



# technical data

Air Cooled Selection Procedure

air conditioning systems



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# 1 Selection procedure VRV® system based on heating load

## 1 - 1 Indoor unit selection

Enter indoor unit capacity tables at given indoor and outdoor temperature.  
 Select the unit that the capacity is the nearest to and higher than the given load.

**NOTE**  
 1 Individual indoor unit capacity is subject to change by the combination. Actual capacity has to be calculated according to the combination by using outdoor units capacity table.

## 1 - 2 Outdoor unit selection

Allowable combinations are indicated in the indoor unit combination total capacity index table.  
 In general, outdoor units can be selected as follows though the location of the unit, zoning and usage of the rooms should be considered.  
 The indoor and outdoor unit combination is determined in such a way that the sum of indoor unit capacity index is nearest to and smaller than the capacity index at 100 % combination ratio of each outdoor unit. Up to 16 indoor units can be connected to one outdoor unit. It is recommended to choose a larger outdoor unit if the installation space is large enough.  
 If the combination ratio is higher than 100 %, the indoor unit selection will have to be reviewed by using the actual capacity of each indoor unit.

Indoor unit combination total capacity index table

| Outdoor unit | Indoor unit combination ratio |       |       |       |      |      |     |      |      |
|--------------|-------------------------------|-------|-------|-------|------|------|-----|------|------|
|              | 130 %                         | 120 % | 110 % | 100 % | 90 % | 80 % | 70% | 60 % | 50 % |
| RXYN10A      | 325                           | 300   | 275   | 250   | 225  | 200  | 175 | 150  | 125  |

Indoor unit capacity index

|                |    |    |       |    |    |      |     |
|----------------|----|----|-------|----|----|------|-----|
| Model          | 20 | 25 | 32    | 40 | 50 | 63   | 100 |
| Capacity index | 20 | 25 | 31.25 | 40 | 50 | 62.5 | 100 |

## 1 - 3 Actual performance data

Use outdoor unit capacity tables  
 Determine the correct table according to the outdoor unit model and combination ratio.  
 Enter the table at given indoor and outdoor temperature and find the outdoor capacity and power input. The individual indoor unit capacity (power input) can be calculated as follows:

$$ICA = \frac{OCA \times INX}{TNX}$$

- ICA: Individual indoor unit capacity (power input)
- OCA: Outdoor unit capacity (power input)
- INX: Individual indoor unit capacity index
- TNX: Total capacity index

Then, correct the indoor unit capacity according to the piping length.  
 If the corrected capacity is smaller than the load, the size of indoor unit has to be increased. Repeat the same selection procedure.

# 1 Selection procedure VRV® system based on heating load

## 1 - 4 Selection example based on heating load

### 1 Given

- Design condition  
Heating: indoor 20°CDB, outdoor -14.7°CDB -15.0°CWB  
Distance between outdoor unit and furthest indoor unit = 30 meter
- Heating load

|           |     |     |     |     |     |     |     |     |
|-----------|-----|-----|-----|-----|-----|-----|-----|-----|
| Room      | A   | B   | C   | D   | E   | F   | G   | H   |
| Load (kW) | 2.2 | 1.7 | 5.6 | 1.8 | 3.7 | 2.7 | 3.6 | 2.8 |

### 2 Indoor unit selection

For CO<sub>2</sub> VRV only 1 type of indoor units is available at the moment.

Select indoor unit size using indoor capacity tables.

Conditions: indoor 20°CDB, outdoor -14.7°C -15.0°CWB

|           |     |     |     |     |     |     |     |     |
|-----------|-----|-----|-----|-----|-----|-----|-----|-----|
| Room      | A   | B   | C   | D   | E   | F   | G   | H   |
| Load (kW) | 2.2 | 1.7 | 5.6 | 1.8 | 3.7 | 2.7 | 3.6 | 2.8 |
| Unit size | 25  | 20  | 63  | 20  | 40  | 32  | 40  | 32  |
| Capacity  | 2.5 | 2.0 | 6.4 | 2.0 | 4.0 | 3.2 | 4.0 | 3.2 |

Calculate total indoor unit capacity index.

$$2 \times 20 + 1 \times 25 + 2 \times 31.25 + 2 \times 40 + 1 \times 62.5 = 270$$

### 3 Outdoor unit selection

Check if the total capacity index of the indoor units is close to 100% connection ratio. A connection ratio up to 130% is allowed.

Total capacity index of indoor units = 270

Calculate actual connection ratio:

$$\text{RXYN10A: } 250 \text{ at } 100\% \rightarrow 270 / 250 = 108\%$$

Calculate outdoor capacity.

RXYN10A at 110% at design conditions: 24.9

RXYN10A at 100% at design conditions: 24.8

To know the outdoor capacity at 108% we have to interpolate the values at 110% and 100%

Interpolate:

|      |     |      |
|------|-----|------|
| 24.8 | ?   | 24.9 |
| 250  | 270 | 275  |

$$24.8 + (24.9 - 24.8) / (270 - 250) \times (275 - 270) = 24.88$$

### 4 Correction factors

For refrigerant piping:

Check graphs in the next chapter of this databook.

For this example we assume a correction factor f 1.

For defrost factor (only in heating):

The capacity tables in the databook do not take account of the reduction in capacity when frost has accumulated or while the defrosting operation is in progress. The integrated heating capacity (which takes these factors into account) can be calculated by multiplying the capacity from the capacity tables with the defrost factor.

For this example with an outdoor temperature of -15°C, the defrost factor is 1.

Actual outdoor capacity = outdoor unit capacity x refrigerant piping correction factor x defrost factor.

Actual indoor capacity = outdoor capacity x refrigerant piping correction factor x defrost factor x indoor unit index/total capacity index

$$\text{Actual outdoor capacity} = 24.88 \times 1 \times 1 = 24.88$$

### 5 Actual performance data

If the combination ratio is higher than 100%, the indoor unit selection will have to be reviewed by calculating the actual capacity of each indoor unit. If the delivered capacity is not satisfying, a larger sized indoor unit needs to be selected. Then the calculation to select the outdoor unit needs to be done again.

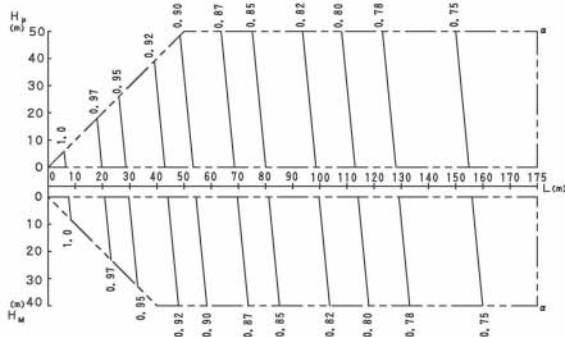
|       | Total load | unit | cap. Index | OU cap. | actual IU cap. |
|-------|------------|------|------------|---------|----------------|
| A     | 2.2        | 25   | 25         | 24.88   | 2.3            |
| B     | 1.7        | 20   | 20         |         | 1.8            |
| C     | 5.6        | 63   | 62.5       |         | 5.8            |
| D     | 1.8        | 20   | 20         |         | 1.8            |
| E     | 3.7        | 40   | 40         |         | 3.7            |
| F     | 2.7        | 32   | 31.25      |         | 2.9            |
| G     | 3.6        | 40   | 40         |         | 3.7            |
| G     | 2.8        | 32   | 31.25      |         | 2.9            |
| Total | 24.1       | 272  | 270        |         | 24.88          |

## 2 Capacity correction ratio

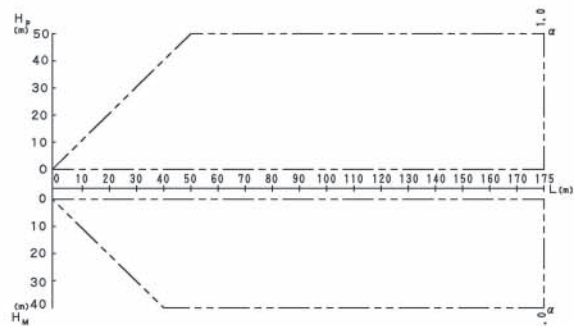
### 2 - 1 VRV® heat pump

RXYN10A

1. Rate of change in cooling capacity



2. Rate of change in heating capacity



[ Notes ]

1. These figures illustrate the rate of change in capacity of a standard indoor unit system at maximum load (with the thermostat set to maximum) under standard conditions. Moreover, under partial load conditions there is only a minor deviation from the rate of change in capacity shown in the above figures.
2. With this outdoor unit, evaporating pressure constant control when cooling, and condensing pressure constant control when heating is carried out.
3. Method of calculating A/C (cooling/heating) capacity:  
The maximum A/C capacity of the system will be either the total A/C capacity of the indoor units obtained from capacity characteristic table or the maximum A/C capacity of outdoor units as mentioned below, whichever smaller.

Calculating A/C capacity of outdoor units

- Condition: Indoor unit combination ratio does not exceed 100%.

Maximum A/C capacity of outdoor units

$$= \text{A/C capacity of outdoor units obtained from capacity characteristic table at the 100\% combination} \times \text{Capacity change rate due to piping length to the farthest indoor unit}$$

- Condition: Indoor unit combination ratio exceeds 100%.

Maximum A/C capacity of outdoor units

$$= \text{A/C capacity of outdoor units obtained from capacity characteristic table at the combination} \times \text{Capacity change rate due to piping length to the farthest indoor unit}$$

[ Explanation of symbols ]

- HP : Level difference(m) between indoor and outdoor units where indoor unit in inferior position
- HM : Level difference(m) between indoor and outdoor units where indoor unit in superior position
- L : Equivalent pipe length(m)
- α : Rate of change in cooling / heating Capacity

[ Diameter of the main pipes(standard size) ]

| Model   | gas    | liquid |
|---------|--------|--------|
| RXYN10A | φ 15.9 | φ 9.5  |

3D063503A

### 3 Integrated heating capacity coefficient

RXYN10A

#### INTEGRATED HEATING CAPACITY COEFFICIENT

The heating capacity tables do not take account of the reduction in capacity, when frost has accumulated or while the defrosting operation is in progress. The capacity values, which take these factors into account, in other words, the integrated heating capacity values, can be calculated as follows:

Formula:

Integrated heating capacity = A

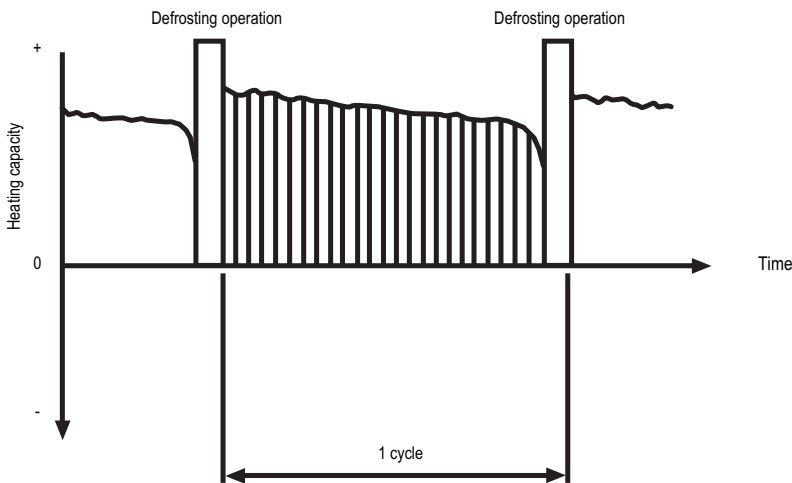
Value given in table of capacity characteristics = B

Integrated correction factor for frost accumulation = C

$A = B \times C$

Integrating correction factor for finding integrated heating capacity

|  |      |      |      |      |      |      |     |
|--|------|------|------|------|------|------|-----|
| Inlet port temperature of heat exchanger (°C/RH 85%) | -7   | -5   | -3   | 0    | 3    | 5    | 7   |
| Integrating correction factor for frost accumulation | 0.95 | 0.93 | 0.88 | 0.84 | 0.85 | 0.90 | 1.0 |



ED34-845A

#### NOTE

- 1 The figure shows that the integrated heating capacity expresses the integrated capacity for a single cycle ( from defrost operation to defrost operation) in terms of time.

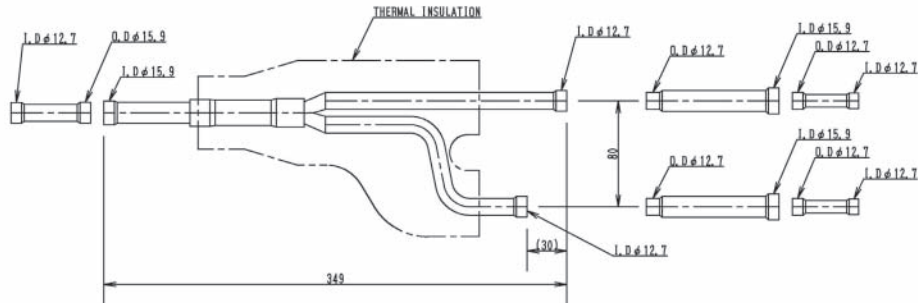
Please note that, when there is an accumulation of snow against the outside surface of the outdoor unit heat exchanger, there will always be a temporary reduction in capacity, although this will of course vary in degree in accordance with a number of other factors, such as the outdoor temperature (°CDB), relative humidity (RH) and the amount of frosting which occurs.

## 4 Refnet pipe systems

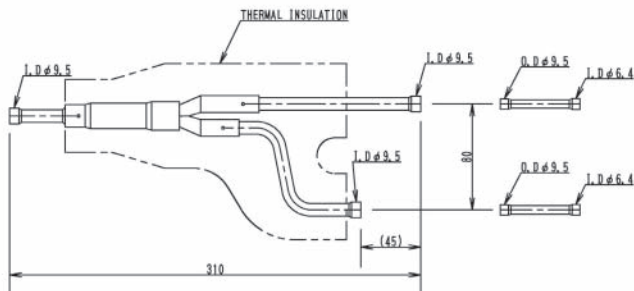
BHRN26A33T

|                            |      |
|----------------------------|------|
| Accessories                |      |
| Gas side accessory pipe    | 5pc. |
| Liquid side accessory pipe | 2pc. |
| Thermal Insulation         | 2pc. |
| Installation manual        | 1pc. |

GAS SIDE



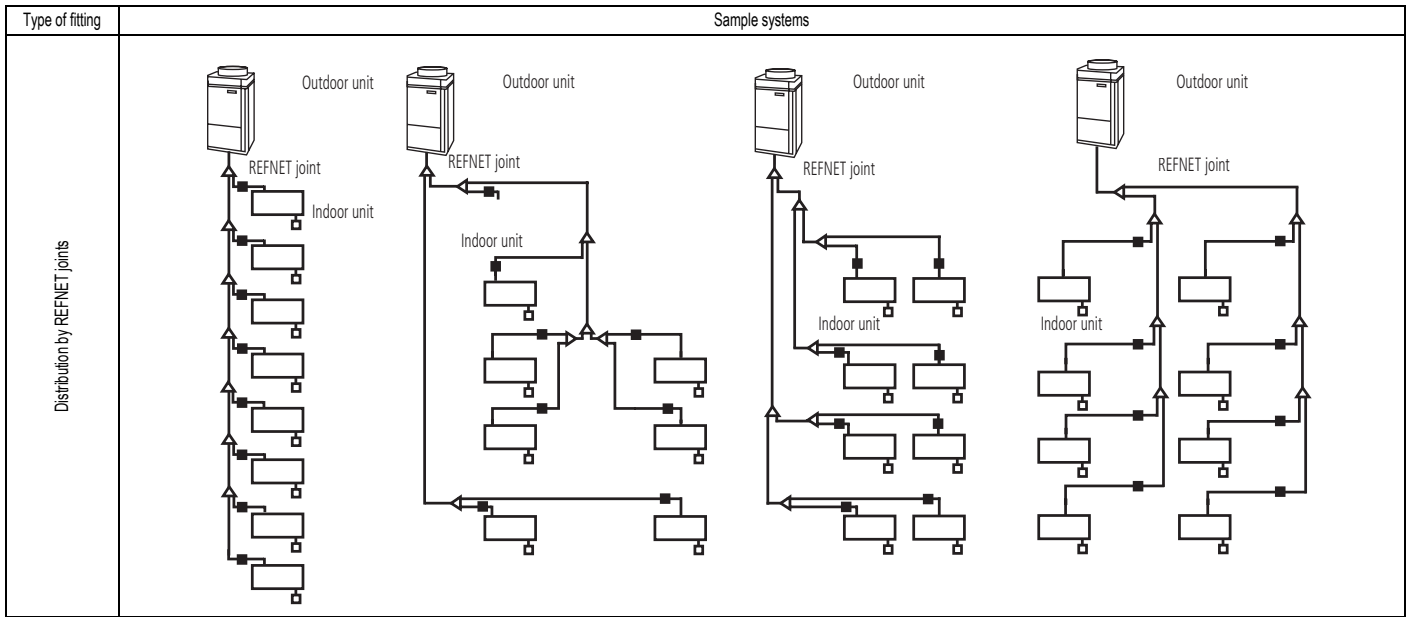
LIQUID SIDE



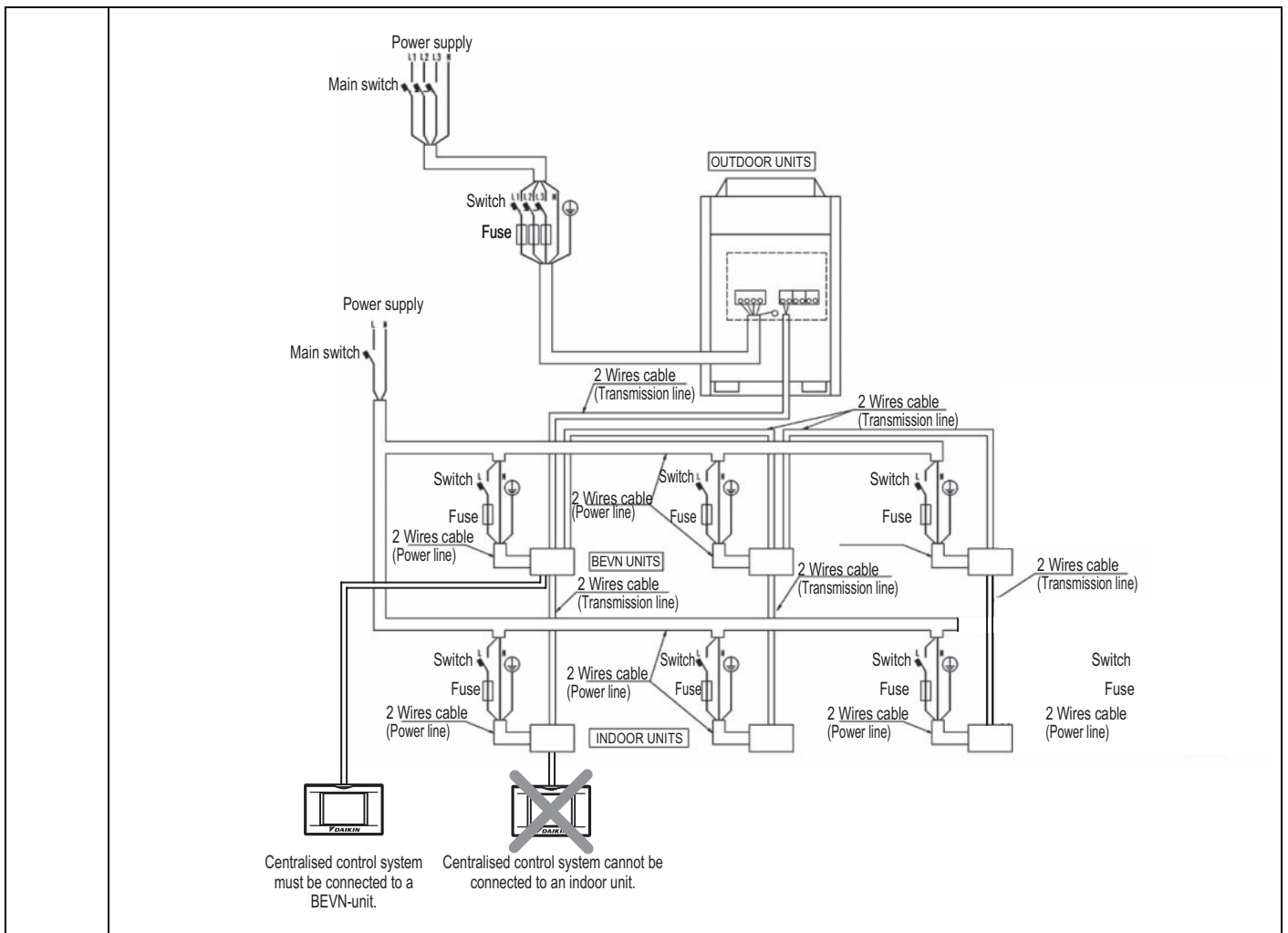
3D062855

## 5 Example of layouts

### 5 - 1 Example of Refnet piping layout



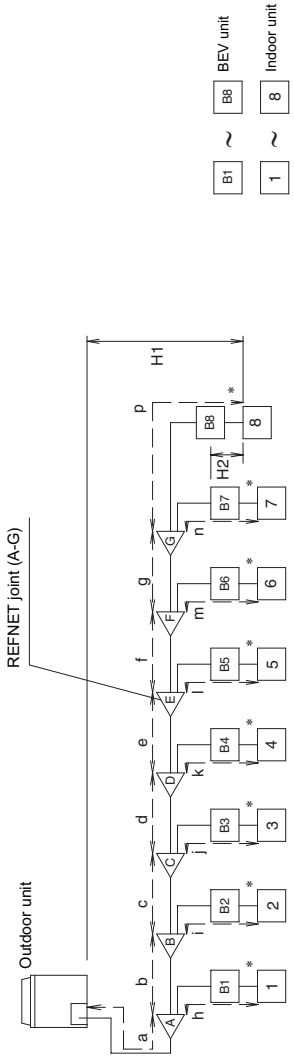
### 5 - 2 Example of a wiring diagram



# 6 Refrigerant pipe selection

## 6 - 1 VRV® heat pump

RXN10A

| <p><b>Example of connection</b><br/>(In case of connecting 8 indoor units and 8 BEV units)</p>    | <p><b>Actual piping length</b><br/>Example unit 8: a+b+c+d+e+f+g+p ≤ 150m</p> <p><b>Equivalent length</b><br/>Equivalent piping length between outdoor and indoor units ≤ 175m (assume equivalent piping length of REFNET joint to be 0.5 m)</p> <p><b>Total extension length</b><br/>Total piping length from outdoor unit* to all indoor units ≤ 300m</p> <p><b>Actual pipe length</b><br/>*Actual piping length between each BEV unit and the corresponding indoor unit. Refer to the BEV unit installation manual.</p> <p><b>Difference in height</b><br/>Difference in height between outdoor and indoor units (H1) ≤ 50m (≤ 40m if the outdoor unit is below).</p> <p><b>Difference in height</b><br/>Difference in height between adjacent indoor units (H2) ≤ 15m</p> <p><b>Actual piping length</b><br/>Piping length from first REFNET joint to indoor unit ≤ 40m<br/>Example unit 8: b+c+d+e+f+g+p ≤ 40m</p> | <p>All refrigerant branch kit<br/>(Example: REFNET joint (A-G))    BHRN26A33T</p> |                    |        |          |             |      |        |      |        |       |        |   |                      |                    |         |          |   |               |               |               |              |               |               |               |              |               |               |              |              |               |               |              |  |
|---|---|---|--------------------|--------|----------|-------------|------|--------|------|--------|-------|--------|---|----------------------|--------------------|---------|----------|---|---------------|---------------|---------------|--------------|---------------|---------------|---------------|--------------|---------------|---------------|--------------|--------------|---------------|---------------|--------------|--|
| <p><b>Maximum allowable length</b><br/>Between outdoor and indoor units</p> <p><b>Allowable height length</b><br/>Between outdoor and indoor units<br/>Between indoor and indoor units</p> <p><b>Allowable length after the branch</b></p> <p><b>Refrigerant branch kit selection</b></p> <p>Refrigerant branch kits can only be used with R744</p> | <p><b>Actual piping length</b><br/>Example unit 8: a+b+c+d+e+f+g+p ≤ 150m</p> <p><b>Equivalent length</b><br/>Equivalent piping length between outdoor and indoor units ≤ 175m (assume equivalent piping length of REFNET joint to be 0.5 m)</p> <p><b>Total extension length</b><br/>Total piping length from outdoor unit* to all indoor units ≤ 300m</p> <p><b>Actual pipe length</b><br/>*Actual piping length between each BEV unit and the corresponding indoor unit. Refer to the BEV unit installation manual.</p> <p><b>Difference in height</b><br/>Difference in height between outdoor and indoor units (H1) ≤ 50m (≤ 40m if the outdoor unit is below).</p> <p><b>Difference in height</b><br/>Difference in height between adjacent indoor units (H2) ≤ 15m</p> <p><b>Actual piping length</b><br/>Piping length from first REFNET joint to indoor unit ≤ 40m<br/>Example unit 8: b+c+d+e+f+g+p ≤ 40m</p> | <p>All refrigerant branch kit<br/>(Example: REFNET joint (A-G))    BHRN26A33T</p> |                    |        |          |             |      |        |      |        |       |        |   |                      |                    |         |          |   |               |               |               |              |               |               |               |              |               |               |              |              |               |               |              |  |
| <p><b>Pipe size selection</b></p>   | <p><b>Piping length between outdoor unit and REFNET joint (Part a)</b><br/>Select the pipes from the following table according to the total capacity of the indoor units connected downstream.</p> <table border="1" data-bbox="981 1142 1077 1512"> <thead> <tr> <th rowspan="2">Indoor unit total capacity index</th> <th colspan="2">Piping size (O.D.)</th> </tr> <tr> <th>Gas pipe</th> <th>Liquid pipe</th> </tr> </thead> <tbody> <tr> <td>&lt;138</td> <td>Ø12.7</td> <td>Ø9.5</td> </tr> <tr> <td>≥138</td> <td>Ø15.9</td> <td>Ø9.5</td> </tr> </tbody> </table> <p>(Unit: mm)</p>   | Indoor unit total capacity index  | Piping size (O.D.) |        | Gas pipe | Liquid pipe | <138 | Ø12.7  | Ø9.5 | ≥138   | Ø15.9 | Ø9.5   | <p><b>Piping length between REFNET joint and indoor unit</b><br/>Select the pipes from the following table according to the capacity of the indoor unit.</p> <table border="1" data-bbox="1141 324 1252 705"> <thead> <tr> <th rowspan="2">Indoor unit capacity</th> <th colspan="2">Piping size (O.D.)</th> </tr> <tr> <th>Gas pipe</th> <th>Liquid pipe</th> </tr> </thead> <tbody> <tr> <td>20-100 type</td> <td>Ø9.5</td> <td>Ø6.4</td> </tr> </tbody> </table> <p>(Unit: mm)</p> | Indoor unit capacity | Piping size (O.D.) |         | Gas pipe | Liquid pipe   | 20-100 type   | Ø9.5          | Ø6.4          |              |               |               |               |              |               |               |              |              |               |               |              |  |
| Indoor unit total capacity index  | Piping size (O.D.)  |   |                    |        |          |             |      |        |      |        |       |        |   |                      |                    |         |          |   |               |               |               |              |               |               |               |              |               |               |              |              |               |               |              |  |
|   | Gas pipe  | Liquid pipe   |                    |        |          |             |      |        |      |        |       |        |   |                      |                    |         |          |   |               |               |               |              |               |               |               |              |               |               |              |              |               |               |              |  |
| <138  | Ø12.7   | Ø9.5  |                    |        |          |             |      |        |      |        |       |        |   |                      |                    |         |          |   |               |               |               |              |               |               |               |              |               |               |              |              |               |               |              |  |
| ≥138  | Ø15.9   | Ø9.5  |                    |        |          |             |      |        |      |        |       |        |   |                      |                    |         |          |   |               |               |               |              |               |               |               |              |               |               |              |              |               |               |              |  |
| Indoor unit capacity  | Piping size (O.D.)  |   |                    |        |          |             |      |        |      |        |       |        |   |                      |                    |         |          |   |               |               |               |              |               |               |               |              |               |               |              |              |               |               |              |  |
|   | Gas pipe  | Liquid pipe   |                    |        |          |             |      |        |      |        |       |        |   |                      |                    |         |          |   |               |               |               |              |               |               |               |              |               |               |              |              |               |               |              |  |
| 20-100 type   | Ø9.5  | Ø6.4  |                    |        |          |             |      |        |      |        |       |        |   |                      |                    |         |          |   |               |               |               |              |               |               |               |              |               |               |              |              |               |               |              |  |
| <p><b>How to calculate the additional refrigerant to be charged</b><br/>Additional refrigerant to be charged: R (kg)<br/>(R should be rounded off in units of 0.1 kg)</p>   | <p><b>Indoor unit total capacity index</b></p> <table border="1" data-bbox="1157 728 1332 985"> <thead> <tr> <th>INDOOR TYPE</th> <th>CAPACITY INDEX</th> </tr> </thead> <tbody> <tr><td>FXSN20</td><td>20</td></tr> <tr><td>FXSN25</td><td>25</td></tr> <tr><td>FXSN32</td><td>32</td></tr> <tr><td>FXSN40</td><td>40</td></tr> <tr><td>FXSN50</td><td>50</td></tr> <tr><td>FXSN63</td><td>63</td></tr> <tr><td>FXSN100</td><td>100</td></tr> </tbody> </table> <p><b>Indoor unit total capacity index</b></p> <p>R = (Total length (m) of liquid piping size at Ø9.5) × 0.039 × 0.016 + (Total length (m) of liquid piping size at Ø6.4) × 0.016</p> <p>+ (Indoor unit total capacity index) × 0.009</p> <p>Example: R = 90 × 0.039 + 59 × 0.016 + 256 × 0.009 = 6.758</p> <p>↑ a+b+c+d+e    ↑ h+i+j+k+l+m    ↓ 6.8</p> <p>↑+↑g    ↑+↑p</p>   | INDOOR TYPE   | CAPACITY INDEX     | FXSN20 | 20       | FXSN25      | 25   | FXSN32 | 32   | FXSN40 | 40    | FXSN50 | 50  | FXSN63               | 63                 | FXSN100 | 100      | <p><b>Example: In case of connecting eight 32-type indoor units for refrigerant branching</b></p> <table border="1" data-bbox="1157 324 1252 705"> <thead> <tr> <th>a: Ø9.5 x 30m</th> <th>e: Ø9.5 x 10m</th> <th>i: Ø6.4 x 10m</th> <th>m: Ø6.4 x 3m</th> </tr> </thead> <tbody> <tr> <td>b: Ø9.5 x 10m</td> <td>f: Ø9.5 x 10m</td> <td>j: Ø6.4 x 10m</td> <td>n: Ø6.4 x 3m</td> </tr> <tr> <td>c: Ø9.5 x 10m</td> <td>g: Ø9.5 x 10m</td> <td>k: Ø6.4 x 9m</td> <td>o: Ø6.4 x 1m</td> </tr> <tr> <td>d: Ø9.5 x 10m</td> <td>h: Ø9.5 x 20m</td> <td>l: Ø6.4 x 3m</td> <td></td> </tr> </tbody> </table> <p>R = 90 × 0.039 + 59 × 0.016 + 256 × 0.009 = 6.758</p> <p>↑ a+b+c+d+e    ↑ h+i+j+k+l+m    ↓ 6.8</p> <p>↑+↑g    ↑+↑p</p> | a: Ø9.5 x 30m | e: Ø9.5 x 10m | i: Ø6.4 x 10m | m: Ø6.4 x 3m | b: Ø9.5 x 10m | f: Ø9.5 x 10m | j: Ø6.4 x 10m | n: Ø6.4 x 3m | c: Ø9.5 x 10m | g: Ø9.5 x 10m | k: Ø6.4 x 9m | o: Ø6.4 x 1m | d: Ø9.5 x 10m | h: Ø9.5 x 20m | l: Ø6.4 x 3m |  |
| INDOOR TYPE   | CAPACITY INDEX  |   |                    |        |          |             |      |        |      |        |       |        |   |                      |                    |         |          |   |               |               |               |              |               |               |               |              |               |               |              |              |               |               |              |  |
| FXSN20  | 20  |   |                    |        |          |             |      |        |      |        |       |        |   |                      |                    |         |          |   |               |               |               |              |               |               |               |              |               |               |              |              |               |               |              |  |
| FXSN25  | 25  |   |                    |        |          |             |      |        |      |        |       |        |   |                      |                    |         |          |   |               |               |               |              |               |               |               |              |               |               |              |              |               |               |              |  |
| FXSN32  | 32  |   |                    |        |          |             |      |        |      |        |       |        |   |                      |                    |         |          |   |               |               |               |              |               |               |               |              |               |               |              |              |               |               |              |  |
| FXSN40  | 40  |   |                    |        |          |             |      |        |      |        |       |        |   |                      |                    |         |          |   |               |               |               |              |               |               |               |              |               |               |              |              |               |               |              |  |
| FXSN50  | 50  |   |                    |        |          |             |      |        |      |        |       |        |   |                      |                    |         |          |   |               |               |               |              |               |               |               |              |               |               |              |              |               |               |              |  |
| FXSN63  | 63  |   |                    |        |          |             |      |        |      |        |       |        |   |                      |                    |         |          |   |               |               |               |              |               |               |               |              |               |               |              |              |               |               |              |  |
| FXSN100   | 100   |   |                    |        |          |             |      |        |      |        |       |        |   |                      |                    |         |          |   |               |               |               |              |               |               |               |              |               |               |              |              |               |               |              |  |
| a: Ø9.5 x 30m   | e: Ø9.5 x 10m   | i: Ø6.4 x 10m   | m: Ø6.4 x 3m       |        |          |             |      |        |      |        |       |        |   |                      |                    |         |          |   |               |               |               |              |               |               |               |              |               |               |              |              |               |               |              |  |
| b: Ø9.5 x 10m   | f: Ø9.5 x 10m   | j: Ø6.4 x 10m   | n: Ø6.4 x 3m       |        |          |             |      |        |      |        |       |        |   |                      |                    |         |          |   |               |               |               |              |               |               |               |              |               |               |              |              |               |               |              |  |
| c: Ø9.5 x 10m   | g: Ø9.5 x 10m   | k: Ø6.4 x 9m  | o: Ø6.4 x 1m       |        |          |             |      |        |      |        |       |        |   |                      |                    |         |          |   |               |               |               |              |               |               |               |              |               |               |              |              |               |               |              |  |
| d: Ø9.5 x 10m   | h: Ø9.5 x 20m   | l: Ø6.4 x 3m  |                    |        |          |             |      |        |      |        |       |        |   |                      |                    |         |          |   |               |               |               |              |               |               |               |              |               |               |              |              |               |               |              |  |

## 6 Refrigerant pipe selection

### 6 - 2 Piping thickness

| Piping diameter | Material | Minimum thickness [mm] |
|-----------------|----------|------------------------|
| Ø 6.4           | 1/2H     | 0.8                    |
| Ø 9.5           | 1/2H     | 1.0                    |
| Ø 12.7          | 1/2H     | 1.3                    |
| Ø 15.9          | 1/2H     | 1.8                    |

1/2H : half-hard

Maximal: Phosphorous deoxidized seamless copperpipe (C1220T-1/2H or C1220T-H)

Pipe wall thickness: Product withstanding 12.3 MPa



Daikin's unique position as a manufacturer of air conditioning equipment, compressors and refrigerants has led to its close involvement in environmental issues. For several years Daikin has had the intension to become a leader in the provision of products that have limited impact on the environment. This challenge demands the eco design and development of a wide range of products and an energy management system, resulting in energy conservation and a reduction of waste.



Daikin Europe N.V. is approved by LRQA for its Quality Management System in accordance with the ISO9001 standard. ISO9001 pertains to quality assurance regarding design, development, manufacturing as well as to services related to the product.



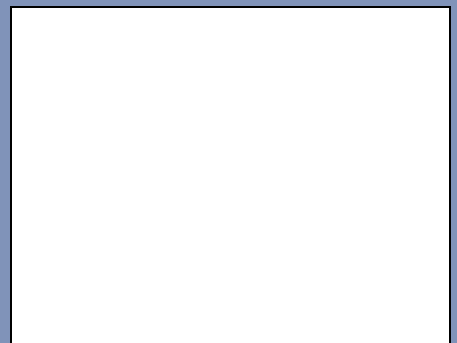
ISO14001 assures an effective environmental management system in order to help protect human health and the environment from the potential impact of our activities, products and services and to assist in maintaining and improving the quality of the environment.



Daikin units comply with the European regulations that guarantee the safety of the product.

VRV® products are not within the scope of the Eurovent certification programme.

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