MITSUBISHI ELECTRIC

*Changes for the Better*

AIR TO WATER HEAT PUMP SYSTEMS

Mitsubishi Electric Quality

ecodan

Renewable Heating Technology

# DATA BOOK

**Vol.4.1**

for a greener tomorrow

eco Changes

| Model Name | | | | PUHZ-SHW140YHA(-BS) | PUHZ-SHW230YKA2 |
|---|---|---|---|---|---|
| Power supply (phase, cycle, voltage) | | | | 3φ, 400V, 50Hz | 3φ, 400V, 50Hz |
| | Max. current | | A | 13.0 | 20.0 |
| Breaker size | | | A | 16 | 25 |
| Outer casing | | | | Galvanized plate | Galvanized plate |
| External finish | | | | Munsell 3Y 7.8/1.1 | Munsell 3Y 7.8/1.1 |
| Refrigerant control | | | | Linear expansion valve | Linear expansion valve |
| Compressor | | | | Hermetic scroll | Hermetic scroll |
| | Model | | | ANB33FJQMT | ANB66FJNMT |
| | Motor output | | kW | 2.5 | 4.7 |
| | Start type | | | Inverter | Inverter |
| | Protection devices | | | HP switch<br>LP switch<br>Discharge thermo<br>Comp. Surface thermo | HP switch<br>LP switch<br>Discharge thermo<br>Comp. Surface thermo<br>Orver current detection |
| | Oil (Model) | | L | 1.40 (FVC68D) | 1.70 (FV50S) |
| Crankcase heater | | | W | - | - |
| Heat exchanger | | Air | | Plate fin coil | Plate fin coil |
| | | Water | | - | - |
| Fan | Fan(drive) x No. | | | Propeller fan ×2 | Propeller fan ×2 |
| | Fan motor output | | kW | 0.074 ×2 | 0.150 ×2 |
| | Air flow | | $m^3$/min(CFM) | 100 (3,530) | 140 (4,940) |
| Defrost method | | | | Reverse cycle | Reverse cycle |
| Noise level (SPL) | | Heating | dB(A) | 52 | 59 |
| | | Cooling | dB(A) | 51 | 58 |
| Noise level (PWL) | | Heating | dB(A) | 70 | 75 |
| Dimensions | | Width | mm(in) | 950 (37-3/8) | 1050 (41-5/16) |
| | | Depth | mm(in) | 330+30 (13+1-3/16) | 330+30 (13+1-3/16) |
| | | Height | mm(in) | 1350 (53-1/8) | 1338 (52-11/16) |
| Weight | | | kg(lbs) | 134 (296) | 143(315) |
| Refrigerant (GWP) | | | | R410A (1975) | R410A (1975) |
| | | Quantity | kg(lbs) | 5.5 (12.1) | 7.1 (15.7) |
| Pipe size O.D. | | Liquid | mm(in) | 9.52 (3/8) | 12.7 (1/2) |
| | | Gas | mm(in) | 15.88 (5/8) | 25.4 (1) |
| Connection method | | | | Flared | Flared |
| Between the indoor & outdoor unit | | Height difference | m | Max. 30 | Max. 30 |
| | | Piping length | m | 2 to 75 | 2 to 80 |
| Guaranteed operating range (Outdoor) | | Heating | °C | -28 (*1) to +21 | -25 to +21 |
| | | DHW | °C | -28 (*1) to +35 | -25 to +35 |
| | | Cooling *2 | °C | -15 to +46 | -15 to +46 |
| Outlet water temp. (Max in heating, Min in cooling) | | Heating | °C | +60 | +60 |
| | | Cooling | °C | +5 | +5 |
| Nominal return water temperature range | | Heating | °C | +10 to +59 | +10 to +59 |
| | | Cooling | °C | +8 to +28 | +8 to +28 |
| Water flow rate range | | | L/min | 17.9 to 40.1 | 28.7 to 65.9 |

*1 Service reference number from "R2" (before "R2" : -25°C)

*2 Optional air protection guide is required where ambient temperature is lower than -5°C.
The temperature is 10°C when the unit is connected with Cylinder unit or Hydrobox.
For more details, refer to "Cylinder unit / Hydrobox".

| Model name | | | PUHZ-SHW230YKA2 |
|---|---|---|---|
| Nominal water flow rate (Heating mode) | | L/min | 65.9 |
| Heating (A7/W35) | Capacity | kW | 23.00 |
| | COP | | 3.65 |
| | Power input | kW | 6.31 |
| Heating (A2/W35) | Capacity | kW | 23.00 |
| | COP | | 2.37 |
| | Power input | kW | 9.71 |
| Pressure difference (water circuit) | | kPa | - |
| Heating pump input (based on EN14511) | | kW | - |
| Nominal water flow rate (Cooling mode) | | L/min | 57.3 |
| Cooling (A35/W7) | Capacity | kW | 20.00 |
| | EER (COP) | | 2.22 |
| | Power input | kW | 9.01 |
| Cooling (A35/W18) | Capacity | kW | 20.00 |
| | EER (COP) | | 3.55 |
| | Power input | kW | 5.63 |
| Pressure difference (water circuit) | | kPa | - |
| Cooling pump input (based on EN14511) | | kW | - |
| Recommended plate heat exchanger | | | ACH70-40 x 2 Parallel connection |

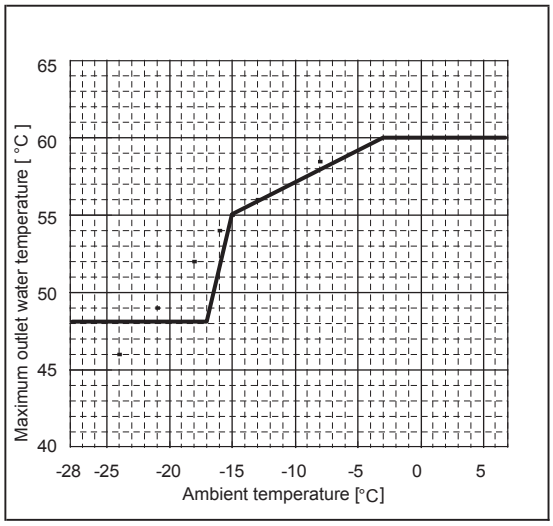
The table shows performance data obtained when a plate heat exchanger is connected.

| Model name | | | PUHZ-SHW80VAA(-BS) | PUHZ-SHW80YAA(-BS) |
|---|---|---|---|---|
| Nominal water flow rate (Heating mode) | | L/min | 22.9 | 22.9 |
| Heating (A7/W35) | Capacity | kW | 8.0 | 8.0 |
| | COP | | 4.65 | 4.65 |
| | Power input | kW | 1.72 | 1.72 |
| Heating (A2/W35) | Capacity | kW | 8.0 | 8.0 |
| | COP | | 3.55 | 3.55 |
| | Power input | kW | 2.25 | 2.25 |
| Pressure difference (water circuit) | | kPa | - | - |
| Heating pump input (based on EN14511) | | kW | - | - |
| Nominal water flow rate (Cooling mode) | | L/min | 20.4 | 20.4 |
| Cooling (A35/W7) | Capacity | kW | 7.1 | 7.1 |
| | EER (COP) | | 3.31 | 3.31 |
| | Power input | kW | 2.15 | 2.15 |
| Cooling (A35/W18) | Capacity | kW | 7.1 | 7.1 |
| | EER (COP) | | 4.52 | 4.52 |
| | Power input | kW | 1.57 | 1.57 |
| Pressure difference (water circuit) | | kPa | - | - |
| Cooling pump input (based on EN14511) | | kW | - | - |
| Recommended plate heat exchanger | | | MWA2-38PA | MWA2-38PA |

The table shows performance data obtained when a plate heat exchanger is connected.

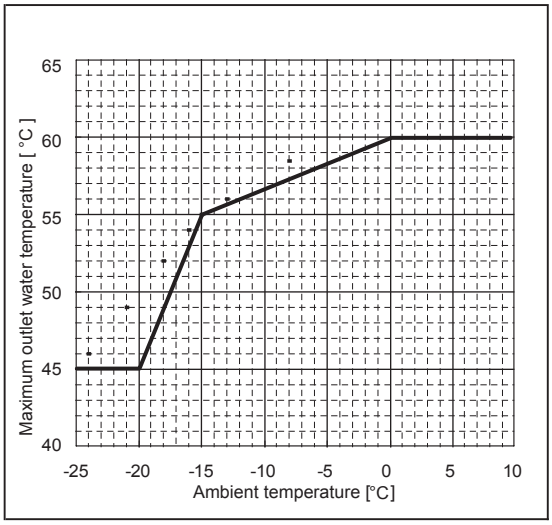
■Zubadan

**PUHZ-SHW80/112VHA(-BS)**
**PUHZ-SHW112/140YHA(-BS)**
**PUHZ-SHW230YKA2**




*PUHZ-SHW80/112/140 Service reference number from “R2”: down to -28°C
Before “R2” and PUHZ-SHW230 : down to -25°C

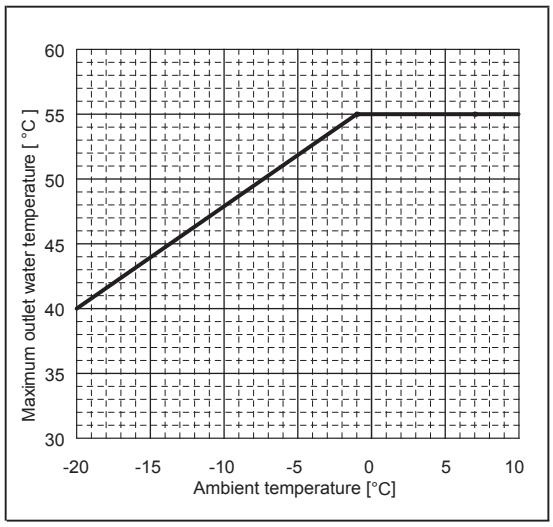
**PUHZ-SHW80/112VAA(-BS)**
**PUHZ-SHW80/112YAA(-BS)**



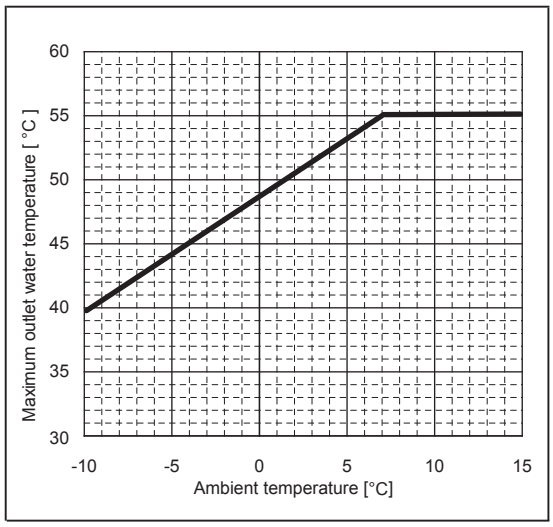

■Inverter multi

**PUMY-P112/125/140VKM4(-BS)**
**PUMY-P112/125/140YKM4(-BS)**
**PUMY-P112/125/140YKME4(-BS)**

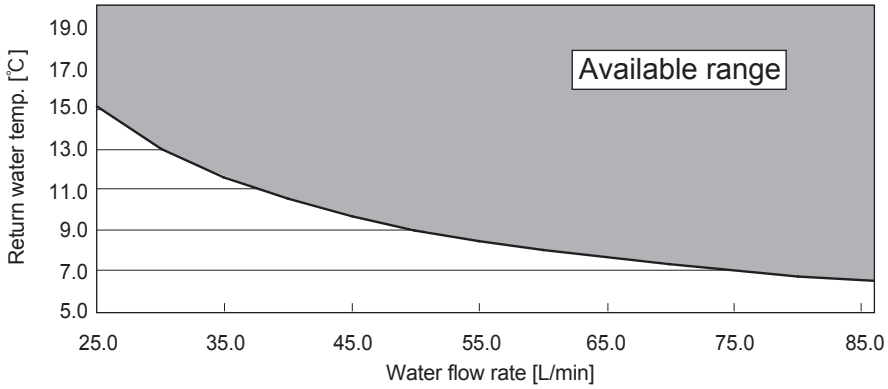
Maximum outlet water temperature curve at single operation of ATW Heating



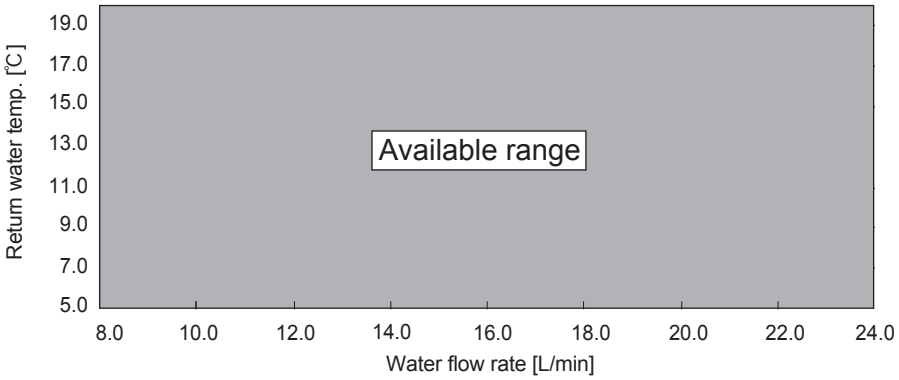

Maximum outlet water temperature curve at simultaneous operation of ATA Heating and ATW heating



**PUHZ-SHW230YKA2**

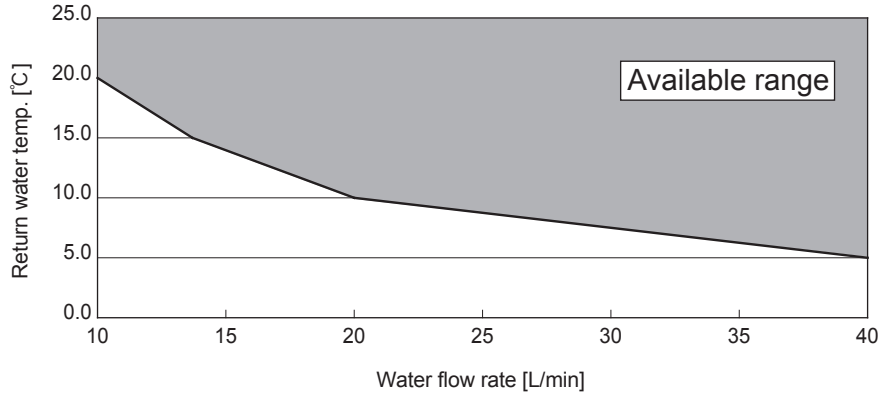



**PUHZ-FRP71VHA2**

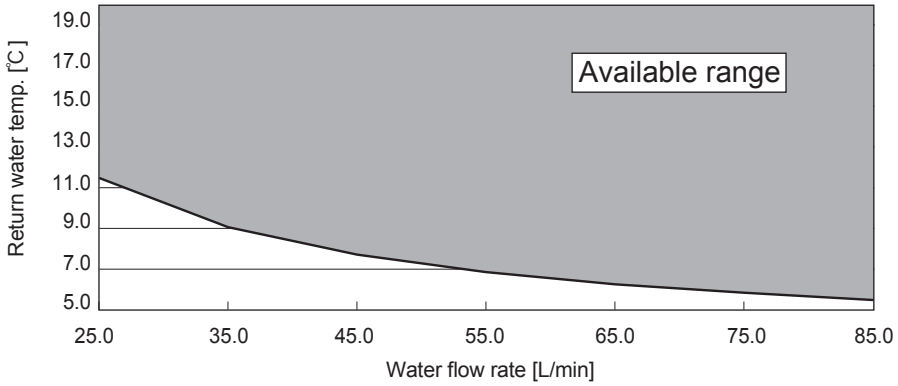



**<Note>**
**Water circuit will not be used during defrost in FRP system.**

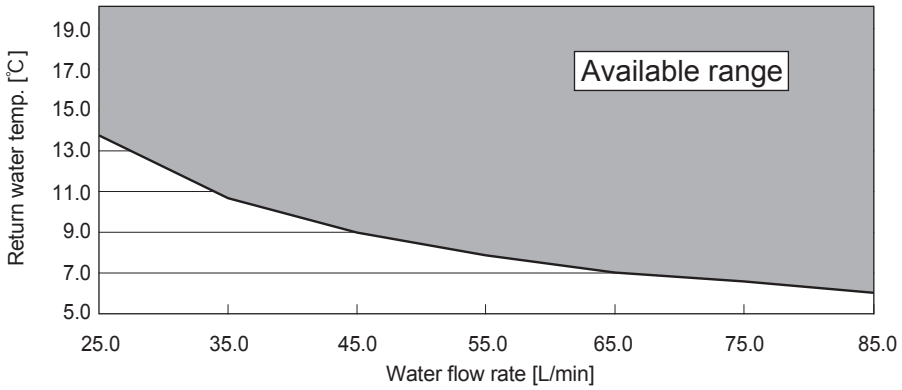
**PUMY-P112/125/140VKM4(-BS)**
**PUMY-P112/125/140YKM4(-BS)**
**PUMY-P112/125/140YKME4(-BS)**



**PUHZ-SW160YKA(-BS)**
**PUHZ-SW200YKA(-BS)**

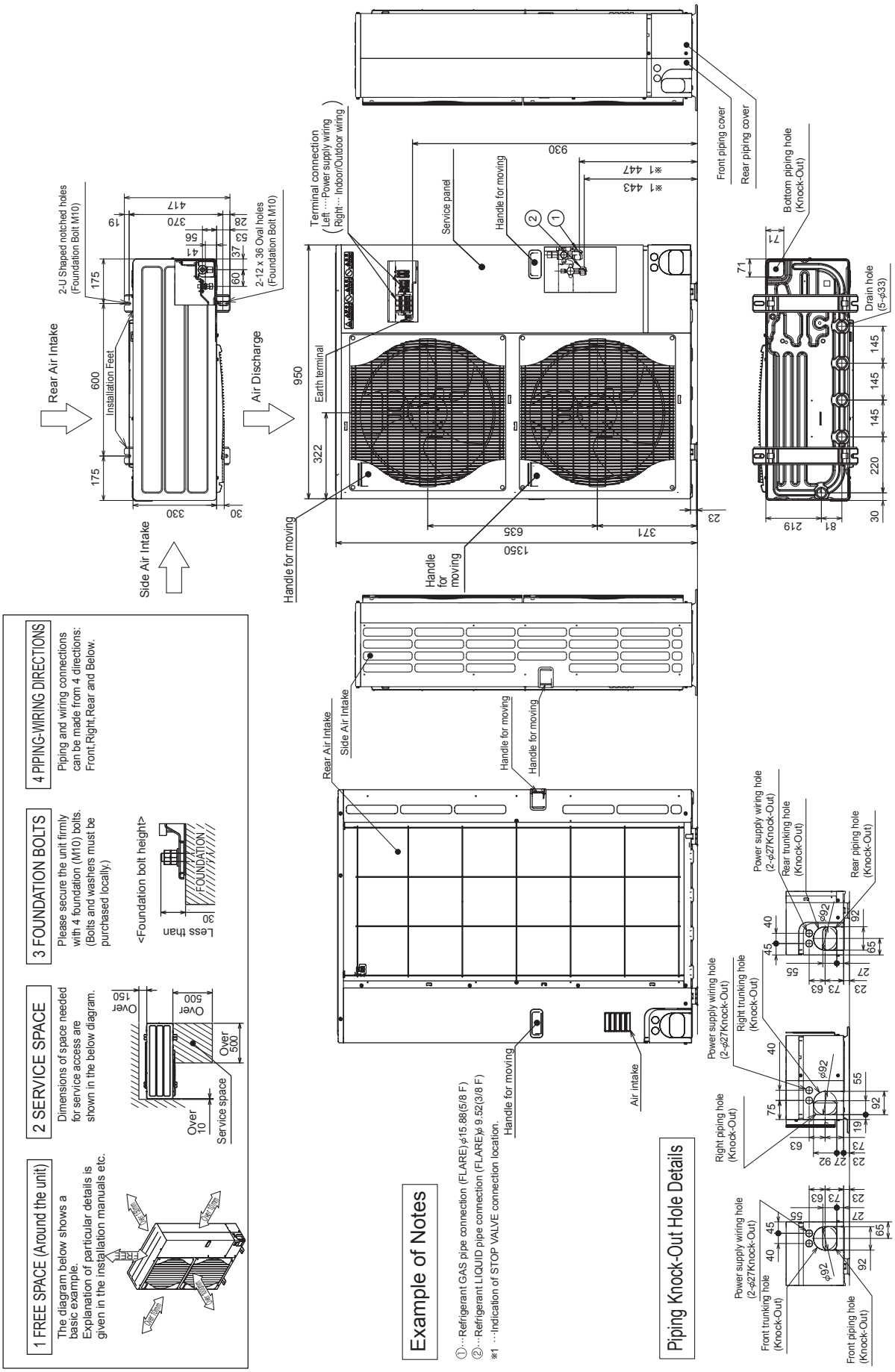



**PUHZ-SHW230YKA2**



## ■ PUHZ-SHW230YKA2

Unit : mm



## ■ PUHZ-SHW230YKA2

| SYMBOL | NAME | SYMBOL | NAME | SYMBOL | NAME |
|---|---|---|---|---|---|
| TB1 | Terminal Block 〈Power Supply〉 | TH34 | Thermistor 〈Comp. Surface〉 | SW5 | Switch 〈Function Switch, Model Select〉 |
| TB2 | Terminal Block 〈Indoor/Outdoor〉 | LEV-A, LEV-B, LEV-C | Linear Expansion Valve | SW6 | Switch 〈Model Select〉 |
| MC | Motor for Compressor | ACL4 | Reactor | SW7 | Switch 〈Function Switch〉 |
| MF1,MF2 | Fan Motor | DCL | Reactor | SW8 | Switch 〈Function Switch〉 |
| 21S4 | Solenoid Valve (4-Way Valve) | RS | Rush Current Protect Resistor | SW9 | Switch 〈Function Switch〉 |
| 63H | High Pressure Switch | FUSE1, FUSE2 | Fuse 〈T15AL250V〉 | SWP | Switch 〈Pump Down〉 |
| 63L | Low Pressure Switch | CY1, CY2 | Capacitor | CN31 | Connector 〈Emergency Operation〉 |
| 63HS | High Pressure Sensor | P. B. | Power Circuit Board | F3, F4 | Fuse 〈T6.3AL250V〉 |
| TH3 | Thermistor 〈Liquid〉 | N. F. | Noise Filter Circuit Board | SV1/CH | Connector 〈Connection for Option〉 |
| TH4 | Thermistor 〈Discharge〉 | F1 | Fuse 〈T6.3A L250V〉 | SV3/SS | Connector 〈Connection for Option〉 |
| TH6 | Thermistor 〈2-Phase Pipe〉 | C. B. | Controller Circuit Board | CNM | Connector 〈Connection for Option〉 |
| TH7 | Thermistor 〈Ambient〉 | SW1 | Switch 〈Manual Defrost, Defect History Record Reset, Refrigerant Address〉 | CNMNT | Connector 〈Connection for Option〉 |
| TH8 | Thermistor 〈HEAT Sink〉 | | | CNVMNT | Connector 〈Connection for Option〉 |
| TH32 | Thermistor 〈Suction〉 | SW4 | Switch 〈Function Switch〉 | CNDM | Connector 〈Connection for Option〉 |

∗1 MODEL SELECT
The black square (■) indicates a switch position.

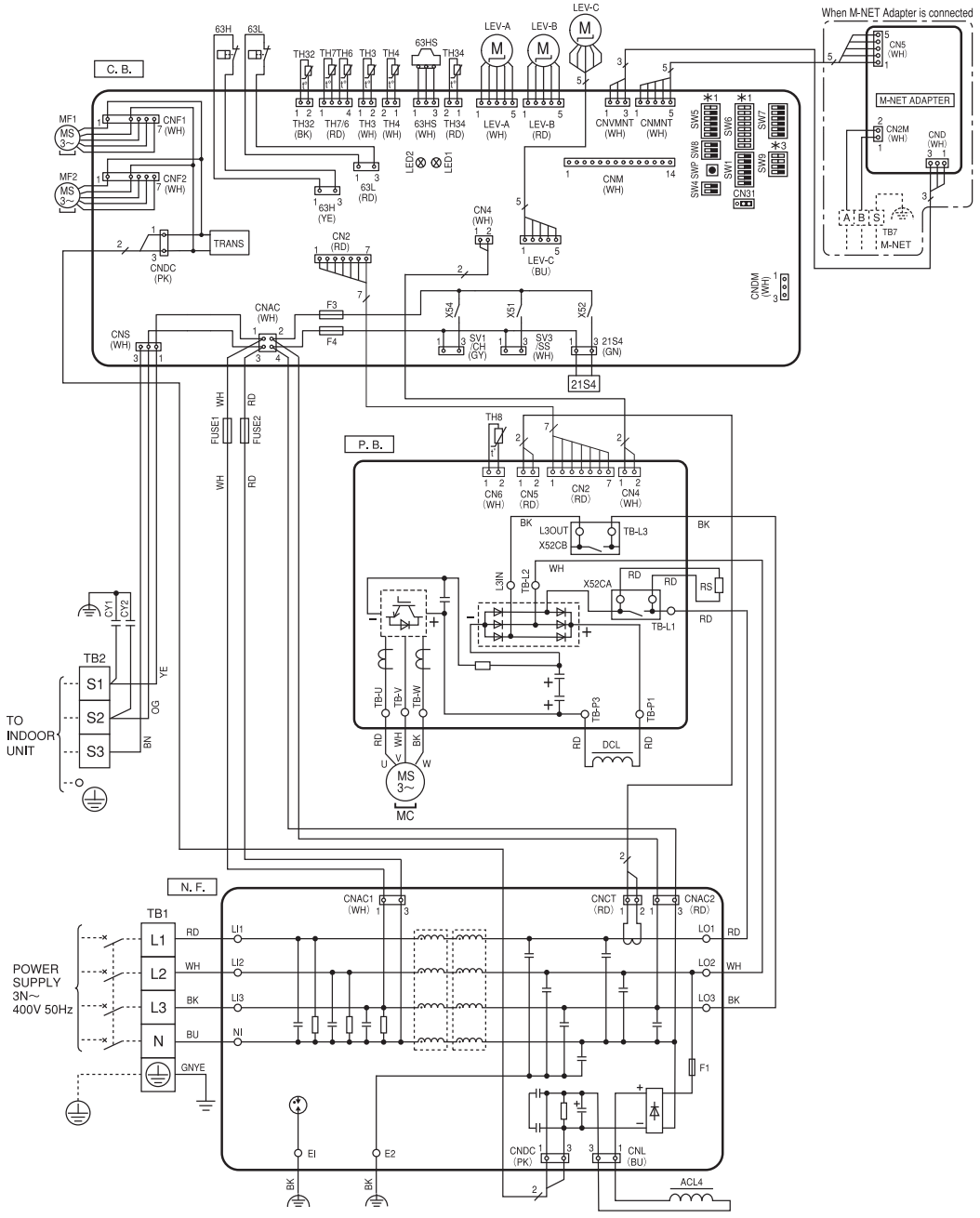
| MODEL | SW6 |
|---|---|
| 230Y | ON OFF 1 2 3 4 5 6 7 8 |
| | SW5-6 ∗2 |
| | ON OFF 1 2 3 4 5 6 |

∗2 SW5 -1 to 5 : Function Switch.

∗3 Ambient temp. of ZUBADAN Flash Injection becomes effective.
The black square (■) indicates a switch position.

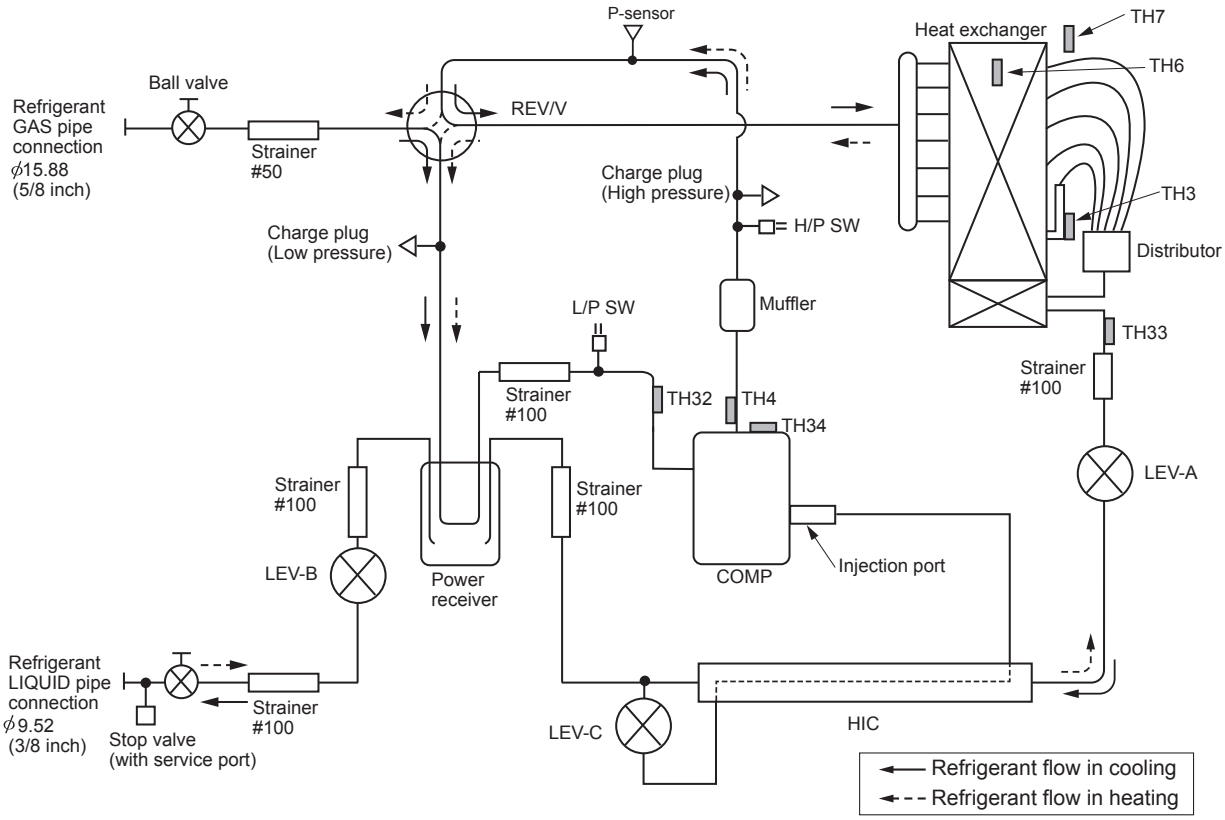
| Ambient temp. | SW9-3,9-4 ∗4 | Ambient temp. | SW9-3,9-4 ∗4 | Ambient temp. | SW9-3,9-4 ∗4 | Ambient temp. | SW9-3,9-4 ∗4 |
|---|---|---|---|---|---|---|---|
| 3℃ or less (Default setting) | ON OFF 1 2 3 4 | 0℃ or less | ON OFF 1 2 3 4 | −3℃ or less | ON OFF 1 2 3 4 | −6℃ or less | ON OFF 1 2 3 4 |

∗4 SW9-1 to 2 : Function Switch



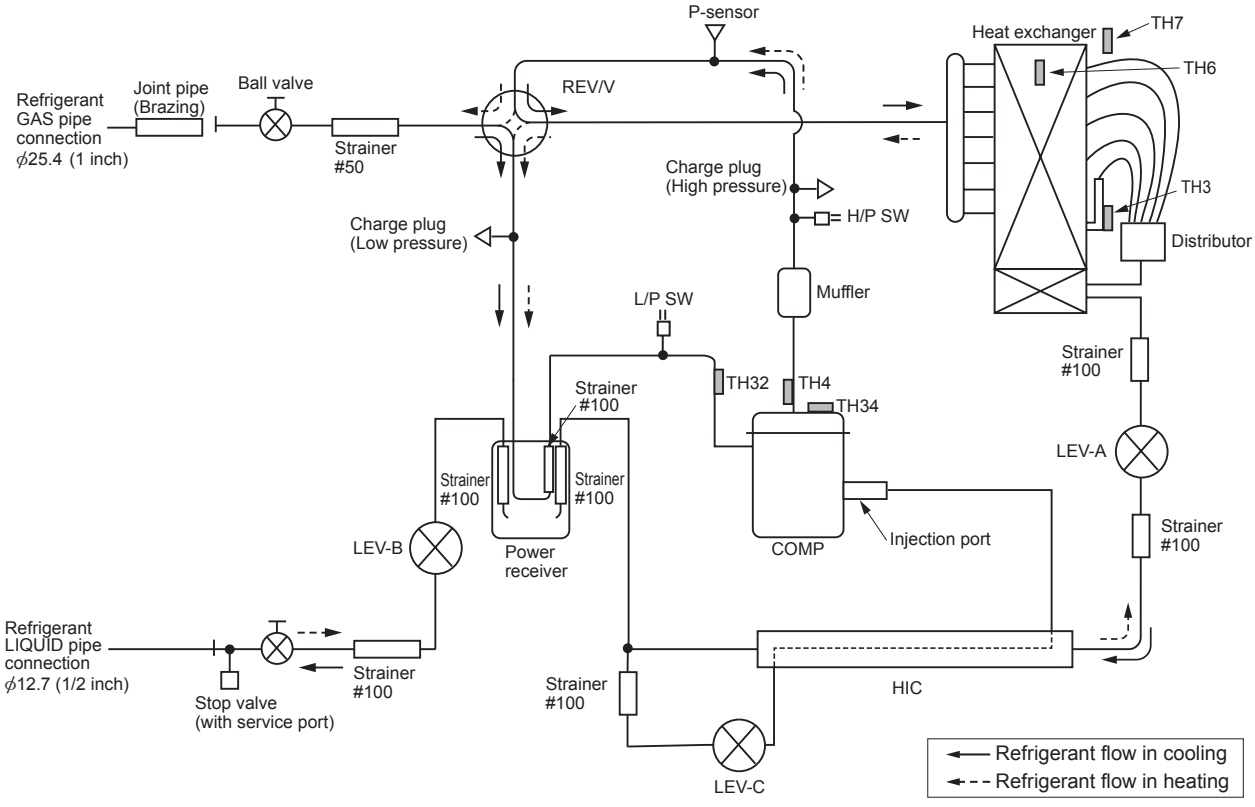
■ **PUHZ-SHW80VHA(-BS)** **PUHZ-SHW112VHA(-BS)**
**PUHZ-SHW112YHA(-BS)** **PUHZ-SHW140YHA(-BS)**

**Unit : mm (inch)**




■ **PUHZ-SHW230YKA2**

**Unit : mm (inch)**

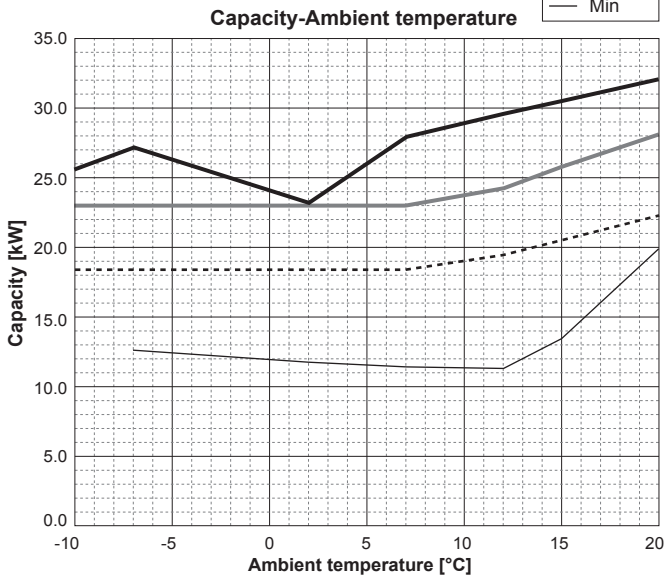


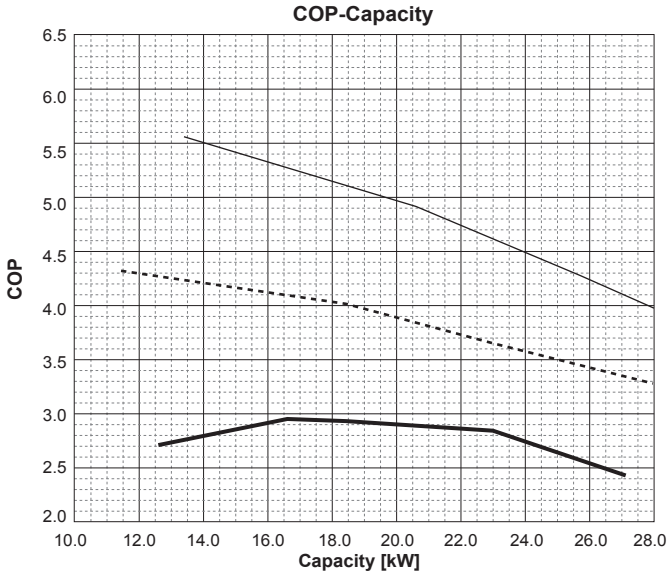
## ■ PUHZ-SHW230YKA2

| Water outlet temperature[℃] | | 35 | | 40 | | 45 | | 50 | | 55 | | 60 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ambient temperature[℃] | | Capacity | COP | Capacity | COP | Capacity | COP | Capacity | COP | Capacity | COP | Capacity | COP |
| Max | (INJ) -25 | - | - | 16.4 | 1.48 | 16.0 | 1.30 | - | - | - | - | - | - |
| | (INJ) -20 | 20.3 | 2.06 | 19.8 | 1.84 | 19.3 | 1.62 | - | - | - | - | - | - |
| | (INJ) -15 | 22.9 | 2.20 | 22.7 | 2.00 | 22.5 | 1.80 | 21.6 | 1.61 | 20.8 | 1.41 | - | - |
| | (INJ) -10 | 25.6 | 2.34 | 25.6 | 2.16 | 25.7 | 1.98 | 25.7 | 1.84 | 25.6 | 1.69 | - | - |
| | (INJ) -7 | 27.1 | 2.43 | 27.4 | 2.26 | 27.7 | 2.09 | 28.1 | 1.98 | 28.4 | 1.86 | - | - |
| | (INJ) 2 | 23.2 | 2.29 | 23.0 | 2.16 | 22.9 | 2.02 | 22.8 | 2.02 | 22.8 | 2.02 | 22.7 | 1.98 |
| | 7 | 2.80 | 3.28 | 27.9 | 3.07 | 27.9 | 2.85 | 27.7 | 2.65 | 27.5 | 2.42 | 26.3 | 2.05 |
| | 12 | 29.5 | 3.48 | 29.3 | 3.21 | 29.1 | 2.94 | 28.8 | 2.75 | 28.5 | 2.54 | 27.4 | 2.24 |
| | 15 | 30.5 | 3.60 | 30.2 | 3.30 | 29.8 | 3.00 | 29.5 | 2.82 | 29.1 | 2.61 | 28.2 | 2.35 |
| | 20 | 32.1 | 3.80 | 31.6 | 3.45 | 31.1 | 3.09 | 30.6 | 2.92 | 30.1 | 2.73 | 29.3 | 2.54 |
| Nominal | (INJ) -25 | - | - | 16.4 | 1.48 | 16.0 | 1.30 | - | - | - | - | - | - |
| | (INJ) -20 | 20.3 | 2.06 | 19.8 | 1.84 | 19.3 | 1.62 | - | - | - | - | - | - |
| | (INJ) -15 | 22.9 | 2.20 | 22.7 | 2.00 | 22.5 | 1.80 | 21.6 | 1.61 | 20.8 | 1.41 | - | - |
| | (INJ) -10 | 23.0 | 2.60 | 23.0 | 2.36 | 23.0 | 2.12 | 23.0 | 1.99 | 23.0 | 1.85 | - | - |
| | (INJ) -7 | 23.0 | 2.85 | 23.0 | 2.58 | 23.0 | 2.32 | 23.0 | 2.22 | 23.0 | 2.11 | - | - |
| | (INJ) 2 | 23.0 | 2.37 | 23.0 | 2.16 | 22.9 | 2.02 | 22.8 | 2.02 | 22.8 | 2.02 | 22.7 | 1.98 |
| | 7 | 23.0 | 3.65 | 23.0 | 3.34 | 23.0 | 3.02 | 23.0 | 2.76 | 23.0 | 2.47 | 23.0 | 2.09 |
| | 12 | 24.3 | 4.10 | 24.3 | 3.68 | 24.3 | 3.26 | 24.3 | 2.98 | 24.3 | 2.67 | 24.3 | 2.34 |
| | 15 | 25.7 | 4.29 | 25.7 | 3.84 | 25.7 | 3.39 | 25.7 | 3.10 | 25.7 | 2.79 | 25.7 | 2.49 |
| | 20 | 28.1 | 4.61 | 28.1 | 4.10 | 28.1 | 3.59 | 28.1 | 3.31 | 28.1 | 2.99 | 28.1 | 2.75 |
| Mid | (INJ) -25 | - | - | 13.1 | 1.68 | 12.8 | 1.55 | - | - | - | - | - | - |
| | (INJ) -20 | 16.2 | 2.00 | 15.8 | 1.87 | 15.4 | 1.73 | - | - | - | - | - | - |
| | (INJ) -15 | 18.3 | 2.36 | 18.2 | 2.16 | 18.0 | 1.97 | 17.3 | 1.82 | 16.6 | 1.66 | - | - |
| | (INJ) -10 | 18.4 | 2.72 | 18.4 | 2.46 | 18.4 | 2.21 | 18.4 | 2.06 | 18.4 | 1.90 | - | - |
| | (INJ) -7 | 18.4 | 2.93 | 18.4 | 2.64 | 18.4 | 2.35 | 18.4 | 2.21 | 18.4 | 2.05 | - | - |
| | (INJ) 2 | 18.4 | 2.90 | 18.4 | 2.60 | 18.3 | 2.30 | 18.3 | 2.26 | 18.2 | 2.21 | 18.1 | 2.08 |
| | 7 | 18.4 | 4.01 | 18.4 | 3.58 | 18.4 | 3.14 | 18.4 | 2.83 | 18.4 | 2.49 | 18.4 | 2.24 |
| | 12 | 19.4 | 4.58 | 19.4 | 4.05 | 19.4 | 3.52 | 19.4 | 3.15 | 19.4 | 2.76 | 19.4 | 2.55 |
| | 15 | 20.6 | 4.91 | 20.6 | 4.34 | 20.6 | 3.76 | 20.6 | 3.37 | 20.6 | 2.96 | 20.6 | 2.74 |
| | 20 | 22.5 | 5.55 | 22.5 | 4.89 | 22.5 | 4.23 | 22.5 | 3.80 | 22.5 | 3.34 | 22.5 | 3.05 |
| Min | -25 | - | - | 13.1 | 1.68 | 12.8 | 1.55 | - | - | - | - | - | - |
| | -20 | 16.2 | 2.00 | 15.8 | 1.87 | 15.4 | 1.73 | - | - | - | - | - | - |
| | -15 | 18.3 | 2.36 | 18.2 | 2.16 | 18.0 | 1.97 | 17.3 | 1.82 | 16.6 | 1.66 | - | - |
| | -10 | 18.4 | 2.72 | 18.4 | 2.46 | 18.4 | 2.21 | 18.4 | 2.06 | 18.4 | 1.90 | - | - |
| | -7 | 12.6 | 2.72 | 12.1 | 2.41 | 11.6 | 2.10 | 10.7 | 1.83 | 9.7 | 1.53 | - | - |
| | 2 | 11.8 | 3.52 | 11.3 | 3.11 | 10.8 | 2.70 | 10.0 | 2.35 | 9.1 | 1.97 | - | - |
| | 7 | 11.4 | 4.31 | 10.5 | 3.73 | 9.6 | 3.15 | 8.4 | 2.64 | 7.2 | 2.10 | - | - |
| | 12 | 11.4 | 5.08 | 10.4 | 4.39 | 9.4 | 3.70 | 8.3 | 3.39 | 7.2 | 3.05 | - | - |
| | 15 | 13.5 | 5.58 | 12.4 | 4.87 | 11.4 | 4.17 | 10.4 | 3.85 | 9.5 | 3.49 | - | - |
| | 20 | 20.0 | 5.94 | 19.1 | 5.29 | 18.3 | 4.63 | 17.5 | 4.21 | 16.7 | 3.75 | - | - |

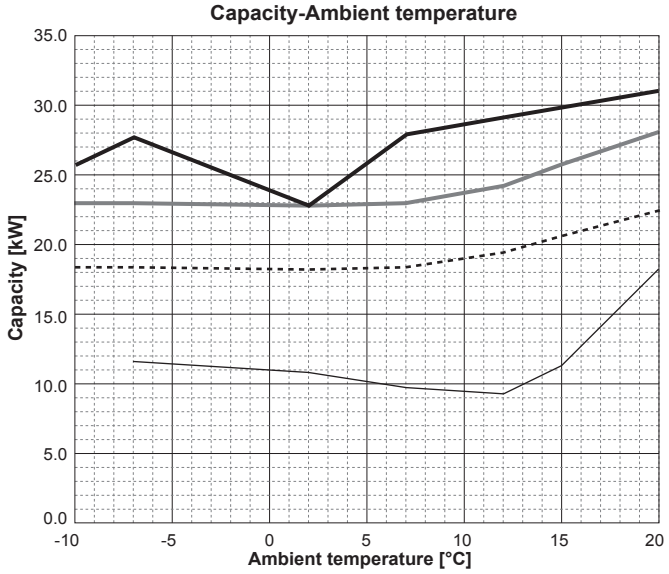
## PUHZ-SHW230YKA2

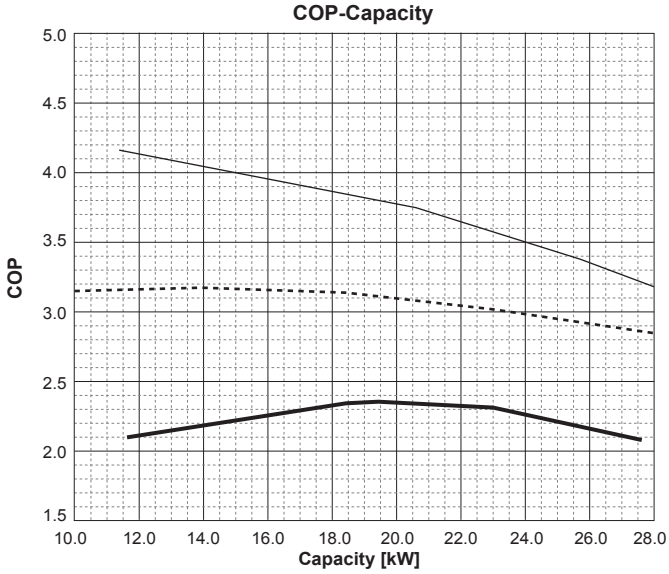
### ■ Water outlet temperature 35 [°C ]



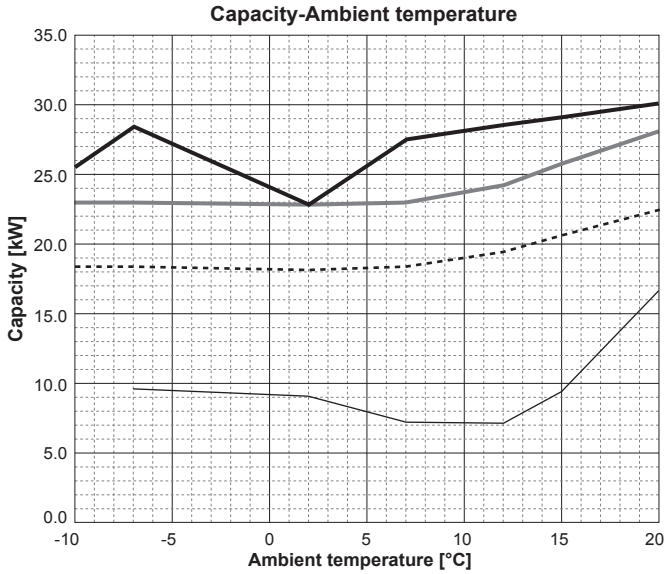



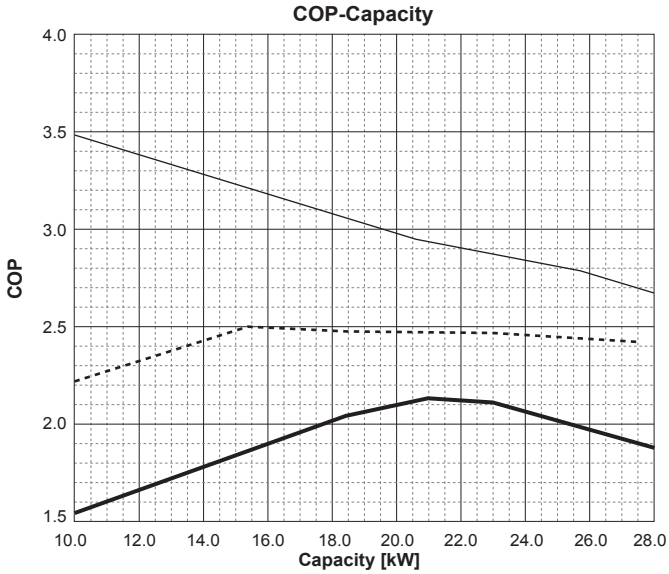

### ■ Water outlet temperature 45 [°C ]



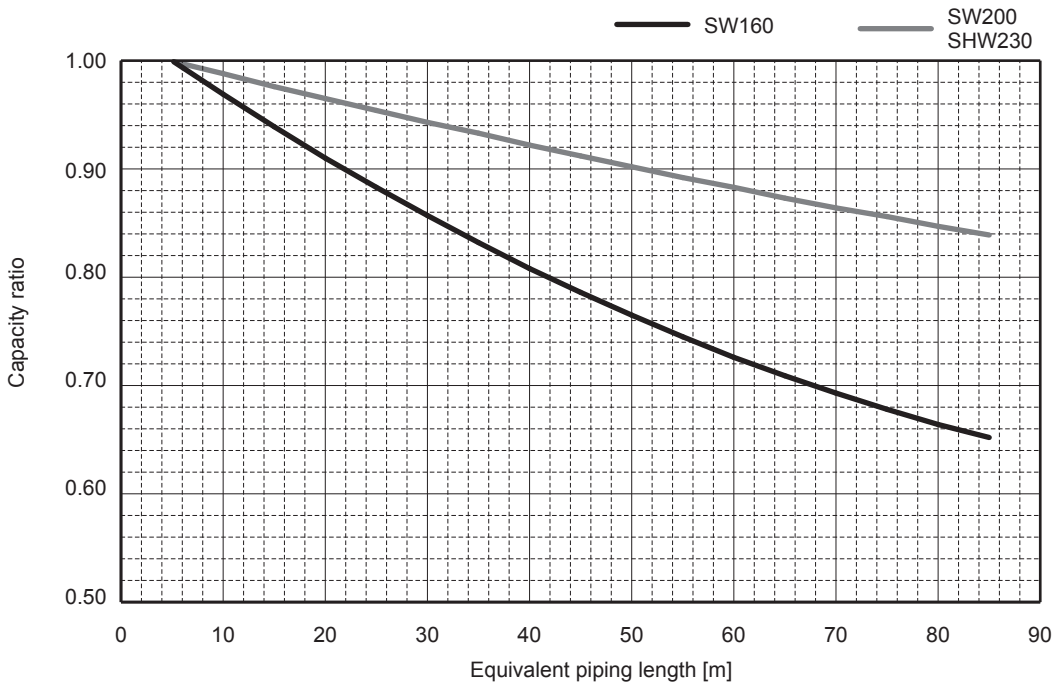

### ■ Water outlet temperature 55 [°C ]



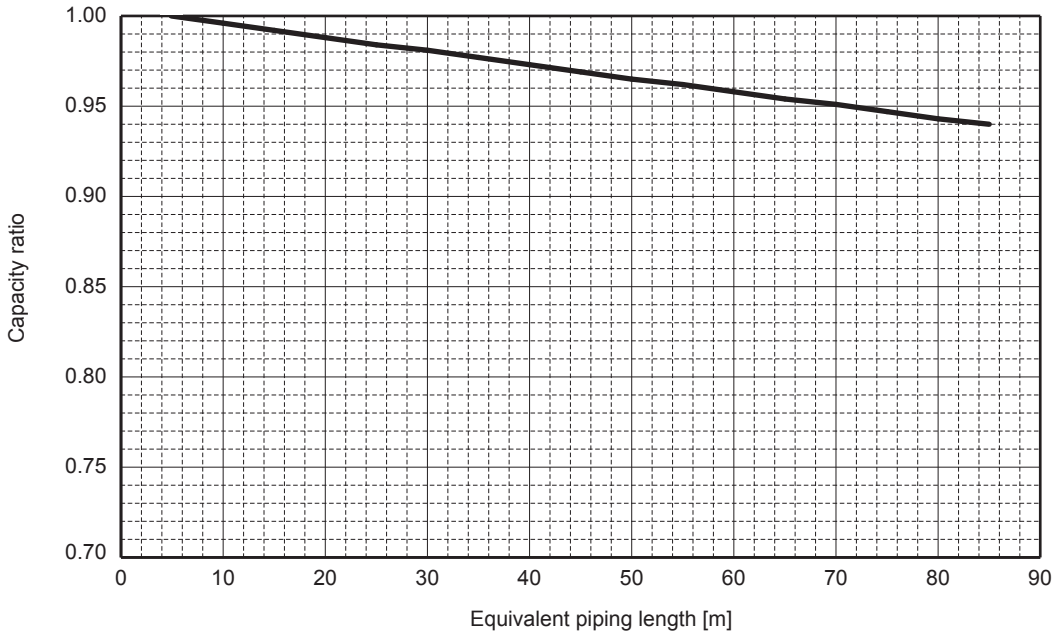



■ **PUHZ-SW160YKA(-BS)** **PUHZ-SHW230YKA2**
**PUHZ-SW200YKA(-BS)**

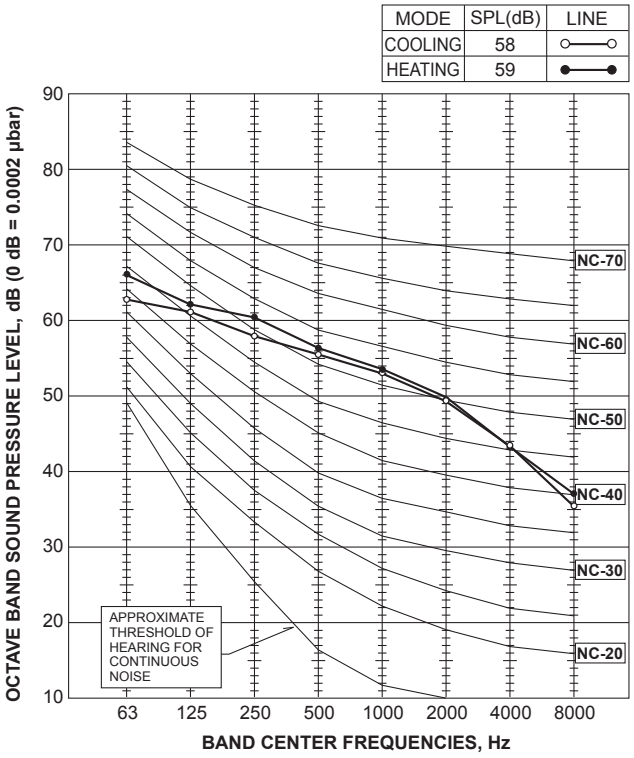
**<Cooling>**



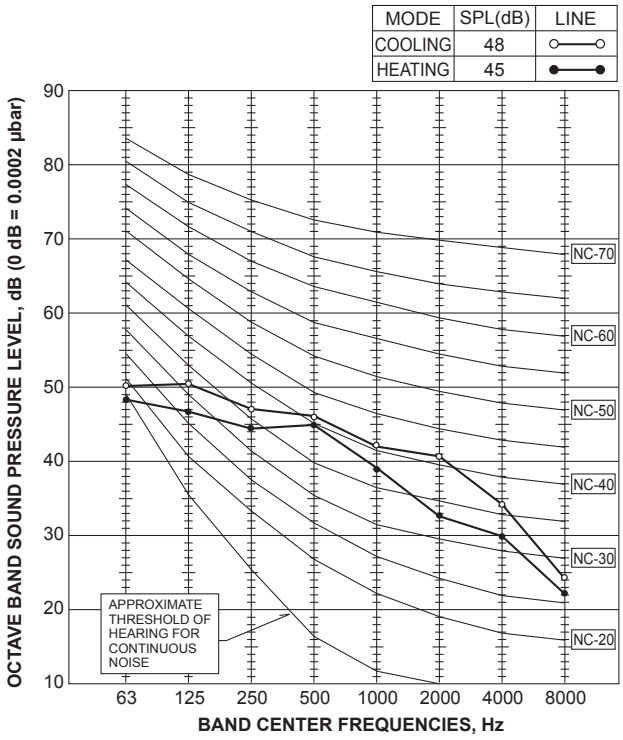

**<Heating>**



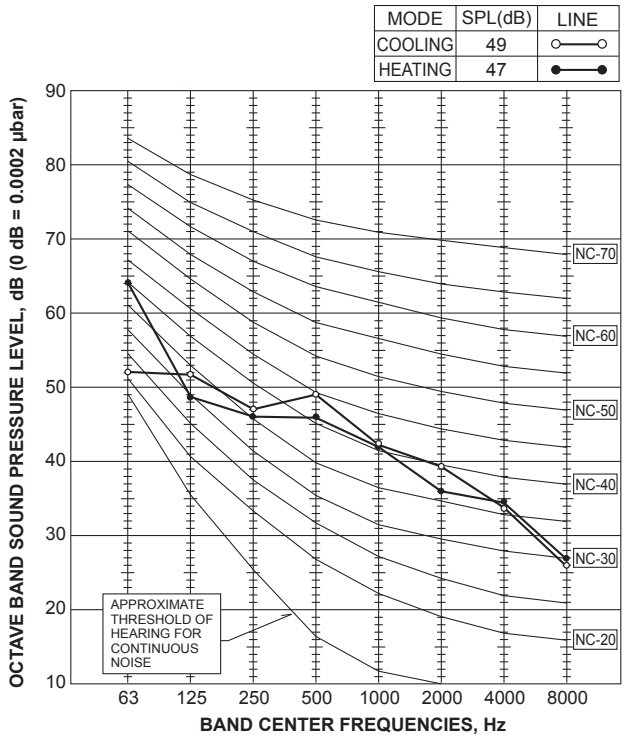
## ■ PUHZ-SHW230YKA2




## ■ PUHZ-SHW80VAA(-BS) PUHZ-SHW80YAA(-BS)




## ■ PUHZ-SHW112VAA(-BS) PUHZ-SHW112YAA(-BS)




**<Notes>**
**1) Sound data is taken when the system is running stably.**
**2) Relatively large noise could be heard transiently in the case 4-way valve, or LEV operates.**

1.Type: ZUBADAN Outdoor unit

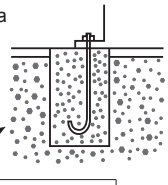
2.Model name: PUHZ-SHW230YKA2

## 3.Specification

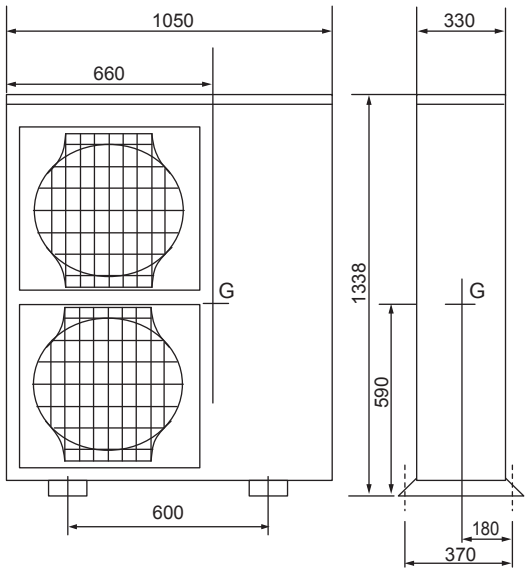
| | | | | | | |
|---|---|---|---|---|---|---|
| (1) Unit mass | W= | 143 | kg | | | |
| (2) Anchor bolt | | | | | | |
| 1.The total number of bolts | N= | 4 | | | | |
| 2.The size and shape | "=M | 10 | type | | | |
| 3.The axis section area per one bolt | A= | 78 | $mm^2$= | 78 $\times 10^{-6}$ | $m^2$ | |
| 4.The total number of bolts in one side which be pulled stronger when the unit inverted | Nt= | 2 | | | | |
| (3) The height between the installing surface and the center of gravity of the unit | Hg= | 590 | mm= | 0.590 | m | |
| (4) The bolt-span from the examination angle | L= | 370 | mm= | 0.370 | m | |
| (5) The distance between the center of bolt and the center of gravity of the unit | Lg= | 170 | mm(Lg≦L/2)= | 0.170 | m | |

## 4.The examination calculation (by rounding off to the first decimal place of each item)

| | | | | | | |
|---|---|---|---|---|---|---|
| (1) The horizontal seismic coefficient for designing | Kh= | 1.0 | | | | |
| (2) The vertical seismic coefficient for designing | Kv=Kh/2= | 0.5 | | | | |
| (3) The horizontal earthquake forces for designing | Fh=Kh·W·9.8= | 1401.4 | N | | | |
| (4) The vertical earthquake forces for designing | Fv=Kv·W·9.8= | 700.7 | N | | | |
| (5) The withdrawal strength of the anchor bolt $Rb=\frac{Fh\cdot Hg-(W\cdot 9.8-Fv)\cdot Lg}{L\cdot Nt}$ | = | 956.4 | N | | | |
| (6) The shear forces of the anchor bolt | Q=Fh/N= | 350.4 | N | | | |
| (7) The stress arising to the anchor bolt | | | | | | |
| 1.The tensile stress | σ=Rb/A= | 12.3 | MPa＜ft=176.4MPa | | | |
| 2.The shearing stress | τ=Q/A= | 4.5 | MPa＜fs=132.3MPa | | | |
| 3.The stress when affected by both the shearing and the tensile at the same time | fts=1.4ft-1.6τ= | 239.8 | MPa | | | |
| σ= 12.3 MPa | ＜ fts= | 239.8 | MPa | | | |
| (8) The construction way of the anchor bolt | | | | | | |
| 1.The construction way of the anchor bolt | = | Boxed J type anchor | | | | |
| 2.The thickness of the concrete | = | 120 | mm= | 0.120 | m | |
| 3.The length of buried part of bolt | = | 70 | mm= | 0.070 | m | |
| 4.The permissible withdrawal weight | Ta= | 3136 | N ＞ | Rb= | 956 | N |



Since the results from the examination above, the anchor bolt has enough strength.



## 10.4 Split-type units ( ZUBADAN )

**PUHZ-SHW80VHA(-BS), PUHZ-SHW112VHA(-BS), PUHZ-SHW112YHA(-BS), PUHZ-SHW140YHA(-BS), PUHZ-SHW230YKA2**

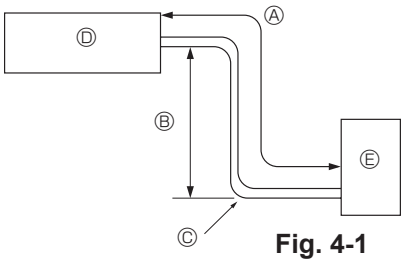
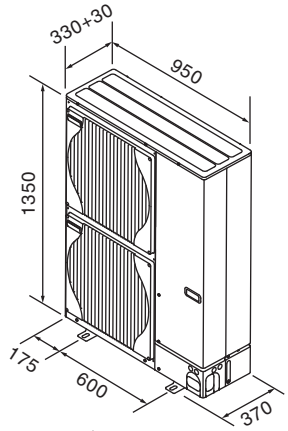



Fig. 4-1

**SHW80,112,140**




**SHW230**

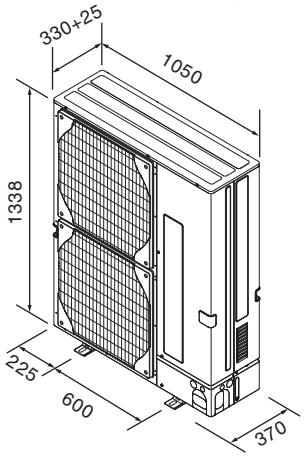



Fig. 4-2

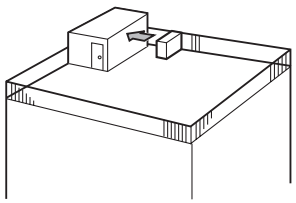


Fig. 4-3

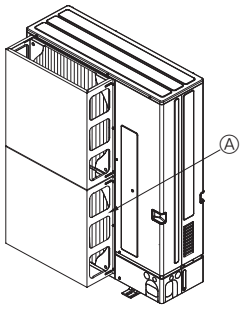



Fig. 4-4

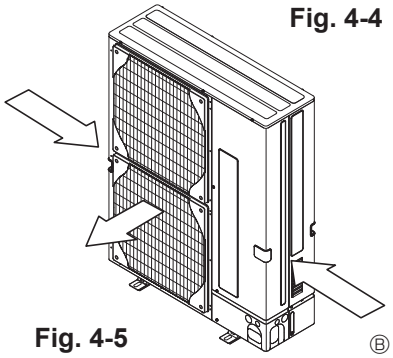



Fig. 4-5

### ■ Refrigerant pipe (Fig. 4-1)

**Check that the difference between the heights of the indoor and outdoor units, the length of refrigerant pipe, and the number of bends in the pipe are within the limits shown below.**

| Models | Ⓐ Pipe length (one way) | Ⓑ Height difference | Ⓒ Number of bends (one way) |
|---|---|---|---|
| SHW80,112,140 | 2 m - 75 m | Max. 30 m | Max. 15 |
| SHW230 | 2 m - 80 m | Max. 30 m | Max. 15 |

- Height difference limitations are binding regardless of which unit, indoor or outdoor, is positioned higher.
  ⒹIndoor unit ⒺOutdoor unit

### ■ Choosing the outdoor unit installation location

- Avoid locations exposed to direct sunlight or other sources of heat.
- Select a location from which noise emitted by the unit will not inconvenience neighbors.
- Select a location permitting easy wiring and pipe access to the power source and indoor unit.
- Avoid locations where combustible gases may leak, be produced, flow, or accumulate.
- Note that water may drain from the unit during operation.
- Select a level location that can bear the weight and vibration of the unit.
- Avoid locations where the unit can be covered by snow. In areas where heavy snow fall is anticipated, special precautions such as raising the installation location or installing a hood on the air intake must be taken to prevent the snow from blocking the air intake or blowing directly against it. This can reduce the airflow and a malfunction may result.
- Avoid locations exposed to oil, steam, or sulfuric gas.
- Use the transportation handles of the outdoor unit to transport the unit. If the unit is carried from the bottom, hands or fingers may be pinched.

### ■ Outline dimensions (Outdoor unit) (Fig. 4-2)

### ■ Ventilation and service space

**(1) Windy location installation**

When installing the outdoor unit on a rooftop or other location unprotected from the wind, situate the air outlet of the unit so that it is not directly exposed to strong winds. Strong wind entering the air outlet may impede the normal airflow and a malfunction may result.

The following shows three examples of precautions against strong winds.

① Face the air outlet towards the nearest available wall about 50 cm away from the wall. (Fig. 4-3)

② Install an optional air guide if the unit is installed in a location where strong winds from a typhoon, etc. may directly enter the air outlet. (Fig. 4-4)
ⒶAir protection guide

③ Position the unit so that the air outlet blows perpendicularly to the seasonal wind direction, if possible. (Fig. 4-5)
ⒷWind direction

**(2) When installing a single outdoor unit** **(Refer to the next page)**

Minimum dimensions are as follows, except for Max., meaning Maximum dimensions, indicated.

Refer to the figures for each case.

① Obstacles at rear only (Fig. 4-6)

② Obstacles at rear and above only (Fig. 4-7)

③ Obstacles at rear and sides only (Fig. 4-8)

④ Obstacles at front only (Fig. 4-9)
*When using the optional air outlet guides, the clearance is 500 mm or more.

⑤ Obstacles at front and rear only (Fig. 4-10)
*When using the optional air outlet guides, the clearance is 500 mm or more.

⑥ Obstacles at rear, sides, and above only (Fig. 4-11)
•Do not install the optional air outlet guides for upward airflow.

**(3) When installing multiple outdoor units** **(Refer to the next page)**

Leave 10 mm space or more between the units.

① Obstacles at rear only (Fig. 4-12)

② Obstacles at rear and above only (Fig. 4-13)
•No more than 3 units must be installed side by side. In addition, leave space as shown.
•Do not install the optional air outlet guides for upward airflow.

③ Obstacles at front only (Fig. 4-14)
*When using the optional air outlet guides, the clearance is 1000 mm or more.

④ Obstacles at front and rear only (Fig. 4-15)
*When using the optional air outlet guides, the clearance is 1000 mm or more.

⑤ Single parallel unit arrangement (Fig. 4-16)
*When using the optional air outlet guides installed for upward airflow, the clearance is 1000 mm or more.

⑥ Multiple parallel unit arrangement (Fig. 4-17)
*When using the optional air outlet guides installed for upward airflow, the clearance is 1500 mm or more.

⑦ Stacked unit arrangement (Fig. 4-18)
•The units can be stacked up to 2 units high.
•No more than 2 stacked units must be installed side by side. In addition, leave space as shown.

## 4.1 Water Quality and System Preparation

### ■ General

- The water in both primary and sanitary circuit should be clean and with pH value of 6.5-8.0
- The followings are the maximum values;
  Calcium: 100mg/L, Ca hardness: 250mg/L
  Chlorine: 100mg/L, Copper: 0.3mg/L

- Other constituents should be to European Directive 98/83 EC standards.
- In known hard water areas, to prevent/minimise scaling, it is beneficial to restrict the routine stored water temperature (DHW max. temp.) to 55°C.

### ■ Anti-Freeze

Anti-freeze solutions should use propylene glycol with a toxicity rating of Class 1 as listed in Clinical Toxicology of Commercial Products, 5th Edition.

**Note:**

**1. Ethylene glycol is toxic and should NOT be used in the primary water circuit in case of any cross-contamination of the potable circuit.**

**2. For 2-zone valve ON/OFF control, propylene glycol should be used.**

### ■ New Installation (primary water circuit)

- Before connecting outdoor unit, thoroughly cleanse pipework of building debris, solder etc using a suitable chemical cleansing agent.
- Flush the system to remove chemical cleanser.
- For all packaged model systems add a combined inhibitor and anti-freeze solution to prevent damage to the pipework and system components.
- For split model systems the responsible installer should decide if anti-freeze solution is necessary for each site's conditions. Corrosion inhibitor however should always be used.

### ■ Existing Installation (primary water circuit)

- Before connecting outdoor unit the existing heating circuit MUST be chemically cleansed to remove existing debris from the heating circuit.
- Flush the system to remove chemical cleanser.
- For all packaged model systems, and the split model without booster heater, add a combined inhibitor and anti-freeze solution to prevent damage to the pipework and system components.
- For split model systems the responsible installer should decide if anti-freeze solution is necessary for each site's conditions. Corrosion inhibitor however should always be used.

When using chemical cleansers and inhibitors always follow manufacturer's instructions and ensure the product is appropriate for the materials used in the water circuit

### ■ Minimum amount of water required in the space heating / cooling circuit

| Outdoor heat pump unit | | Minimum water quantity [L] |
|---|---|---|
| Packaged model | PUHZ-W50 | 29 |
| | PUHZ-W60 | 34 |
| | PUHZ-W85 | 37 |
| | PUHZ-W112 | 48 |
| | PUHZ-HW112 | 48 |
| | PUHZ-HW140 | 60 |
| Split model | SUHZ-SW45 | 17 |
| | PUHZ-SW50 | 22 |
| | PUHZ-FRP71 | 32 |
| | PUHZ-SW75 | 32 |
| | PUHZ-SW100 | 43 |
| | PUHZ-SW120 | 54 |
| | PUHZ-SW160 | 69 |
| | PUHZ-SW200 | 86 |
| | PUHZ-SHW80 | 34 |
| | PUHZ-SHW112 | 48 |
| | PUHZ-SHW140 | 60 |
| | PUHZ-SHW230 | 99 |
| | PUMY-P112 | 80 |
| | PUMY-P125 | 80 |
| | PUMY-P140 | 80 |

**Note:**
**For 2-zone temperature control system, the value in the table above excludes the amount of stored water in zone 2.**

## 4.2 Water Pipe Work

**Note: Prevent the field piping from straining the piping on the cylinder unit/ hydrobox by fixing it to a wall or applying other methods.**

### ■ Hot Water Pipework

The function of the following safety components of the cylinder unit/hydrobox should be checked on installation for any abnormalities;

- Pressure relief valve
- Expansion vessel pre-charge (gas charge pressure)

The instruction on the following pages regarding safe discharge of hot water from Safety devices should be followed carefully.

- The pipework will become very hot, so should be insulated to prevent burns.
- When connecting pipework, ensure that no foreign objects such as debris or the like do not enter the pipe.

### ■ Hydraulic Filter Work (ONLY EHPX series)

Install a hydraulic filter or strainer (local supply) at the water intake ("Pipe E" in Table 2.1.1)

### ■ Negative pressure prevention (ONLY CYLINDER unit)

To prevent negative pressure effecting DHW tank, installer should install appropriate pipework or use appropriate devices.

### ■ Pipework Connections (Except for EHSE/ERSE series)

Connections to the cylinder unit / hydrobox should be made using the 22 mm or 28 mm compression as appropriate. (except for ERSC series)

Do not over-tighten compression fittings as this will lead to deformation of the olive ring and potential leaks.

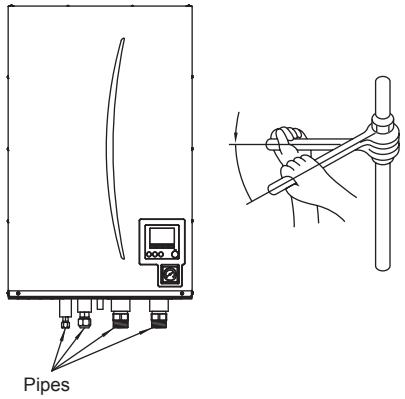
**Note: To weld the pipes in the field, cool the pipes on the cylinder unit / hydrobox using wet towel etc.**
**ERSC series have G1 (male) thread connections.**

### ■ Pipework Connections (EHSE/ERSE series)

Connections to the hydrobox should be made using the G1-1/2 nut as appropriate. (The hydrobox has G1-1/2 (male) thread connections.)

Please apply a gasket not to leak water.

Use two wrenches to tighten piping connection (see <Figure 4.2.1>).




<Figure 4.2.1>

### ■ Insulation of Pipework

- All exposed water pipework should be insulated to prevent unnecessary heat loss and condensation. To prevent condensate entering the hydrobox, the pipework and connections at the top of the cylinder unit / hydrobox should be carefully insulated.
- Cold and hot water pipework should not be run close together where possible, to avoid unwanted heat transfer.
- Pipework between outdoor heat pump unit and cylinder unit / hydrobox should be insulated with suitable pipe insulation material with a thermal conductivity of ≤ 0.04 W/m.K.