

AIR CONDITIONING SYSTEMS

# CITY MULTI DATA BOOK

MODEL

## PUMY-P36, 48, 60NKMU1(-BS)

Heat Pump S Series



|             |               |               |               |
|-------------|---------------|---------------|---------------|
| Type(BTU/h) | 36K           | 48K           | 60K           |
| Model Name  | PUMY-P36NKMU1 | PUMY-P48NKMU1 | PUMY-P60NKMU1 |

## PUMY-P-NKMU1

|                                                    |          |
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# 1. SPECIFICATIONS

Outdoor units

PUMY-P-NKMU1

| Model                                            |                              |          | PUMY-P36NKMU1(-BS)                                                                                                                                                                                                                                                | PUMY-P48NKMU1(-BS) |
|--------------------------------------------------|------------------------------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| Power source                                     |                              |          | Single-phase 208-230V -5%~+10%,60Hz                                                                                                                                                                                                                               |                    |
| Cooling capacity<br>(Nominal)                    | *1                           | BTU/h    | 36000                                                                                                                                                                                                                                                             | 48000              |
|                                                  | *1                           | kW       | 10.6                                                                                                                                                                                                                                                              | 14.1               |
|                                                  | Power input                  | kW       | 2.445                                                                                                                                                                                                                                                             | 3.690              |
|                                                  | Current input                | A        | 11.9 - 10.8                                                                                                                                                                                                                                                       | 18.0 - 16.3        |
|                                                  | EER                          | BTU/h/W  | 14.7                                                                                                                                                                                                                                                              | 13.0               |
| Temp. range of<br>cooling                        | Indoor                       | W.B.     | 59 to 75°F (15 to 24°C)                                                                                                                                                                                                                                           |                    |
|                                                  | Outdoor                      | D.B.     | 23 to 115°F (-5 to 46°C) *3*4                                                                                                                                                                                                                                     |                    |
| Heating capacity<br>(Nominal)                    | *2                           | BTU/h    | 42000                                                                                                                                                                                                                                                             | 54000              |
|                                                  | *2                           | kW       | 12.3                                                                                                                                                                                                                                                              | 15.8               |
|                                                  | Power input                  | kW       | 3.100                                                                                                                                                                                                                                                             | 4.085              |
|                                                  | Current input                | A        | 15.1 - 13.7                                                                                                                                                                                                                                                       | 19.9 - 18.0        |
|                                                  | COP                          | BTU/h/W  | 3.97                                                                                                                                                                                                                                                              | 3.87               |
| Temp. range of<br>heating                        | Indoor                       | D.B.     | 59 to 81°F (15 to 27°C)                                                                                                                                                                                                                                           |                    |
|                                                  | Outdoor                      | W.B.     | -13 to 59°F (-25 to 15°C)                                                                                                                                                                                                                                         |                    |
| Indoor unit<br>connectable                       | Total capacity               |          | 50~130% of outdoor unit capacity                                                                                                                                                                                                                                  |                    |
|                                                  | Model/Quantity               |          | P06 - P36 / 1 - 7                                                                                                                                                                                                                                                 | P06 - P54 / 1 - 10 |
| Sound pressure level (measured in anechoic room) |                              | dB <A>   | 49 / 53                                                                                                                                                                                                                                                           | 51 / 54            |
| Refrigerant                                      | Liquid pipe                  | in. (mm) | 3/8"(9.52) Flare                                                                                                                                                                                                                                                  |                    |
| piping diameter                                  | Gas pipe                     | in. (mm) | 5/8"(15.88) Flare                                                                                                                                                                                                                                                 |                    |
| FAN                                              | Type x Quantity              |          | Propeller fan × 2                                                                                                                                                                                                                                                 |                    |
|                                                  | Air flow rate                | cfm      | 3885                                                                                                                                                                                                                                                              |                    |
|                                                  |                              | m³/min   | 110                                                                                                                                                                                                                                                               |                    |
|                                                  |                              | L/s      | 1834                                                                                                                                                                                                                                                              |                    |
|                                                  | Control, Driving mechanism   |          | DC-control                                                                                                                                                                                                                                                        |                    |
|                                                  | Motor output                 | kW       | 0.074 + 0.074                                                                                                                                                                                                                                                     |                    |
|                                                  | External static press.       |          | 0                                                                                                                                                                                                                                                                 |                    |
| Compressor                                       | Type x Quantity              |          | Scroll hermetic compressor × 1                                                                                                                                                                                                                                    |                    |
|                                                  | Manufacture                  |          | MITSUBISHI ELECTRIC CORPORATION                                                                                                                                                                                                                                   |                    |
|                                                  | Starting method              |          | Inverter                                                                                                                                                                                                                                                          |                    |
|                                                  | Motor output                 | kW       | 2.8                                                                                                                                                                                                                                                               | 3.3                |
|                                                  | Case heater                  | kW       | -                                                                                                                                                                                                                                                                 |                    |
|                                                  | Lubricant                    |          | FV50S                                                                                                                                                                                                                                                             |                    |
| External finish                                  |                              |          | Galvanized steel sheets<br><MUNSELL 3Y 7.8/1.1>                                                                                                                                                                                                                   |                    |
| External dimension H × W × D                     |                              | in.      | 52-11/16 × 41-11/32 × 13 (+1)                                                                                                                                                                                                                                     |                    |
|                                                  |                              | mm       | 1,338 × 1,050 × 330 (+25)                                                                                                                                                                                                                                         |                    |
| Protection devices                               | High pressure protection     |          | High pressure switch, High pressure Sensor                                                                                                                                                                                                                        |                    |
|                                                  | Inverter circuit (COMP./FAN) |          | Overcurrent detection, Overheat detection (Heat sink thermistor)                                                                                                                                                                                                  |                    |
|                                                  | Compressor                   |          | Compressor thermistor, Overcurrent detection                                                                                                                                                                                                                      |                    |
|                                                  | Fan motor                    |          | Overheating, Voltage protection                                                                                                                                                                                                                                   |                    |
| Refrigerant                                      | Type x original charge       |          | R410A 10.6 lbs (4.8kg)                                                                                                                                                                                                                                            |                    |
|                                                  | Control                      |          | Electronic expansion valve                                                                                                                                                                                                                                        |                    |
| Net weight                                       |                              | lbs (kg) | 269 (122)                                                                                                                                                                                                                                                         |                    |
| Heat exchanger                                   |                              |          | Cross fin and Copper tube                                                                                                                                                                                                                                         |                    |
| HIC circuit (HIC: Heat Inter-Changer)            |                              |          | HIC circuit                                                                                                                                                                                                                                                       |                    |
| Defrosting method                                |                              |          | Reversed refrigerant circuit                                                                                                                                                                                                                                      |                    |
| Drawing                                          | External                     |          | BK01V261                                                                                                                                                                                                                                                          |                    |
|                                                  | Wiring                       |          | BH78B813                                                                                                                                                                                                                                                          |                    |
| Standard attachment                              | Document                     |          | Installation Manual                                                                                                                                                                                                                                               |                    |
|                                                  | Accessory                    |          | Grounded lead wire ×2, Conduit plate                                                                                                                                                                                                                              |                    |
| Optional parts                                   |                              |          | Joint: CMY-Y62-G-E<br>Header: CMY-Y64/68-G-E                                                                                                                                                                                                                      |                    |
| Remarks                                          |                              |          | * Details on foundation work, duct work, insulation work, electrical wiring, power source switch, and other items shall be referred to the Installation Manual.<br>* Due to continuing improvement, above specifications may be subject to change without notice. |                    |

| Notes:                                                                                                                                                                                                                                           | Unit converter                                                           |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|
| *1.Cooling conditions (Test conditions are based on AHRI 210/240)<br>Indoor: 80°F D.B./67°F W.B. (26.7°C D.B./19.4°C W.B.), Outdoor: 95°F D.B./75°F W.B. (35.0°C D.B./23.9°C W.B.)<br>Pipe length: 7.6 m (25 ft.), Level difference: 0 m (0 ft.) | BTU/h =kW × 3,412<br>cfm =m <sup>3</sup> /min × 35.31<br>lbs =kg /0.4536 |
| *2.Heating conditions (Test conditions are based on AHRI 210/240)<br>Indoor: 70°F D.B./60°F W.B. (21.1°C D.B./15.6°C W.B.), Outdoor: 47°F D.B./43°F W.B. (8.3°C D.B./6.1°C W.B.)<br>Pipe length: 7.6 m (25 ft.), Level difference: 0 m (0 ft.)   |                                                                          |
| *3.50 to 115 °F [10 to 46 °C] D.B.: When connecting PKFY-P06NBMU, PKFY-P08NHMU, PFFY-P06/08/12NEMU, and PFFY-P06/08/12NRMU type indoor unit.                                                                                                     |                                                                          |
| *4.5 to 115 °F [-15 to 46 °C] D.B.: When using an optional air protect guide [PAC-SH95AG-E]. However, this condition does not apply to the indoor units listed in *3.                                                                            | *Above specification data is subject to rounding variation.              |

# 1. SPECIFICATIONS

Outdoor units

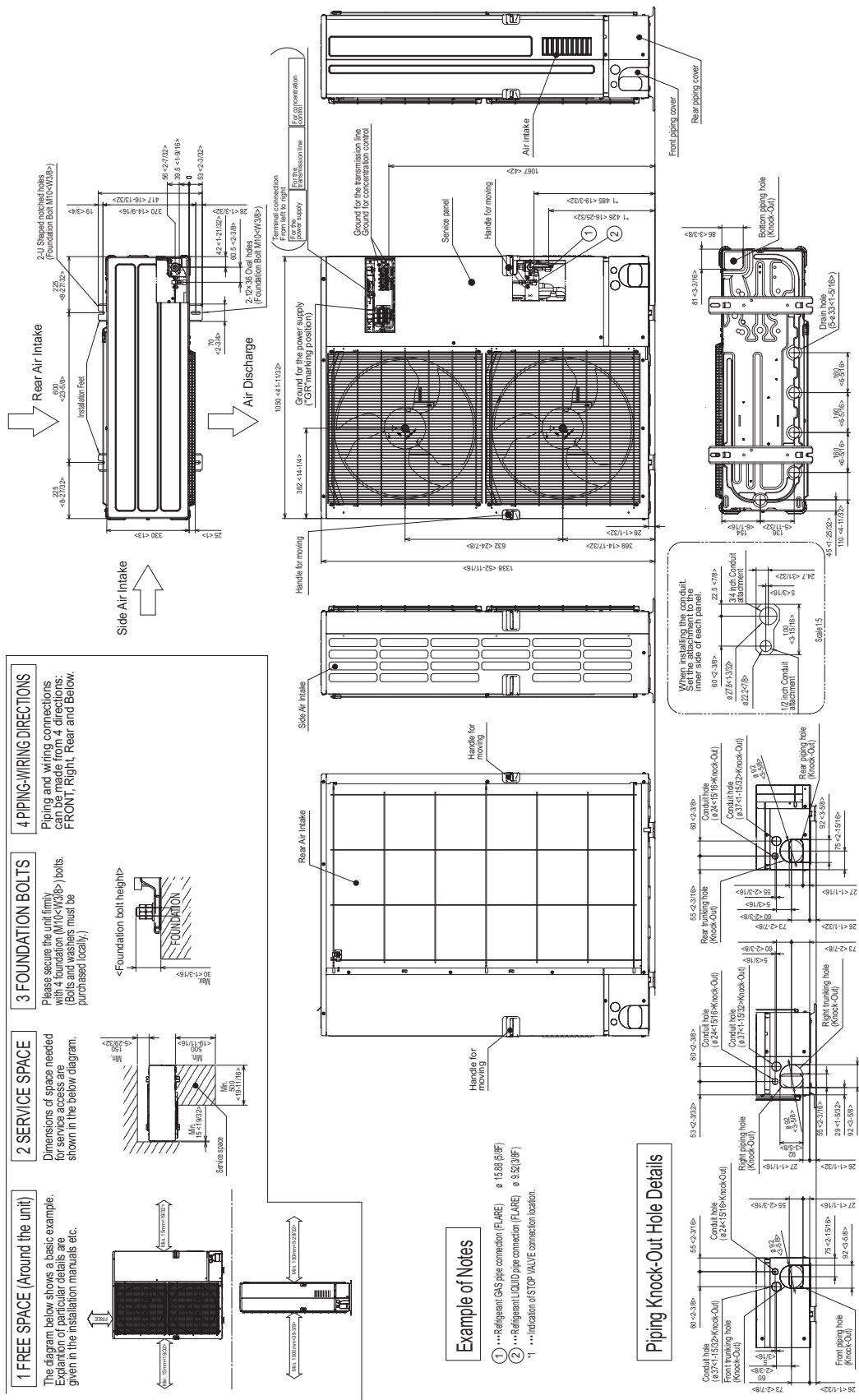
PUMY-P-NKMU1

| Model                                            |                              |          | PUMY-P60NKMU1(-BS)                                                                                                                                                                                                                                                |  |
|--------------------------------------------------|------------------------------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Power source                                     |                              |          | Single-phase 208-230V -5%~+10%, 60Hz                                                                                                                                                                                                                              |  |
| Cooling capacity<br>(Nominal)                    | *1                           | BTU/h    | 60000                                                                                                                                                                                                                                                             |  |
|                                                  | *1                           | kW       | 17.6                                                                                                                                                                                                                                                              |  |
|                                                  | Power input                  | kW       | 4.680                                                                                                                                                                                                                                                             |  |
|                                                  | Current input                | A        | 22.8 - 20.6                                                                                                                                                                                                                                                       |  |
|                                                  | EER                          | BTU/h/W  | 12.8                                                                                                                                                                                                                                                              |  |
| Temp. range of<br>cooling                        | Indoor                       | W.B.     | 59 to 75°F (15 to 24°C)                                                                                                                                                                                                                                           |  |
|                                                  | Outdoor                      | D.B.     | 23 to 115°F (-5 to 46°C) *3*4                                                                                                                                                                                                                                     |  |
| Heating capacity<br>(Nominal)                    | *2                           | BTU/h    | 66000                                                                                                                                                                                                                                                             |  |
|                                                  | *2                           | kW       | 19.3                                                                                                                                                                                                                                                              |  |
|                                                  | Power input                  | kW       | 5.450                                                                                                                                                                                                                                                             |  |
|                                                  | Current input                | A        | 26.6 - 24.1                                                                                                                                                                                                                                                       |  |
|                                                  | COP                          | BTU/h/W  | 3.55                                                                                                                                                                                                                                                              |  |
| Temp. range of<br>heating                        | Indoor                       | D.B.     | 59 to 81°F (15 to 27°C)                                                                                                                                                                                                                                           |  |
|                                                  | Outdoor                      | W.B.     | -13 to 59°F (-25 to 15°C)                                                                                                                                                                                                                                         |  |
| Indoor unit<br>connectable                       | Total capacity               |          | 50~130% of outdoor unit capacity                                                                                                                                                                                                                                  |  |
|                                                  | Model/Quantity               |          | P06~P72 / 1 - 12                                                                                                                                                                                                                                                  |  |
| Sound pressure level (measured in anechoic room) |                              | dB <A>   | 58 / 59                                                                                                                                                                                                                                                           |  |
| Refrigerant                                      | Liquid pipe                  | in. (mm) | 3/8" (9.52) Flare                                                                                                                                                                                                                                                 |  |
| piping diameter                                  | Gas pipe                     | in. (mm) | 3/4" (19.05) Flare                                                                                                                                                                                                                                                |  |
| FAN                                              | Type x Quantity              |          | Propeller fan × 2                                                                                                                                                                                                                                                 |  |
|                                                  | Air flow rate                | cfm      | 4879                                                                                                                                                                                                                                                              |  |
|                                                  |                              | m³/min   | 138                                                                                                                                                                                                                                                               |  |
|                                                  |                              | L/s      | 2300                                                                                                                                                                                                                                                              |  |
|                                                  | Control, Driving mechanism   |          | DC-control                                                                                                                                                                                                                                                        |  |
|                                                  | Motor output                 | kW       | 0.200 + 0.200                                                                                                                                                                                                                                                     |  |
|                                                  | External static press.       |          | 0                                                                                                                                                                                                                                                                 |  |
| Compressor                                       | Type x Quantity              |          | Scroll hermetic compressor × 1                                                                                                                                                                                                                                    |  |
|                                                  | Manufacture                  |          | MITSUBISHI ELECTRIC CORPORATION                                                                                                                                                                                                                                   |  |
|                                                  | Starting method              |          | Inverter                                                                                                                                                                                                                                                          |  |
|                                                  | Motor output                 | kW       | 4.1                                                                                                                                                                                                                                                               |  |
|                                                  | Case heater                  | kW       | -                                                                                                                                                                                                                                                                 |  |
|                                                  | Lubricant                    |          | FV50S                                                                                                                                                                                                                                                             |  |
| External finish                                  |                              |          | Galvanized steel sheets<br><MUNSELL 3Y 7.8/1.1>                                                                                                                                                                                                                   |  |
| External dimension H x W x D                     |                              | in.      | 52-11/16 × 41-11/32 × 13 (+1)                                                                                                                                                                                                                                     |  |
|                                                  |                              | mm       | 1,338 × 1,050 × 330 (+25)                                                                                                                                                                                                                                         |  |
| Protection devices                               | High pressure protection     |          | High pressure switch, High pressure Sensor                                                                                                                                                                                                                        |  |
|                                                  | Inverter circuit (COMP./FAN) |          | Overcurrent detection, Overheat detection (Heat sink thermistor)                                                                                                                                                                                                  |  |
|                                                  | Compressor                   |          | Compressor thermistor, Overcurrent detection                                                                                                                                                                                                                      |  |
|                                                  | Fan motor                    |          | Overheating, Voltage protection                                                                                                                                                                                                                                   |  |
| Refrigerant                                      | Type x original charge       |          | R410A 11.2 lbs (5.1kg)                                                                                                                                                                                                                                            |  |
|                                                  | Control                      |          | Electronic expansion valve                                                                                                                                                                                                                                        |  |
| Net weight                                       |                              | lbs (kg) | 306 (139)                                                                                                                                                                                                                                                         |  |
| Heat exchanger                                   |                              |          | Cross fin and Copper tube                                                                                                                                                                                                                                         |  |
| HIC circuit (HIC: Heat Inter-Changer)            |                              |          | HIC circuit                                                                                                                                                                                                                                                       |  |
| Defrosting method                                |                              |          | Reversed refrigerant circuit                                                                                                                                                                                                                                      |  |
| Drawing                                          | External                     |          | BK01V261                                                                                                                                                                                                                                                          |  |
|                                                  | Wiring                       |          | BH78B813                                                                                                                                                                                                                                                          |  |
| Standard attachment                              | Document                     |          | Installation Manual                                                                                                                                                                                                                                               |  |
|                                                  | Accessory                    |          | Grounded lead wire ×2, Conduit plate                                                                                                                                                                                                                              |  |
| Optional parts                                   |                              |          | Joint: CMY-Y62-G-E<br>Header: CMY-Y64/68-G-E                                                                                                                                                                                                                      |  |
| Remarks                                          |                              |          | * Details on foundation work, duct work, insulation work, electrical wiring, power source switch, and other items shall be referred to the Installation Manual.<br>* Due to continuing improvement, above specifications may be subject to change without notice. |  |

|                                                                                                                                                                                                                                                          |  |                                                             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-------------------------------------------------------------|
| Notes:                                                                                                                                                                                                                                                   |  | Unit converter                                              |
| *1.Cooling conditions (Test conditions are based on AHRI 210/240)<br>Indoor: 80°F D.B./67°F F.W.B. (26.7°C D.B./19.4°C F.W.B.), Outdoor: 95°F D.B./75°F F.W.B. (35.0°C D.B./23.9°C F.W.B.)<br>Pipe length: 7.6 m (25 ft.), Level difference: 0 m (0 ft.) |  | BTU/h =kW x 3,412                                           |
| *2.Heating conditions (Test conditions are based on AHRI 210/240)<br>Indoor: 70°F D.B./60°F F.W.B. (21.1°C D.B./15.6°C F.W.B.), Outdoor: 47°F D.B./43°F F.W.B. (8.3°C D.B./6.1°C F.W.B.)<br>Pipe length: 7.6 m (25 ft.), Level difference: 0 m (0 ft.)   |  | cfm =m³/min x 35.31                                         |
| *3.50 to 115 °F [10 to 46 °C] D.B.: When connecting PKFY-P06NBMU and PKFY-P08NHMU type indoor unit.                                                                                                                                                      |  | lbs =kg /0.4536                                             |
| *4.5 to 115 °F [-15 to 46 °C] D.B.: When using an optional air protect guide [PAC-SH95AG-E]. However, this condition does not apply to the indoor units listed in *3.                                                                                    |  | *Above specification data is subject to rounding variation. |

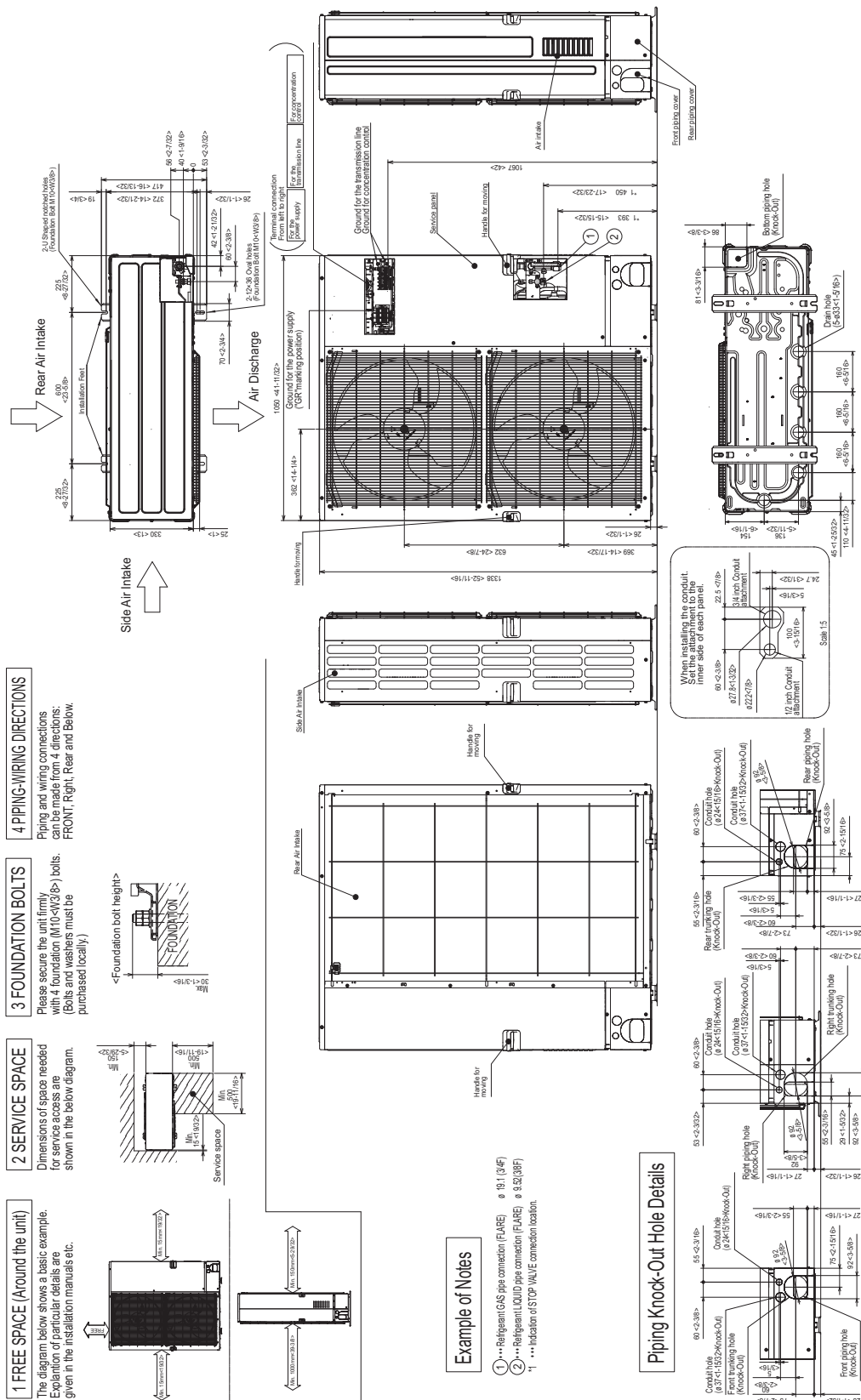
## Unit : mm(in)

PUMY-P-NKMU1



## PUMY-P60NKMU1(-BS)

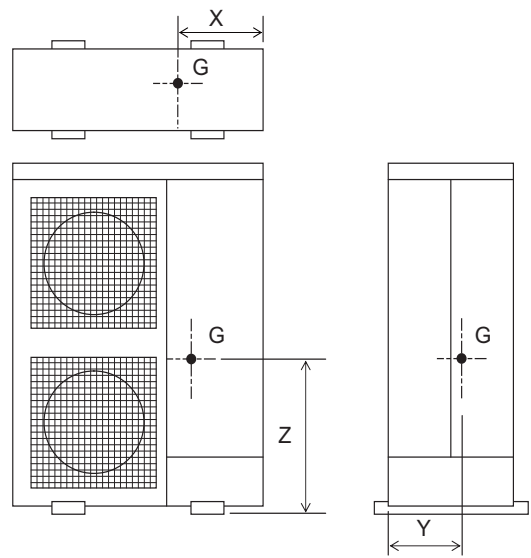
Unit : mm(in)



PUMY-P-NKMU1

PUMY-P36, 48, 60NKMU1(-BS)

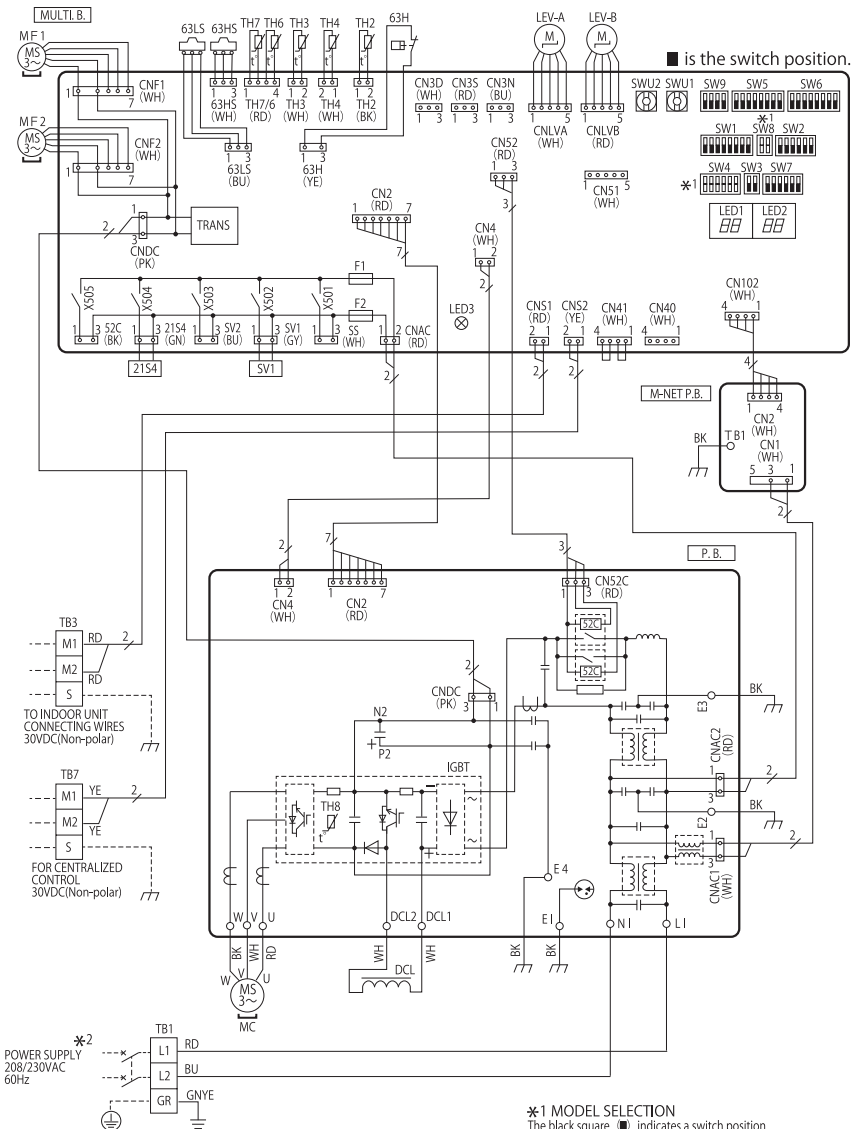
Unit : mm[in.]



| Model         | X           | Y           | Z             |
|---------------|-------------|-------------|---------------|
| PUMY-P36NKMU1 | 380[15]     | 160[6-5/16] | 586[23-1/16]  |
| PUMY-P48NKMU1 | 380[15]     | 160[6-5/16] | 586[23-1/16]  |
| PUMY-P60NKMU1 | 390[15-3/8] | 182[7-3/16] | 582[22-15/16] |

## PUMY-P36, 48NKMU1(-BS)

| SYMBOL      | NAME                                                   |
|-------------|--------------------------------------------------------|
| TB1         | Terminal Block (Power Supply)                          |
| TB3         | Terminal Block (Indoor/Outdoor Transmission Line)      |
| TB7         | Terminal Block (Centralized Control Transmission Line) |
| MC          | Motor For Compressor                                   |
| MF1,MF2     | Fan Motor                                              |
| 21S4        | Solenoid Valve Coil (4-Way Valve)                      |
| 63H         | High Pressure Switch                                   |
| 63HS        | High Pressure Sensor                                   |
| 63LS        | Low Pressure Sensor                                    |
| SV1         | Solenoid Valve Coil (Bypass Valve)                     |
| TH2         | Thermistor (Hic Pipe)                                  |
| TH3         | Thermistor (Outdoor Liquid Pipe)                       |
| TH4         | Thermistor (Compressor)                                |
| TH6         | Thermistor (Suction Pipe)                              |
| TH7         | Thermistor (Ambient)                                   |
| TH8         | Thermistor (Heat Sink)                                 |
| LEV-A,LEV-B | Linear Expansion Valve                                 |
| DCL         | Reactor                                                |
| P.B.        | Power Circuit Board                                    |
| U/V/W       | Connection Terminal (U/V/W-Phase)                      |
| LI          | Connection Terminal (L-Phase)                          |
| NI          | Connection Terminal (N-Phase)                          |
| DCL1,DCL2   | Connection Terminal (Reactor)                          |
| IGBT        | Power Module                                           |
| ELE2,E3,E4  | Connection Terminal (Electrical Parts Box)             |
| MULTLB.     | Multi Controller Circuit Board                         |
| SW1         | Switch (Display Selection)                             |
| SW2         | Switch (Function Selection)                            |
| SW3         | Switch (Test Run)                                      |
| SW4         | Switch (Model Selection)                               |
| SW5         | Switch (Function Selection)                            |
| SW6         | Switch (Function Selection)                            |
| SW7         | Switch (Function Selection)                            |
| SW8         | Switch (Model Selection)                               |
| SW9         | Switch (Function Selection)                            |
| SWU1        | Switch (Unit Address Selection, ones digit)            |
| SWU2        | Switch (Unit Address Selection, tens digit)            |
| CNS1        | Connector (Indoor/Outdoor Transmission Line)           |
| CNS2        | Connector (Centralized Control Transmission Line)      |
| SS          | Connector (Connection For Option)                      |
| CN3D        | Connector (Connection For Option)                      |
| CN3S        | Connector (Connection For Option)                      |
| CN3N        | Connector (Connection For Option)                      |
| CN51        | Connector (Connection For Option)                      |
| LED1,LED2   | LED (Operation Inspection Display)                     |
| LED3        | LED (Power Supply to Main Microcomputer)               |
| F1,F2       | Fuse (UL6.3A250V)                                      |
| X501~505    | Relay                                                  |
| M-NET P.B.  | M-NET Power Circuit Board                              |
| TB1         | Connection Terminal (Electrical Parts Box)             |



## Cautions when Servicing

- ⚠ **WARNING:** When the main supply is turned off, the voltage [340 V] in the main capacitor will drop to 20 V in approx. 2 minutes (input voltage: 230 V). When servicing, make sure that LED1, LED2 on the outdoor multi controller circuit board goes out, and then wait for at least 1 minute.
- Components other than the outdoor circuit boards may be faulty: Check and take corrective action, referring to the service manual. Do not replace the outdoor circuit boards without checking.

## NOTES:

- Refer to the wiring diagrams of the indoor units for details on wiring of each indoor unit.
- Self-diagnosis function  
The indoor and outdoor units can be diagnosed automatically using the self-diagnosis switch (SW1) and LED indication (LED1, LED2) found on the outdoor multi controller circuit board.  
LED indication : Set all contacts of SW1 to OFF.

- During normal operation  
The LED indicates the drive state of outdoor unit.

| Bit        | 1                   | 2   | 3    | 4   | 5     | 6 | 7 | 8          |
|------------|---------------------|-----|------|-----|-------|---|---|------------|
| Indication | Compressor operated | 52C | 21S4 | SV1 | (SV2) | — | — | Always lit |

- When fault requiring inspection has occurred  
The LED alternately indicates the check code and the address of the unit in which the fault has occurred.

(Example)  
When the compressor and SV1 are on during cooling operation.



## \*1 MODEL SELECTION

The black square (■) indicates a switch position.

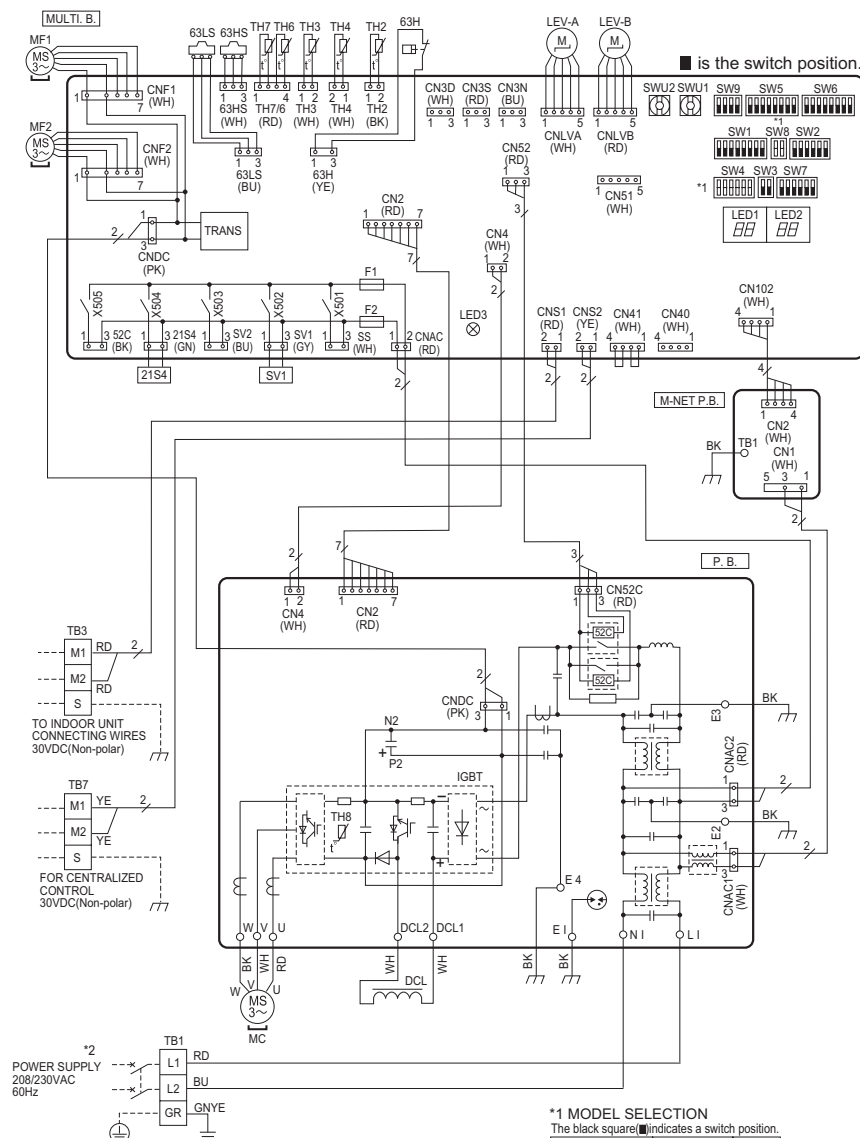
| MODELS        | SW4       | SW8       |
|---------------|-----------|-----------|
| PUMY-P36NKMU1 | ON<br>OFF | ON<br>OFF |
| PUMY-P48NKMU1 | ON<br>OFF | ON<br>OFF |

\*2 Use copper supply wires.

Utilisez des fils d'alimentation en cuivre.

## PUMY-P60NKMU1(-BS)

| SYMBOL      | NAME                                                   |
|-------------|--------------------------------------------------------|
| TB1         | Terminal Block <Power Supply>                          |
| TB3         | Terminal Block <Indoor/Outdoor Transmission Line>      |
| TB7         | Terminal Block <Centralized Control Transmission Line> |
| MC          | Motor For Compressor                                   |
| MF1,MF2     | Fan Motor                                              |
| 21S4        | Solenoid Valve Coil<4-Way Valve>                       |
| 63H         | High Pressure Switch                                   |
| 63HS        | High Pressure Sensor                                   |
| 63LS        | Low Pressure Sensor                                    |
| SV1         | Solenoid Valve Coil<Bypass Valve>                      |
| TH2         | Thermistor<Hic Pipe>                                   |
| TH3         | Thermistor<Outdoor Liquid Pipe>                        |
| TH4         | Thermistor<Compressor>                                 |
| TH6         | Thermistor<Suction Pipe>                               |
| TH7         | Thermistor<Ambient>                                    |
| TH8         | Thermistor<Heat Sink>                                  |
| LEV-A,LEV-B | Linear Expansion Valve                                 |
| DCL         | Reactor                                                |
| P.B.        | Power Circuit Board                                    |
| U/V/W       | Connection Terminal<U/V/W-Phase>                       |
| LI          | Connection Terminal<L-Phase>                           |
| NI          | Connection Terminal<N-Phase>                           |
| DCL1,DCL2   | Connection Terminal<Reactor>                           |
| IGBT        | Power Module                                           |
| E1,E2,E3,E4 | Connection Terminal<Electrical Parts Box>              |
| MULTI.B.    | Multi Controller Circuit Board                         |
| SW1         | Switch<Display Selection>                              |
| SW2         | Switch<Function Selection>                             |
| SW3         | Switch<Test Run>                                       |
| SW4         | Switch<Model Selection>                                |
| SW5         | Switch<Function Selection>                             |
| SW6         | Switch<Function Selection>                             |
| SW7         | Switch<Function Selection>                             |
| SW8         | Switch<Model Selection>                                |
| SW9         | Switch<Function Selection>                             |
| SWU1        | Switch<Unit Address Selection, ones digit>             |
| SWU2        | Switch<Unit Address Selection, tens digit>             |
| CNS1        | Connector <Indoor/Outdoor Transmission Line>           |
| CNS2        | Connector<Centralized Control Transmission Line>       |
| SS          | Connector<Connection For Option>                       |
| CN3D        | Connector<Connection For Option>                       |
| CN3S        | Connector<Connection For Option>                       |
| CN3N        | Connector<Connection For Option>                       |
| CN51        | Connector<Connection For Option>                       |
| LED1,LED2   | LED<Operation Inspection Display>                      |
| LED3        | LED<Power Supply to Main Microcomputer>                |
| F1,F2       | Fuse<UL6.3A250V>                                       |
| X501~505    | Relay                                                  |
| M-NET P.B.  | M-NET Power Circuit Board                              |
| TB1         | Connection Terminal<Electrical Parts Box>              |



## Cautions when Servicing

- ⚠ WARNING: When the main supply is turned off, the voltage [340 V] in the main capacitor will drop to 20 V in approx. 2 minutes (input voltage: 230 V). When servicing, make sure that LED1, LED2 on the outdoor multi controller circuit board goes out, and then wait for at least 1 minute.
- Components other than the outdoor circuit boards may be faulty: Check and take corrective action, referring to the service manual. Do not replace the outdoor circuit boards without checking.

## Précautions pendant l'entretien

- ⚠ AVERTISSEMENT : lorsque l'alimentation principale est hors tension, la tension [340 V] dans le condensateur principal chute à 20 V en 2 minutes environ (tension d'entrée : 230 V). Lors de l'entretien, assurez-vous que la diode LED1, LED2 sur la carte de circuit extérieure s'éteint, puis patientez au moins 1 minute.
- Des composants autres que la carte de circuit extérieure peuvent être défectueux : vérifiez et prenez des mesures de correction, en vous reportant au manuel d'entretien. Ne remplacez pas la carte de circuit extérieure sans vérification.

## NOTES:

- Refer to the wiring diagrams of the indoor units for details on wiring of each indoor unit.
- Self-diagnosis function  
The indoor and outdoor units can be diagnosed automatically using the self-diagnosis switch (SW1) and LED indication (LED1, LED2) found on the outdoor multi controller circuit board.  
LED indication : Set all contacts of SW1 to OFF.

- During normal operation  
The LED indicates the drive state of outdoor unit.

| Bit        | 1                   | 2   | 3    | 4   | 5     | 6 | 7 | 8          |
|------------|---------------------|-----|------|-----|-------|---|---|------------|
| Indication | Compressor operated | 52C | 21S4 | SV1 | (SV2) | — | — | Always lit |

- When fault requiring inspection has occurred  
The LED alternately indicates the check code and the address of the unit in which the fault has occurred.

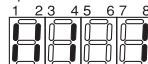
## \*1 MODEL SELECTION

The black square indicates a switch position.

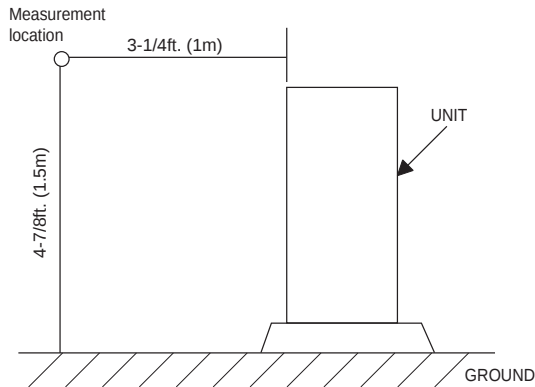
| MODEL         | SW4    | SW8    |
|---------------|--------|--------|
| PUMY-P60NKMU1 | ON OFF | ON OFF |

- \*2 Use copper supply wires.  
Utilisez des fils d'alimentation en cuivre.

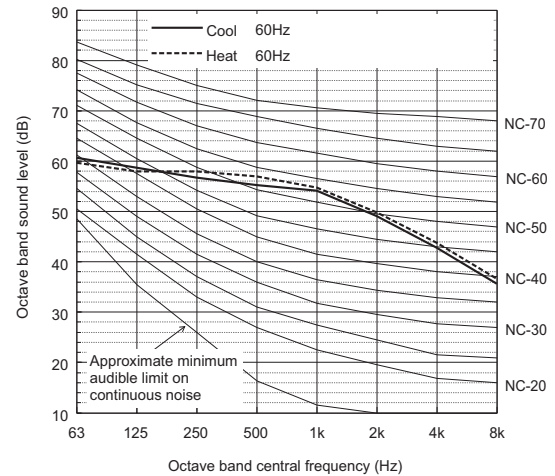
[Example]  
When the compressor and SV1 are on during cooling operation.



## Measurement condition PUMY-P36, 48, 60NKMU1(-BS)

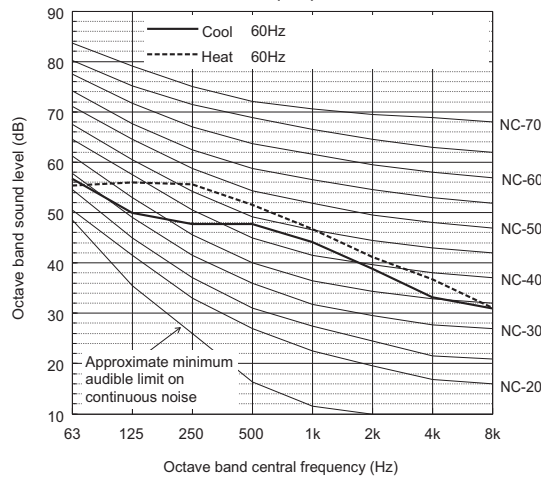


## Sound level of PUMY-P60NKMU1(-BS)



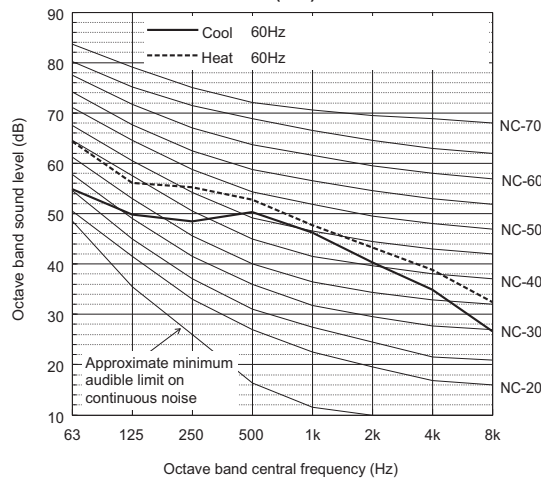
|                  |      | 63   | 125  | 250  | 500  | 1k   | 2k   | 4k   | 8k   | dB(A) |
|------------------|------|------|------|------|------|------|------|------|------|-------|
| Standard Cooling | 60Hz | 60.7 | 58.7 | 56.7 | 55.2 | 54.1 | 49.1 | 42.8 | 35.6 | 58.0  |
| Standard Heating | 60Hz | 59.7 | 58.0 | 58.0 | 56.9 | 54.7 | 49.8 | 43.8 | 36.6 | 59.0  |

## Sound level of PUMY-P36NKMU1(-BS)



|                  |      | 63   | 125  | 250  | 500  | 1k   | 2k   | 4k   | 8k   | dB(A) |
|------------------|------|------|------|------|------|------|------|------|------|-------|
| Standard Cooling | 60Hz | 56.7 | 49.9 | 47.7 | 47.7 | 44.2 | 38.9 | 33.1 | 31.0 | 49.0  |
| Standard Heating | 60Hz | 55.4 | 56.0 | 55.6 | 51.6 | 46.7 | 41.2 | 36.7 | 31.1 | 53.0  |

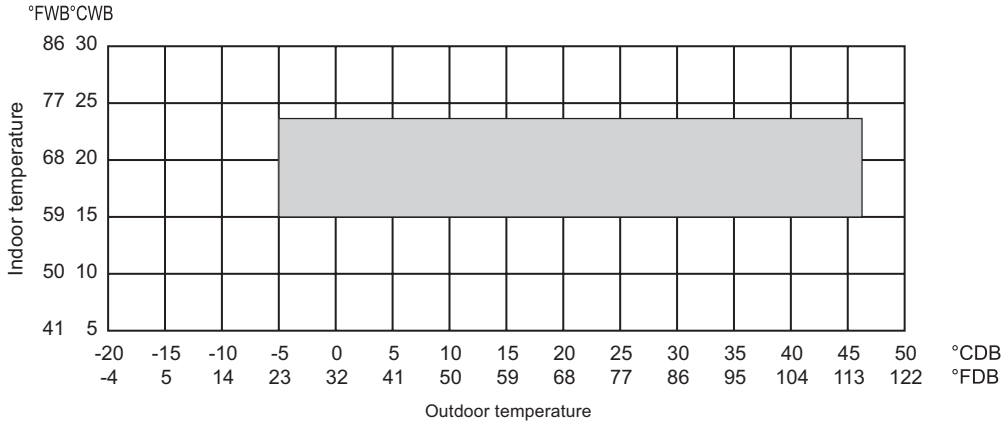
## Sound level of PUMY-P48NKMU1(-BS)



|                  |      | 63   | 125  | 250  | 500  | 1k   | 2k   | 4k   | 8k   | dB(A) |
|------------------|------|------|------|------|------|------|------|------|------|-------|
| Standard Cooling | 60Hz | 54.8 | 49.9 | 48.5 | 50.3 | 46.3 | 40.3 | 34.8 | 26.7 | 51.0  |
| Standard Heating | 60Hz | 64.3 | 56.1 | 55.2 | 52.8 | 47.7 | 43.3 | 38.8 | 32.5 | 54.0  |

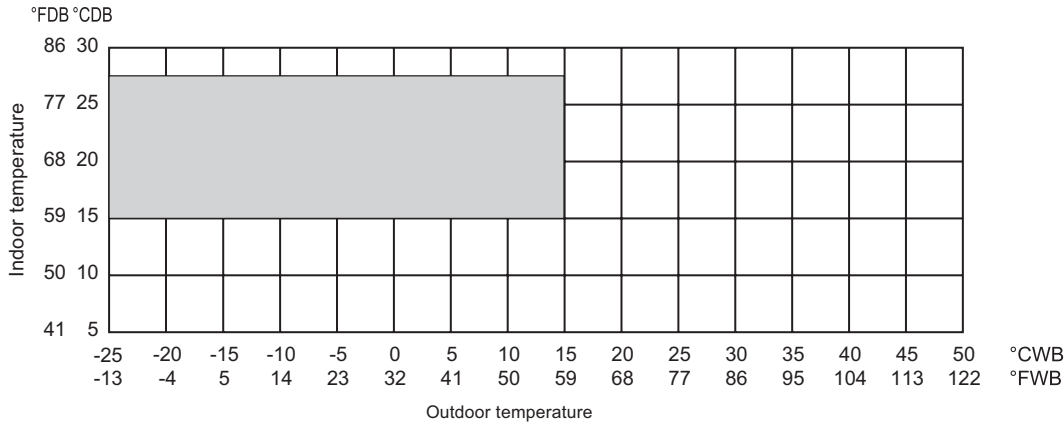
PUMY-P-NKMU1

• Cooling



\*For PUMY-P36, 48NKMU1(-BS), 50 to 115 °F [10 to 46 °C] D.B.: When connecting PKFY-P06NBMU, PKFY-P08NHMU, PFFY-P06/08/12NEMU, and PFFY-P06/08/12NRMU type indoor unit.  
\*For PUMY-P60NKMU1(-BS), 50 to 115 °F [10 to 46 °C] D.B.: When connecting PKFY-P06NBMU and PKFY-P08NHMU type indoor unit.

• Heating



Section 7-1.

Shows an example of how to select the indoor and outdoor units according to the required heating/cooling load.

Section 7-2. through 7-5.

Show the actual correction data of indoor and outdoor units.

## 7-1. Selection of Cooling/Heating Units

How to determine the capacity when less than or equal 100% indoor model size units are connected in total:

The purpose of this flow chart is to select the indoor and outdoor units. For other purposes, this flow chart is intended only for reference.

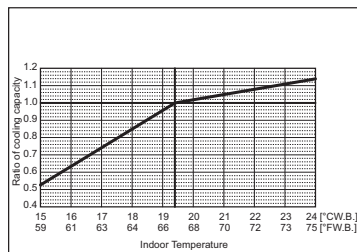
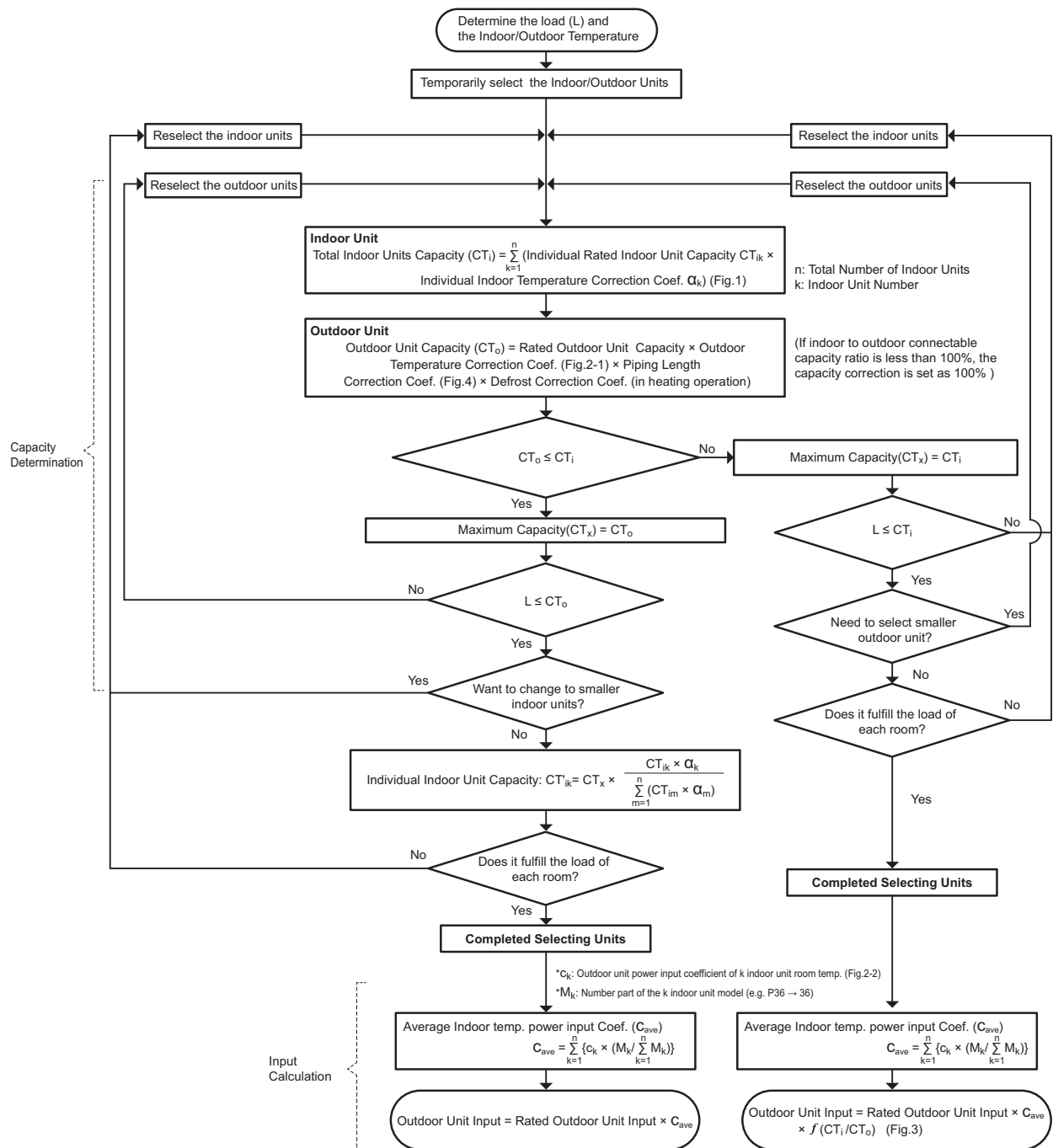


Fig.1 Indoor unit temperature correction

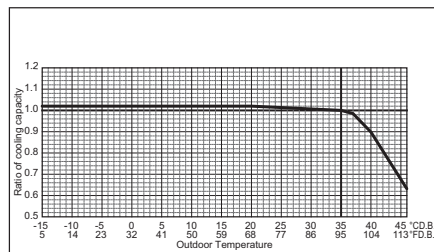


Fig.2-1 Outdoor unit temperature correction (capacity)

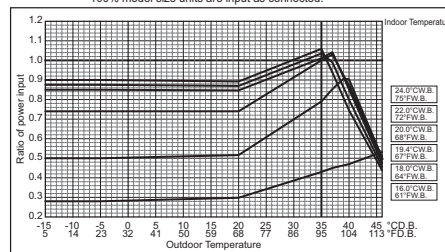


Fig.2-2 Outdoor unit temperature correction (power input)

**How to determine the capacity when greater than 100% indoor model size units are connected in total:**

The purpose of this flow chart is to select the indoor and outdoor units. For other purposes, this flow chart is intended only for reference.

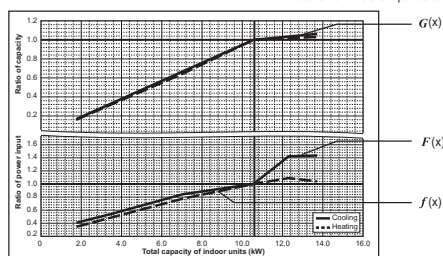
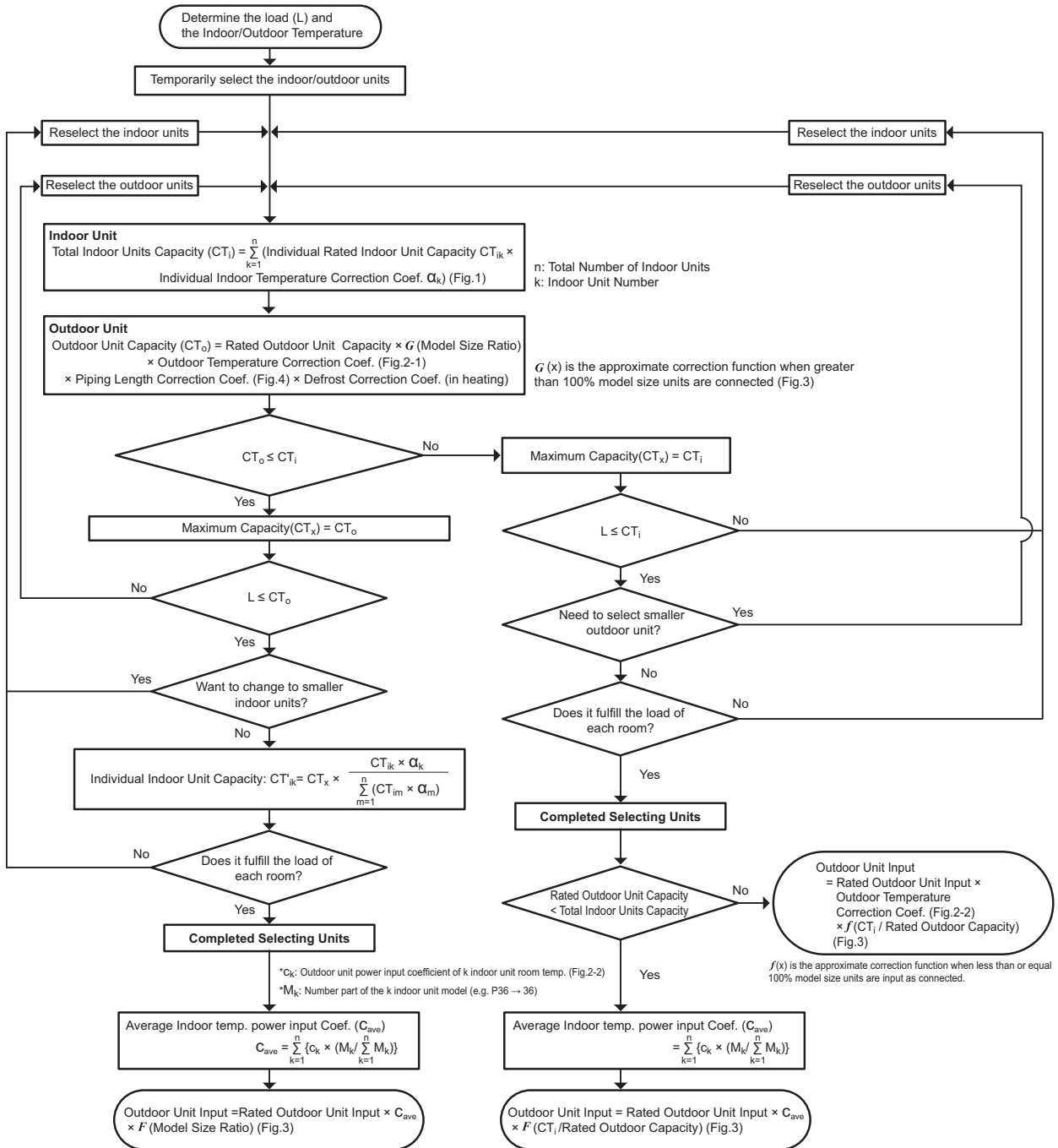


Fig.3 Correction by total indoor

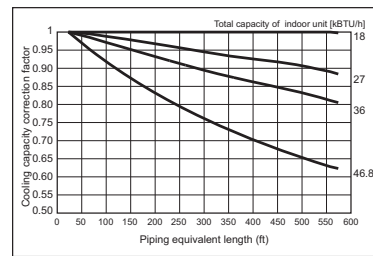


Fig.4 Correction of refrigerant piping length

&lt;Cooling&gt;

| Design Condition                        |        |
|-----------------------------------------|--------|
| Outdoor Design Dry Bulb Temperature     | 37 °C  |
| Total Cooling Load                      | 9.0 kW |
| Room1                                   |        |
| Indoor Design Dry Bulb Temperature      | 28 °C  |
| Indoor Design Wet Bulb Temperature      | 22 °C  |
| Cooling Load                            | 5.0 kW |
| Room2                                   |        |
| Indoor Design Dry Bulb Temperature      | 24 °C  |
| Indoor Design Wet Bulb Temperature      | 18 °C  |
| Cooling Load                            | 4.0 kW |
| <Other>                                 |        |
| Indoor/Outdoor Equivalent Piping Length | 30 m   |

## 1. Cooling Calculation

## (1) Temporary Selection of Indoor Units

|          |                |
|----------|----------------|
| Room1    |                |
| PEFY-P18 | 5.3 kW (Rated) |
| Room2    |                |
| PEFY-P18 | 5.3 kW (Rated) |

## (2) Total Indoor Units Capacity

P18 + P18 = P36

## (3) Selection of Outdoor Unit

The P36 outdoor unit is selected as total indoor units capacity is P36

PUMY-P36 10.6 kW

## (4) Total Indoor Units Capacity Correction Calculation

|                                                      |                       |
|------------------------------------------------------|-----------------------|
| Room1                                                |                       |
| Indoor Design Wet Bulb Temperature Correction (22°C) | 1.08 (Refer to Fig.1) |
| Room2                                                |                       |
| Indoor Design Wet Bulb Temperature Correction (18°C) | 0.85 (Refer to Fig.1) |

Total Indoor Units Capacity (CTi)

$$\begin{aligned}
 CTi &= \Sigma (\text{Indoor Unit Rating} \times \text{Indoor Design Temperature Correction}) \\
 &= 5.3 \times 1.08 + 5.3 \times 0.85 \\
 &\approx 10.2 \text{ kW}
 \end{aligned}$$

## (5) Outdoor Unit Correction Calculation

|                                                       |                       |
|-------------------------------------------------------|-----------------------|
| Outdoor Design Dry Bulb Temperature Correction (37°C) | 0.99 (Refer to Fig.2) |
| Piping Length Correction (30 m)                       | 0.97 (Refer to Fig.3) |

Total Outdoor Unit Capacity (CTo)

$$\begin{aligned}
 CTo &= \text{Outdoor Rating} \times \text{Outdoor Design Temperature Correction} \times \text{Piping Length Correction} \\
 &= 10.6 \times 0.99 \times 0.97 \\
 &\approx 10.1 \text{ kW}
 \end{aligned}$$

## (6) Determination of Maximum System Capacity (CTx)

Comparison of Capacity between Total Indoor Units Capacity (CTi) and Total Outdoor Unit Capacity (CTo)

CTi = 10.2 &gt; CTo = 10.1, thus, select CTo.

CTx = CTo = 10.1 kW

## (7) Comparison with Essential Load

Against the essential load 9.0kW, the maximum system capacity is 10.1kW: Proper outdoor units have been selected.

## (8) Calculation of Maximum Indoor Unit Capacity of Each Room

CTx = CTo, thus, calculate by the calculation below

|                                                                                                                                |                             |
|--------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| Room1                                                                                                                          |                             |
| Maximum Capacity × Room1 Capacity after the Temperature Correction / (Room1,2 Total Capacity after the Temperature Correction) |                             |
| $= 10.1 \times (5.3 \times 1.08) / (5.3 \times 1.08 + 5.3 \times 0.85)$                                                        |                             |
| $\approx 5.7 \text{ kW}$                                                                                                       | OK: fulfills the load 5.0kW |

|                                                                                                                                |                             |
|--------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| Room2                                                                                                                          |                             |
| Maximum Capacity × Room2 Capacity after the Temperature Correction / (Room1,2 Total Capacity after the Temperature Correction) |                             |
| $= 10.1 \times (5.3 \times 0.85) / (5.3 \times 1.08 + 5.3 \times 0.85)$                                                        |                             |
| $\approx 4.4 \text{ kW}$                                                                                                       | OK: fulfills the load 4.0kW |

Go on to the heating trial calculation since the selected units fulfill the cooling loads of Room 1, 2.

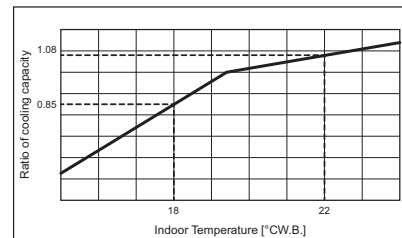
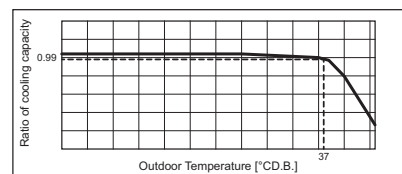
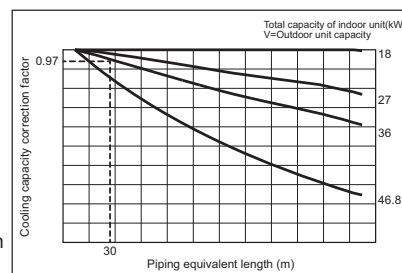
Fig.1 Indoor unit temperature correction  
To be used to correct indoor unit onlyFig.2 Outdoor unit temperature correction  
To be used to correct outdoor unit only

Fig.3 Correction of refrigerant piping length

&lt;Heating&gt;

| Design Condition                        |         |
|-----------------------------------------|---------|
| Outdoor Design Wet Bulb Temperature     | 2 °C    |
| Total Heating Load                      | 9.0 kW  |
| Room1                                   |         |
| Indoor Design Dry Bulb Temperature      | 26 °C   |
| Heating Load                            | 4.0 kW  |
| Room2                                   |         |
| Indoor Design Dry Bulb Temperature      | 21.1 °C |
| Heating Load                            | 5.0 kW  |
| <Other>                                 |         |
| Indoor/Outdoor Equivalent Piping Length | 30 m    |

## 2. Heating Calculation

## (1) Temporary Selection of Indoor Units

Room1  
PEFY-P18

5.9 kW (Rated)

Room2  
PEFY-P18

5.9 kW (Rated)

## (2) Total Indoor Units Capacity

P18 + P18 = P36

## (3) Selection of Outdoor Unit

The P36 outdoor unit is selected as total indoor units capacity is P36

PUMY-P36

12.3 kW

## (4) Total Indoor Units Capacity Correction Calculation

Room1

Indoor Design Dry Bulb Temperature Correction (26°C)

0.81 (Refer to Fig.4)

Room2

Indoor Design Dry Bulb Temperature Correction (21°C)

1.00 (Refer to Fig.4)

Total Indoor Units Capacity (CTi)

$$CTi = \Sigma (\text{Indoor Unit Rating} \times \text{Indoor Design Temperature Correction})$$

$$= 5.9 \times 0.81 + 5.9 \times 1.00$$

$$\approx 10.6 \text{ kW}$$

## (5) Outdoor Unit Correction Calculation

Outdoor Design Wet Bulb Temperature Correction (2°C)

1.00 (Refer to Fig.5)

Piping Length Correction (30 m)

0.98 (Refer to Fig.6)

Defrost Correction

0.89 (Refer to Tbl.1)

Total Outdoor Unit Capacity (CTo)

$$CTo = \text{Outdoor Unit Rating} \times \text{Outdoor Design Temperature Correction} \times \text{Piping Length Correction} \times \text{Defrost Correction}$$

$$= 12.3 \times 1.00 \times 0.98 \times 0.89$$

$$\approx 10.7 \text{ kW}$$

## (6) Determination of Maximum System Capacity (CTx)

Comparison of Capacity between Total Indoor Units Capacity (CTi) and Total Outdoor Unit Capacity (CTo)

CTi = 10.6 &lt; CTo = 10.7, thus, select CTi.

CTx = CTi = 10.6 kW

## (7) Comparison with Essential Load

Against the essential load 9.0kW, the maximum system capacity is 10.6kW: Proper outdoor units have been selected.

## (8) Calculation of Maximum Indoor Unit Capacity of Each Room

CTx = CTi, thus, calculate by the calculation below

Room1

$$\text{Indoor Unit Rating} \times \text{Indoor Design Temperature Correction}$$

$$= 5.9 \times 0.81$$

$$\approx 4.8 \text{ kW}$$

OK: fulfills the load 4.0kW

Room2

$$\text{Indoor Unit Rating} \times \text{Indoor Design Temperature Correction}$$

$$= 5.9 \times 1.00$$

$$= 5.9 \text{ kW}$$

OK: fulfills the load 5.0kW

Completed selecting units since the selected units fulfill the heating loads of Room 1, 2.

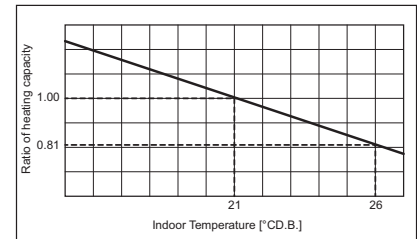


Fig.4 Indoor unit temperature correction  
To be used to correct indoor unit only

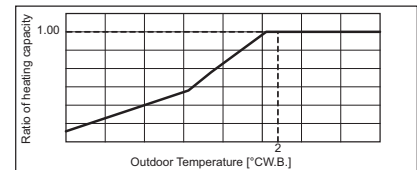


Fig.5 Outdoor unit temperature correction  
To be used to correct outdoor unit only

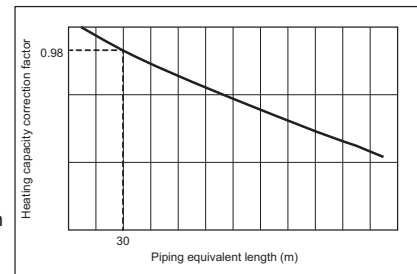


Fig.6 Correction of refrigerant piping length

Tbl.1 Table of correction factor at frost and defrost

| Outdoor inlet air temp. °FWB | 43   | 39   | 36   | 32   | 28   | 25   | 21   | 18   | 14   | 5    | -4   | -13  |
|------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Outdoor inlet air temp. °CWB | 6    | 4    | 2    | 0    | -2   | -4   | -6   | -8   | -10  | -15  | -20  | -25  |
| PUMY-P36NKMU1(-BS)           | 1.00 | 0.98 | 0.89 | 0.88 | 0.89 | 0.90 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| PUMY-P48NKMU1(-BS)           | 1.00 | 0.98 | 0.89 | 0.88 | 0.89 | 0.90 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| PUMY-P60NKMU1(-BS)           | 1.00 | 0.98 | 0.89 | 0.88 | 0.89 | 0.90 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |

3. Power input of outdoor unit

<Cooling>

(1) Rated power input of outdoor unit 2.45 kW (Nominal)

(2) Calculation of the average indoor temperature power input coefficient

Coefficient of the outdoor unit for indoor unit 1 (Outdoor temp. 37 °CD.B., Indoor temp. 22 °CW.B.)  
0.99

Coefficient of the outdoor unit for indoor unit 2 (Outdoor temp. 37 °CD.B., Indoor temp. 18 °CW.B.)  
0.85

Average indoor temp. power input coefficient ( $C_{ave}$ ) =  $\sum_{k=1}^n \{c_k \times (M_k / \sum_{k=1}^n M_k)\}$

n: Total number of the indoor units

k: Number of the indoor unit

$c_k$ : Outdoor unit power input coefficient of k indoor unit room temp.

$M_k$ : Number part of the k indoor unit model (e.g. P36 → 36)

=  $0.99 \times 18 / (18 + 18) + 0.85 \times 18 / (18 + 18)$   
= 0.92

(3) No need to consider Coefficient of the partial load  $f(CTi/CTo)$  -

(4) Outdoor power input (Plo)

Maximum System Capacity (CTx) = Total Outdoor unit Capacity (CTo), so use the following formula  
Plo = Outdoor unit Cooling Rated Power Input × Correction Coefficient of Indoor temperature  
=  $2.445 \times 0.92$   
≈ 2.20 kW

&lt;Heating&gt;

**(1) Rated power input of outdoor unit** **3.1 kW (Nominal)****(2) Calculation of the average indoor temperature power input coefficient**Coefficient of the outdoor unit for indoor unit 1 (Outdoor temp. 2 °CW.B., Indoor temp. 26 °CD.B.)  
0.87Coefficient of the outdoor unit for indoor unit 2 (Outdoor temp. 2 °CW.B., Indoor temp. 21.1 °CD.B.)  
1.20

$$\text{Average indoor temp. power input coefficient (C}_{\text{ave}}) = \sum_{k=1}^n \{c_k \times (M_k / \sum_{k=1}^n M_k)\}$$

n: Total number of the indoor units

k: Number of the indoor unit

c<sub>k</sub>: Outdoor unit power input coefficient of k indoor unit room temp.M<sub>k</sub>: Number part of the k indoor unit model (e.g. P36 → 36)

$$= 0.87 \times 18 / (18 + 18) + 1.2 \times 18 / (18 + 18) \\ \approx 1.04$$

**(3) Coefficient of the partial load  $f'(CT_i/CT_o)$**  **0.99****(4) Outdoor power input (P<sub>lo</sub>)**Maximum System Capacity (CT<sub>x</sub>) = Total Indoor unit Capacity (CT<sub>i</sub>), so use the following formula

$$\begin{aligned} P_{lo} &= \text{Outdoor unit Heating Rated Power Input} \times \text{Correction Coefficient of Indoor temperature} \times f'(CT_i/CT_o) \\ &= 3.1 \times 1.04 \times 0.99 \\ &\approx 3.20 \text{ kW} \end{aligned}$$

## &lt;Cooling&gt;

| Design Condition                        |              |
|-----------------------------------------|--------------|
| Outdoor Design Dry Bulb Temperature     | 99 °F        |
| Total Cooling Load                      | 31,000 BTU/h |
| Room1                                   |              |
| Indoor Design Dry Bulb Temperature      | 82 °F        |
| Indoor Design Wet Bulb Temperature      | 72 °F        |
| Cooling Load                            | 17,000 BTU/h |
| Room2                                   |              |
| Indoor Design Dry Bulb Temperature      | 75 °F        |
| Indoor Design Wet Bulb Temperature      | 64 °F        |
| Cooling Load                            | 14,000 BTU/h |
| <Other>                                 |              |
| Indoor/Outdoor Equivalent Piping Length | 98 ft.       |

## 1. Cooling Calculation

## (1) Temporary Selection of Indoor Units

|          |                      |
|----------|----------------------|
| Room1    |                      |
| PEFY-P18 | 18,000 BTU/h (Rated) |
| Room2    |                      |
| PEFY-P18 | 18,000 BTU/h (Rated) |

## (2) Total Indoor Units Capacity

$$P18 + P18 = P36$$

## (3) Selection of Outdoor Unit

The P36 outdoor unit is selected as total indoor units capacity is P36

|          |              |
|----------|--------------|
| PUMY-P36 | 36,000 BTU/h |
|----------|--------------|

## (4) Total Indoor Units Capacity Correction Calculation

|                                                      |                       |
|------------------------------------------------------|-----------------------|
| Room1                                                |                       |
| Indoor Design Wet Bulb Temperature Correction (72°F) | 1.08 (Refer to Fig.1) |
| Room2                                                |                       |
| Indoor Design Wet Bulb Temperature Correction (64°F) | 0.85 (Refer to Fig.1) |

Total Indoor Units Capacity (CTi)

$$\begin{aligned}
 CTi &= \Sigma (\text{Indoor Unit Rating} \times \text{Indoor Design Temperature Correction}) \\
 &= 18,000 \times 1.08 + 18,000 \times 0.85 \\
 &\approx 34,700 \text{ BTU/h}
 \end{aligned}$$

## (5) Outdoor Unit Correction Calculation

|                                                       |                       |
|-------------------------------------------------------|-----------------------|
| Outdoor Design Dry Bulb Temperature Correction (99°F) | 0.99 (Refer to Fig.2) |
| Piping Length Correction (98 ft.)                     | 0.97 (Refer to Fig.3) |

Total Outdoor Unit Capacity (CTo)

$$\begin{aligned}
 CTo &= \text{Outdoor Rating} \times \text{Outdoor Design Temperature Correction} \times \text{Piping Length Correction} \\
 &= 36,000 \times 0.99 \times 0.97 \\
 &\approx 34,600 \text{ BTU/h}
 \end{aligned}$$

## (6) Determination of Maximum System Capacity (CTx)

Comparison of Capacity between Total Indoor Units Capacity (CTi) and Total Outdoor Unit Capacity (CTo)

$$CTi = 34,700 > CTo = 34,600, \text{ thus, select } CTo.$$

$$CTx = CTo = 34,600 \text{ BTU/h}$$

## (7) Comparison with Essential Load

Against the essential load 31,000BTU/h, the maximum system capacity is 34,600BTU/h: Proper outdoor units have been selected.

## (8) Calculation of Maximum Indoor Unit Capacity of Each Room

CTx = CTo, thus, calculate by the calculation below

Room1

$$\begin{aligned}
 &\text{Maximum Capacity} \times \text{Room1 Capacity after the Temperature Correction} / (\text{Room1,2 Total Capacity after the Temperature Correction}) \\
 &= 34,600 \times (18,000 \times 1.08) / (18,000 \times 1.08 + 18,000 \times 0.85) \\
 &\approx 19,400 \text{ BTU/h} \quad \text{OK: fulfills the load 17,000BTU/h}
 \end{aligned}$$

Room2

$$\begin{aligned}
 &\text{Maximum Capacity} \times \text{Room2 Capacity after the Temperature Correction} / (\text{Room1,2 Total Capacity after the Temperature Correction}) \\
 &= 34,600 \times (18,000 \times 0.85) / (18,000 \times 1.08 + 18,000 \times 0.85) \\
 &\approx 15,200 \text{ BTU/h} \quad \text{OK: fulfills the load 14,000BTU/h}
 \end{aligned}$$

Go on to the heating trial calculation since the selected units fulfill the cooling loads of Room 1, 2.

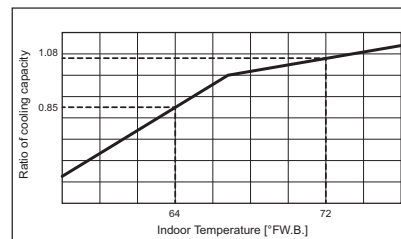


Fig.1 Indoor unit temperature correction  
To be used to correct indoor unit only

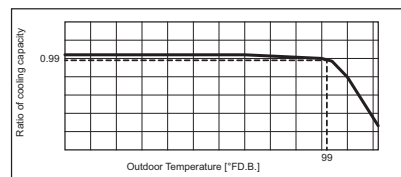


Fig.2 Outdoor unit temperature correction  
To be used to correct outdoor unit only

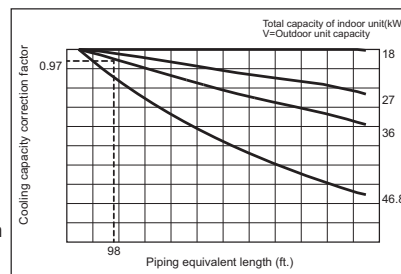


Fig.3 Correction of refrigerant piping length

&lt;Heating&gt;

| Design Condition                        |              |
|-----------------------------------------|--------------|
| Outdoor Design Wet Bulb Temperature     | 36 °F        |
| Total Heating Load                      | 31,000 BTU/h |
| Room1                                   |              |
| Indoor Design Dry Bulb Temperature      | 79 °F        |
| Heating Load                            | 14,000 BTU/h |
| Room2                                   |              |
| Indoor Design Dry Bulb Temperature      | 70 °F        |
| Heating Load                            | 17,000 BTU/h |
| <Other>                                 |              |
| Indoor/Outdoor Equivalent Piping Length | 98 ft.       |

## 2. Heating Calculation

## (1) Temporary Selection of Indoor Units

|          |                      |
|----------|----------------------|
| Room1    |                      |
| PEFY-P18 | 20,000 BTU/h (Rated) |
| Room2    |                      |
| PEFY-P18 | 20,000 BTU/h (Rated) |

## (2) Total Indoor Units Capacity

$$P18 + P18 = P36$$

## (3) Selection of Outdoor Unit

The P36 outdoor unit is selected as total indoor units capacity is P36

|          |              |
|----------|--------------|
| PUMY-P36 | 42,000 BTU/h |
|----------|--------------|

## (4) Total Indoor Units Capacity Correction Calculation

|                                                      |                       |
|------------------------------------------------------|-----------------------|
| Room1                                                |                       |
| Indoor Design Dry Bulb Temperature Correction (79°F) | 0.81 (Refer to Fig.4) |
| Room2                                                |                       |
| Indoor Design Dry Bulb Temperature Correction (70°F) | 1.00 (Refer to Fig.4) |

Total Indoor Units Capacity (CTi)

$$\begin{aligned} CTi &= \Sigma (\text{Indoor Unit Rating} \times \text{Indoor Design Temperature Correction}) \\ &= 20,000 \times 0.81 + 20,000 \times 1.00 \\ &= 36,200 \text{ BTU/h} \end{aligned}$$

## (5) Outdoor Unit Correction Calculation

|                                                       |                       |
|-------------------------------------------------------|-----------------------|
| Outdoor Design Wet Bulb Temperature Correction (36°F) | 1.00 (Refer to Fig.5) |
| Piping Length Correction (98 ft.)                     | 0.98 (Refer to Fig.6) |
| Defrost Correction                                    | 0.89 (Refer to Tbl.1) |

Total Outdoor Unit Capacity (CTo)

$$\begin{aligned} CTo &= \text{Outdoor Unit Rating} \times \text{Outdoor Design Temperature Correction} \times \text{Piping Length} \\ &\quad \text{Correction} \times \text{Defrost Correction} \\ &= 42,000 \times 1.00 \times 0.98 \times 0.89 \\ &\approx 36,700 \text{ BTU/h} \end{aligned}$$

## (6) Determination of Maximum System Capacity (CTx)

Comparison of Capacity between Total Indoor Units Capacity (CTi) and Total Outdoor Unit Capacity (CTo)

$$CTi = 36,200 < CTo = 36,700, \text{ thus, select } CTi.$$

$$CTx = CTi = 36,200 \text{ BTU/h}$$

## (7) Comparison with Essential Load

Against the essential load 31,000BTU/h, the maximum system capacity is 36,200BTU/h: Proper outdoor units have been selected.

## (8) Calculation of Maximum Indoor Unit Capacity of Each Room

CTx = CTi, thus, calculate by the calculation below

Room1

$$\begin{aligned} &\text{Indoor Unit Rating} \times \text{Indoor Design Temperature Correction} \\ &= 20,000 \times 0.81 \\ &= 16,200 \text{ BTU/h} \quad \text{OK: fulfills the load 14,000BTU/h} \end{aligned}$$

Room2

$$\begin{aligned} &\text{Indoor Unit Rating} \times \text{Indoor Design Temperature Correction} \\ &= 20,000 \times 1.00 \\ &= 20,000 \text{ BTU/h} \quad \text{OK: fulfills the load 17,000BTU/h} \end{aligned}$$

Completed selecting units since the selected units fulfill the heating loads of Room 1, 2.

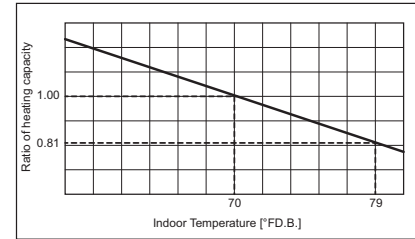


Fig.4 Indoor unit temperature correction  
To be used to correct indoor unit only

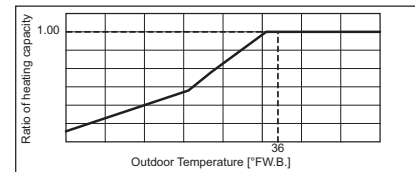


Fig.5 Outdoor unit temperature correction  
To be used to correct outdoor unit only

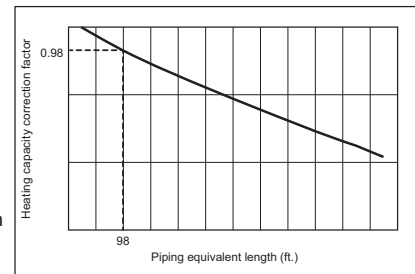


Fig.6 Correction of refrigerant piping length

Tbl.1 Table of correction factor at frost and defrost

| Outdoor inlet air temp. °FWB | 43   | 39   | 36   | 32   | 28   | 25   | 21   | 18   | 14   | 5    | -4   | -13  |
|------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Outdoor inlet air temp. °CWB | 6    | 4    | 2    | 0    | -2   | -4   | -6   | -8   | -10  | -15  | -20  | -25  |
| PUMY-P36NKMU1(-BS)           | 1.00 | 0.98 | 0.89 | 0.88 | 0.89 | 0.90 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| PUMY-P48NKMU1(-BS)           | 1.00 | 0.98 | 0.89 | 0.88 | 0.89 | 0.90 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| PUMY-P60NKMU1(-BS)           | 1.00 | 0.98 | 0.89 | 0.88 | 0.89 | 0.90 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |

PUMY-P-NKMU1

3. Power input of outdoor unit

<Cooling>

(1) Rated power input of outdoor unit 2.45 kW (Nominal)

(2) Calculation of the average indoor temperature power input coefficient

Coefficient of the outdoor unit for indoor unit 1 (Outdoor temp. 99 °FD.B., Indoor temp. 72 °FW.B.)  
0.99

Coefficient of the outdoor unit for indoor unit 2 (Outdoor temp. 99 °FD.B., Indoor temp. 64 °FW.B.)  
0.85

Average indoor temp. power input coefficient ( $C_{ave}$ ) =  $\sum_{k=1}^n \{c_k \times (M_k / \sum_{k=1}^n M_k)\}$

n: Total number of the indoor units

k: Number of the indoor unit

$c_k$ : Outdoor unit power input coefficient of k indoor unit room temp.

$M_k$ : Number part of the k indoor unit model (e.g. P36 → 36)

$= 0.99 \times 18 / (18 + 18) + 0.85 \times 18 / (18 + 18)$   
 $= 0.92$

(3) No need to consider Coefficient of the partial load  $f(CTi/CTo)$  -

(4) Outdoor power input (Plo)

Maximum System Capacity (CTx) = Total Outdoor unit Capacity (CTo), so use the following formula  
Plo = Outdoor unit Cooling Rated Power Input × Correction Coefficient of Indoor temperature  
 $= 2.445 \times 0.92$   
 $\approx 2.20 \text{ kW}$

&lt;Heating&gt;

**(1) Rated power input of outdoor unit** **3.1 kW (Nominal)****(2) Calculation of the average indoor temperature power input coefficient**Coefficient of the outdoor unit for indoor unit 1 (Outdoor temp. 36 °FW.B., Indoor temp. 79 °FD.B.)  
0.87Coefficient of the outdoor unit for indoor unit 2 (Outdoor temp. 36 °FW.B., Indoor temp. 70 °FD.B.)  
1.20

$$\text{Average indoor temp. power input coefficient (C}_{\text{ave}}) = \sum_{k=1}^n \{c_k \times (M_k / \sum_{k=1}^n M_k)\}$$

n: Total number of the indoor units

k: Number of the indoor unit

c<sub>k</sub>: Outdoor unit power input coefficient of k indoor unit room temp.M<sub>k</sub>: Number part of the k indoor unit model (e.g. P36 → 36)

$$= 0.87 \times 18 / (18 + 18) + 1.2 \times 18 / (18 + 18) \\ \approx 1.04$$

**(3) Coefficient of the partial load f'(CTi/CTo)** **0.99****(4) Outdoor power input (Plo)**

Maximum System Capacity (CTx) = Total Indoor unit Capacity (CTi), so use the following formula

$$\begin{aligned} Plo &= \text{Outdoor unit Heating Rated Power Input} \times \text{Correction Coefficient of Indoor temperature} \times f'(CTi/CTo) \\ &= 3.1 \times 1.04 \times 0.99 \\ &\approx 3.20 \text{ kW} \end{aligned}$$

## 7-2. Correction by temperature

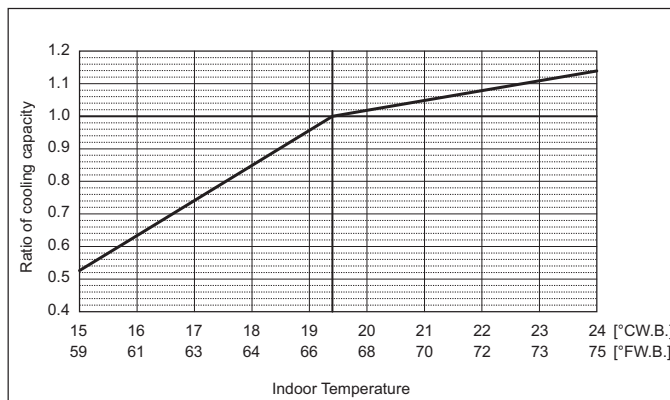
CITY MULTI could have varied capacity at different designing temperature. Using the nominal cooling/heating capacity value and the ratio below, the capacity can be observed at various temperature.

PUMY-P-NKMU1

| PUMY-                    |       | P36NKMU1 | P48NKMU1 |
|--------------------------|-------|----------|----------|
| Nominal cooling capacity | BTU/h | 36,000   | 48,000   |
|                          | kW    | 10.6     | 14.1     |
| Input                    | kW    | 2.445    | 3.690    |

## Indoor unit temperature correction

To be used to correct indoor unit capacity only

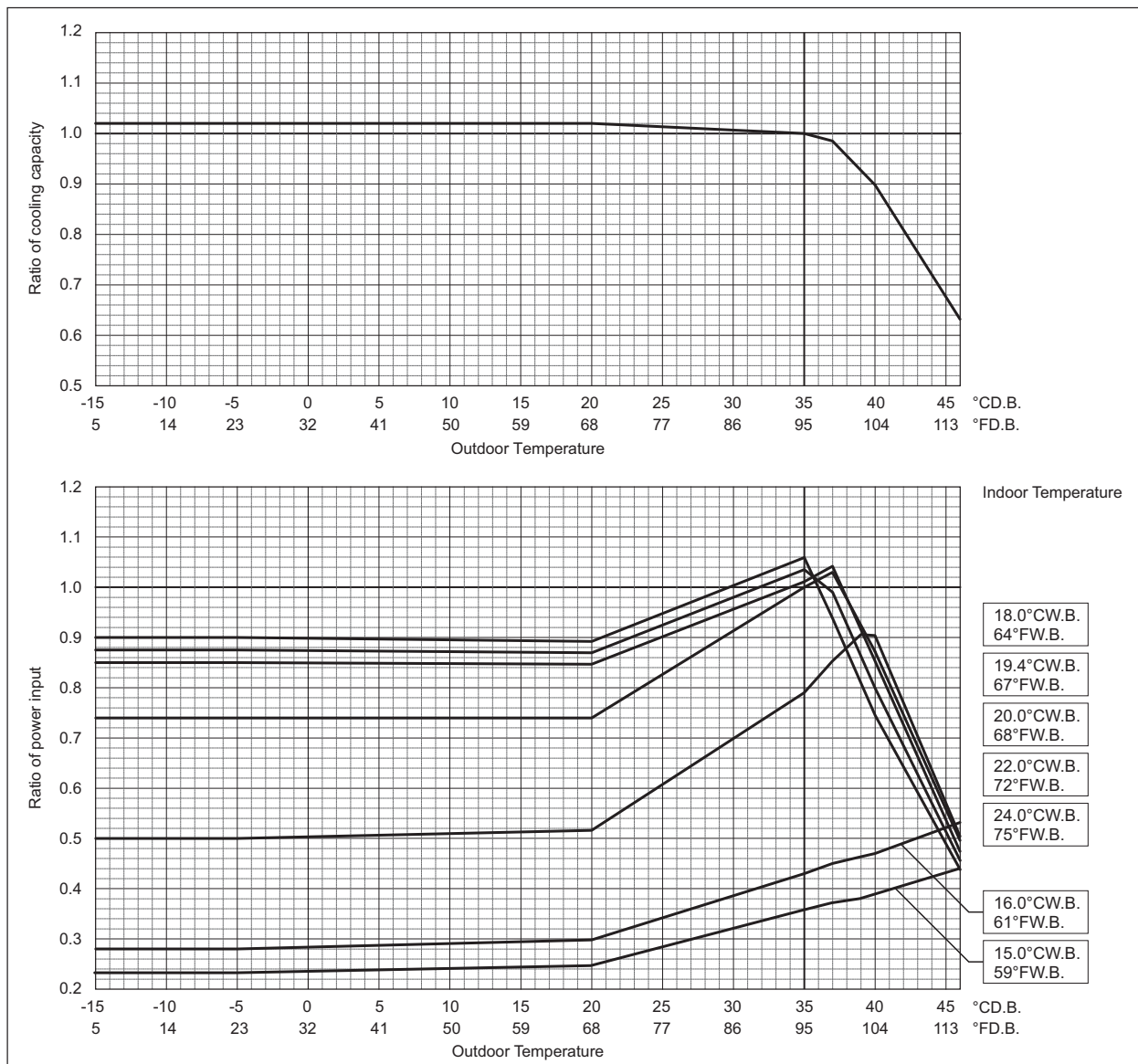


## Outdoor unit temperature correction

To be used to correct outdoor unit only

Outdoor unit capacity is NOT affected by the indoor temperature.

Outdoor unit power input is affected by the indoor and outdoor temperatures. Please consult the sales office for details.



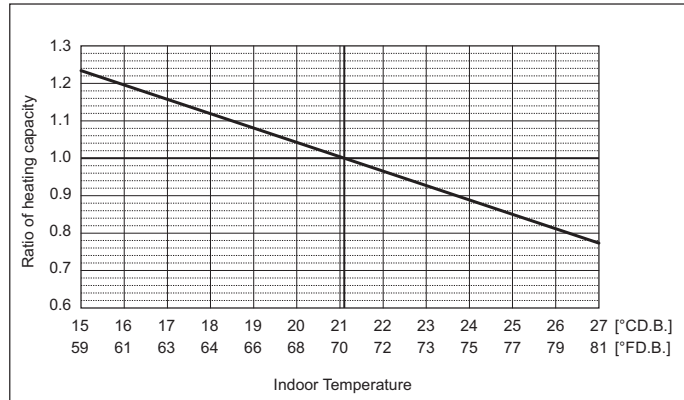
## 7. CAPACITY TABLES

Outdoor units

| PUMY-                    |          | P36NKMU1 | P48NKMU1 |
|--------------------------|----------|----------|----------|
| Nominal Heating capacity | BTU/h    | 42,000   | 54,000   |
|                          | kW       | 12.3     | 15.8     |
|                          | Input kW | 3.100    | 4.085    |

### Indoor unit temperature correction

To be used to correct indoor unit capacity only

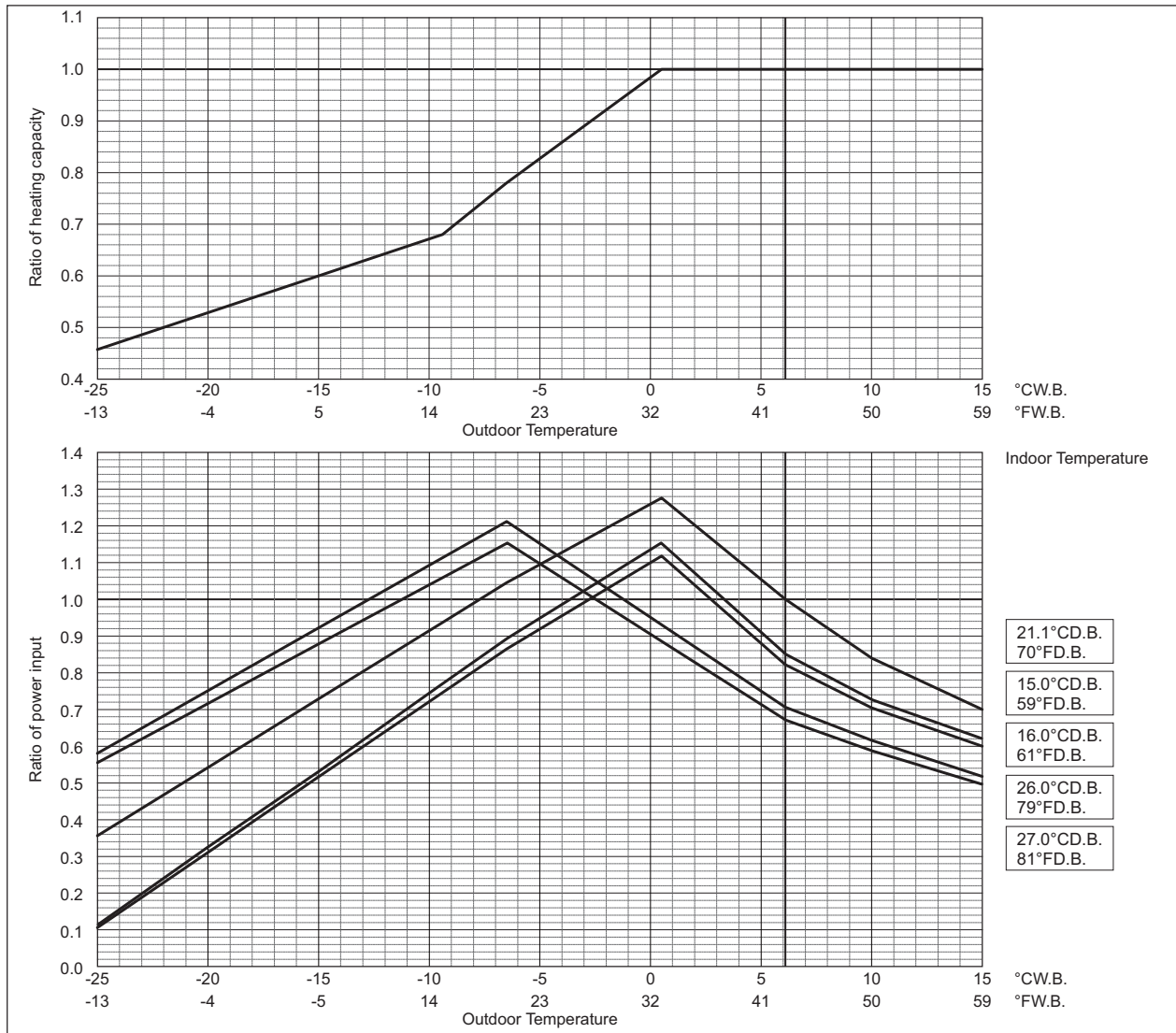


### Outdoor unit temperature correction

To be used to correct outdoor unit only

Outdoor unit capacity is NOT affected by the indoor temperature.

Outdoor unit power input is affected by the indoor and outdoor temperatures. Please consult the sales office for details.



PUMY-P-NKMU1

## 7. CAPACITY TABLES

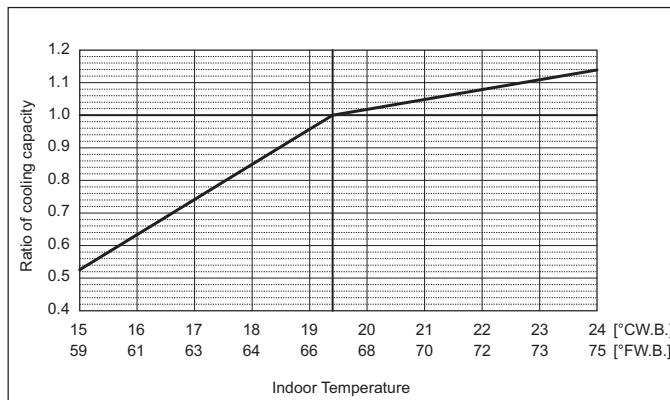
Outdoor units

PUMY-P-NKMU1

| PUMY-                    |          | P60NKMU1 |
|--------------------------|----------|----------|
| Nominal cooling capacity | BTU/h    | 60,000   |
|                          | kW       | 17.6     |
|                          | Input kW | 4.680    |

### Indoor unit temperature correction

To be used to correct indoor unit capacity only

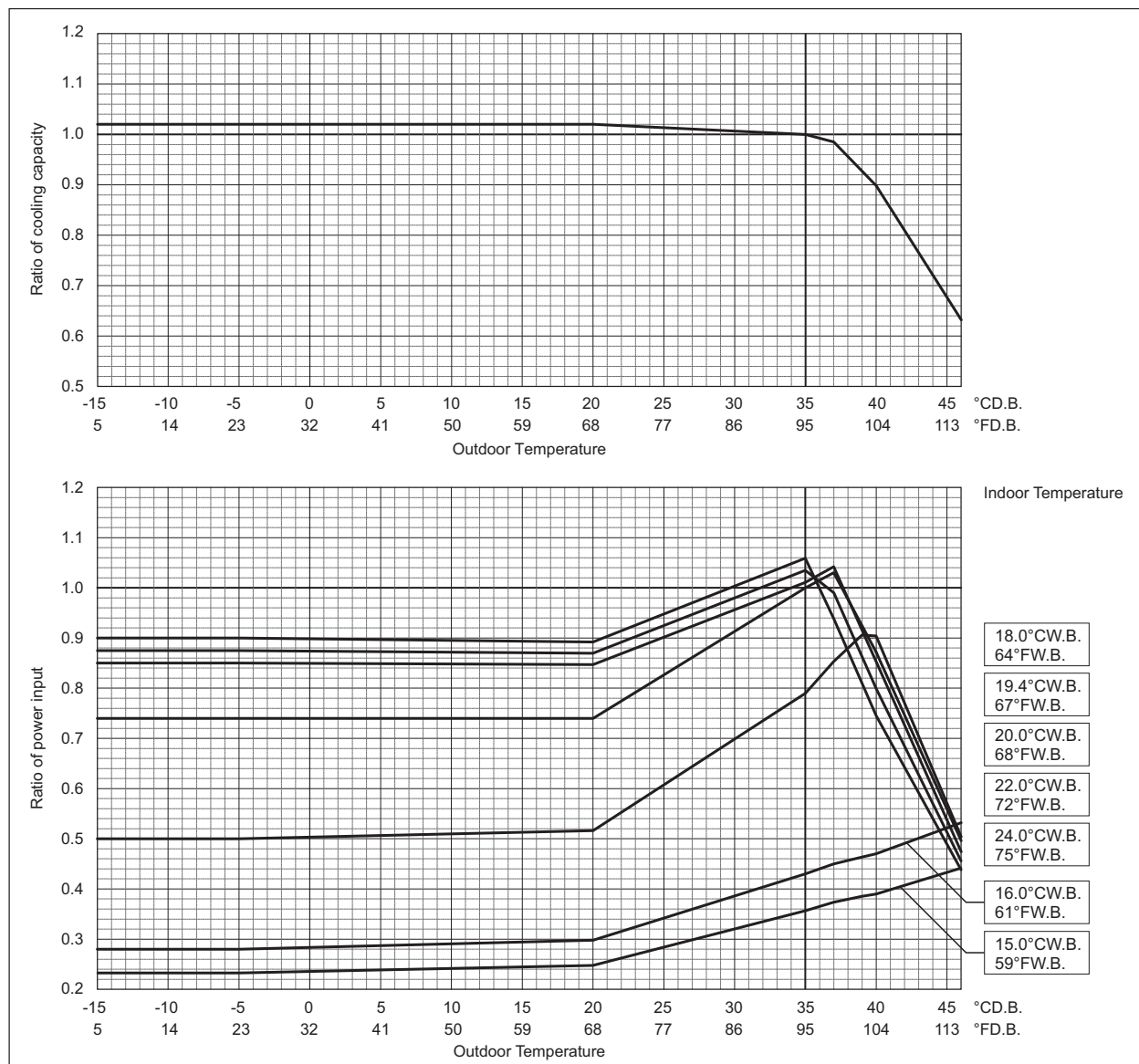


### Outdoor unit temperature correction

To be used to correct outdoor unit only

Outdoor unit capacity is NOT affected by the indoor temperature.

Outdoor unit power input is affected by the indoor and outdoor temperatures. Please consult the sales office for details.



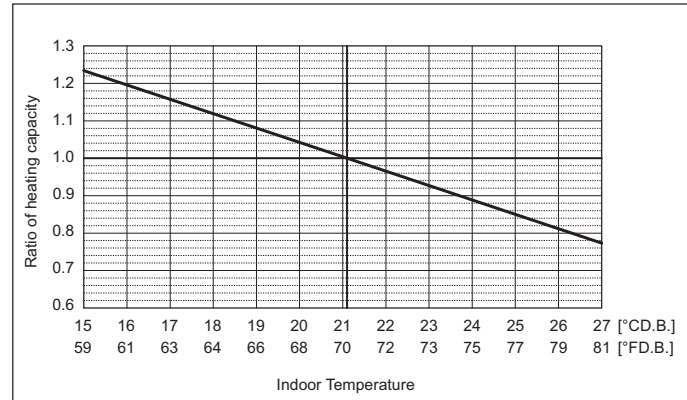
## 7. CAPACITY TABLES

Outdoor units

| PUMY-                    |          | P60NKMU1 |
|--------------------------|----------|----------|
| Nominal Heating capacity | BTU/h    | 66,000   |
|                          | kW       | 19.3     |
|                          | Input kW | 5.450    |

### Indoor unit temperature correction

To be used to correct indoor unit capacity only

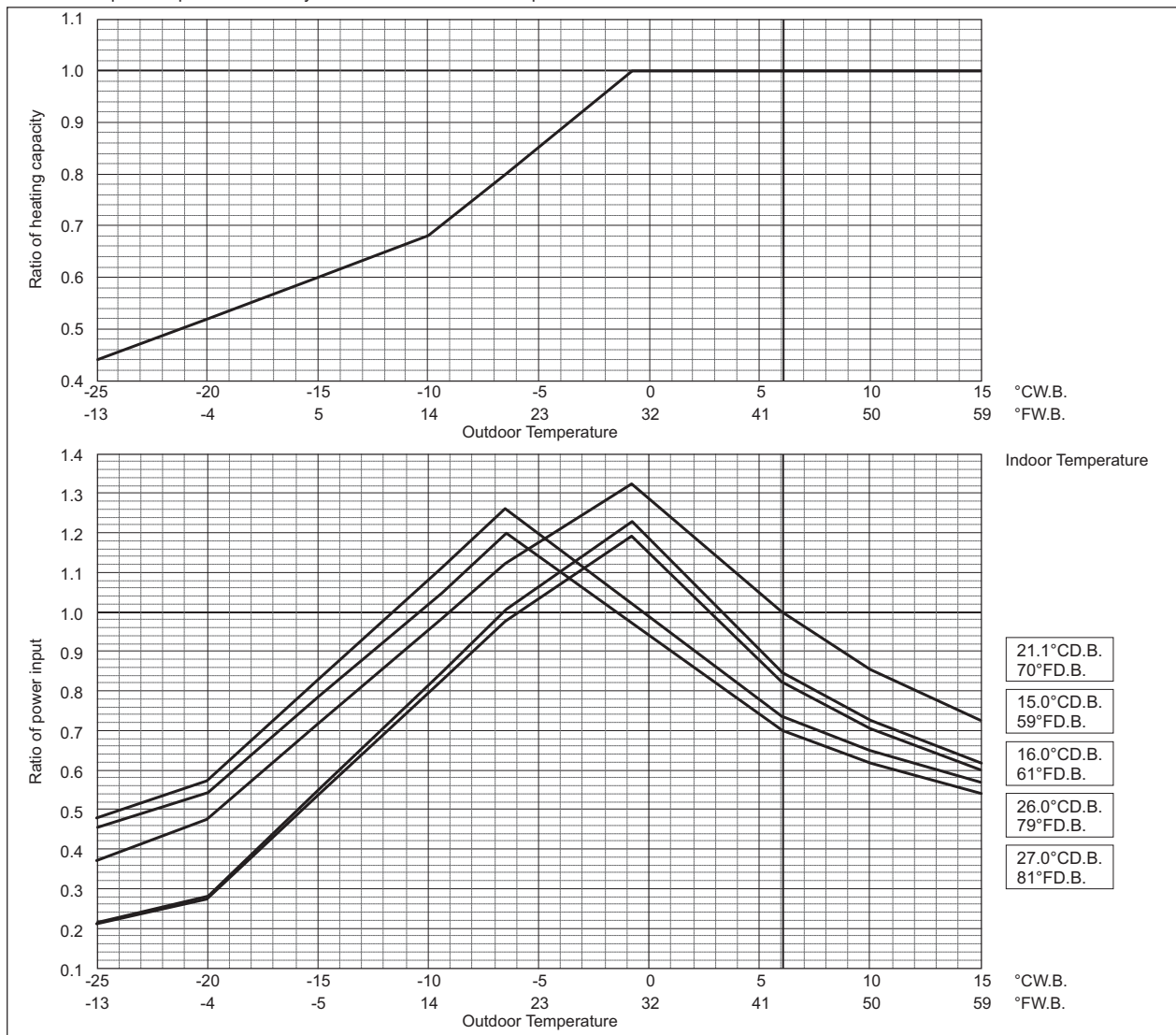


### Outdoor unit temperature correction

To be used to correct outdoor unit only

Outdoor unit capacity is NOT affected by the indoor temperature.

Outdoor unit power input is affected by the indoor and outdoor temperatures. Please consult the sales office for details.



## 7. CAPACITY TABLES

Outdoor units

### Correction by temperature (High Heating Performance Mode)

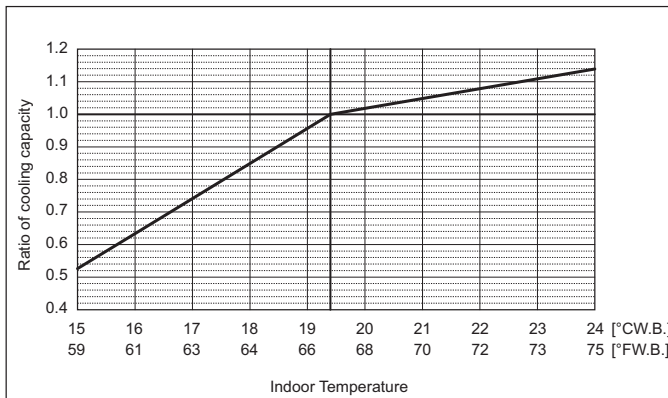
CITY MULTI could have various capacities at different designing temperatures. Using the nominal cooling/heating capacity values and the ratios below, the capacity can be found for various temperatures.

To select high heating performance mode, DipSW 7-3 must be set to ON. (In the low ambient temperature, heating capacity and power input become higher than those under standard mode.)

| PUMY-                    |          | P36NKMU1 | P48NKMU1 |
|--------------------------|----------|----------|----------|
| Nominal cooling capacity | BTU/h    | 36,000   | 48,000   |
|                          | kW       | 10.6     | 14.1     |
|                          | Input kW | 2.445    | 3.690    |

### Indoor unit temperature correction

To be used to correct indoor unit capacity only

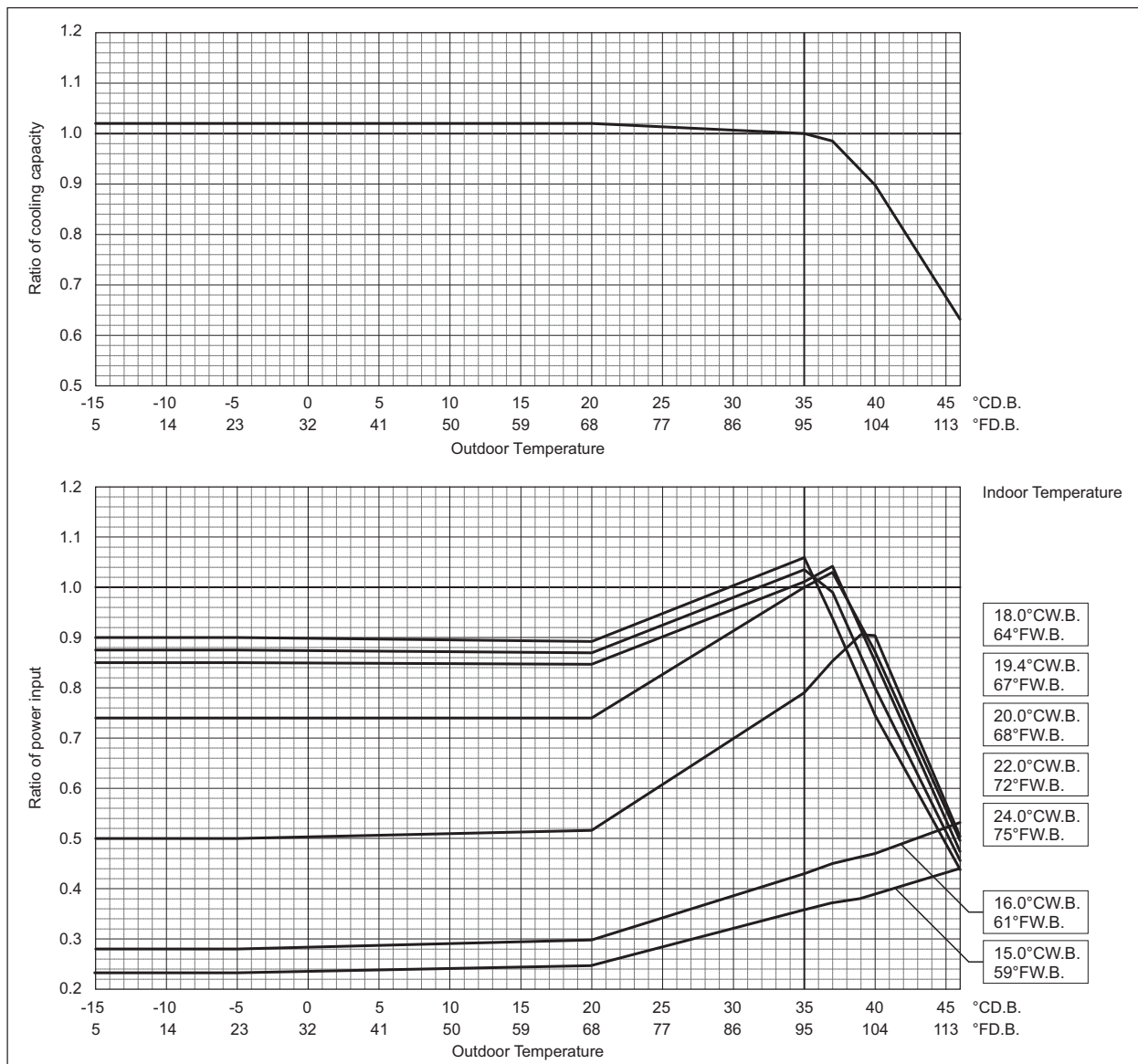


### Outdoor unit temperature correction

To be used to correct outdoor unit only

Outdoor unit capacity is NOT affected by the indoor temperature.

Outdoor unit power input is affected by the indoor and outdoor temperatures. Please consult the sales office for details.



## 7. CAPACITY TABLES

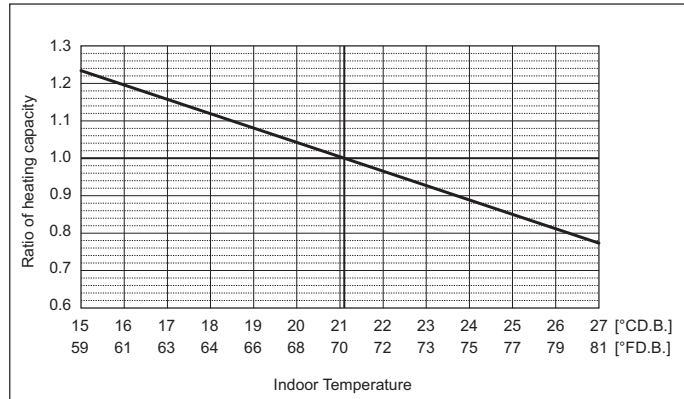
Outdoor units

### High Heating Performance Mode

| PUMY-                    |       | P36NKMU1 | P48NKMU1 |
|--------------------------|-------|----------|----------|
| Nominal Heating capacity | BTU/h | 42,000   | 54,000   |
|                          | kW    | 12.3     | 15.8     |
| Input                    | kW    | 3.100    | 4.085    |

### Indoor unit temperature correction

To be used to correct indoor unit capacity only

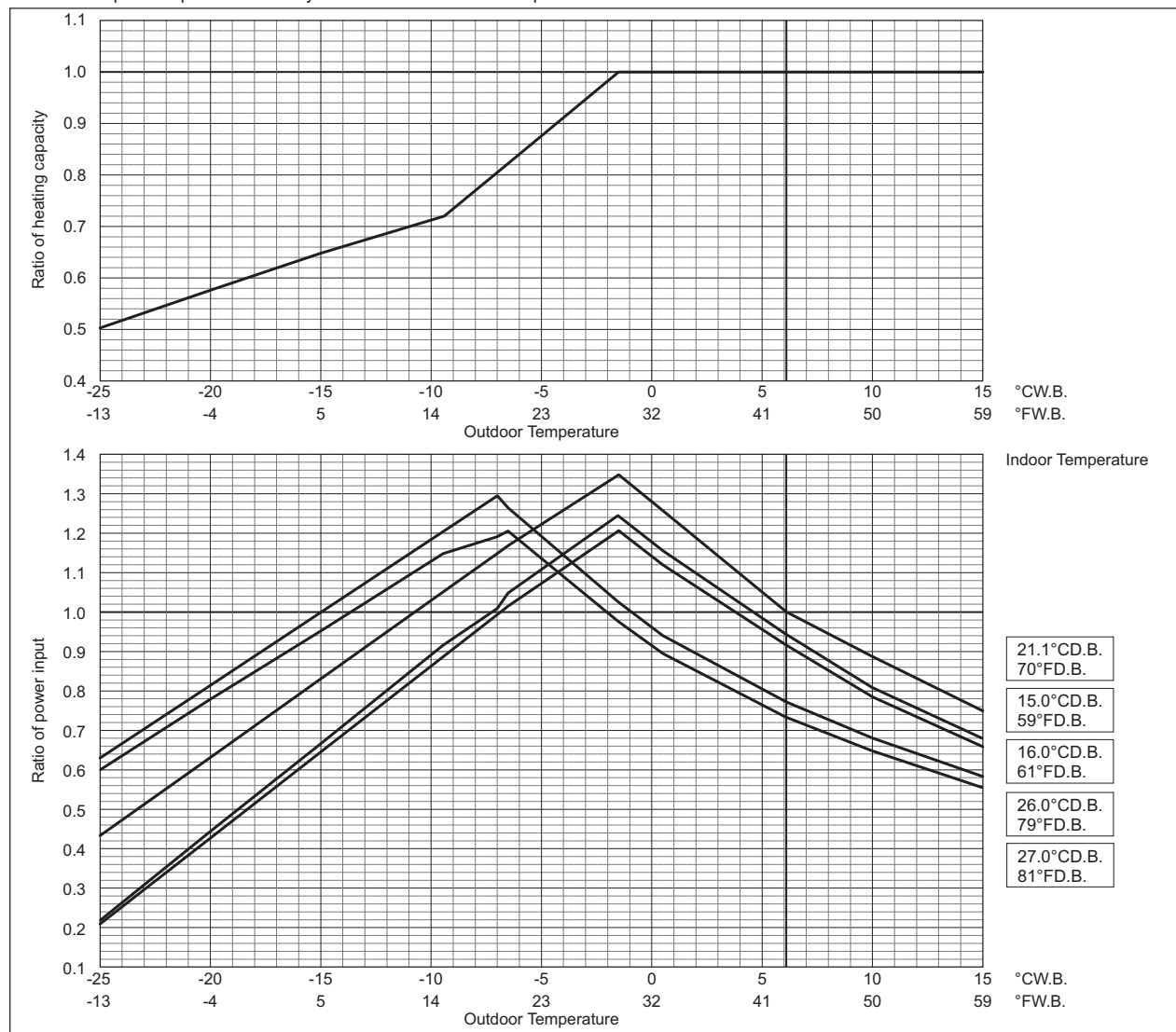


### Outdoor unit temperature correction

To be used to correct outdoor unit only

Outdoor unit capacity is NOT affected by the indoor temperature.

Outdoor unit power input is affected by the indoor and outdoor temperatures. Please consult the sales office for details.



# 7. CAPACITY TABLES

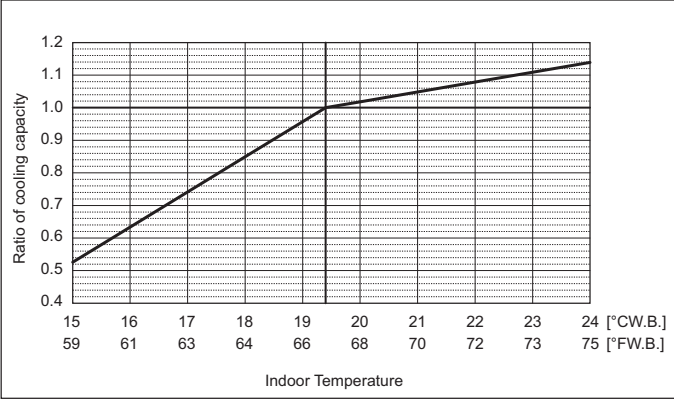
Outdoor units

PUMY-P-NKMU1

| PUMY-                    |       | P60NKMU1 |
|--------------------------|-------|----------|
| Nominal cooling capacity | BTU/h | 60,000   |
|                          | kW    | 17.6     |
| Input                    | kW    | 4.680    |

## Indoor unit temperature correction

To be used to correct indoor unit capacity only

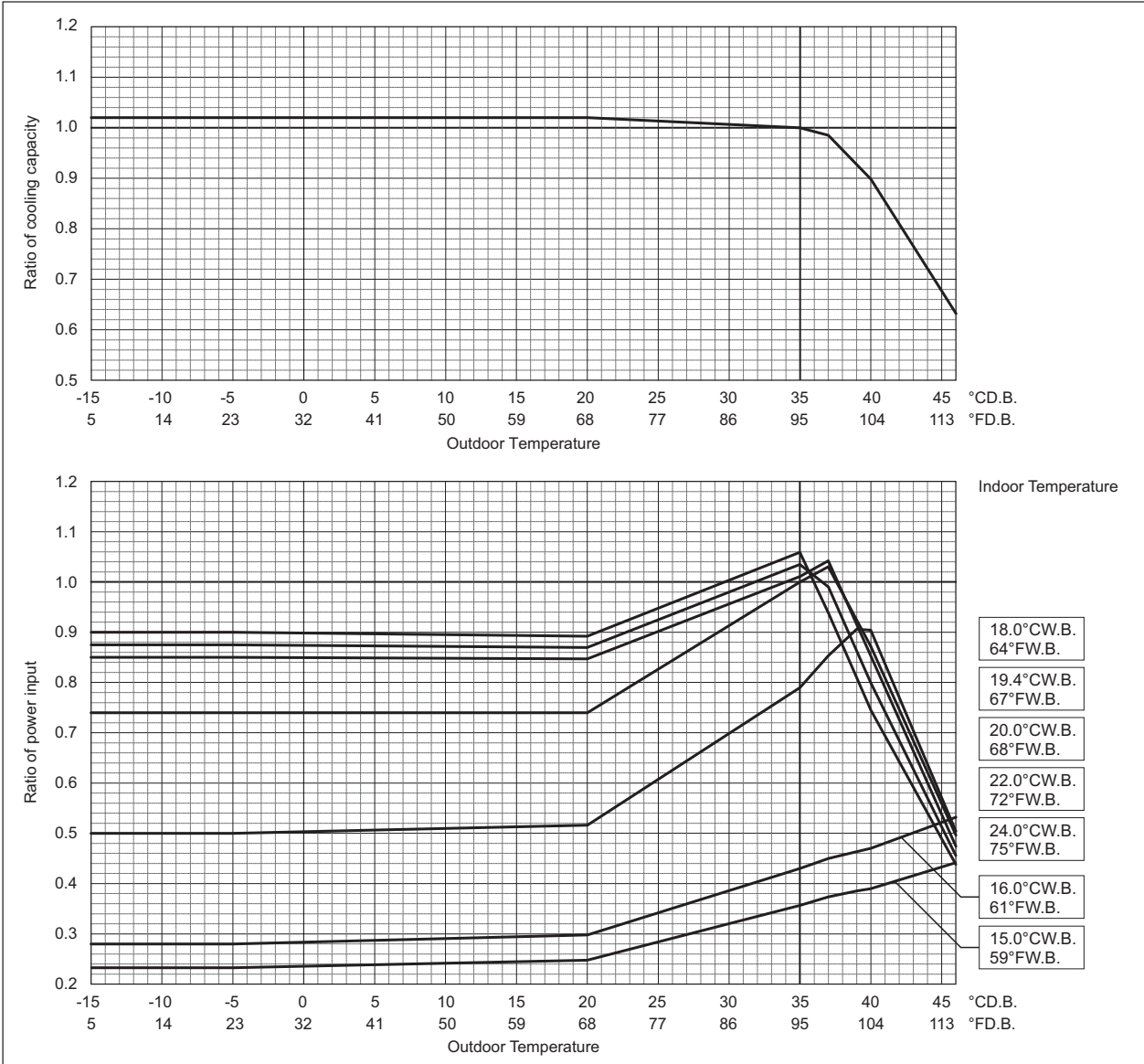


## Outdoor unit temperature correction

To be used to correct outdoor unit only

Outdoor unit capacity is NOT affected by the indoor temperature.

Outdoor unit power input is affected by the indoor and outdoor temperatures. Please consult the sales office for details.



## 7. CAPACITY TABLES

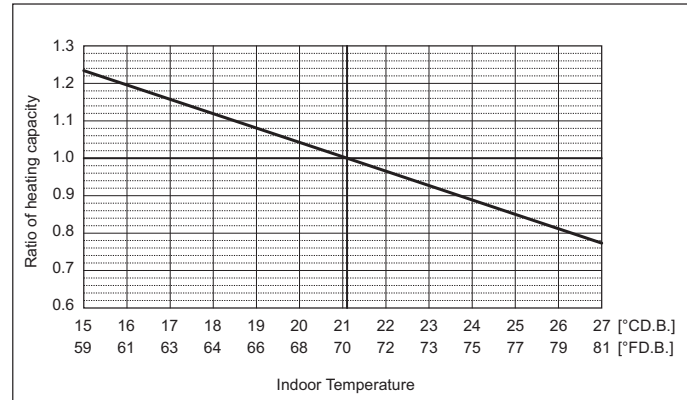
Outdoor units

### High Heating Performance Mode

| PUMY-                    |       | P60NKMU1 |
|--------------------------|-------|----------|
| Nominal Heating capacity | BTU/h | 66,000   |
|                          | kW    | 19.3     |
| Input                    | kW    | 5.450    |

### Indoor unit temperature correction

To be used to correct indoor unit capacity only

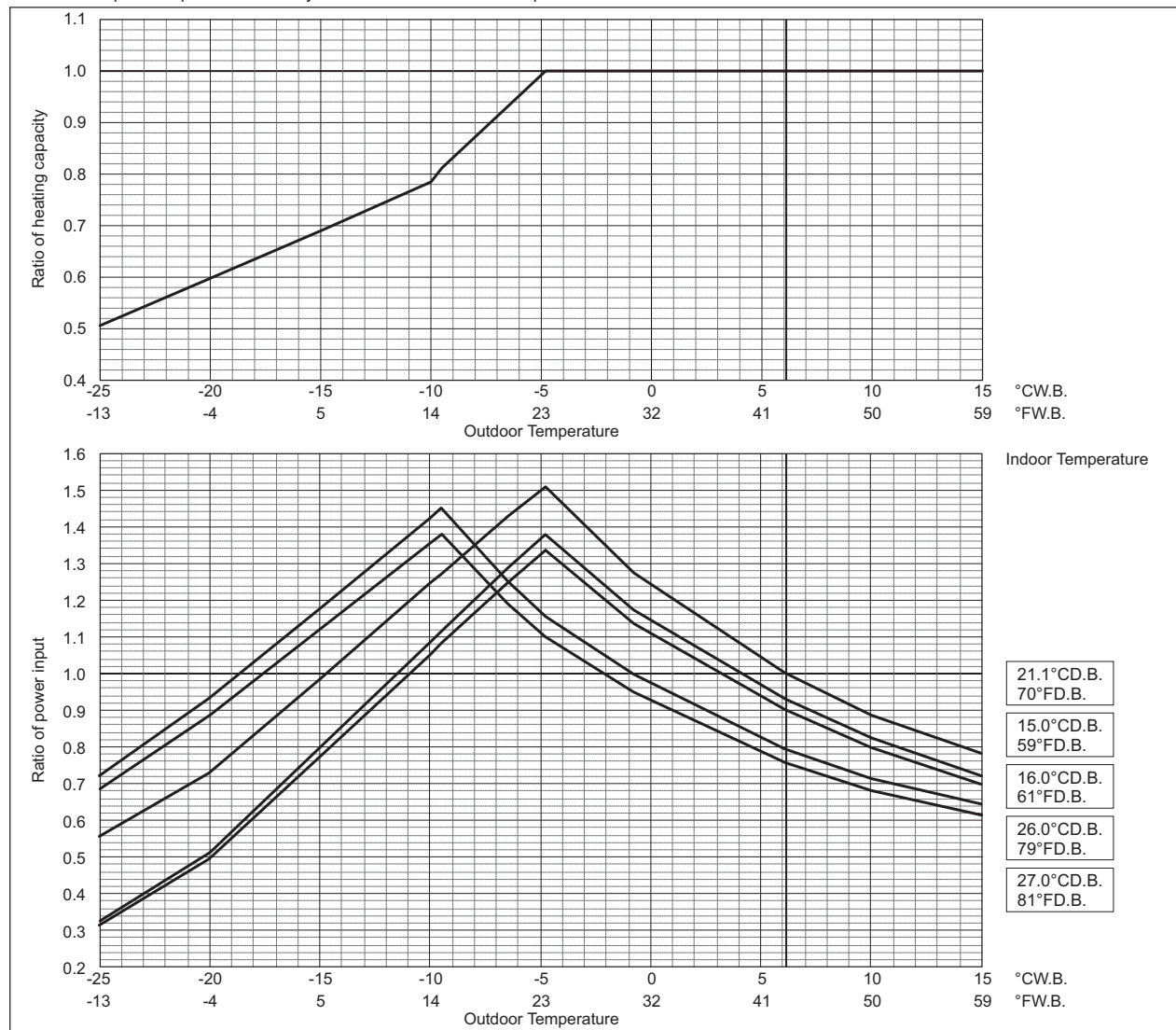


### Outdoor unit temperature correction

To be used to correct outdoor unit only

Outdoor unit capacity is NOT affected by the indoor temperature.

Outdoor unit power input is affected by the indoor and outdoor temperatures. Please consult the sales office for details.



PUMY-P-NKMU1

## 7-3. Correction by total indoor

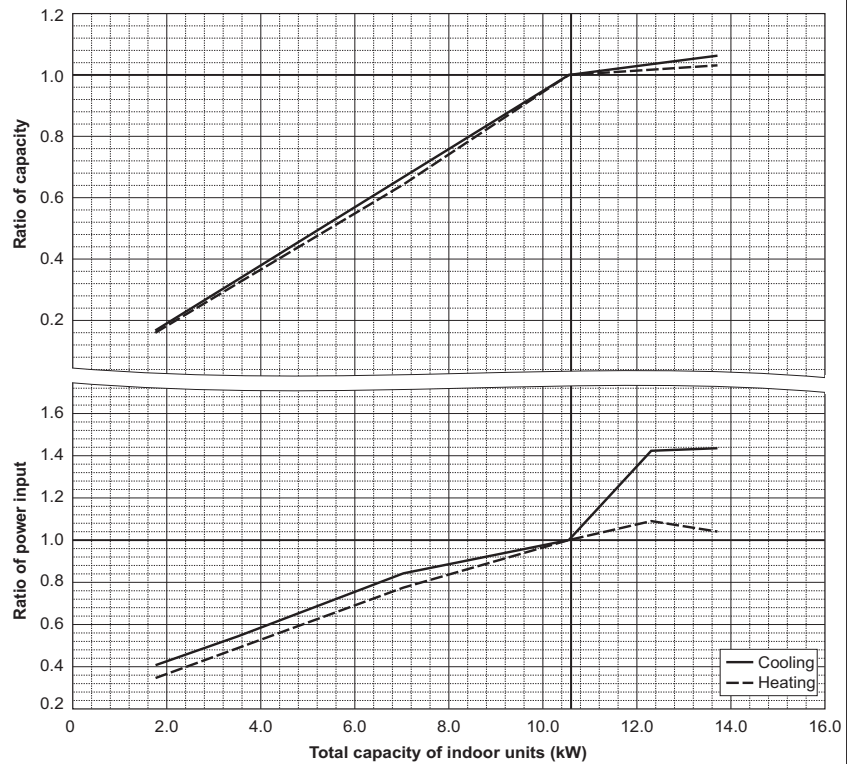
CITY MULTI system have different capacities and inputs when many combinations of indoor units with different total capacities are connected. Using following tables, the maximum capacity can be found to ensure the system is installed with enough capacity for a particular application.

PUMY-P-NKMU1

| PUMY-                    |       | P36NKMU1 |
|--------------------------|-------|----------|
| Nominal cooling capacity | BTU/h | 36,000   |
|                          | kW    | 10.6     |
| Input                    | kW    | 2.445    |

| PUMY-                    |       | P36NKMU1 |
|--------------------------|-------|----------|
| Nominal Heating capacity | BTU/h | 42,000   |
|                          | kW    | 12.3     |
| Input                    | kW    | 3.100    |

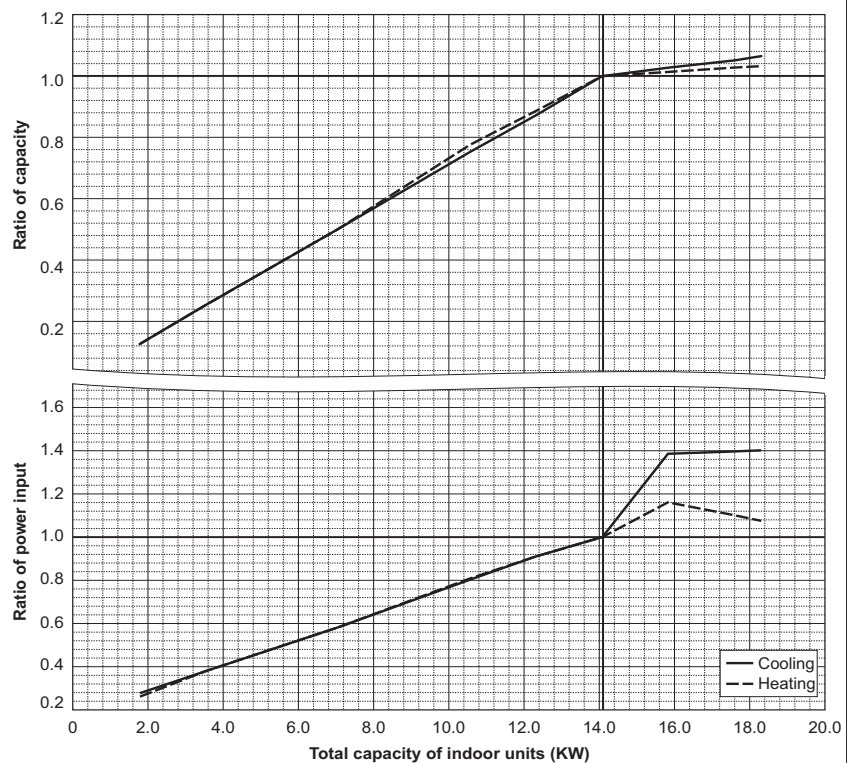
PUMY-P36NKMU1



| PUMY-                    |       | P48NKMU1 |
|--------------------------|-------|----------|
| Nominal cooling capacity | BTU/h | 48,000   |
|                          | kW    | 14.1     |
| Input                    | kW    | 3.690    |

| PUMY-                    |       | P48NKMU1 |
|--------------------------|-------|----------|
| Nominal Heating capacity | BTU/h | 54,000   |
|                          | kW    | 15.8     |
| Input                    | kW    | 4.085    |

PUMY-P48NKMU1

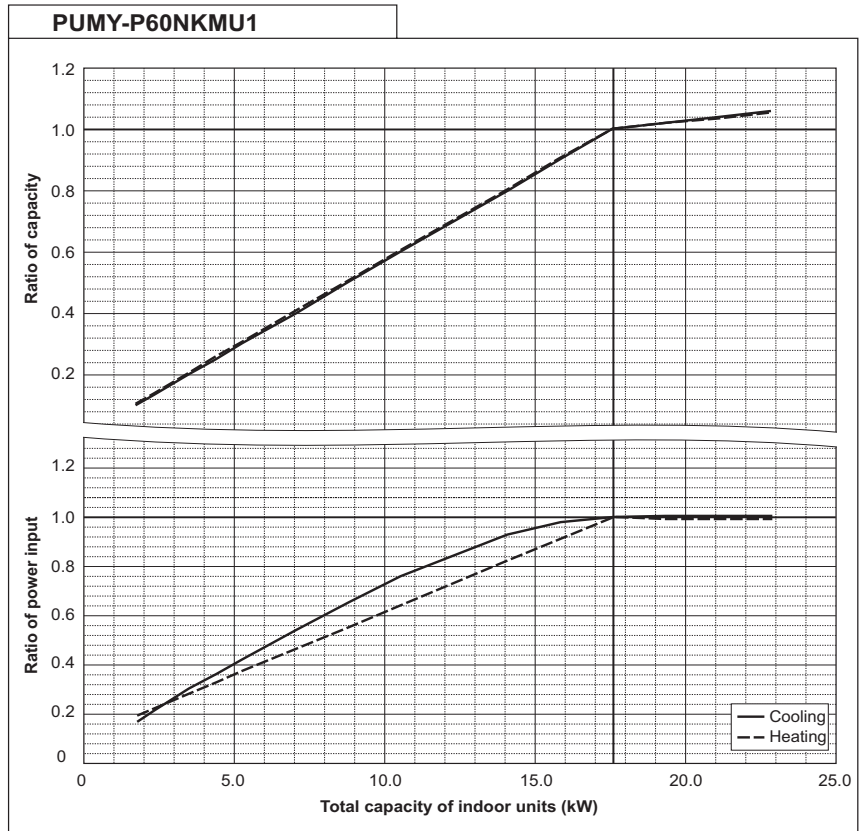


## 7. CAPACITY TABLES

Outdoor units

| PUMY-                    |          | P60NKMU1 |
|--------------------------|----------|----------|
| Nominal cooling capacity | BTU/h    | 60,000   |
|                          | kW       | 17.6     |
|                          | Input kW | 4.680    |

| PUMY-                    |          | P60NKMU1 |
|--------------------------|----------|----------|
| Nominal Heating capacity | BTU/h    | 66,000   |
|                          | kW       | 19.3     |
|                          | Input kW | 5.450    |

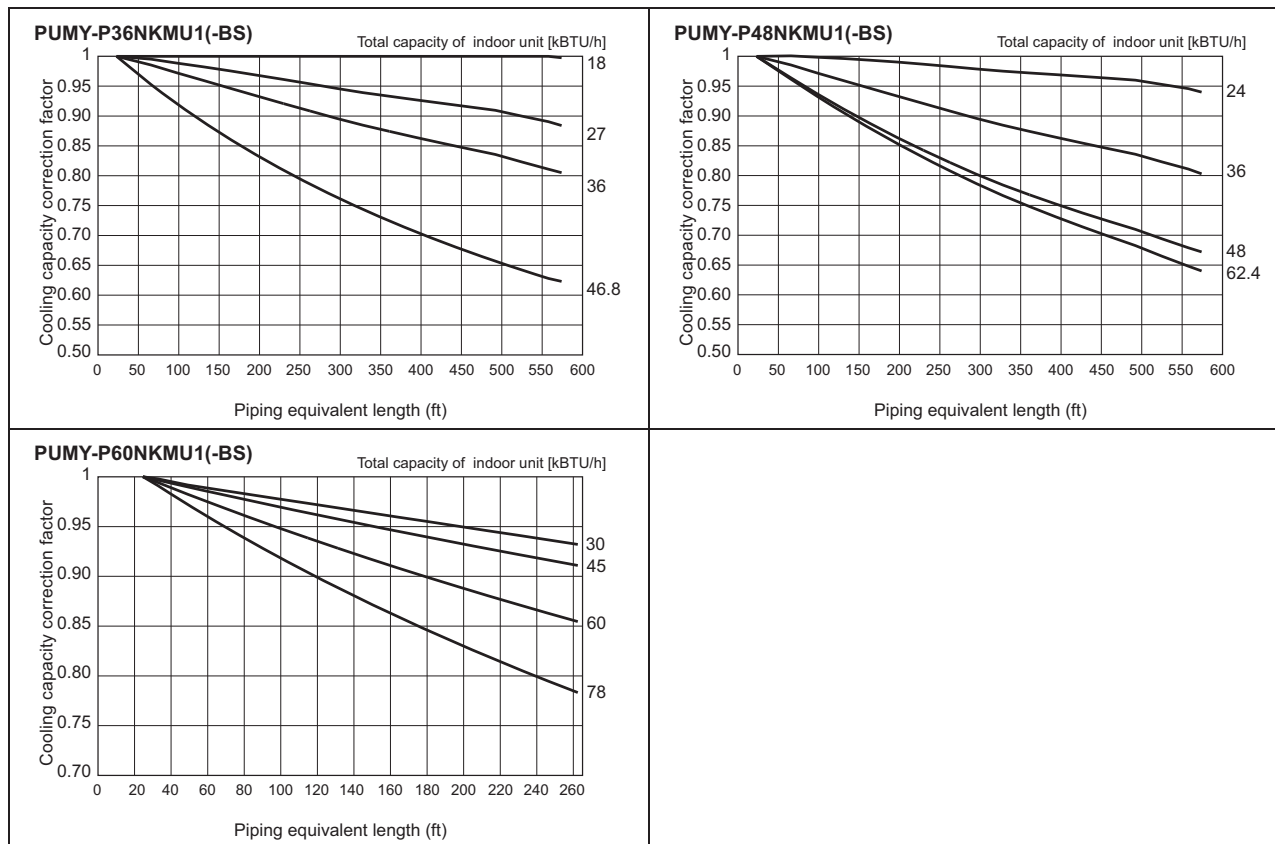


PUMY-P-NKMU1

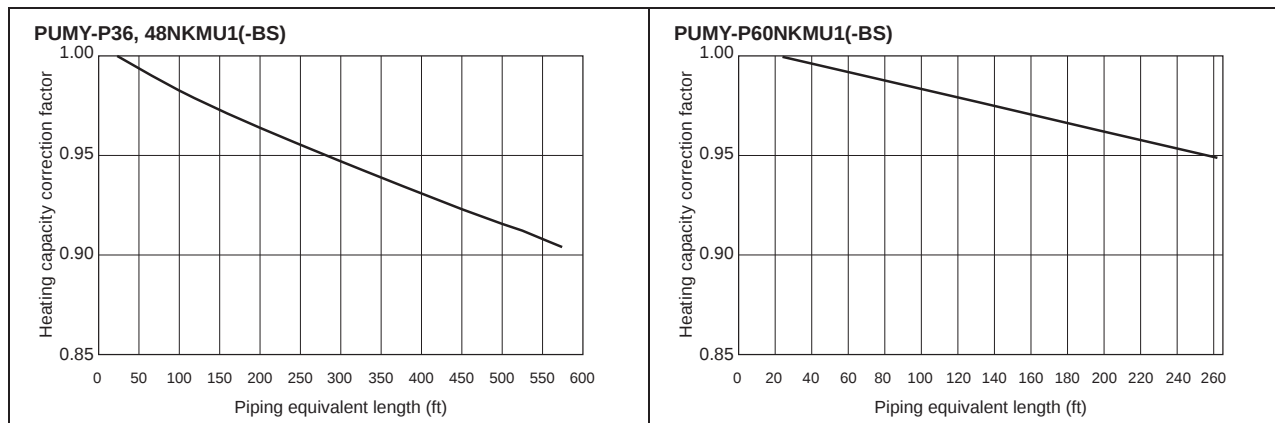
### 7-4. Correction by refrigerant piping length

CITY MULTI systems can have extended piping lengths if certain limitations are followed, but cooling/heating capacity could be reduced. Using following correction factor by equivalent piping length shown at 7-4-1 and 7-4-2, capacity can be found. 7-4-3 shows how to obtain the equivalent piping length.

#### 7-4-1. Cooling capacity correction



#### 7-4-2. Heating capacity correction



#### 7-4-3. How to obtain the equivalent piping length

##### 1. PUMY-P36, 48, 60NKMU1(-BS)

Equivalent length [m]= (Actual piping length to the farthest indoor unit) + (0.30 x number of bends in the piping)

Equivalent length [ft.]= (Actual piping length to the farthest indoor unit) + (0.99 x number of bends in the piping)

## 7-5. Correction at frost and defrost

Due to frost at the outdoor heat exchanger and the automatic defrost operation, the heating capacity of the outdoor unit can be calculated by multiplying the correction factor shown in the table below.

Table of correction factor at frost and defrost

| Outdoor inlet air temp. °FWB | 43   | 39   | 36   | 32   | 28   | 25   | 21   | 18   | 14   | 5    | -4   | -13  |
|------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Outdoor inlet air temp. °CWB | 6    | 4    | 2    | 0    | -2   | -4   | -6   | -8   | -10  | -15  | -20  | -25  |
| PUMY-P36NKMU1(-BS)           | 1.00 | 0.98 | 0.89 | 0.88 | 0.89 | 0.90 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| PUMY-P48NKMU1(-BS)           | 1.00 | 0.98 | 0.89 | 0.88 | 0.89 | 0.90 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| PUMY-P60NKMU1(-BS)           | 1.00 | 0.98 | 0.89 | 0.88 | 0.89 | 0.90 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |

\* The correction factors in the table above are used for a full-load and above.

Use the formula below to calculate the correction factor to use for a partial load.

Correction factor for partial load: K

Correction factor for a full load and above:  $K_0$

Partial load factor: A

$$K = 1 - (1 - K_0) \times A$$

8-1. JOINT

CITY MULTI units can be easily connected by using Joint sets and Header sets provided by Mitsubishi Electric. One kind of Joint sets are available for use. Refer to section "Piping Design" or the Installation Manual that comes with the Joint set for how to install the Joint set.

PUMY-P-NKMU1

CMY-Y62-G

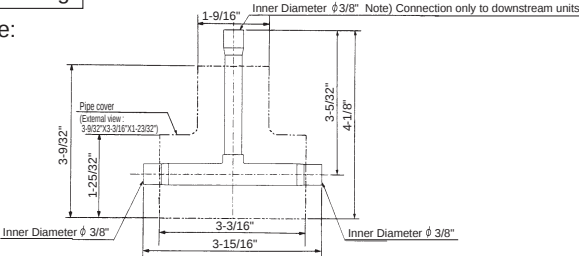
Ref.: 7FAGFA  
in.

1. Specification

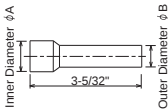
| Items     |                         | Details                                                             |
|-----------|-------------------------|---------------------------------------------------------------------|
| Main      | Number of ports         | 2 ports                                                             |
|           | Number of branch joints | One for each liquid and gas pipe                                    |
|           | Pipe material           | Phosphorus deoxidized copper C1220T-OL (JIS H3300)                  |
| Accessory | Insulation material     | Foamed polyethylene (one for each liquid and gas pipe)              |
|           | Reducer                 | 10 reducers of 7 types (Refer to the external drawing for details.) |

2. External drawing

For liquid pipe:

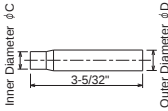
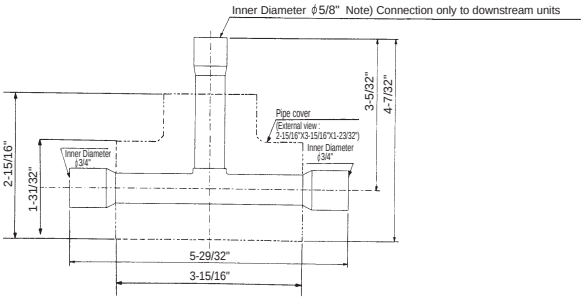


Reducer (Accessory):



| A (Inner Diameter) | B (Outer Diameter) | Number of reducers |
|--------------------|--------------------|--------------------|
| φ 1/2"             | φ 3/8"             | 2                  |
| φ 3/4"             | φ 5/8"             | 1                  |
| φ 7/8"             | φ 3/4"             | 1                  |

For gas pipe:



| C (Inner Diameter) | D (Outer Diameter) | Number of reducers |
|--------------------|--------------------|--------------------|
| φ 1/4"             | φ 3/8"             | 2                  |
| φ 1/2"             | φ 5/8"             | 1                  |
| φ 1/2"             | φ 3/4"             | 1                  |
| φ 5/8"             | φ 3/4"             | 2                  |

## 8-2. HEADER

CITY MULTI units can be easily connected by using Joint sets and Header sets provided by Mitsubishi Electric. Two kinds of Header sets are available for use. Refer to section "Piping Design" or the Installation Manual that comes with the Header set for how to install the Header set.

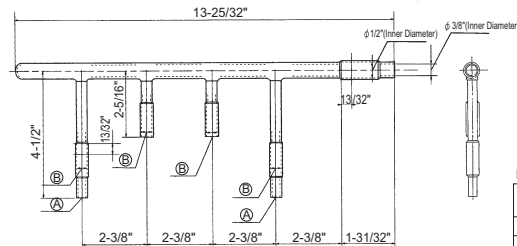
## CMY-Y64-G

## 1. Specification

|           | Items                   | Details                                                                    |
|-----------|-------------------------|----------------------------------------------------------------------------|
| Main      | Number of ports         | 3 ~ 4 ports                                                                |
|           | Number of branch joints | One for each liquid and gas pipe                                           |
|           | Pipe material           | Phosphorus deoxidized copper C1220T-OL (JIS H3300)                         |
|           | Insulation material     | Foamed polyethylene                                                        |
| Accessory | Reducer                 | 7 reducers of 5 types                                                      |
|           | Cap                     | 2 caps of 2 different types for each liquid and gas pipe ; 4 caps in total |

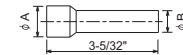
## 2. External drawing

For liquid pipe:



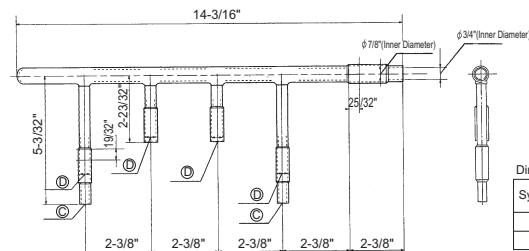
| Symbol | Inner Diameter (mm) |
|--------|---------------------|
| A      | φ 1/4"              |
| B      | φ 3/8"              |

Reducer (Accessory):

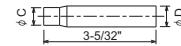


| A (Inner Diameter) | B (Outer Diameter) | Number of reducers |
|--------------------|--------------------|--------------------|
| φ 3/4"             | φ 5/8"             | 1                  |
| φ 5/8"             | φ 1/2"             | 2                  |
| φ 3/8"             | φ 1/4"             | 2                  |

For gas pipe:



| Symbol | Inner Diameter (mm) |
|--------|---------------------|
| C      | φ 1/2"              |
| D      | φ 5/8"              |



| C (Inner Diameter) | D (Outer Diameter) | Number of reducers |
|--------------------|--------------------|--------------------|
| φ 5/8"             | φ 3/4"             | 1                  |
| φ 3/8"             | φ 1/2"             | 1                  |

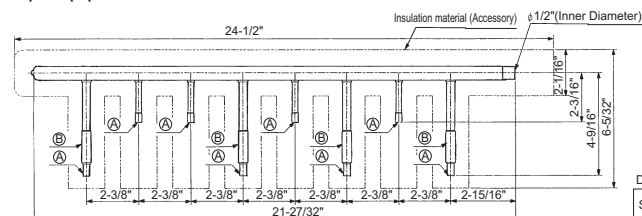
## CMY-Y68-G

## 1. Specification

|           | Items                   | Details                                            |
|-----------|-------------------------|----------------------------------------------------|
| Main      | Number of ports         | 5 ~ 8 ports                                        |
|           | Number of branch joints | One for each liquid and gas pipe                   |
|           | Pipe material           | Phosphorus deoxidized copper C1220T-OL (JIS H3300) |
|           | Insulation material     | Foamed polyethylene                                |
| Accessory | Reducer                 | 3 reducers of 3 types                              |
|           | Cap                     | 3 caps for each liquid and gas pipe ; 6 in total   |

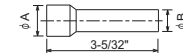
## 2. External drawing

For liquid pipe:



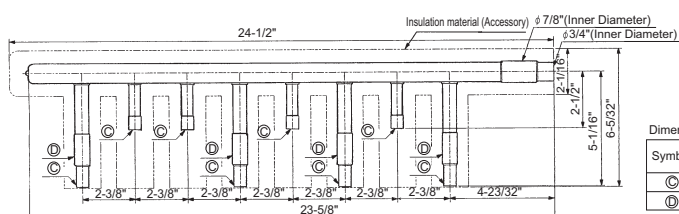
| Symbol | Inner Diameter (mm) |
|--------|---------------------|
| A      | φ 1/4"              |
| B      | φ 3/8"              |

Reducer (Accessory):

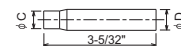


| A (Inner Diameter) | B (Outer Diameter) | Number of reducers |
|--------------------|--------------------|--------------------|
| φ 3/4"             | φ 5/8"             | 1                  |
| φ 1/2"             | φ 3/8"             | 1                  |

For gas pipe:



| Symbol | Inner Diameter (mm) |
|--------|---------------------|
| C      | φ 1/2"              |
| D      | φ 5/8"              |



| C (Inner Diameter) | D (Outer Diameter) | Number of reducers |
|--------------------|--------------------|--------------------|
| φ 5/8"             | φ 3/4"             | 1                  |