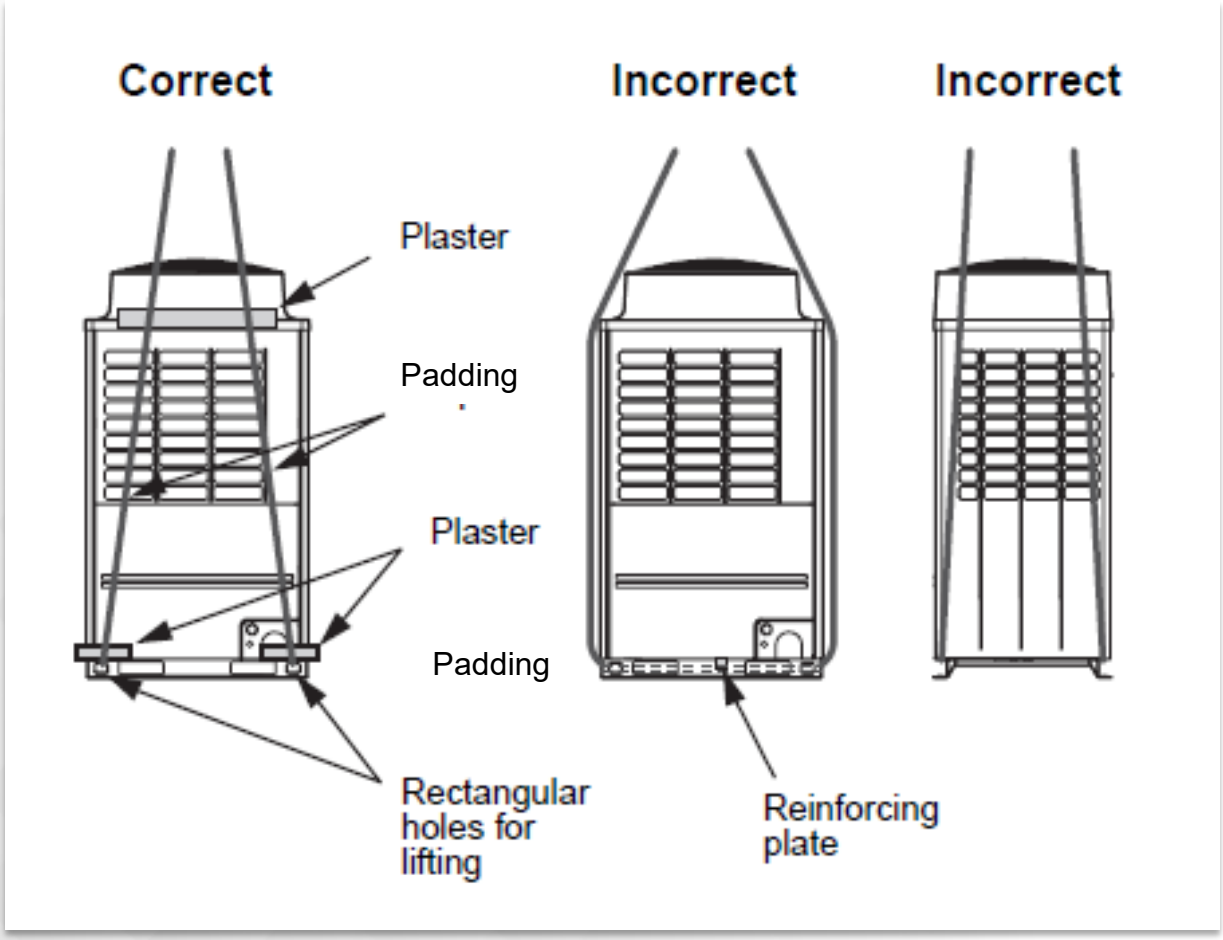
Do Not lift the Outdoor unit with the forks directly against the base as this can cause damage to the equipment.



INSTALLATION

Moving the Outdoor Unit

If lifting is required rig as shown to avoid damage

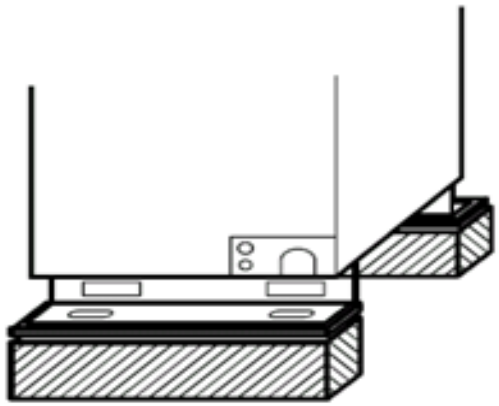


INSTALLATION

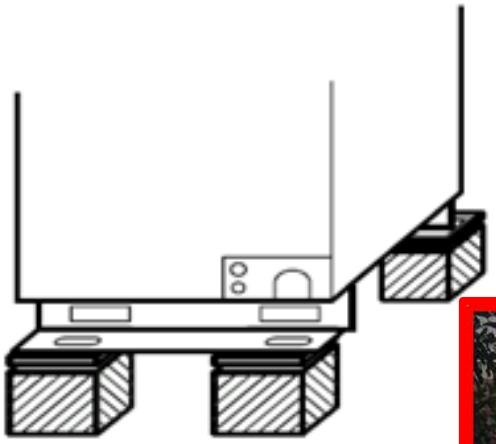
Anchoring

- 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

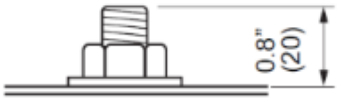


INCORRECT



INSTALLATION

Anchoring



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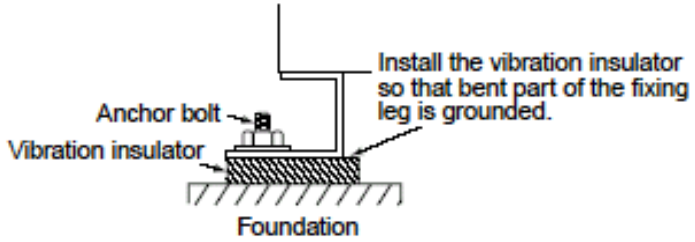

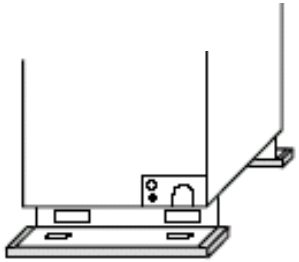

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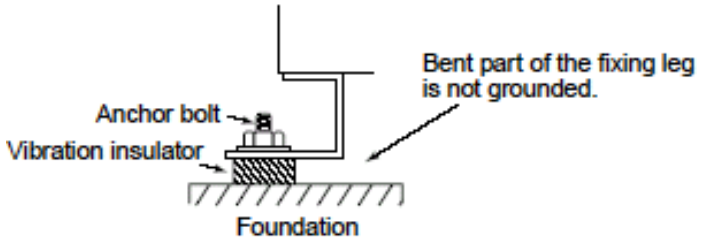
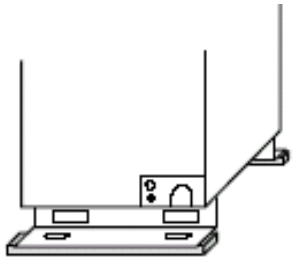
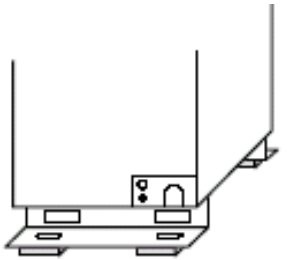


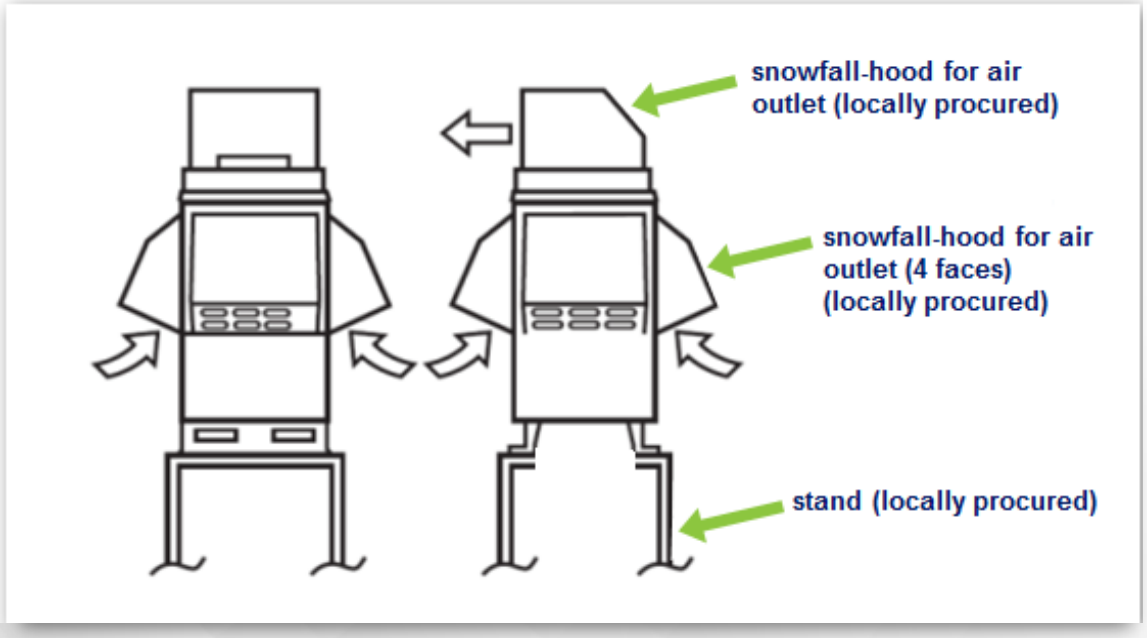




INSTALLATION

Mounting Base

In high snow fall, or cold climate areas the units should be equipped with a tall mounting base **(24” minimum)** plus snow hoods as shown below. Stand and hoods should be procured locally.



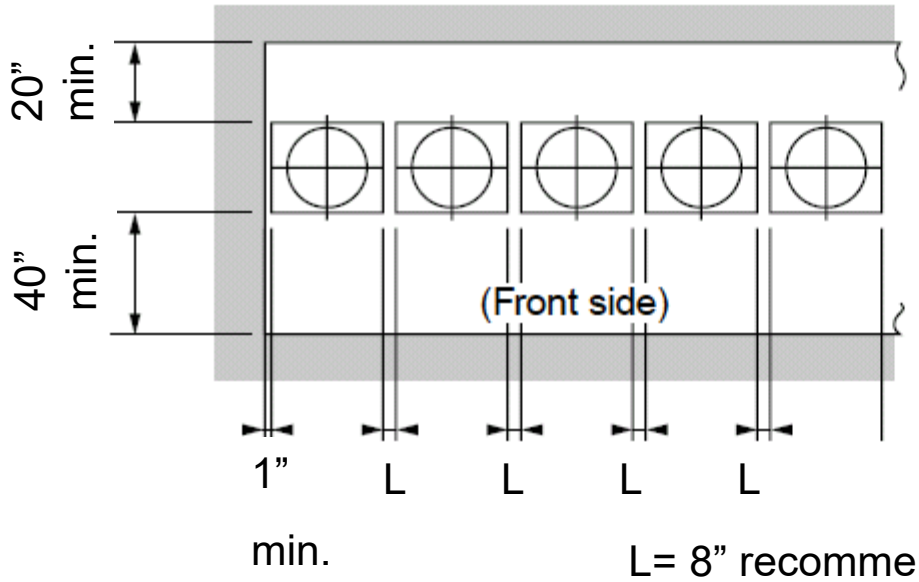
For specifications please contact your RSM.

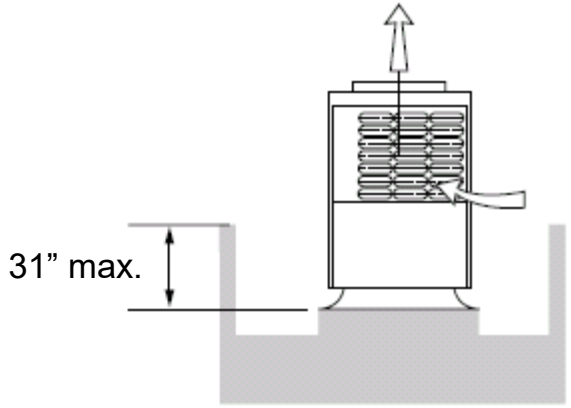
INSTALLATION

Multiple Unit Installation

IF A SURROUNDING WALL IS SHORTER THAN THE OUTDOOR UNITS

1. One-row installation:





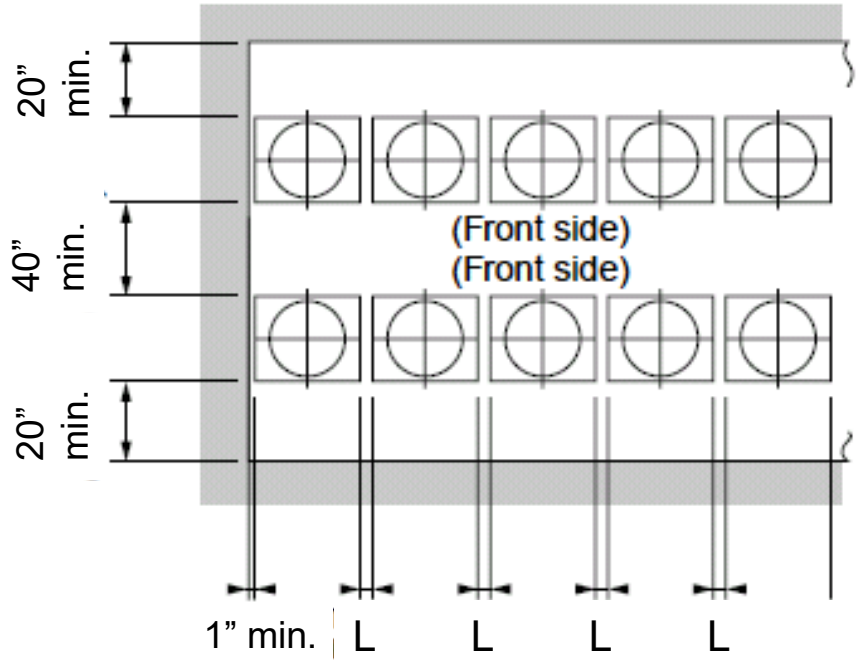
L= 8” recommended

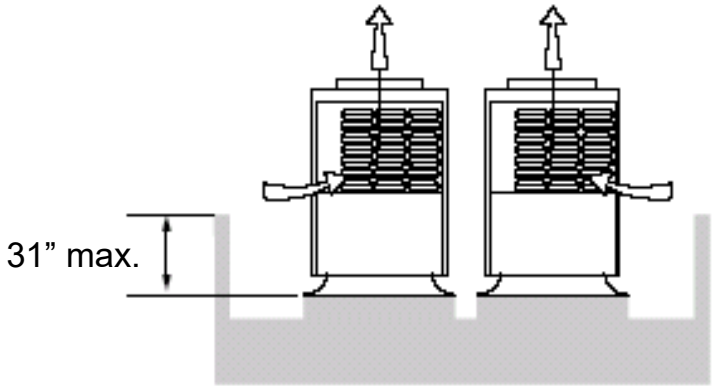
INSTALLATION

Multiple Unit Installation

IF A SURROUNDING WALL IS SHORTER THAN THE OUTDOOR UNITS

2. Two-row installation:



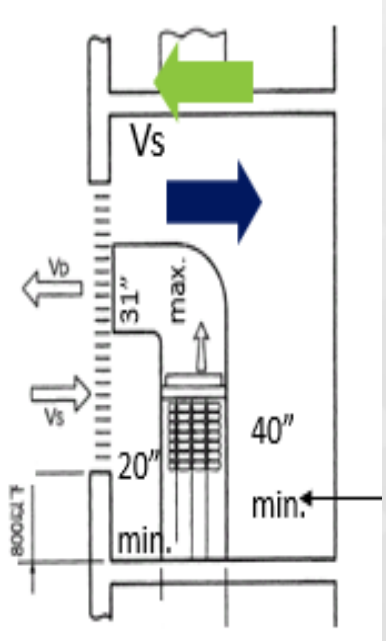


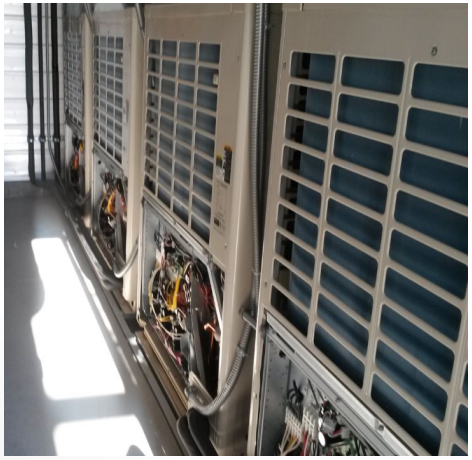
L= 8” recommended

INSTALLATION

Multiple Unit Installation

ODUs in a heated doghouse or penthouse

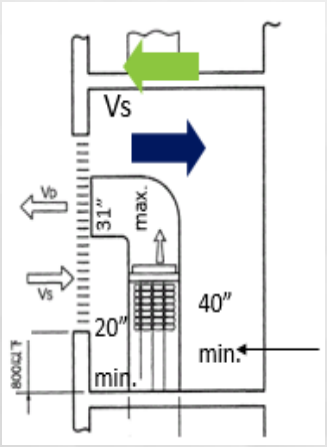




INSTALLATION

Multiple Unit Installation

PROPER LOUVER SIZING



			MMY-	MAP0724FT6UL	MAP0964FT6UL	MAP1204FT6UL
Center Voltage			V/Ph/Hz	460 / 3 / 60		
Acceptable Voltage			V	414 Minimum / 506 Maximum		
Nominal capacity		(*1)	kBtu/h	72	96	120
Rated capacity				70	92	118
Rated power consumption		(*2)	kW	5.64	7.79	10.04
Rated EER			Btu/W	12.4	11.8	11.8
Nominal capacity		(*1)	kBtu/h	81	108	135
Rated capacity				77	103	113
Rated power consumption		(*2)	kW	6.35	8.52	9.10
Rated COP			W/W	3.55	3.54	3.64
			A	Soft Start		
Packing	Height		In	76.3	76.3	76.3
	Width		In	41.8	50.5	50.5
	Depth		In	32.6	32.6	32.6
Unit	Height		In	72.9	72.9	72.9
	Width		In	39.0	47.6	47.6
	Depth		In	30.7	30.7	30.7
Packed			lbs	691	863	863
Unit			lbs	658	826	826
				Silky shade (Munsell 1Y8.5/0.5)		
Type				Hermetic twin rotary compressor		
Motor output			kW	2.3 x 2	2.1 x 3	2.7 x 3
Fan				Propeller fan		
Motor output			kW	1.0	1.0	1.0
Air volume			cfm	5,120	7,060	7,620

Example:
Area = CFM / velocity

Intake velocity Vs through vent: 4.9 ft./s maximum = 294 ft./m
Area = 5120 (CFM) / 294 (ft./m velocity)
Area = 17.41 ft² for a MMY-MAP072FT6UL

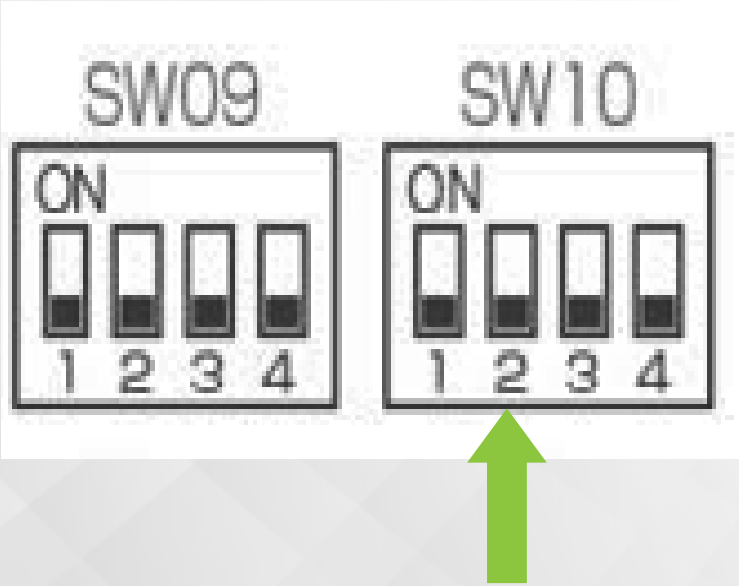
- Opening rate: 80% and more
- Louver angle (Blade Slope): 20° and less
- Louver shape: Don't use drainable blade type
- Air velocity of inlet side: 294-fpm or less

INSTALLATION

Outdoor Fan High Static Pressure Shift (SW10)

SETUP

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



INSTALLATION

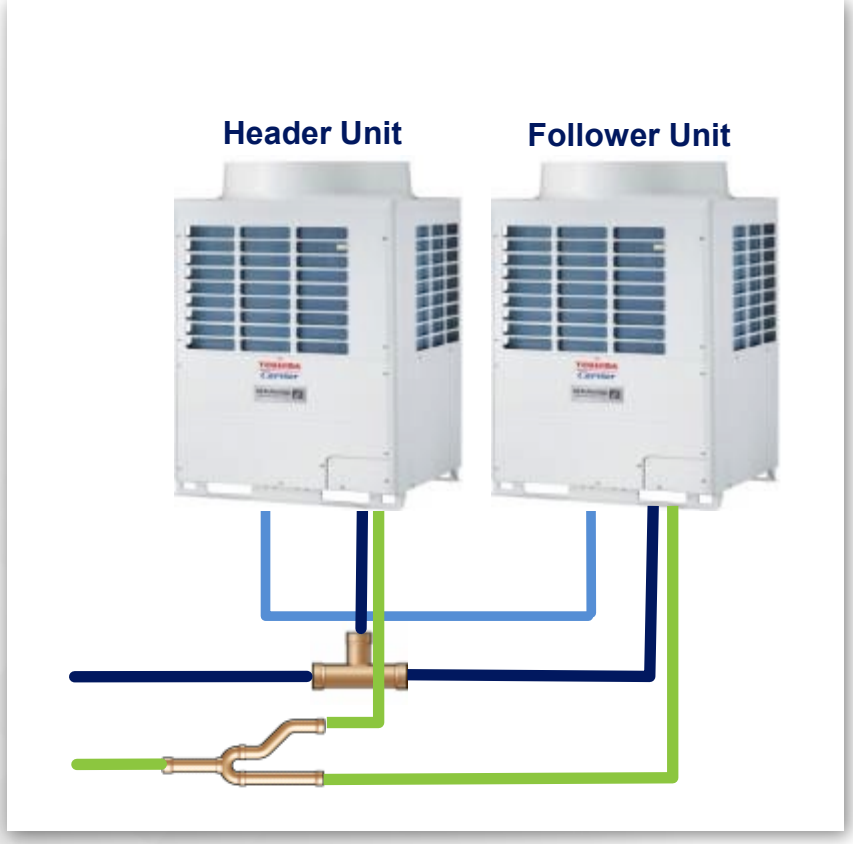
PIPING INSTALLATION

INSTALLATION

Heat Pump Outdoor Unit Piping Arrangement

Install the outdoor units in order of capacity

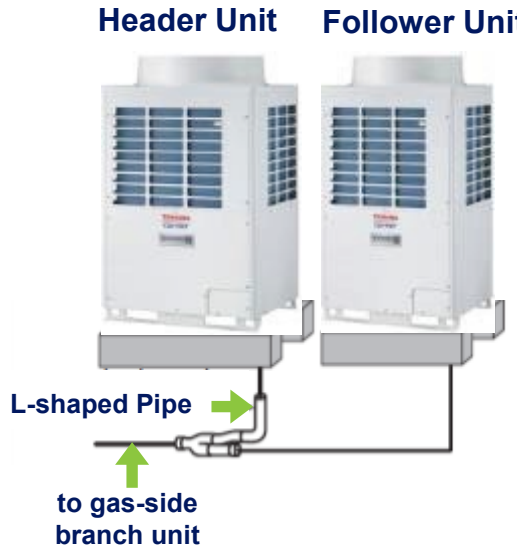
(Header Unit >= Follower Unit)



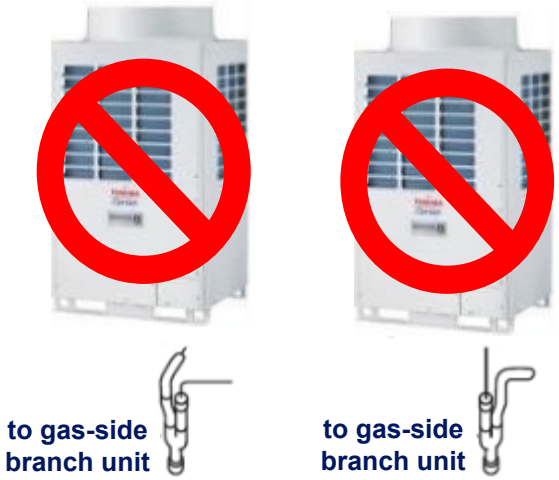
INSTALLATION

Piping Basics

CORRECT



INCORRECT



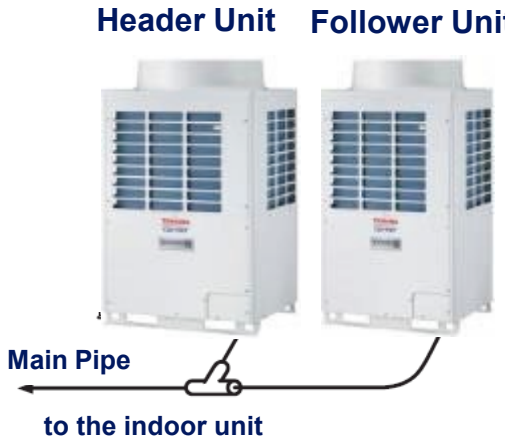
- Piping exit through unit bottom
- Y – branch must be installed horizontally

INSTALLATION

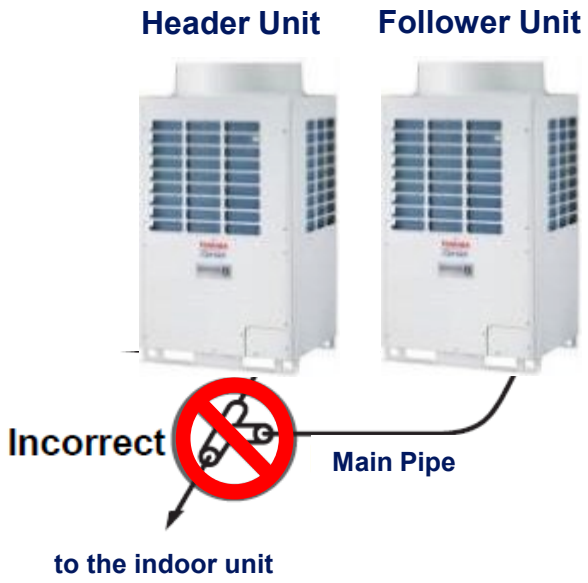
Piping Basics

LIQUID PIPE CONFIGURATION

CORRECT



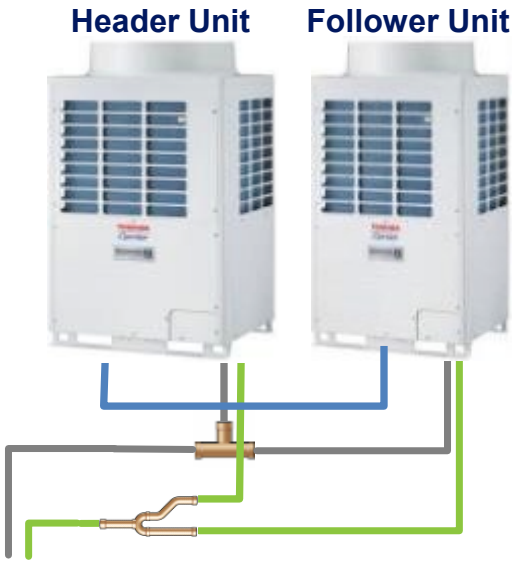
INCORRECT



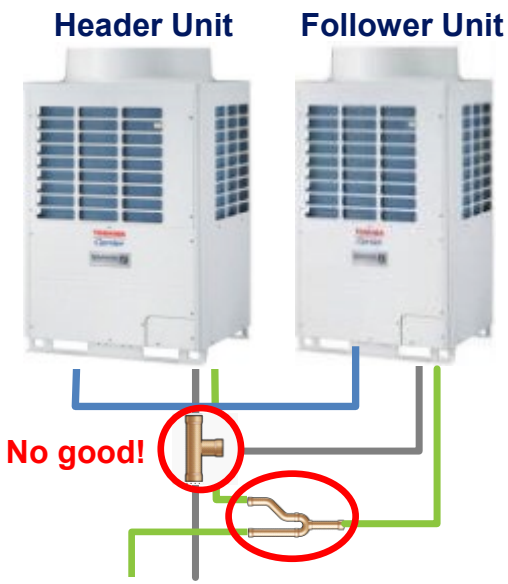
INSTALLATION

Heat Pump Outdoor Piping Arrangement

CORRECT



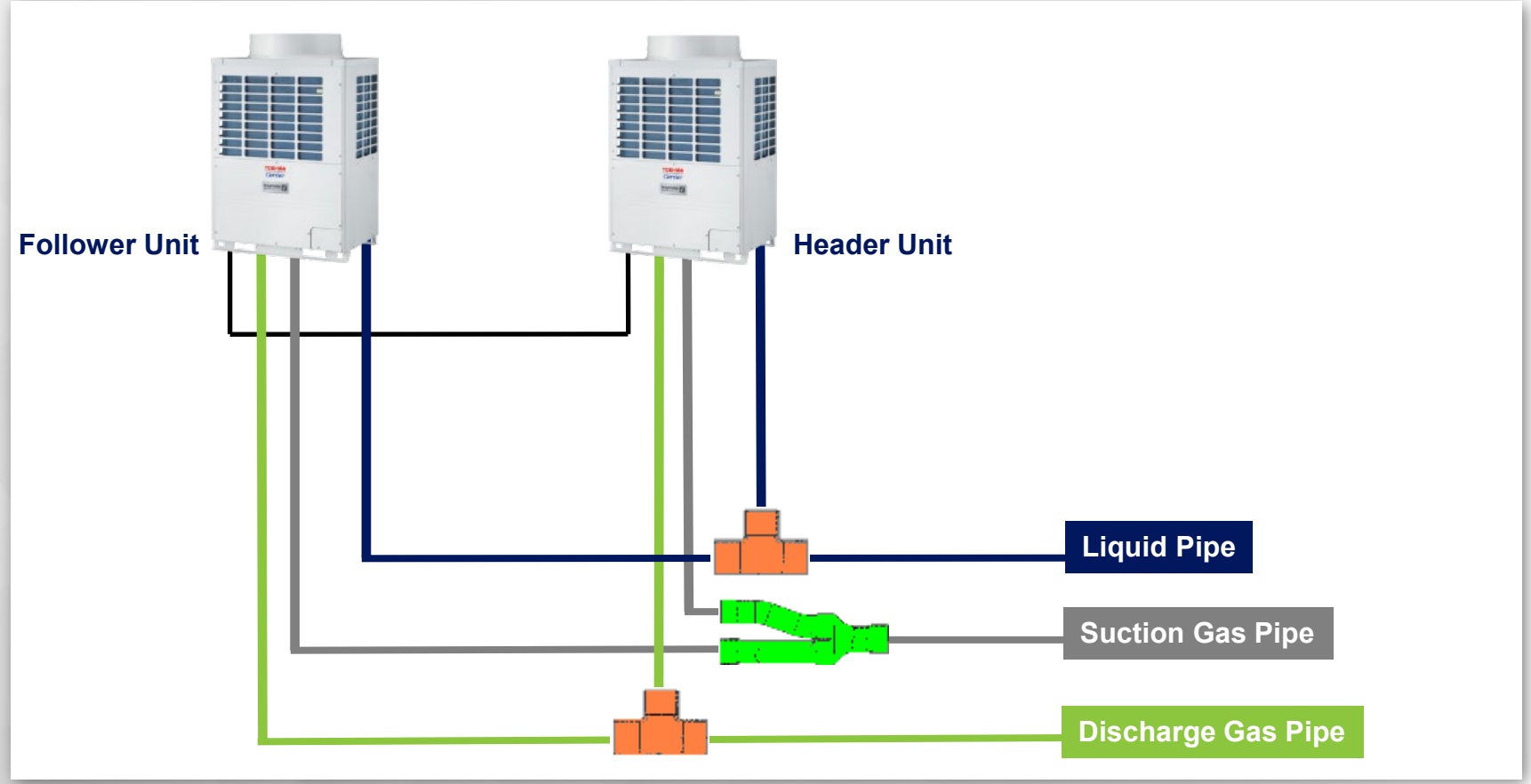
INCORRECT



INSTALLATION

Heat Recovery Outdoor Piping Arrangement

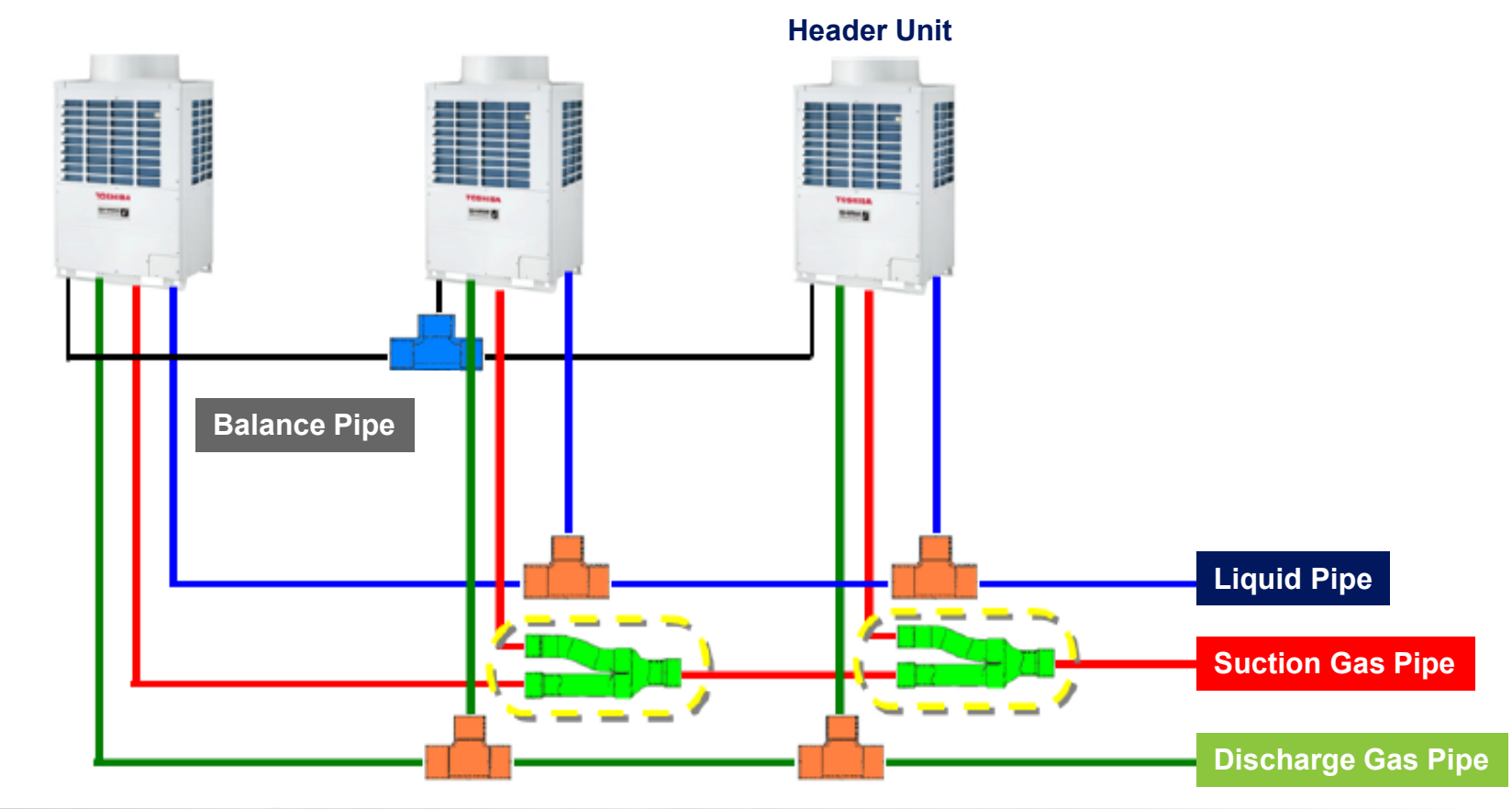
DUAL-MODULE PIPING



INSTALLATION

Heat Recovery Outdoor Piping Arrangement

TRIPLE-MODULE PIPING



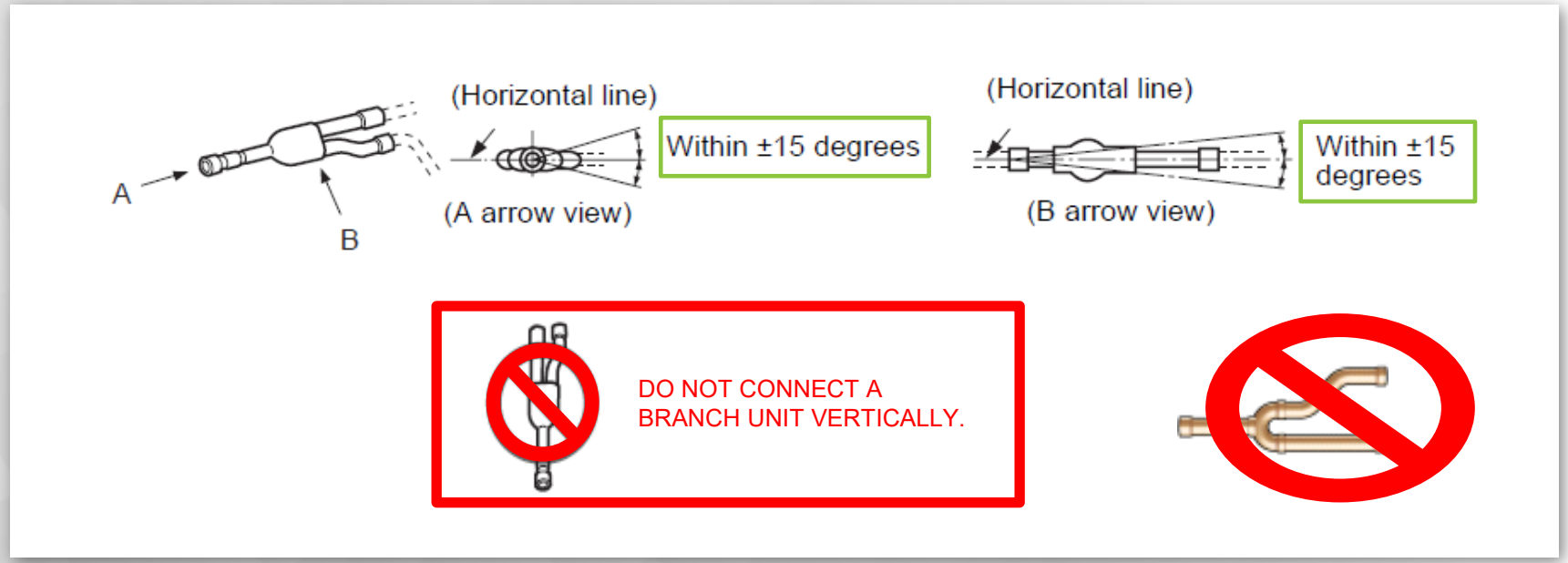
INSTALLATION

Refrigerant 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.

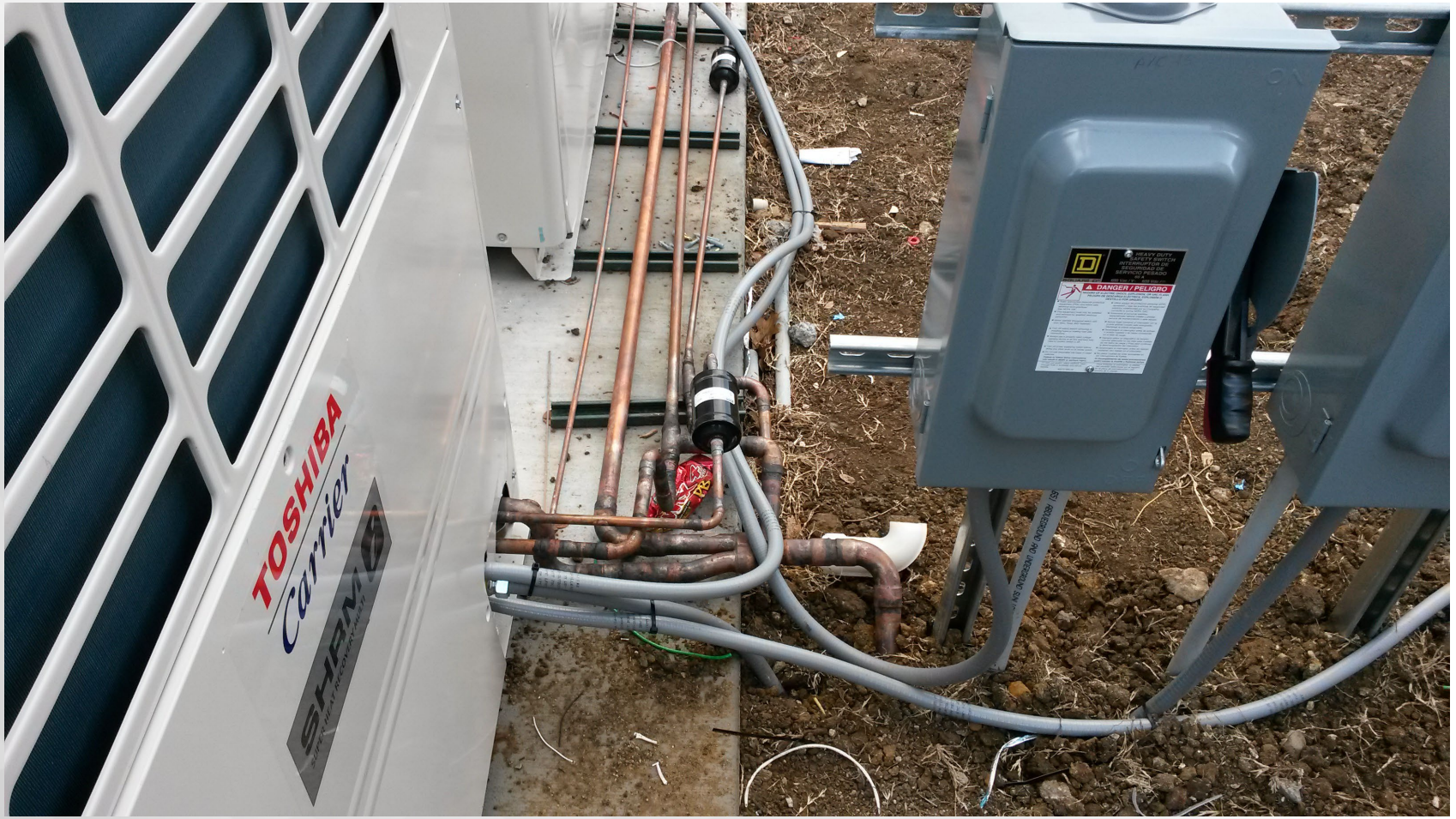
Do not exceed +/- 15 degrees.



WHAT IS WRONG WITH THE FOLLOWING PICTURES?

WHAT IS WRONG WITH THIS PICTURE?

Installation

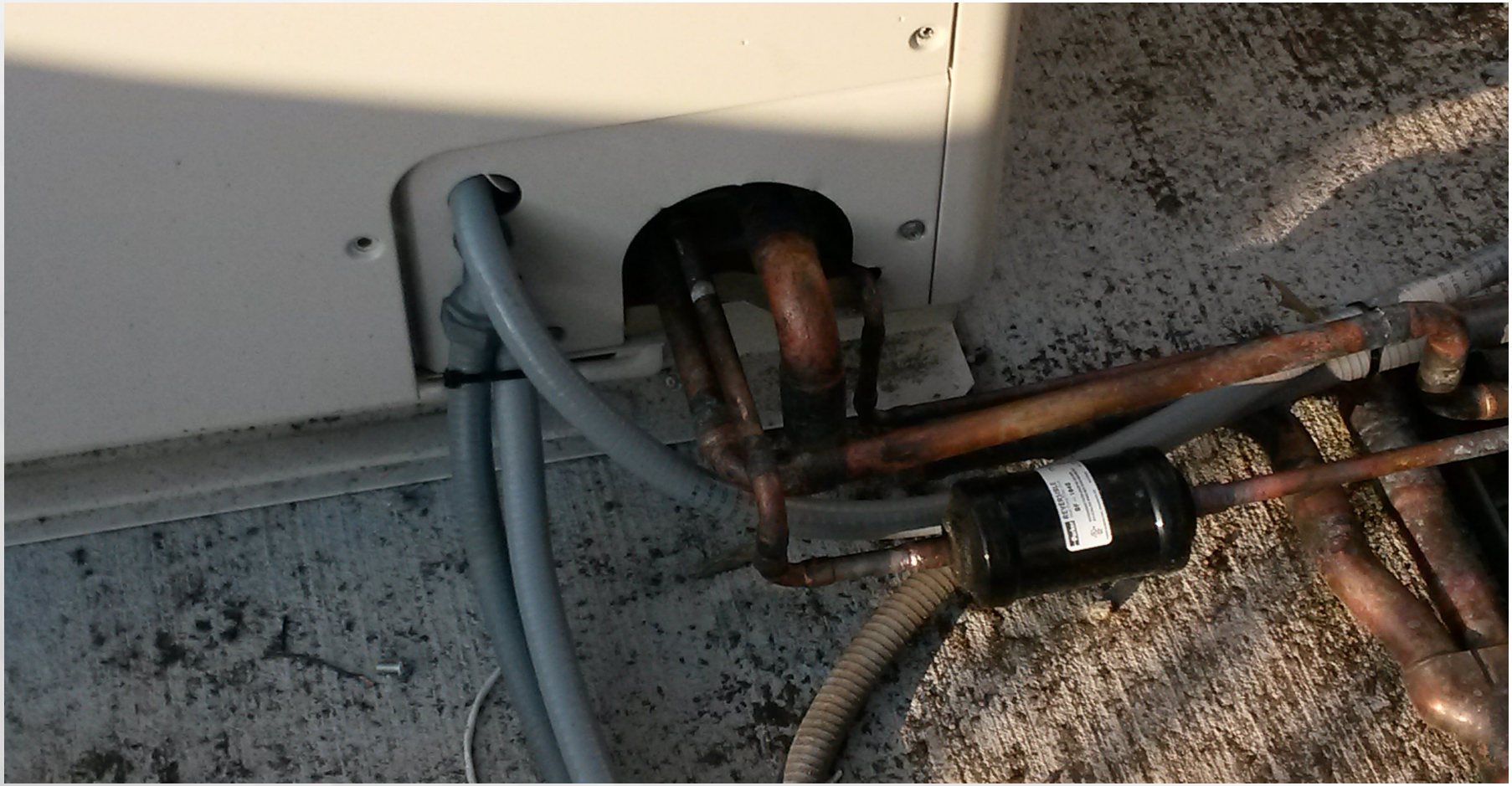


WHAT IS WRONG WITH THIS PICTURE?

Installation

WHAT IS WRONG WITH THIS PICTURE?

Installation



WHAT IS WRONG WITH THIS PICTURE?

Installation

WHAT IS WRONG WITH THIS PICTURE?

Installation

WHAT IS WRONG WITH THIS PICTURE?

Installation

INSTALLATION

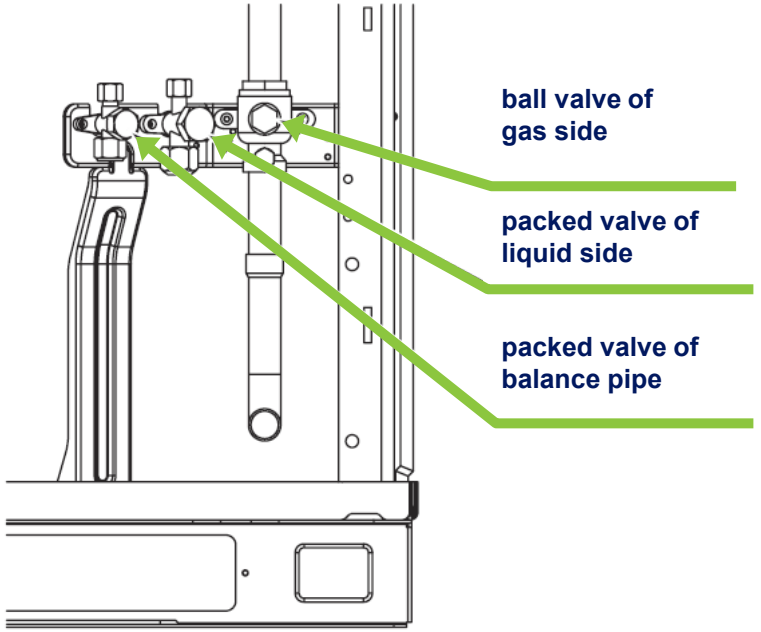
Connection Of Refrigerant Pipe

072, 096, 114 type

Liquid 1/2” flare

Gas 7/8” blazing (114 type : 1-1/8”)

Balance 3/8” flare



MMY-MAP0724*, MAP0964*, MAP1144*

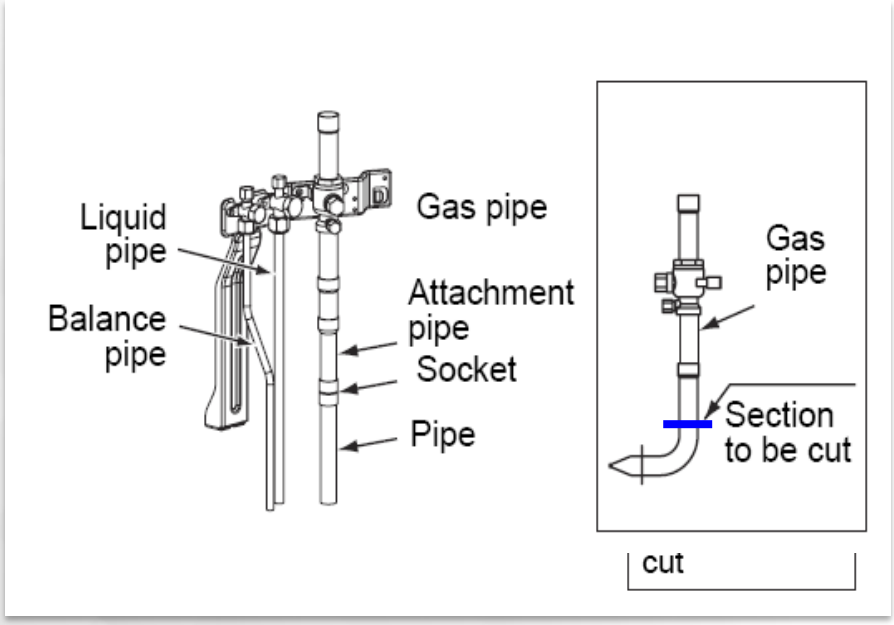
INSTALLATION

Outdoor Unit Piping

CONNECTING GAS PIPING

Pipe exit unit front

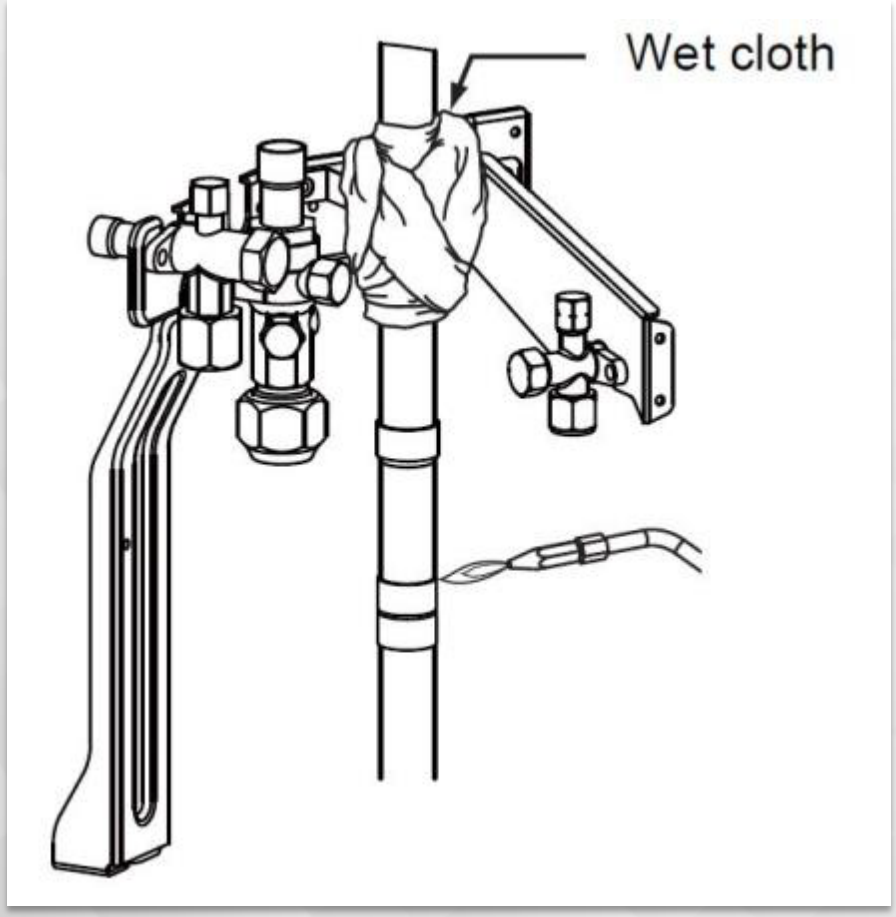
Cut the L-shaped pipe at the horizontal straight section, then braze the supplied attachment pipe and the socket and pipe procured locally.



INSTALLATION

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.

INSTALLATION

Outdoor Unit Piping

TECH TIP

The term *dry nitrogen* is not very well defined. Suppliers use their own names for the grades of gas products they sell. All compressed gas contains some level of other substances. The amount is typically measured in parts per million (ppm). The grade of the gas is indicated with two numbers that describe the percentage of purity. The first digit tells how many "9" digits are in the percentage, and the second digit identifies the number after the last "9." A grade 5.6 gas is 99.9996% pure. A 3.0 grade, 99.90% pure, is the minimum acceptable for refrigeration purposes. It is important to ask your gas supplier what the gas grade is you are purchasing and what the level of water is in it.

Source: AHRI Fundamentals of HVACR Second addition 2013

Ultra High Purity

3.0 gas

Industrial Grade Black Bottle

5.6 gas

Research Grade Aqua (Blue Green) Bottle

1500 hour failure test- blockage & moisture

Fatty Acid has formed

POE Oil

Note: Research grade nitrogen is mandated when performing "med gas" installation. It is highly recommended to install VRF refrigeration piping in the same manner. The final pressure test of 500 psi should be performed using medical grade nitrogen. This aids in a cleaner, dryer system that will pull down below 500 microns much easier; many time without the need of triple evacuation.

INSTALLATION

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.

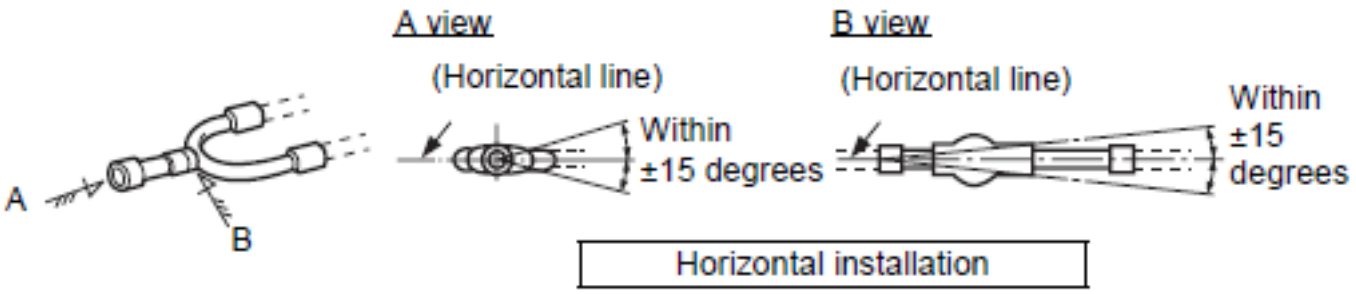
Ball valves are the only exception.

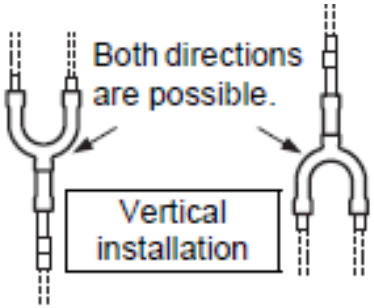
INSTALLATION

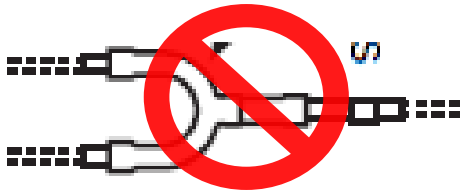
Indoor Unit Piping

BRANCHING CONNECTORS

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







INSTALLATION

Indoor Unit Piping

INSTALLATION

Indoor Unit Piping

INSTALLATION

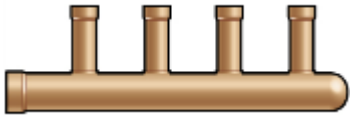
Indoor Unit Piping

INSTALLATION

Indoor Unit Piping

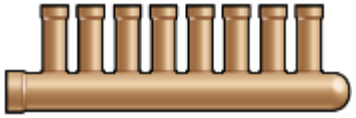
INDOOR UNIT HEADERS

4-BRANCHING HEADER

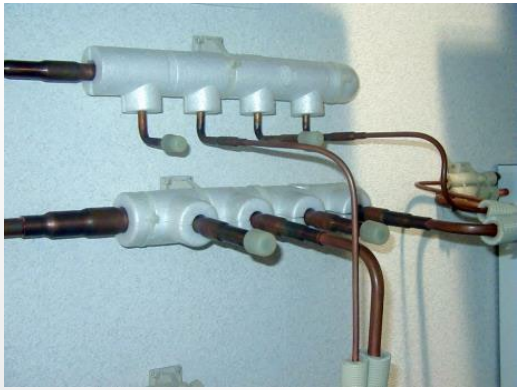


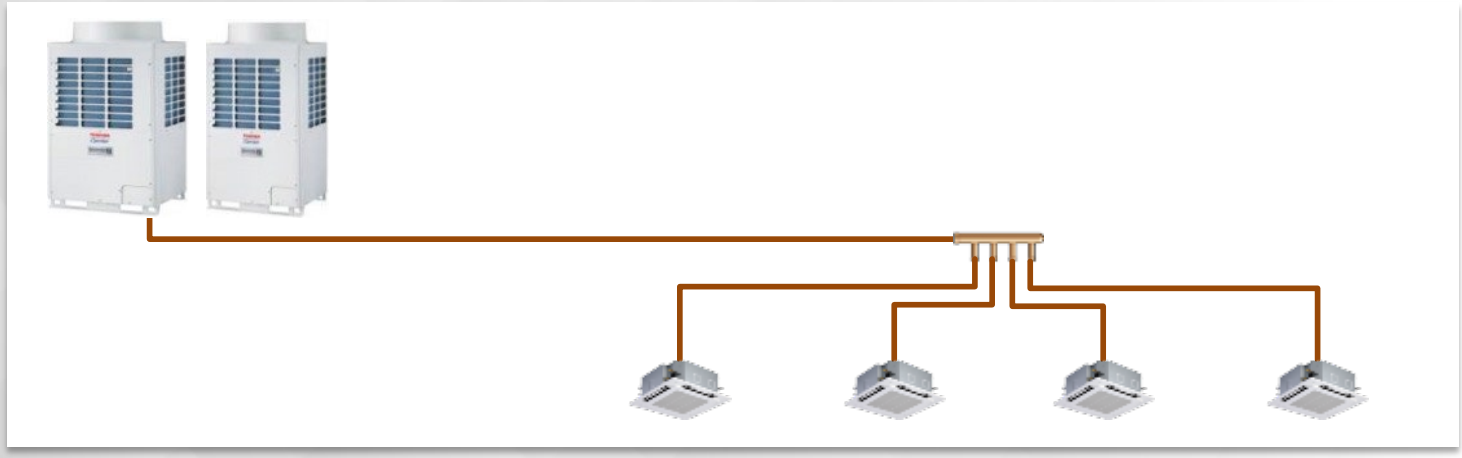
RBM-HY1043UL
RBM-HY2043UL

8-BRANCHING HEADER



RBM-HY1083UL
RBM-HY2083UL

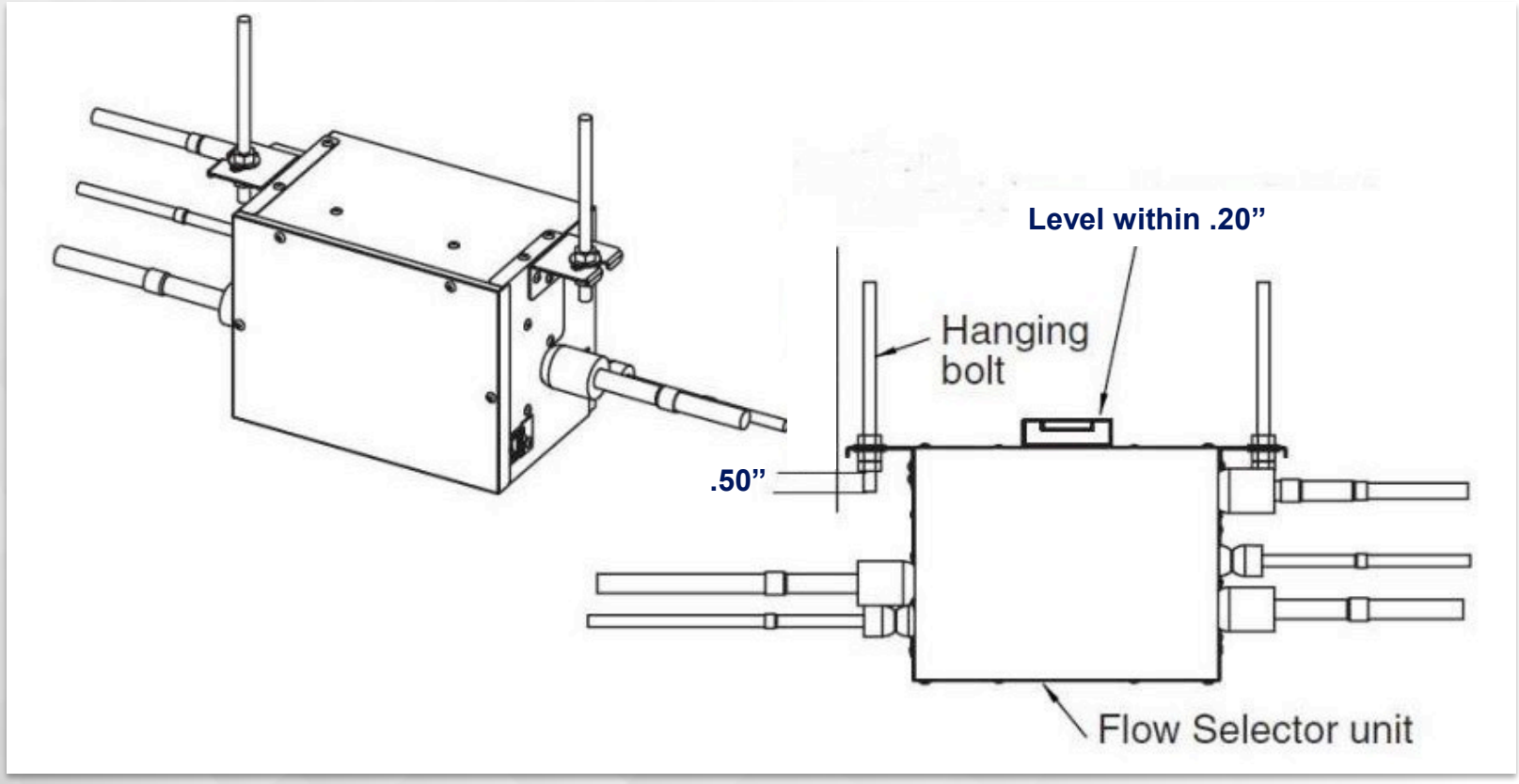




INSTALLATION

Indoor Unit Piping (Flow Selector Installation)

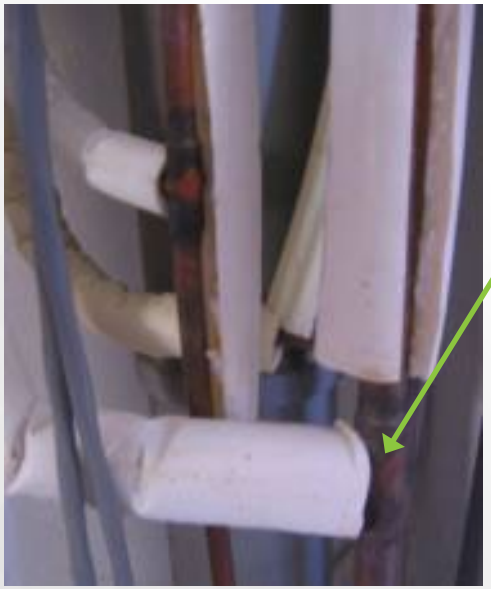
POSITIONING THE FLOW SELECTOR



INSTALLATION

Indoor Unit Piping (Flow Selector Installation)

POOR INSTALLATION



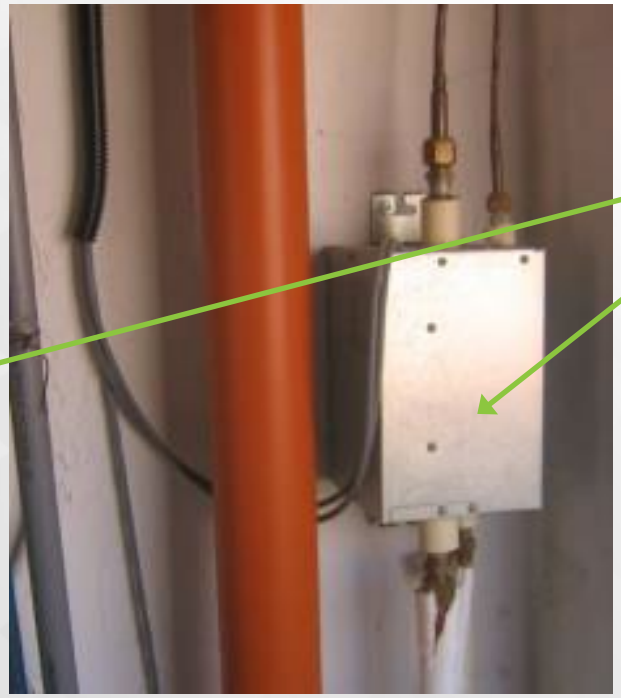
T-joint branching distribution instead of proper branching joint

(Bad capacity distribution / flow noise)

INSTALLATION

Indoor Unit Piping (Flow Selector Installation)

POOR INSTALLATION



Vertical FS unit installation

(valve does not work / Flow noise)

INSTALLATION

Indoor Unit Piping (Flow Selector Installation)

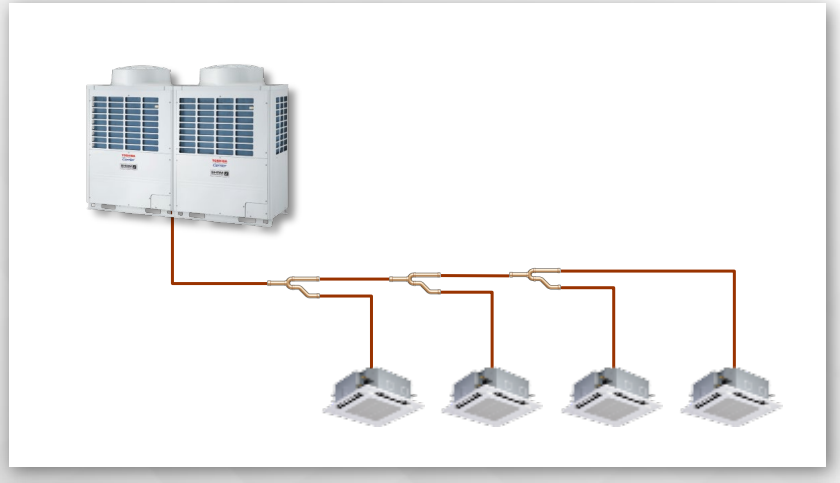
POOR INSTALLATION

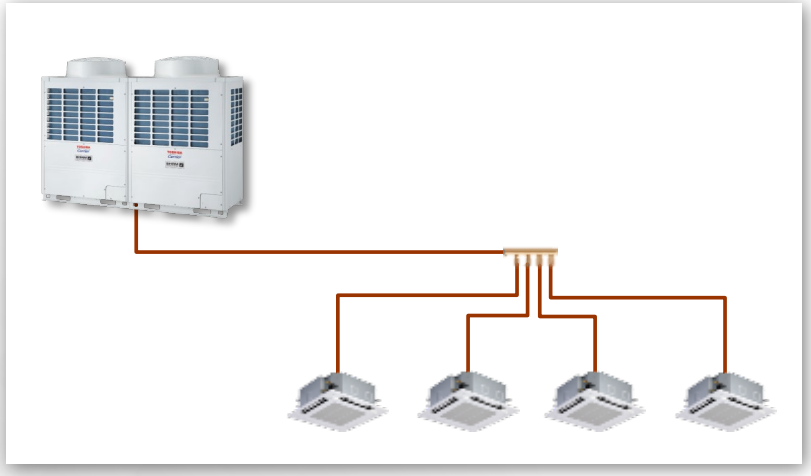
FS unit attached the ceiling

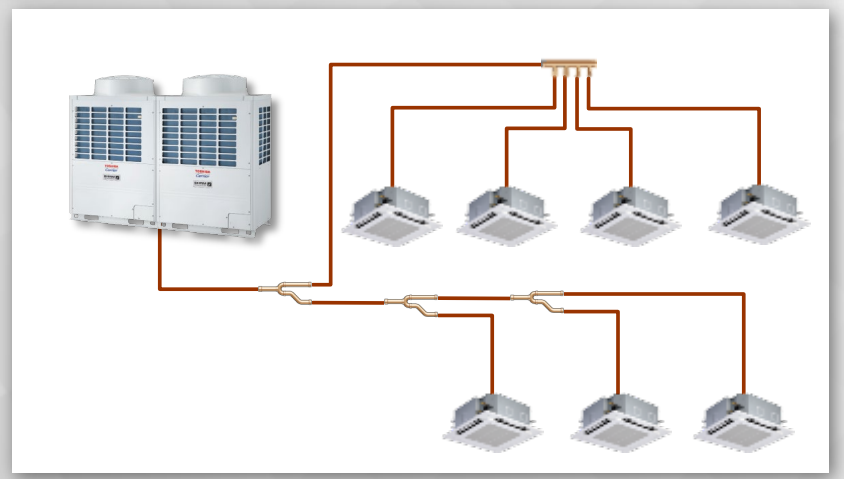
(Noise / service issue)

INSTALLATION

Indoor Unit Piping





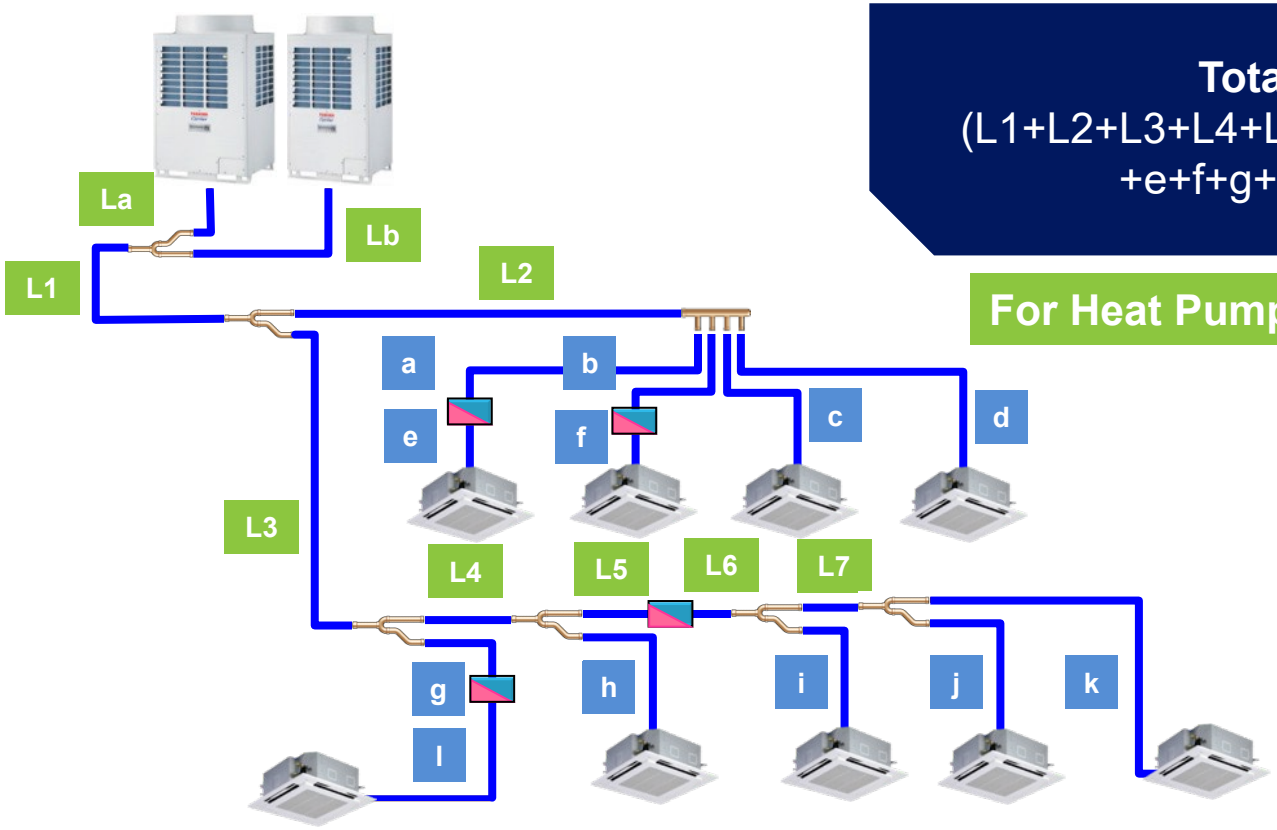


Determining the best piping strategy depends on the application and layout of the indoor units and the merits of each branching method.

For Heat Pump or Heat Recovery

INSTALLATION

Total Extension Of Pipe (Liquid Pipe, Real Length)

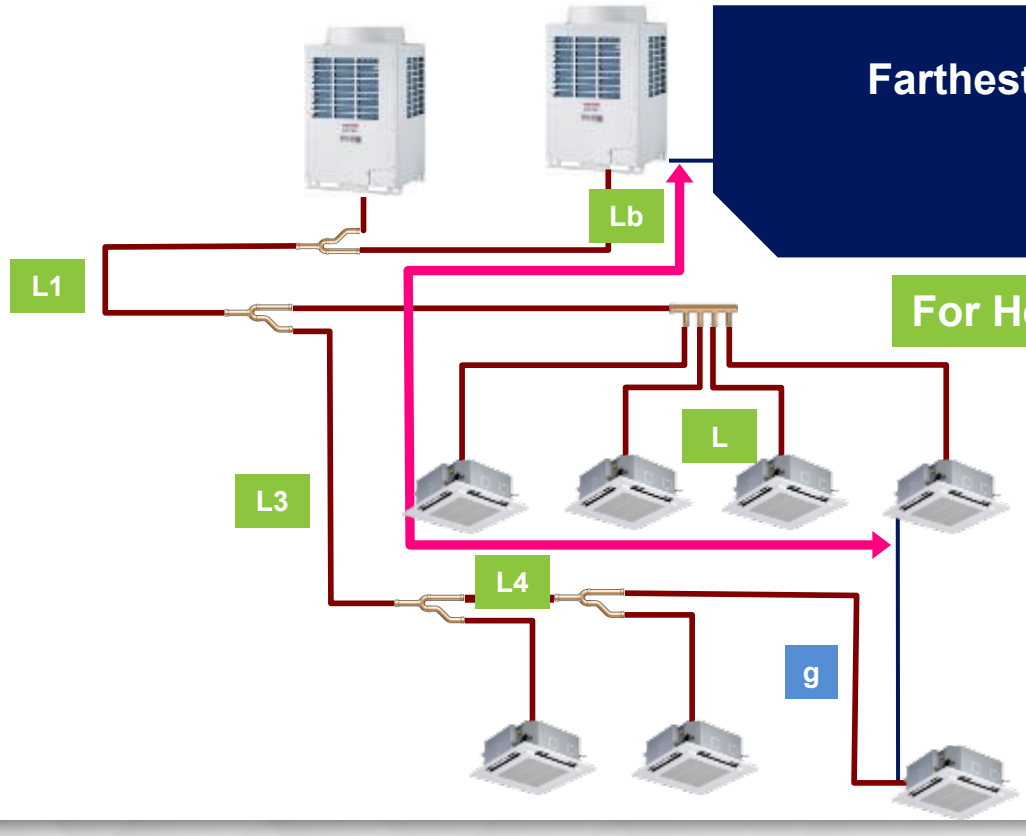


Total Length <= 985 ft.
(L1+L2+L3+L4+L5+L6+L7+a+b+c+d
+e+f+g+h+i+j+k+Lb+La+Lb)

For Heat Pump or Heat Recovery

INSTALLATION

Farthest Piping Length (L)



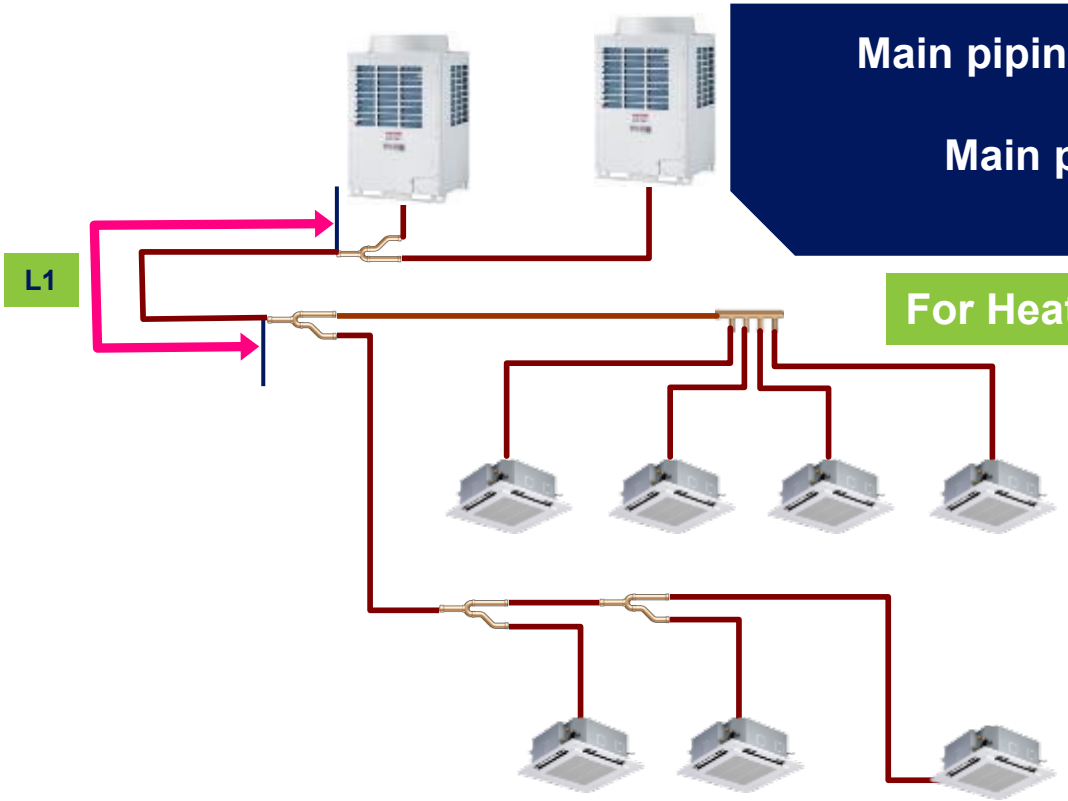
Farthest equivalent length <= 720ft (220m)

(L1+L3+L4+g+Lb)

For Heat Pump ONLY

INSTALLATION

Main Piping Length (L1)

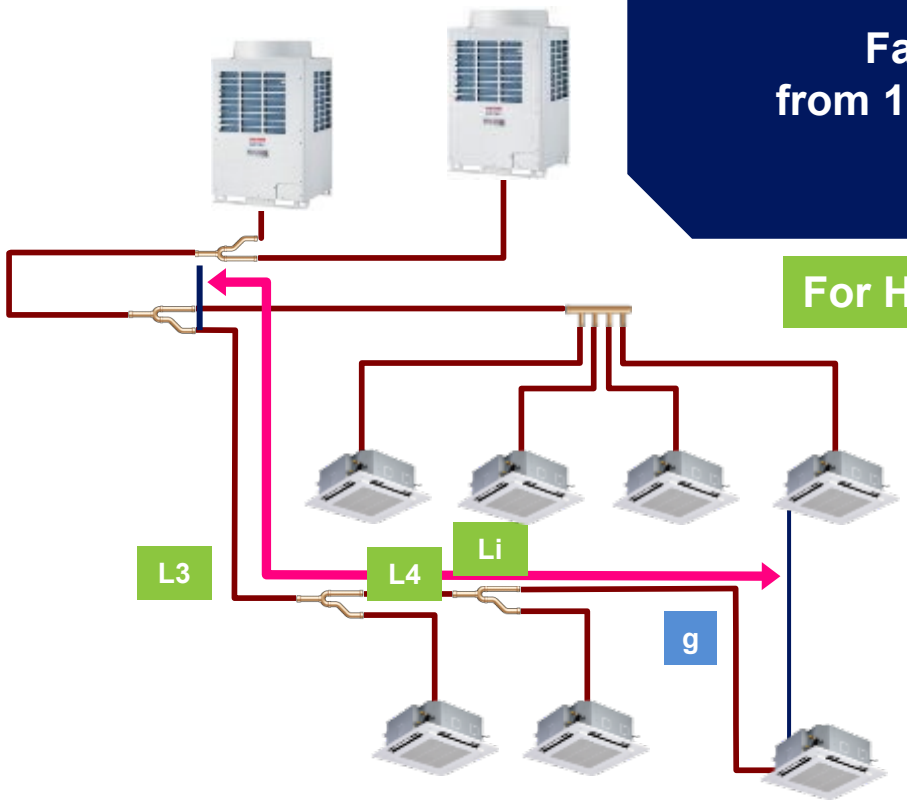


Main piping equivalent length <= 395ft (120m)
Main piping actual length <= 330ft (100m

For Heat Pump ONLY

INSTALLATION

Farthest Equivalent Piping Length From 1st Branch (Li)

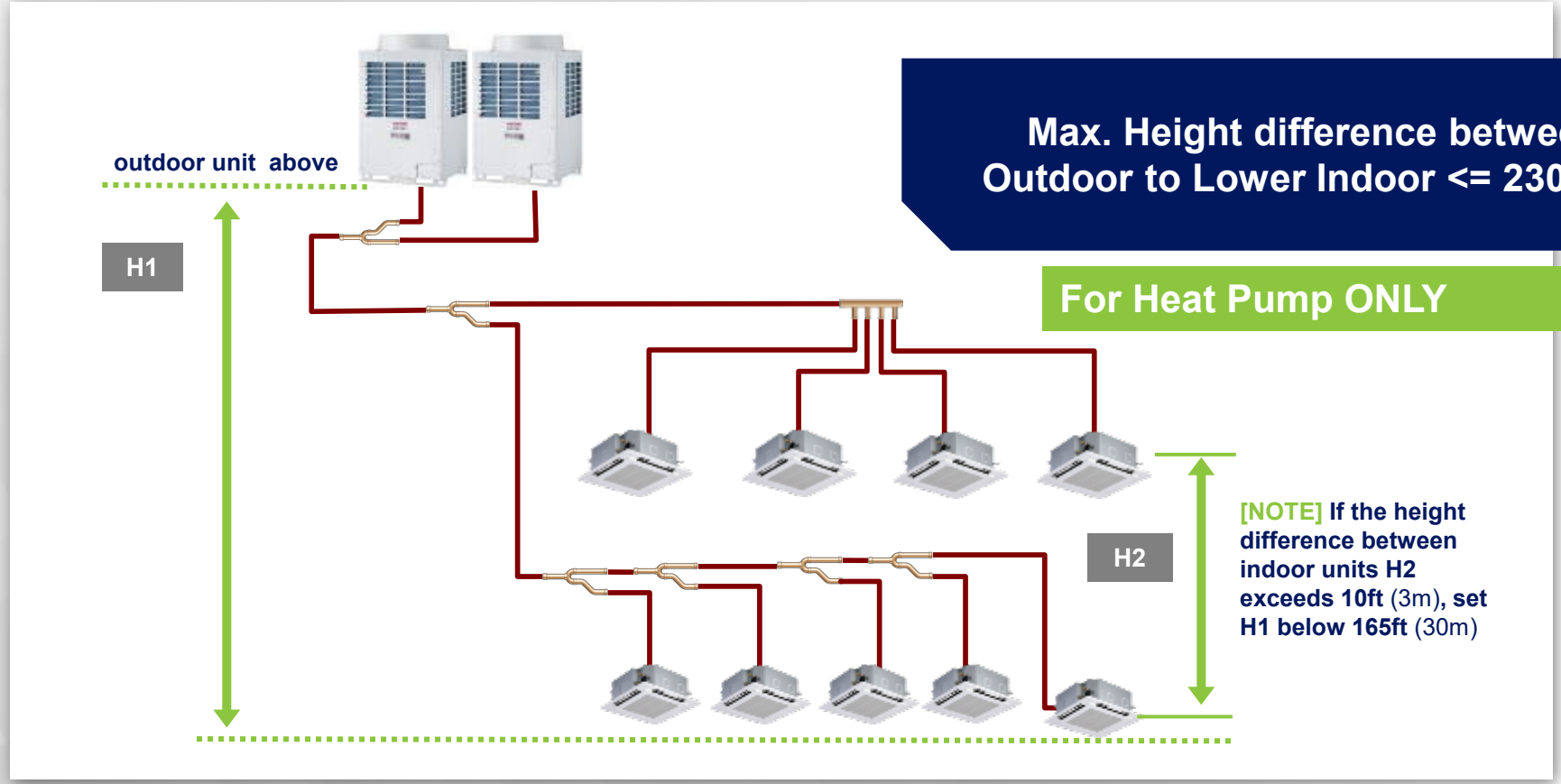


Farthest equivalent length from 1st branch <= 295ft (90m)
(L3+L4+g)

For Heat Pump ONLY

INSTALLATION

Height Difference Between Outdoor To Lower Indoor (H1)

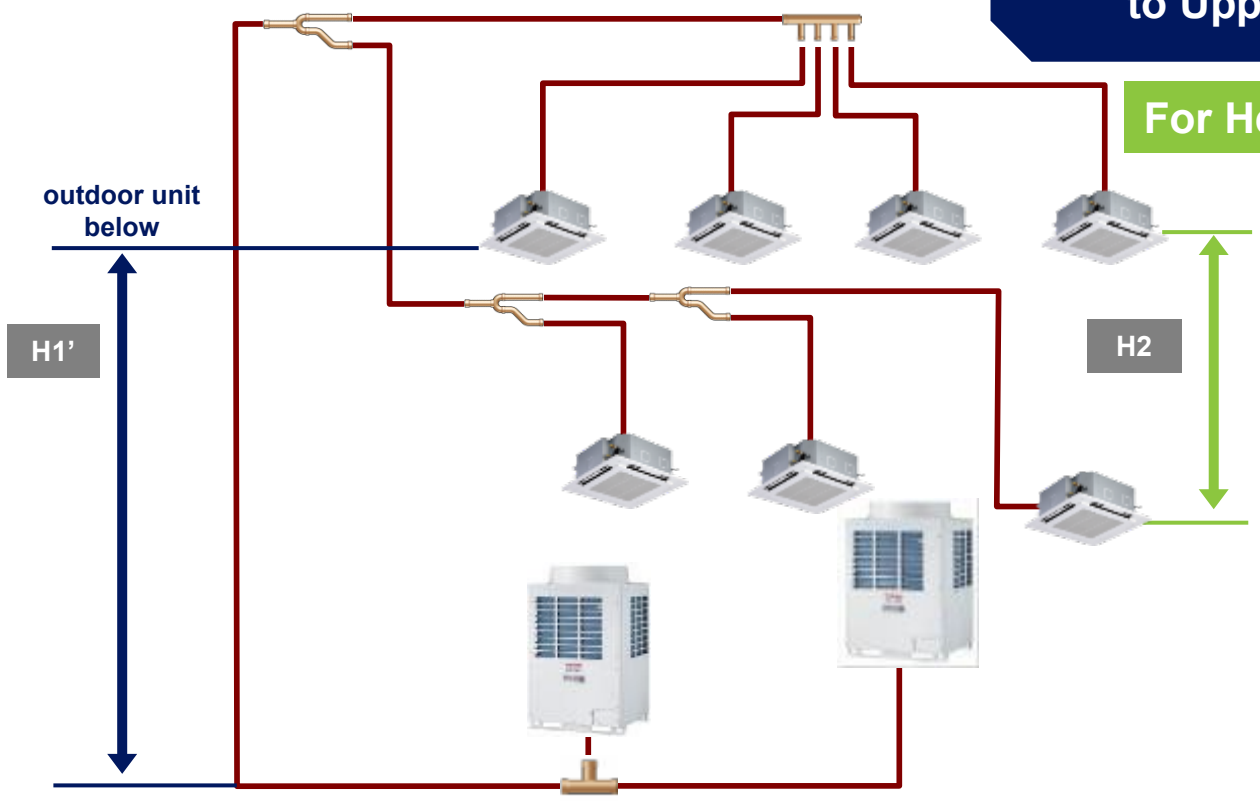


INSTALLATION

Height Difference Between Outdoor To Upper Indoor (H1')

Max. Height difference between Outdoor to Upper Indoor <= 130ft (40m)

For Heat Pump ONLY

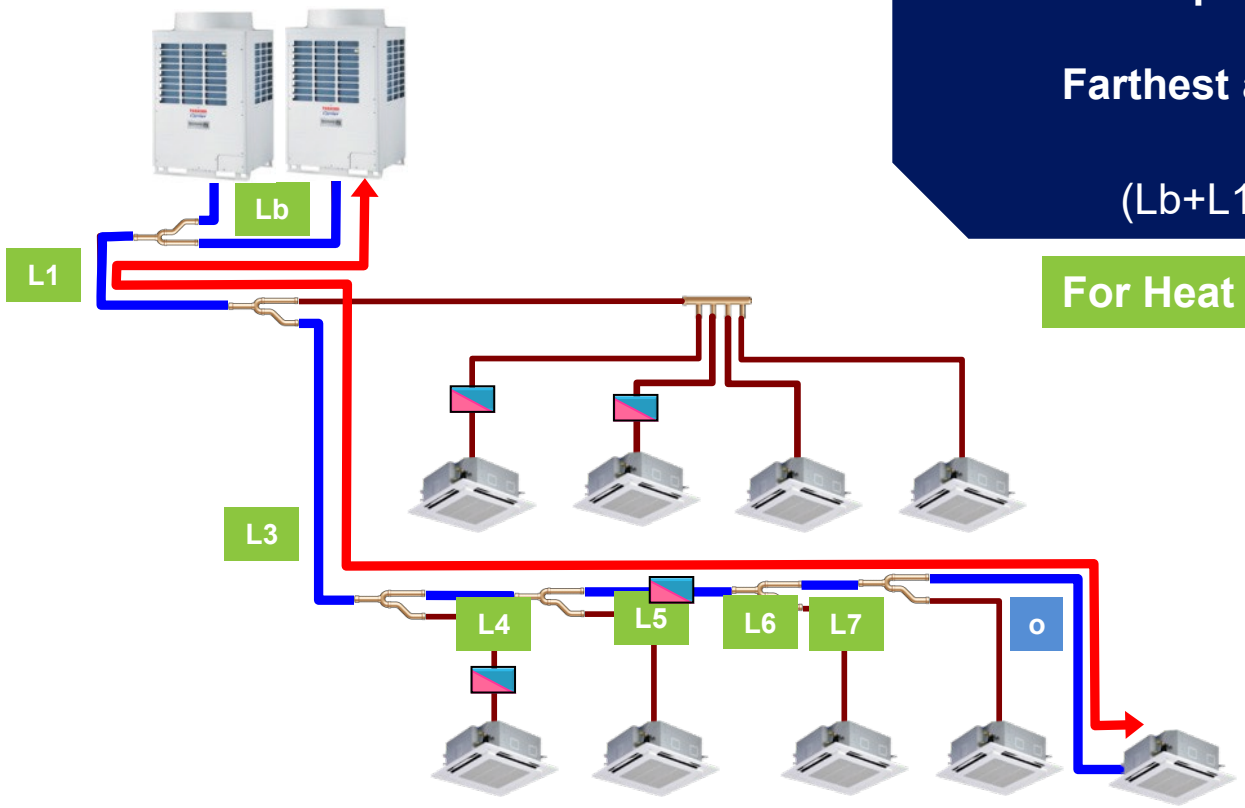


[NOTE] If the height difference between indoor units H2 exceeds 10ft (3m)**, set H1 below 98ft** (30m)

INSTALLATION

Refrigerant Piping Length And Height

FARTHEST PIPING LENGTH (L)

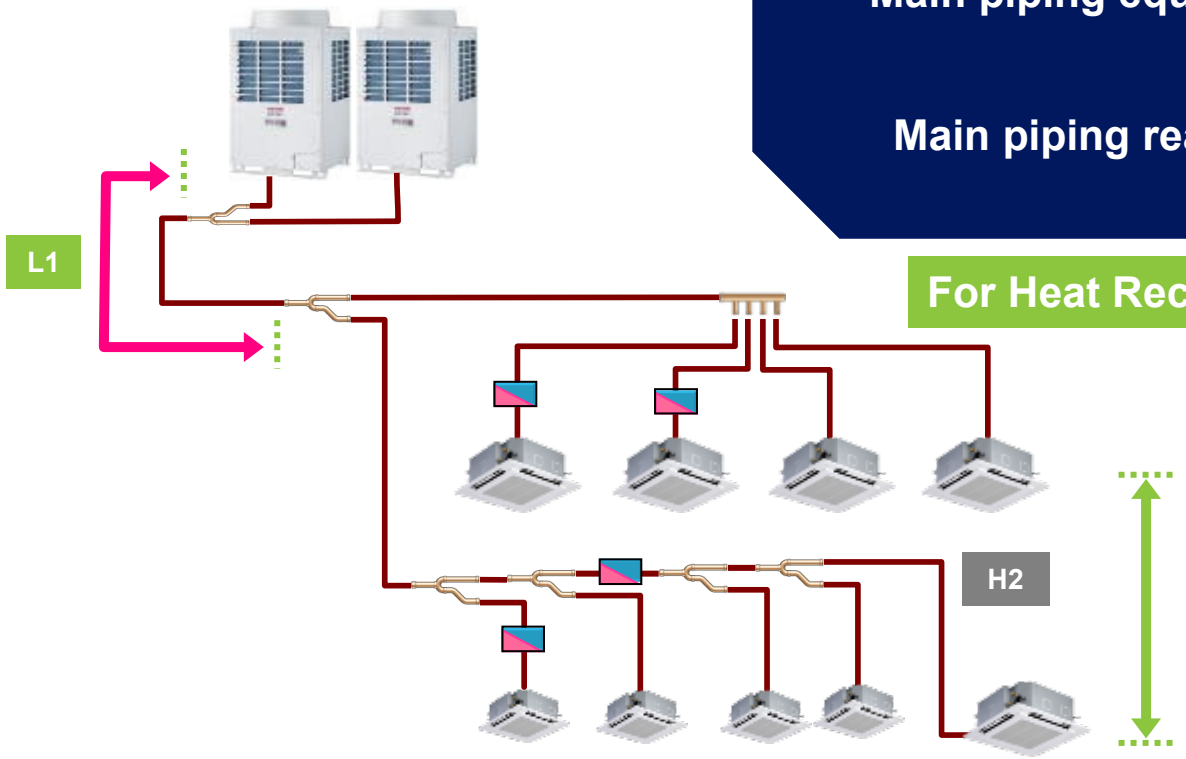


Farthest equivalent length <= 640ft (195m)
Farthest actual length <= 575ft (175m)
(Lb+L1+L3+L4+L5+L6+L7+o)

For Heat Recovery ONLY

INSTALLATION

Main Piping Length



 # H2 <= 3m

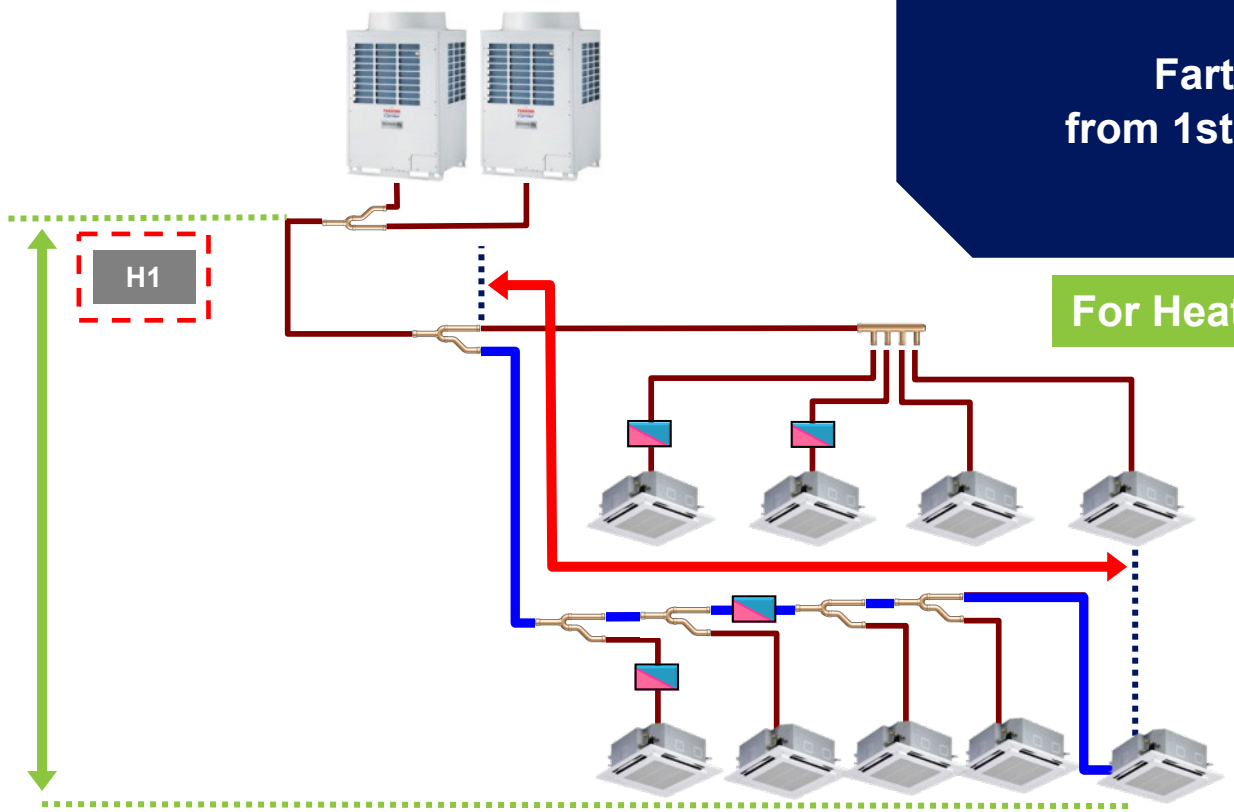
Main piping equivalent length <= 395ft (120m)

Main piping real length <= 330ft (100m)

For Heat Recovery ONLY

INSTALLATION

Equivalent Length Of Farthest Piping From 1st Branching Li(*)



 # H1 > 3m

Farthest equivalent length from 1st branch <= 165ft (50m)

(L3+L4+L5+L6+L7+k)

For Heat Recovery ONLY

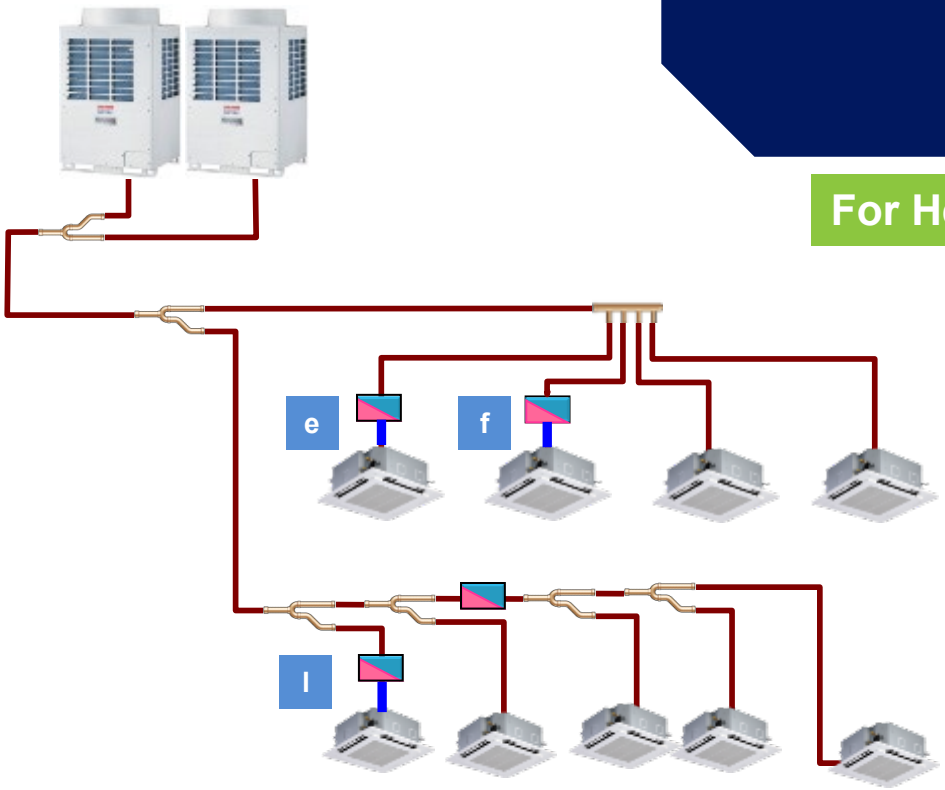
INSTALLATION

Actual Piping Length Between FS Box And Indoor Unit

 # FS unit –Indoor unit
("Heat Pump" Indoor unit)

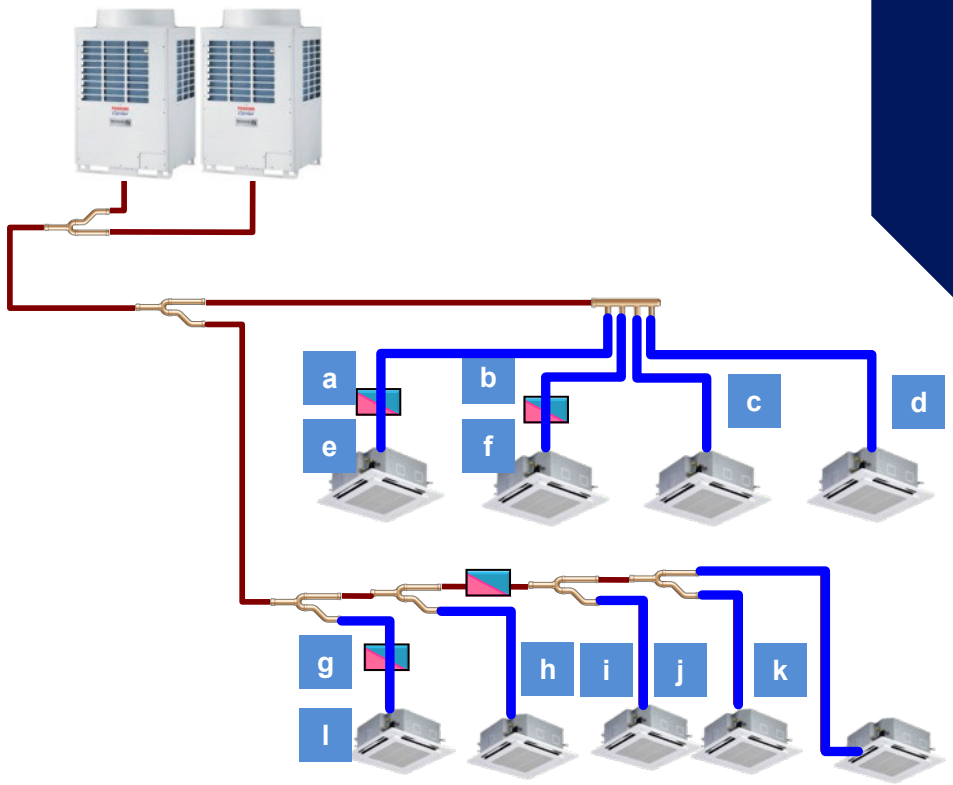
Max. real length between FS unit and indoor unit <= 49ft
(e,f,l)

For Heat Recovery ONLY



INSTALLATION

Actual Piping Length From Joint To Indoor Unit



 # Branch – FS unit –Indoor unit
("Heat Pump" Indoor unit)

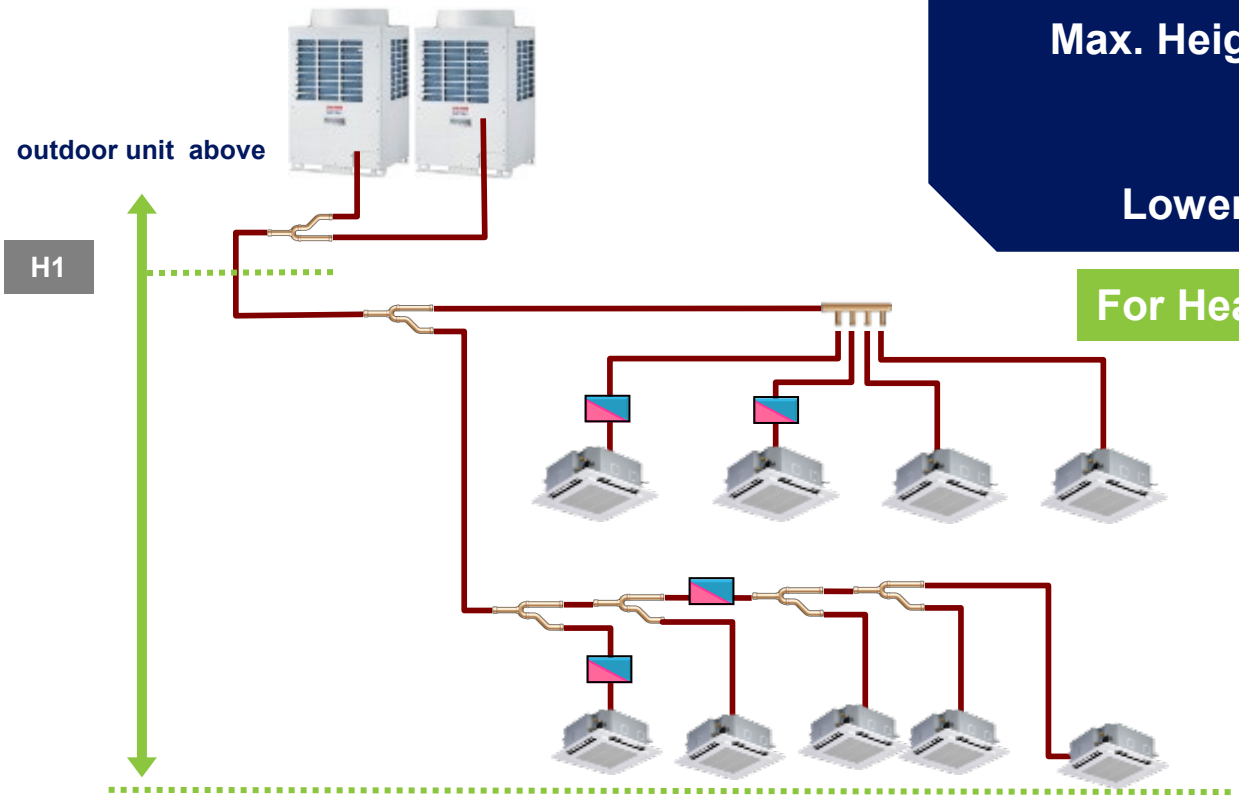
 # Branch – Indoor unit
(Cooling Only" Indoor unit)

Max. pipe length of indoor unit <= 98ft (30m)
(a+e,b+f,c,d,g+l,h,i,j,k)

For Heat Recovery ONLY

INSTALLATION

Height Difference Between Outdoor To Lower Indoor (H1)



Max. Height difference between

Outdoor to

Lower Indoor <= 165ft (50m)

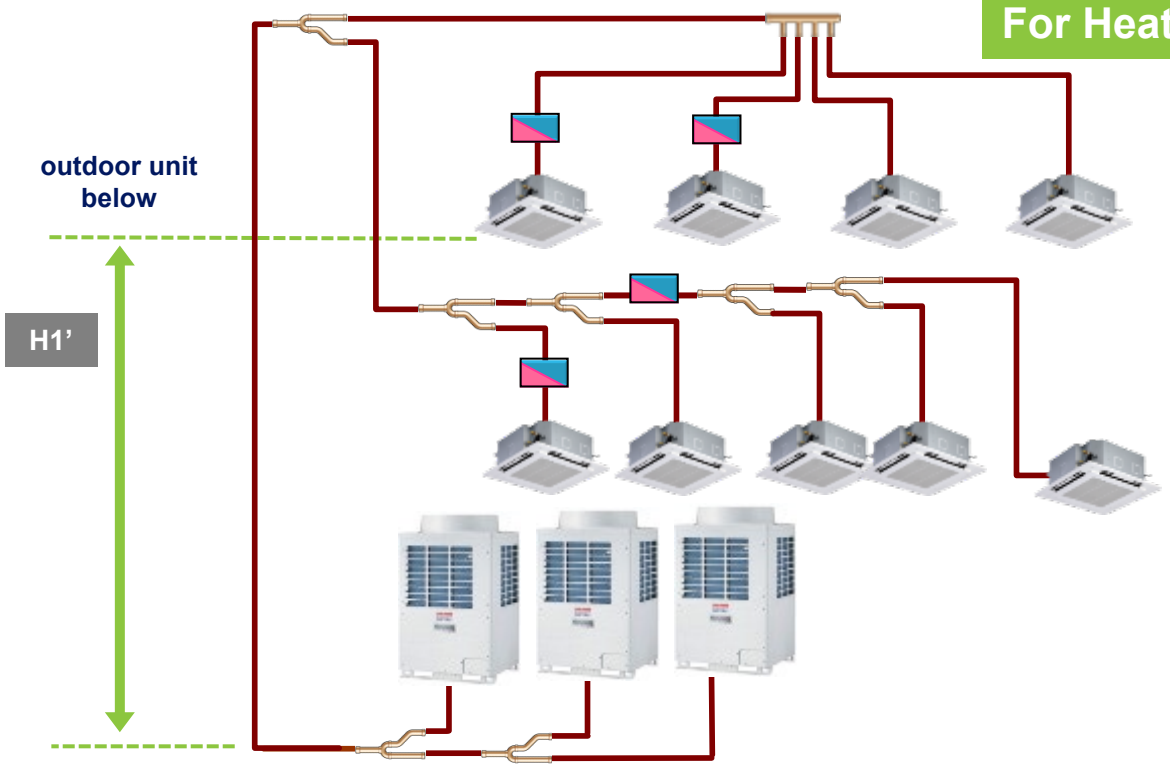
For Heat Recovery ONLY

INSTALLATION

Height Difference Between Outdoor To Upper Indoor (H1')

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

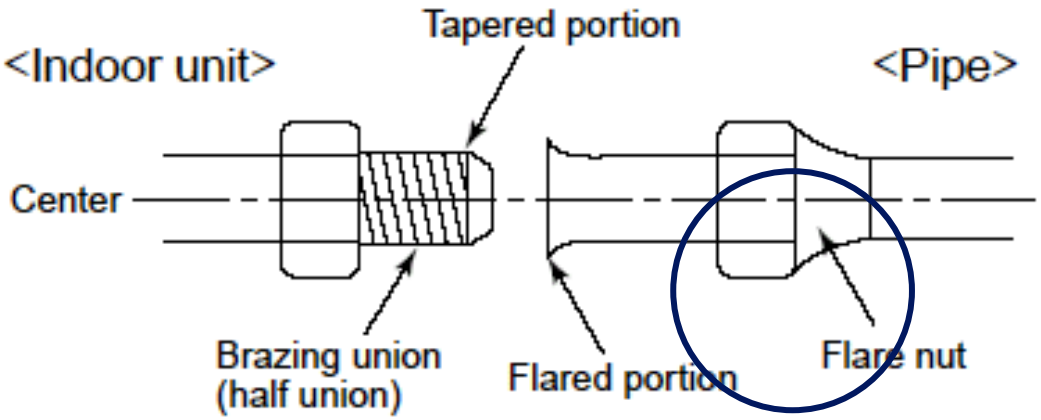
For Heat Recovery ONLY



INSTALLATION

Indoor Unit Piping

CONNECTING AND CENTERING



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

INSTALLATION

Indoor Unit Piping

WHY A DEDICATED R410A FLARING TOOL?

✓R-410a Flaring Tool

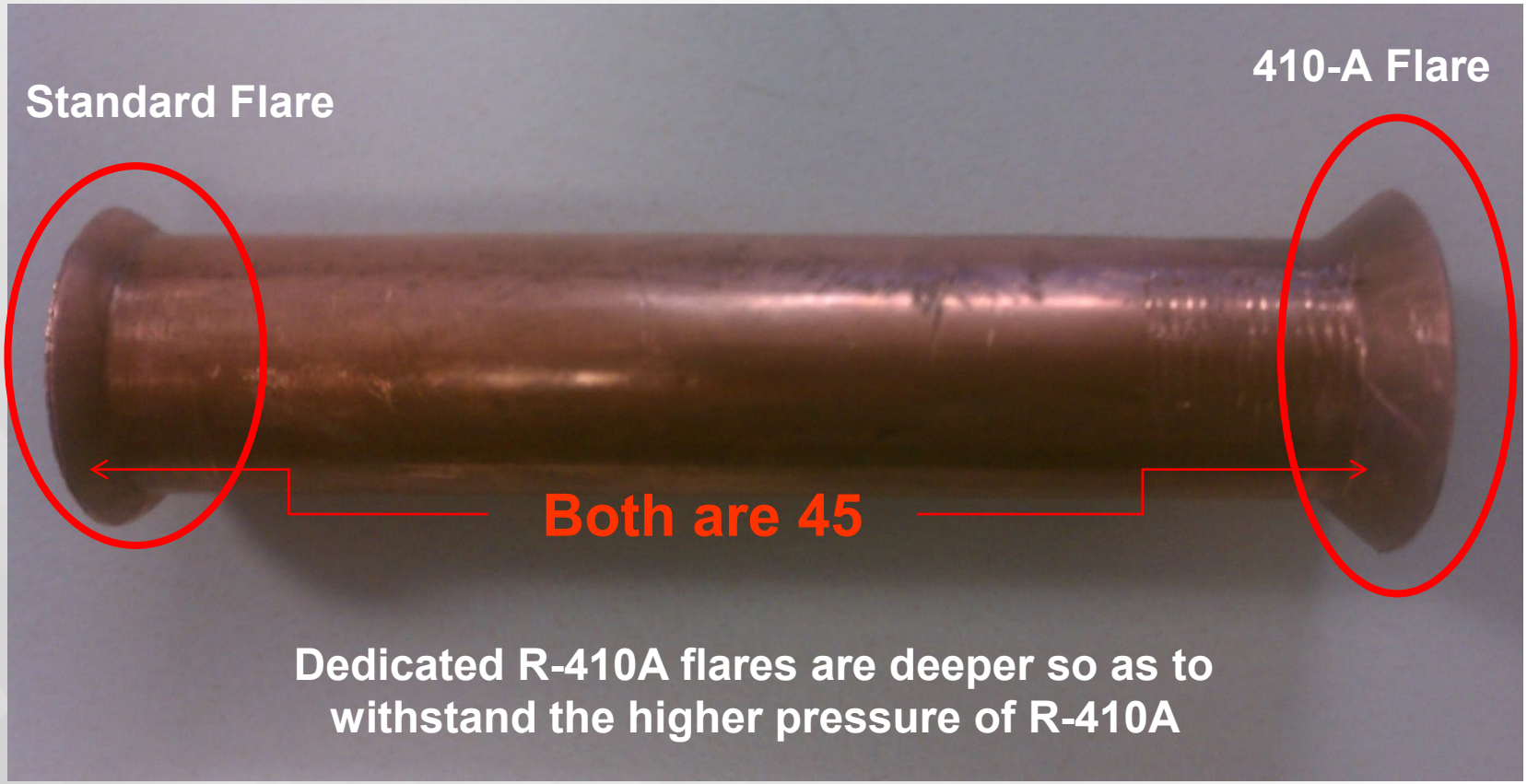
R410A systems operate at high pressures

- 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.

INSTALLATION

Indoor Unit Piping

WHY A DEDICATED R410A FLARING TOOL?



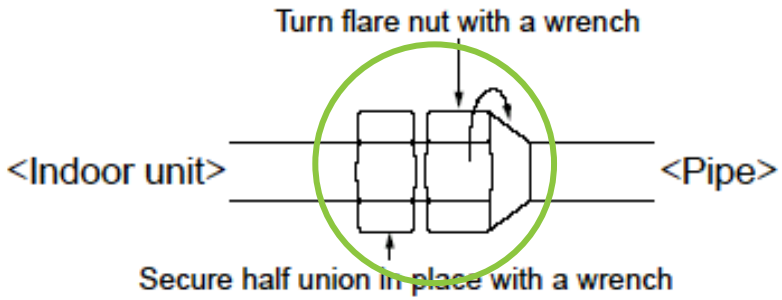
INSTALLATION

Indoor Unit Piping

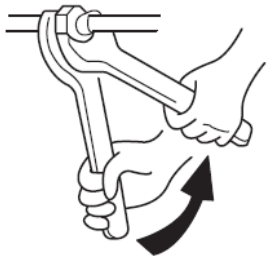
TIGHTENING THE FLARE NUT

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

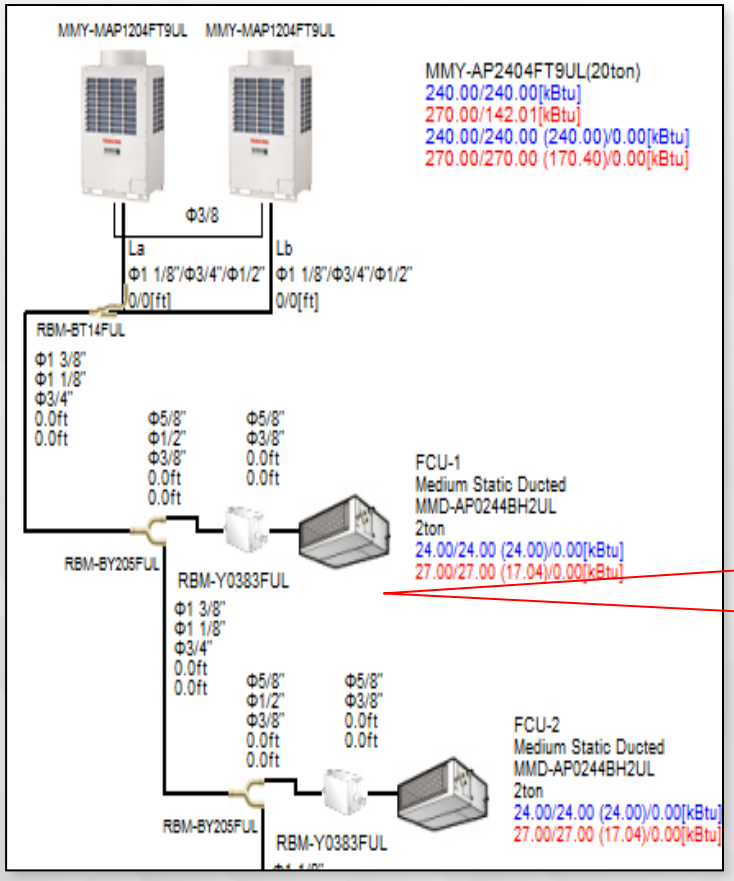


Use a backup wrench

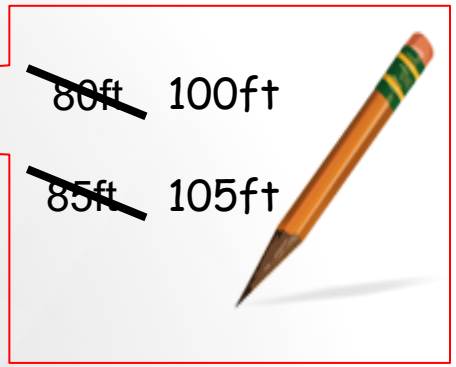


INSTALLATION

As-Built Line Lengths



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



INSTALLATION

INSULATION AND CONDENSATE

INSTALLATION

Insulation Work

MATERIAL

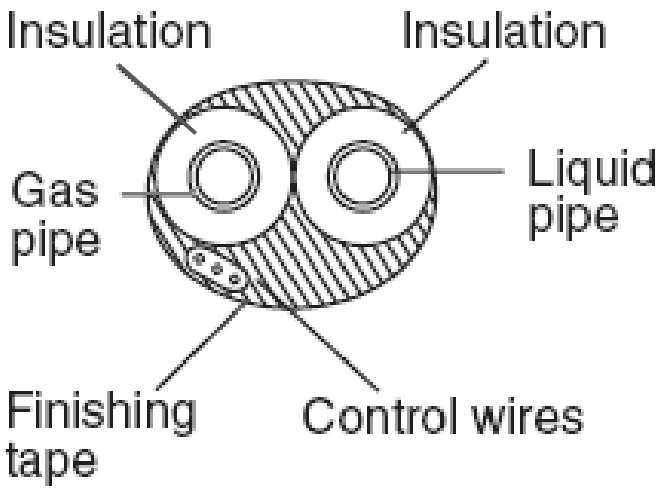
245^{o} F Closed cell foam pipe insulation material as specified by local and national codes

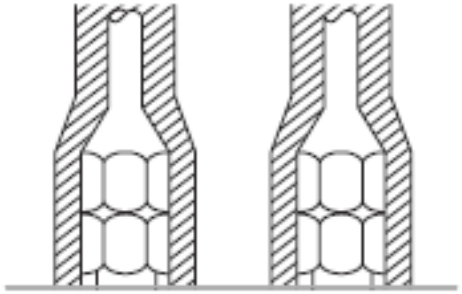
INSTALLATION

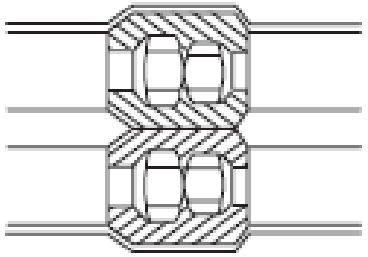
Insulation Work

INSULATION GUIDELINES

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







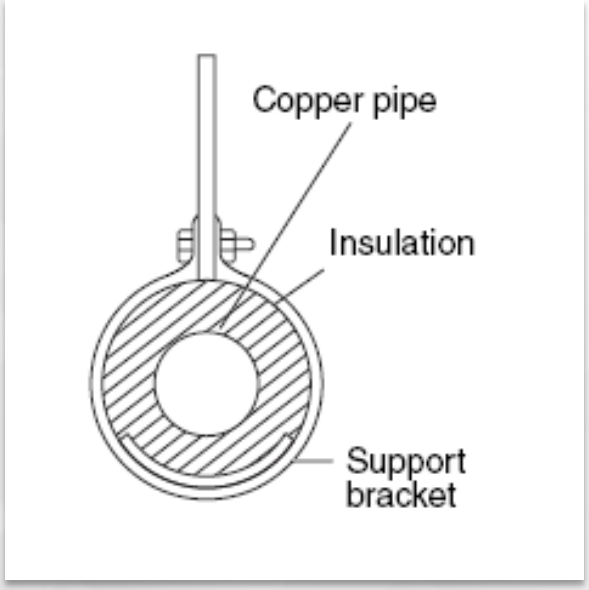
INSTALLATION

Insulation Work

INSULATION GUIDELINES

When insulating a supported section:

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



INSTALLATION

Drain Piping

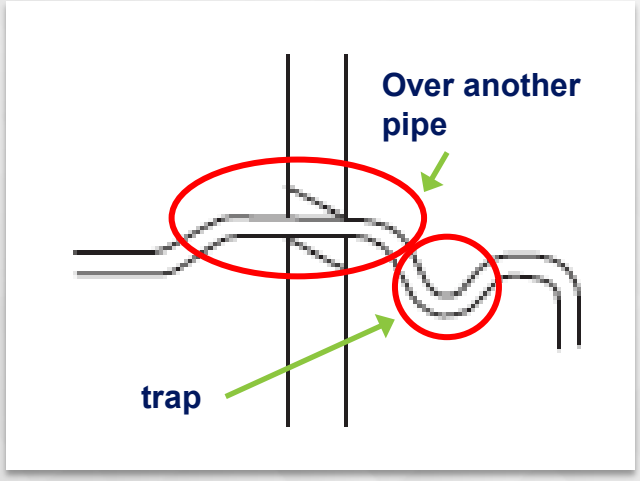
DRAIN PIPE PITCH

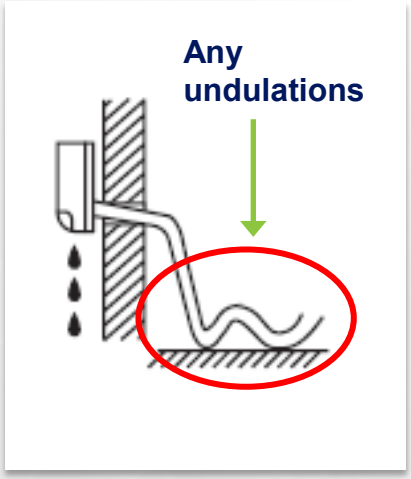
Minimum pitch to comply with local codes

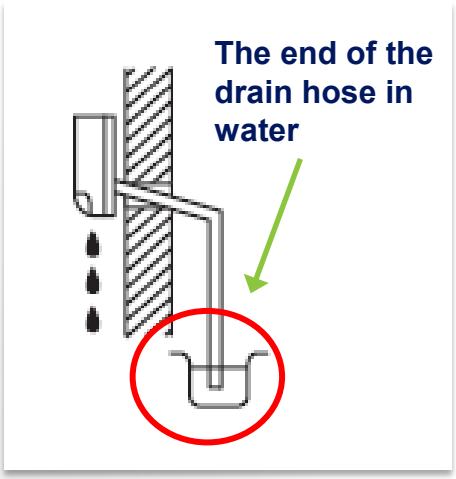
INSTALLATION

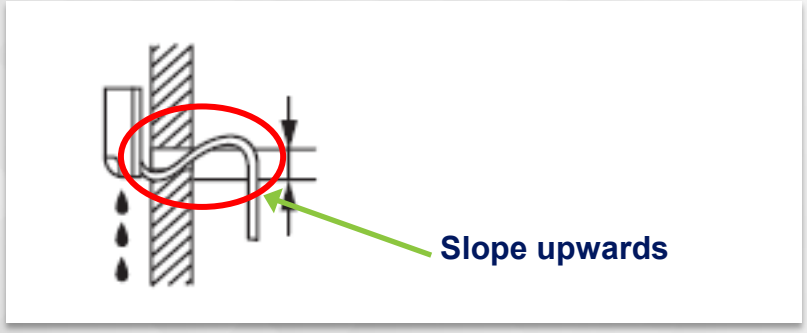
Drain Piping

DRAIN PIPING ERRORS





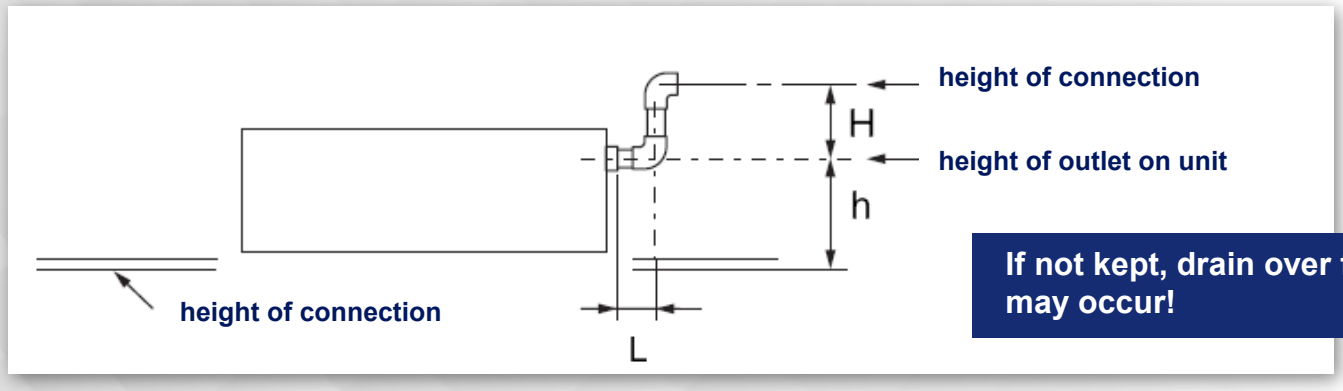




INSTALLATION

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!

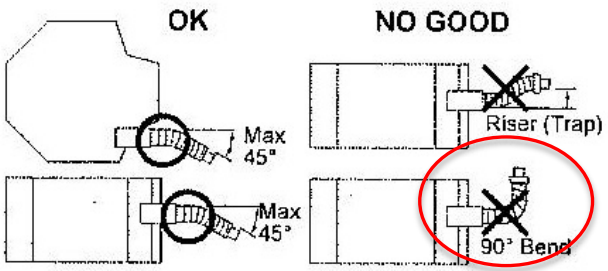
INSTALLATION

Flexible Hose—No 90-degree Bends

■ 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.



INSTALLATION

ELECTRICAL

INSTALLATION

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

INSTALLATION

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**

INSTALLATION

Electrical Work

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

INSTALLATION

Electrical Work

POWER WIRING FOR OUTDOOR UNIT

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

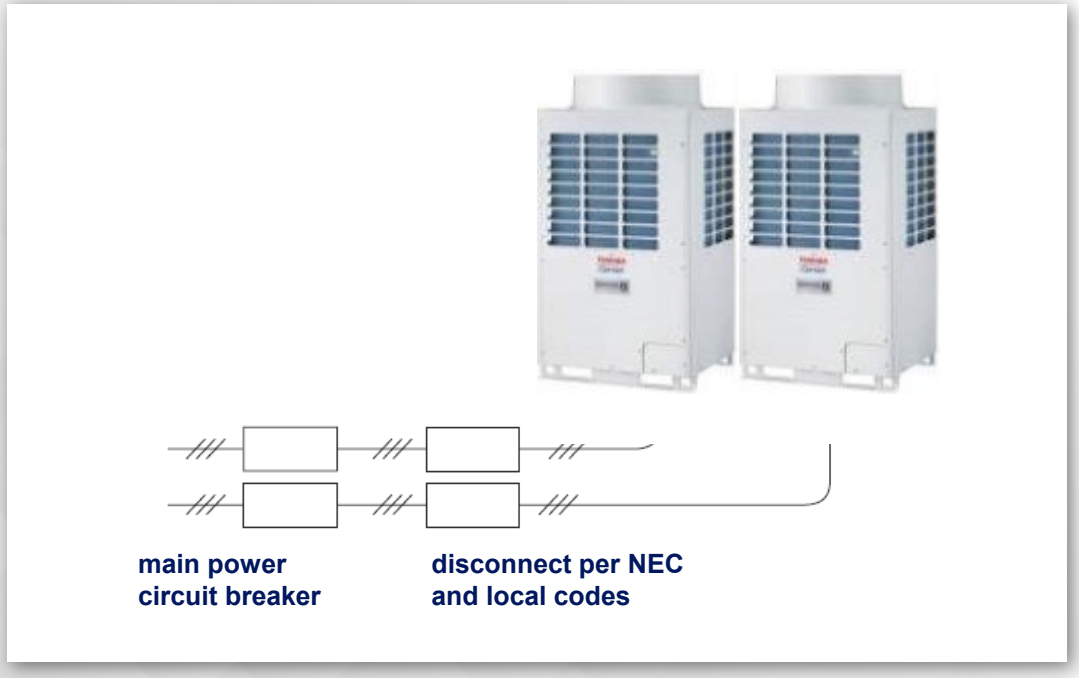
Model MMY-	Volts-Ph-Hz	MCA (A)	Recommended Fuse Size (A)
MAP0726HT6P-UL	460-3-60	12.9	15
MAP0966HT6P-UL	460-3-60	20	25
MAP1206HT6P-UL	460-3-60	23	25
MAP1446HT6P-UL	460-3-60	25	30
MAP1686HT6P-UL	460-3-60	31	35

MCA : Minimum Circuit Amps

INSTALLATION

Power Wiring For Outdoor Unit

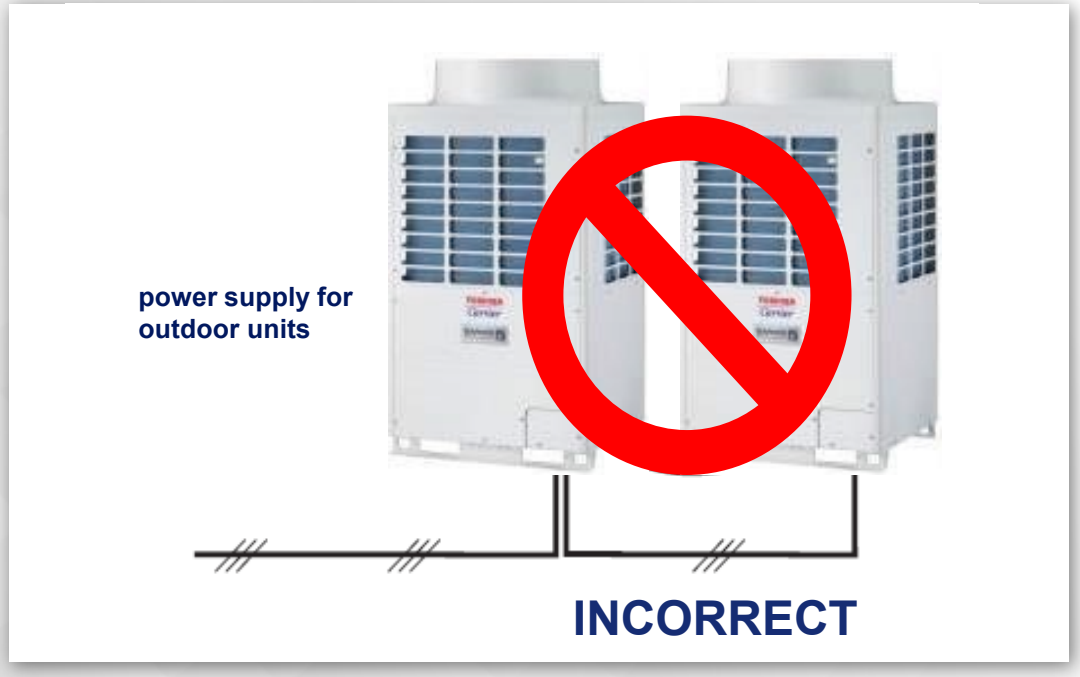
ALL OUTDOOR UNIT FIELD POWER MUST BE WIRED INDIVIDUALLY



INSTALLATION

Electrical Work

POWER WIRING FOR OUTDOOR UNIT



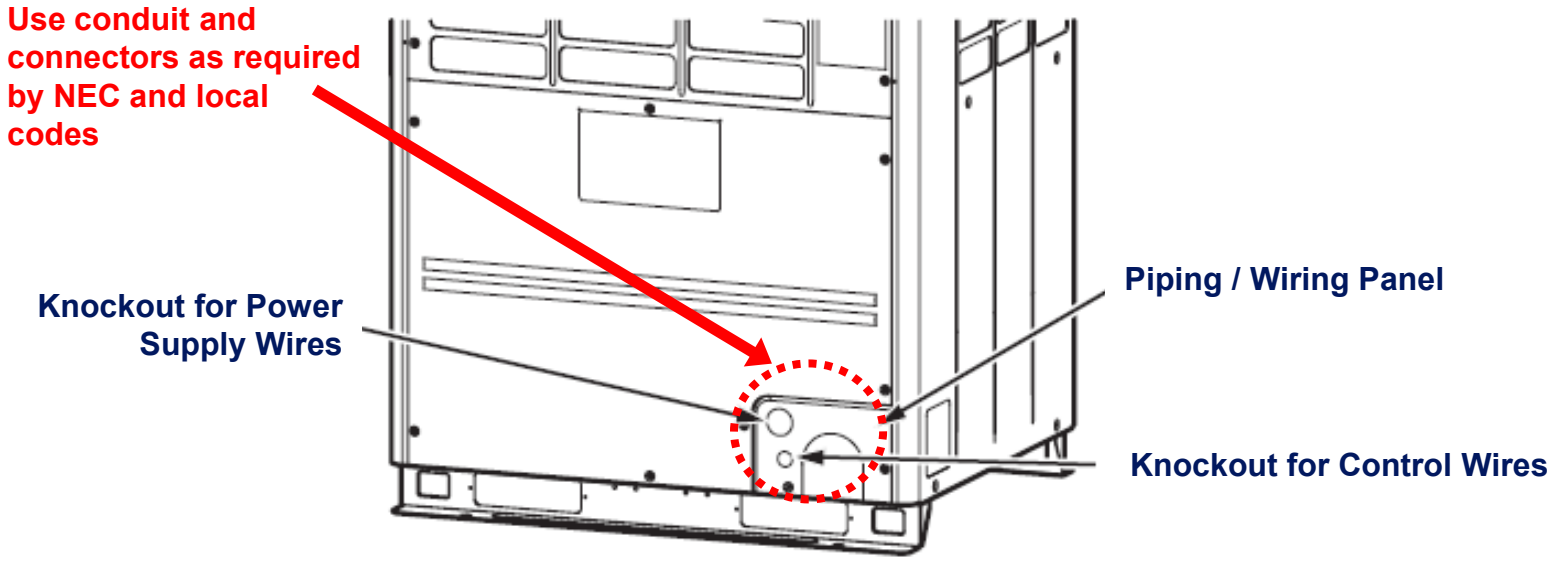
Do not connect field power wiring from unit to unit (No Daisy Chain)

INSTALLATION

Power Wiring For Outdoor Unit

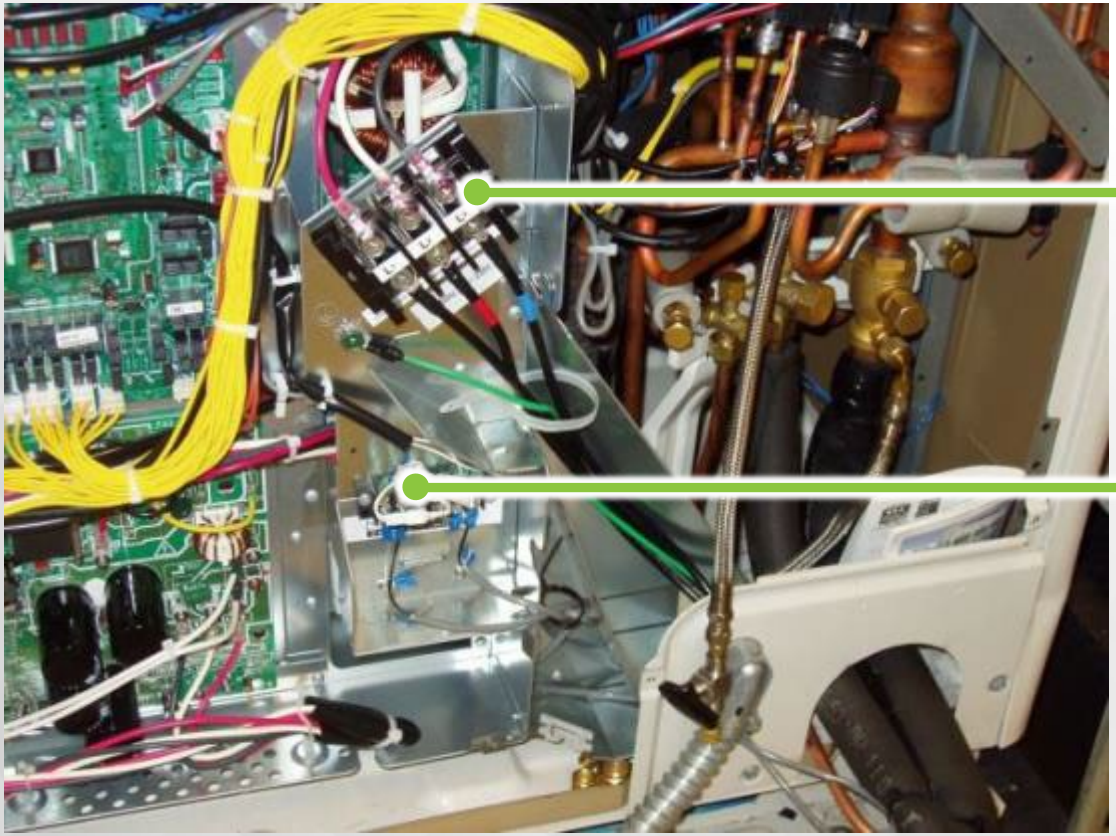
CONNECTION OF POWER WIRING TO OUTDOOR UNIT

Keep power wires and control wires separate at all times.



INSTALLATION

Power Wiring For Outdoor Unit



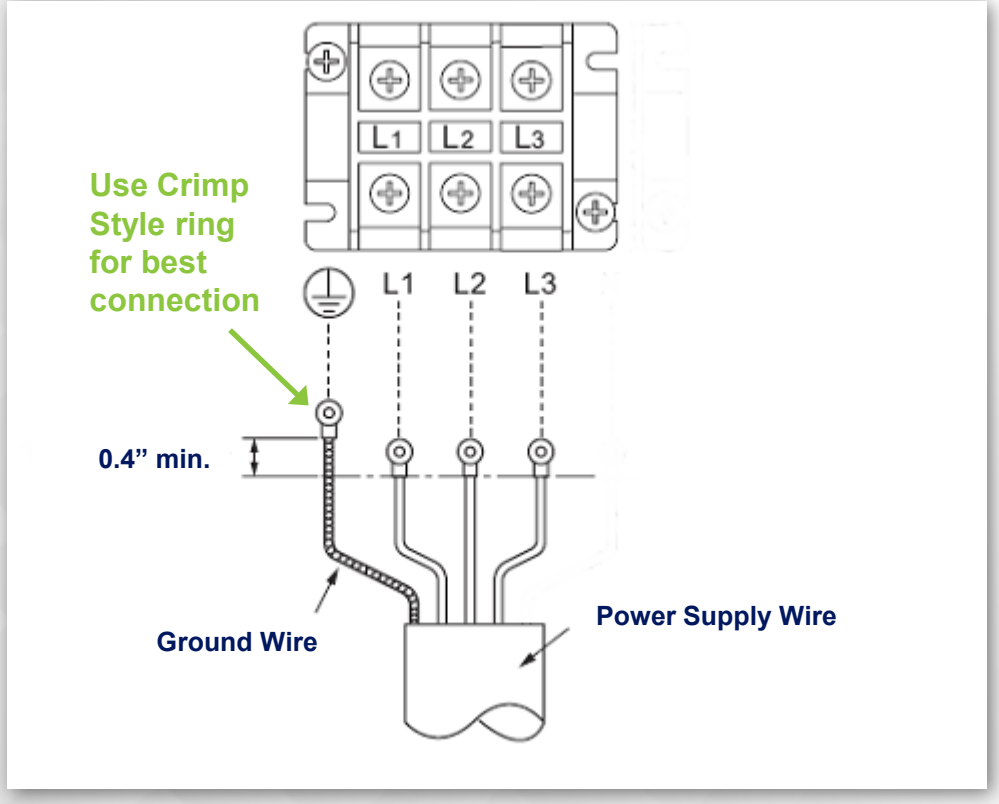
Power Supply Terminal Block

Control Wire Terminal Block

INSTALLATION

Power Wiring For Outdoor Unit

POWER SUPPLY TERMINAL BLOCK

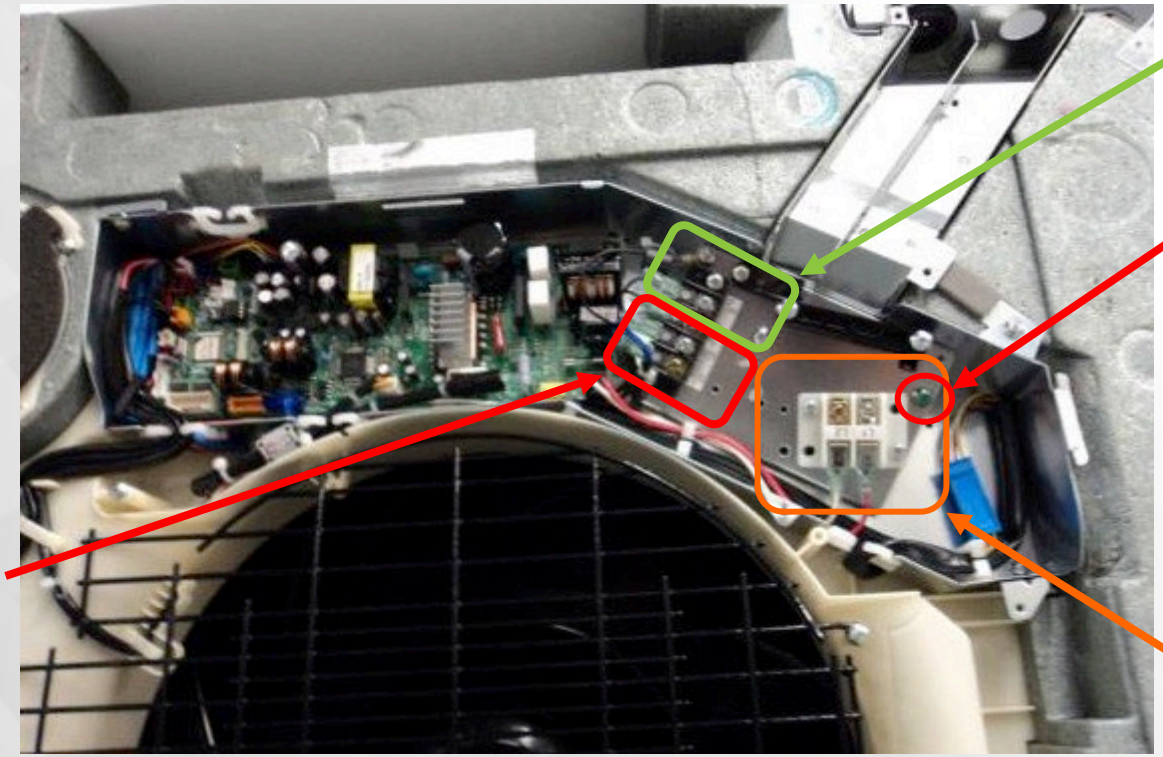


INSTALLATION

Electrical Work

CONNECTION OF INDOOR UNIT TERMINAL

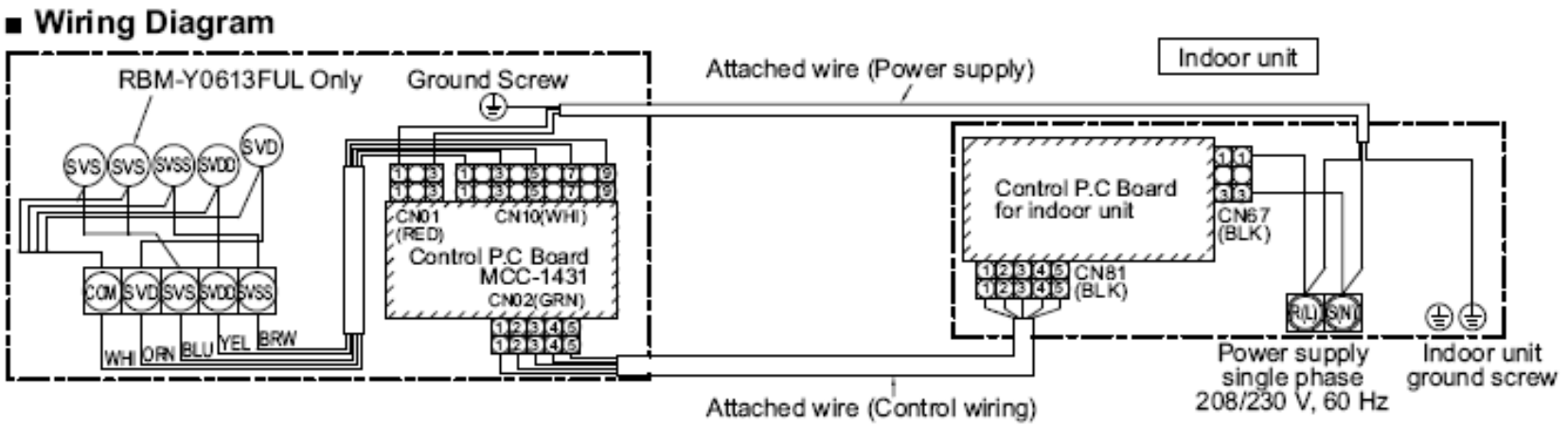
Sample: 4-way Cassette Type



INSTALLATION

Flow Selector Wiring

■ **Wiring Diagram**

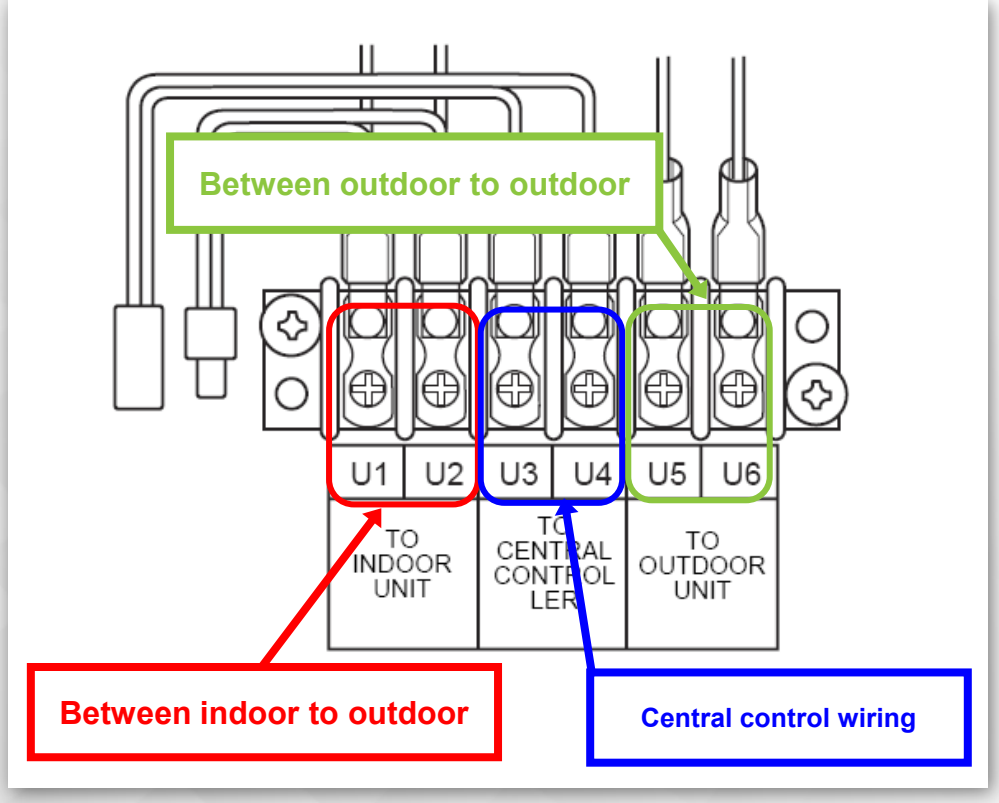


Power wiring must follow NEC and or Local Codes

INSTALLATION

Connection Of Outdoor Unit Terminal

COMMUNICATION TERMINAL BLOCK



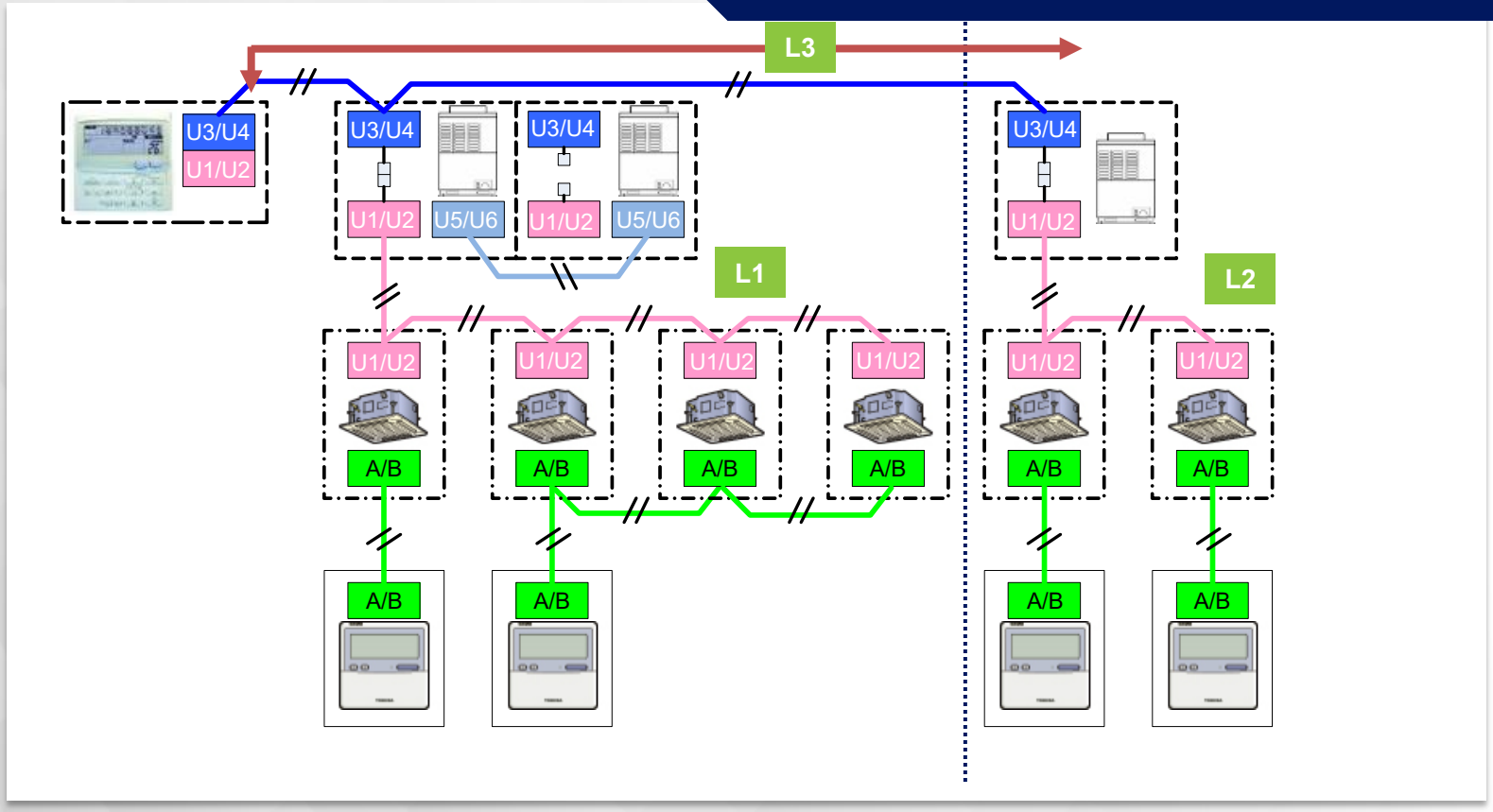
INSTALLATION

Electrical Work

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.



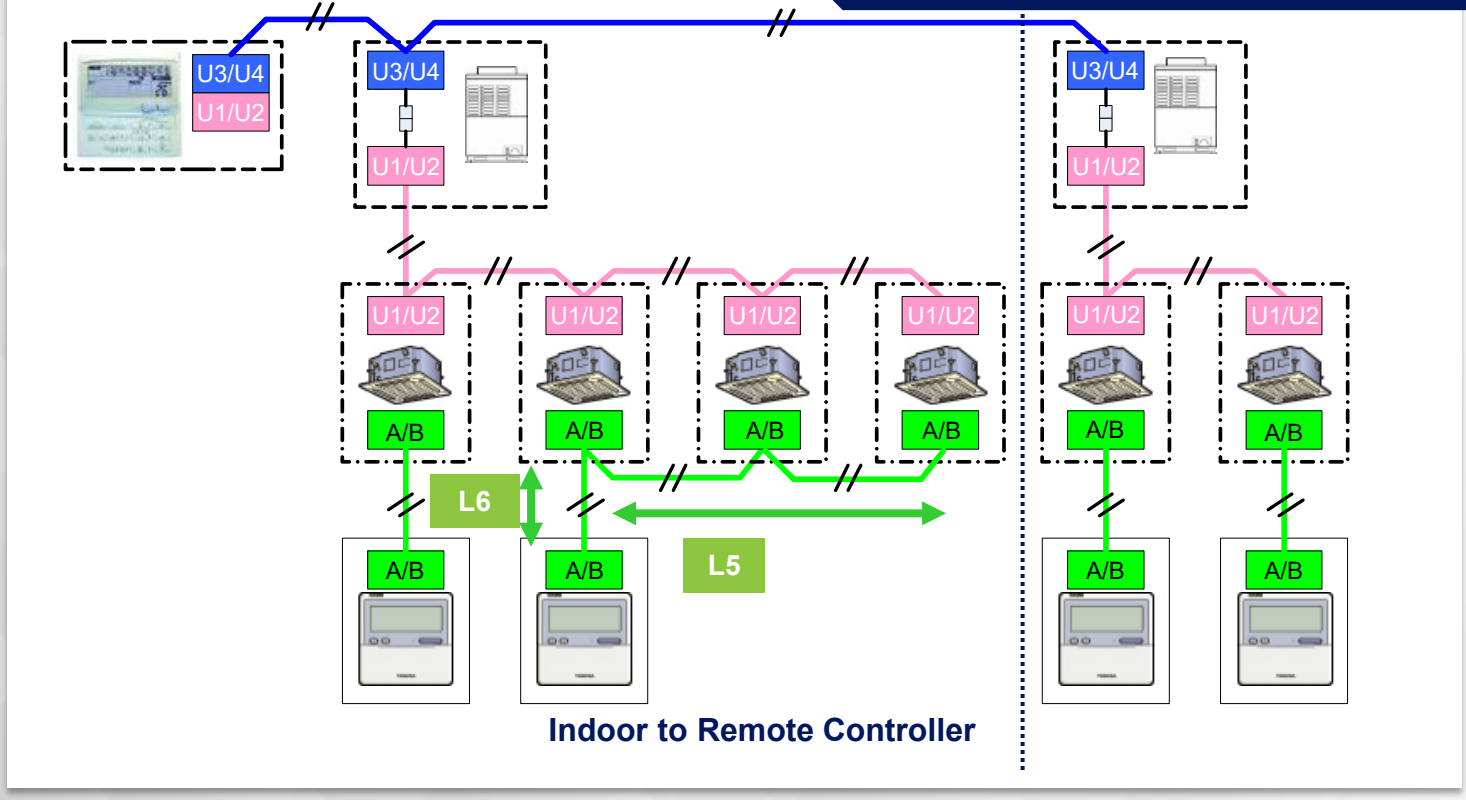
INSTALLATION

Electrical Work

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

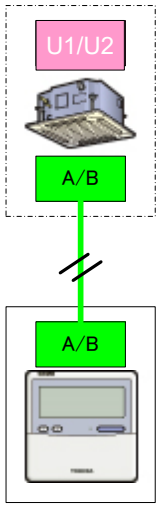


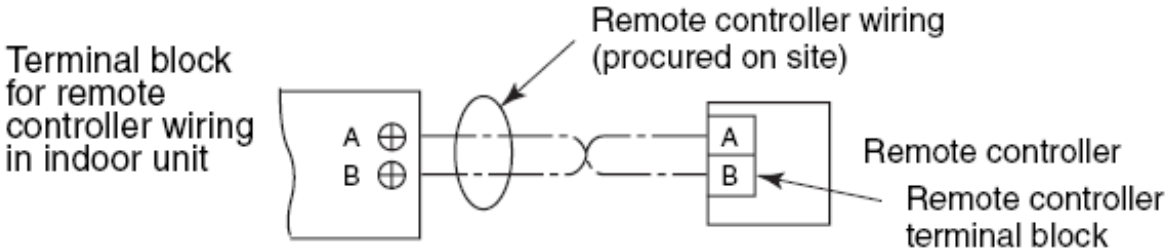
INSTALLATION

Electrical Work

CONNECTION OF REMOTE CONTROL

Individual Control (1:1)





Terminals A and B are 2-core non-polarity

INSTALLATION

Group Control Wiring

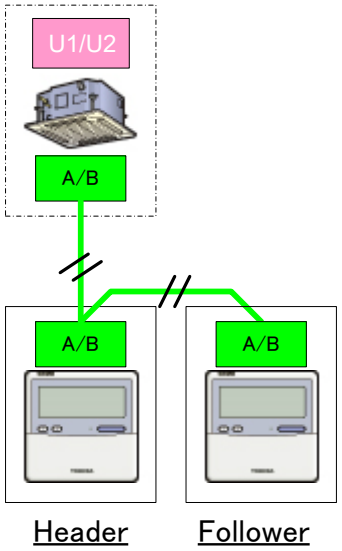
Max. 8 indoor units connectable for one group control.

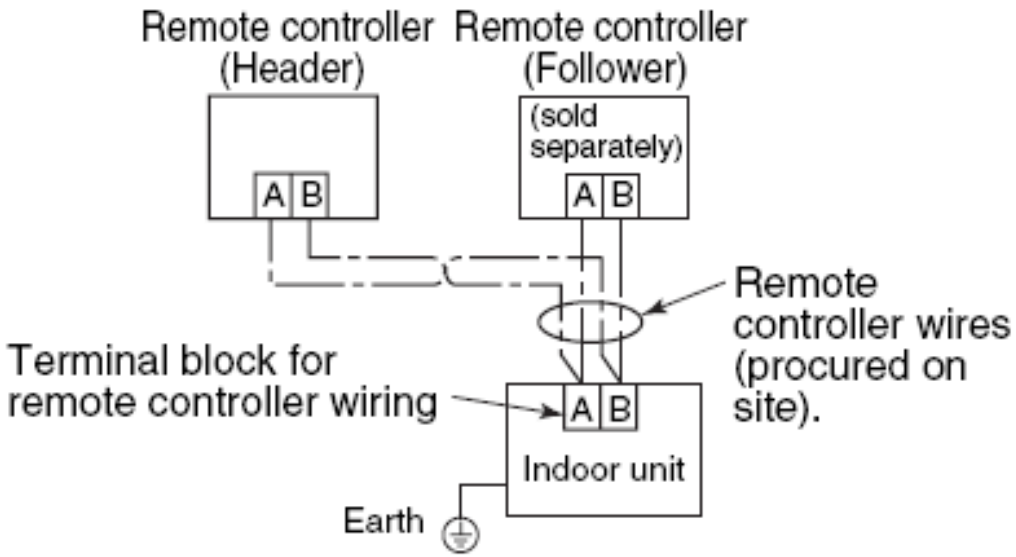
INSTALLATION

Electrical Work

CONNECTION OF REMOTE CONTROL

Two Remote Controls



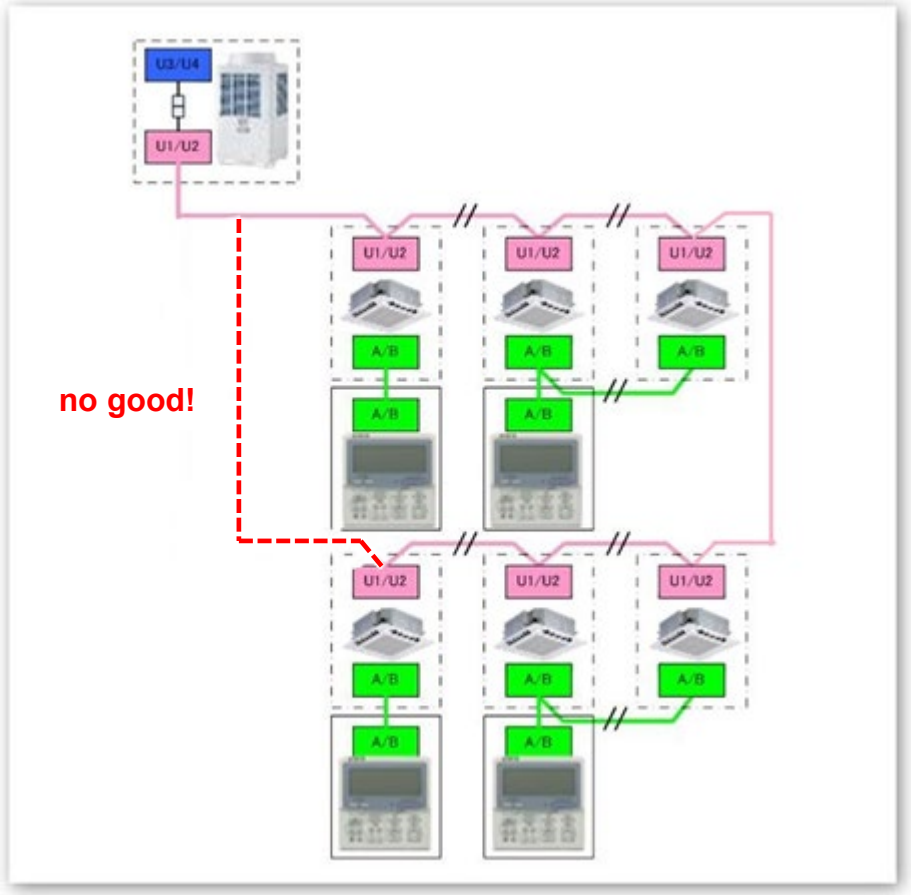


A maximum of two remote controllers can be connected

INSTALLATION

Control Wiring

LOOP WIRING OF CONTROL WIRES IS PROHIBITED



INSTALLATION

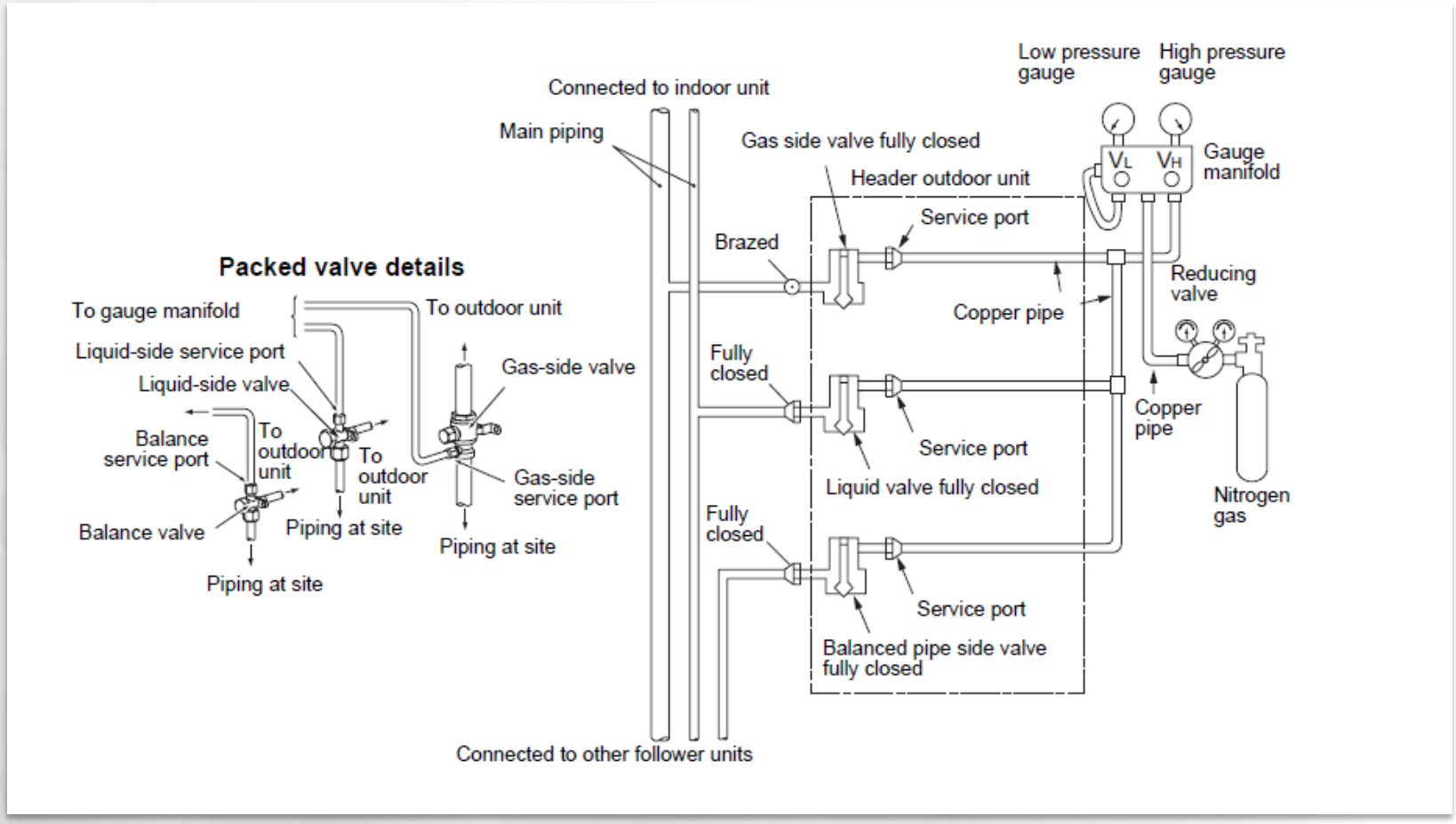
LEAK TEST

INSTALLATION

Leak Test

LEAK TEST METHOD

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



INSTALLATION

Start Up

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

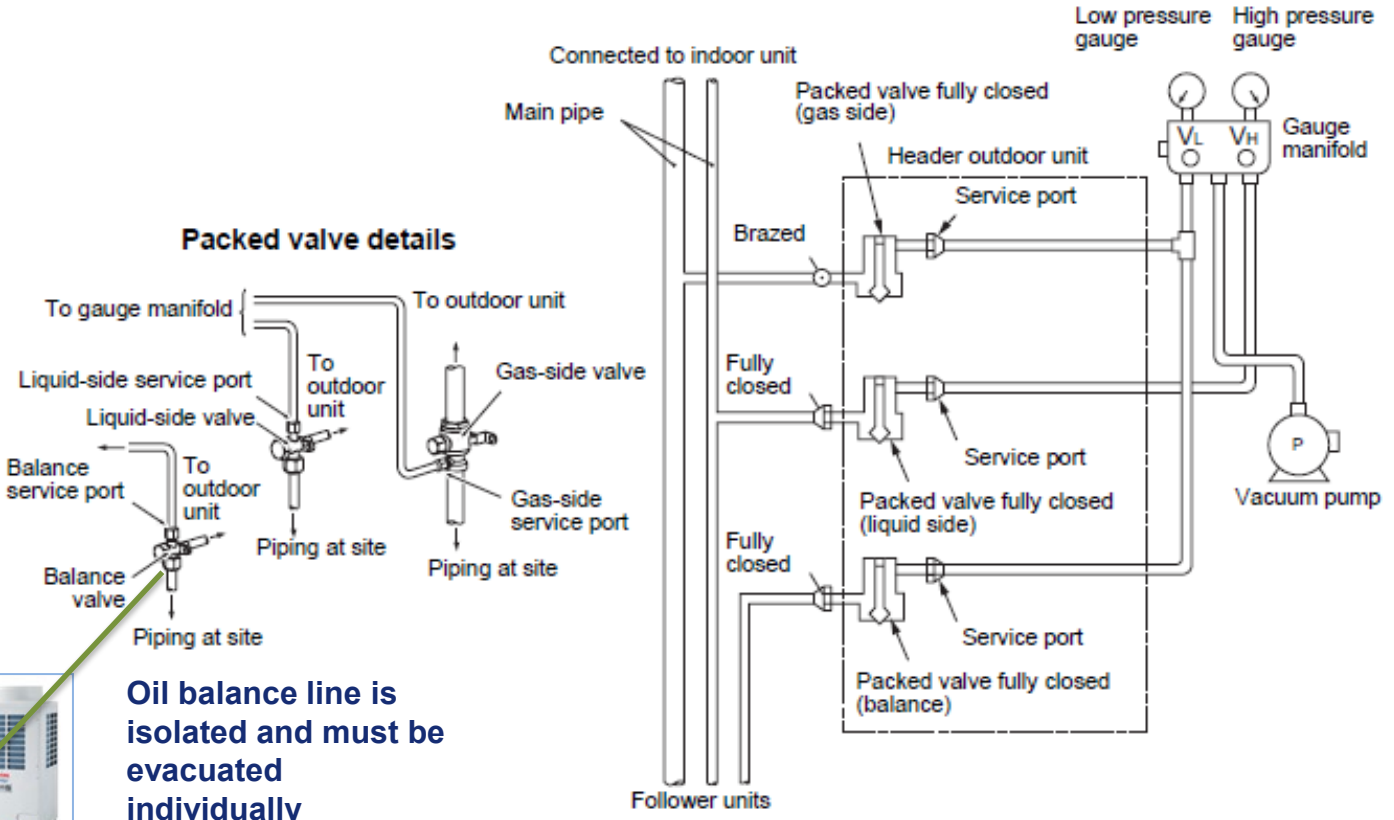
The pressure will change by approx. 2.6psi per 1 deg. F

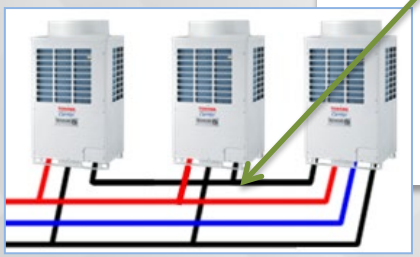
@ record time & temperature
@ compare start test data and adjust by temperature difference

INSTALLATION

Vacuuming

VACUUMING METHOD



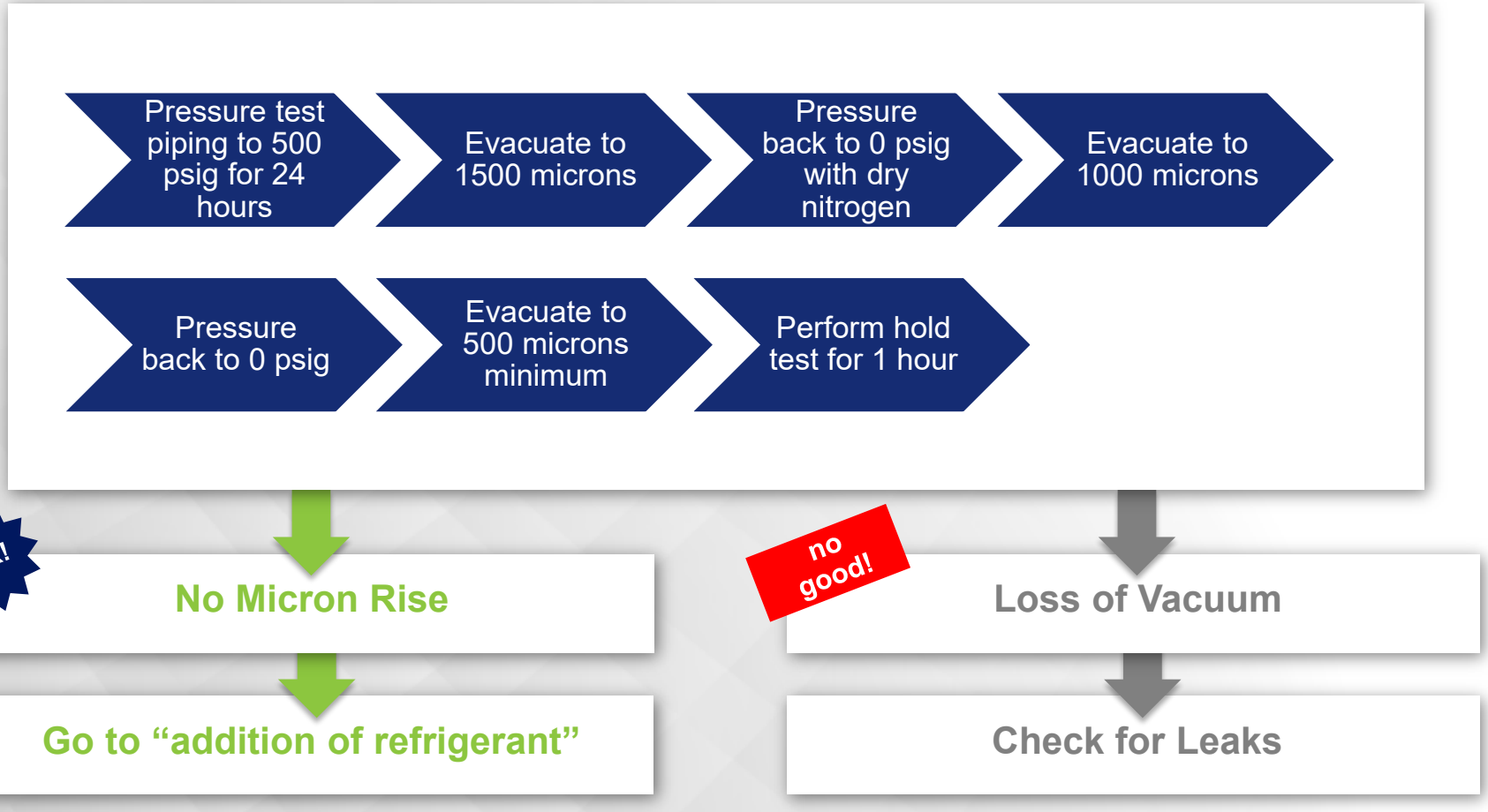


Oil balance line is isolated and must be evacuated individually

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

INSTALLATION

Start Up



INSTALLATION

ADDITIONAL REFIGERANT CHARGE

INSTALLATION

Refrigerant Charge

FOR HEAT PUMP ONLY

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**

INSTALLATION

Refrigerant Charge

FOR HEAT PUMP ONLY

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

INSTALLATION

Refrigerant Charge

FOR HEAT RECOVERY ONLY

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

INSTALLATION

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

INSTALLATION

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		

INSTALLATION

Addition Of Refrigerant

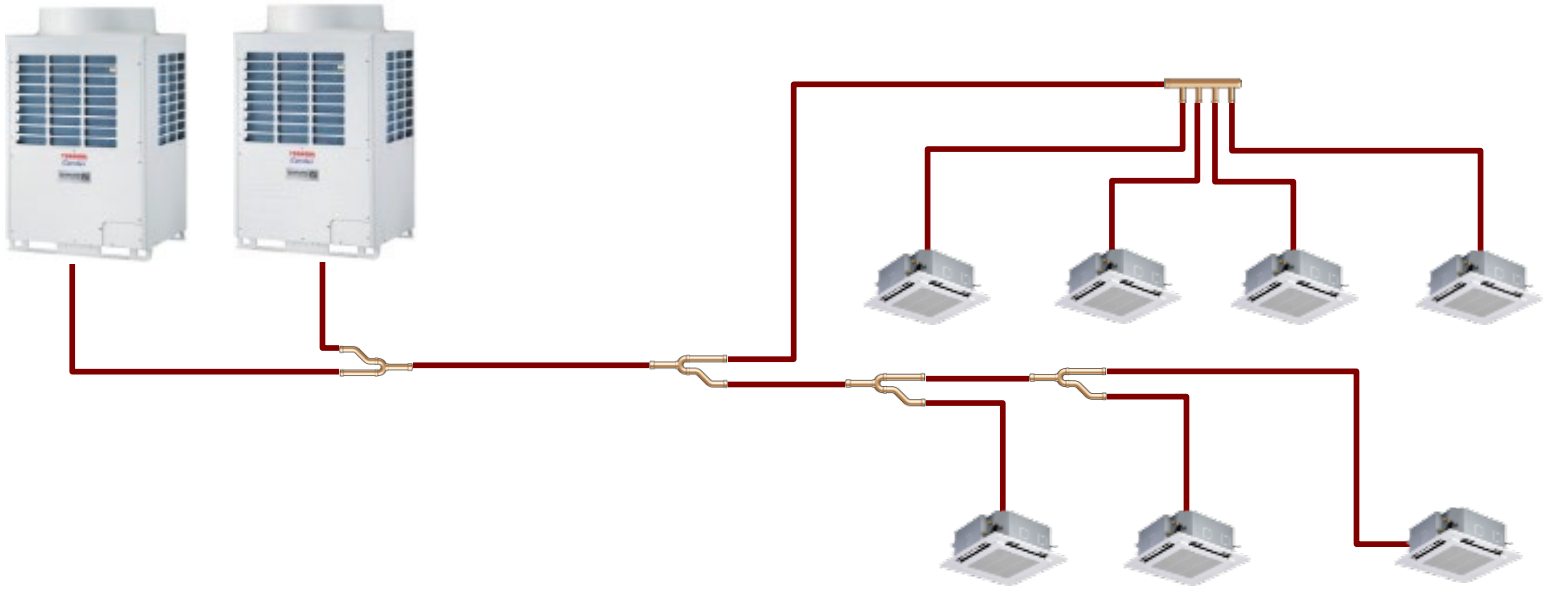
ADJUSTMENT AMOUNT OF REFRIGERANT FOR SHRM-e HEAT RECOVERY

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		

INSTALLATION

Refrigerant Charge

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

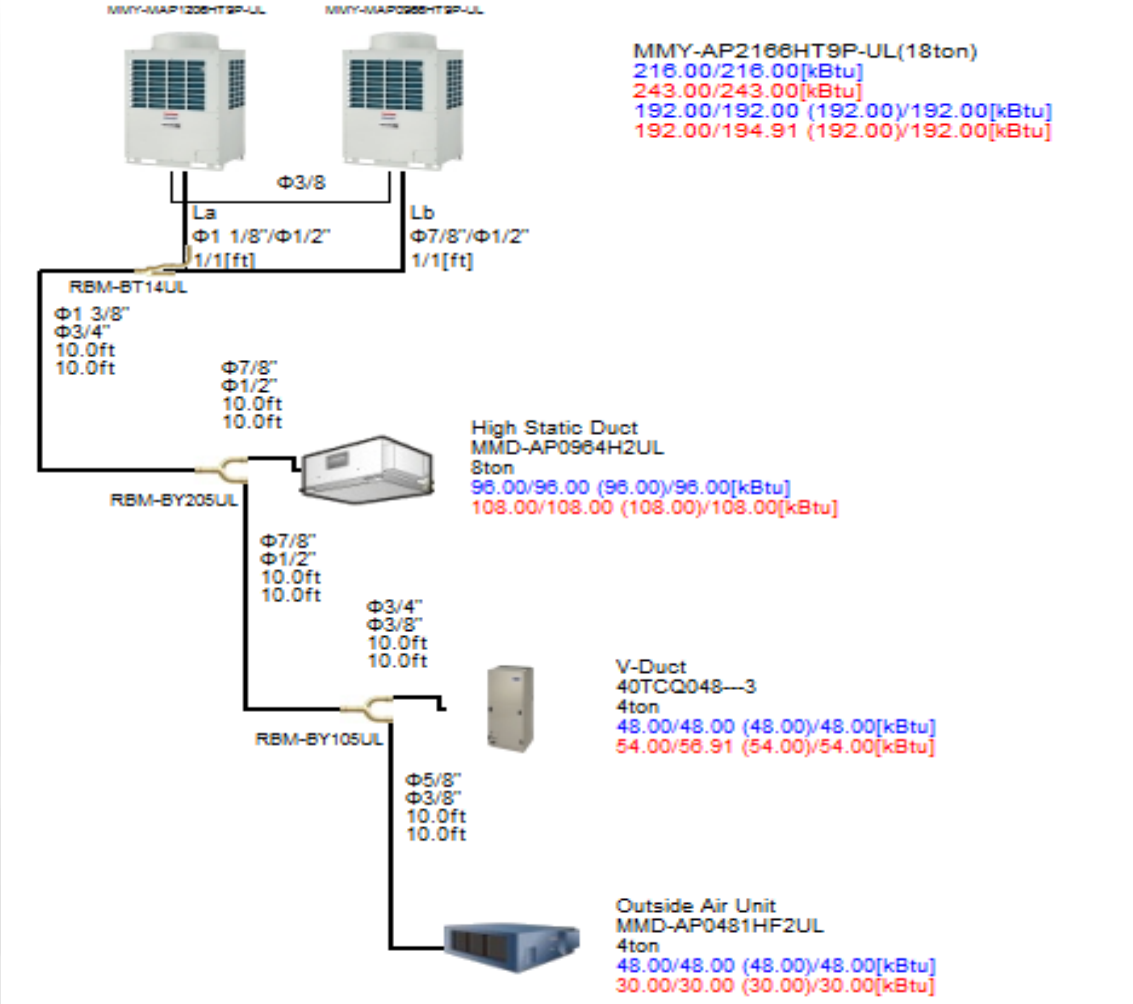


Total Charge = (25.4 lbs.(SMMSe) (24.3 lbs.(SHRMe) X quantity outdoor units + additional charge.)

Refrigerant Charge Exercise

Charge Calculation

Using information you have just acquired, calculate the additional charge for this system.



START UP

START UP

Pre-Start Up Checklist

TOSHIBA CARRIER VRF SUPERVISED PRE-STARTUP CHECKLIST

Carrier factory personnel will supervise and train contractor personnel in the startup of the Toshiba Carrier VRF system. Any work performed during this supervised start-up will be the responsibility of the installing contractor.

INSTALLING CONTRACTOR CONTACT INFORMATION:

Name:
Address:
Phone Number:
E-mail:

GENERAL CONTRACTOR CONTACT INFORMATION:

Name:
Address:
Phone Number:
E-mail

SUB-CONTRACTOR(S) CONTACT INFORMATION:

Name:
Address:
Phone Number:
E-mail

START UP

Powering Up The System

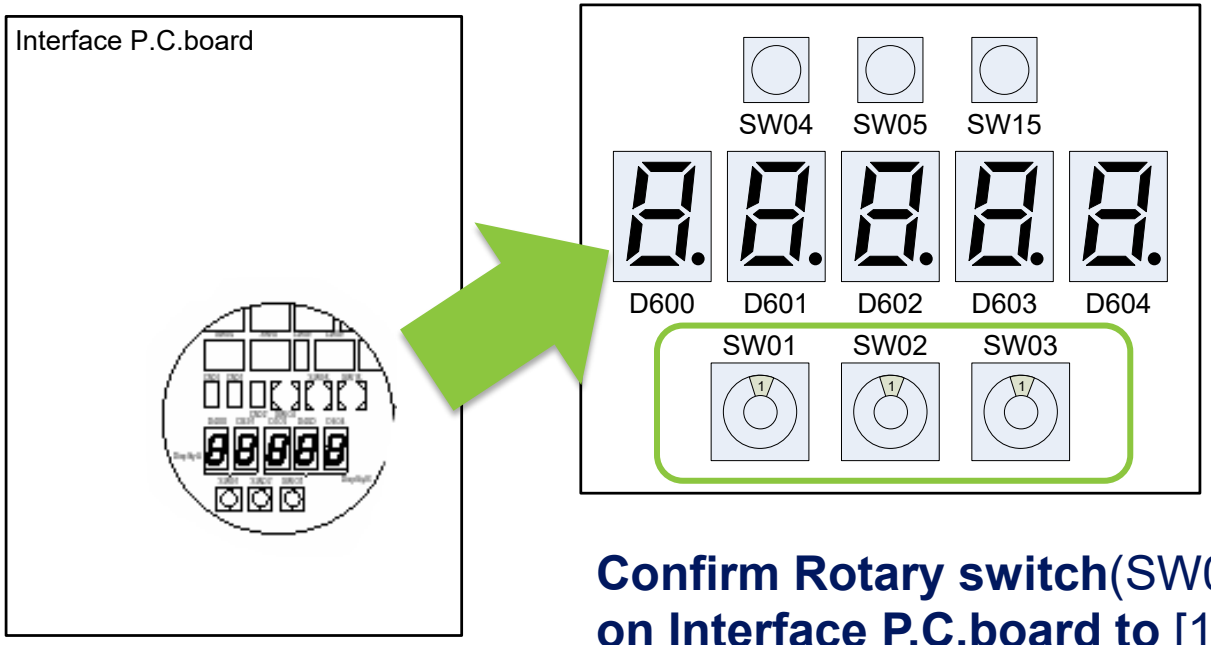
CAUTION

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

START UP

Addressing

CAUTION



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

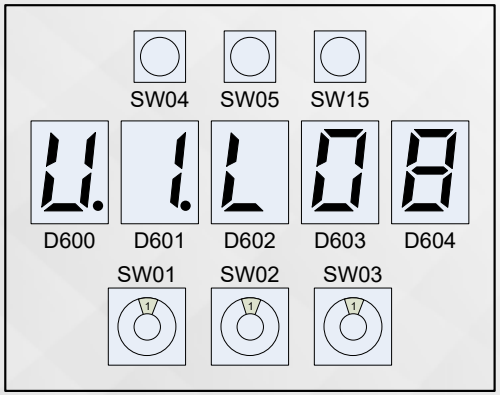
AUTOMATIC ADDRESS SETTING PROCEDURE 1

START UP

Addressing

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.

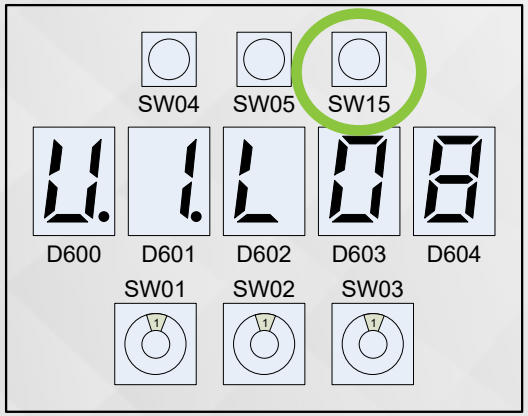
START UP

Addressing

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.

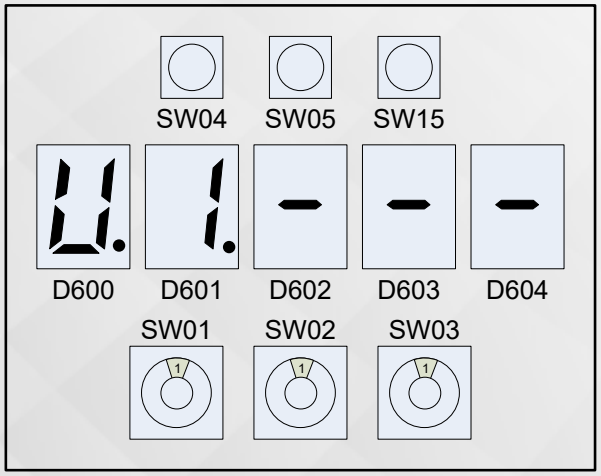


START UP

Addressing

AUTOMATIC ADDRESS SETTING – PROCEDURE 1

STEP 5 ☑ When 7-segment display changes from **[U.1. - - -]** flash to **[U.1. - - -]** steady, Automatic setup finished.

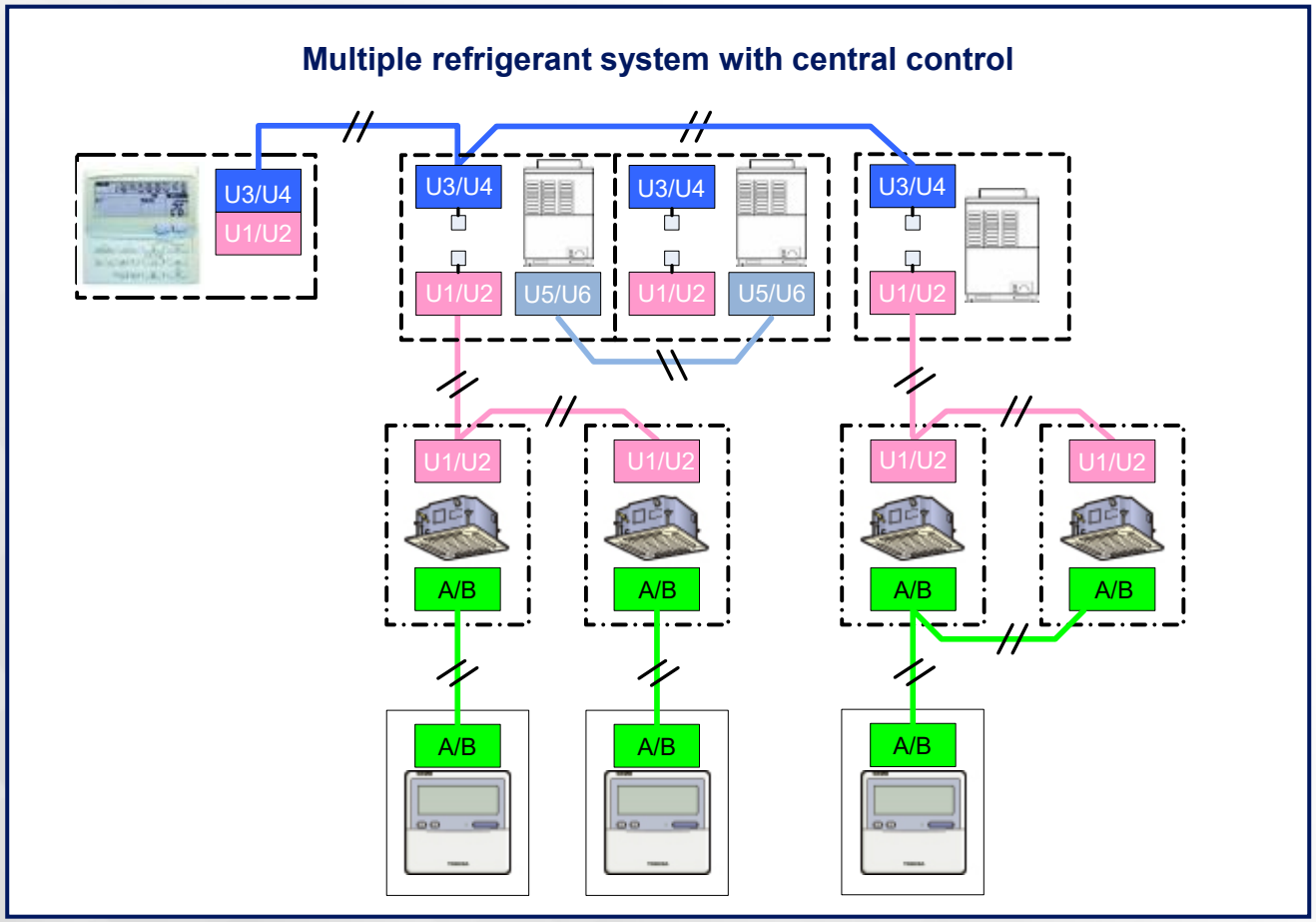


AUTOMATIC ADDRESS SETTING PROCEDURE 2

START UP

Address Setting

AUTOMATIC ADDRESS SETTING – PROCEDURE 2



START UP

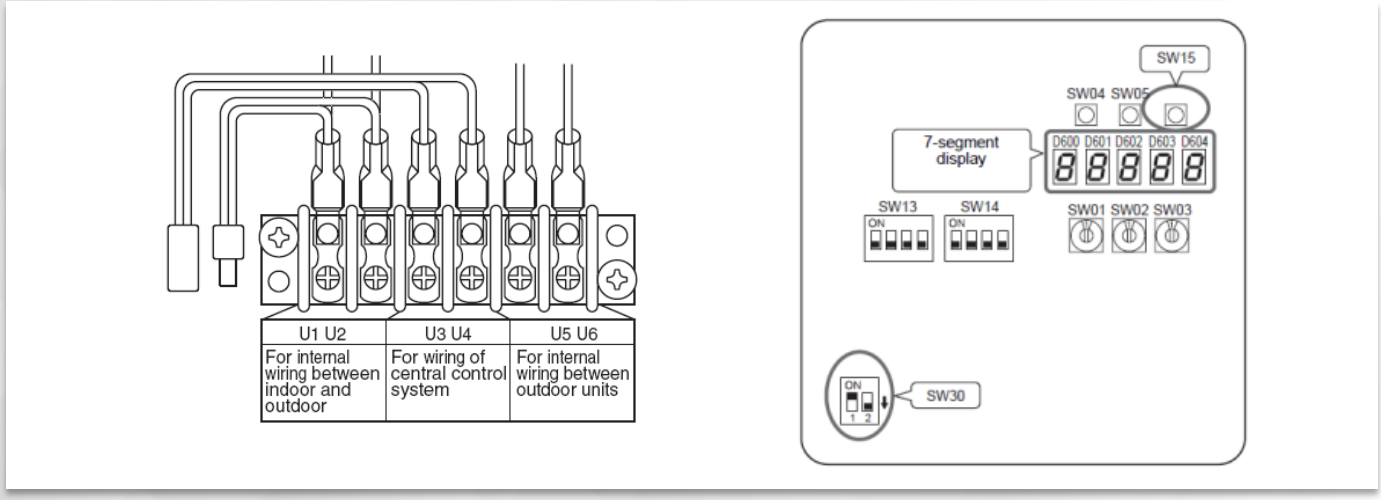
Addressing

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!



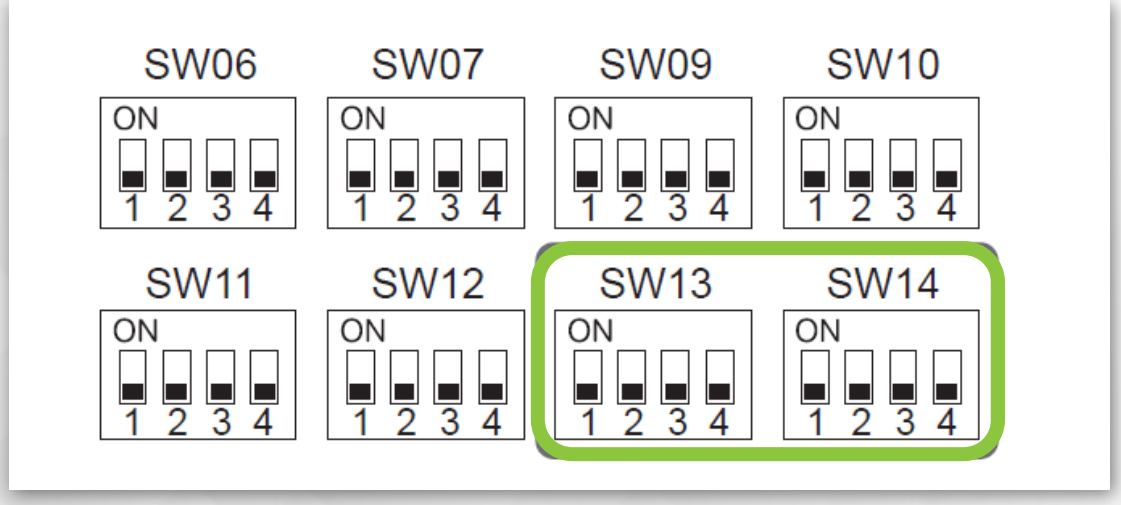
START UP

Addressing

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”

START UP

Addressing

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

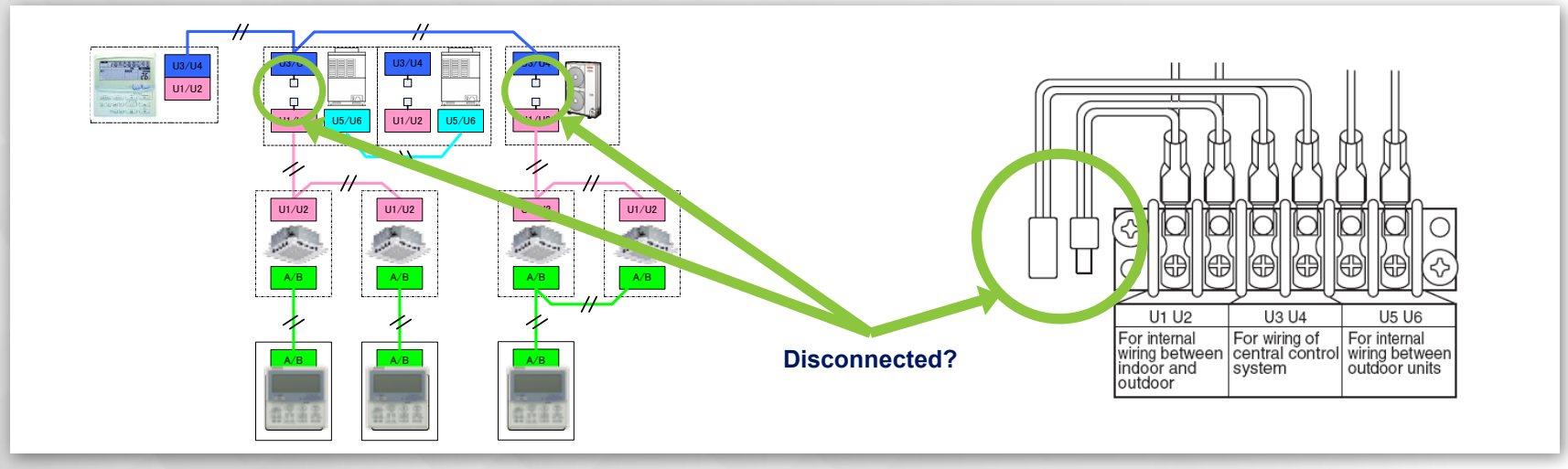
Not used for setup of line address (do not change setup.)

START UP

Addressing

AUTOMATIC ADDRESS SETTING – PROCEDURE 2

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



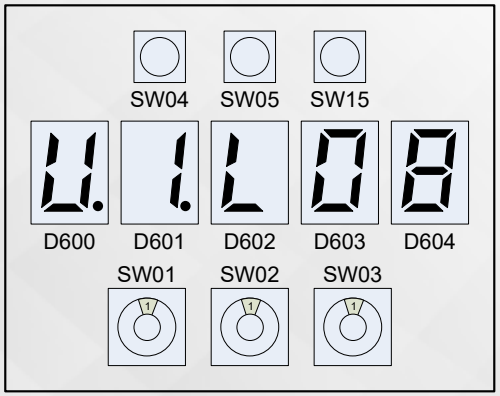
At shipment: Disconnected

START UP

Addressing

AUTOMATIC ADDRESS SETTING – PROCEDURE 2

STEP 3 Turn on the power of 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.

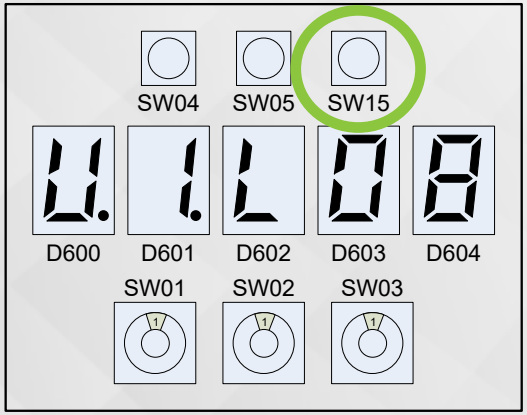
START UP

Addressing

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.

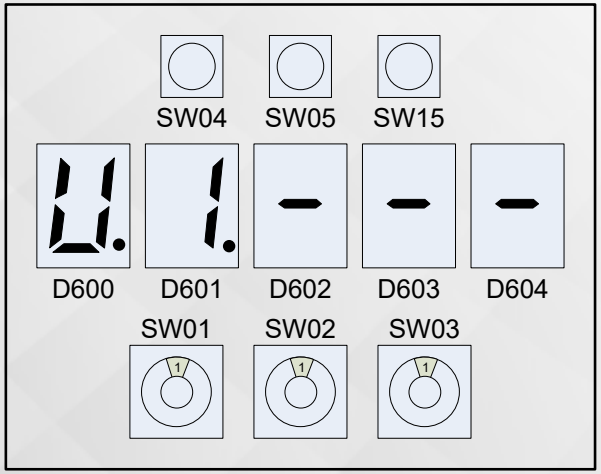


START UP

Addressing

AUTOMATIC ADDRESS SETTING – PROCEDURE 2

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



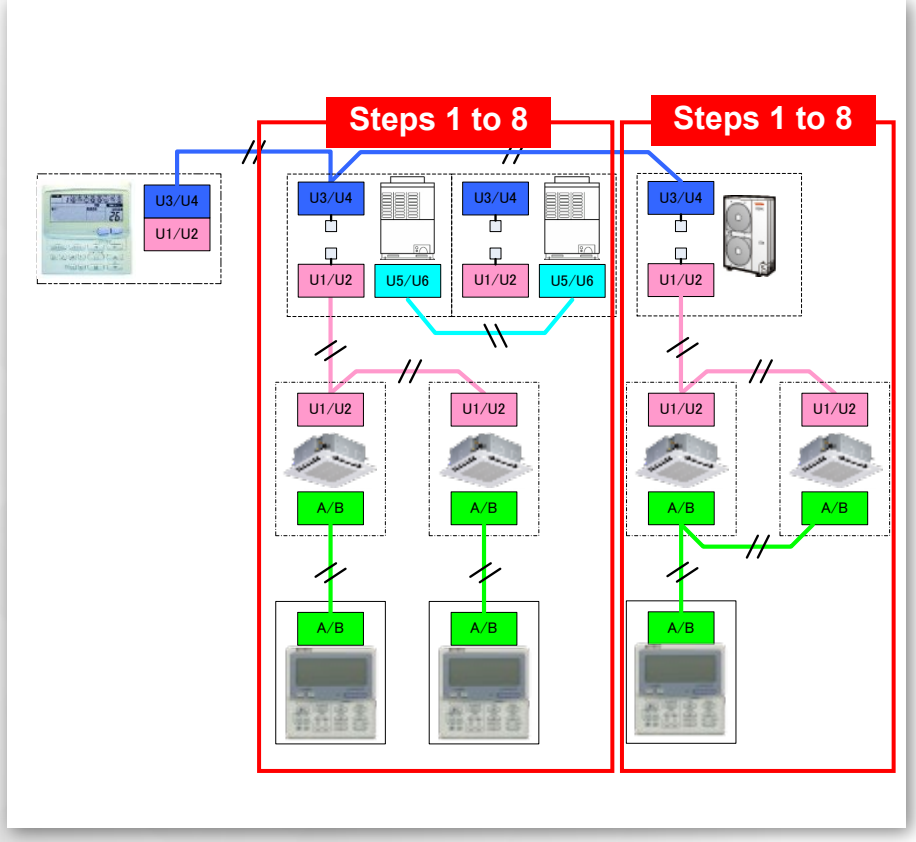
START UP

Addressing

AUTOMATIC ADDRESS SETTING – PROCEDURE 2

STEP 8 ☑

Step 1 to 8 are repeated for other refrigerant system.

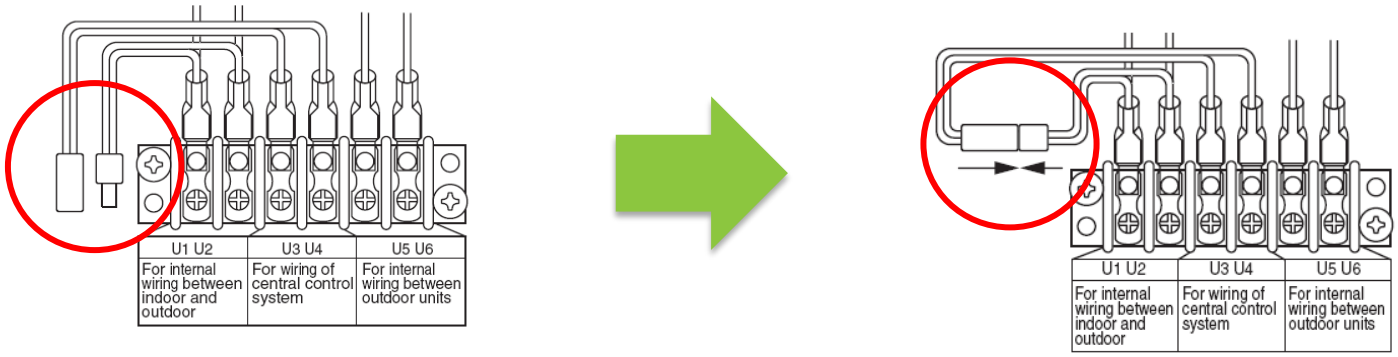


START UP

Address Setting

AUTOMATIC ADDRESS SETTING – PROCEDURE 2

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



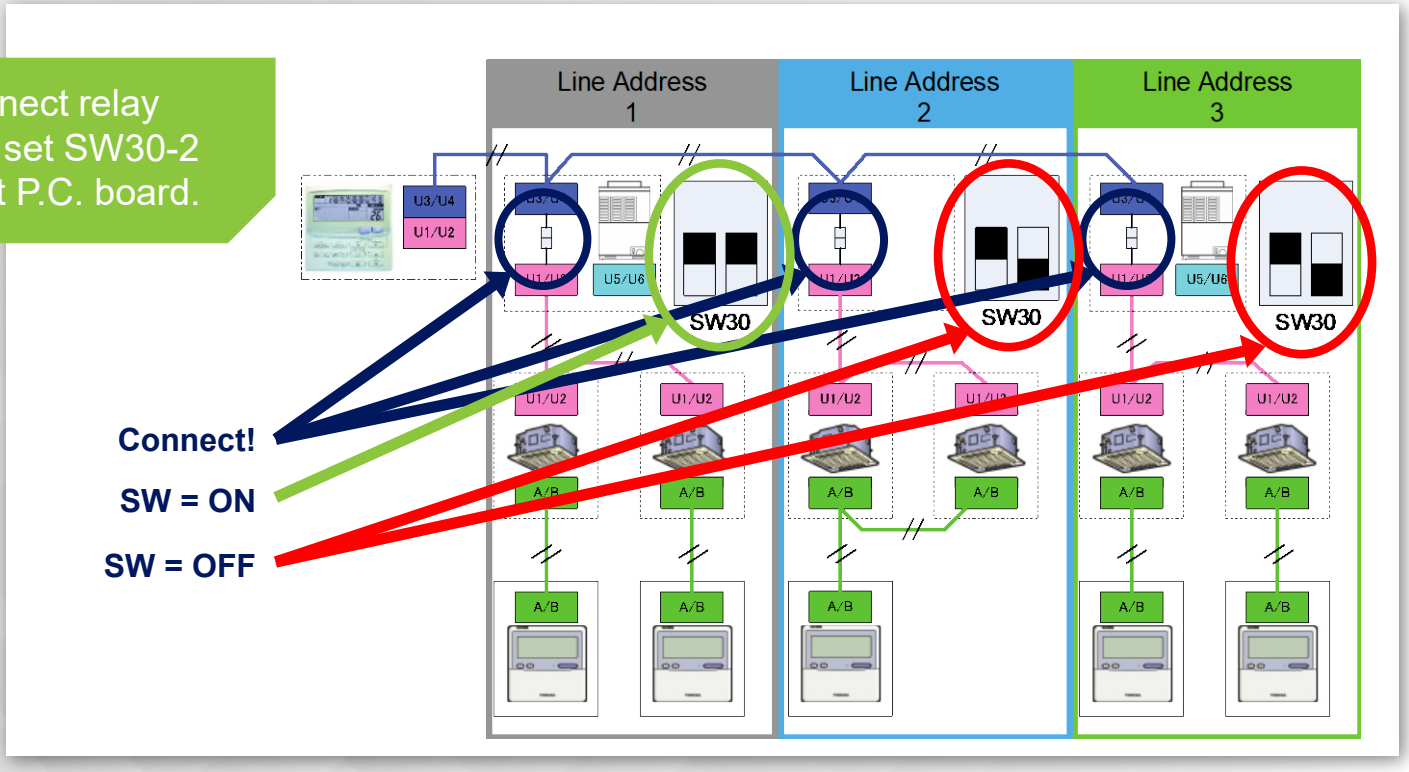
Connect Control Jumper and set SW30-2 for all other refrigerant systems.

START UP

Control Wire/Addressing (Group Address)

CENTRAL CONTROL ADDRESS SETTING CAUTION

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



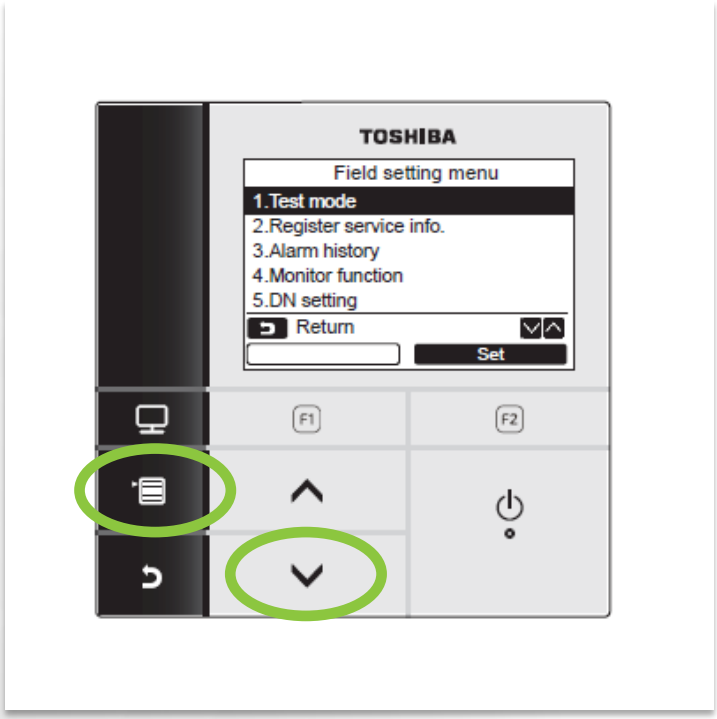
ADDRESSING EXERCISE

START UP

Central Control Address Setting (Group Address)

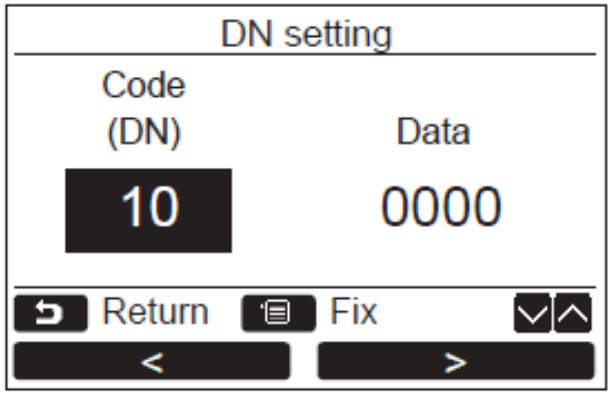
STEP 1

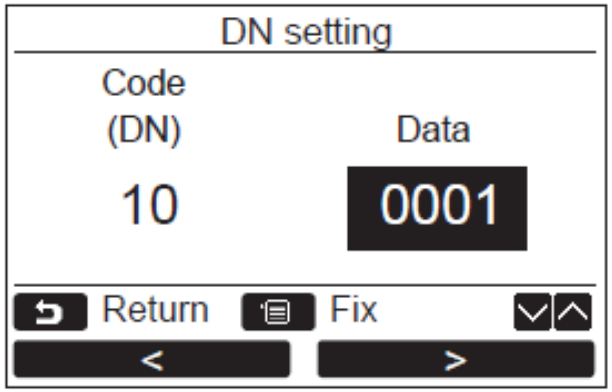
1. Push the  button to display the menu screen.
2. Push and hold the  button and the ⌄ button at the same time to display the “Field setting menu”.
3. Push the  button to return.



START UP

Central Control Address Setting (Group Address)





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”.

START UP

Central Control Address (Group Address)

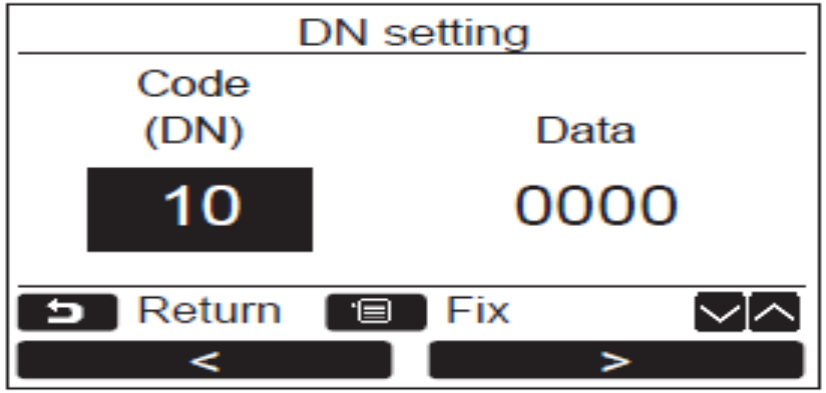
CENTRAL CONTROL ADDRESS SETTING

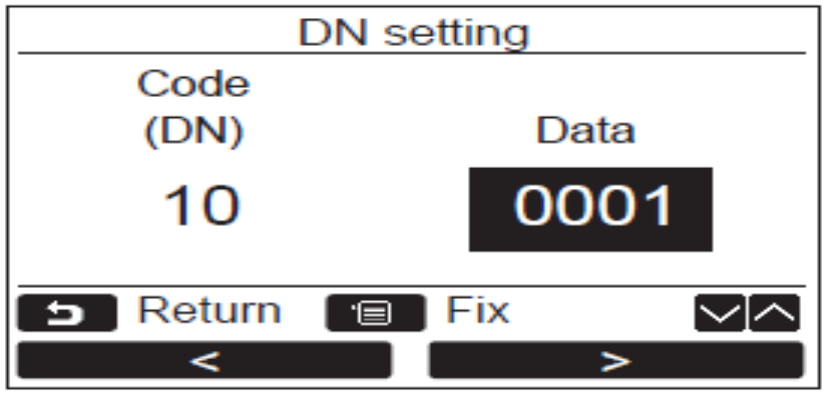
CENTRAL CONTROL Address

STEP 2 Using the buttons, set to the item code ‘03’.

STEP 3 Press the F2 button, use the to change line address.

STEP 4 Push button to fix the changed data.





START UP

Control Wire/Addressing (Group Address)

MANUAL ADDRESS SETTING

STEP 5 ☑ Push ↩ button to exit DN menu.

FINISH

ADDRESSING EXERCISE

1. Allow class to go through the auto addressing procedure on training room systems.

2. Exercise should take about 30 minutes.

5.5

DN CODE SETTING EXERCISE

START UP

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

START UP

DN Code Setting

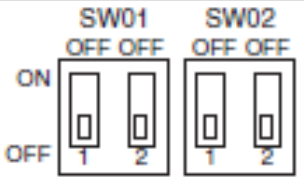
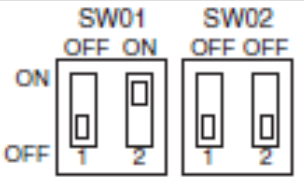
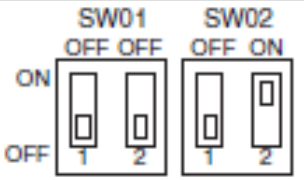
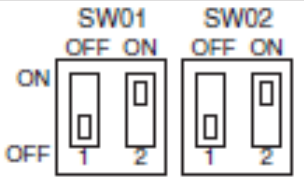
COMMON DN CODES FOR SMMSe AND SHRMe

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

START UP

Ducted Static Pressure Adjustment

MEDIUM STATIC DUCTED TYPE

DN	Item	Description			Atshipment
5d	SET DATA	0000	0001	0003	0006
	External static pressure	0.008psi (55Pa)	0.013psi (90Pa)	0.017psi (120Pa)	0.006psi (40Pa)
		Standard (Factory default)	High static pressure 1	High static pressure 3	Low static pressure
	DIP Switch position				

START UP

Cassette Ceiling Setting

DN	Item	Description	Atshipment
5d	High-ceiling adjustment (Air flow selection)	4-way Cassette	0000: Standard

Value	Type	AP018			AP021, AP024, AP030			AP036, AP042		
	Air flow at outlet	4-Way	3-Way	2-Way	4-Way	3-Way	2-Way	4-Way	3-Way	2-Way
0000	Standard (factory default)	9'2" (2.8)	10'6" (3.2)	11'6" (3.5)	9'10" (3.0)	10'10" (3.3)	11'10" (3.6)	12'10" (3.9)	13'9" (4.2)	14'9" (4.5)
0001	High-ceiling (1)	10'6" (3.2)	11'6" (3.5)	12'6" (3.8)	10'10" (3.3)	11'6" (3.5)	12'6" (3.8)	13'9" (4.2)	14'5" (4.4)	15'1" (4.6)
0003	High-ceiling (3)	11'6" (3.5)	12'6" (3.8)	—	11'10" (3.6)	12'6" (3.8)	—	14'9" (4.5)	15'1" (4.6)	—

Ceiling

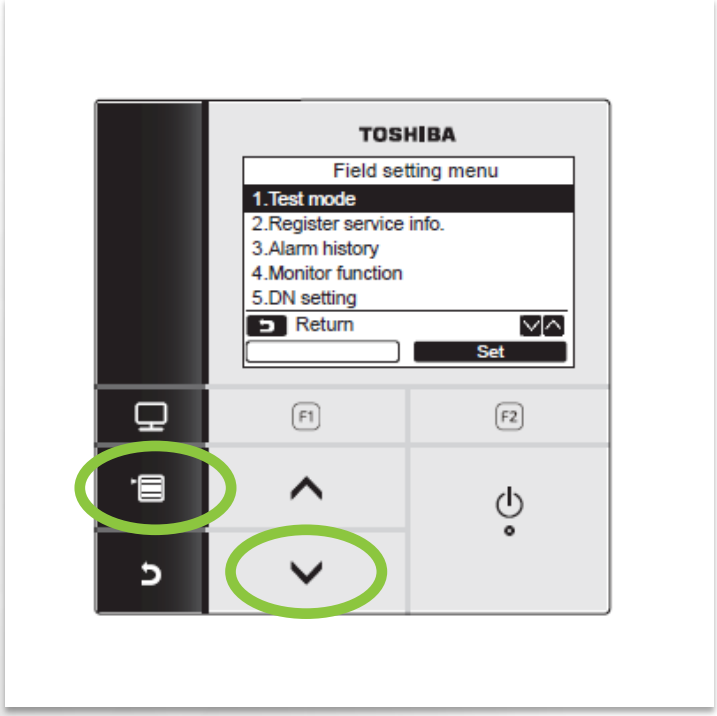
Value	Type	AP015~AP056
0000	Standard (factory default)	11.5 ft (3.5 m) or less
0001	High-ceiling (1)	13 ft (4.0 m) or less

START UP

DN Code Setting

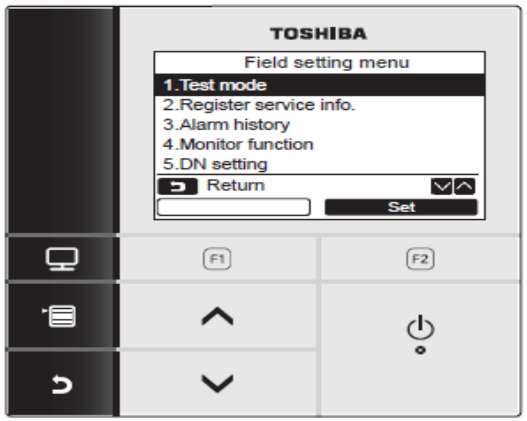
STEP 1

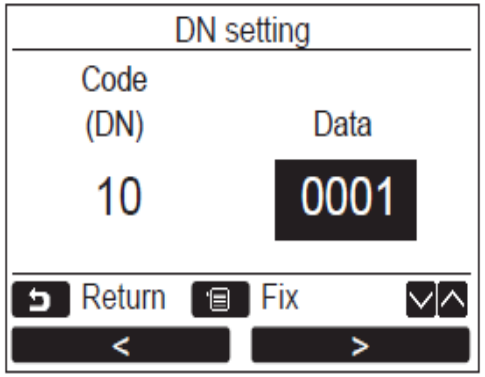
1. Push the  button to display the menu screen.
2. Push and hold the  button and the ⌄ button at the same time to display the “Field setting menu”.
3. Push the  button to return.



START UP

DN Code Setting





1. Push the ^ / v button to select the “5. DN setting” on the “Field setting menu” screen, then push the “Set” F2 button.

The fan and louver of the indoor unit operate. When the group control is used, the fan and louver of the selected indoor unit operate.

Move the cursor to select “DN code” with the “<“ [F1] button, then set “DN code” with the ^ / v button.

Move the cursor to select “data” with the “>“ [F2] button, then set “data” with the ^ / v button.

2. Refer to the Installation Manual supplied with the indoor unit or service manual for details about the DN code and data.

6

TROUBLESHOOTING

TROUBLESHOOTING

Error Codes

We provided an “Inverter box window” for easy access to the control board.

TROUBLESHOOTING

Error Codes

WITHOUT TAKING OFF THE FRONT PANEL

The following functions can be carried out:

- Test run
- Trouble shooting
- Setting changes
- Address setting
- etc.

TROUBLESHOOTING

Error Codes

TROUBLE DIAGNOSIS

Checks and Inspections

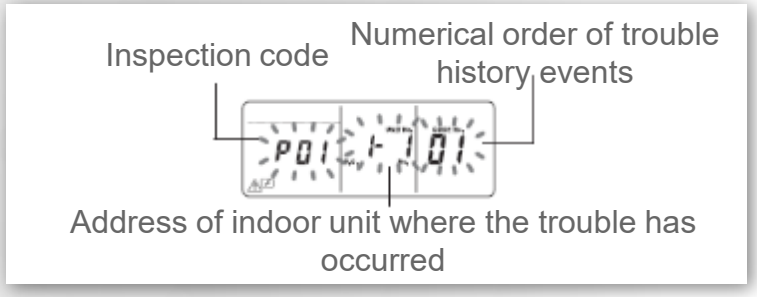
- When trouble has occurred in the air conditioner, an inspection code and the number of the indoor unit concerned blink on the numeric display.

Inspection code — Address of indoor unit where the trouble has occurred

- Inspection codes are displayed only during operation.
- If the display has gone off, check the trouble by following the steps in “Checking the trouble history”

Check the Trouble History

- When trouble has occurred in the air conditioner, the trouble history can be checked by the following steps below. (Up to four events are stored in the trouble history.)
- The trouble history can be checked whether the air conditioner is running or shut down.
- Push the ‘Set’ button (42) and ‘test’ button (43) together for at least 4 seconds.
  - The numeric displays a blink, and the ‘servicing display’ and ‘inspect display’ light.



TROUBLESHOOTING

Error Codes

(Error detected by indoor unit)

Check code	Description of error
E03	Communication from remote controller or network adaptor has been lost (so has central control communication).
E04	Signals are not being received from outdoor unit.
E08	Indoor unit detects address identical to its own.
E10	MCU communication between main controller and motor microcontroller is faulty.
E18	Periodic communication between indoor header and follower units cannot be maintained.
F01	Heat exchanger temperature sensor (TCJ) has been open/short-circuited.
F02	Heat exchanger temperature sensor (TC2) has been open/short-circuited.
F03	Heat exchanger temperature sensor (TC1) has been open/short-circuited.
F10	Ambient temperature sensor (TA) has been open/ short-circuited.
F11	Discharge temperature sensor (TF) has been open/ short-circuited.
F29	Indoor EEPROM is abnormal (some other error may be detected).
L02	In case that outdoor unit model is different (Not corresponded)

Check code	Description of error
L03	There is more than one header unit in group.
L07	There is at least one stand-alone indoor unit to which group control cable is connected.
L08	Address setting has not been performed for one or more indoor units (also detected at outdoor unit end).
L09	Capacity setting has not been performed for indoor unit.
L20	There is duplication in central control address setting.
L30	Unit shutdown has been caused by external error input (CN80).
F17	Open/Short of outside air suction temperature sensor (TOA) was detected.
F18	Open/Short of indoor air suction temperature sensor (TRA) was detected.
P01	Indoor AC fan error is detected (activation of fan motor thermal relay).
P10	Float switch has been activated.
P12	Indoor DC fan error (e.g. overcurrent or lock-up) is detected.
P31	Follower unit cannot be operated due to header unit alarm (E03/L03/L07/L08).

TROUBLESHOOTING

Error Codes

(Error detected by main remote controller)

Check code	Description of error
E01	Signals cannot be received from indoor unit; master remote controller has not been set (including two remote controller control).
E02	Signals cannot be transmitted to indoor unit.
E09	Both remote controllers have been set as master remote controller in two remote controller control (alarm and shutdown for header unit and continued operation for follower unit)

(Error detected by central control device)

Check code	Description of error	Check code	Description of error
C05	Central control device is unable to transmit signal due to duplication of central control device.	—	Multiple network adapters are connected to remote controller communication line.
C06	Central control device is unable to receive signal.	P30	Group follower unit is faulty (unit No. and above detail [***] displayed on main remote controller)
C12	Device connected to general-purpose device control interface for TCC-LINK is faulty.		

Note) The same error, e.g. a communication error, may result in the display of different check codes depending on the device that detects it.
Moreover, check codes detected by the main remote controller/central control device do not necessarily have a direct impact on air conditioner operation.

TROUBLESHOOTING

Error Codes

(Errors detected by IPDU featuring in SMMS-i standard outdoor unit - typical examples)

Check code	Description of error	Check code	Description of error
F13	Temperature sensor built into indoor IGBT (TH) has been open/short-circuited.	P04	High-pressure SW is activated.
H01	Inverter current (Idc) detection circuit detects overcurrent.	P07	Temperature sensor built into IGBT (TH) detects overheating.
H02	Compressor lockup is detected	P22	Outdoor fan IPDU detects error.
H03	Abnormal current is detected while inverter compressor is turned off.	P26	Short-circuit protection for compressor motor driver circuit components is activated (momentary overcurrent).
		P29	Compressor motor position detection error is detected.

Note) The above check codes are examples only, and different check codes may be displayed depending on the outdoor unit configuration (e.g. a Super Modular multi system). For details, see the service manual for the outdoor unit.

TROUBLESHOOTING

Error Codes

Check code	Description of error
E06	Indoor unit initially communicating normally fails to return signal (reduction in number of indoor units connected).
E07	Signal cannot be transmitted to indoor units (→ indoor units left without communication from outdoor unit).
E08	More than one indoor unit is assigned same address (also detected at indoor unit end).
E12	• Indoor automatic address setting is started while automatic address setting for equipment in other refrigerant line is in progress. • Outdoor automatic address setting is started while automatic address setting for indoor units is in progress.
E15	Indoor unit fails to communicate while automatic address setting for indoor units is in progress.
E16	Combined capacity of indoor units is too large (more than 125% of combined capacity of outdoor units).
E19	There is no or more than one outdoor header unit in one refrigerant line.
E20	Indoor unit from other refrigerant line is detected while indoor automatic address setting is in progress.
E23	Signal cannot be transmitted to other outdoor units.
E25	There is duplication in outdoor addresses set manually.

Check code	Description of error
H05	Wiring/installation error or detachment of outdoor discharge temperature sensor (TD1) has been detected.
H06	Low pressure (Ps) sensor detects abnormally low operating pressure.
H07	Temperature sensor for oil level detection (TK1-5) detects abnormally low oil level.
H08	Temperature sensor for oil level detection (TK1-5) has been open/short-circuited.
H15	Wiring/installation error or detachment of outdoor discharge temperature sensor (TD2) has been detected.
H16	No temperature change is detected by temperature sensor for oil level detection (TK1-5) despite compressor having been started.
H25	Wiring/installation error or detachment of outdoor discharge temperature sensor (TD3) has been detected.
L04	Identical refrigerant line address has been assigned to outdoor units belonging to different refrigerant piping systems.
L06	More than one indoor unit has been set up as priority indoor unit.
L08	Address setting has not been performed for one or more indoor units (also detected at indoor end).
L10	Outdoor unit capacity has not been set (after P.C. board replacement).

TROUBLESHOOTING

Error Codes

E26	Follower outdoor unit initially communicating normally fails to do so (reduction in number of follower outdoor units connected).
E28	Outdoor header unit detects fault relating to follower outdoor unit (detail displayed on follower outdoor unit).
E31	There is no communication between IPDUs (P.C. boards) in inverter box. Outdoor I/F board error When power supply was turned on within 30 seconds (before electric discharge of capacitor) after power supply was reset
F04	Outdoor discharge temperature sensor (TD1) has been open/short-circuited.
F05	Outdoor discharge temperature sensor (TD2) has been open/short-circuited.
F06	Outdoor heat exchanger temperature sensors (TE1, TE2) have been open/short-circuited.
F07	Outdoor liquid temperature sensor (TL) has been open/short-circuited.
F08	Outdoor outside air temperature sensor (TO) has been open/short-circuited.
F12	Outdoor suction temperature sensor (TS1, TS2) has been open/short-circuited.
F15	Wiring error in outdoor temperature sensors (TE1, TL) has been detected.
	board replacement).
L17	Old model outdoor unit (prior to 3 series) has been connected.
L18	Cooling/heating cycle error resulting from piping error is detected.
L28	More than 4 outdoor units have been connected.
L29	There are insufficient number of IPDUs (P.C. boards) in inverter box.
L30	Indoor unit has been shut down for external error input in one refrigerant line (detected by indoor unit).
L31	—
P03	Outdoor discharge temperature sensor (TD1) has detected abnormally high temperature.
P05	Open phase is detected when power is turned on. Inverter DC voltage is too high (overvoltage) or too low (undervoltage).
P07	Temperature sensor built into IGBT (TH) detects overheating.
P10	Indoor unit has been shutdown in one refrigerant line due to detection of overflow (detected by indoor unit).
P13	State of refrigerant cycle circuit indicates liquid backflow operation.
P15	Outdoor suction temperature sensor (TS1) detects sustained and repeated high temperatures that exceed standard value.

TROUBLESHOOTING

Error Codes

			exceed standard value.
F16	Wiring error in outdoor pressure sensors (Pd, Ps) has been detected.	P17	Outdoor discharge temperature sensor (TD2) detects abnormally high temperature.
F22	Outdoor discharge temperature sensor (TD3) has been open/short-circuited.	P18	Outdoor discharge temperature sensor (TD3) detects abnormally high temperature.
F23	Output voltage of low pressure sensor (Ps) is zero.	P19	Abnormality in refrigerating cycle is detected during heating operation.
F24	Output voltage of high pressure sensor (Pd) is zero or provides abnormal readings when compressors have been turned off.	P20	High pressure (Pd) sensor detects high pressure that exceeds standard value.
F31	Outdoor EEPROM is faulty (alarm and shutdown for header unit and continued operation for follower unit)		

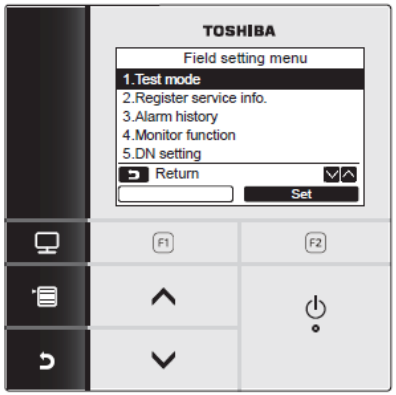
TROUBLESHOOTING

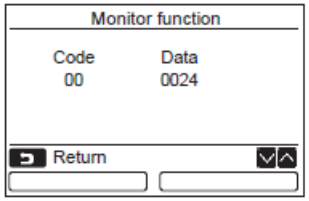
Monitoring

STEP 1 Select the Monitor function from the field setting menu.

STEP 2 Using the ^ v buttons, select the item code to be monitored.

RBC-AMS51E-EN





TROUBLESHOOTING

Monitoring

Monitor item code table(1)

	CODE No.	Data name	Display format	Unit	Remote controller display example
Indoor unit data *2	00	Room temperature (During control)	×1	°C	[0027]=27 °C
	01	Room temperature (Remote controller)	×1	°C	
	02	Indoor suction temperature (TA)	×1	°F	[0080]=80 °F
	03	Indoor coil temperature (TCJ)	×1	°F	
	04	Indoor coil temperature (TC2)	×1	°F	
	05	Indoor coil temperature (TC1)	×1	°F	
	06	Indoor discharge temperature (TF) *1	×1	°F	
	08	Indoor PMV opening	×1/10	pls	[0150]=1500 pulse
System data	0A	No. of connected indoor units	×1	unit	[0024]=24 units
	0B	Total capacity of connected indoor units	×10	ton	[0215]=21.5 ton
	0C	No. of connected outdoor units	×1	unit	[0002]=2 units
	0D	Total capacity of outdoor units	×10	ton	[0160]=16 ton

TROUBLESHOOTING

Monitoring

Monitor item code table(1)

	CODE No.		Data name	Display format	Unit	Remote controller display example
	U1	U2				
Outdoor unit individual data 1 *3	10	20	High-pressure sensor detention pressure (Pd)	×10	psi	[4350]=435 psi
	11	21	Low-pressure sensor detention pressure (Ps)	×10	psi	
	12	22	Compressor 1 discharge temperature (Td1)	×1	°F	[0080]=80 °F
	13	23	Compressor 2 discharge temperature (Td2)	×1	°F	
	14	24	Compressor 3 discharge temperature (Td3)	×1	°F	
	15	25	Suction temperature (TS)	×1	°F	
	16	26	Outdoor coil temperature 1 (TE1)	×1	°F	
	17	27	Outdoor coil temperature 2 (TE2)	×1	°F	
	18	28	Temperature at liquid side (TL)	×1	°F	
	19	29	Outside ambient temperature (TO)	×1	°F	
	1A	2A	PMV1 + 2 opening	×1	pls	[0500]=500 pulse
	1B	2B	PMV4 opening	×1	pls	
	1C	2C	Compressor 1 current (I1)	×10	A	[0135]=13.5 A
	1D	2D	Compressor 2 current (I2)	×10	A	
	1E	2E	Compressor 3 current (I3)	×10	A	
	1F	2F	Outdoor fan current (IFan)	×10	A	

TROUBLESHOOTING

Monitoring

Monitor item code table(2)

	CODE No. U1	CODE No. U2	Data name	Display format	Unit	Remote controller display example
Outdoor unit individual data 2 *4	50	60	Compressor 1 revolutions	×10	rps	[0642]=64.2 rps
	51	61	Compressor 2 revolutions	×10	rps	
	52	62	Compressor 3 revolutions	×10	rps	
	53	63	Outdoor fan mode	×1	mode	[0058]= 58 mode
	54	64	Compressor IPDU 1 heat sink temperature	×1	°F	[0080]=80 °F
	55	65	Compressor IPDU 2 heat sink temperature	×1	°F	
	56	66	Compressor IPDU 3 heat sink temperature	×1	°F	
	57	67	Outdoor fan IPDU heat sink temperature	×1	°F	
	58	-	Heating/cooling recovery controlled *5	0: Normal 1: Recovery controlled		[0010]=Heating recovery controlled [0001]=Cooling recovery controlled
	59	-	Pressure release *5	0: Normal 1: Release controlled		[0010]=Pressure release controlled
	5A	-	Discharge temperature release *5			[0001]=Discharge temperature release controlled
	5B	-	Follower unit release (U2/U2/U4 outdoor units) *5			[0100]=U2 outdoor unit release controlled [0010]=U3 outdoor unit release controlled [0001]=U4 outdoor unit release controlled
	5F	6F	Outdoor unit capacity	×10	ton	[0080]=8 ton

1. Only part of indoor unit types is installed with the discharge temperature sensor. This temperature is not displayed for other types.
2. When the units are connected to a group, data of the header indoor unit only can be displayed.
3. The first digit of an CODE No. indicates the outdoor unit number.
4. The upper digit of an CODE No. -4 indicates the outdoor unit number.
   1*5*… U1 outdoor unit (header unit)
   2*6*…U2 outdoor until (Follower until 1)
5. Only the CODE No. 5* of U1 outdoor unit (header unit) is displayed.

TROUBLESHOOTING

Monitoring

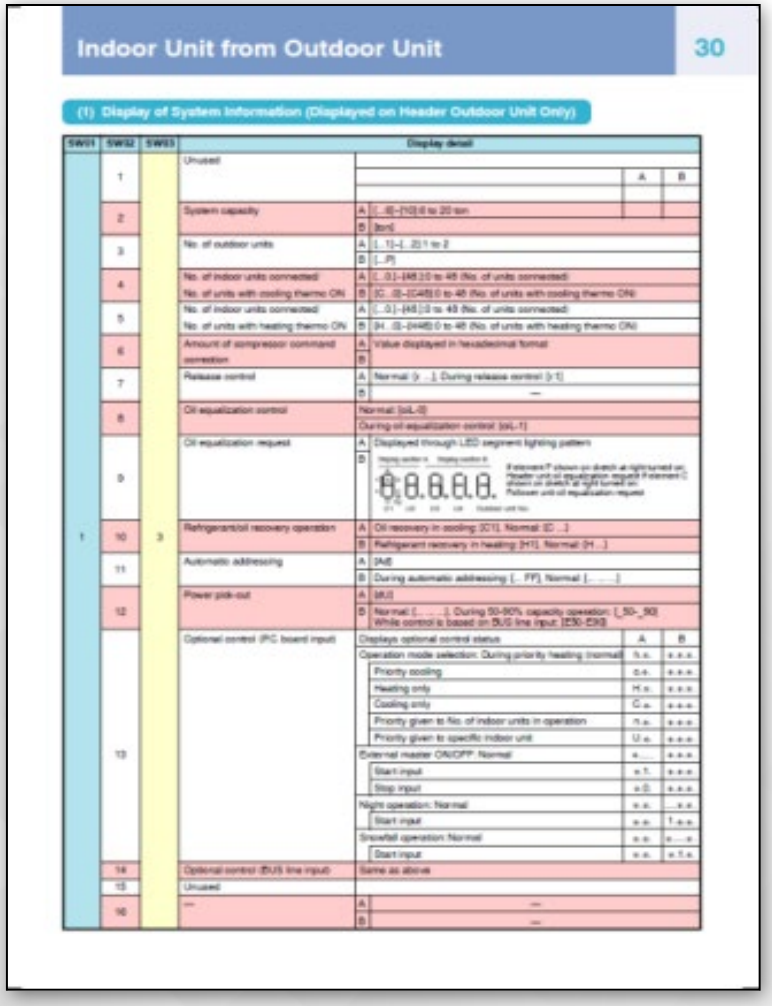
STEP 3 ☑ Push ‘Return’ button to finish the monitor function.

FINISH

‘Return’ button

TROUBLESHOOTING

Monitoring



Indoor Unit from Outdoor Unit 30

(1) Display of System Information (Displayed on Header Outdoor Unit Only)

SW01	SW02	SW03	Display detail		A	B
1	1	3	Unused			
	2		System capacity	A [...6]–[10]:6 to 20 ton		
				B [ton]		
	3		No. of outdoor units	A [...1]–[...2]:1 to 2		
				B [...P]		
	4		No. of indoor units connected	A [...0]–[48]:0 to 48 (No. of units connected)		
			No. of units with cooling thermo ON	B [C...0]–[C48]:0 to 48 (No. of units with cooling thermo ON)		
	5		No. of indoor units connected	A [...0]–[H48]:0 to 48 (No. of units connected)		
			No. of units with heating thermo ON	B [H...0]–[H48]:0 to 48 (No. of units with heating thermo ON)		
	6		Amount of compressor command correction	A Value displayed in hexadecimal format		
				B		
	7		Release control	A Normal: [r...]; During release control: [r.1]		
				B —		
	8		Oil equalization control	Normal: [oiL.0]		
				During oil equalization control: [oiL.1]		
	9		Oil equalization request	A Displayed through LED segment lighting pattern		
				B		
	10		Refrigerant/oil recovery operation	A Oil recovery in cooling: [C1]; Normal: [C ...]		
				B Refrigerant recovery in heating: [H1]; Normal: [H ...]		
	11		Automatic addressing	A [Ad]		
				B During automatic addressing: [... FF]; Normal: [... ....]		
	12		Power pick-out	A [dU]		
				B Normal: [... ....]; During 50-90% capacity operation: [_50-_90] While control is based on BUS line input: [E50-E90]		
	13		Optional control (PC board input)	Displays optional control status	A	B
				Operation mode selection: During priority heating (normal)	h.s.	s.s.s.
				Priority cooling	C.s.	s.s.s.
				Heating only	H.s.	s.s.s.
				Cooling only	C.s.	s.s.s.
				Priority given to No. of indoor units in operation	n.s.	s.s.s.
				Priority given to specific indoor unit	U.s.	s.s.s.
				External master ON/OFF: Normal	s....	s.s.s.
				Start input	s.1.	s.s.s.
				Stop input	s.0.	s.s.s.
				Night operation: Normal	s.s.	...s.s.
				Start input	s.s.	1.s.s.
				Snowfall operation: Normal	s.s.	s....s
				Start input	s.s.	s.1.s.
	14		Optional control (BUS line input)	Same as above		
	15		Unused			
	16		—	A —		
				B —		

TROUBLESHOOTING

DYNA Doctor

NOW THAT WE HAVE A COMPLETED SYSTEM INSTALLED AND HAVE VERIFIED/SET

- Piping lengths
- Proper insulation thickness
- Pressure tested
- Condensate heights, fall (slope)
- Evacuated below 500 microns
- Added the additional refrigerant (found on the selection report) and opened the service valves
- Wiring
- Power verified and on at the ODU for 24 hrs.
- Communication wiring connections and wire size
- Set applicable DN code
- Made any necessary air flow adjustment

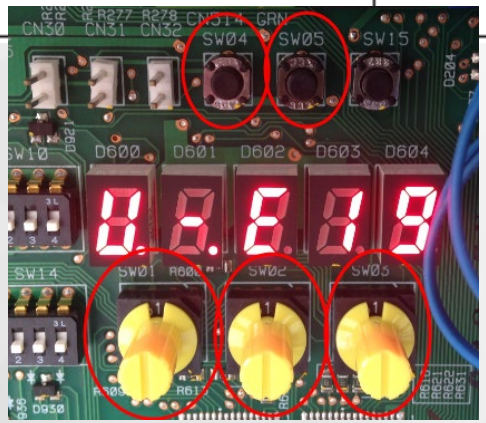
You are now ready to hook up Dyna Doctor and record 60 minutes of test run in heating and cooling modes (60 minutes is recommended to allow the system to balance and to get reading in both heating and cooling modes)

TROUBLESHOOTING

DYNA Doctor

The following functions of the indoor unit can start or stop by the switches on the interface P.C. board of the header unit.

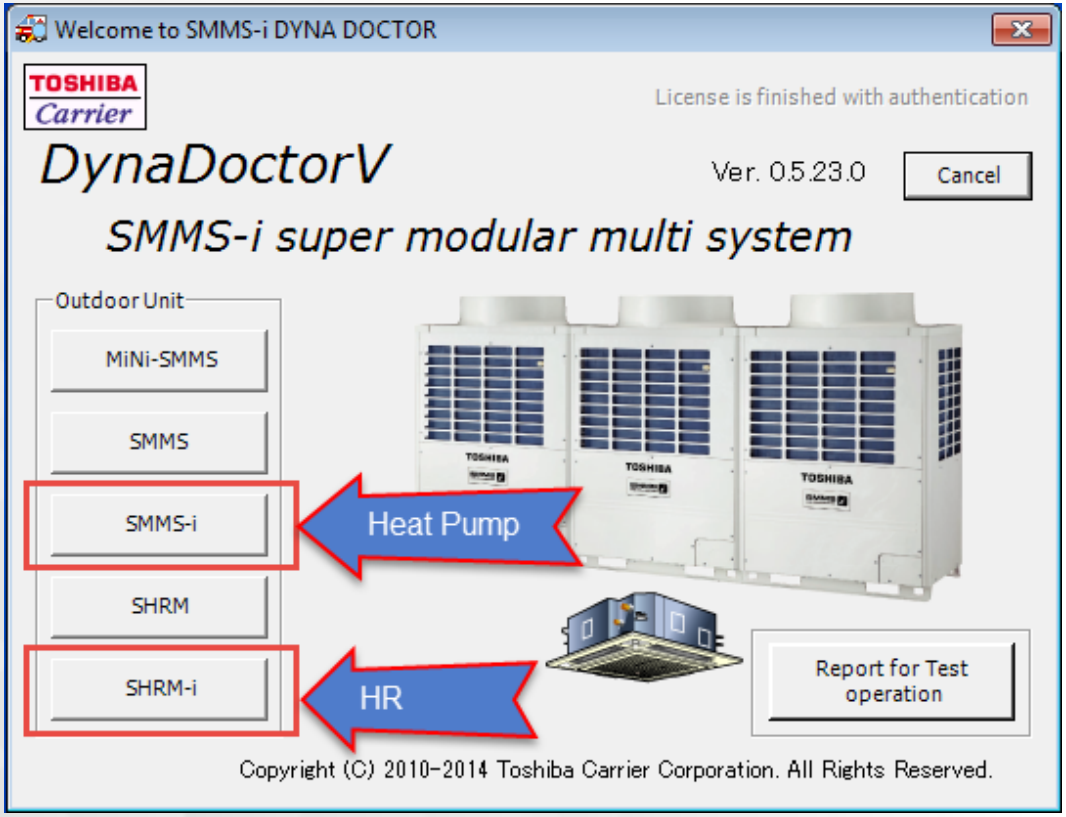
No.	Function	Outline	Setup/Release	7-segment display	
1	All cooling test operation	Changes the mode of all the connected indoor units collectively to cooling test operation. Note) Control operation same as usual test operation from remote control is performed.	[Setup] Set SW01/SW02/SW03 to [2/5/1], and push SW04 for 2 seconds or more. [Release] Return SW01/SW02/SW03 to [1/1/1].	Section A [C.]	Section B [– C]
2	All heating test operation	Changes the mode of all the connected indoor units collectively to heating test operation. Note) Control operation same as usual test operation from remote control is performed.	[Setup] Set SW01/SW02/SW03 to [2/6/1], and push SW04 for 2 seconds or more. [Release] Return SW01/SW02/SW03 to [1/1/1].	Section A [H.]	Section B [– H]



TROUBLESHOOTING

DYNA Doctor

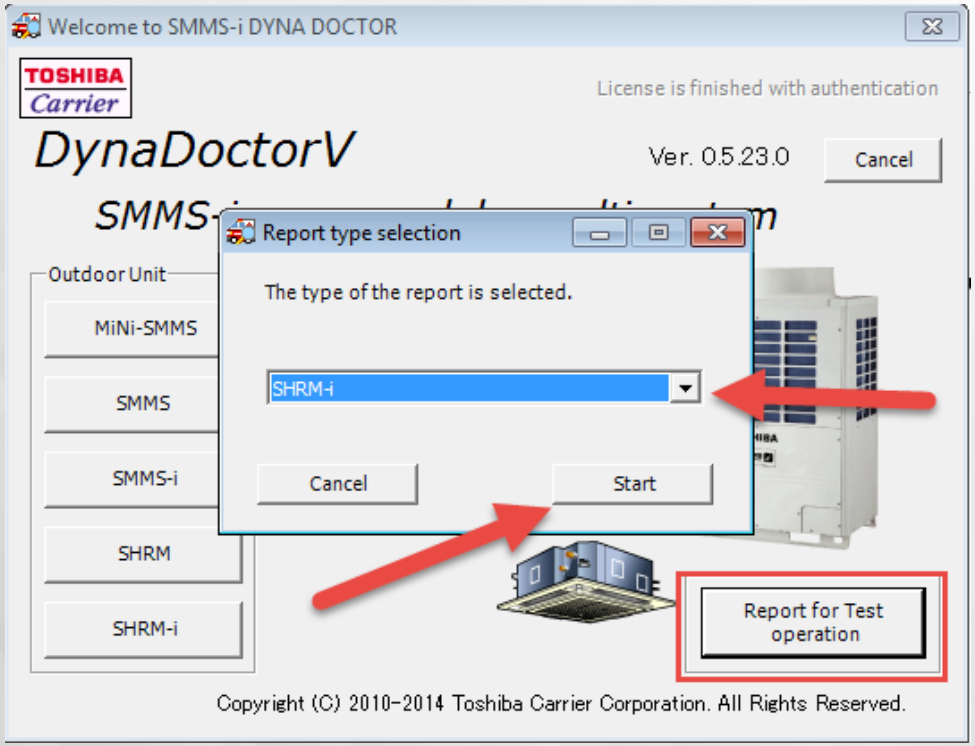
You should now have dyna doctor connected to the Header unit and recording the test data while evaluating the data to assure the system is functioning properly



TROUBLESHOOTING

DYNA Doctor

RECOMMEND CREATING A REPORT FOR THE TEST OPERATION



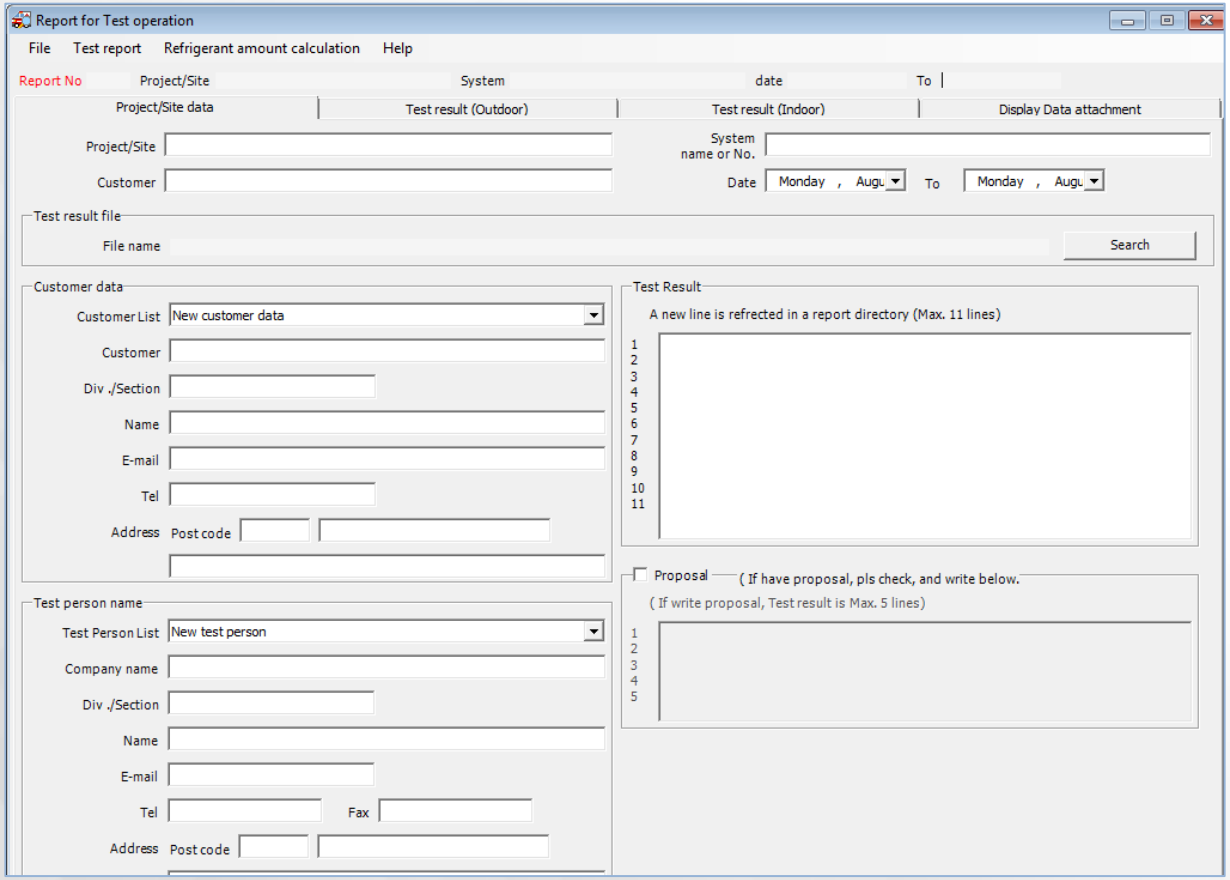
This is great for your records and to supply to Toshiba Carrier field service teams if there is ever an issue on site.

1. Click on Report for test operation
2. Click on the drop down arrow and pick the type of system
3. Click Start

TROUBLESHOOTING

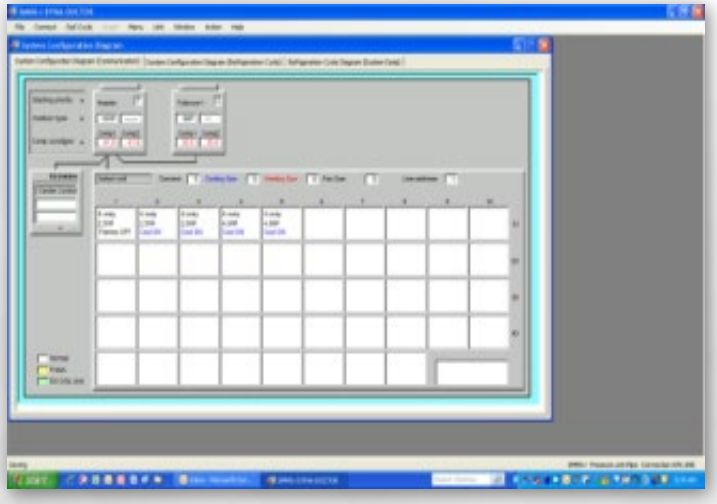
DYNA Doctor

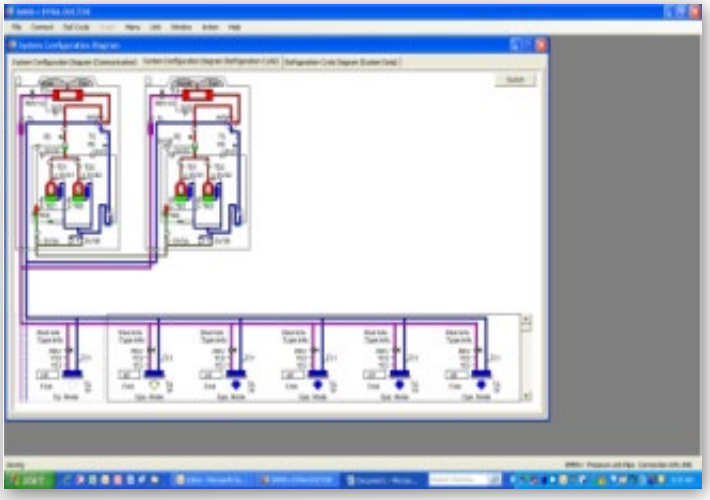
Fill in all the field for your report when complete and the test run has completed; save to your job file along with the recorded data.

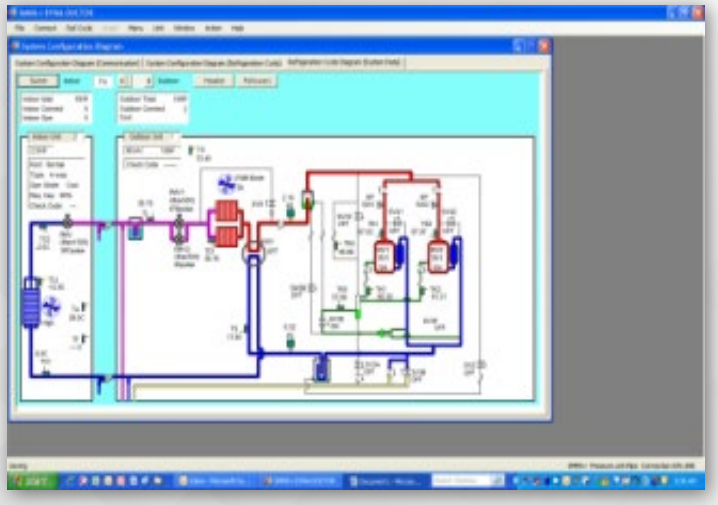


TROUBLESHOOTING

DYNA Doctor

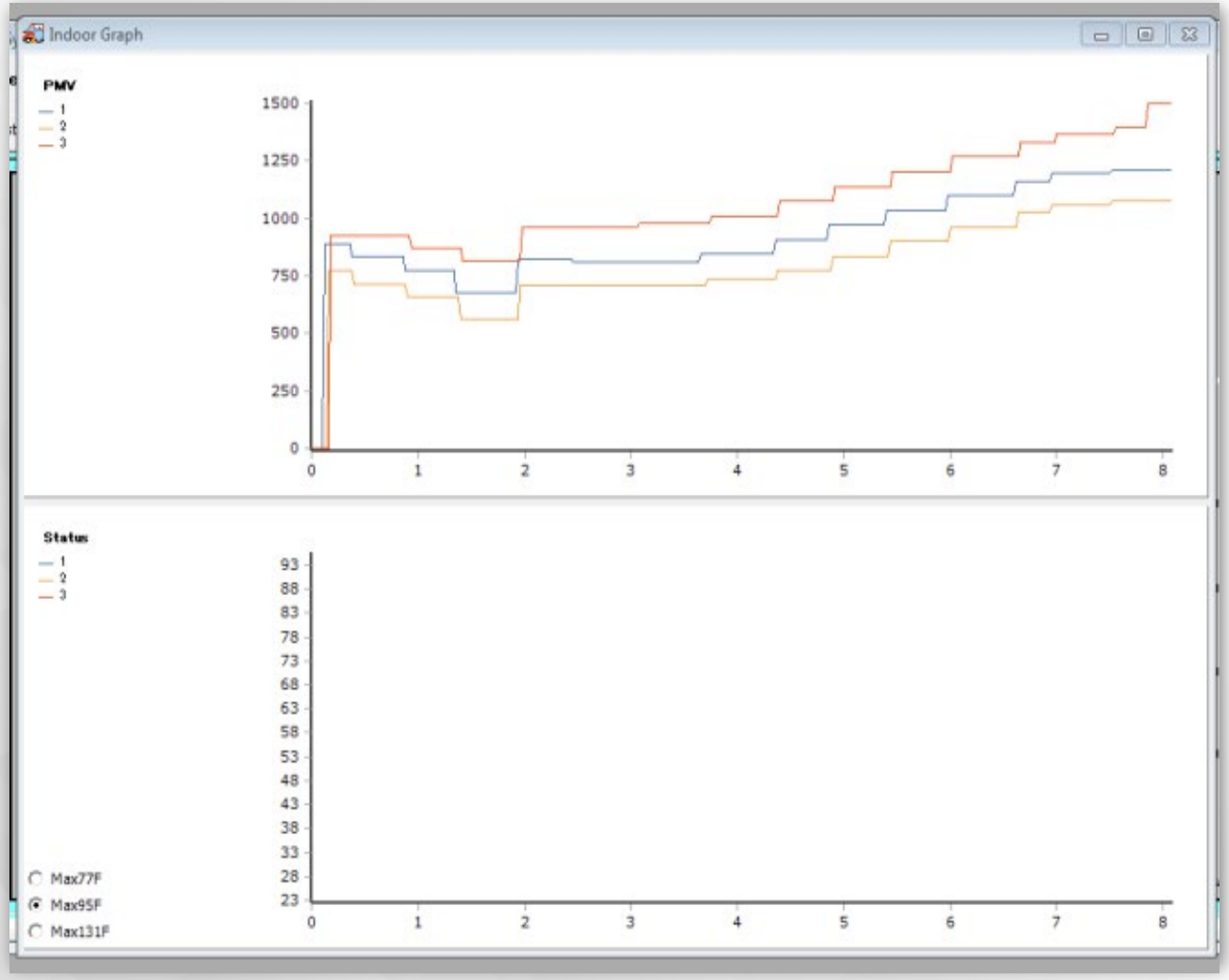






TROUBLESHOOTING

DYNA Doctor



6.5

DYNA DOCTOR LIVE DEMO

THANK YOU!