Trane Module Chiller Installation / Operation / Maintenance Manual

CG-SVX026A-EN

# Installation / Operation / Maintenance Manual

## Trane Module Chiller

**CX(G)AV 085 / 150**
**Cooling: 85~1700kW / 150~3000kW**
**Heating: 85~1700kW / 150~3000kW**
**50 / 60Hz**

**⚠ Safety Precautions**

Please pay attention to the warning messages and cautionary notes listed throughout this manual. Warning messages represent dangerous tasks that may result in death or serious injury to the installer. Cautionary notes are intended to remind the operator to take care in order to prevent damage to the equipment.
These preventative measures must be strictly adhered to in order to perform normal operation of the equipment in a safe manner.

March 2015

**CG-SVX026A-EN**

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CG-SVX026A-EN March 2015

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# Contents

# 1 Operations

## 1-1. Safety Precautions

### Warnings and Cautionary Notes

Please pay attention to the warning messages and cautionary notes listed throughout this manual. Warning messages represent dangerous tasks that may result in death or serious injury to the installer.

Cautionary notes are intended to remind the operator to take care in order to prevent damage to the equipment.

These preventative measures must be strictly adhered to in order to perform normal operation of the equipment in a safe manner.

### Note

Warning messages and cautionary notes are listed throughout this manual. Take care to read the entire manual contents thoroughly.

### Symbol Explanation

⚠ Warning: Failing to adhere to warning messages is dangerous and may result in death or serious injury.

⚠ Note: Failing to adhere to cautionary notes is dangerous and may result in medium to light injuries. Read the cautionary notes again as a reminder if you find yourself in a situation where objects may be damaged due to carelessness.

Always wear a protective helmet whenever operating, maintaining or inspecting.

**Trapping Hazard**

Rotating parts inside. Keep hands clear.

**Electrical Hazard**

Multiple power lines inside.
Do not remove the cover.

**Burn Hazard**

Do not touch.

| | | |
|---|---|---|
| ⚠ Warning | Do not top-up or replace refrigerant with anything other than the specified refrigerant. Using refrigerants other than the specified refrigerant may cause serious equipment and safety problems. We assume no responsibility for any events resulting from the use of any refrigerant other than the specified refrigerant. | Prohibited |

# 2 Specification Tables

## 2-1. Interpreting Model Numbers

| | Model Number Structure | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| E.g. | C | X | A | V | 1 | 5 | 0 | 3 | 2 | A | 1 | 2 | 1 | 0 | 0 | 1 | 1 | 1 | A | C | A |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 |

| | |
|---|---|
| 1 | C = Chiller |
| 2 | X = Heat pump, G = Cooler only |
| 3 | A = Air cooling |
| 4 | V = Module package |
| 5, 6, 7 | Model number (cooler capacity)<br>085 (85 kW)<br>150 (150 kW) |
| 8 | Voltage/Frequency/Phases<br>1 = 200 V/50 Hz/3 PH<br>2 = 200 V/60 Hz/3 PH<br>3 = 400 V/50 Hz/3 PH<br>4 = 400 V/60 Hz/3 PH |
| 9 | Water pump<br>0 = None<br>1 = Fixed speed water pump - standard head<br>2 = Fixed speed water pump - high head<br>3 = Variable speed water pump - standard head<br>4 = Variable speed water pump - high head |
| 10 | Design order<br>A |
| 11 | Module controller<br>0 = None / Single unit<br>1 = Yes / Unit with module settings<br>2 = None / Unit with module settings |
| 12 | BAS Interface<br>0 = None<br>1 = Modbus<br>2 = BACnet |
| 13 | Harmonic filter<br>0 = None<br>Max. performance<br>High performance |
| 14 | Pressure gauge<br>0 = None<br>1 = Pressure gauge incl. |
| 15 | Condenser coil guard<br>0 = None<br>1 = Yes |
| 16 | Noise dampener<br>0 = None<br>1 = Yes |
| 17 | Equipment type<br>0 = Standard-efficiency<br>1 = High-efficiency<br>2 = Corrosion-proof |
| 18 | Accessories<br>0 = None<br>1 = Rubber pad |
| 19 | Service order<br>A |
| 20 | Related resources and language<br>B = English<br>C = Japanese |
| 21 | Refrigerant charge<br>A = Yes<br>B = No |

# 2-2. Heat Pump Performance

## ■ 30HP Heat Pump Unit

| Model | | | CXAV085 | CXAV085 | CXAV085 | CXAV085 | CXAV085 | CXAV085 | CXAV085 | CXAV085 | CXAV085 | CXAV085 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No. Modules Connected | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Capacity | Cooling | kW | 85 | 170 | 255 | 340 | 425 | 510 | 595 | 680 | 765 | 850 |
| | Heating | kW | 85 | 170 | 255 | 340 | 425 | 510 | 595 | 680 | 765 | 850 |
| Electrical Characteristics(Note 1) | Power Supply(Note 3) | | 3-Phase / 200V / 50, 60Hz | | | | | | | | | |
| | Operating Current (when cooling) | A | 70.4 | 140.8 | 211.2 | 281.6 | 352.0 | 422.4 | 492.8 | 563.2 | 633.6 | 704.0 |
| | Power Consumed (when cooling) | kW | 22.08 | 44.2 | 66.2 | 88.3 | 110.4 | 132.5 | 154.6 | 176.6 | 198.7 | 220.8 |
| | Efficiency (when cooling) | | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 |
| | Operating Current (when heating) | A | 70.5 | 141.0 | 211.5 | 282.0 | 352.5 | 423.0 | 493.5 | 564.0 | 634.5 | 705.0 |
| | Power Consumed (when heating) | kW | 22.89 | 45.78 | 68.67 | 91.56 | 114.45 | 137.34 | 160.23 | 183.12 | 206.01 | 228.90 |
| | Efficiency (when heating) | | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Electrical Characteristics(Note 2) | Power Supply(Note 3) | | 3-Phase / 200V / 50, 60Hz | | | | | | | | | |
| | Operating Current (when cooling) | A | 68.7 | 137.4 | 206.1 | 274.8 | 343.5 | 412.2 | 480.9 | 549.6 | 618.3 | 687.0 |
| | Power Consumed (when cooling) | kW | 21.61 | 43.2 | 64.8 | 86.4 | 108.1 | 129.7 | 151.3 | 172.9 | 194.5 | 216.1 |
| | Efficiency (when cooling) | | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 |
| | Operating Current (when heating) | A | 69.1 | 138.2 | 207.3 | 276.4 | 345.5 | 414.6 | 483.7 | 552.8 | 621.9 | 691.0 |
| | Power Consumed (when heating) | kW | 22.42 | 44.84 | 67.26 | 89.68 | 112.10 | 134.52 | 156.94 | 179.36 | 201.78 | 224.20 |
| | Efficiency (when heating) | | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Compressor | Category | | Hermetically Sealed Scroll | | | | | | | | | |
| | Output × No. Units | kW | 9 × 4 | 9 × 8 | 9 × 12 | 9 × 16 | 9 × 20 | 9 × 24 | 9 × 28 | 9 × 32 | 9 × 36 | 9 × 40 |
| | Starting Method | | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting |
| | Crank Case Heater × No. Units | W | 90 × 4 | 90 × 8 | 90 × 12 | 90 × 16 | 90 × 20 | 90 × 24 | 90 × 28 | 90 × 32 | 90 × 36 | 90 × 40 |
| Air Heat Exchanger | Category | | Tube with Fan | | | | | | | | | |
| | Fan Material | | Resin Coating (Blue Fin) | | | | | | | | | |
| | Tube Material | | Copper | Copper | Copper | Copper | Copper | Copper | Copper | Copper | Copper | Copper |
| | No. | | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| | Fan (Model) | | Propeller Fin | | | | | | | | | |
| | Motor Output × No. Units | kW | 0.35 × 4 | 0.35 × 8 | 0.35 × 12 | 0.35 × 16 | 0.35 × 20 | 0.35 × 24 | 0.35 × 28 | 0.35 × 32 | 0.35 × 36 | 0.35 × 40 |
| | Airflow | $m^3$/min | 600 | 1200 | 1800 | 2400 | 3000 | 3600 | 4200 | 4800 | 5400 | 6000 |
| Water Heat Exchanger | Category | | Brazing Plate Heat Exchanger | | | | | | | | | |
| | Material | | SUS316 | | | | | | | | | |
| | Rated Flow(Note 1) | $m^3$/min | 242 | 484 | 726 | 968 | 1210 | 1452 | 1694 | 1936 | 2178 | 2420 |
| | Pressure Loss(Note 1) | kPa | 53 | 53 | 53 | 53 | 53 | 53 | 53 | 53 | 53 | 53 |
| | Rated Flow(Note 2) | $m^3$/min | 172 | 344 | 516 | 688 | 860 | 1032 | 1204 | 1376 | 1548 | 1720 |
| | Pressure Loss(Note 2) | kPa | 29 | 29 | 29 | 29 | 29 | 29 | 29 | 29 | 29 | 29 |
| Capacity Control | Method | | Hot/Cold Water Outlet Temperature Control | | | | | | | | | |
| | Range(Note 4) | | 18 - 100% | 9 - 100% | 6 - 100% | 5 - 100% | 4 - 100% | 3 - 100% | 3 - 100% | 2 - 100% | 2 - 100% | 2 - 100% |
| Refrigerant | Refrigerant | | R410A | R410A | R410A | R410A | R410A | R410A | R410A | R410A | R410A | R410A |
| | Loading | kg | 9.1 × 4 | 9.1 × 8 | 9.1 × 12 | 9.1 × 16 | 9.1 × 20 | 9.1 × 24 | 9.1 × 28 | 9.1 × 32 | 9.1 × 36 | 9.1 × 40 |
| | Control method | | Electronic expansion valve | | | | | | | | | |
| Refrigerator Oil | Category | | 160SZ | 160SZ | 160SZ | 160SZ | 160SZ | 160SZ | 160SZ | 160SZ | 160SZ | 160SZ |
| | Loading | L | 3.8 × 4 | 3.8 × 8 | 3.8 × 12 | 3.8 × 16 | 3.8 × 20 | 3.8 × 24 | 3.8 × 28 | 3.8 × 32 | 3.8 × 36 | 3.8 × 40 |
| External Dimensions (mm)(Note 5) | Length | mm | 3795 | 3795 | 3795 | 3795 | 3795 | 3795 | 3795 | 3795 | 3795 | 3795 |
| | Width | mm | 1020 | 2200 | 3380 | 4560 | 5740 | 6920 | 8100 | 9280 | 10460 | 11640 |
| | Height | mm | 2345 | 2345 | 2345 | 2345 | 2345 | 2345 | 2345 | 2345 | 2345 | 2345 |
| Weight | Shipping Weight | kg | 1465 | 2930 | 4395 | 5860 | 7325 | 8790 | 10255 | 11720 | 13185 | 14650 |
| | Operating Weight | kg | 1495 | 2990 | 4485 | 5980 | 7475 | 8970 | 10465 | 11960 | 13455 | 14950 |
| Noise(Note 6) | When Cooling (Standard) | dBA | 63.5 | 65.8 | 67.6 | 68.8 | 69.8 | 70.6 | 71.3 | 71.9 | 72.4 | 72.8 |
| | When Heating (Standard) | dBA | 64.0 | 66.3 | 68.1 | 69.3 | 70.3 | 71.1 | 71.8 | 72.4 | 72.9 | 73.3 |
| | When Cooling (Low Noise Option) | dBA | 61.0 | 63.3 | 65.1 | 66.3 | 67.3 | 68.1 | 68.8 | 69.4 | 69.9 | 70.3 |
| | When Heating (Low Noise Option) | dBA | 61.0 | 63.3 | 65.1 | 66.3 | 67.3 | 68.1 | 68.8 | 69.4 | 69.9 | 70.3 |
| Standard Head Pump (optional) | Rated Output | kW | 1.5 × 1 | 1.5 × 2 | 1.5 × 3 | 1.5 × 4 | 1.5 × 5 | 1.5 × 6 | 1.5 × 7 | 1.5 × 8 | 1.5 × 9 | 1.5 × 10 |
| | Maximum Operating Current | A | 7.2 × 1 | 7.2 × 2 | 7.2 × 3 | 7.2 × 4 | 7.2 × 5 | 7.2 × 6 | 7.2 × 7 | 7.2 × 8 | 7.2 × 9 | 7.2 × 10 |
| | Starting Method | | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting |
| High Head Pump (optional) | Rated Output | kW | 1.85 × 1 | 1.85 × 2 | 1.85 × 3 | 1.85 × 4 | 1.85 × 5 | 1.85 × 6 | 1.85 × 7 | 1.85 × 8 | 1.85 × 9 | 1.85 × 10 |
| | Maximum Operating Current | A | 9.0 × 1 | 9.0 × 2 | 9.0 × 3 | 9.0 × 4 | 9.0 × 5 | 9.0 × 6 | 9.0 × 7 | 9.0 × 8 | 9.0 × 9 | 9.0 × 10 |
| | Starting Method | | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting |
| Statutory Chiller Tonnage | | | 15.6 Statutory Chiller Tonnage | | | | | | | | | |
| High Pressure Gas Safety Act License Classification | | | Not Required (as long as not joined with water pipe systems of other heat sources) | | | | | | | | | |

Notes: 1. Test Conditions: Cooling: Cold water inlet 12°C outlet 7°C, ambient temperature 35°C DB
Heating: Hot water inlet 40°C / outlet 45°C, ambient temperature 7°C DB, 6°C WB
2. Test Conditions: Cooling: Cold water inlet 14°C outlet 7°C, ambient temperature 35°C DB
Heating: Hot water inlet 38°C / outlet 45°C, ambient temperature 7°C DB, 6°C WB
3. The power supply should not have greater than 2% voltage offset so as to not exceed the ±10% tolerance during unexpected voltage fluctuations.
4. Capacity control range may differ with operating conditions.
5. External dimensions do not include protruding objects such as pipes, power wiring kits (if mounting components sold separately) etc.
6. Noise value measured was taken in an anechoic chambers or other place free of reflected noise. In actual installations environmental noise may cause this value to be higher. Measured noise tolerance is ±2dBA.

## ■ 30HP Heat Pump Unit

| Model | | | CXAV085 | CXAV085 | CXAV085 | CXAV085 | CXAV085 | CXAV085 | CXAV085 | CXAV085 | CXAV085 | CXAV085 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No. Modules Connected | | | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| Capacity | Cooling | kW | 935 | 1020 | 1105 | 1190 | 1275 | 1360 | 1445 | 1530 | 1615 | 1700 |
| | Heating | kW | 935 | 1020 | 1105 | 1190 | 1275 | 1360 | 1445 | 1530 | 1615 | 1700 |
| Electrical Characteristics(Note 1) | Power Supply(Note 3) | | 3-Phase / 200V / 50, 60Hz | | | | | | | | | |
| | Operating Current (when cooling) | A | 774.4 | 844.8 | 915.2 | 985.6 | 1056.0 | 1126.4 | 1196.8 | 1267.2 | 1337.6 | 1408.0 |
| | Power Consumed (when cooling) | kW | 242.9 | 265.0 | 287.0 | 309.1 | 331.2 | 353.3 | 375.4 | 397.4 | 419.5 | 441.6 |
| | Efficiency (when cooling) | | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 |
| | Operating Current (when heating) | A | 775.5 | 846.0 | 916.5 | 987.0 | 1057.5 | 1128.0 | 1198.5 | 1269.0 | 1339.5 | 1410.0 |
| | Power Consumed (when heating) | kW | 251.79 | 274.68 | 297.57 | 320.46 | 343.35 | 366.24 | 389.13 | 412.02 | 434.91 | 457.80 |
| | Efficiency (when heating) | | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Electrical Characteristics(Note 2) | Power Supply(Note 3) | | 3-Phase / 200V / 50, 60Hz | | | | | | | | | |
| | Operating Current (when cooling) | A | 755.7 | 824.4 | 893.1 | 961.8 | 1030.5 | 1099.2 | 1167.9 | 1236.6 | 1305.3 | 1374.0 |
| | Power Consumed (when cooling) | kW | 237.7 | 259.3 | 280.9 | 302.5 | 324.2 | 345.8 | 367.4 | 389.0 | 410.6 | 432.2 |
| | Efficiency (when cooling) | | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 |
| | Operating Current (when heating) | A | 760.1 | 829.2 | 898.3 | 967.4 | 1036.5 | 1105.6 | 1174.7 | 1243.8 | 1312.9 | 1382.0 |
| | Power Consumed (when heating) | kW | 246.62 | 269.04 | 291.46 | 313.88 | 336.30 | 358.72 | 381.14 | 403.56 | 425.98 | 448.40 |
| | Efficiency (when heating) | | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Compressor | Category | | Hermetically Sealed Scroll | | | | | | | | | |
| | Output × No. Units | kW | 9 × 44 | 9 × 48 | 9 × 52 | 9 × 56 | 9 × 60 | 9 × 64 | 9 × 68 | 9 × 72 | 9 × 76 | 9 × 80 |
| | Starting Method | | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting |
| | Crank Case Heater x No. Units | W | 90 × 44 | 90 × 48 | 90 × 52 | 90 × 56 | 90 × 60 | 90 × 64 | 90 × 68 | 90 × 72 | 90 × 76 | 90 × 80 |
| Air Heat Exchanger | Category | | Tube with Fan | | | | | | | | | |
| | Fan Material | | Resin Coating (Blue Fin) | | | | | | | | | |
| | Tube Material | | Copper | Copper | Copper | Copper | Copper | Copper | Copper | Copper | Copper | Copper |
| | No. | | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| | Fan (Model) | | Propeller Fin | | | | | | | | | |
| | Motor Output x No. Units | kW | 0.35 × 44 | 0.35 × 48 | 0.35 × 52 | 0.35 × 56 | 0.35 × 60 | 0.35 × 64 | 0.35 × 68 | 0.35 × 72 | 0.35 × 76 | 0.35 × 80 |
| | Airflow | m³/min | 6600 | 7200 | 7800 | 8400 | 9000 | 9600 | 10200 | 10800 | 11400 | 12000 |
| Water Heat Exchanger | Category | | Brazing Plate Heat Exchanger | | | | | | | | | |
| | Material | | SUS316 | | | | | | | | | |
| | Rated Flow(Note 1) | m³/min | 2662 | 2904 | 3146 | 3388 | 3630 | 3872 | 4114 | 4356 | 4598 | 4840 |
| | Pressure Loss(Note 1) | kPa | 53 | 53 | 53 | 53 | 53 | 53 | 53 | 53 | 53 | 53 |
| | Rated Flow(Note 2) | m³/min | 1892 | 2064 | 2236 | 2408 | 2580 | 2752 | 2924 | 3096 | 3268 | 3440 |
| | Pressure Loss(Note 2) | kPa | 29 | 29 | 29 | 29 | 29 | 29 | 29 | 29 | 29 | 29 |
| Capacity Control | Method | | Hot/Cold Water Outlet Temperature Control | | | | | | | | | |
| | Range(Note 4) | | 2 - 100% | 1 - 100% | 1 - 100% | 1 - 100% | 1 - 100% | 1 - 100% | 1 - 100% | 1 - 100% | 1 - 100% | 1 - 100% |
| Refrigerant | Refrigerant | | R410A | R410A | R410A | R410A | R410A | R410A | R410A | R410A | R410A | R410A |
| | Loading | kg | 9.1 × 44 | 9.1 × 48 | 9.1 × 52 | 9.1 × 56 | 9.1 × 60 | 9.1 × 64 | 9.1 × 68 | 9.1 × 72 | 9.1 × 76 | 9.1 × 80 |
| | Control method | | Electronic expansion valve | | | | | | | | | |
| Refrigerator Oil | Category | | 160SZ | 160SZ | 160SZ | 160SZ | 160SZ | 160SZ | 160SZ | 160SZ | 160SZ | 160SZ |
| | Loading | L | 3.8 × 44 | 3.8 × 48 | 3.8 × 52 | 3.8 × 56 | 3.8 × 60 | 3.8 × 64 | 3.8 × 68 | 3.8 × 72 | 3.8 × 76 | 3.8 × 80 |
| External Dimensions (mm)(Note 5) | Length | mm | 3795 | 3795 | 3795 | 3795 | 3795 | 3795 | 3795 | 3795 | 3795 | 3795 |
| | Width | mm | 12820 | 14000 | 15180 | 16360 | 17540 | 18720 | 19900 | 21080 | 22260 | 23440 |
| | Height | mm | 2345 | 2345 | 2345 | 2345 | 2345 | 2345 | 2345 | 2345 | 2345 | 2345 |
| Weight | Shipping Weight | kg | 16115 | 17580 | 19045 | 20510 | 21975 | 23440 | 24905 | 26370 | 27835 | 29300 |
| | Operating Weight | kg | 16445 | 17940 | 19435 | 20930 | 22425 | 23920 | 25415 | 26910 | 28405 | 29900 |
| Noise(Note 6) | When Cooling (Standard) | dBA | 73.2 | 73.6 | 74.0 | 74.3 | 74.6 | 74.9 | 75.1 | 75.4 | 75.6 | 75.8 |
| | When Heating (Standard) | dBA | 73.7 | 74.1 | 74.5 | 74.8 | 75.1 | 75.4 | 75.6 | 75.9 | 76.1 | 76.3 |
| | When Cooling (Low Noise Option) | dBA | 70.7 | 71.1 | 71.5 | 71.8 | 72.1 | 72.4 | 72.6 | 72.9 | 73.1 | 73.3 |
| | When Heating (Low Noise Option) | dBA | 70.7 | 71.1 | 71.5 | 71.8 | 72.1 | 72.4 | 72.6 | 72.9 | 73.1 | 73.3 |
| Standard Head Pump (optional) | Rated Output | kW | 1.5 × 11 | 1.5 × 12 | 1.5 × 13 | 1.5 × 14 | 1.5 × 15 | 1.5 × 16 | 1.5 × 17 | 1.5 × 18 | 1.5 × 19 | 1.5 × 20 |
| | Maximum Operating Current | A | 7.2 × 11 | 7.2 × 12 | 7.2 × 13 | 7.2 × 14 | 7.2 × 15 | 7.2 × 16 | 7.2 × 17 | 7.2 × 18 | 7.2 × 19 | 7.2 × 20 |
| | Starting Method | | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting |
| High Head Pump (optional) | Rated Output | kW | 1.85 × 11 | 1.85 × 12 | 1.85 × 13 | 1.85 × 14 | 1.85 × 15 | 1.85 × 16 | 1.85 × 17 | 1.85 × 18 | 1.85 × 19 | 1.85 × 20 |
| | Maximum Operating Current | A | 9.0 × 11 | 9.0 × 12 | 9.0 × 13 | 9.0 × 14 | 9.0 × 15 | 9.0 × 16 | 9.0 × 17 | 9.0 × 18 | 9.0 × 19 | 9.0 × 20 |
| | Starting Method | | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting |
| Statutory Chiller Tonnage | | | 15.6 Statutory Chiller Tonnage | | | | | | | | | |
| High Pressure Gas Safety Act License Classification | | | Not Required (as long as not joined with water pipe systems of other heat sources) | | | | | | | | | |

Notes: 1. Test Conditions: Cooling: Cold water inlet 12°C outlet 7°C, ambient temperature 35°C DB
Heating: Hot water inlet 40°C / outlet 45°C, ambient temperature 7°C DB, 6°C WB
2. Test Conditions: Cooling: Cold water inlet 14°C outlet 7°C, ambient temperature 35°C DB
Heating: Hot water inlet 38°C / outlet 45°C, ambient temperature 7°C DB, 6°C WB
3. The power supply should not have greater than 2% voltage offset so as to not exceed the ±10% tolerance during unexpected voltage fluctuations.
4. Capacity control range may differ with operating conditions.
5. External dimensions do not include protruding objects such as pipes, power wiring kits (if mounting components sold separately) etc.
6. Noise value measured was taken in an anechoic chambers or other place free of reflected noise. In actual installations environmental noise may cause this value to be higher. Measured noise tolerance is ±2dBA.

## ■ 30HP Heat Pump Unit with Aspersion Apparatus

| Model | | | CXAV085 | CXAV085 | CXAV085 | CXAV085 | CXAV085 | CXAV085 | CXAV085 | CXAV085 | CXAV085 | CXAV085 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No. Modules Connected | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Capacity | Cooling | kW | 85 | 170 | 255 | 340 | 425 | 510 | 595 | 680 | 765 | 850 |
| | Heating | kW | 85 | 170 | 255 | 340 | 425 | 510 | 595 | 680 | 765 | 850 |
| Electrical Characteristics(Note 1) | Power Supply(Note 3) | | 3-Phase / 200V / 50, 60Hz | | | | | | | | | |
| | Operating Current (when cooling) | A | 44.8 | 89.6 | 134.5 | 179.3 | 224.1 | 268.9 | 313.7 | 358.6 | 403.4 | 448.2 |
| | Power Consumed (when cooling) | kW | 15.10 | 30.2 | 45.3 | 60.4 | 75.5 | 90.6 | 105.7 | 120.8 | 135.9 | 151.0 |
| | Efficiency (when cooling) | | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 |
| | Operating Current (when heating) | A | 70.5 | 141.0 | 211.5 | 282.0 | 352.5 | 423.0 | 493.5 | 564.0 | 634.5 | 705.0 |
| | Power Consumed (when heating) | kW | 22.89 | 45.78 | 68.67 | 91.56 | 114.45 | 137.34 | 160.23 | 183.12 | 206.01 | 228.90 |
| | Efficiency (when heating) | | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Electrical Characteristics(Note 2) | Power Supply(Note 3) | | 3-Phase / 200V / 50, 60Hz | | | | | | | | | |
| | Operating Current (when cooling) | A | 42.6 | 85.2 | 127.8 | 170.4 | 213.0 | 255.6 | 298.2 | 340.8 | 383.4 | 426.0 |
| | Power Consumed (when cooling) | kW | 14.40 | 28.8 | 43.2 | 57.6 | 72.0 | 86.4 | 100.8 | 115.2 | 129.6 | 144.0 |
| | Efficiency (when cooling) | | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 |
| | Operating Current (when heating) | A | 69.1 | 138.2 | 207.3 | 276.4 | 345.5 | 414.6 | 483.7 | 552.8 | 621.9 | 691.0 |
| | Power Consumed (when heating) | kW | 22.42 | 44.84 | 67.26 | 89.68 | 112.10 | 134.52 | 156.94 | 179.36 | 201.78 | 224.20 |
| | Efficiency (when heating) | | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Compressor | Category | | Hermetically Sealed Scroll | | | | | | | | | |
| | Output × No. Units | kW | 9 × 4 | 9 × 8 | 9 × 12 | 9 × 16 | 9 × 20 | 9 × 24 | 9 × 28 | 9 × 32 | 9 × 36 | 9 × 40 |
| | Starting Method | | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting |
| | Crank Case Heater x No. Units | W | 90 × 4 | 90 × 8 | 90 × 12 | 90 × 16 | 90 × 20 | 90 × 24 | 90 × 28 | 90 × 32 | 90 × 36 | 90 × 40 |
| Air Heat Exchanger | Category | | Tube with Fan | | | | | | | | | |
| | Fan Material | | Resin Coating (Gold Fin) | | | | | | | | | |
| | Tube Material | | Copper | Copper | Copper | Copper | Copper | Copper | Copper | Copper | Copper | Copper |
| | No. | | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| | Fan (Model) | | Propeller Fin | | | | | | | | | |
| | Motor Output x No. Units | kW | 0.35 × 4 | 0.35 × 8 | 0.35 × 12 | 0.35 × 16 | 0.35 × 20 | 0.35 × 24 | 0.35 × 28 | 0.35 × 32 | 0.35 × 36 | 0.35 × 40 |
| | Airflow | $m^3$/min | 600 | 1200 | 1800 | 2400 | 3000 | 3600 | 4200 | 4800 | 5400 | 6000 |
| Aspersion Apparatus | Aspersion Volume | $m^3$/min | 13.3 | 26.6 | 39.9 | 53.2 | 66.5 | 79.8 | 93.1 | 106.4 | 119.7 | 133 |
| | Water Supply Pressure | MPa | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |
| | Water Temperature Range | °C | 10 to 30 | 10 to 30 | 10 to 30 | 10 to 30 | 10 to 30 | 10 to 30 | 10 to 30 | 10 to 30 | 10 to 30 | 10 to 30 |
| | Operable Temperature Range | °C | ≥20 | ≥20 | ≥20 | ≥20 | ≥20 | ≥20 | ≥20 | ≥20 | ≥20 | ≥20 |
| | Control method | | Solenoid ON/OFF + Fan Speed Control | | | | | | | | | |
| Water Heat Exchanger | Category | | Brazing Plate Heat Exchanger | | | | | | | | | |
| | Material | | SUS316 | | | | | | | | | |
| | Rated Flow(Note 1) | $m^3$/min | 242 | 484 | 726 | 968 | 1210 | 1452 | 1694 | 1936 | 2178 | 2420 |
| | Pressure Loss(Note 1) | kPa | 53 | 53 | 53 | 53 | 53 | 53 | 53 | 53 | 53 | 53 |
| | Rated Flow(Note 2) | $m^3$/min | 172 | 344 | 516 | 688 | 860 | 1032 | 1204 | 1376 | 1548 | 1720 |
| | Pressure Loss(Note 2) | kPa | 29 | 29 | 29 | 29 | 29 | 29 | 29 | 29 | 29 | 29 |
| Capacity Control | Method | | Hot/Cold Water Outlet Temperature Control | | | | | | | | | |
| | Range(Note 4) | | 18 - 100% | 9 - 100% | 6 - 100% | 5 - 100% | 4 - 100% | 3 - 100% | 3 - 100% | 2 - 100% | 2 - 100% | 2 - 100% |
| Refrigerant | Refrigerant | | R410A | R410A | R410A | R410A | R410A | R410A | R410A | R410A | R410A | R410A |
| | Loading | kg | 9.1 × 4 | 9.1 × 8 | 9.1 × 12 | 9.1 × 16 | 9.1 × 20 | 9.1 × 24 | 9.1 × 28 | 9.1 × 32 | 9.1 × 36 | 9.1 × 40 |
| | Control method | | Electronic expansion valve | | | | | | | | | |
| Refrigerator Oil | Category | | 160SZ | 160SZ | 160SZ | 160SZ | 160SZ | 160SZ | 160SZ | 160SZ | 160SZ | 160SZ |
| | Loading | L | 3.8 × 4 | 3.8 × 8 | 3.8 × 12 | 3.8 × 16 | 3.8 × 20 | 3.8 × 24 | 3.8 × 28 | 3.8 × 32 | 3.8 × 36 | 3.8 × 40 |
| External Dimensions (mm)(Note 5) | Length | mm | 3795 | 3795 | 3795 | 3795 | 3795 | 3795 | 3795 | 3795 | 3795 | 3795 |
| | Width | mm | 1020 | 2200 | 3380 | 4560 | 5740 | 6920 | 8100 | 9280 | 10460 | 11640 |
| | Height | mm | 2345 | 2345 | 2345 | 2345 | 2345 | 2345 | 2345 | 2345 | 2345 | 2345 |
| Weight | Shipping Weight | kg | 1465 | 2930 | 4395 | 5860 | 7325 | 8790 | 10255 | 11720 | 13185 | 14650 |
| | Operating Weight | kg | 1495 | 2990 | 4485 | 5980 | 7475 | 8970 | 10465 | 11960 | 13455 | 14950 |
| Noise(Note 6) | When Cooling (Standard) | dBA | 63.5 | 65.8 | 67.6 | 68.8 | 69.8 | 70.6 | 71.3 | 71.9 | 72.4 | 72.8 |
| | When Heating (Standard) | dBA | 64.0 | 66.3 | 68.1 | 69.3 | 70.3 | 71.1 | 71.8 | 72.4 | 72.9 | 73.3 |
| | When Cooling (Low Noise Option) | dBA | 61.0 | 63.3 | 65.1 | 66.3 | 67.3 | 68.1 | 68.8 | 69.4 | 69.9 | 70.3 |
| | When Heating (Low Noise Option) | dBA | 61.0 | 63.3 | 65.1 | 66.3 | 67.3 | 68.1 | 68.8 | 69.4 | 69.9 | 70.3 |
| Standard Head Pump (optional) | Rated Output | kW | 1.5 × 1 | 1.5 × 2 | 1.5 × 3 | 1.5 × 4 | 1.5 × 5 | 1.5 × 6 | 1.5 × 7 | 1.5 × 8 | 1.5 × 9 | 1.5 × 10 |
| | Maximum Operating Current | A | 7.2 × 1 | 7.2 × 2 | 7.2 × 3 | 7.2 × 4 | 7.2 × 5 | 7.2 × 6 | 7.2 × 7 | 7.2 × 8 | 7.2 × 9 | 7.2 × 10 |
| | Starting Method | | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting |
| High Head Pump (optional) | Rated Output | kW | 1.85 × 1 | 1.85 × 2 | 1.85 × 3 | 1.85 × 4 | 1.85 × 5 | 1.85 × 6 | 1.85 × 7 | 1.85 × 8 | 1.85 × 9 | 1.85 × 10 |
| | Maximum Operating Current | A | 9.0 × 1 | 9.0 × 2 | 9.0 × 3 | 9.0 × 4 | 9.0 × 5 | 9.0 × 6 | 9.0 × 7 | 9.0 × 8 | 9.0 × 9 | 9.0 × 10 |
| | Starting Method | | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting |
| Statutory Chiller Tonnage | | | 15.6 Statutory Chiller Tonnage | | | | | | | | | |
| High Pressure Gas Safety Act License Classification | | | Not Required (as long as not joined with water pipe systems of other heat sources) | | | | | | | | | |

Notes: 1. Test Conditions: Cooling: Cold water inlet 12°C outlet 7°C, ambient temperature 35°C DB
Heating: Hot water inlet 40°C / outlet 45°C, ambient temperature 7°C DB, 6°C WB
2. Test Conditions: Cooling: Cold water inlet 14°C outlet 7°C, ambient temperature 35°C DB
Heating: Hot water inlet 38°C / outlet 45°C, ambient temperature 7°C DB, 6°C WB
3. The power supply should not have greater than 2% voltage offset so as to not exceed the ±10% tolerance during unexpected voltage fluctuations.
4. Capacity control range may differ with operating conditions.
5. External dimensions do not include protruding objects such as pipes, power wiring kits (if mounting components sold separately) etc.
6. Noise value measured was taken in an anechoic chambers or other place free of reflected noise. In actual installations environmental noise may cause this value to be higher. Measured noise tolerance is ±2dBA.

## ■ 30HP Heat Pump Unit with Aspersion Apparatus

| Model | | | CXAV085 | CXAV085 | CXAV085 | CXAV085 | CXAV085 | CXAV085 | CXAV085 | CXAV085 | CXAV085 | CXAV085 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No. Modules Connected | | | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| Capacity | Cooling | kW | 935 | 1020 | 1105 | 1190 | 1275 | 1360 | 1445 | 1530 | 1615 | 1700 |
| | Heating | kW | 935 | 1020 | 1105 | 1190 | 1275 | 1360 | 1445 | 1530 | 1615 | 1700 |
| Electrical Characteristics(Note 1) | Power Supply(Note 3) | | 3-Phase / 200V / 50, 60Hz | | | | | | | | | |
| | Operating Current (when cooling) | A | 493.0 | 537.8 | 582.7 | 627.5 | 672.3 | 717.1 | 761.9 | 806.8 | 851.6 | 896.4 |
| | Power Consumed (when cooling) | kW | 166.1 | 181.2 | 196.3 | 211.4 | 226.5 | 241.6 | 256.7 | 271.8 | 286.9 | 302.0 |
| | Efficiency (when cooling) | | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 |
| | Operating Current (when heating) | A | 775.5 | 846.0 | 916.5 | 987.0 | 1057.5 | 1128.0 | 1198.5 | 1269.0 | 1339.5 | 1410.0 |
| | Power Consumed (when heating) | kW | 251.79 | 274.68 | 297.57 | 320.46 | 343.35 | 366.24 | 389.13 | 412.02 | 434.91 | 457.80 |
| | Efficiency (when heating) | | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Electrical Characteristics(Note 2) | Power Supply(Note 3) | | 3-Phase / 200V / 50, 60Hz | | | | | | | | | |
| | Operating Current (when cooling) | A | 468.6 | 511.2 | 553.8 | 596.4 | 639.0 | 681.6 | 724.2 | 766.8 | 809.4 | 852.0 |
| | Power Consumed (when cooling) | kW | 158.4 | 172.8 | 187.2 | 201.6 | 216.0 | 230.4 | 244.8 | 259.2 | 273.6 | 288.0 |
| | Efficiency (when cooling) | | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 |
| | Operating Current (when heating) | A | 760.1 | 829.2 | 898.3 | 967.4 | 1036.5 | 1105.6 | 1174.7 | 1243.8 | 1312.9 | 1382.0 |
| | Power Consumed (when heating) | kW | 246.62 | 269.04 | 291.46 | 313.88 | 336.30 | 358.72 | 381.14 | 403.56 | 425.98 | 448.40 |
| | Efficiency (when heating) | | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Compressor | Category | | Hermetically Sealed Scroll | | | | | | | | | |
| | Output × No. Units | kW | 9 × 44 | 9 × 48 | 9 × 52 | 9 × 56 | 9 × 60 | 9 × 64 | 9 × 68 | 9 × 72 | 9 × 76 | 9 × 80 |
| | Starting Method | | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting |
| | Crank Case Heater x No. Units | W | 90 × 44 | 90 × 48 | 90 × 52 | 90 × 56 | 90 × 60 | 90 × 64 | 90 × 68 | 90 × 72 | 90 × 76 | 90 × 80 |
| Air Heat Exchanger | Category | | Tube with Fan | | | | | | | | | |
| | Fan Material | | Resin Coating (Gold Fin) | | | | | | | | | |
| | Tube Material | | Copper | Copper | Copper | Copper | Copper | Copper | Copper | Copper | Copper | Copper |
| | No. | | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| | Fan (Model) | | Propeller Fin | | | | | | | | | |
| | Motor Output x No. Units | kW | 0.35 × 44 | 0.35 × 48 | 0.35 × 52 | 0.35 × 56 | 0.35 × 60 | 0.35 × 64 | 0.35 × 68 | 0.35 × 72 | 0.35 × 76 | 0.35 × 80 |
| | Airflow | $m^3$/min | 6600 | 7200 | 7800 | 8400 | 9000 | 9600 | 10200 | 10800 | 11400 | 12000 |
| Aspersion Apparatus | Aspersion Volume | $m^3$/min | 146.3 | 159.6 | 172.9 | 186.2 | 199.5 | 212.8 | 226.1 | 239.4 | 252.7 | 266 |
| | Water Supply Pressure | MPa | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |
| | Water Temperature Range | °C | 10 to 30 | 10 to 30 | 10 to 30 | 10 to 30 | 10 to 30 | 10 to 30 | 10 to 30 | 10 to 30 | 10 to 30 | 10 to 30 |
| | Operable Temperature Range | °C | ≥20 | ≥20 | ≥20 | ≥20 | ≥20 | ≥20 | ≥20 | ≥20 | ≥20 | ≥20 |
| | Control method | | Solenoid ON/OFF + Fan Speed Control | | | | | | | | | |
| Water Heat Exchanger | Category | | Brazing Plate Heat Exchanger | | | | | | | | | |
| | Material | | SUS316 | | | | | | | | | |
| | Rated Flow(Note 1) | $m^3$/min | 2662 | 2904 | 3146 | 3388 | 3630 | 3872 | 4114 | 4356 | 4598 | 4840 |
| | Pressure Loss(Note 1) | kPa | 53 | 53 | 53 | 53 | 53 | 53 | 53 | 53 | 53 | 53 |
| | Rated Flow(Note 2) | $m^3$/min | 1892 | 2064 | 2236 | 2408 | 2580 | 2752 | 2924 | 3096 | 3268 | 3440 |
| | Pressure Loss(Note 2) | kPa | 29 | 29 | 29 | 29 | 29 | 29 | 29 | 29 | 29 | 29 |
| Capacity Control | Method | | Hot/Cold Water Outlet Temperature Control | | | | | | | | | |
| | Range(Note 4) | | 2 - 100% | 1 - 100% | 1 - 100% | 1 - 100% | 1 - 100% | 1 - 100% | 1 - 100% | 1 - 100% | 1 - 100% | 1 - 100% |
| Refrigerant | Refrigerant | | R410A | R410A | R410A | R410A | R410A | R410A | R410A | R410A | R410A | R410A |
| | Loading | kg | 9.1 × 44 | 9.1 × 48 | 9.1 × 52 | 9.1 × 56 | 9.1 × 60 | 9.1 × 64 | 9.1 × 68 | 9.1 × 72 | 9.1 × 76 | 9.1 × 80 |
| | Control method | | Electronic expansion valve | | | | | | | | | |
| Refrigerator Oil | Category | | 160SZ | 160SZ | 160SZ | 160SZ | 160SZ | 160SZ | 160SZ | 160SZ | 160SZ | 160SZ |
| | Loading | L | 3.8 × 44 | 3.8 × 48 | 3.8 × 52 | 3.8 × 56 | 3.8 × 60 | 3.8 × 64 | 3.8 × 68 | 3.8 × 72 | 3.8 × 76 | 3.8 × 80 |
| External Dimensions (mm)(Note 5) | Length | mm | 3795 | 3795 | 3795 | 3795 | 3795 | 3795 | 3795 | 3795 | 3795 | 3795 |
| | Width | mm | 12820 | 14000 | 15180 | 16360 | 17540 | 18720 | 19900 | 21080 | 22260 | 23440 |
| | Height | mm | 2345 | 2345 | 2345 | 2345 | 2345 | 2345 | 2345 | 2345 | 2345 | 2345 |
| Weight | Shipping Weight | kg | 16115 | 17580 | 19045 | 20510 | 21975 | 23440 | 24905 | 26370 | 27835 | 29300 |
| | Operating Weight | kg | 16445 | 17940 | 19435 | 20930 | 22425 | 23920 | 25415 | 26910 | 28405 | 29900 |
| Noise(Note 6) | When Cooling (Standard) | dBA | 73.2 | 73.6 | 74.0 | 74.3 | 74.6 | 74.9 | 75.1 | 75.4 | 75.6 | 75.8 |
| | When Heating (Standard) | dBA | 73.7 | 74.1 | 74.5 | 74.8 | 75.1 | 75.4 | 75.6 | 75.9 | 76.1 | 76.3 |
| | When Cooling (Low Noise Option) | dBA | 70.7 | 71.1 | 71.5 | 71.8 | 72.1 | 72.4 | 72.6 | 72.9 | 73.1 | 73.3 |
| | When Heating (Low Noise Option) | dBA | 70.7 | 71.1 | 71.5 | 71.8 | 72.1 | 72.4 | 72.6 | 72.9 | 73.1 | 73.3 |
| Standard Head Pump (optional) | Rated Output | kW | 1.5 × 11 | 1.5 × 12 | 1.5 × 13 | 1.5 × 14 | 1.5 × 15 | 1.5 × 16 | 1.5 × 17 | 1.5 × 18 | 1.5 × 19 | 1.5 × 20 |
| | Maximum Operating Current | A | 7.2 × 11 | 7.2 × 12 | 7.2 × 13 | 7.2 × 14 | 7.2 × 15 | 7.2 × 16 | 7.2 × 17 | 7.2 × 18 | 7.2 × 19 | 7.2 × 20 |
| | Starting Method | | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting |
| High Head Pump (optional) | Rated Output | kW | 1.85 × 11 | 1.85 × 12 | 1.85 × 13 | 1.85 × 14 | 1.85 × 15 | 1.85 × 16 | 1.85 × 17 | 1.85 × 18 | 1.85 × 19 | 1.85 × 20 |
| | Maximum Operating Current | A | 9.0 × 11 | 9.0 × 12 | 9.0 × 13 | 9.0 × 14 | 9.0 × 15 | 9.0 × 16 | 9.0 × 17 | 9.0 × 18 | 9.0 × 19 | 9.0 × 20 |
| | Starting Method | | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting |
| Statutory Chiller Tonnage | | | 15.6 Statutory Chiller Tonnage | | | | | | | | | |
| High Pressure Gas Safety Act License Classification | | | Not Required (as long as not joined with water pipe systems of other heat sources) | | | | | | | | | |

Notes: 1. Test Conditions: Cooling: Cold water inlet 12°C outlet 7°C, ambient temperature 35°C DB
Heating: Hot water inlet 40°C / outlet 45°C, ambient temperature 7°C DB, 6°C WB
2. Test Conditions: Cooling: Cold water inlet 14°C outlet 7°C, ambient temperature 35°C DB
Heating: Hot water inlet 38°C / outlet 45°C, ambient temperature 7°C DB, 6°C WB
3. The power supply should not have greater than 2% voltage offset so as to not exceed the ±10% tolerance during unexpected voltage fluctuations.
4. Capacity control range may differ with operating conditions.
5. External dimensions do not include protruding objects such as pipes, power wiring kits (if mounting components sold separately) etc.
6. Noise value measured was taken in an anechoic chambers or other place free of reflected noise. In actual installations environmental noise may cause this value to be higher. Measured noise tolerance is ±2dBA.

## ■ 50HP Heat Pump Unit

| Model | | | CXAV150 | CXAV150 | CXAV150 | CXAV150 | CXAV150 | CXAV150 | CXAV150 | CXAV150 | CXAV150 | CXAV150 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No. Modules Connected | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Capacity | Cooling | kW | 150 | 300 | 450 | 600 | 750 | 900 | 1050 | 1200 | 1350 | 1500 |
| | Heating | kW | 150 | 300 | 450 | 600 | 750 | 900 | 1050 | 1200 | 1350 | 1500 |
| Electrical Characteristics(Note 1) | Power Supply(Note 3) | | 3-Phase / 200V / 50, 60Hz | | | | | | | | | |
| | Operating Current (when cooling) | A | 150.6 | 301.2 | 451.8 | 602.4 | 753.0 | 903.6 | 1054.2 | 1204.8 | 1355.4 | 1506.0 |
| | Power Consumed (when cooling) | kW | 48.26 | 96.5 | 144.8 | 193.0 | 241.3 | 289.6 | 337.8 | 386.1 | 434.3 | 482.6 |
| | Efficiency (when cooling) | | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| | Operating Current (when heating) | A | 141.3 | 282.6 | 423.9 | 565.2 | 706.5 | 847.8 | 989.1 | 1130.4 | 1271.7 | 1413.0 |
| | Power Consumed (when heating) | kW | 45.11 | 90.22 | 135.33 | 180.44 | 225.55 | 270.66 | 315.77 | 360.88 | 405.99 | 451.10 |
| | Efficiency (when heating) | | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Electrical Characteristics(Note 2) | Power Supply(Note 3) | | 3-Phase / 200V / 50, 60Hz | | | | | | | | | |
| | Operating Current (when cooling) | A | 147.0 | 294.0 | 441.0 | 588.0 | 735.0 | 882.0 | 1029.0 | 1176.0 | 1323.0 | 1470.0 |
| | Power Consumed (when cooling) | kW | 46.82 | 93.6 | 140.5 | 187.3 | 234.1 | 280.9 | 327.7 | 374.6 | 421.4 | 468.2 |
| | Efficiency (when cooling) | | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| | Operating Current (when heating) | A | 140.9 | 281.8 | 422.7 | 563.6 | 704.5 | 845.4 | 986.3 | 1127.2 | 1268.1 | 1409.0 |
| | Power Consumed (when heating) | kW | 44.77 | 89.54 | 134.31 | 179.08 | 223.85 | 268.62 | 313.39 | 358.16 | 402.93 | 447.70 |
| | Efficiency (when heating) | | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Compressor | Category | | Hermetically Sealed Scroll | | | | | | | | | |
| | Output x No. Units | kW | 15 × 4 | 15 × 8 | 15 × 12 | 15 × 16 | 15 × 20 | 15 × 24 | 15 × 28 | 15 × 32 | 15 × 36 | 15 × 40 |
| | Starting Method | | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting |
| | Crank Case Heater x No. Units | W | 90 × 4 | 90 × 8 | 90 × 12 | 90 × 16 | 90 × 20 | 90 × 24 | 90 × 28 | 90 × 32 | 90 × 36 | 90 × 40 |
| Air Heat Exchanger | Category | | Tube with Fan | | | | | | | | | |
| | Fan Material | | Resin Coating (Blue Fin) | | | | | | | | | |
| | Tube Material | | Copper | Copper | Copper | Copper | Copper | Copper | Copper | Copper | Copper | Copper |
| | No. | | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| | Fan (Model) | | Propeller Fin | | | | | | | | | |
| | Motor Output x No. Units | kW | 1 × 4 | 1 × 8 | 1 × 12 | 1 × 16 | 1 × 20 | 1 × 24 | 1 × 28 | 1 × 32 | 1 × 36 | 1 × 40 |
| | Airflow | $m^3$/min | 906 | 1812 | 2718 | 3624 | 4530 | 5436 | 6342 | 7248 | 8154 | 9060 |
| Water Heat Exchanger | Category | | Brazing Plate Heat Exchanger | | | | | | | | | |
| | Material | | SUS316 | | | | | | | | | |
| | Rated Flow(Note 1) | $m^3$/min | 420 | 840 | 1260 | 1680 | 2100 | 2520 | 2940 | 3360 | 3780 | 4200 |
| | Pressure Loss(Note 1) | kPa | 141 | 141 | 141 | 141 | 141 | 141 | 141 | 141 | 141 | 141 |
| | Rated Flow(Note 2) | $m^3$/min | 305 | 610 | 915 | 1220 | 1525 | 1830 | 2135 | 2440 | 2745 | 3050 |
| | Pressure Loss(Note 2) | kPa | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 |
| Capacity Control | Method | | Hot/Cold Water Outlet Temperature Control | | | | | | | | | |
| | Range(Note 4) | | 10 - 100% | 5 - 100% | 4 - 100% | 3 - 100% | 2 - 100% | 2 - 100% | 1 - 100% | 1 - 100% | 1 - 100% | 1 - 100% |
| Refrigerant | Refrigerant | | R410A | R410A | R410A | R410A | R410A | R410A | R410A | R410A | R410A | R410A |
| | Loading | kg | 9.1 × 4 | 9.1 × 8 | 9.1 × 12 | 9.1 × 16 | 9.1 × 20 | 9.1 × 24 | 9.1 × 28 | 9.1 × 32 | 9.1 × 36 | 9.1 × 40 |
| | Control method | | Electronic expansion valve | | | | | | | | | |
| Refrigerator Oil | Category | | 160SZ | 160SZ | 160SZ | 160SZ | 160SZ | 160SZ | 160SZ | 160SZ | 160SZ | 160SZ |
| | Loading | L | 3.8 × 4 | 3.8 × 8 | 3.8 × 12 | 3.8 × 16 | 3.8 × 20 | 3.8 × 24 | 3.8 × 28 | 3.8 × 32 | 3.8 × 36 | 3.8 × 40 |
| External Dimensions (mm)(Note 5) | Length | mm | 3795 | 3795 | 3795 | 3795 | 3795 | 3795 | 3795 | 3795 | 3795 | 3795 |
| | Width | mm | 1020 | 2200 | 3380 | 4560 | 5740 | 6920 | 8100 | 9280 | 10460 | 11640 |
| | Height | mm | 2345 | 2345 | 2345 | 2345 | 2345 | 2345 | 2345 | 2345 | 2345 | 2345 |
| Weight | Shipping Weight | kg | 1465 | 2930 | 4395 | 5860 | 7325 | 8790 | 10255 | 11720 | 13185 | 14650 |
| | Operating Weight | kg | 1495 | 2990 | 4485 | 5980 | 7475 | 8970 | 10465 | 11960 | 13455 | 14950 |
| Noise(Note 6) | When Cooling (Standard) | dBA | 73.0 | 75.3 | 77.1 | 78.3 | 79.3 | 80.1 | 80.8 | 81.4 | 81.9 | 82.3 |
| | When Heating (Standard) | dBA | 73.5 | 75.8 | 77.6 | 78.8 | 79.8 | 80.6 | 81.3 | 81.9 | 82.4 | 82.8 |
| | When Cooling (Low Noise Option) | dBA | 69.5 | 71.8 | 73.6 | 74.8 | 75.8 | 76.6 | 77.3 | 77.9 | 78.4 | 78.8 |
| | When Heating (Low Noise Option) | dBA | 69.5 | 71.8 | 73.6 | 74.8 | 75.8 | 76.6 | 77.3 | 77.9 | 78.4 | 78.8 |
| Standard Head Pump (optional) | Rated Output | kW | 3 × 1 | 3 × 2 | 3 × 3 | 3 × 4 | 3 × 5 | 3 × 6 | 3 × 7 | 3 × 8 | 3 × 9 | 3 × 10 |
| | Maximum Operating Current | A | 11.8 × 1 | 11.8 × 2 | 11.8 × 3 | 11.8 × 4 | 11.8 × 5 | 11.8 × 6 | 11.8 × 7 | 11.8 × 8 | 11.8 × 9 | 11.8 × 10 |
| | Starting Method | | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting |
| High Head Pump (optional) | Rated Output | kW | 4 × 1 | 4 × 2 | 4 × 3 | 4 × 4 | 4 × 5 | 4 × 6 | 4 × 7 | 4 × 8 | 4 × 9 | 4 × 10 |
| | Maximum Operating Current | A | 15.3 × 1 | 15.3 × 2 | 15.3 × 3 | 15.3 × 4 | 15.3 × 5 | 15.3 × 6 | 15.3 × 7 | 15.3 × 8 | 15.3 × 9 | 15.3 × 10 |
| | Starting Method | | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting |
| Statutory Chiller Tonnage | | | 18.2 Statutory Chiller Tonnage | | | | | | | | | |
| High Pressure Gas Safety Act License Classification | | | Not Required (as long as not joined with water pipe systems of other heat sources) | | | | | | | | | |

Notes: 1. Test Conditions: Cooling: Cold water inlet 12°C outlet 7°C, ambient temperature 35°C DB
Heating: Hot water inlet 40°C / outlet 45°C, ambient temperature 7°C DB, 6°C WB
2. Test Conditions: Cooling: Cold water inlet 14°C outlet 7°C, ambient temperature 35°C DB
Heating: Hot water inlet 38°C / outlet 45°C, ambient temperature 7°C DB, 6°C WB
3. The power supply should not have greater than 2% voltage offset so as to not exceed the ±10% tolerance during unexpected voltage fluctuations.
4. Capacity control range may differ with operating conditions.
5. External dimensions do not include protruding objects such as pipes, power wiring kits (if mounting components sold separately) etc.
6. Noise value measured was taken in an anechoic chambers or other place free of reflected noise. In actual installations environmental noise may cause this value to be higher. Measured noise tolerance is ±2dBA.

## ■ 50HP Heat Pump Unit

| Model | | | CXAV150 | CXAV150 | CXAV150 | CXAV150 | CXAV150 | CXAV150 | CXAV150 | CXAV150 | CXAV150 | CXAV150 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No. Modules Connected | | | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| Capacity | Cooling | kW | 1650 | 1800 | 1950 | 2100 | 2250 | 2400 | 2550 | 2700 | 2850 | 3000 |
| | Heating | kW | 1650 | 1800 | 1950 | 2100 | 2250 | 2400 | 2550 | 2700 | 2850 | 3000 |
| Electrical Characteristics(Note 1) | Power Supply(Note 3) | | 3-Phase / 200V / 50, 60Hz | | | | | | | | | |
| | Operating Current (when cooling) | A | 1656.6 | 1807.2 | 1957.8 | 2108.4 | 2259.0 | 2409.6 | 2560.2 | 2710.8 | 2861.4 | 3012.0 |
| | Power Consumed (when cooling) | kW | 530.9 | 579.1 | 627.4 | 675.6 | 723.9 | 772.2 | 820.4 | 868.7 | 916.9 | 965.2 |
| | Efficiency (when cooling) | | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| | Operating Current (when heating) | A | 1554.3 | 1695.6 | 1836.9 | 1978.2 | 2119.5 | 2260.8 | 2402.1 | 2543.4 | 2684.7 | 2826.0 |
| | Power Consumed (when heating) | kW | 496.21 | 541.32 | 586.43 | 631.54 | 676.65 | 721.76 | 766.87 | 811.98 | 857.09 | 902.20 |
| | Efficiency (when heating) | | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Electrical Characteristics(Note 2) | Power Supply(Note 3) | | 3-Phase / 200V / 50, 60Hz | | | | | | | | | |
| | Operating Current (when cooling) | A | 1617.0 | 1764.0 | 1911.0 | 2058.0 | 2205.0 | 2352.0 | 2499.0 | 2646.0 | 2793.0 | 2940.0 |
| | Power Consumed (when cooling) | kW | 515.0 | 561.8 | 608.7 | 655.5 | 702.3 | 749.1 | 795.9 | 842.8 | 889.6 | 936.4 |
| | Efficiency (when cooling) | | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| | Operating Current (when heating) | A | 1549.9 | 1690.8 | 1831.7 | 1972.6 | 2113.5 | 2254.4 | 2395.3 | 2536.2 | 2677.1 | 2818.0 |
| | Power Consumed (when heating) | kW | 492.47 | 537.24 | 582.01 | 626.78 | 671.55 | 716.32 | 761.09 | 805.86 | 850.63 | 895.40 |
| | Efficiency (when heating) | | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Compressor | Category | | Hermetically Sealed Scroll | | | | | | | | | |
| | Output x No. Units | kW | 15 × 44 | 15 × 48 | 15 × 52 | 15 × 56 | 15 × 60 | 15 × 64 | 15 × 68 | 15 × 72 | 15 × 76 | 15 × 80 |
| | Starting Method | | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting |
| | Crank Case Heater x No. Units | W | 90 × 44 | 90 × 48 | 90 × 52 | 90 × 56 | 90 × 60 | 90 × 64 | 90 × 68 | 90 × 72 | 90 × 76 | 90 × 80 |
| Air Heat Exchanger | Category | | Tube with Fan | | | | | | | | | |
| | Fan Material | | Resin Coating (Blue Fin) | | | | | | | | | |
| | Tube Material | | Copper | Copper | Copper | Copper | Copper | Copper | Copper | Copper | Copper | Copper |
| | No. | | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| | Fan (Model) | | Propeller Fin | | | | | | | | | |
| | Motor Output x No. Units | kW | 1 × 44 | 1 × 48 | 1 × 52 | 1 × 56 | 1 × 60 | 1 × 64 | 1 × 68 | 1 × 72 | 1 × 76 | 1 × 80 |
| | Airflow | m³/min | 9966 | 10872 | 11778 | 12684 | 13590 | 14496 | 15402 | 16308 | 17214 | 18120 |
| Water Heat Exchanger | Category | | Brazing Plate Heat Exchanger | | | | | | | | | |
| | Material | | SUS316 | | | | | | | | | |
| | Rated Flow(Note 1) | m³/min | 4620 | 5040 | 5460 | 5880 | 6300 | 6720 | 7140 | 7560 | 7980 | 8400 |
| | Pressure Loss(Note 1) | kPa | 141 | 141 | 141 | 141 | 141 | 141 | 141 | 141 | 141 | 141 |
| | Rated Flow(Note 2) | m³/min | 3355 | 3660 | 3965 | 4270 | 4575 | 4880 | 5185 | 5490 | 5795 | 6100 |
| | Pressure Loss(Note 2) | kPa | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 |
| Capacity Control | Method | | Hot/Cold Water Outlet Temperature Control | | | | | | | | | |
| | Range(Note 4) | | 1 - 100% | 1 - 100% | 1 - 100% | 1 - 100% | 1 - 100% | 1 - 100% | 1 - 100% | 1 - 100% | 1 - 100% | 1 - 100% |
| Refrigerant | Refrigerant | | R410A | R410A | R410A | R410A | R410A | R410A | R410A | R410A | R410A | R410A |
| | Loading | kg | 9.1 × 44 | 9.1 × 48 | 9.1 × 52 | 9.1 × 56 | 9.1 × 60 | 9.1 × 64 | 9.1 × 68 | 9.1 × 72 | 9.1 × 76 | 9.1 × 80 |
| | Control method | | Electronic expansion valve | | | | | | | | | |
| Refrigerator Oil | Category | | 160SZ | 160SZ | 160SZ | 160SZ | 160SZ | 160SZ | 160SZ | 160SZ | 160SZ | 160SZ |
| | Loading | L | 3.8 × 44 | 3.8 × 48 | 3.8 × 52 | 3.8 × 56 | 3.8 × 60 | 3.8 × 64 | 3.8 × 68 | 3.8 × 72 | 3.8 × 76 | 3.8 × 80 |
| External Dimensions (mm)(Note 5) | Length | mm | 3795 | 3795 | 3795 | 3795 | 3795 | 3795 | 3795 | 3795 | 3795 | 3795 |
| | Width | mm | 12820 | 14000 | 15180 | 16360 | 17540 | 18720 | 19900 | 21080 | 22260 | 23440 |
| | Height | mm | 2345 | 2345 | 2345 | 2345 | 2345 | 2345 | 2345 | 2345 | 2345 | 2345 |
| Weight | Shipping Weight | kg | 16115 | 17580 | 19045 | 20510 | 21975 | 23440 | 24905 | 26370 | 27835 | 29300 |
| | Operating Weight | kg | 16445 | 17940 | 19435 | 20930 | 22425 | 23920 | 25415 | 26910 | 28405 | 29900 |
| Noise(Note 6) | When Cooling (Standard) | dBA | 82.7 | 83.1 | 83.5 | 83.8 | 84.1 | 84.4 | 84.6 | 84.9 | 85.1 | 85.3 |
| | When Heating (Standard) | dBA | 83.2 | 83.6 | 84 | 84.3 | 84.6 | 84.9 | 85.1 | 85.4 | 85.6 | 85.8 |
| | When Cooling (Low Noise Option) | dBA | 79.2 | 79.6 | 80 | 80.3 | 80.6 | 80.9 | 81.1 | 81.4 | 81.6 | 81.8 |
| | When Heating (Low Noise Option) | dBA | 79.2 | 79.6 | 80 | 80.3 | 80.6 | 80.9 | 81.1 | 81.4 | 81.6 | 81.8 |
| Standard Head Pump (optional) | Rated Output | kW | 3 × 11 | 3 × 12 | 3 × 13 | 3 × 14 | 3 × 15 | 3 × 16 | 3 × 17 | 3 × 18 | 3 × 19 | 3 × 20 |
| | Maximum Operating Current | A | 11.8 × 11 | 11.8 × 12 | 11.8 × 13 | 11.8 × 14 | 11.8 × 15 | 11.8 × 16 | 11.8 × 17 | 11.8 × 18 | 11.8 × 19 | 11.8 × 20 |
| | Starting Method | | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting |
| High Head Pump (optional) | Rated Output | kW | 4 × 11 | 4 × 12 | 4 × 13 | 4 × 14 | 4 × 15 | 4 × 16 | 4 × 17 | 4 × 18 | 4 × 19 | 4 × 20 |
| | Maximum Operating Current | A | 15.3 × 11 | 15.3 × 12 | 15.3 × 13 | 15.3 × 14 | 15.3 × 15 | 15.3 × 16 | 15.3 × 17 | 15.3 × 18 | 15.3 × 19 | 15.3 × 20 |
| | Starting Method | | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting |
| Statutory Chiller Tonnage | | | 18.2 Statutory Chiller Tonnage | | | | | | | | | |
| High Pressure Gas Safety Act License Classification | | | Not Required (as long as not joined with water pipe systems of other heat sources) | | | | | | | | | |

Notes: 1. Test Conditions: Cooling: Cold water inlet 12°C outlet 7°C, ambient temperature 35°C DB
Heating: Hot water inlet 40°C / outlet 45°C, ambient temperature 7°C DB, 6°C WB
2. Test Conditions: Cooling: Cold water inlet 14°C outlet 7°C, ambient temperature 35°C DB
Heating: Hot water inlet 38°C / outlet 45°C, ambient temperature 7°C DB, 6°C WB
3. The power supply should not have greater than 2% voltage offset so as to not exceed the ±10% tolerance during unexpected voltage fluctuations.
4. Capacity control range may differ with operating conditions.
5. External dimensions do not include protruding objects such as pipes, power wiring kits (if mounting components sold separately) etc.
6. Noise value measured was taken in an anechoic chambers or other place free of reflected noise. In actual installations environmental noise may cause this value to be higher. Measured noise tolerance is ±2dBA.

## ■ 50HP Heat Pump Unit with Aspersion Device

| Model | | | CXAV150 | CXAV150 | CXAV150 | CXAV150 | CXAV150 | CXAV150 | CXAV150 | CXAV150 | CXAV150 | CXAV150 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No. Modules Connected | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Capacity | Cooling | kW | 150 | 300 | 450 | 600 | 750 | 900 | 1050 | 1200 | 1350 | 1500 |
| | Heating | kW | 150 | 300 | 450 | 600 | 750 | 900 | 1050 | 1200 | 1350 | 1500 |
| Electrical Characteristics(Note 1) | Power Supply(Note 3) | | 3-Phase / 200V / 50, 60Hz | | | | | | | | | |
| | Operating Current (when cooling) | A | 113.3 | 226.5 | 339.8 | 453.0 | 566.3 | 679.5 | 792.8 | 906.0 | 1019.3 | 1132.5 |
| | Power Consumed (when cooling) | kW | 37.7 | 75.4 | 113.1 | 150.8 | 188.5 | 226.2 | 263.9 | 301.6 | 339.3 | 377.0 |
| | Efficiency (when cooling) | | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| | Operating Current (when heating) | A | 141.3 | 282.6 | 423.9 | 565.2 | 706.5 | 847.8 | 989.1 | 1130.4 | 1271.7 | 1413.0 |
| | Power Consumed (when heating) | kW | 45.11 | 90.22 | 135.33 | 180.44 | 225.55 | 270.66 | 315.77 | 360.88 | 405.99 | 451.10 |
| | Efficiency (when heating) | | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Electrical Characteristics(Note 2) | Power Supply(Note 3) | | 3-Phase / 200V / 50, 60Hz | | | | | | | | | |
| | Operating Current (when cooling) | A | 109.7 | 219.4 | 329.1 | 438.8 | 548.5 | 658.2 | 767.9 | 877.6 | 987.3 | 1097.0 |
| | Power Consumed (when cooling) | kW | 36.26 | 72.5 | 108.8 | 145.0 | 181.3 | 217.6 | 253.8 | 290.1 | 326.3 | 362.6 |
| | Efficiency (when cooling) | | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| | Operating Current (when heating) | A | 140.9 | 281.8 | 422.7 | 563.6 | 704.5 | 845.4 | 986.3 | 1127.2 | 1268.1 | 1409.0 |
| | Power Consumed (when heating) | kW | 44.77 | 89.54 | 134.31 | 179.08 | 223.85 | 268.62 | 313.39 | 358.16 | 402.93 | 447.70 |
| | Efficiency (when heating) | | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Compressor | Category | | Hermetically Sealed Scroll | | | | | | | | | |
| | Output x No. Units | kW | 15 × 4 | 15 × 8 | 15 × 12 | 15 × 16 | 15 × 20 | 15 × 24 | 15 × 28 | 15 × 32 | 15 × 36 | 15 × 40 |
| | Starting Method | | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting |
| | Crank Case Heater x No. Units | W | 90 × 4 | 90 × 8 | 90 × 12 | 90 × 16 | 90 × 20 | 90 × 24 | 90 × 28 | 90 × 32 | 90 × 36 | 90 × 40 |
| Air Heat Exchanger | Category | | Tube with Fan | | | | | | | | | |
| | Fan Material | | Resin Coating (Gold Fin) | | | | | | | | | |
| | Tube Material | | Copper | Copper | Copper | Copper | Copper | Copper | Copper | Copper | Copper | Copper |
| | No. | | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| | Fan (Model) | | Propeller Fin | | | | | | | | | |
| | Motor Output x No. Units | kW | 1 × 4 | 1 × 8 | 1 × 12 | 1 × 16 | 1 × 20 | 1 × 24 | 1 × 28 | 1 × 32 | 1 × 36 | 1 × 40 |
| | Airflow | $m^3$/min | 906 | 1812 | 2718 | 3624 | 4530 | 5436 | 6342 | 7248 | 8154 | 9060 |
| Aspersion Apparatus | Aspersion Volume | $m^3$/min | 13.3 | 26.6 | 39.9 | 53.2 | 66.5 | 79.8 | 93.1 | 106.4 | 119.7 | 133 |
| | Water Supply Pressure | MPa | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |
| | Water Temperature Range | °C | 10 to 30 | 10 to 30 | 10 to 30 | 10 to 30 | 10 to 30 | 10 to 30 | 10 to 30 | 10 to 30 | 10 to 30 | 10 to 30 |
| | Operable Temperature Range | °C | ≥20 | ≥20 | ≥20 | ≥20 | ≥20 | ≥20 | ≥20 | ≥20 | ≥20 | ≥20 |
| | Control method | | Solenoid ON/OFF + Fan Speed Control | | | | | | | | | |
| Water Heat Exchanger | Category | | Brazing Plate Heat Exchanger | | | | | | | | | |
| | Material | | SUS316 | | | | | | | | | |
| | Rated Flow(Note 1) | $m^3$/min | 420 | 840 | 1260 | 1680 | 2100 | 2520 | 2940 | 3360 | 3780 | 4200 |
| | Pressure Loss(Note 1) | kPa | 141 | 141 | 141 | 141 | 141 | 141 | 141 | 141 | 141 | 141 |
| | Rated Flow(Note 2) | $m^3$/min | 305 | 610 | 915 | 1220 | 1525 | 1830 | 2135 | 2440 | 2745 | 3050 |
| | Pressure Loss(Note 2) | kPa | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 |
| Capacity Control | Method | | Hot/Cold Water Outlet Temperature Control | | | | | | | | | |
| | Range(Note 4) | | 10 - 100% | 5 - 100% | 4 - 100% | 3 - 100% | 2 - 100% | 2 - 100% | 1 - 100% | 1 - 100% | 1 - 100% | 1 - 100% |
| Refrigerant | Refrigerant | | R410A | R410A | R410A | R410A | R410A | R410A | R410A | R410A | R410A | R410A |
| | Loading | kg | 9.1 × 4 | 9.1 × 8 | 9.1 × 12 | 9.1 × 16 | 9.1 × 20 | 9.1 × 24 | 9.1 × 28 | 9.1 × 32 | 9.1 × 36 | 9.1 × 40 |
| | Control method | | Electronic expansion valve | | | | | | | | | |
| Refrigerator Oil | Category | | 160SZ | 160SZ | 160SZ | 160SZ | 160SZ | 160SZ | 160SZ | 160SZ | 160SZ | 160SZ |
| | Loading | L | 3.8 × 4 | 3.8 × 8 | 3.8 × 12 | 3.8 × 16 | 3.8 × 20 | 3.8 × 24 | 3.8 × 28 | 3.8 × 32 | 3.8 × 36 | 3.8 × 40 |
| External Dimensions (mm)(Note 5) | Length | mm | 3795 | 3795 | 3795 | 3795 | 3795 | 3795 | 3795 | 3795 | 3795 | 3795 |
| | Width | mm | 1020 | 2200 | 3380 | 4560 | 5740 | 6920 | 8100 | 9280 | 10460 | 11640 |
| | Height | mm | 2345 | 2345 | 2345 | 2345 | 2345 | 2345 | 2345 | 2345 | 2345 | 2345 |
| Weight | Shipping Weight | kg | 1465 | 2930 | 4395 | 5860 | 7325 | 8790 | 10255 | 11720 | 13185 | 14650 |
| | Operating Weight | kg | 1495 | 2990 | 4485 | 5980 | 7475 | 8970 | 10465 | 11960 | 13455 | 14950 |
| Noise(Note 6) | When Cooling (Standard) | dBA | 73.0 | 75.3 | 77.1 | 78.3 | 79.3 | 80.1 | 80.8 | 81.4 | 81.9 | 82.3 |
| | When Heating (Standard) | dBA | 73.5 | 75.8 | 77.6 | 78.8 | 79.8 | 80.6 | 81.3 | 81.9 | 82.4 | 82.8 |
| | When Cooling (Low Noise Option) | dBA | 69.5 | 71.8 | 73.6 | 74.8 | 75.8 | 76.6 | 77.3 | 77.9 | 78.4 | 78.8 |
| | When Heating (Low Noise Option) | dBA | 69.5 | 71.8 | 73.6 | 74.8 | 75.8 | 76.6 | 77.3 | 77.9 | 78.4 | 78.8 |
| Standard Head Pump (optional) | Rated Output | kW | 3 × 1 | 3 × 2 | 3 × 3 | 3 × 4 | 3 × 5 | 3 × 6 | 3 × 7 | 3 × 8 | 3 × 9 | 3 × 10 |
| | Maximum Operating Current | A | 11.8 × 1 | 11.8 × 2 | 11.8 × 3 | 11.8 × 4 | 11.8 × 5 | 11.8 × 6 | 11.8 × 7 | 11.8 × 8 | 11.8 × 9 | 11.8 × 10 |
| | Starting Method | | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting |
| High Head Pump (optional) | Rated Output | kW | 4 × 1 | 4 × 2 | 4 × 3 | 4 × 4 | 4 × 5 | 4 × 6 | 4 × 7 | 4 × 8 | 4 × 9 | 4 × 10 |
| | Maximum Operating Current | A | 15.3 × 1 | 15.3 × 2 | 15.3 × 3 | 15.3 × 4 | 15.3 × 5 | 15.3 × 6 | 15.3 × 7 | 15.3 × 8 | 15.3 × 9 | 15.3 × 10 |
| | Starting Method | | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting |
| Statutory Chiller Tonnage | | | 18.2 Statutory Chiller Tonnage | | | | | | | | | |
| High Pressure Gas Safety Act License Classification | | | Not Required (as long as not joined with water pipe systems of other heat sources) | | | | | | | | | |

Notes: 1. Test Conditions: Cooling: Cold water inlet 12°C outlet 7°C, ambient temperature 35°C DB
Heating: Hot water inlet 40°C / outlet 45°C, ambient temperature 7°C DB, 6°C WB
2. Test Conditions: Cooling: Cold water inlet 14°C outlet 7°C, ambient temperature 35°C DB
Heating: Hot water inlet 38°C / outlet 45°C, ambient temperature 7°C DB, 6°C WB
3. The power supply should not have greater than 2% voltage offset so as to not exceed the ±10% tolerance during unexpected voltage fluctuations.
4. Capacity control range may differ with operating conditions.
5. External dimensions do not include protruding objects such as pipes, power wiring kits (if mounting components sold separately) etc.
6. Noise value measured was taken in an anechoic chambers or other place free of reflected noise. In actual installations environmental noise may cause this value to be higher. Measured noise tolerance is ±2dBA.

## ■ 50HP Heat Pump Unit with Aspersion Device

| Model | | | CXAV150 | CXAV150 | CXAV150 | CXAV150 | CXAV150 | CXAV150 | CXAV150 | CXAV150 | CXAV150 | CXAV150 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No. Modules Connected | | | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| Capacity | Cooling | kW | 1650 | 1800 | 1950 | 2100 | 2250 | 2400 | 2550 | 2700 | 2850 | 3000 |
| | Heating | kW | 1650 | 1800 | 1950 | 2100 | 2250 | 2400 | 2550 | 2700 | 2850 | 3000 |
| Electrical Characteristics(Note 1) | Power Supply(Note 3) | | 3-Phase / 200V / 50, 60Hz | | | | | | | | | |
| | Operating Current (when cooling) | A | 1245.8 | 1359.0 | 1472.3 | 1585.5 | 1698.8 | 1812.0 | 1925.3 | 2038.5 | 2151.8 | 2265.0 |
| | Power Consumed (when cooling) | kW | 414.7 | 452.4 | 490.1 | 527.8 | 565.5 | 603.2 | 640.9 | 678.6 | 716.3 | 754.0 |
| | Efficiency (when cooling) | | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| | Operating Current (when heating) | A | 1554.3 | 1695.6 | 1836.9 | 1978.2 | 2119.5 | 2260.8 | 2402.1 | 2543.4 | 2684.7 | 2826.0 |
| | Power Consumed (when heating) | kW | 496.21 | 541.32 | 586.43 | 631.54 | 676.65 | 721.76 | 766.87 | 811.98 | 857.09 | 902.20 |
| | Efficiency (when heating) | | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Electrical Characteristics(Note 2) | Power Supply(Note 3) | | 3-Phase / 200V / 50, 60Hz | | | | | | | | | |
| | Operating Current (when cooling) | A | 1206.7 | 1316.4 | 1426.1 | 1535.8 | 1645.5 | 1755.2 | 1864.9 | 1974.6 | 2084.3 | 2194.0 |
| | Power Consumed (when cooling) | kW | 398.9 | 435.1 | 471.4 | 507.6 | 543.9 | 580.2 | 616.4 | 652.7 | 688.9 | 725.2 |
| | Efficiency (when cooling) | | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| | Operating Current (when heating) | A | 1549.9 | 1690.8 | 1831.7 | 1972.6 | 2113.5 | 2254.4 | 2395.3 | 2536.2 | 2677.1 | 2818.0 |
| | Power Consumed (when heating) | kW | 492.47 | 537.24 | 582.01 | 626.78 | 671.55 | 716.32 | 761.09 | 805.86 | 850.63 | 895.40 |
| | Efficiency (when heating) | | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Compressor | Category | | Hermetically Sealed Scroll | | | | | | | | | |
| | Output x No. Units | kW | 15 × 44 | 15 × 48 | 15 × 52 | 15 × 56 | 15 × 60 | 15 × 64 | 15 × 68 | 15 × 72 | 15 × 76 | 15 × 80 |
| | Starting Method | | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting |
| | Crank Case Heater x No. Units | W | 90 × 44 | 90 × 48 | 90 × 52 | 90 × 56 | 90 × 60 | 90 × 64 | 90 × 68 | 90 × 72 | 90 × 76 | 90 × 80 |
| Air Heat Exchanger | Category | | Tube with Fan | | | | | | | | | |
| | Fan Material | | Resin Coating (Gold Fin) | | | | | | | | | |
| | Tube Material | | Copper | Copper | Copper | Copper | Copper | Copper | Copper | Copper | Copper | Copper |
| | No. | | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| | Fan (Model) | | Propeller Fin | | | | | | | | | |
| | Motor Output x No. Units | kW | 1 × 44 | 1 × 48 | 1 × 52 | 1 × 56 | 1 × 60 | 1 × 64 | 1 × 68 | 1 × 72 | 1 × 76 | 1 × 80 |
| | Airflow | $m^3$/min | 9966 | 10872 | 11778 | 12684 | 13590 | 14496 | 15402 | 16308 | 17214 | 18120 |
| Aspersion Apparatus | Aspersion Volume | $m^3$/min | 146.3 | 159.6 | 172.9 | 186.2 | 199.5 | 212.8 | 226.1 | 239.4 | 252.7 | 266 |
| | Water Supply Pressure | MPa | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |
| | Water Temperature Range | °C | 10 to 30 | 10 to 30 | 10 to 30 | 10 to 30 | 10 to 30 | 10 to 30 | 10 to 30 | 10 to 30 | 10 to 30 | 10 to 30 |
| | Operable Temperature Range | °C | ≥20 | ≥20 | ≥20 | ≥20 | ≥20 | ≥20 | ≥20 | ≥20 | ≥20 | ≥20 |
| | Control method | | Solenoid ON/OFF + Fan Speed Control | | | | | | | | | |
| Water Heat Exchanger | Category | | Brazing Plate Heat Exchanger | | | | | | | | | |
| | Material | | SUS316 | | | | | | | | | |
| | Rated Flow(Note 1) | $m^3$/min | 4620 | 5040 | 5460 | 5880 | 6300 | 6720 | 7140 | 7560 | 7980 | 8400 |
| | Pressure Loss(Note 1) | kPa | 141 | 141 | 141 | 141 | 141 | 141 | 141 | 141 | 141 | 141 |
| | Rated Flow(Note 2) | $m^3$/min | 3355 | 3660 | 3965 | 4270 | 4575 | 4880 | 5185 | 5490 | 5795 | 6100 |
| | Pressure Loss(Note 2) | kPa | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 |
| Capacity Control | Method | | Hot/Cold Water Outlet Temperature Control | | | | | | | | | |
| | Range(Note 4) | | 1 - 100% | 1 - 100% | 1 - 100% | 1 - 100% | 1 - 100% | 1 - 100% | 1 - 100% | 1 - 100% | 1 - 100% | 1 - 100% |
| Refrigerant | Refrigerant | | R410A | R410A | R410A | R410A | R410A | R410A | R410A | R410A | R410A | R410A |
| | Loading | kg | 9.1 × 44 | 9.1 × 48 | 9.1 × 52 | 9.1 × 56 | 9.1 × 60 | 9.1 × 64 | 9.1 × 68 | 9.1 × 72 | 9.1 × 76 | 9.1 × 80 |
| | Control method | | Electronic expansion valve | | | | | | | | | |
| Refrigerator Oil | Category | | 160SZ | 160SZ | 160SZ | 160SZ | 160SZ | 160SZ | 160SZ | 160SZ | 160SZ | 160SZ |
| | Loading | L | 3.8 × 44 | 3.8 × 48 | 3.8 × 52 | 3.8 × 56 | 3.8 × 60 | 3.8 × 64 | 3.8 × 68 | 3.8 × 72 | 3.8 × 76 | 3.8 × 80 |
| External Dimensions (mm)(Note 5) | Length | mm | 3795 | 3795 | 3795 | 3795 | 3795 | 3795 | 3795 | 3795 | 3795 | 3795 |
| | Width | mm | 12820 | 14000 | 15180 | 16360 | 17540 | 18720 | 19900 | 21080 | 22260 | 23440 |
| | Height | mm | 2345 | 2345 | 2345 | 2345 | 2345 | 2345 | 2345 | 2345 | 2345 | 2345 |
| Weight | Shipping Weight | kg | 16115 | 17580 | 19045 | 20510 | 21975 | 23440 | 24905 | 26370 | 27835 | 29300 |
| | Operating Weight | kg | 16445 | 17940 | 19435 | 20930 | 22425 | 23920 | 25415 | 26910 | 28405 | 29900 |
| Noise(Note 6) | When Cooling (Standard) | dBA | 82.7 | 83.1 | 83.5 | 83.8 | 84.1 | 84.4 | 84.6 | 84.9 | 85.1 | 85.3 |
| | When Heating (Standard) | dBA | 83.2 | 83.6 | 84.0 | 84.3 | 84.6 | 84.9 | 85.1 | 85.4 | 85.6 | 85.8 |
| | When Cooling (Low Noise Option) | dBA | 79.2 | 79.6 | 80.0 | 80.3 | 80.6 | 80.9 | 81.1 | 81.4 | 81.6 | 81.8 |
| | When Heating (Low Noise Option) | dBA | 79.2 | 79.6 | 80.0 | 80.3 | 80.6 | 80.9 | 81.1 | 81.4 | 81.6 | 81.8 |
| Standard Head Pump (optional) | Rated Output | kW | 3 × 11 | 3 × 12 | 3 × 13 | 3 × 14 | 3 × 15 | 3 × 16 | 3 × 17 | 3 × 18 | 3 × 19 | 3 × 20 |
| | Maximum Operating Current | A | 11.8 × 11 | 11.8 × 12 | 11.8 × 13 | 11.8 × 14 | 11.8 × 15 | 11.8 × 16 | 11.8 × 17 | 11.8 × 18 | 11.8 × 19 | 11.8 × 20 |
| | Starting Method | | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting |
| High Head Pump (optional) | Rated Output | kW | 4 × 11 | 4 × 12 | 4 × 13 | 4 × 14 | 4 × 15 | 4 × 16 | 4 × 17 | 4 × 18 | 4 × 19 | 4 × 20 |
| | Maximum Operating Current | A | 15.3 × 11 | 15.3 × 12 | 15.3 × 13 | 15.3 × 14 | 15.3 × 15 | 15.3 × 16 | 15.3 × 17 | 15.3 × 18 | 15.3 × 19 | 15.3 × 20 |
| | Starting Method | | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting | Inverter starting |
| Statutory Chiller Tonnage | | | 18.2 Statutory Chiller Tonnage | | | | | | | | | |
| High Pressure Gas Safety Act License Classification | | | Not Required (as long as not joined with water pipe systems of other heat sources) | | | | | | | | | |

Notes: 1. Test Conditions: Cooling: Cold water inlet 12°C outlet 7°C, ambient temperature 35°C DB
Heating: Hot water inlet 40°C / outlet 45°C, ambient temperature 7°C DB, 6°C WB
2. Test Conditions: Cooling: Cold water inlet 14°C outlet 7°C, ambient temperature 35°C DB
Heating: Hot water inlet 38°C / outlet 45°C, ambient temperature 7°C DB, 6°C WB
3. The power supply should not have greater than 2% voltage offset so as to not exceed the ±10% tolerance during unexpected voltage fluctuations.
4. Capacity control range may differ with operating conditions.
5. External dimensions do not include protruding objects such as pipes, power wiring kits (if mounting components sold separately) etc.
6. Noise value measured was taken in an anechoic chambers or other place free of reflected noise. In actual installations environmental noise may cause this value to be higher. Measured noise tolerance is ±2dBA.

# 3 Performance Tables

## 3-1. Applicable Environment

| Item | | Unit | 30HP | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No. Modules Connected | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Power supply | | | Rated Voltage ± 10% | | | | | | | | | |
| Evaporator Flow Rate | Pump built in | L/min | 121 to 242 | 121 to 484 | 121 to 726 | 121 to 968 | 121 to 1210 | 121 to 1452 | 121 to 1694 | 121 to 1936 | 121 to 2178 | 121 to 2420 |
| | Without pump | L/min | 121 to 242 | 242 to 484 | 363 to 726 | 484 to 968 | 605 to 1210 | 726 to 1452 | 847 to 1694 | 968 to 1936 | 1089 to 2178 | 1210 to 2420 |
| Outlet water temperature | When Cooling | °C | 5 to 18 | | | | | | | | | |
| | When Heating | °C | 20 to 55 | | | | | | | | | |
| | Inlet/Outlet Temperature Difference | °C | 5 to 10 | | | | | | | | | |
| Ambient Temperature | When Cooling | °C | -10 to 46 | | | | | | | | | |
| | When Heating | °C | -10 to 20 | | | | | | | | | |
| Minimum Water Held in System | | L | 400 | | | | | | | | | |
| Water Held in Machine | | L | 30 | 60 | 90 | 120 | 150 | 180 | 210 | 240 | 270 | 300 |

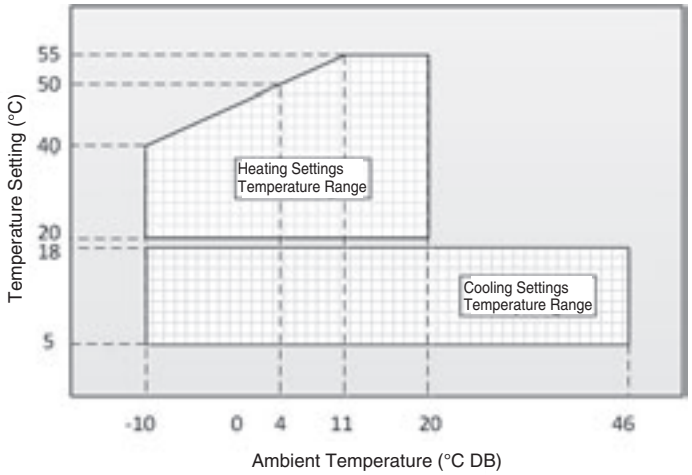
| Item | | Unit | 30HP | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No. Modules Connected | | | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| Power supply | | | Rated Voltage ± 10% | | | | | | | | | |
| Evaporator Flow Rate | Pump built in | L/min | 121 to 2662 | 121 to 2904 | 121 to 3146 | 121 to 3388 | 121 to 3630 | 121 to 3872 | 121 to 4114 | 121 to 4356 | 121 to 4598 | 121 to 4840 |
| | Without pump | L/min | 1331 to 2662 | 1452 to 2904 | 1573 to 3146 | 1694 to 3388 | 1815 to 3630 | 1936 to 3872 | 2057 to 4114 | 2178 to 4356 | 2299 to 4598 | 2420 to 4840 |
| Outlet water temperature | When Cooling | °C | 5 to 18 | | | | | | | | | |
| | When Heating | °C | 20 to 55 | | | | | | | | | |
| | Inlet/Outlet Temperature Difference | °C | 5 to 10 | | | | | | | | | |
| Ambient Temperature | When Cooling | °C | -10 to 46 | | | | | | | | | |
| | When Heating | °C | -10 to 20 | | | | | | | | | |
| Minimum Water Held in System | | L | 400 | | | | | | | | | |
| Water Held in Machine | | L | 330 | 360 | 390 | 420 | 450 | 480 | 510 | 540 | 570 | 600 |

| Item | | Unit | 50HP | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No. Modules Connected | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Power supply | | | Rated Voltage ± 10% | | | | | | | | | |
| Evaporator Flow Rate | Pump built in | L/min | 210 to 420 | 210 to 840 | 210 to 1260 | 210 to 1680 | 210 to 2100 | 210 to 2520 | 210 to 2940 | 210 to 3360 | 210 to 3780 | 210 to 4200 |
| | Without pump | L/min | 210 to 420 | 420 to 840 | 630 to 1260 | 840 to 1680 | 1050 to 2100 | 1260 to 2520 | 1470 to 2940 | 1680 to 3360 | 1890 to 3780 | 2100 to 4200 |
| Outlet water temperature | When Cooling | °C | 5 to 18 | | | | | | | | | |
| | When Heating | °C | 20 to 55 | | | | | | | | | |
| | Inlet/Outlet Temperature Difference | °C | 5 to 10 | | | | | | | | | |
| Ambient Temperature | When Cooling | °C | -10 to 46 | | | | | | | | | |
| | When Heating | °C | -10 to 20 | | | | | | | | | |
| Minimum Water Held in System | | L | 400 | | | | | | | | | |
| Water Held in Machine | | L | 30 | 60 | 90 | 120 | 150 | 180 | 210 | 240 | 270 | 300 |

| Item | | Unit | 50HP | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No. Modules Connected | | | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| Power supply | | | Rated Voltage ± 10% | | | | | | | | | |
| Evaporator Flow Rate | Pump built in | L/min | 210 to 4620 | 210 to 5040 | 210 to 5460 | 210 to 5880 | 210 to 6300 | 210 to 6720 | 210 to 7140 | 210 to 7560 | 210 to 7980 | 210 to 8400 |
| | Without pump | L/min | 2310 to 4620 | 2520 to 5040 | 2730 to 5460 | 2940 to 5880 | 3150 to 6300 | 3360 to 6720 | 3570 to 7140 | 3780 to 7560 | 3990 to 7980 | 4200 to 8400 |
| Outlet water temperature | When Cooling | °C | 5 to 18 | | | | | | | | | |
| | When Heating | °C | 20 to 55 | | | | | | | | | |
| | Inlet/Outlet Temperature Difference | °C | 5 to 10 | | | | | | | | | |
| Ambient Temperature | When Cooling | °C | -10 to 46 | | | | | | | | | |
| | When Heating | °C | -10 to 20 | | | | | | | | | |
| Minimum Water Held in System | | L | 400 | | | | | | | | | |
| Water Held in Machine | | L | 330 | 360 | 390 | 420 | 450 | 480 | 510 | 540 | 570 | 600 |

Note 1: The heat supplying equipment can only be used within the below range within 1 hour of starting. Establish bypass routes within the cold (hot) water pipework systems as necessary if exceeding this operating range in order not to go beyond the operating range listed in the previous chart.
Cooling: Cold water outlet 35°C or less. Heating: Hot water outlet 20°C or more (heat pump only)

Note 2: Atmospheric temperature conditions may limit the hot water outlet temperatures as per below. (heat pump only)




Note 3: When calculating water held, calculate in sections where water volume is the least, taking into account pipe flow paths etc. due to bypass routes.
The water held as shown in the table is the value for standard flow volumes (designed with a input/output temperature difference of ⊿t=7°C).

Note 4: Release control (forced frequency adjustment) may occur if the compressor operates outside its operating range in order to prevent damage.

Note 5: Heat pump only

Note 6: Contact us if using at temperature differences greater than 10°C.

# 3-2. Performance Characteristics (Single Module Performance Table)

## 3-2-1. 30HP Unit Performance Table

Cooling Performance Table - Water Temp.Δt=5°C
CXAV085

| Refrigerant outlet temperature | Item | Unit | Ambient temperature (°C) | | | | |
|---|---|---|---|---|---|---|---|
| | | | 25 | 30 | 35 | 40 | 46 |
| 5 | Performance | kW | 92.1 | 85.7 | 79.4 | 72.0 | 64.6 |
| | Input | kW | 18.2 | 20.2 | 22.1 | 24.7 | 27.3 |
| | Flow | L/min | 262.5 | 244.4 | 226.5 | 205.3 | 184.3 |
| 7 | Performance | kW | 98.5 | 92.0 | 85.0 | 77.8 | 70.1 |
| | Input | kW | 18.4 | 20.4 | 22.1 | 25.0 | 27.6 |
| | Flow | L/min | 280.8 | 262.4 | 242.4 | 222.0 | 199.8 |
| 9 | Performance | kW | 107.7 | 100.9 | 94.3 | 85.0 | 75.9 |
| | Input | kW | 18.8 | 20.8 | 22.8 | 25.1 | 27.4 |
| | Flow | L/min | 307.1 | 287.8 | 268.8 | 242.4 | 216.3 |
| 12 | Performance | kW | 116.9 | 109.8 | 102.8 | 92.2 | 81.7 |
| | Input | kW | 19.2 | 21.2 | 23.1 | 25.1 | 27.1 |
| | Flow | L/min | 333.3 | 313.1 | 293.2 | 262.9 | 232.8 |
| 15 | Performance | kW | 126.1 | 118.7 | 111.4 | 99.4 | 87.5 |
| | Input | kW | 19.6 | 21.6 | 23.5 | 25.2 | 26.9 |
| | Flow | L/min | 359.6 | 338.5 | 317.7 | 283.4 | 249.4 |
| 18 | Performance | kW | 135.3 | 127.6 | 120.0 | 99.4 | 87.5 |
| | Input | kW | 20.0 | 22.0 | 23.8 | 25.2 | 26.9 |
| | Flow | L/min | 385.8 | 363.8 | 342.2 | 283.4 | 249.4 |

Cooling Performance Table - Water Temp.Δt=7°C
CXAV085

| Refrigerant outlet temperature | Item | Unit | Ambient temperature (°C) | | | | |
|---|---|---|---|---|---|---|---|
| | | | 25 | 30 | 35 | 40 | 46 |
| 5 | Performance | kW | 91.4 | 85.1 | 78.8 | 71.4 | 64.0 |
| | Input | kW | 17.5 | 19.4 | 21.3 | 23.8 | 26.3 |
| | Flow | L/min | 186.2 | 173.4 | 160.5 | 145.5 | 130.4 |
| 7 | Performance | kW | 97.8 | 91.4 | 85.0 | 77.2 | 69.5 |
| | Input | kW | 17.7 | 19.6 | 21.6 | 24.1 | 26.6 |
| | Flow | L/min | 199.2 | 186.1 | 173.1 | 157.3 | 141.5 |
| 9 | Performance | kW | 106.9 | 100.2 | 93.5 | 84.4 | 75.2 |
| | Input | kW | 18.1 | 20.0 | 21.9 | 24.1 | 26.4 |
| | Flow | L/min | 217.8 | 204.1 | 190.5 | 171.8 | 153.1 |
| 12 | Performance | kW | 116.1 | 109.1 | 102.0 | 91.5 | 80.9 |
| | Input | kW | 18.5 | 20.4 | 22.3 | 24.2 | 26.1 |
| | Flow | L/min | 236.4 | 222.1 | 207.8 | 186.3 | 164.8 |
| 15 | Performance | kW | 125.2 | 117.9 | 110.5 | 98.6 | 86.7 |
| | Input | kW | 18.9 | 20.8 | 22.6 | 24.2 | 25.9 |
| | Flow | L/min | 255.0 | 240.1 | 225.1 | 200.8 | 176.5 |
| 18 | Performance | kW | 134.4 | 126.7 | 119.1 | 98.6 | 86.7 |
| | Input | kW | 19.3 | 21.1 | 23.0 | 24.2 | 25.9 |
| | Flow | L/min | 273.7 | 258.1 | 242.5 | 200.8 | 176.5 |

## Heating Performance Table - Water Temp.Δt=5°C
CXAV085

| Hot water outlet temperature | Item | Unit | Ambient temperature (°C) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | -10 | -6 | -2 | 0 | 7 | 15 | 20 |
| 35 | Performance | kW | 68.0 | 73.0 | 78.0 | 80.5 | 100.1 | 112.5 | 124.1 |
| | Input | kW | 25.9 | 25.9 | 25.8 | 25.7 | 27.2 | 32.6 | 37.9 |
| | Flow | L/min | 193.8 | 208.1 | 222.4 | 229.5 | 285.3 | 320.7 | 353.9 |
| 37 | Performance | kW | 63.6 | 69.5 | 75.3 | 78.2 | 97.1 | 110.1 | 122.7 |
| | Input | kW | 23.3 | 23.7 | 24.1 | 24.3 | 26.4 | 31.4 | 36.5 |
| | Flow | L/min | 181.4 | 198.0 | 214.7 | 223.0 | 276.7 | 313.9 | 349.8 |
| 40 | Performance | kW | 57.1 | 64.2 | 71.2 | 74.8 | 92.5 | 106.5 | 120.5 |
| | Input | kW | 19.3 | 20.5 | 21.6 | 22.2 | 25.1 | 29.8 | 34.4 |
| | Flow | L/min | 162.8 | 183.0 | 203.1 | 213.2 | 263.9 | 303.6 | 343.7 |
| 45 | Performance | kW | | 55.3 | 64.5 | 69.0 | 85.0 | 100.5 | 116.9 |
| | Input | kW | | 15.1 | 17.5 | 18.7 | 22.9 | 26.9 | 31.0 |
| | Flow | L/min | | 157.8 | 183.8 | 196.8 | 242.4 | 286.5 | 333.4 |
| 47 | Performance | kW | | | | 68.3 | 84.8 | 99.5 | 115.1 |
| | Input | kW | | | | 18.0 | 22.0 | 25.5 | 29.2 |
| | Flow | L/min | | | | 194.9 | 241.8 | 283.8 | 328.3 |
| 50 | Performance | kW | | | | | 84.0 | 98.6 | 113.3 |
| | Input | kW | | | | | 20.8 | 24.1 | 27.5 |
| | Flow | L/min | | | | | 239.4 | 281.1 | 323.1 |
| 52 | Performance | kW | | | | | 83.4 | 97.3 | 112.1 |
| | Input | kW | | | | | 20.0 | 23.2 | 26.3 |
| | Flow | L/min | | | | | 237.7 | 277.3 | 319.7 |
| 55 | Performance | kW | | | | | | 95.3 | 110.3 |
| | Input | kW | | | | | | 21.8 | 24.5 |
| | Flow | L/min | | | | | | 271.7 | 314.6 |

## Heating Performance Table - Water Temp.Δt=7°C
CXAV085

| Hot water outlet temperature | Item | Unit | Ambient temperature (°C) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | -10 | -6 | -2 | 0 | 7 | 15 | 20 |
| 35 | Performance | kW | 68.3 | 73.0 | 77.6 | 79.9 | 98.6 | 111.6 | 123.0 |
| | Input | kW | 25.5 | 25.2 | 24.9 | 24.7 | 25.9 | 31.4 | 36.6 |
| | Flow | L/min | 194.9 | 208.1 | 221.3 | 162.8 | 200.8 | 227.3 | 250.6 |
| 37 | Performance | kW | 63.7 | 69.3 | 74.9 | 77.7 | 95.9 | 109.2 | 121.6 |
| | Input | kW | 22.7 | 23.0 | 23.3 | 23.4 | 25.2 | 30.3 | 35.2 |
| | Flow | L/min | 181.6 | 197.5 | 213.5 | 158.2 | 195.3 | 222.4 | 247.6 |
| 40 | Performance | kW | 56.7 | 63.7 | 70.7 | 74.2 | 91.8 | 105.6 | 119.4 |
| | Input | kW | 18.6 | 19.7 | 20.8 | 21.4 | 24.1 | 28.7 | 33.2 |
| | Flow | L/min | 115.5 | 181.7 | 201.7 | 151.2 | 187.0 | 215.1 | 243.3 |
| 45 | Performance | kW | | 54.5 | 63.9 | 68.6 | 85.0 | 99.7 | 115.9 |
| | Input | kW | | 14.2 | 16.7 | 18.0 | 22.4 | 26.0 | 29.8 |
| | Flow | L/min | | 155.3 | 182.1 | 139.6 | 173.1 | 203.0 | 236.0 |
| 47 | Performance | kW | | | | 67.9 | 84.1 | 98.7 | 114.1 |
| | Input | kW | | | | 17.3 | 21.1 | 24.6 | 28.1 |
| | Flow | L/min | | | | 138.2 | 171.4 | 201.1 | 232.4 |
| 50 | Performance | kW | | | | | 83.3 | 97.8 | 112.3 |
| | Input | kW | | | | | 20.0 | 23.2 | 26.4 |
| | Flow | L/min | | | | | 169.6 | 199.2 | 228.7 |
| 52 | Performance | kW | | | | | 82.7 | 96.5 | 111.1 |
| | Input | kW | | | | | 19.3 | 22.3 | 25.3 |
| | Flow | L/min | | | | | 105.6 | 124.0 | 142.4 |
| 55 | Performance | kW | | | | | | 94.5 | 109.3 |
| | Input | kW | | | | | | 21.0 | 23.6 |
| | Flow | L/min | | | | | | 11.3 | 13.0 |

## 3-2-2. 50HP Unit Performance Table

Cooling Performance Table - Water Temp.Δt=5°C
CXAV150

| Refrigerant outlet temperature | Item | Unit | Ambient temperature (°C) | | | | |
|---|---|---|---|---|---|---|---|
| | | | 25 | 30 | 35 | 40 | 46 |
| 5 | Performance | kW | 162.3 | 151.7 | 141.2 | 128.6 | 116.1 |
| | Input | kW | 41.4 | 44.8 | 48.3 | 52.3 | 56.3 |
| | Flow | L/min | 462.8 | 432.4 | 402.5 | 366.7 | 331.1 |
| 7 | Performance | kW | 170.4 | 159.0 | 150.0 | 136.4 | 122.2 |
| | Input | kW | 42.0 | 45.4 | 48.3 | 52.8 | 55.1 |
| | Flow | L/min | 485.8 | 453.3 | 427.7 | 388.8 | 348.5 |
| 9 | Performance | kW | 183.9 | 172.5 | 160.5 | 145.4 | 127.7 |
| | Input | kW | 42.7 | 46.1 | 49.7 | 51.6 | 52.6 |
| | Flow | L/min | 524.4 | 491.8 | 457.8 | 414.5 | 364.0 |
| 12 | Performance | kW | 197.4 | 186.0 | 175.1 | 154.4 | 133.1 |
| | Input | kW | 43.5 | 46.9 | 50.5 | 50.5 | 50.2 |
| | Flow | L/min | 563.0 | 530.4 | 499.3 | 440.1 | 379.6 |
| 15 | Performance | kW | 211.0 | 199.5 | 188.2 | 163.3 | 138.6 |
| | Input | kW | 44.2 | 47.6 | 51.0 | 49.3 | 47.7 |
| | Flow | L/min | 601.5 | 568.9 | 536.8 | 465.8 | 395.2 |
| 18 | Performance | kW | 224.5 | 213.0 | 201.4 | 163.3 | 138.6 |
| | Input | kW | 45.0 | 48.4 | 51.4 | 48.3 | 45.7 |
| | Flow | L/min | 640.1 | 607.4 | 574.2 | 465.8 | 395.2 |

Cooling Performance Table - Water Temp.Δt=7°C
CXAV150

| Refrigerant outlet temperature | Item | Unit | Ambient temperature (°C) | | | | |
|---|---|---|---|---|---|---|---|
| | | | 25 | 30 | 35 | 40 | 46 |
| 5 | Performance | kW | 161.2 | 150.6 | 140.0 | 127.6 | 115.1 |
| | Input | kW | 39.8 | 43.2 | 46.5 | 50.4 | 54.3 |
| | Flow | L/min | 328.3 | 306.7 | 285.2 | 259.8 | 234.4 |
| 7 | Performance | kW | 169.2 | 157.9 | 150.0 | 135.3 | 121.1 |
| | Input | kW | 40.4 | 43.7 | 46.8 | 50.9 | 53.1 |
| | Flow | L/min | 344.6 | 321.5 | 305.5 | 275.5 | 246.7 |
| 9 | Performance | kW | 182.6 | 171.3 | 159.3 | 144.2 | 126.5 |
| | Input | kW | 41.1 | 44.4 | 47.9 | 49.8 | 50.7 |
| | Flow | L/min | 372.0 | 348.9 | 324.4 | 293.7 | 257.7 |
| 12 | Performance | kW | 196.1 | 184.7 | 173.7 | 153.1 | 131.9 |
| | Input | kW | 41.8 | 45.1 | 48.7 | 48.6 | 48.3 |
| | Flow | L/min | 399.3 | 376.2 | 353.8 | 311.9 | 268.7 |
| 15 | Performance | kW | 209.5 | 198.1 | 186.8 | 162.0 | 137.3 |
| | Input | kW | 42.5 | 45.8 | 49.1 | 47.5 | 46.0 |
| | Flow | L/min | 426.7 | 403.5 | 380.4 | 330.0 | 279.7 |
| 18 | Performance | kW | 222.9 | 211.5 | 199.8 | 162.0 | 137.3 |
| | Input | kW | 43.3 | 46.6 | 49.6 | 46.5 | 44.1 |
| | Flow | L/min | 454.0 | 430.8 | 406.9 | 330.0 | 279.7 |

## Heating Performance Table - Water Temp.Δt=5°C
CXAV150

| Hot water outlet temperature | Item | Unit | Ambient temperature (°C) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | -10 | -6 | -2 | 0 | 7 | 15 | 20 |
| 35 | Performance | kW | 119.9 | 128.8 | 137.6 | 142.1 | 176.6 | 192.5 | 218.6 |
| | Input | kW | 29.6 | 34.8 | 39.9 | 42.5 | 54.9 | 46.1 | 39.8 |
| | Flow | L/min | 342.0 | 367.2 | 392.5 | 405.1 | 503.5 | 548.9 | 623.2 |
| 37 | Performance | kW | 112.3 | 122.6 | 132.9 | 138.0 | 171.3 | 190.7 | 216.2 |
| | Input | kW | 33.2 | 37.2 | 41.2 | 43.2 | 52.9 | 46.3 | 41.2 |
| | Flow | L/min | 320.1 | 349.5 | 378.9 | 393.5 | 488.4 | 543.7 | 616.5 |
| 40 | Performance | kW | 100.8 | 113.2 | 125.7 | 131.9 | 163.3 | 187.9 | 212.7 |
| | Input | kW | 38.5 | 40.8 | 43.1 | 44.3 | 50.0 | 46.7 | 43.4 |
| | Flow | L/min | 287.3 | 322.9 | 358.4 | 376.2 | 465.6 | 535.7 | 606.5 |
| 45 | Performance | kW | | 97.7 | 113.8 | 121.8 | 150.0 | 183.3 | 206.8 |
| | Input | kW | | 46.8 | 46.3 | 46.0 | 45.1 | 47.3 | 47.0 |
| | Flow | L/min | | 278.5 | 324.4 | 347.4 | 427.7 | 522.6 | 589.7 |
| 47 | Performance | kW | | | | 120.6 | 149.7 | 178.6 | 203.4 |
| | Input | kW | | | | 40.2 | 48.1 | 49.0 | 49.1 |
| | Flow | L/min | | | | 343.9 | 426.8 | 509.3 | 580.0 |
| 50 | Performance | kW | | | | | 148.2 | 174.0 | 200.0 |
| | Input | kW | | | | | 50.1 | 50.7 | 51.2 |
| | Flow | L/min | | | | | 422.4 | 496.1 | 570.2 |
| 52 | Performance | kW | | | | | 147.1 | 170.9 | 197.7 |
| | Input | kW | | | | | 51.5 | 51.8 | 52.6 |
| | Flow | L/min | | | | | 419.5 | 487.2 | 563.7 |
| 55 | Performance | kW | | | | | | 166.2 | 194.3 |
| | Input | kW | | | | | | 53.5 | 54.7 |
| | Flow | L/min | | | | | | 474.0 | 554.0 |

## Heating Performance Table - Water Temp.Δt=7°C
CXAV150

| Hot water outlet temperature | Item | Unit | Ambient temperature (°C) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | -10 | -6 | -2 | 0 | 7 | 15 | 20 |
| 35 | Performance | kW | 120.6 | 128.8 | 137.0 | 141.1 | 174.0 | 191.0 | 216.6 |
| | Input | kW | 30.4 | 34.6 | 38.8 | 40.9 | 51.5 | 44.4 | 38.4 |
| | Flow | L/min | 343.9 | 367.2 | 390.6 | 287.3 | 354.4 | 389.0 | 441.2 |
| 37 | Performance | kW | 112.4 | 122.2 | 132.1 | 137.1 | 169.2 | 189.1 | 214.3 |
| | Input | kW | 33.1 | 36.5 | 39.9 | 41.6 | 50.2 | 44.6 | 39.7 |
| | Flow | L/min | 320.4 | 348.6 | 376.7 | 279.1 | 344.6 | 385.2 | 436.4 |
| 40 | Performance | kW | 100.1 | 112.4 | 124.8 | 131.0 | 162.0 | 186.4 | 210.8 |
| | Input | kW | 37.0 | 39.3 | 41.5 | 42.6 | 48.2 | 45.0 | 41.8 |
| | Flow | L/min | 203.8 | 320.6 | 355.9 | 266.9 | 330.0 | 379.6 | 429.3 |
| 45 | Performance | kW | | 96.1 | 112.7 | 121.0 | 150.0 | 181.8 | 205.0 |
| | Input | kW | | 43.9 | 44.2 | 44.3 | 44.8 | 45.6 | 45.3 |
| | Flow | L/min | | 274.0 | 321.3 | 246.4 | 305.5 | 370.3 | 417.5 |
| 47 | Performance | kW | | | | 119.8 | 148.5 | 177.2 | 201.6 |
| | Input | kW | | | | 38.7 | 46.3 | 47.2 | 47.3 |
| | Flow | L/min | | | | 243.9 | 302.4 | 360.9 | 410.6 |
| 50 | Performance | kW | | | | | 147.0 | 172.6 | 198.2 |
| | Input | kW | | | | | 48.3 | 48.8 | 49.3 |
| | Flow | L/min | | | | | 299.3 | 351.5 | 403.7 |
| 52 | Performance | kW | | | | | 146.0 | 169.5 | 195.9 |
| | Input | kW | | | | | 49.6 | 49.9 | 50.7 |
| | Flow | L/min | | | | | 297.3 | 345.2 | 399.1 |
| 55 | Performance | kW | | | | | | 164.9 | 192.6 |
| | Input | kW | | | | | | 51.5 | 52.7 |
| | Flow | L/min | | | | | | 335.9 | 392.2 |

## 3-2-3. 30HP Unit with Aspersion Device Performance Table

Cooling Performance Table - Water Temp.Δt=5°C
CXAV085

| Refrigerant outlet temperature | Item | Unit | Ambient temperature (°C) | | | | |
|---|---|---|---|---|---|---|---|
| | | | 25 | 30 | 35 | 40 | 46 |
| 5 | Performance | kW | 87.1 | 82.9 | 79.1 | 75.6 | 69.8 |
| | Input | kW | 13.1 | 14.5 | 15.5 | 16.5 | 18.0 |
| | Flow | L/min | 248.3 | 236.3 | 225.4 | 215.6 | 199.0 |
| 7 | Performance | kW | 93.2 | 89.0 | 85.0 | 76.7 | 69.0 |
| | Input | kW | 13.2 | 14.7 | 15.1 | 16.4 | 18.1 |
| | Flow | L/min | 265.6 | 253.8 | 242.4 | 218.6 | 196.8 |
| 9 | Performance | kW | 101.9 | 97.6 | 93.8 | 89.3 | 81.9 |
| | Input | kW | 13.5 | 15.0 | 15.9 | 16.8 | 18.1 |
| | Flow | L/min | 290.5 | 278.3 | 267.4 | 254.6 | 233.6 |
| 12 | Performance | kW | 110.6 | 106.2 | 102.3 | 96.8 | 88.2 |
| | Input | kW | 13.8 | 15.2 | 16.2 | 16.8 | 17.9 |
| | Flow | L/min | 315.3 | 302.8 | 291.8 | 276.1 | 251.5 |
| 15 | Performance | kW | 119.3 | 114.8 | 110.9 | 104.4 | 94.4 |
| | Input | kW | 14.1 | 15.5 | 16.4 | 16.9 | 17.7 |
| | Flow | L/min | 340.2 | 327.3 | 316.1 | 297.6 | 269.3 |
| 18 | Performance | kW | 128.0 | 123.4 | 119.4 | 104.4 | 94.4 |
| | Input | kW | 14.4 | 15.8 | 16.7 | 16.9 | 17.7 |
| | Flow | L/min | 365.0 | 351.8 | 340.5 | 297.6 | 269.3 |

Cooling Performance Table - Water Temp.Δt=7°C
CXAV085

| Refrigerant outlet temperature | Item | Unit | Ambient temperature (°C) | | | | |
|---|---|---|---|---|---|---|---|
| | | | 25 | 30 | 35 | 40 | 46 |
| 5 | Performance | kW | 86.5 | 82.3 | 78.4 | 75.0 | 69.2 |
| | Input | kW | 12.6 | 14.0 | 14.9 | 15.9 | 17.3 |
| | Flow | L/min | 176.1 | 167.6 | 159.7 | 152.8 | 140.9 |
| 7 | Performance | kW | 92.5 | 88.4 | 85.0 | 81.1 | 75.0 |
| | Input | kW | 12.7 | 14.1 | 14.4 | 16.1 | 17.6 |
| | Flow | L/min | 188.4 | 180.0 | 173.1 | 165.2 | 152.8 |
| 9 | Performance | kW | 101.2 | 96.9 | 93.0 | 88.6 | 81.2 |
| | Input | kW | 13.0 | 14.4 | 15.3 | 16.2 | 17.4 |
| | Flow | L/min | 206.0 | 197.4 | 189.5 | 180.4 | 165.4 |
| 12 | Performance | kW | 109.8 | 105.5 | 101.5 | 96.1 | 87.4 |
| | Input | kW | 13.3 | 14.7 | 15.6 | 16.2 | 17.2 |
| | Flow | L/min | 223.7 | 214.8 | 206.8 | 195.6 | 178.0 |
| 15 | Performance | kW | 118.5 | 114.0 | 110.0 | 103.5 | 93.6 |
| | Input | kW | 13.6 | 14.9 | 15.8 | 16.2 | 17.1 |
| | Flow | L/min | 241.3 | 232.2 | 224.0 | 210.9 | 190.6 |
| 18 | Performance | kW | 127.1 | 122.5 | 118.5 | 103.5 | 93.6 |
| | Input | kW | 13.9 | 15.2 | 16.1 | 16.2 | 17.1 |
| | Flow | L/min | 258.9 | 249.6 | 241.3 | 210.9 | 190.6 |

## Heating Performance Table - Water Temp.Δt=5°C
CXAV085

| Hot water outlet temperature | Item | Unit | Ambient temperature (°C) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | -10 | -6 | -2 | 0 | 7 | 15 | 20 |
| 35 | Performance | kW | 68.0 | 73.0 | 78.0 | 80.5 | 100.1 | 112.5 | 124.1 |
| | Input | kW | 25.9 | 25.9 | 25.8 | 25.7 | 27.2 | 32.6 | 37.9 |
| | Flow | L/min | 193.8 | 208.1 | 222.4 | 229.5 | 285.3 | 320.7 | 353.9 |
| 37 | Performance | kW | 63.6 | 69.5 | 75.3 | 78.2 | 97.1 | 110.1 | 122.7 |
| | Input | kW | 23.3 | 23.7 | 24.1 | 24.3 | 26.4 | 31.4 | 36.5 |
| | Flow | L/min | 181.4 | 198.0 | 214.7 | 223.0 | 276.7 | 313.9 | 349.8 |
| 40 | Performance | kW | 57.1 | 64.2 | 71.2 | 74.8 | 92.5 | 106.5 | 120.5 |
| | Input | kW | 19.3 | 20.5 | 21.6 | 22.2 | 25.1 | 29.8 | 34.4 |
| | Flow | L/min | 162.8 | 183.0 | 203.1 | 213.2 | 263.9 | 303.6 | 343.7 |
| 45 | Performance | kW | | 55.3 | 64.5 | 69.0 | 85.0 | 100.5 | 116.9 |
| | Input | kW | | 15.1 | 17.5 | 18.7 | 22.9 | 26.9 | 31.0 |
| | Flow | L/min | | 157.8 | 183.8 | 196.8 | 242.4 | 286.5 | 333.4 |
| 47 | Performance | kW | | | | 68.3 | 84.8 | 99.5 | 115.1 |
| | Input | kW | | | | 18.0 | 22.0 | 25.5 | 29.2 |
| | Flow | L/min | | | | 194.9 | 241.8 | 283.8 | 328.3 |
| 50 | Performance | kW | | | | | 84.0 | 98.6 | 113.3 |
| | Input | kW | | | | | 20.8 | 24.1 | 27.5 |
| | Flow | L/min | | | | | 239.4 | 281.1 | 323.1 |
| 52 | Performance | kW | | | | | 108.6 | 127.6 | 145.9 |
| | Input | kW | | | | | 27.6 | 31.9 | 36.0 |
| | Flow | L/min | | | | | 309.7 | 363.9 | 415.9 |
| 55 | Performance | kW | | | | | | 171.2 | 194.7 |
| | Input | kW | | | | | | 43.4 | 48.9 |
| | Flow | L/min | | | | | | 488.2 | 555.1 |

## Heating Performance Table - Water Temp.Δt=7°C
CXAV085

| Hot water outlet temperature | Item | Unit | Ambient temperature (°C) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | -10 | -6 | -2 | 0 | 7 | 15 | 20 |
| 35 | Performance | kW | 68.3 | 73.0 | 77.6 | 79.9 | 98.6 | 111.6 | 123.0 |
| | Input | kW | 25.5 | 25.2 | 24.9 | 24.7 | 25.9 | 31.4 | 36.6 |
| | Flow | L/min | 194.9 | 208.1 | 221.3 | 162.8 | 200.8 | 227.3 | 250.6 |
| 37 | Performance | kW | 63.7 | 69.3 | 74.9 | 77.7 | 95.9 | 109.2 | 121.6 |
| | Input | kW | 22.7 | 23.0 | 23.3 | 23.4 | 25.2 | 30.3 | 35.2 |
| | Flow | L/min | 181.6 | 197.5 | 213.5 | 158.2 | 195.3 | 222.4 | 247.6 |
| 40 | Performance | kW | 56.7 | 63.7 | 70.7 | 74.2 | 91.8 | 105.6 | 119.4 |
| | Input | kW | 18.6 | 19.7 | 20.8 | 21.4 | 24.1 | 28.7 | 33.2 |
| | Flow | L/min | 115.5 | 181.7 | 201.7 | 151.2 | 187.0 | 215.1 | 243.3 |
| 45 | Performance | kW | | 54.5 | 63.9 | 68.6 | 85.0 | 99.7 | 115.9 |
| | Input | kW | | 14.2 | 16.7 | 18.0 | 22.4 | 26.0 | 29.8 |
| | Flow | L/min | | 155.3 | 182.1 | 139.6 | 173.1 | 203.0 | 236.0 |
| 47 | Performance | kW | | | | 67.9 | 84.1 | 98.7 | 114.1 |
| | Input | kW | | | | 17.3 | 21.1 | 24.6 | 28.1 |
| | Flow | L/min | | | | 138.2 | 171.4 | 201.1 | 232.4 |
| 50 | Performance | kW | | | | | 83.3 | 97.8 | 112.3 |
| | Input | kW | | | | | 20.0 | 23.2 | 26.4 |
| | Flow | L/min | | | | | 169.6 | 199.2 | 228.7 |
| 52 | Performance | kW | | | | | 107.8 | 126.6 | 144.6 |
| | Input | kW | | | | | 26.6 | 30.7 | 34.7 |
| | Flow | L/min | | | | | 219.5 | 257.9 | 294.4 |
| 55 | Performance | kW | | | | | | 169.8 | 192.9 |
| | Input | kW | | | | | | 41.9 | 47.1 |
| | Flow | L/min | | | | | | 345.9 | 393.0 |

## 3-2-4. 50HP Unit with Aspersion Device Performance Table

Cooling Performance Table - Water Temp.Δt=5°C
CXAV150

| Refrigerant outlet temperature | Item | Unit | Ambient temperature (°C) | | | | |
|---|---|---|---|---|---|---|---|
| | | | 25 | 30 | 35 | 40 | 46 |
| 5 | Performance | kW | 159.9 | 149.4 | 139.0 | 126.7 | 114.4 |
| | Input | kW | 31.9 | 34.5 | 37.2 | 40.3 | 43.4 |
| | Flow | L/min | 325.6 | 304.3 | 283.2 | 258.0 | 233.0 |
| 7 | Performance | kW | 167.8 | 156.6 | 150.0 | 134.3 | 120.4 |
| | Input | kW | 32.3 | 34.9 | 37.7 | 40.7 | 42.4 |
| | Flow | L/min | 341.8 | 318.9 | 305.5 | 273.6 | 245.2 |
| 9 | Performance | kW | 181.2 | 169.9 | 158.1 | 143.2 | 125.7 |
| | Input | kW | 32.9 | 35.5 | 38.3 | 39.8 | 40.5 |
| | Flow | L/min | 369.0 | 346.0 | 322.1 | 291.6 | 256.1 |
| 12 | Performance | kW | 194.5 | 183.2 | 172.5 | 152.0 | 131.1 |
| | Input | kW | 33.5 | 36.1 | 38.9 | 38.9 | 38.6 |
| | Flow | L/min | 396.1 | 373.2 | 351.3 | 309.7 | 267.1 |
| 15 | Performance | kW | 207.8 | 196.5 | 185.4 | 160.9 | 136.5 |
| | Input | kW | 34.0 | 36.7 | 39.3 | 38.0 | 36.7 |
| | Flow | L/min | 423.2 | 400.3 | 377.7 | 327.7 | 278.0 |
| 18 | Performance | kW | 221.1 | 209.8 | 198.3 | 160.9 | 136.5 |
| | Input | kW | 34.6 | 37.3 | 39.6 | 37.2 | 35.2 |
| | Flow | L/min | 450.4 | 427.4 | 404.0 | 327.7 | 278.0 |

Cooling Performance Table - Water Temp.Δt=7°C
CXAV150

| Refrigerant outlet temperature | Item | Unit | Ambient temperature (°C) | | | | |
|---|---|---|---|---|---|---|---|
| | | | 25 | 30 | 35 | 40 | 46 |
| 5 | Performance | kW | 158.8 | 148.3 | 137.9 | 125.7 | 113.4 |
| | Input | kW | 30.7 | 33.2 | 35.8 | 38.8 | 41.8 |
| | Flow | L/min | 323.3 | 302.1 | 280.9 | 255.9 | 230.9 |
| 7 | Performance | kW | 166.7 | 155.5 | 150.0 | 133.2 | 119.3 |
| | Input | kW | 31.1 | 33.6 | 36.3 | 39.2 | 40.9 |
| | Flow | L/min | 339.4 | 316.7 | 305.5 | 271.4 | 243.0 |
| 9 | Performance | kW | 179.9 | 168.7 | 156.9 | 142.0 | 124.6 |
| | Input | kW | 31.7 | 34.2 | 36.9 | 38.3 | 39.1 |
| | Flow | L/min | 366.4 | 343.6 | 319.5 | 289.3 | 253.8 |
| 12 | Performance | kW | 193.1 | 181.9 | 171.1 | 150.8 | 130.0 |
| | Input | kW | 32.2 | 34.7 | 37.5 | 37.5 | 37.2 |
| | Flow | L/min | 393.3 | 370.6 | 348.5 | 307.2 | 264.7 |
| 15 | Performance | kW | 206.4 | 195.2 | 183.9 | 159.6 | 135.3 |
| | Input | kW | 32.8 | 35.3 | 37.8 | 36.6 | 35.4 |
| | Flow | L/min | 420.3 | 397.5 | 374.7 | 325.1 | 275.5 |
| 18 | Performance | kW | 219.6 | 208.4 | 196.8 | 159.6 | 135.3 |
| | Input | kW | 33.3 | 35.9 | 38.2 | 35.8 | 33.9 |
| | Flow | L/min | 447.2 | 424.4 | 400.8 | 325.1 | 275.5 |

## Heating Performance Table - Water Temp.Δt=5°C
CXAV150

| Hot water outlet temperature | Item | Unit | Ambient temperature (°C) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | -10 | -6 | -2 | 0 | 7 | 15 | 20 |
| 35 | Performance | kW | 119.9 | 128.8 | 137.6 | 142.1 | 176.6 | 192.5 | 218.6 |
| | Input | kW | 29.6 | 34.8 | 39.9 | 42.5 | 54.9 | 46.1 | 39.8 |
| | Flow | L/min | 342.0 | 367.2 | 392.5 | 405.1 | 503.5 | 548.9 | 623.2 |
| 37 | Performance | kW | 112.3 | 122.6 | 132.9 | 138.0 | 171.3 | 190.7 | 216.2 |
| | Input | kW | 33.2 | 37.2 | 41.2 | 43.2 | 52.9 | 46.3 | 41.2 |
| | Flow | L/min | 320.1 | 349.5 | 378.9 | 393.5 | 488.4 | 543.7 | 616.5 |
| 40 | Performance | kW | 100.8 | 113.2 | 125.7 | 131.9 | 163.3 | 187.9 | 212.7 |
| | Input | kW | 38.5 | 40.8 | 43.1 | 44.3 | 50.0 | 46.7 | 43.4 |
| | Flow | L/min | 287.3 | 322.9 | 358.4 | 376.2 | 465.6 | 535.7 | 606.5 |
| 45 | Performance | kW | | 97.7 | 113.8 | 121.8 | 150.0 | 183.3 | 206.8 |
| | Input | kW | | 46.8 | 46.3 | 46.0 | 45.1 | 47.3 | 47.0 |
| | Flow | L/min | | 278.5 | 324.4 | 347.4 | 427.7 | 522.6 | 589.7 |
| 47 | Performance | kW | | | | 120.6 | 149.7 | 178.6 | 203.4 |
| | Input | kW | | | | 40.2 | 48.1 | 49.0 | 49.1 |
| | Flow | L/min | | | | 343.9 | 426.8 | 509.3 | 580.0 |
| 50 | Performance | kW | | | | | 148.2 | 174.0 | 200.0 |
| | Input | kW | | | | | 50.1 | 50.7 | 51.2 |
| | Flow | L/min | | | | | 422.4 | 496.1 | 570.2 |
| 52 | Performance | kW | | | | | 147.1 | 170.9 | 197.7 |
| | Input | kW | | | | | 51.5 | 51.8 | 52.6 |
| | Flow | L/min | | | | | 419.5 | 487.2 | 563.7 |
| 55 | Performance | kW | | | | | | 166.2 | 194.3 |
| | Input | kW | | | | | | 53.5 | 54.7 |
| | Flow | L/min | | | | | | 474.0 | 554.0 |

## Heating Performance Table - Water Temp.Δt=7°C
CXAV150

| Hot water outlet temperature | Item | Unit | Ambient temperature (°C) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | -10 | -6 | -2 | 0 | 7 | 15 | 20 |
| 35 | Performance | kW | 120.6 | 128.8 | 137.0 | 141.1 | 174.0 | 191.0 | 216.6 |
| | Input | kW | 30.4 | 34.6 | 38.8 | 40.9 | 51.5 | 44.4 | 38.4 |
| | Flow | L/min | 343.9 | 367.2 | 390.6 | 287.3 | 354.4 | 389.0 | 441.2 |
| 37 | Performance | kW | 112.4 | 122.2 | 132.1 | 137.1 | 169.2 | 189.1 | 214.3 |
| | Input | kW | 33.1 | 36.5 | 39.9 | 41.6 | 50.2 | 44.6 | 39.7 |
| | Flow | L/min | 320.4 | 348.6 | 376.7 | 279.1 | 344.6 | 385.2 | 436.4 |
| 40 | Performance | kW | 100.1 | 112.4 | 124.8 | 131.0 | 162.0 | 186.4 | 210.8 |
| | Input | kW | 37.0 | 39.3 | 41.5 | 42.6 | 48.2 | 45.0 | 41.8 |
| | Flow | L/min | 203.8 | 320.6 | 355.9 | 266.9 | 330.0 | 379.6 | 429.3 |
| 45 | Performance | kW | | 96.1 | 112.7 | 121.0 | 150.0 | 181.8 | 205.0 |
| | Input | kW | | 43.9 | 44.2 | 44.3 | 44.8 | 45.6 | 45.3 |
| | Flow | L/min | | 274.0 | 321.3 | 246.4 | 305.5 | 370.3 | 417.5 |
| 47 | Performance | kW | | | | 119.8 | 148.5 | 177.2 | 201.6 |
| | Input | kW | | | | 38.7 | 46.3 | 47.2 | 47.3 |
| | Flow | L/min | | | | 243.9 | 302.4 | 360.9 | 410.6 |
| 50 | Performance | kW | | | | | 147.0 | 172.6 | 198.2 |
| | Input | kW | | | | | 48.3 | 48.8 | 49.3 |
| | Flow | L/min | | | | | 299.3 | 351.5 | 403.7 |
| 52 | Performance | kW | | | | | 146.0 | 169.5 | 195.9 |
| | Input | kW | | | | | 49.6 | 49.9 | 50.7 |
| | Flow | L/min | | | | | 297.3 | 345.2 | 399.1 |
| 55 | Performance | kW | | | | | | 164.9 | 192.6 |
| | Input | kW | | | | | | 51.5 | 52.7 |
| | Flow | L/min | | | | | | 335.9 | 392.2 |

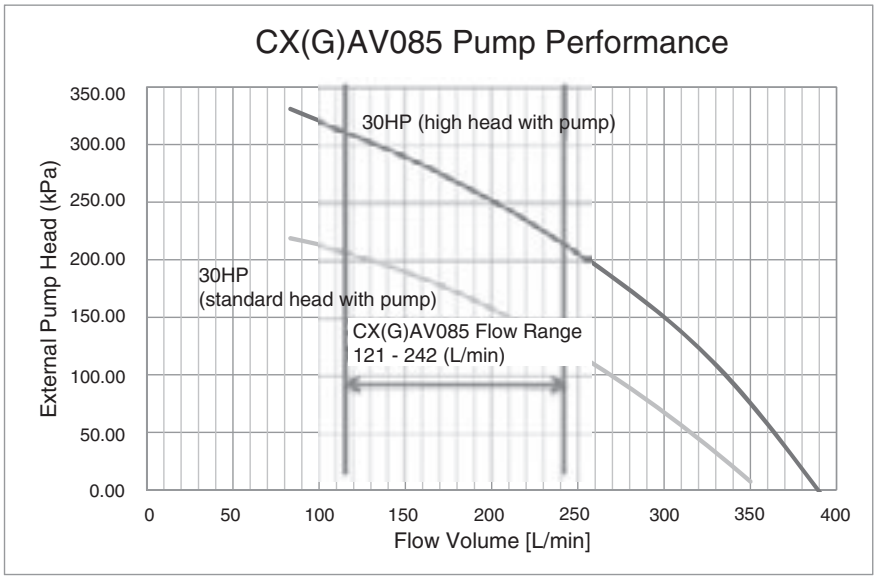
## 3-3. Usage Criteria

| Item | | Description |
|---|---|---|
| Installation Environment | | Locations where air blown from the air heat exchanger will not short circuit.<br>Locations where water from the condenser or aspersion device will not be problematic.<br>Locations that can withstand mass while operating.<br>Locations that have sufficient space to perform maintenance.<br>Areas where snow can be managed if in a region with heavy snowfall.<br>Areas where salt damage can be managed if in a region at risk of salt damage.<br>Locations in environments free of corrosive gas etc.<br>Contact us if installing in any other special environments. |
| Cold (Hot) Water | Water Quality | Water compliant with the Japanese Refrigeration and Air Conditioning Association's Air Conditioning Equipment Water Quality guidelines (JRA-GL-02-1994). |
| | Normal Water Pressure | 0.7MPa or less |
| | | ∗. Install a 20 or greater mesh strainer on the inlet. |
| Aspersion Water Supply | Water Quality | Water compliant with the Japanese Refrigeration and Air Conditioning Association's Air Conditioning Equipment Water Quality guidelines (JRA-GL-02-1994). |
| | Normal Water Pressure | 0.7MPa or less |
| | | ∗. Install a 50 or greater mesh strainer on the inlet. |
| Power supply | Voltage | Within ±10%. |
| | Frequency | Within ±2%. |
| | Phase Unbalance | Within ±2%. |
| | | ∗. Phase unbalance is calculated as the difference between average voltage and maximum (or minimum) voltage. |

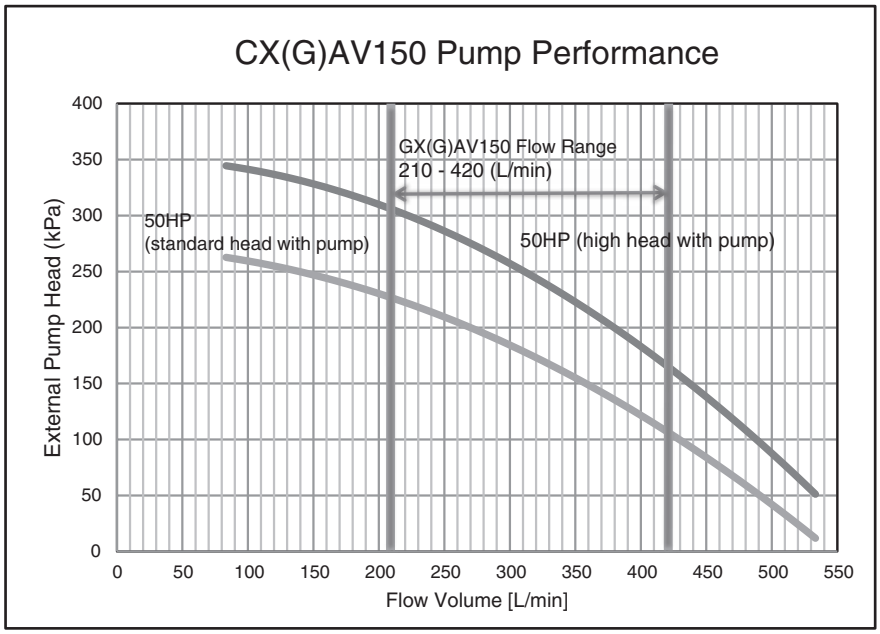
# 3-4. Pump Characteristics and Internal Resistance Curves

## 3-4-1. Performance Curves with Built-In Pumps

30HP Performance Curve



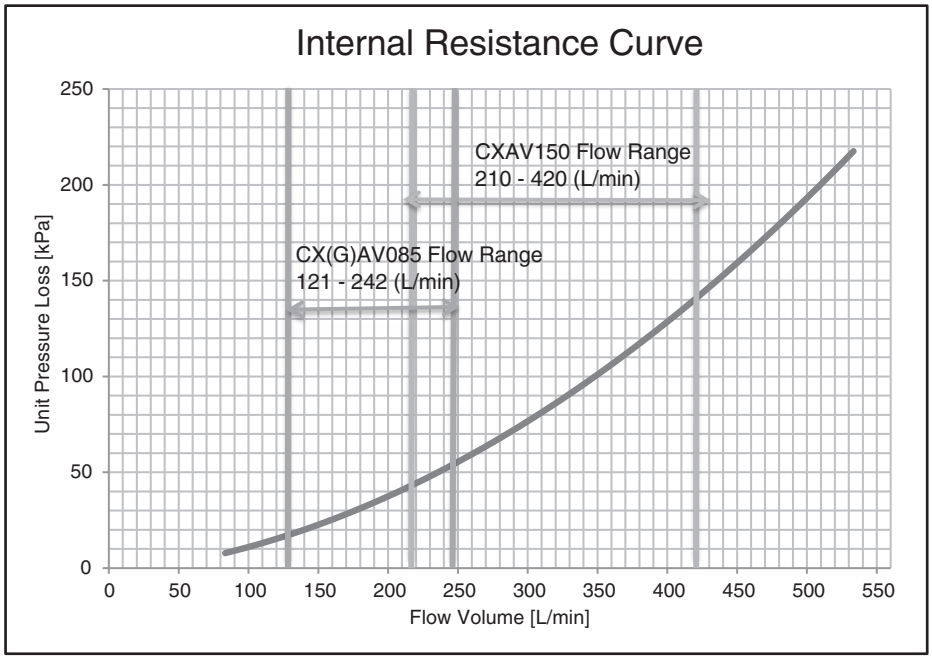

50HP Performance Curve



## 3-4-2. Pump Performance Parameters

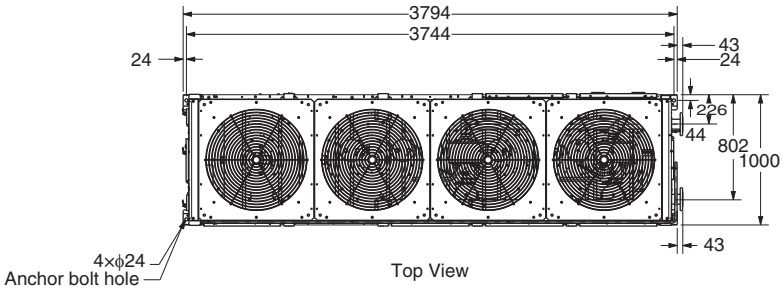
| Model | | | CX(G)AV085 | | CX(G)AV150 | |
|---|---|---|---|---|---|---|
| Pump Type | | | Standard head | High head | Standard head | High head |
| Output | | kW | 1.5 | 1.85 | 3 | 4 |
| Flow | Min. | L/min | 121 | 121 | 210 | 210 |
| | Max. | L/min | 242 | 242 | 420 | 420 |
| External Pressure Loss | Min. | kPa | 15.5 | 15.5 | 40.8 | 40.8 |
| | Max. | kPa | 52.4 | 52.4 | 140.4 | 140.4 |
| Maximum Operating Current | | A | 7.9 | 9.0 | 11.8 | 15.3 |
| Maximum Power Consumption | | kW | 2.04 | 2.22 | 3.55 | 4.66 |
| Maximum Ejection Pressure | | MPa | 1 | 1.6 | 1.6 | 1.6 |
| Maximum Suction Pressure | | MPa | 0.75 | 1.32 | 1.3 | 1.24 |

## 3-4-3. Internal Resistance Curves (Resistance for Non-Built-In Pumps)

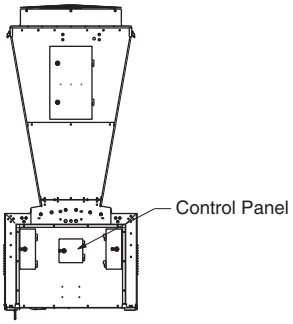


# 4 External Dimensions

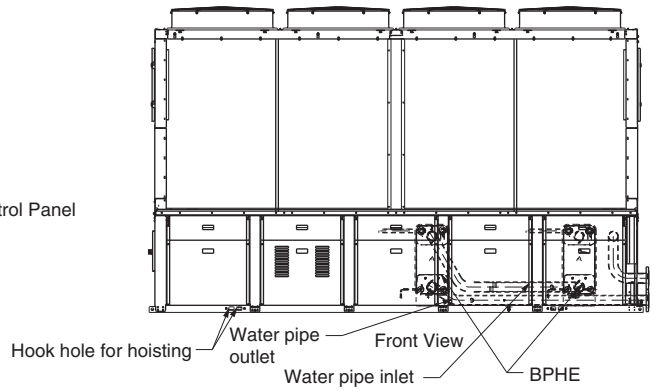
## 50HP Heat Pump Unit (Single)

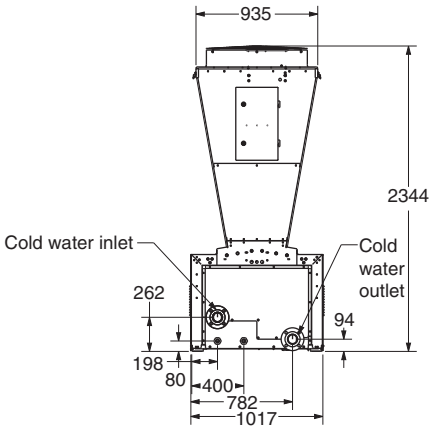



Top View



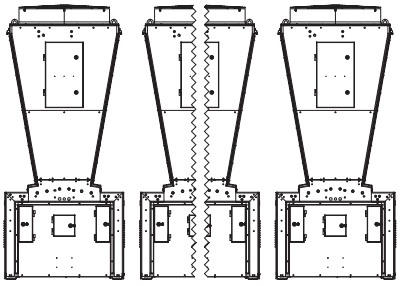

Left Side View



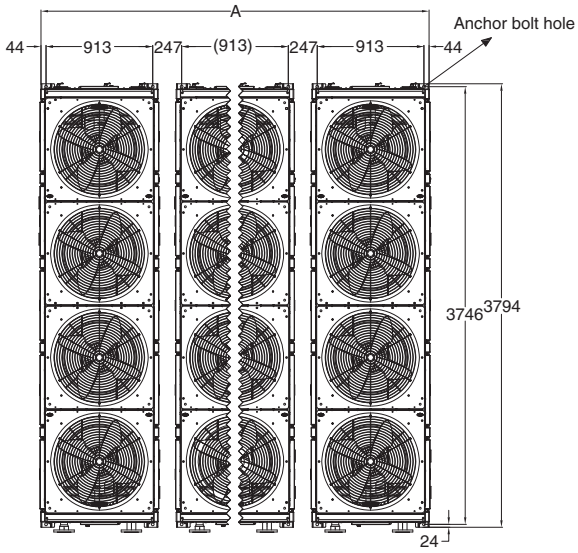




Right Side View

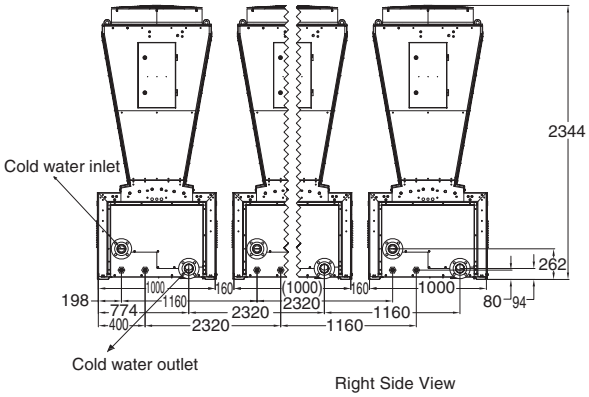
## 50HP Heat Pump Unit (Multiple)



Left Side View



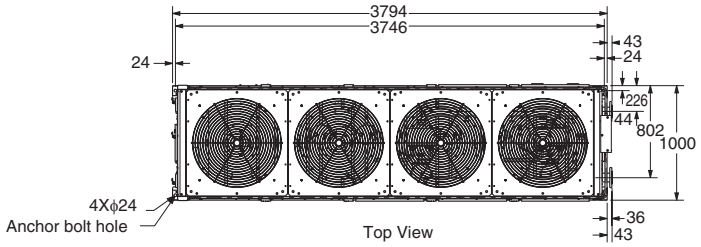

Top View



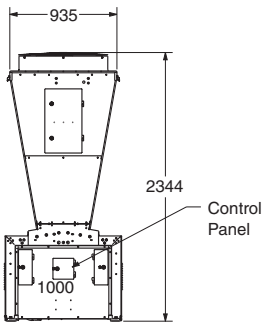

Right Side View

| No. of Units | A | B | No. of Units | A | B | No. of Units | A | B | No. of Units | A | B |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1020 | 4 | 6 | 6920 | 24 | 11 | 12820 | 44 | 16 | 18720 | 64 |
| 2 | 2200 | 8 | 7 | 8100 | 28 | 12 | 14000 | 48 | 17 | 19900 | 68 |
| 3 | 3380 | 12 | 8 | 9280 | 32 | 13 | 15180 | 52 | 18 | 21080 | 72 |
| 4 | 4560 | 16 | 9 | 10460 | 36 | 14 | 16360 | 56 | 19 | 22260 | 76 |
| 5 | 5740 | 20 | 10 | 11640 | 40 | 15 | 17540 | 60 | 20 | 23440 | 80 |

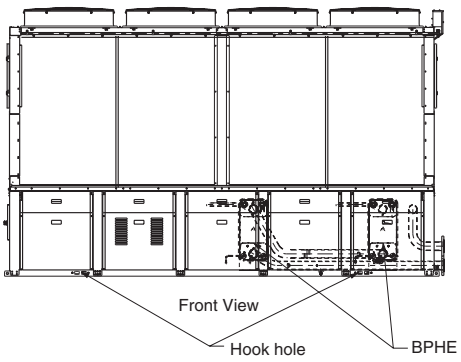
## 30HP Heat Pump Unit (Single)

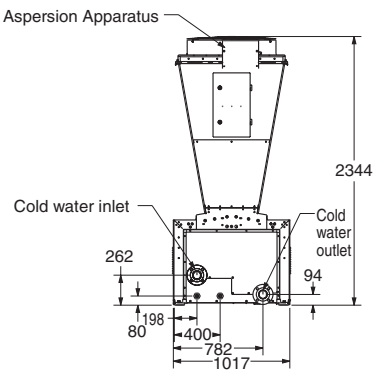



Top View



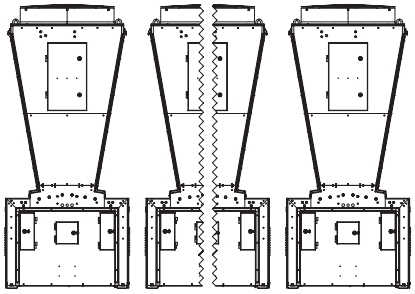

Left Side View



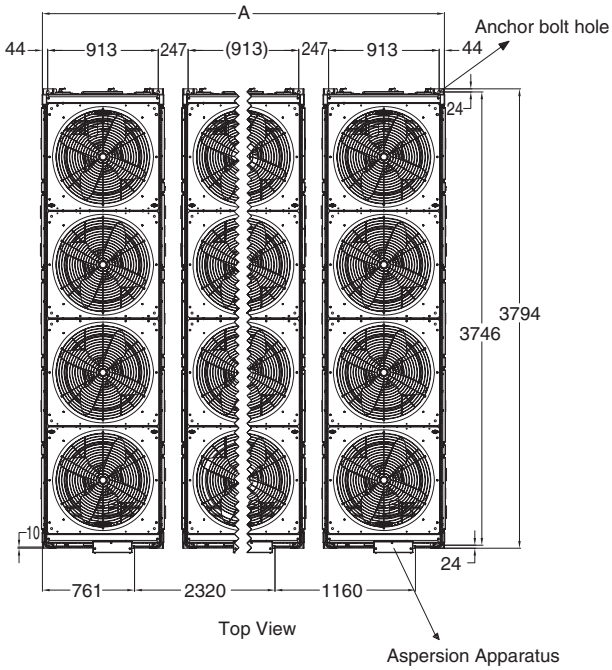



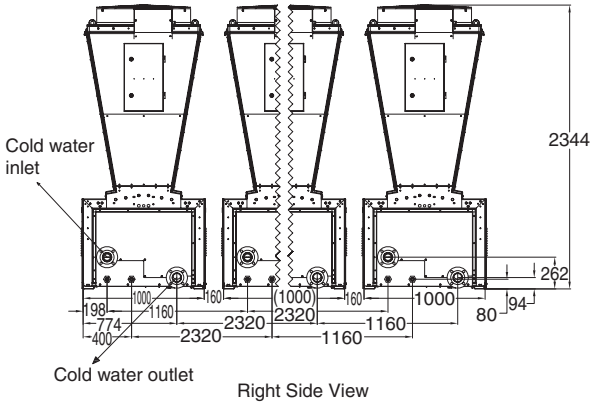

Right Side View

## 30HP Heat Pump Unit (Multiple)



Left Side View



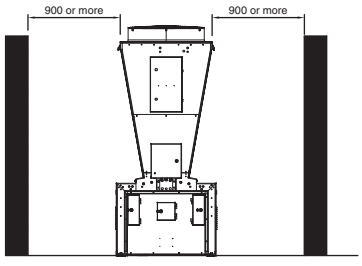



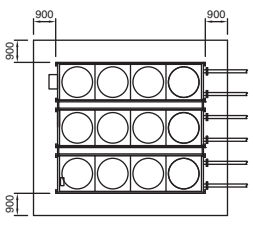

Right Side View

| No. of Units | A | B | No. of Units | A | B | No. of Units | A | B | No. of Units | A | B |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1020 | 4 | 6 | 6920 | 24 | 11 | 12820 | 44 | 16 | 18720 | 64 |
| 2 | 2200 | 8 | 7 | 8100 | 28 | 12 | 14000 | 48 | 17 | 19900 | 68 |
| 3 | 3380 | 12 | 8 | 9280 | 32 | 13 | 15180 | 52 | 18 | 21080 | 72 |
| 4 | 4560 | 16 | 9 | 10460 | 36 | 14 | 16360 | 56 | 19 | 22260 | 76 |
| 5 | 5740 | 20 | 10 | 11640 | 40 | 15 | 17540 | 60 | 20 | 23440 | 80 |

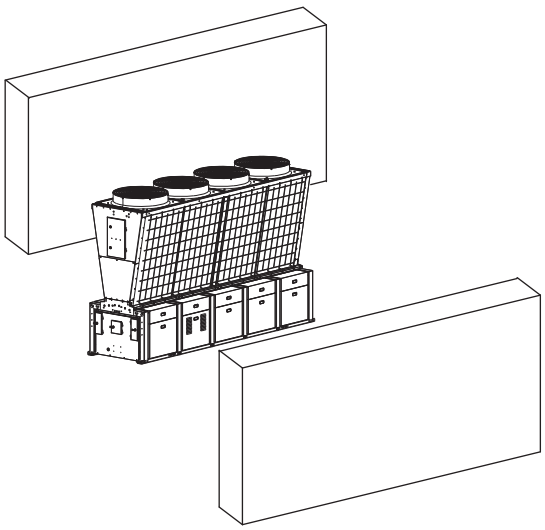
[Installation]

- Installation space:

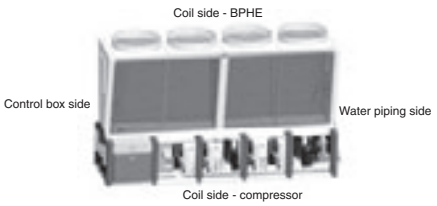


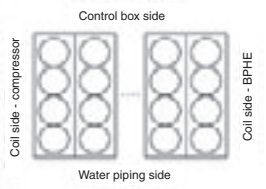




Maintenance space



# 5 Noise Characteristics




· Standard unit

| | | Coil - Compressor (dBA) | Water pipe (dBA) | Coil - BPHE (dBA) | Control box (dBA) | Full RMS (dBA) |
|---|---|---|---|---|---|---|
| 85kW | Cooler | 65 | 61.5 | 64.5 | 61.5 | 63.5 |
| | Heater | 65 | 62.5 | 65 | 62.5 | 64 |
| 150kW | Cooler | 75 | 71.5 | 74 | 70.5 | 73 |
| | Heater | 74.5 | 70 | 75 | 73 | 73.5 |

· Unit with soundproof cover

| | | Coil - Compressor (dBA) | Water pipe (dBA) | Coil - BPHE (dBA) | Control box (dBA) | Full RMS (dBA) |
|---|---|---|---|---|---|---|
| 85kW | Cooler | 63 | 57.5 | 62.5 | 58.5 | 61 |
| | Heater | 62.5 | 59 | 62.5 | 59 | 61 |
| 150kW | Cooler | 71.5 | 68 | 71 | 66 | 69.5 |
| | Heater | 72 | 67.5 | 70.5 | 65.5 | 69.5 |

| Standard Unit | 85kW Cooler (dBA) | 85kW Heater (dBA) | 150kW Cooler (dBA) | 150kW Heater (dBA) |
|---|---|---|---|---|
| 1 Unit | 63.5 | 64.0 | 73.0 | 73.5 |
| 2 Units | 65.8 | 66.3 | 75.3 | 75.8 |
| 3 Units | 67.6 | 68.1 | 77.1 | 77.6 |
| 4 Units | 68.8 | 69.3 | 78.3 | 78.8 |
| 5 Units | 69.8 | 70.3 | 79.3 | 79.8 |
| 6 Units | 70.6 | 71.1 | 80.1 | 80.6 |
| 7 Units | 71.3 | 71.8 | 80.8 | 81.3 |
| 8 Units | 71.9 | 72.4 | 81.4 | 81.9 |
| 9 Units | 72.4 | 72.9 | 81.9 | 82.4 |
| 10 Units | 72.8 | 73.3 | 82.3 | 82.8 |
| 11 Units | 73.2 | 73.7 | 82.7 | 83.2 |
| 12 Units | 73.6 | 74.1 | 83.1 | 83.6 |
| 13 Units | 74.0 | 74.5 | 83.5 | 84.0 |
| 14 Units | 74.3 | 74.8 | 83.8 | 84.3 |
| 15 Units | 74.6 | 75.1 | 84.1 | 84.6 |
| 16 Units | 74.9 | 75.4 | 84.4 | 84.9 |
| 17 Units | 75.1 | 75.6 | 84.6 | 85.1 |
| 18 Units | 75.4 | 75.9 | 84.9 | 85.4 |
| 19 Units | 75.6 | 76.1 | 85.1 | 85.6 |
| 20 Units | 75.8 | 76.3 | 85.3 | 85.8 |

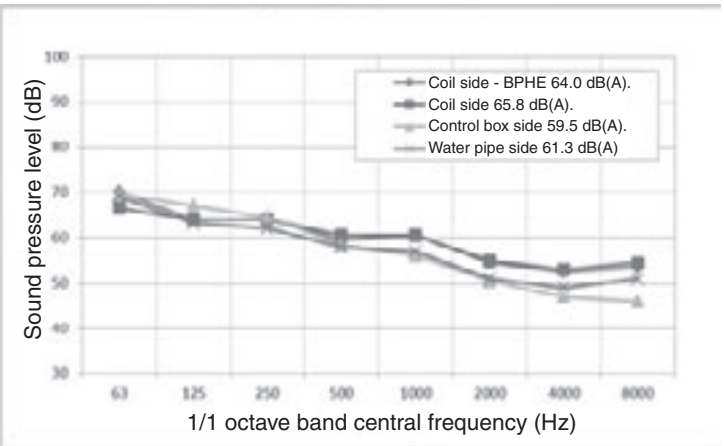
| Unit with Soundproof Cover | 85kW Cooler (dBA) | 85kW Heater (dBA) | 150kW Cooler (dBA) | 150kW Heater (dBA) |
|---|---|---|---|---|
| 1 Unit | 61.0 | 61.0 | 69.5 | 69.5 |
| 2 Units | 63.3 | 63.3 | 71.8 | 71.8 |
| 3 Units | 65.1 | 65.1 | 73.6 | 73.6 |
| 4 Units | 66.3 | 66.3 | 74.8 | 74.8 |
| 5 Units | 67.3 | 67.3 | 75.8 | 75.8 |
| 6 Units | 68.1 | 68.1 | 76.6 | 76.6 |
| 7 Units | 68.8 | 68.8 | 77.3 | 77.3 |
| 8 Units | 69.4 | 69.4 | 77.9 | 77.9 |
| 9 Units | 69.9 | 69.9 | 78.4 | 78.4 |
| 10 Units | 70.3 | 70.3 | 78.8 | 78.8 |
| 11 Units | 70.7 | 70.7 | 79.2 | 79.2 |
| 12 Units | 71.1 | 71.1 | 79.6 | 79.6 |
| 13 Units | 71.5 | 71.5 | 80.0 | 80.0 |
| 14 Units | 71.8 | 71.8 | 80.3 | 80.3 |
| 15 Units | 72.1 | 72.1 | 80.6 | 80.6 |
| 16 Units | 72.4 | 72.4 | 80.9 | 80.9 |
| 17 Units | 72.6 | 72.6 | 81.1 | 81.1 |
| 18 Units | 72.9 | 72.9 | 81.4 | 81.4 |
| 19 Units | 73.1 | 73.1 | 81.6 | 81.6 |
| 20 Units | 73.3 | 73.3 | 81.8 | 81.8 |

(Note 1) All measurements were taken from a microphone located at a distance of 1m and height of 1.5m
(Note 2) Noise value measured was taken in an anechoic chambers or other place free of reflected noise. In actual installations environmental noise may cause this value to be higher.

# 5-1. Without Noise Absorption

• CXAV085 Without Noise Absorption (when cooling):

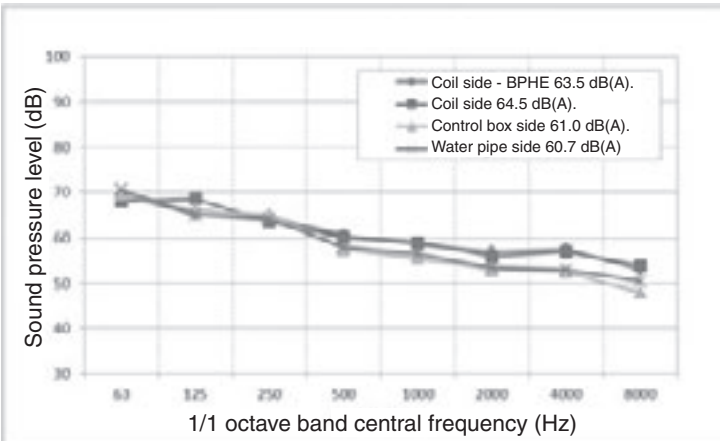
Operating Condition - JIS standard conditions
Measurement Site - Outdoors
Measurement Position - 1 m distance and 1.5 m microphone height




| Label: | Coil side BPHE | Coil side - compressor | Control box side | Water pipe side | Average |
|---|---|---|---|---|---|
| 63 | 70.0 | 66.5 | 69.5 | 69.0 | 69.0 |
| 125 | 64.0 | 64.0 | 67.0 | 63.0 | 64.5 |
| 250 | 64.0 | 64.0 | 64.5 | 62.0 | 63.5 |
| 500 | 59.5 | 60.5 | 58.5 | 58.0 | 59.0 |
| 1000 | 60.5 | 60.5 | 56.0 | 57.0 | 59.0 |
| 2000 | 54.5 | 55.0 | 50.5 | 51.0 | 53.5 |
| 4000 | 52.5 | 53.0 | 47.0 | 49.0 | 51.0 |
| 8000 | 53.5 | 54.5 | 46.0 | 51.0 | 52.0 |
| Overall sound pressure level | 64.5 | 65.0 | 61.5 | 61.5 | 63.5 |

• CXAV085 Without Noise Absorption (when heating):

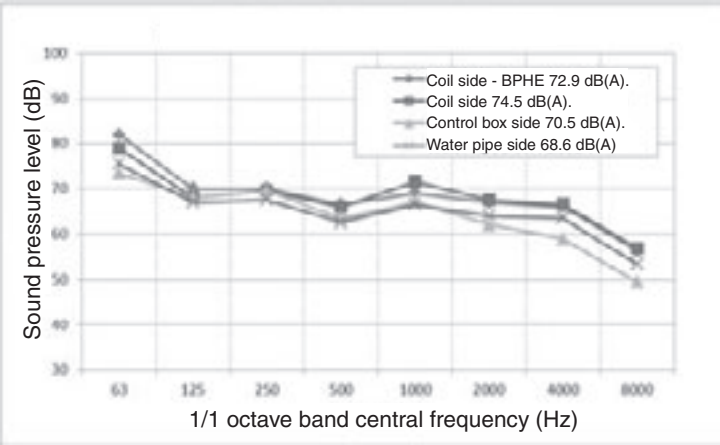
Operating Condition - JIS standard conditions
Measurement Site - Outdoors
Measurement Position - 1 m distance and 1.5 m microphone height




| Label: | Coil side BPHE | Coil side - compressor | Control box side | Water pipe side | Average |
|---|---|---|---|---|---|
| 63 | 69.5 | 68.0 | 69.5 | 70.5 | 69.5 |
| 125 | 65.0 | 68.5 | 66.0 | 65.0 | 66.5 |
| 250 | 64.5 | 63.5 | 65.0 | 64.0 | 64.5 |
| 500 | 60.5 | 60.0 | 57.5 | 58.0 | 59.0 |
| 1000 | 58.5 | 59.0 | 55.5 | 56.5 | 57.5 |
| 2000 | 57.0 | 56.0 | 53.0 | 53.5 | 55.0 |
| 4000 | 57.5 | 57.0 | 52.5 | 53.0 | 55.5 |
| 8000 | 53.0 | 54.0 | 48.0 | 50.5 | 52.0 |
| Overall sound pressure level | 65.0 | 65.0 | 62.5 | 62.5 | 64.0 |

## • CXAV150 Without Noise Absorption (when cooling)

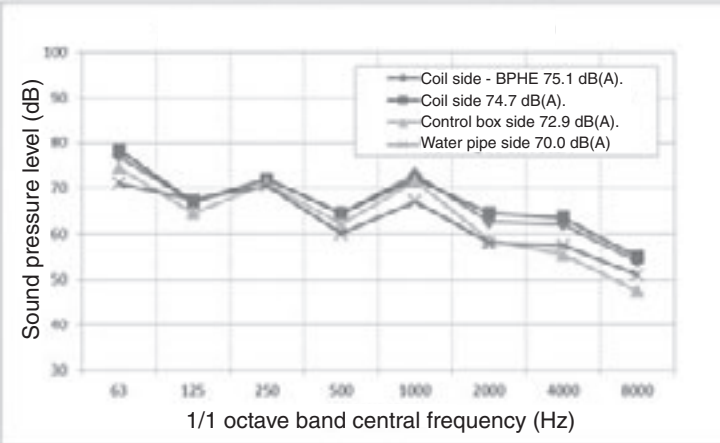
Operating Condition - JIS standard conditions
Measurement Site - Outdoors
Measurement Position - 1 m distance and 1.5 m microphone height




| Label: | Coil side BPHE | Coil side - compressor | Control box side | Water pipe side | Average |
|---|---|---|---|---|---|
| 63 | 82.0 | 79.0 | 73.5 | 75.5 | 78.5 |
| 125 | 70.0 | 68.0 | 68.0 | 67.0 | 68.5 |
| 250 | 70.0 | 69.5 | 69.5 | 67.5 | 69.0 |
| 500 | 66.5 | 66.0 | 63.5 | 62.5 | 65.0 |
| 1000 | 69.0 | 71.5 | 67.0 | 66.5 | 69.0 |
| 2000 | 67.0 | 67.5 | 62.0 | 64.0 | 65.5 |
| 4000 | 66.0 | 66.5 | 59.0 | 63.5 | 64.5 |
| 8000 | 56.5 | 57.0 | 49.5 | 53.5 | 55.0 |
| Overall sound pressure level | 74.0 | 75.0 | 70.5 | 71.5 | 73.0 |

## • CXAV150 Without Noise Absorption (when heating):

Operating Condition - JIS standard conditions
Measurement Site - Outdoors
Measurement Position - 1 m distance and 1.5 m microphone height

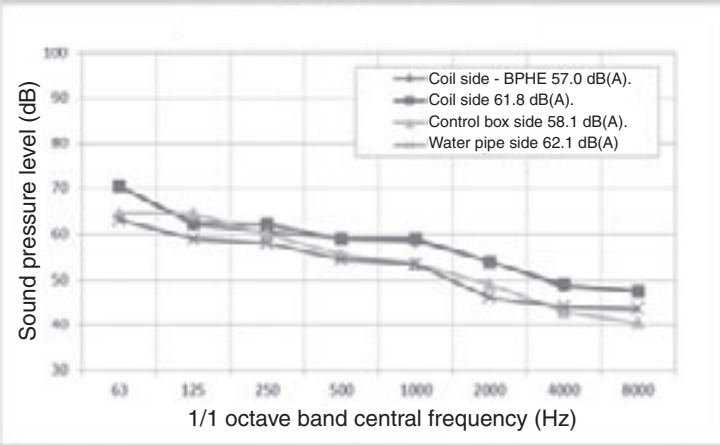



| Label: | Coil side BPHE | Coil side - compressor | Control box side | Water pipe side | Average |
|---|---|---|---|---|---|
| 63 | 77.0 | 78.5 | 74.5 | 71.0 | 76.0 |
| 125 | 67.0 | 67.0 | 64.5 | 67.5 | 66.5 |
| 250 | 72.0 | 72.0 | 71.0 | 70.5 | 71.5 |
| 500 | 64.5 | 64.5 | 62.0 | 60.0 | 63.0 |
| 1000 | 73.0 | 72.0 | 71.5 | 67.0 | 71.5 |
| 2000 | 62.5 | 64.5 | 58.5 | 58.0 | 62.0 |
| 4000 | 62.0 | 63.5 | 55.5 | 57.5 | 60.5 |
| 8000 | 54.0 | 55.0 | 47.5 | 51.0 | 53.0 |
| Overall sound pressure level | 75.0 | 74.5 | 73.0 | 70.0 | 73.5 |

## 5-2. With Noise Absorption

• CXAV085 With Noise Absorption (when cooling):

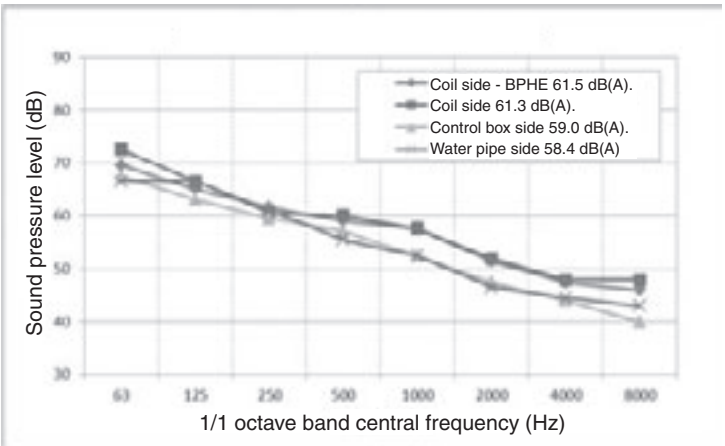
Operating Condition - JIS standard conditions
Measurement Site - Outdoors
Measurement Position - 1 m distance and 1.5 m microphone height




| Label: | Coil side BPHE | Coil side - compressor | Control box side | Water pipe side | Average |
|---|---|---|---|---|---|
| 63 | 70.5 | 70.5 | 64.5 | 63.0 | 68.5 |
| 125 | 62.0 | 62.5 | 64.5 | 59.0 | 62.5 |
| 250 | 60.5 | 62.0 | 60.0 | 58.0 | 60.5 |
| 500 | 59.0 | 59.0 | 55.5 | 54.5 | 57.5 |
| 1000 | 58.5 | 59.0 | 53.5 | 53.5 | 57.0 |
| 2000 | 54.0 | 54.0 | 49.0 | 46.0 | 52.0 |
| 4000 | 48.5 | 49.0 | 43.0 | 44.0 | 47.0 |
| 8000 | 47.5 | 47.5 | 40.5 | 43.5 | 45.5 |
| Overall sound pressure level | 62.5 | 63.0 | 58.5 | 57.5 | 61.0 |

• CXAV085 With Noise Absorption (when heating):

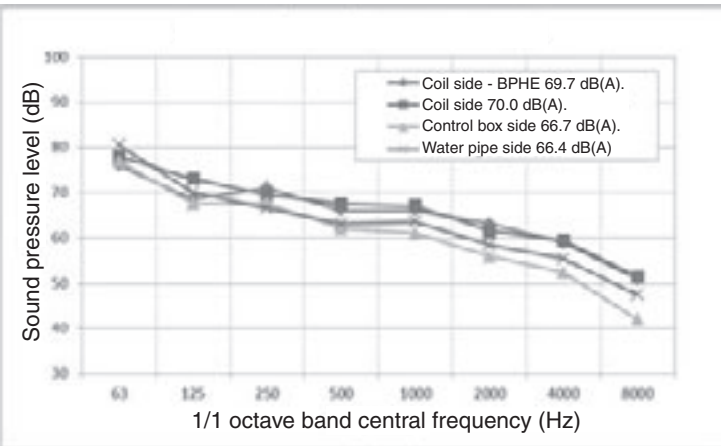
Operating Condition - JIS standard conditions
Measurement Site - Outdoors
Measurement Position - 1 m distance and 1.5 m microphone height




| Label: | Coil side BPHE | Coil side - compressor | Control box side | Water pipe side | Average |
|---|---|---|---|---|---|
| 63 | 70.0 | 73.0 | 68.0 | 67.0 | 70.5 |
| 125 | 65.5 | 67.0 | 63.5 | 67.0 | 66.0 |
| 250 | 62.0 | 61.0 | 60.0 | 61.5 | 61.0 |
| 500 | 59.5 | 60.5 | 57.5 | 56.0 | 58.5 |
| 1000 | 58.0 | 58.0 | 53.0 | 53.0 | 56.0 |
| 2000 | 52.0 | 52.5 | 48.0 | 47.0 | 50.5 |
| 4000 | 48.0 | 48.5 | 44.5 | 45.0 | 47.0 |
| 8000 | 46.5 | 48.5 | 40.5 | 43.5 | 45.5 |
| Overall sound pressure level | 62.5 | 62.5 | 59.0 | 59.0 | 61.0 |

## • CXAV150 With Noise Absorption (when cooling):

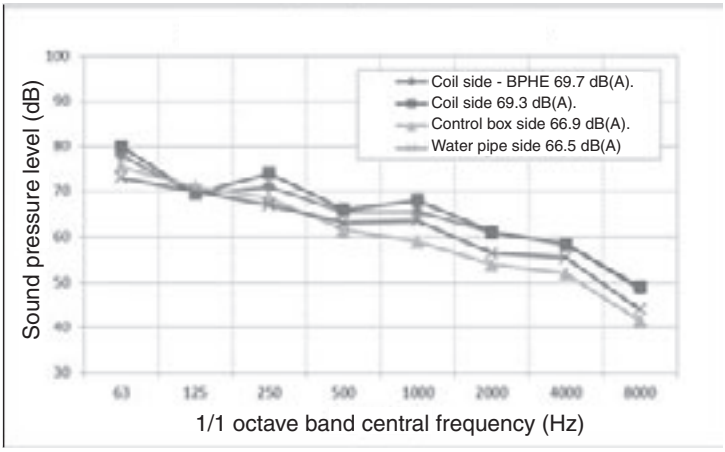
Operating Condition - JIS standard conditions
Measurement Site - Outdoors
Measurement Position - 1 m distance and 1.5 m microphone height




| Label: | Coil side BPHE | Coil side - compressor | Control box side | Water pipe side | Average |
|---|---|---|---|---|---|
| 63 | 76.0 | 78.0 | 77.0 | 80.5 | 78.5 |
| 125 | 68.5 | 73.0 | 67.5 | 70.0 | 70.0 |
| 250 | 71.0 | 69.5 | 67.5 | 66.5 | 69.0 |
| 500 | 66.0 | 67.5 | 62.0 | 63.0 | 65.5 |
| 1000 | 66.0 | 67.0 | 61.0 | 63.5 | 65.0 |
| 2000 | 63.0 | 61.5 | 56.0 | 58.5 | 60.5 |
| 4000 | 59.0 | 59.5 | 52.5 | 55.5 | 57.5 |
| 8000 | 51.0 | 51.5 | 42.0 | 47.5 | 49.5 |
| Overall sound pressure level | 71.0 | 71.5 | 66.0 | 68.0 | 69.5 |

## • CXAV150 With Noise Absorption (when heating):

Operating Condition - JIS standard conditions
Measurement Site - Outdoors
Measurement Position - 1 m distance and 1.5 m microphone height




| Label: | Coil side BPHE | Coil side - compressor | Control box side | Water pipe side | Average |
|---|---|---|---|---|---|
| 63 | 78.0 | 80.0 | 75.5 | 73.0 | 77.5 |
| 125 | 69.5 | 69.5 | 71.0 | 70.0 | 70.0 |
| 250 | 71.0 | 74.0 | 68.5 | 67.0 | 71.0 |
| 500 | 65.5 | 66.0 | 61.5 | 63.0 | 64.5 |
| 1000 | 65.5 | 68.0 | 59.0 | 63.5 | 65.0 |
| 2000 | 61.0 | 61.0 | 54.0 | 56.5 | 59.0 |
| 4000 | 58.5 | 58.5 | 52.0 | 55.5 | 57.0 |
| 8000 | 48.5 | 49.0 | 41.5 | 44.0 | 46.5 |
| Overall sound pressure level | 70.5 | 72.0 | 65.5 | 67.5 | 69.5 |

# 6 Adaptation Examples

## Action

1. The machine is available in 2 types: with or without a built-in pump. In some circumstances pump and water system valves may require programming control by the customer. Either have a systems design specialist / installer help you with this or contact our technical support service.
2. Be sure to test operation after system installation is completed.
3. Multiple built-in pump options are available for this machine. Select a pump model based on the maximum flow rate and pump head and after referencing the internal resistance and pump characteristic curves.
4. Take care to ensure that negative pressure does not take place at the inlet of the built-in pump. Doing so may result in air creeping into the water system through gaps.
5. A strainer is not equipped with the machine at time of shipping. Be sure to install a 20 or greater mesh strainer on the inlet.
6. Flow switches are not equipped with the machine at time of shipping. Be sure to mount flow switches to each module.
7. One air valve and drain valve each are mounted at the highest and lowest points of the machine's water pipework, for use as required.
8. We recommend the minimum holding water be an amount that allows for 2 minutes of unit operation. If the minimum is not met, the unit may start and stop frequently.
9. Install a catch valve to each module on-site if purchased unit has a built-in pump.
10. Install a motor-operated valve to each module on-site if purchased unit does not have a built-in pump.

Adaptation Example List

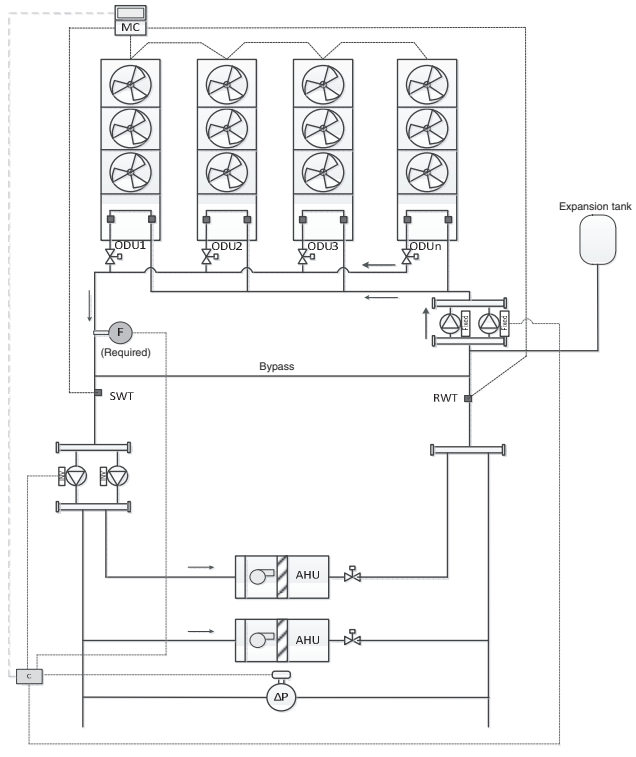
| System | Code | System Configuration Example | Pump | | | Pump Preparation and Control | |
|---|---|---|---|---|---|---|---|
| | | | Primary-Side | | Secondary-Side | Primary-Side | Secondary-Side |
| | | | Factory Mounted | Customer Mounted | Customer Mounted | | |
| 1 | 1 | Primary-Secondary System 1 | – | Fixed | Variable | Selected and controlled by customer. | Selected and controlled by customer. |
| 2 | 1-1 | Primary-Secondary System 2 | – | Variable | Variable | Selected and controlled by customer. | Selected and controlled by customer. |
| 3 | 2 | Primary-Secondary System 3 | Fixed | – | Variable | Built into Module Chiller and controlled. | Selected and controlled by customer. |
| 4 | 2-1 | Primary-Secondary System 4 | Variable | – | Variable | Built into Module Chiller and speed controlled by customer. | Selected and controlled by customer. |
| 5 | 1 | Primary System 1 | Fixed | – | – | Built into Module Chiller and controlled. | |
| 6 | 1-1 | Primary System 2 | Variable | – | – | Built into Module Chiller and speed controlled by customer. | |
| 7 | 2 | Primary System 3 | – | Fixed | – | Selected and controlled by customer. | |
| 8 | 2-1 | Primary System 4 | – | Variable | – | Selected and controlled by customer. | |

## ■ System 1, 2

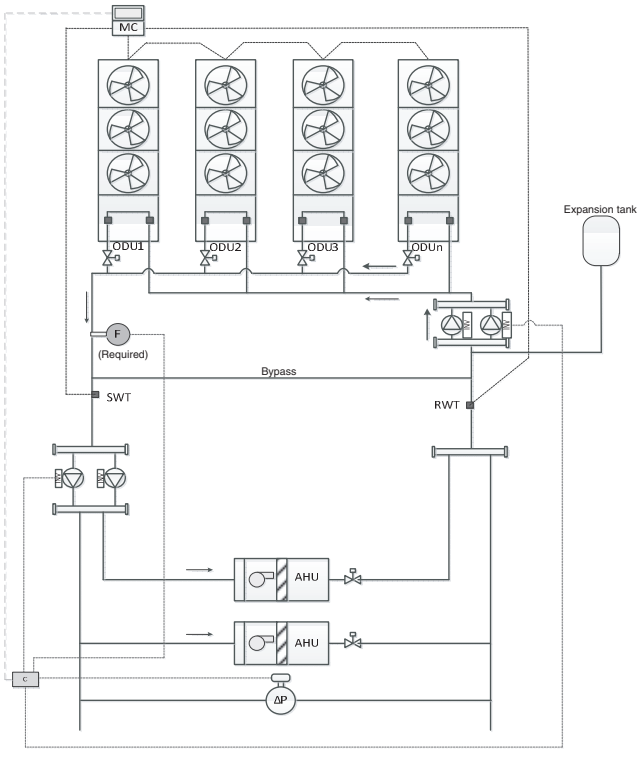
| Product, Part | Amount | Function | Arrangement | | Mounting Location | |
|---|---|---|---|---|---|---|
| | | | Trane | Customer | Trane Factory | On-Site |
| Module Chiller | Depends on design | Cold or hot water source | ○ | | - | |
| Unit Controller (UC) | 1 per module | Control and monitoring of each module | ○ | | ○ | |
| Module Controller (MC, w/ Modbus) | 1 | Control module | ○ | | | ○ |
| BACnet Interface | 1 | For BMS ∗1 | ○ | | | ○ |
| Water temperature sensor (system leaving/returning) | 2 | Module Controller input | MC accessory | | | ○ |
| Primary pump | Depends on design | Cold/Hot water circulation | | ○ | | ○ |
| Flow switch | 1 per module | Protection when water stopped | | Connect to UC | | ○ |
| Flow meter | 1 | Primary pump input control | | ○ | | ○ |
| Motor-operated valve | 1 per module | Water passing functionality of driver module | | Connect to UC | | ○ |

| Considerations: | |
|---|---|
| Trane | 1. Clarifies the maximum flow and minimum flow for each module. (The customer should check the flow is within the valid range when controlling the primary pump).<br>2. Sends information about the number of operating modules to the customer's BMS system.<br>3. Sends information about the number of operating freeze-prevention pumps to the customer's BMS system.<br>4. Controls the opening/closing of the motor-operated valves. |
| Designer Contractor | 1.Selects between the primary and secondary pumps.<br>2. Installs the primary and secondary pumps and builds the control system.<br>3. Selects motor-operated valve and mounts to the outlets of each module.<br>4. Selects other components required for the water system, including flow switches, and mounts.<br>5. If the Module Controller outputs an anti-freeze signal to the BMS, operate the corresponding pump. |

1




2



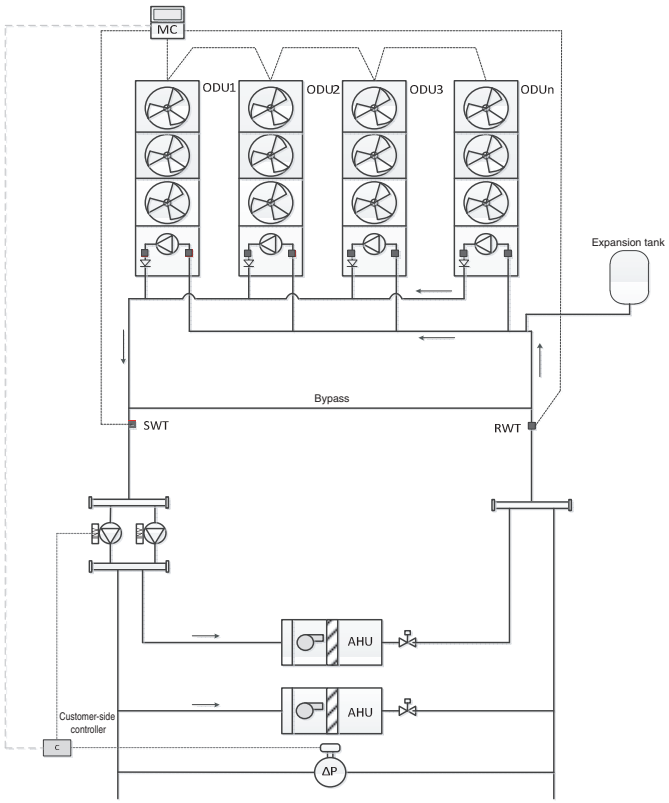

∗1 BMS = Building Management System

## ■ System 3

| Product, Part | Amount | Function | Arrangement | | Mounting Location | |
|---|---|---|---|---|---|---|
| | | | Trane | Customer | Trane Factory | On-Site |
| Module Chiller | Depends on design | Cold or hot water source | ○ | | - | |
| Unit Controller (UC) | 1 per module | Control and monitoring of each module | ○ | | ○ | |
| Module Controller (MC, w/ Modbus) | 1 | Control module | ○ | | | ○ |
| BACnet Interface | 1 | For BMS ∗1 | ○ | | | ○ |
| Water temperature sensor (system leaving/returning) | 2 | Module Controller input | MC accessory | | | ○ |
| Primary pump | 1 per module | Cold/Hot water circulation | ○ | | ○ | |
| Flow switch | 1 per module | Protection when water stopped | | Connect to UC | | ○ |
| Water check valve | 1 per module | Water passing functionality of driver module | | Connect to UC | | ○ |

| Considerations: | |
|---|---|
| Trane | 1. Sends information about the number of operating modules to the customer's BMS system. |
| Designer Contractor | 1. Selects the secondary pump.<br>2. Installs the secondary pump and builds the control system.<br>3. Selects the check valve and mounts to the outlet pipework of each OD unit.<br>4. Selects other components required for the water system, including flow switches, and mounts.<br>5. If the Module Controller outputs an anti-freeze signal to the BMS, operate the corresponding pump. |

3



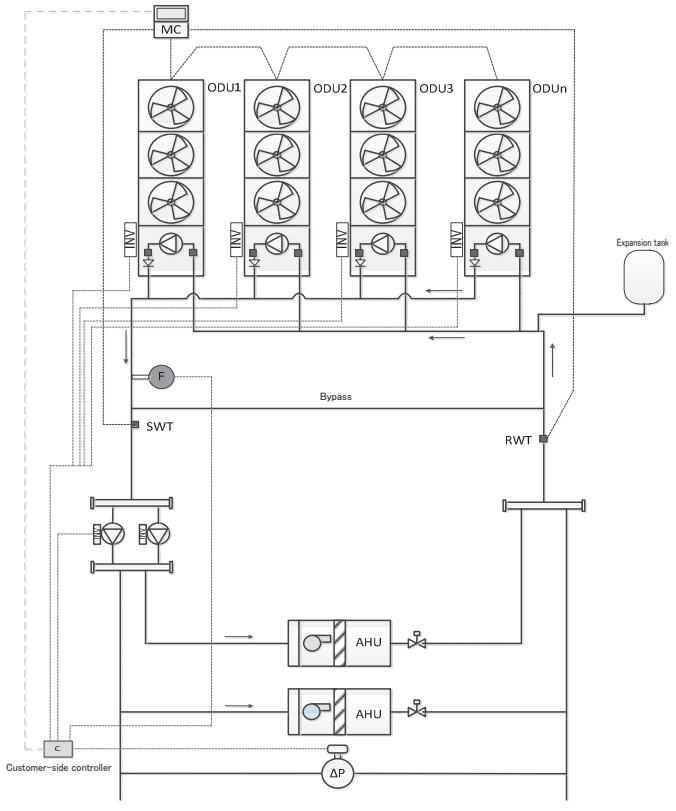

∗1 BMS = Building Management System

## ■ System 4

| Product, Part | Amount | Function | Arrangement | | Mounting Location | |
|---|---|---|---|---|---|---|
| | | | Trane | Customer | Trane Factory | On-Site |
| Module Chiller | Depends on design | Cold or hot water source | ○ | | - | |
| Unit Controller (UC) | 1 per module | Control and monitoring of each module | ○ | | ○ | |
| Module Controller (MC, w/ Modbus) | 1 | Control module | ○ | | | ○ |
| BACnet Interface | 1 | For BMS ∗1 | ○ | | | ○ |
| Water temperature sensor (system leaving/returning) | 2 | Module Controller input | MC accessory | | | ○ |
| Primary pump | 1 per module | Cold/Hot water circulation | ○ | | ○ | |
| Flow switch | 1 per module | Protection when water stopped | | Connect to UC | | ○ |
| Flow meter | 1 | Primary pump input control | | ○ | | ○ |
| Water check valve | 1 per module | Water passing functionality of driver module | | Connect to UC | | ○ |

| Considerations: | |
|---|---|
| Trane | 1. Signals to the customer via the BMS system which units have completed the start-up preparation. (The customer should check that the pipework is prepared).<br>2. Indicates to the customer's BMS system which units are in anti-freeze status. |
| Designer Contractor | 1. Selects the secondary pump.<br>2. Installs the secondary pump and builds the control system.<br>3. The primary pump is controlled from signals sent directly to the variable speed pump driver via a signal cable according to the signals in column 1 above.<br>4. Selects the check valve and mounts to the outlet pipework of each OD unit.<br>5. Selects other components required for the water system, including flow switches, and mounts.<br>6. If the Module Controller outputs an anti-freeze signal, operate the corresponding pump. |

4



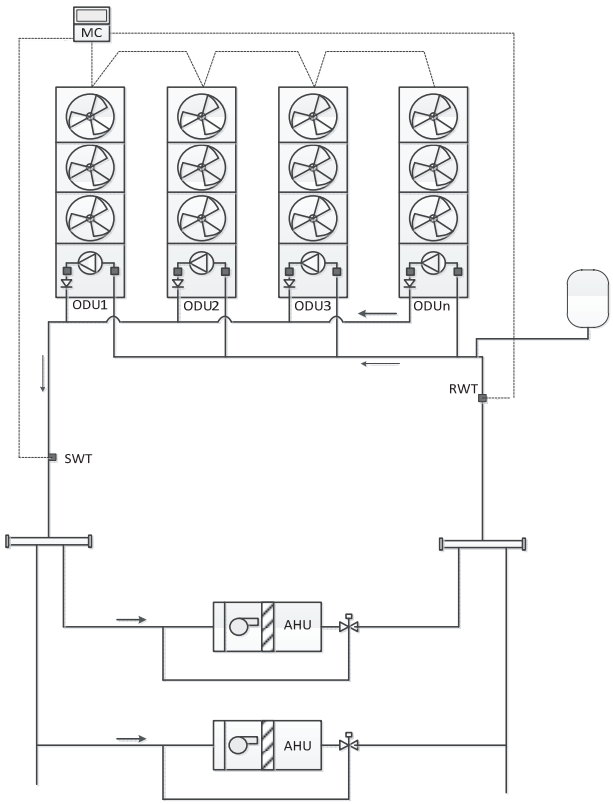

∗1 BMS = Building Management System

## ■ System 5

| Product, Part | Amount | Function | Arrangement | | Mounting Location | |
|---|---|---|---|---|---|---|
| | | | Trane | Customer | Trane Factory | On-Site |
| Module Chiller | Depends on design | Cold or hot water source | ○ | | - | |
| Unit Controller (UC) | 1 per module | Control and monitoring of each module | ○ | | ○ | |
| Module Controller (MC, w/ Modbus) | 1 | Control module | ○ | | | ○ |
| BACnet Interface | 1 | For BMS ∗1 | ○ | | | ○ |
| Water temperature sensor (system leaving/returning) | 2 | Module Controller input | MC accessory | | | ○ |
| Primary pump (fixed speed) | 1 per module | Cold/Hot water circulation | ○ | | ○ | |
| Flow switch | 1 per module | Protection when water stopped | | Connect to UC | | ○ |
| Bypass valve (not always required) | 1 | | | ○ | | ○ |
| Water check valve | 1 per module | Water passing functionality of driver module | | Connect to UC | | ○ |

| Considerations: | |
|---|---|
| Trane | 1. Controls primary pump |
| Designer<br>Contractor | 1. Selects the check valve that can be mounted to the outlets of each module.<br>2. Selects other components required for the water system, including flow switches, and mounts. |

5



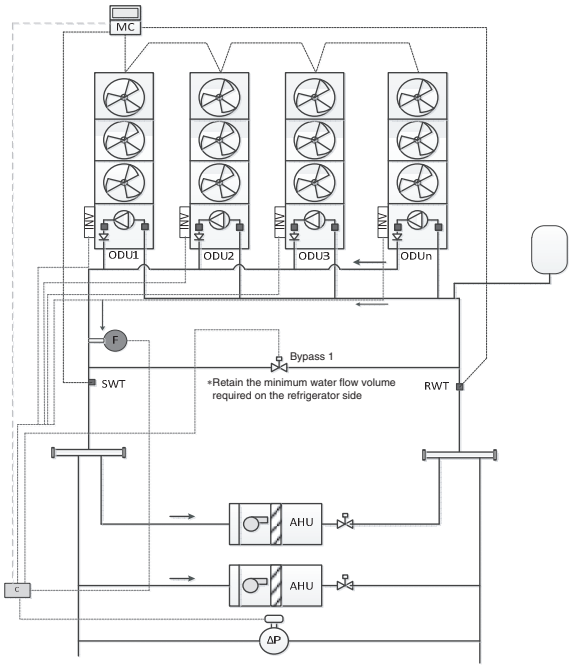

∗1 BMS = Building Management System

## ■ System 6

| Product, Part | Amount | Function | Arrangement | | Mounting Location | |
|---|---|---|---|---|---|---|
| | | | Trane | Customer | Trane Factory | On-Site |
| Module Chiller | Depends on design | Cold or hot water source | ○ | | - | |
| Unit Controller (UC) | 1 per module | Control and monitoring of each module | ○ | | ○ | |
| Module Controller (MC, w/ Modbus) | 1 | Control module | ○ | | | ○ |
| BACnet Interface | 1 | For BMS ∗1 | ○ | | | ○ |
| Water temperature sensor (system leaving/returning) | 2 | Module Controller input | MC accessory | | | ○ |
| Primary pump (variable speed) | 1 per module | Cold/Hot water circulation | ○ | | ○ | |
| Flow switch | 1 per module | Protection when water stopped | | Connect to UC | | ○ |
| Bypass valve | 1 | Check the minimum flow volume of the chiller | | ○ | | ○ |
| Flow meter | 1 | Primary pump input control | | ○ | | ○ |
| Water check valve | 1 per module | Water passing functionality of driver module | | Connect to UC | | ○ |

| Considerations: | |
|---|---|
| Trane | 1. Signals to the customer via the BMS system which units have completed the start-up preparation. (The customer should check that the pipework is prepared).<br>2. Sends information about the number of operating freeze-prevention pumps to the customer's BMS system. |
| Designer<br>Contractor | 1. The primary pump is controlled from signals sent directly to the pump inverter via a signal cable, according to the signals in column 1 above.<br>2. Selects the check valve that can be mounted to the outlets of each module.<br>3. Selects and mounts the bypass valve. Controls the bypass valve so that the minimum water flow for each module is retained.<br>4. Selects other components required for the water system, including flow switches, and mounts.<br>5. When an anti-freeze unit number signal is sent from the Module Controller, you will be able to identify the water flow prepared for freeze protection. |

6



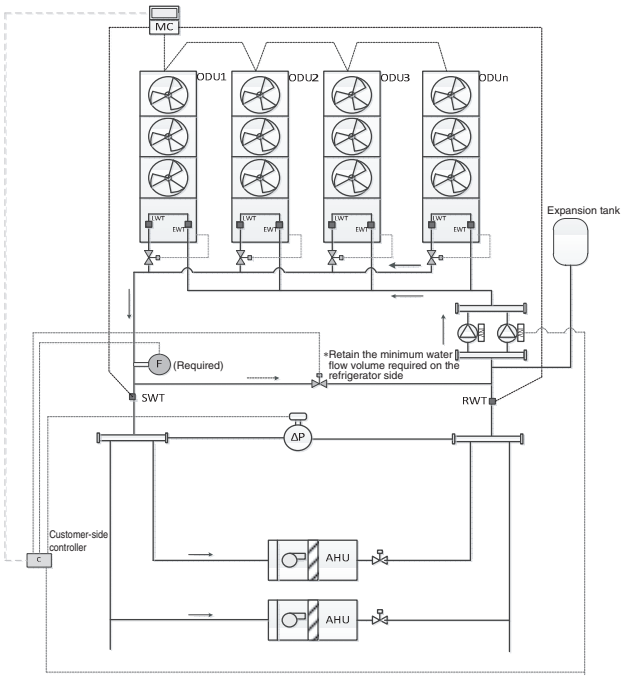

∗1 BMS = Building Management System

## ■ System 7, 8

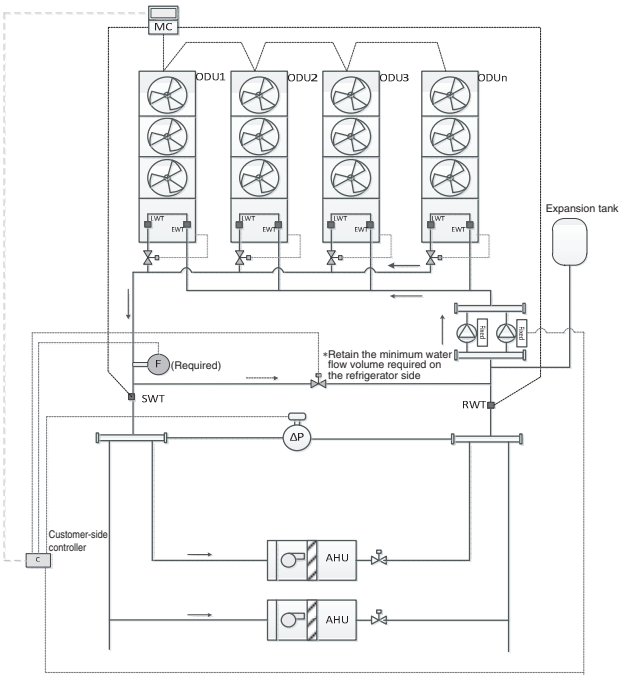
| Product, Part | Amount | Function | Arrangement | | Mounting Location | |
|---|---|---|---|---|---|---|
| | | | Trane | Customer | Trane Factory | On-Site |
| Module Chiller | Depends on design | Cold or hot water source | ○ | | - | |
| Unit Controller (UC) | 1 per module | Control and monitoring of each module | ○ | | ○ | |
| Module Controller (MC, w/ Modbus) | 1 | Control module | ○ | | | ○ |
| BACnet Interface | 1 | For BMS *1 | ○ | | | ○ |
| Water temperature sensor (system leaving/returning) | 2 | Module Controller input | MC accessory | | | ○ |
| Primary pump | 1 per module | Cold/Hot water circulation | | ○ | | ○ |
| Flow switch | 1 per module | Protection when water stopped | | Connect to UC | | ○ |
| Bypass valve | 1 | Check the minimum flow volume of the chiller | | ○ | | ○ |
| Flow meter | 1 | Primary pump input control | | ○ | | ○ |
| Water check valve | 1 per module | Water passing functionality of driver module | | Connect to UC | | ○ |

| Considerations: | |
|---|---|
| Trane | 1. Clarifies the maximum flow and minimum flow for each module. (The customer should check the flow is within the valid range when controlling the primary pump).<br>2. Sends information about the number of operating modules to the customer's BMS system.<br>3. Sends information about the number of operating freeze-prevention pumps to the customer's BMS system.<br>4. Controls the opening/closing of the motor-operated valves. |
| Designer Contractor | 1. Selects between the primary and secondary pumps.<br>2. Installs the primary pump and builds the control system.<br>3. Selects motor-operated valve and mounts to the outlets of each module.<br>4. Selects other components required for the water system, including flow switches, and mounts.<br>5. If the Module Controller outputs an anti-freeze signal to the BMS, operate the corresponding pump.<br>6. Selects and mounts the bypass valve. Controls the bypass valve so that the minimum water flow for each module is retained. |

7




8




1 BMS = Building Management System

# 7 Installation

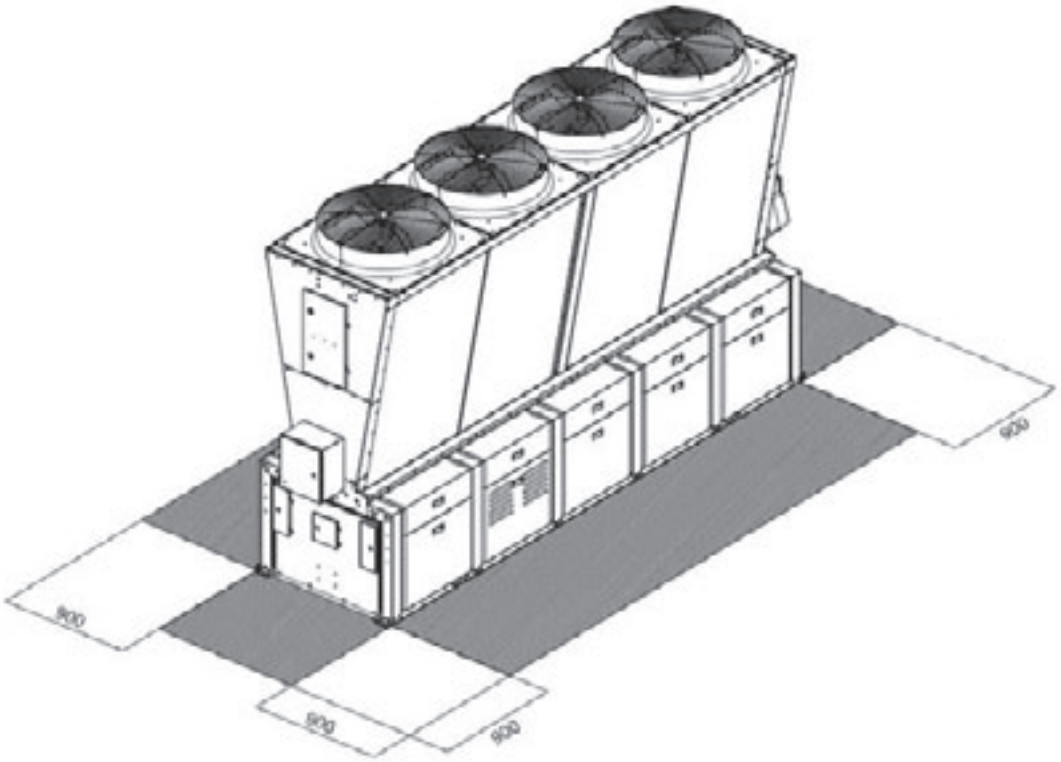
## 7-1. Installation Location

### Pre-Installation Preparation

Check that the information on the unit's nameplate matches the information from the order. Inspect the unit and check that no damage occurred during shipping and that no parts are missing. If any damage has occurred or parts are missing, contact Trane immediately.

### Installation Location Guidelines

1. Do not install in the vicinity of objects that generate a lot of heat, including steam or flammable gas.
2. Install in a location that is not affected by thermal radiation.
3. Install in an open location with sufficient ventilation. The ambient air of the unit should not be influenced by the exhaust of other coolers or heaters.
4. Units installed outdoors commonly have obstacles around them. In such cases, make sure that the minimum distances noted in the figure below are adhered to.
5. Installing the unit in any of the locations listed below may result in failure. Do not install the unit in any of the locations listed below.
   Areas with atomized engine oil
   Coastal areas (where severe salt damage may occur)
   Hot-spring areas
   Flammable areas
   Areas with acidic fumes
   Areas with metal dust
   Areas with high humidity
   Areas with thick gas plumes
   Areas with a slope greater than 1/2000

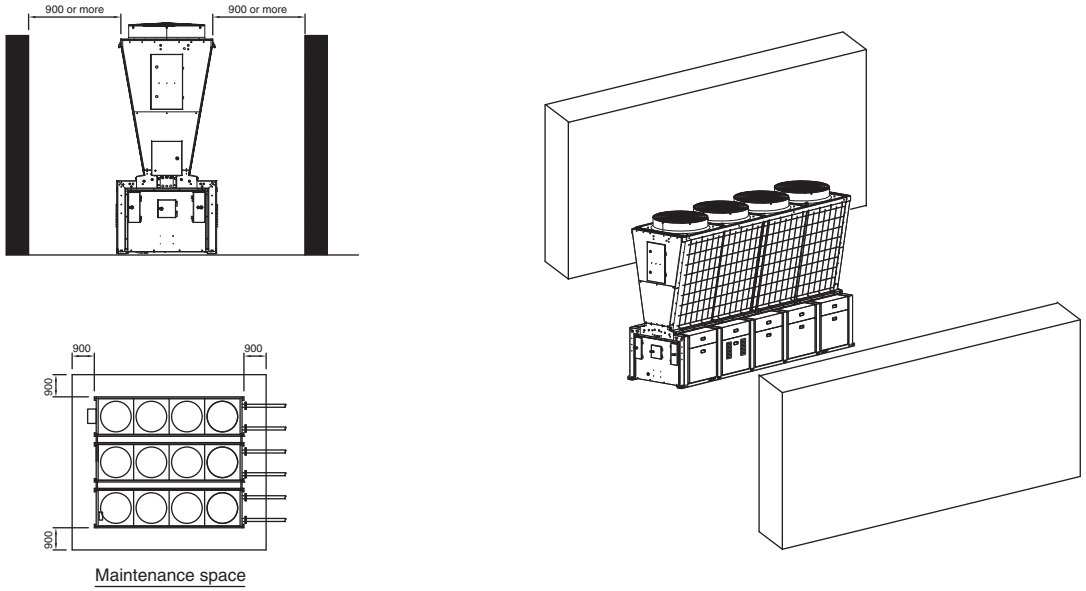



Service and Maintenance Spacing: Single unit

[Standard Mounting Method]

Installation Location Guidelines

- Do not install in the vicinity of objects that generate a lot of heat, including steam or flammable gas.
- Install in a location that is not affected by thermal radiation.
- Install in an open location with sufficient ventilation. The ambient air of the unit should not be influenced by the exhaust of other coolers or heaters.
- Place at sufficient intervals such that intake and exhaust will be separated. (Do not allow short circuits)

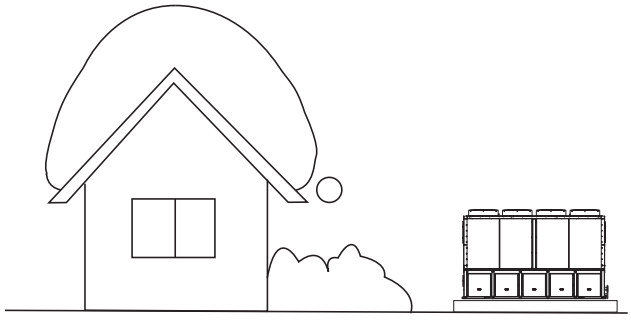



Service and Maintenance Spacing: Module unit

**Installation in Cold Regions**

Take the following countermeasures if installing units in locations with a cold climate where the effects of snow are a concern.

1. If snow may accumulate on the roof, then do not install the unit below the roof. The snow may slide off and cause damage to the unit.



Correct installation example

2. Install the panel on a foundation at least 300mm above ground level. Ice or snow may have a negative effect upon the operation of the unit.
3. Take strong wind countermeasures as necessary and consider seasonal impacts when mounting along coasts and other areas with strong winds.
4. To prevent the negative influence of snow, we recommend the unit be installed atop a rebar framed structure.

### Noise

Install units at an appropriate distance from neighbors so as to prevent disruption of work or sleep due to noise.

### Drainage

1. Check that the installed unit has appropriate drainage. Take appropriate countermeasures to ensure there is no leakage.
2. Water from the heat pump during the defrost cycle should be appropriately drained from the unit. Check to see there are no water puddles or ice on the foundation.
3. If installing units in locations with heavy snowfall, be sure to protect the unit to prevent damage due to the snow.

[Water Pipework]

- Using untreated or inappropriately treated water with the heat exchanger may result in build up of scale, corrosion, rust, algae, or sludge. If water treatment is necessary, determine a suitable method after consulting a qualified water treatment specialist.
- Wash the pipes before performing final connections.
- Do not connect pipes to the unit in the wrong direction. Water should enter from the designated "Inlet" and exit from the "Outlet".
- Select a suitable material for cooling and heating modes if using PVC pipes. Cracks or damage may result in water damage.

# 7-2. Installing and Hanging Modules

**Installation of this system includes the following activities.**

1. Unit equipping and installation
2. System wiring
3. Installing water pipework
4. Cleaning outgoing water pipework
5. Conducting pressure tests
6. Water pipework purification and filling
7. Testing water system
8. Initializing pumps (optional)

## Hanging Units

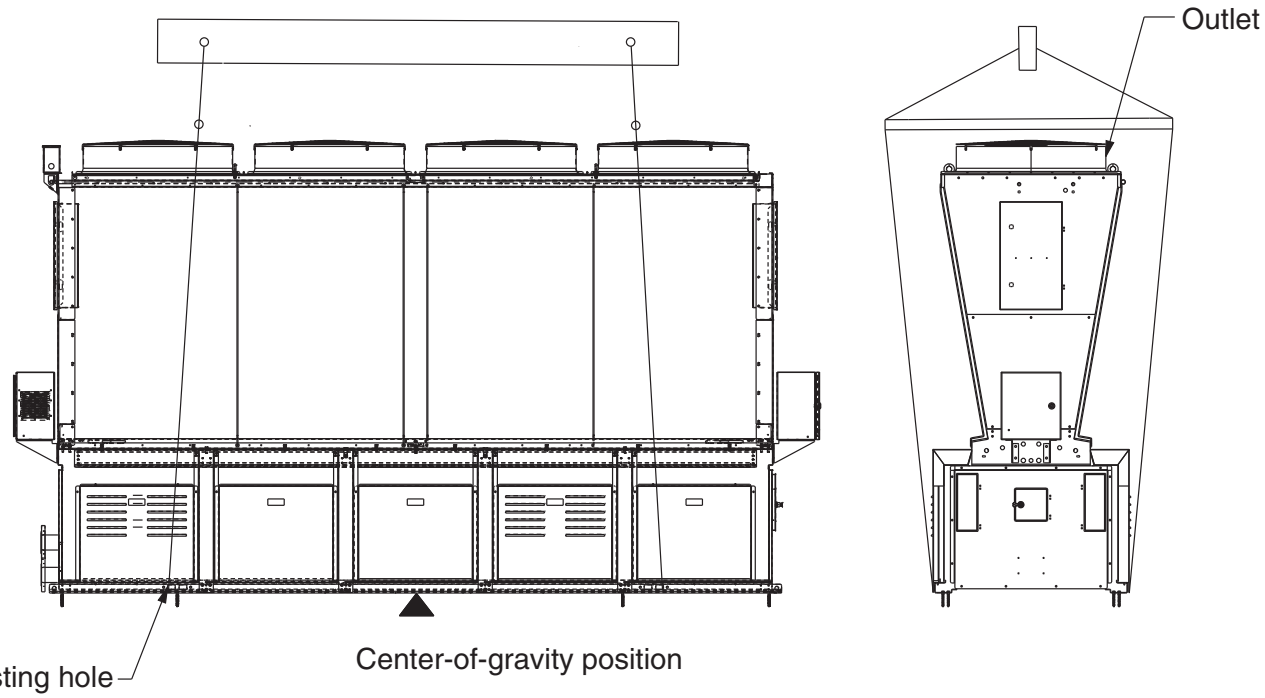
**Warning**

**Heavy: Check that the unit is adequately supported.**

**Hang the unit as per the following diagram. Adjust belt lengths as necessary in order to hold the unit level. Failing to adhere to the correct hanging method may cause damage to property or the equipment. Incorrect hanging techniques may also result in death or serious injury.**

1. Check that the air outlet at the top of the machine is not damaged by the cable.
2. Air heat exchangers are susceptible to shocks and are very fragile, so sufficient care must be taken when handling.
3. Hang the unit in accordance with the center of gravity shown in the diagram below.
4. Do not allow the unit to tilt at more than 15 degrees when lifting.
5. Notes for using a forklift
   Make sure that you do not damage the sheet metal of the unit when inserting the forks of the forklift. Also take care to ensure the forks are completely inserted into the unit.

Hoisting method

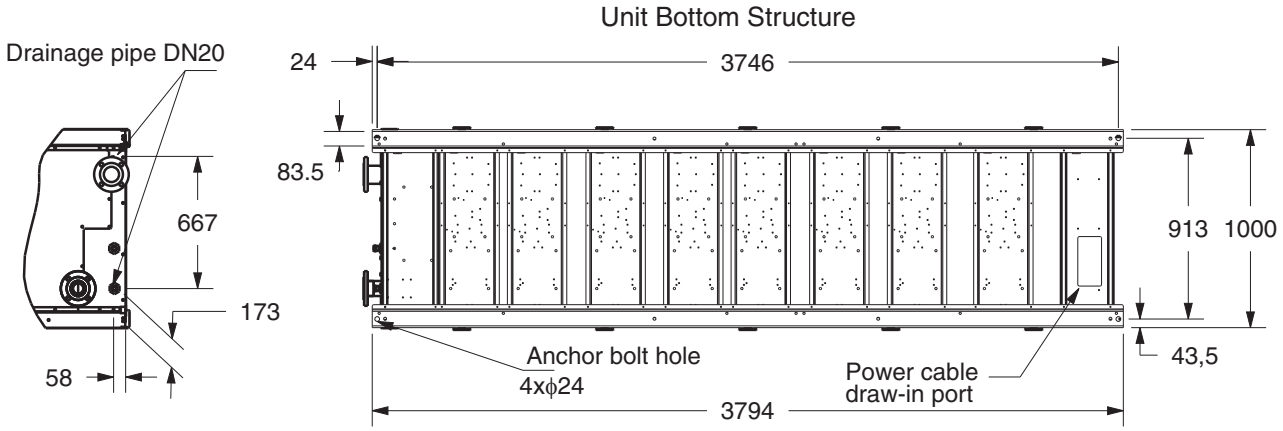


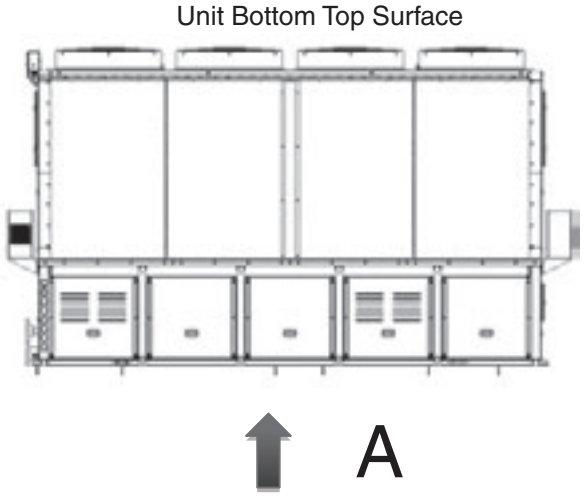
# 7-3. Installation Mode: Installation

## Warning

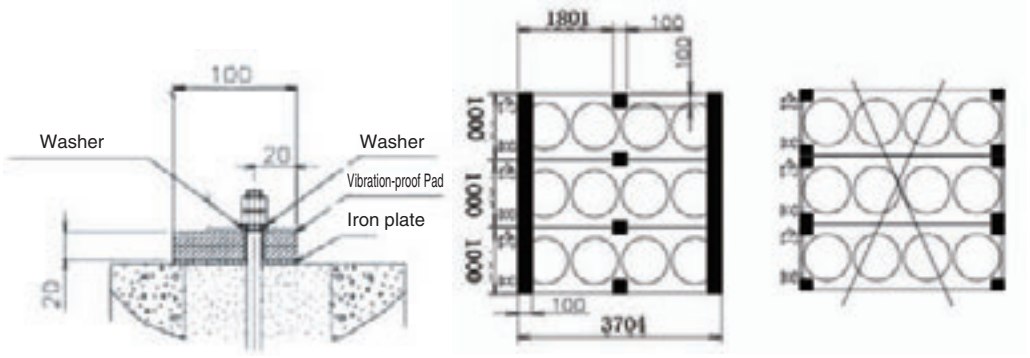
**Heavy: Check that the unit installation site possesses sufficient strength.**
**The structure of the floor must be such that it can completely bear the weight of the unit. If not appropriate, confirm the strength of the flooring. If the flooring is not strong enough, the unit may fall from its installed position and result in death or serious injury and damage to property and equipment.**

1. Use anchor bolts when installing the unit to fix it in place.
   (Example of direct fixing to the foundation)



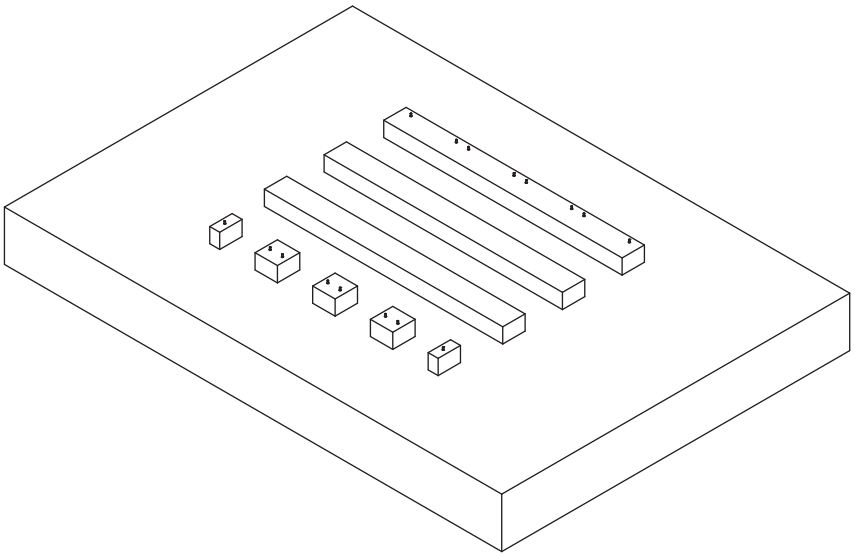




2. If wanting to apply a vibration-proof platform, use a 20mm thick, 100mm wide buffer pad. Refer to the notes below for installation location guidelines.
   (Example using a vibration-proof pad)

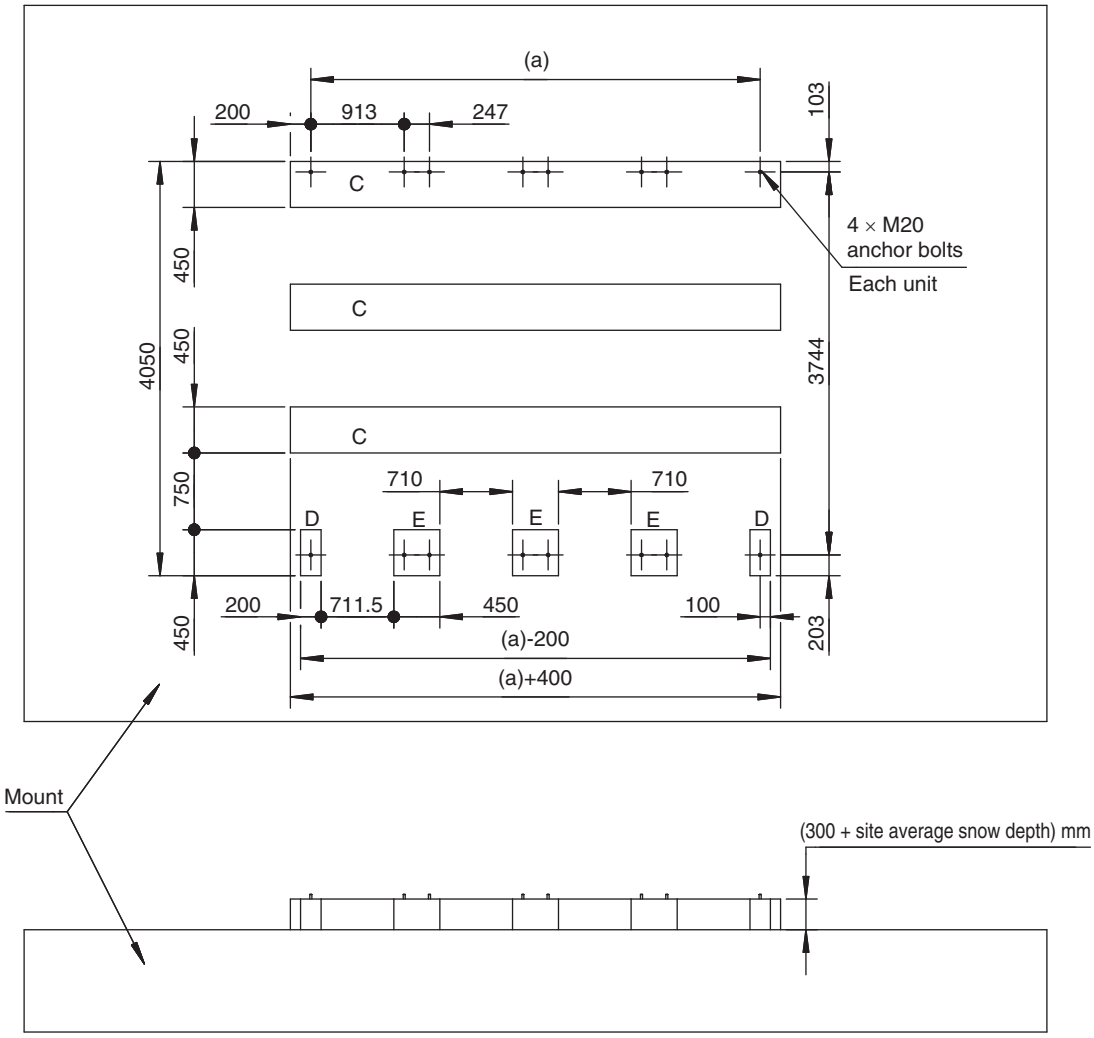



3. Contact us if using spring vibration-proofing.

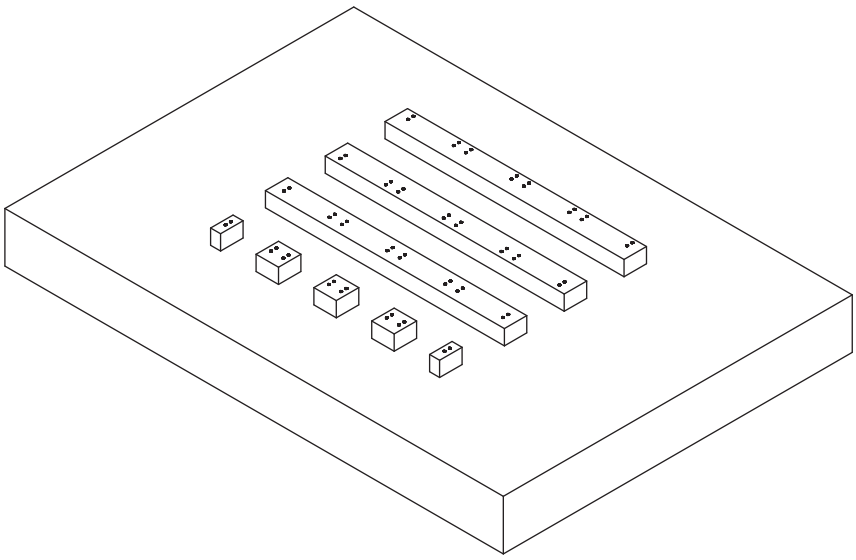
"Example Installation Foundation Application"
Unit foundation cannot be installed at locations with a gradient greater than 1/2000. The red parts indicate concrete pillar placement while the green parts show the position of steel H-beams.
Basic Arrangement A (placing the unit along the width of the concrete pillars)
Standard Unit Installation (reference diagram)



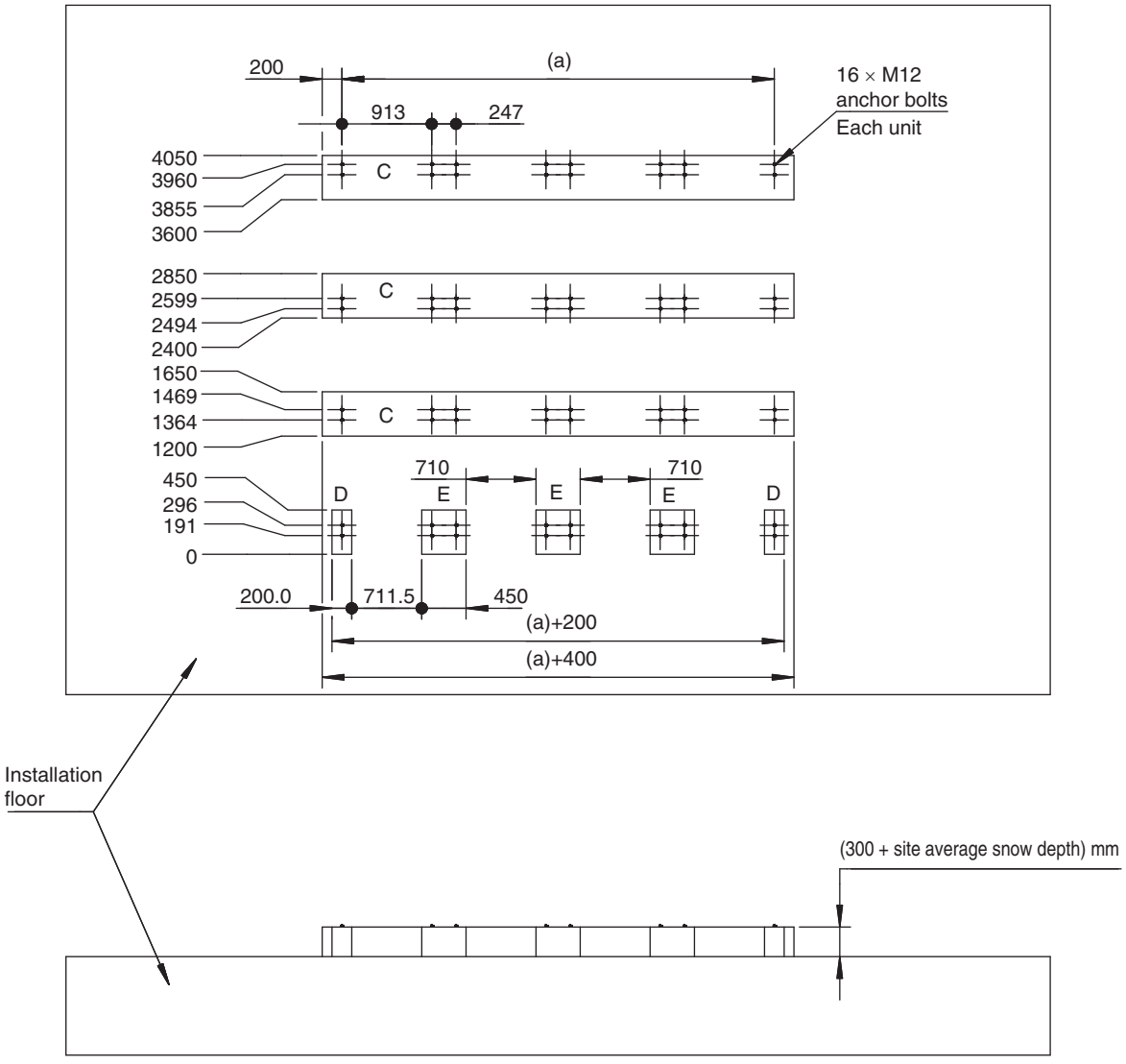
Standard unit options

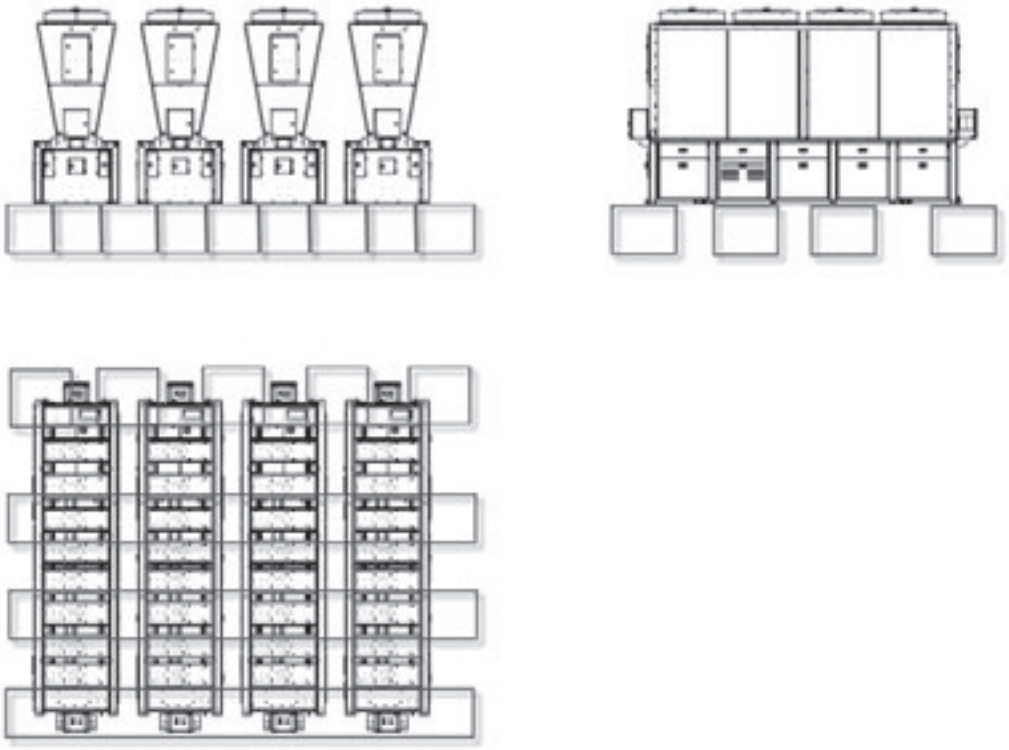


## Unit Installation with Vibration-Proof Rubber Option (reference diagram)

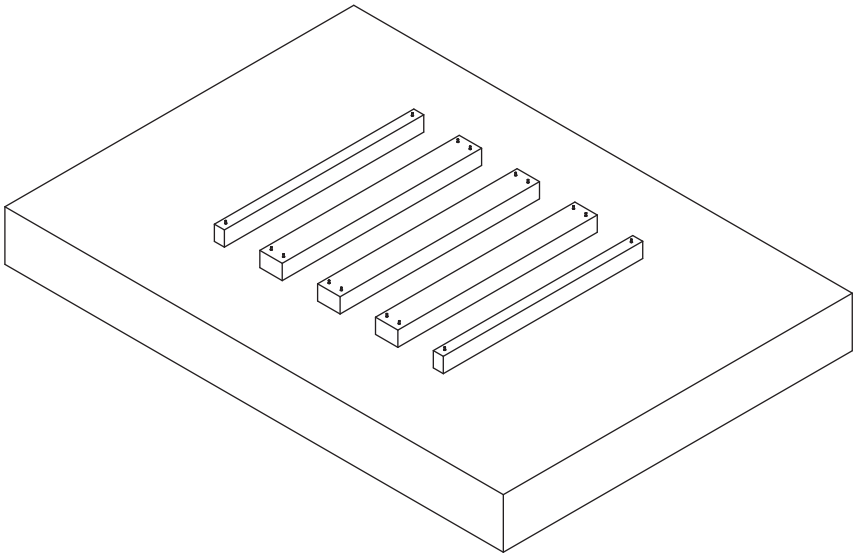


Rubber pad incl.

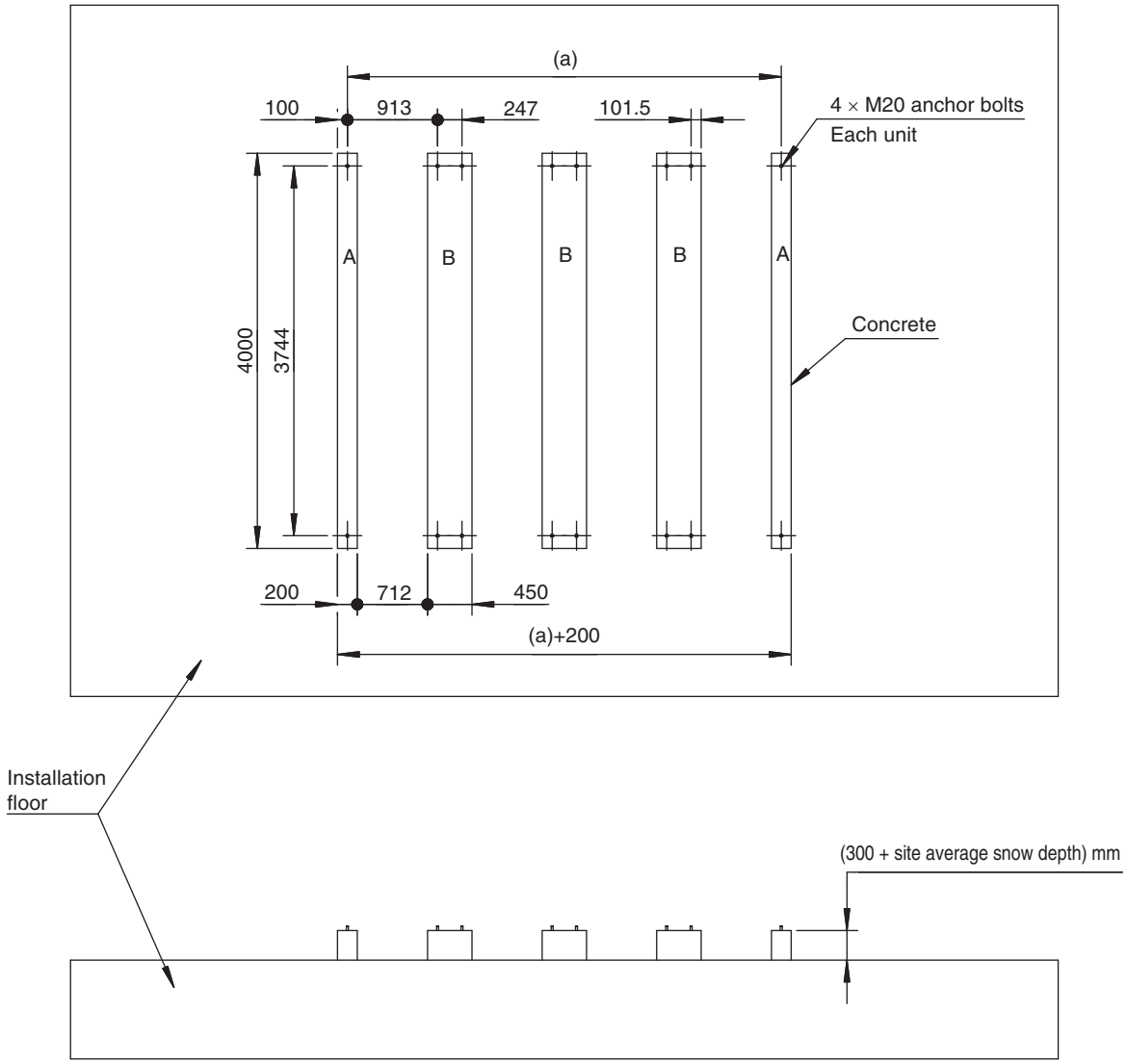




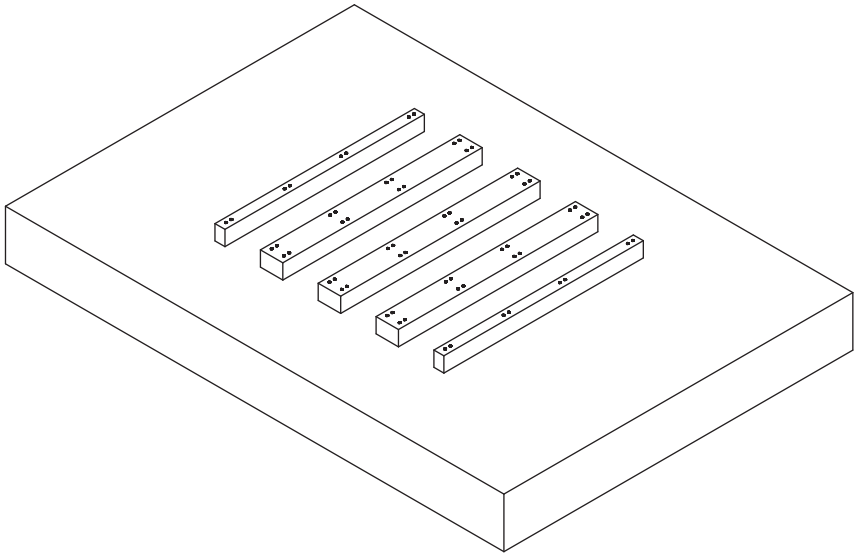
Basic Arrangement B (placing the unit along the length of the concrete pillars)
Standard Unit Installation (reference diagram)



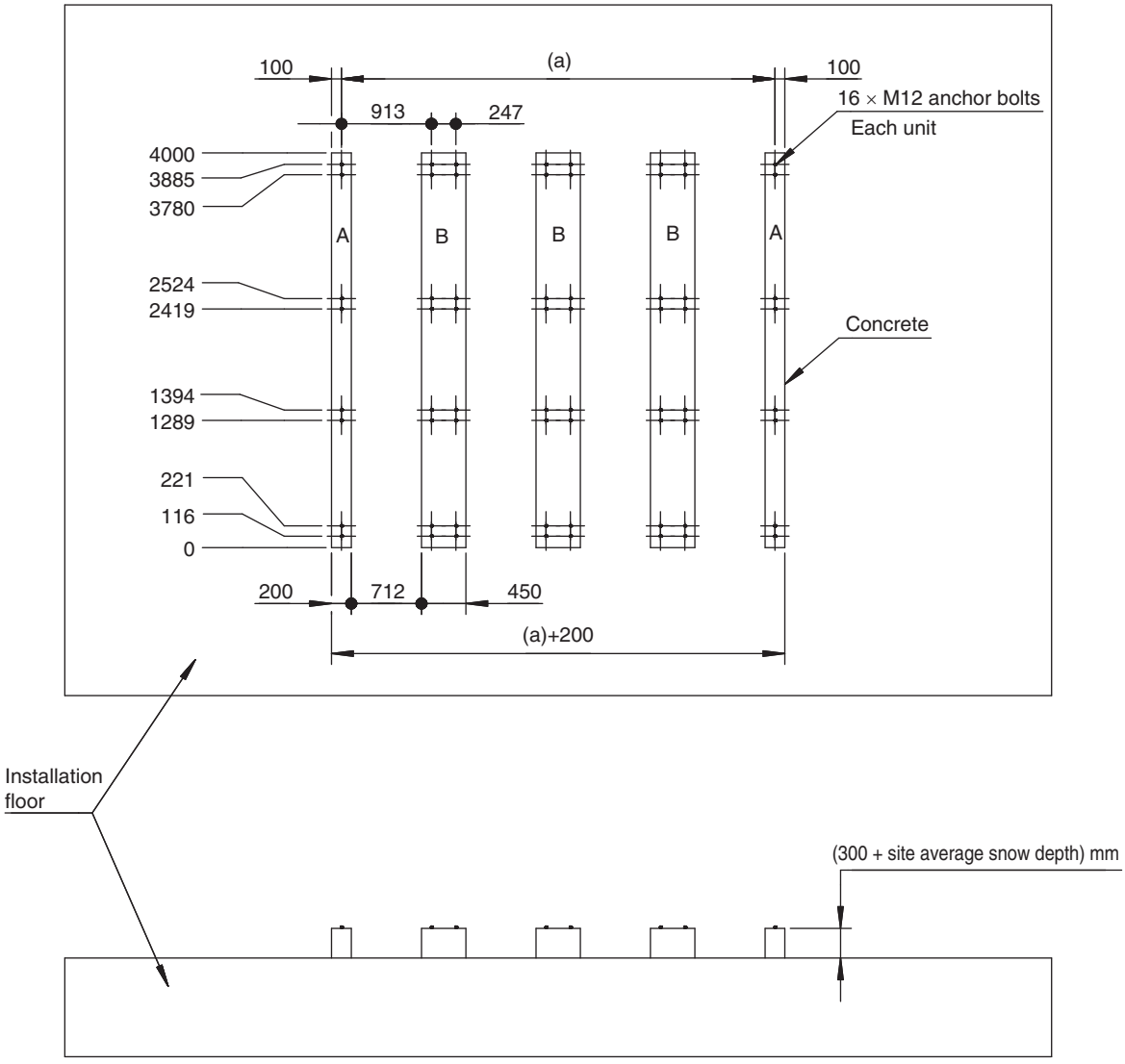
Standard unit options

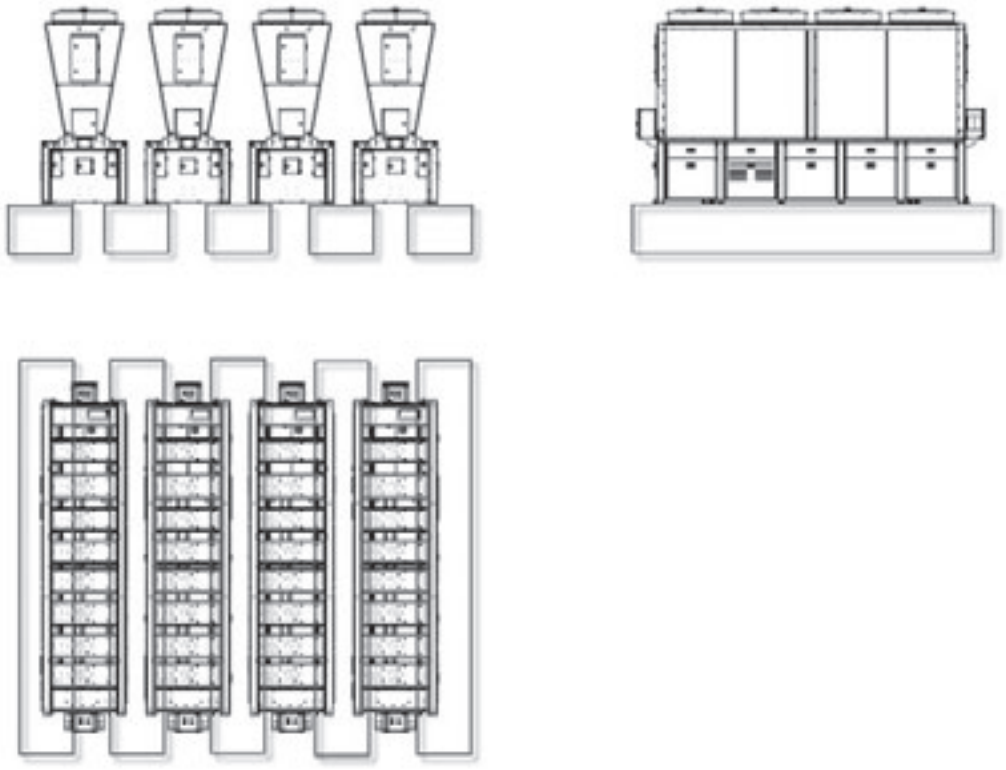



Unit Installation with Vibration-Proof Rubber Option (reference diagram)

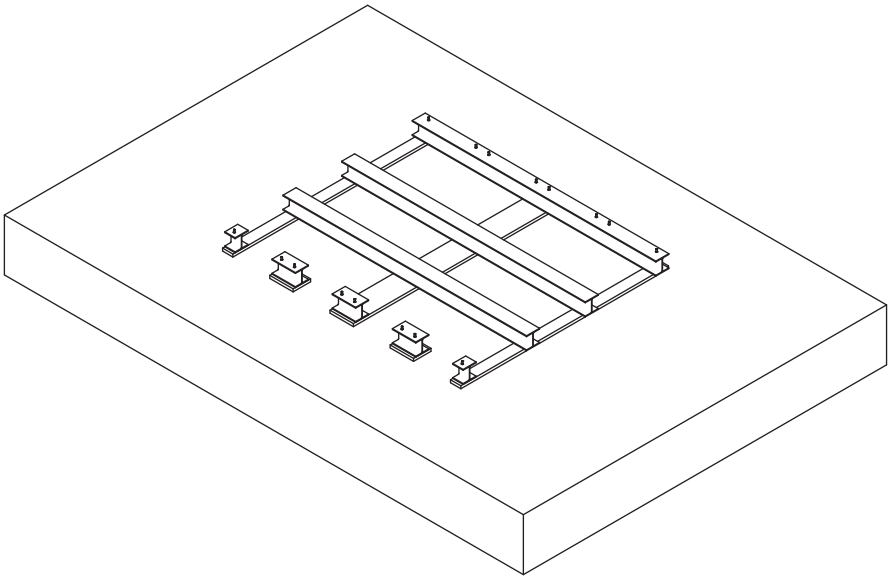


Rubber pad incl.

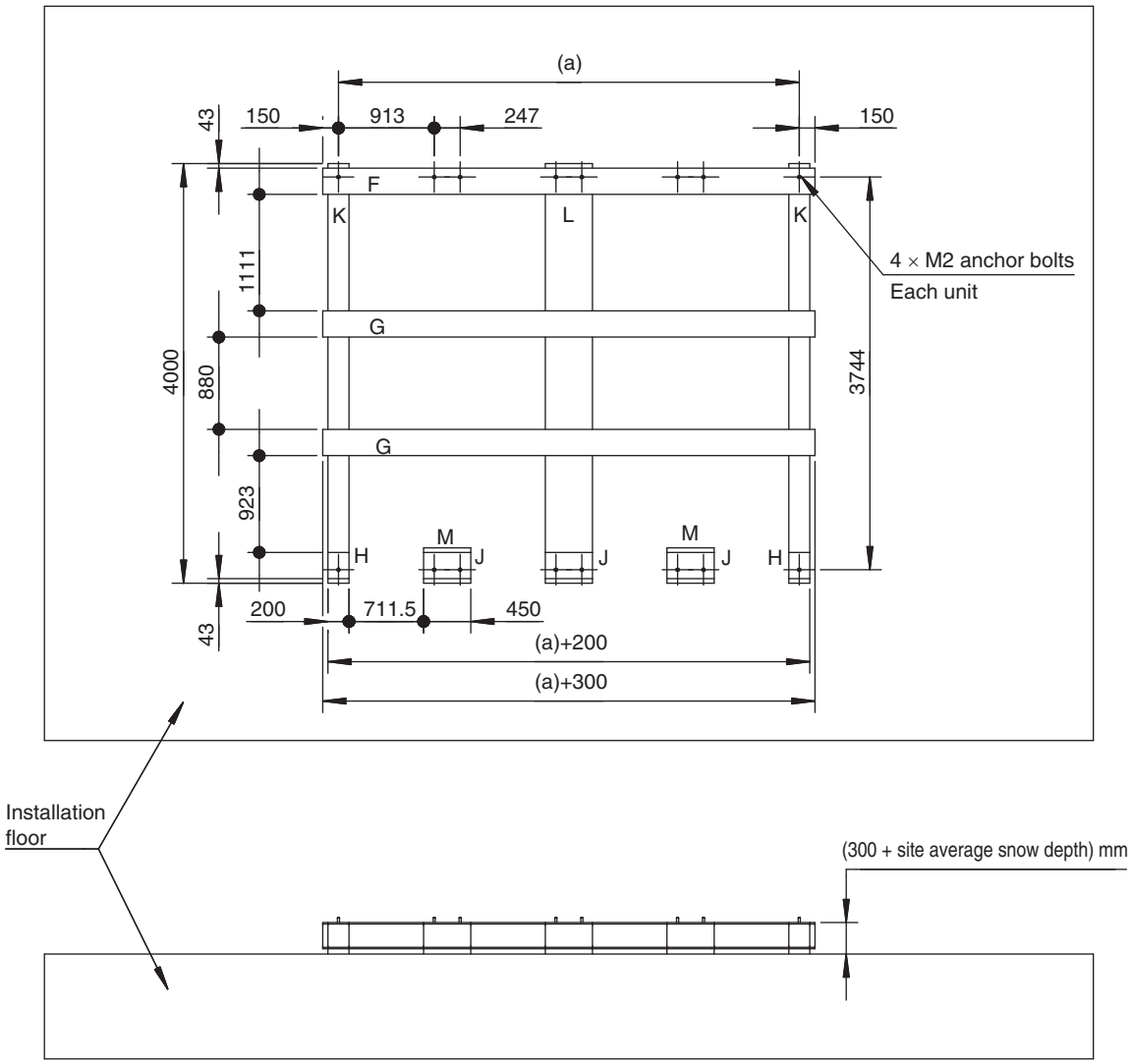




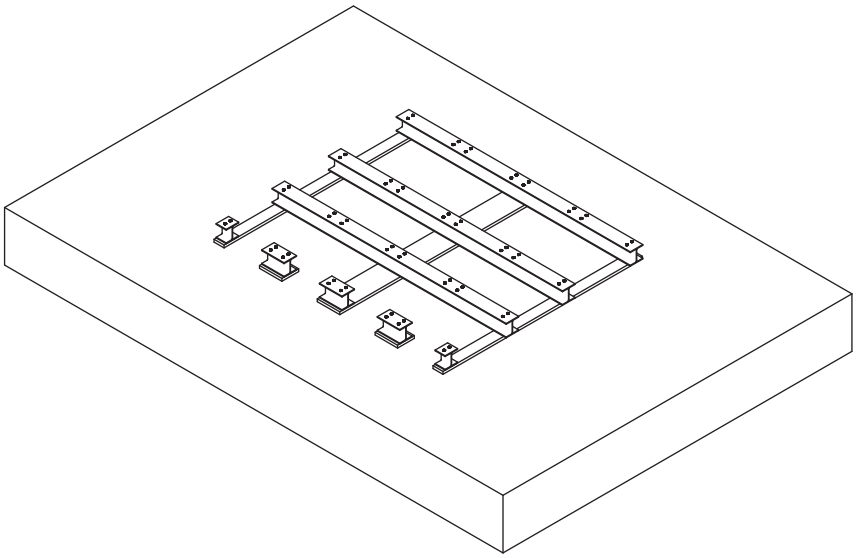
Basic Arrangement C (placing the unit along the width of the concrete pillars and adding steel H-beams)
Standard Unit Installation (reference diagram)



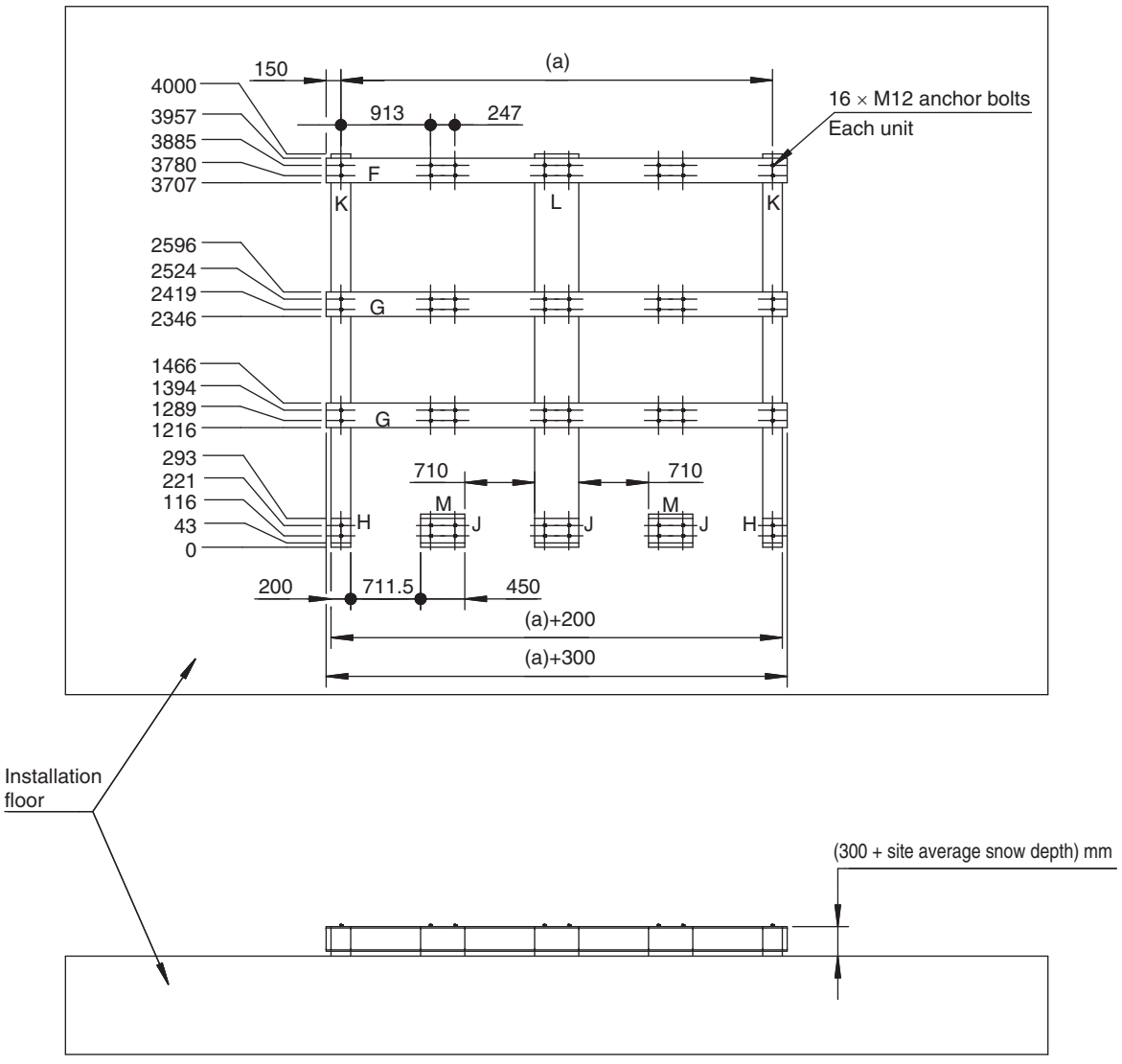
Standard unit options

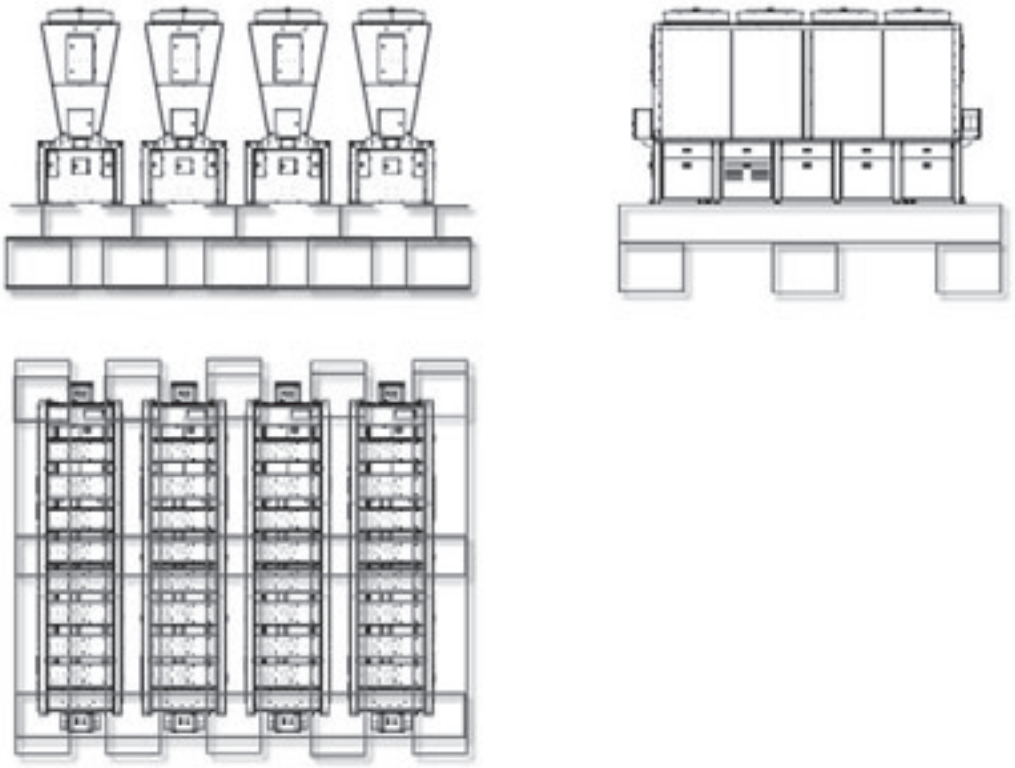


Unit Installation with Vibration-Proof Rubber Option (reference diagram)



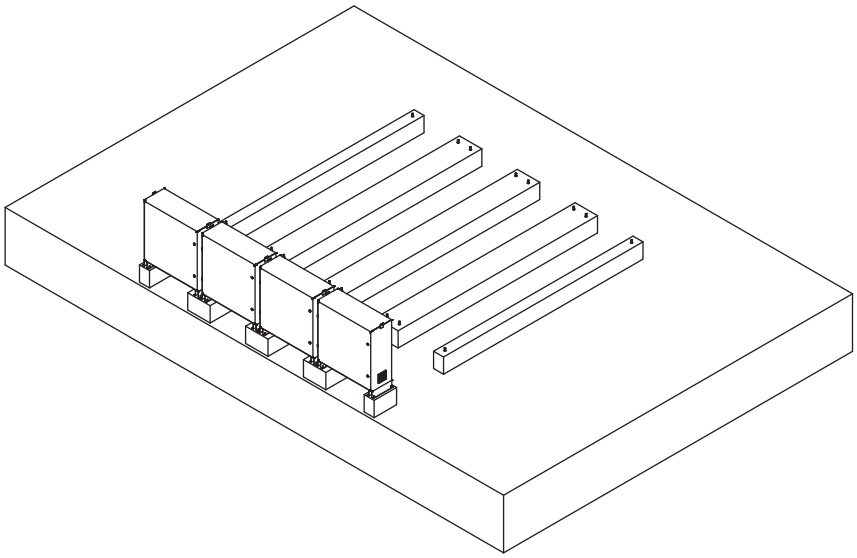
Rubber pad incl.



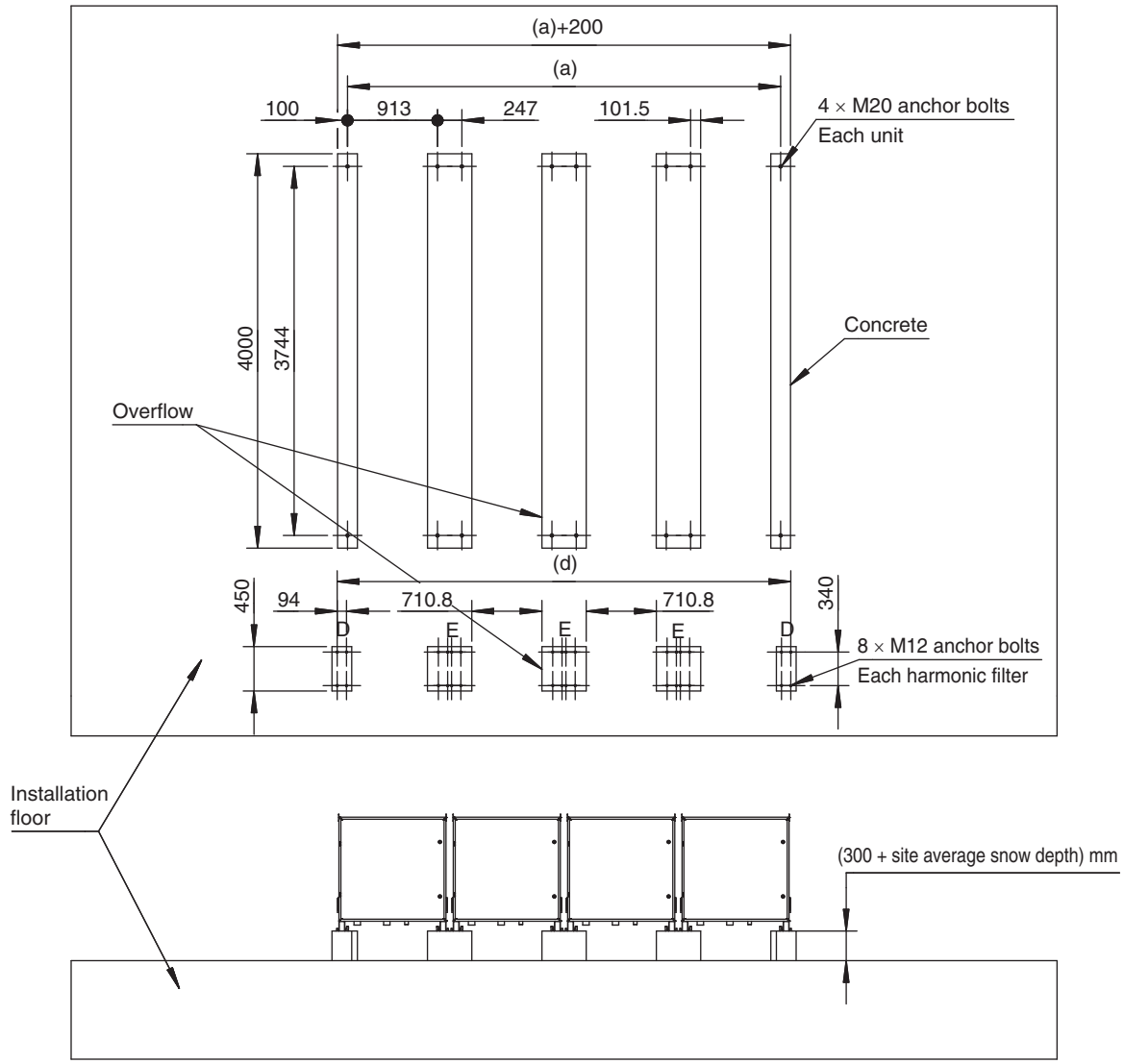


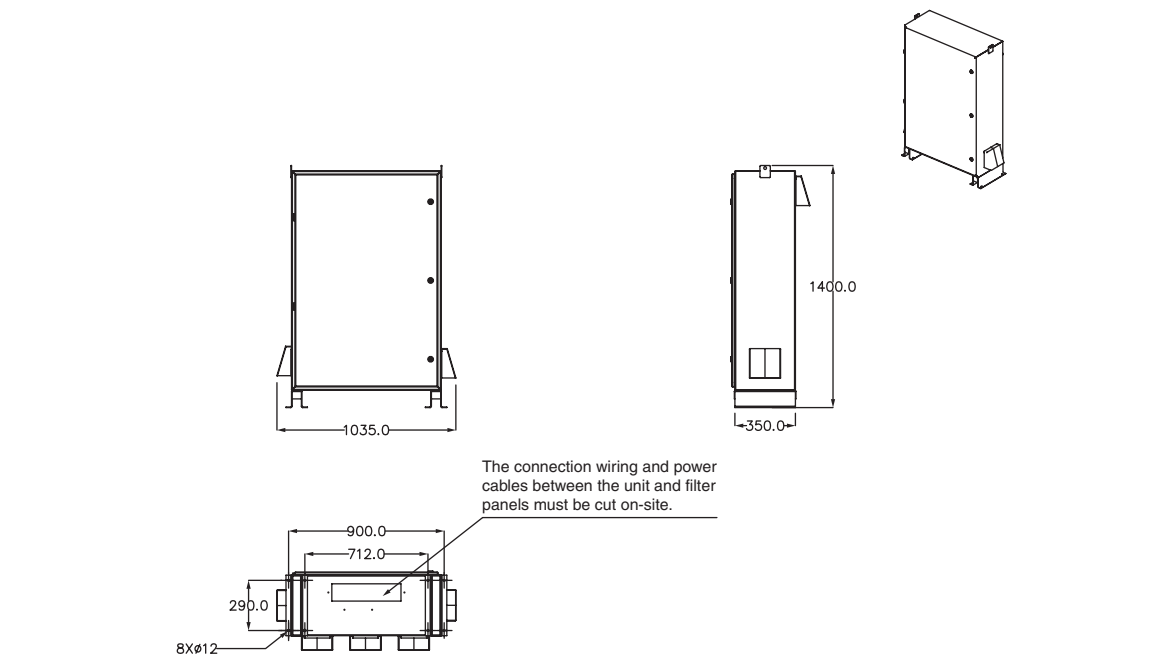
Basic Location of Filter Attachments
Be careful to retain at least 930mm of free space between the unit and the filter when installing the filter.

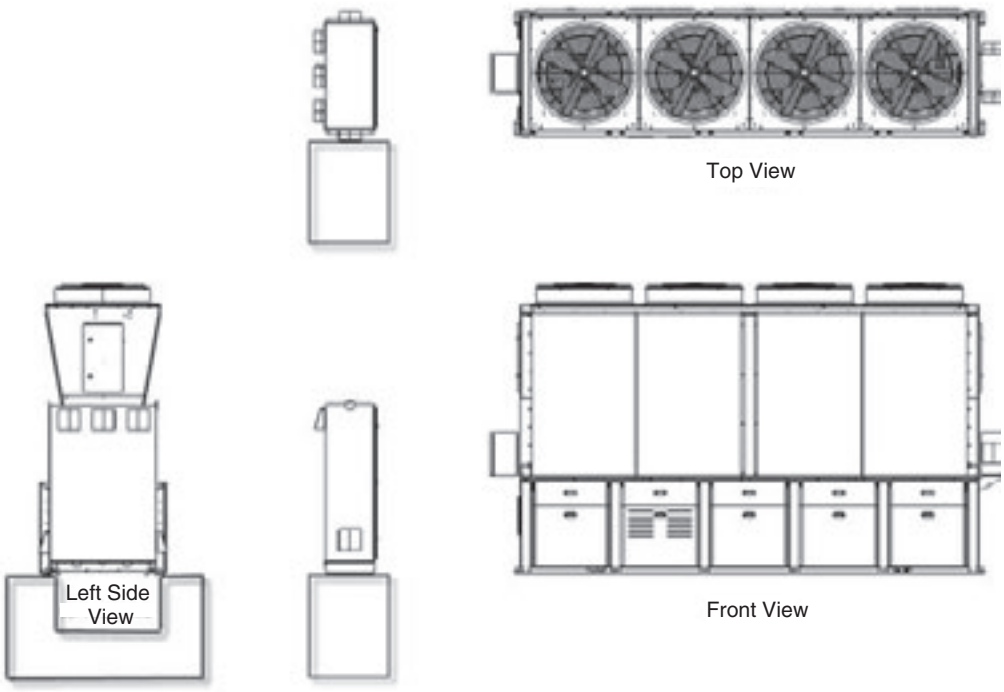
Harmonic Filter Installation (reference diagram)
The harmonic filter panel doesn't necessarily require installation in front of the unit and can be mounted at a location to suit site requirements.



Harmonic filter options



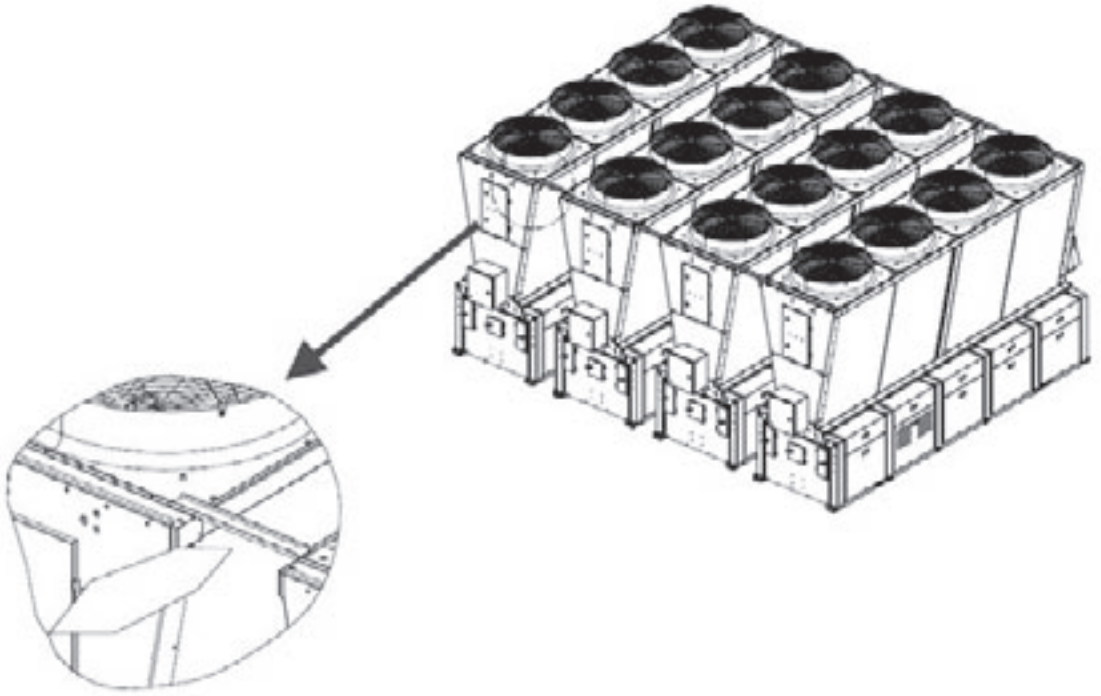


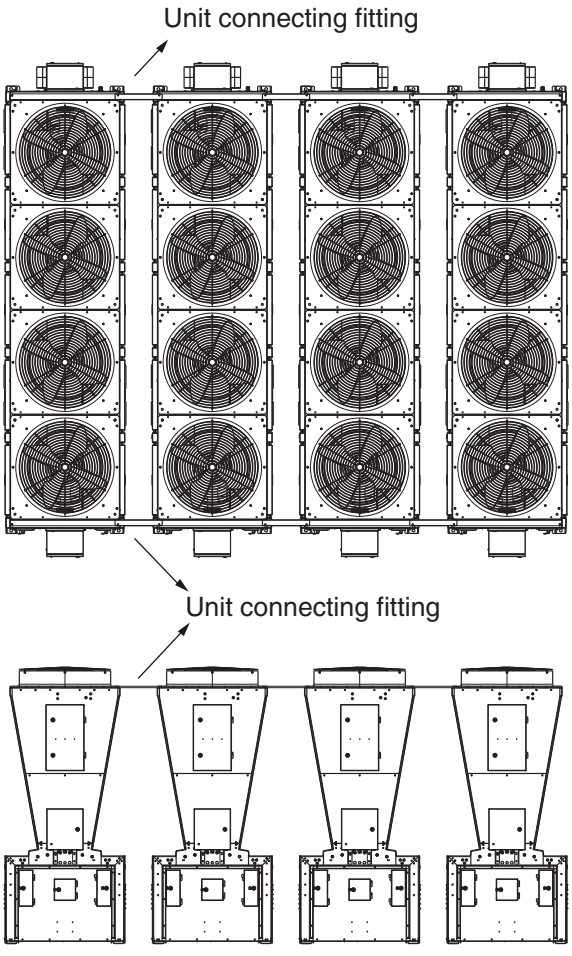

| No. of Units | (a) mm | (d) mm | No. of Units | (a) mm | (d) mm | No. of Units | (a) mm | (d) mm | No. of Units | (a) mm | (d) mm |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 913 | 1120 | 6 | 6713 | 6920 | 11 | 12513 | 12720 | 16 | 18313 | 18520 |
| 2 | 2073 | 2280 | 7 | 7873 | 8080 | 12 | 13673 | 13880 | 17 | 19473 | 19680 |
| 3 | 3233 | 3440 | 8 | 9033 | 9240 | 13 | 14833 | 15040 | 18 | 20633 | 20840 |
| 4 | 4393 | 4600 | 9 | 10193 | 10400 | 14 | 15993 | 16200 | 19 | 21793 | 22000 |
| 5 | 5553 | 5760 | 10 | 11353 | 11560 | 15 | 17153 | 17360 | 20 | 22953 | 23160 |

| Code | Installation Base Structure | Notes |
|---|---|---|
| A | Concrete | Site Embedded |
| B | Concrete | Site Embedded |
| C | Concrete | Site Embedded |
| D | Concrete | Site Embedded |
| E | Concrete | Site Embedded |
| F | Steel H Piles | JIS A 5526 250X250 |
| G | Steel H Piles | JIS A 5526 250X250 |
| H | Steel H Piles | JIS A 5526 250X250 |
| J | Steel H Piles | JIS A 5526 250X250 |
| K | Concrete | Site Embedded |
| L | Concrete | Site Embedded |
| M | Concrete | Site Embedded |

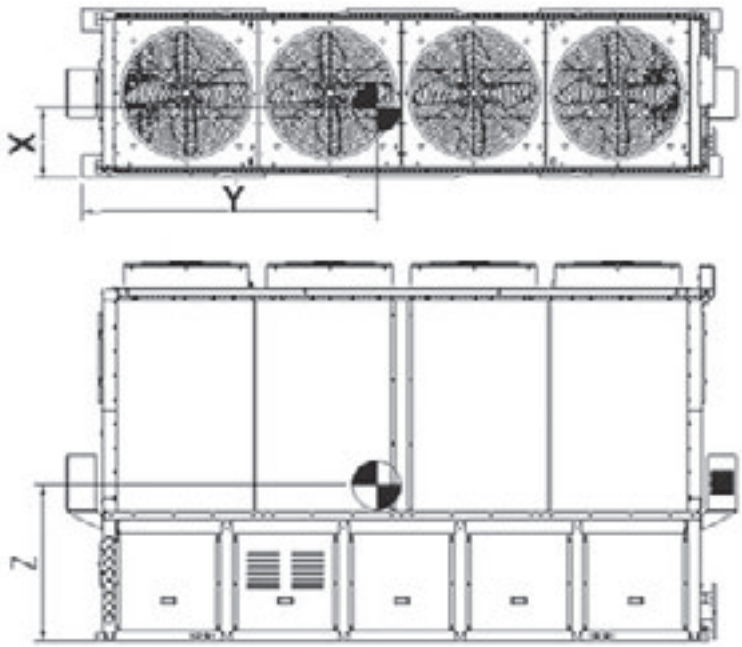
After Installation

1. Connection method: if connecting in parallel, connections should be made according to the diagram below.

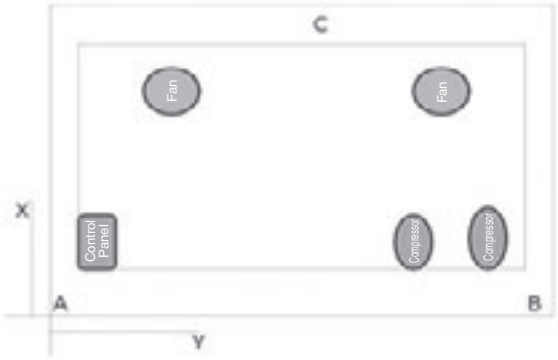




## 7-4. Center of Gravity and Load Distribution



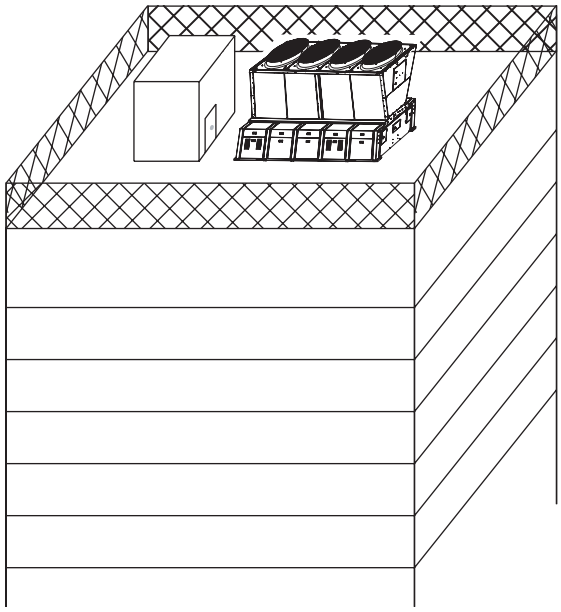

: Center-of-gravity (G)



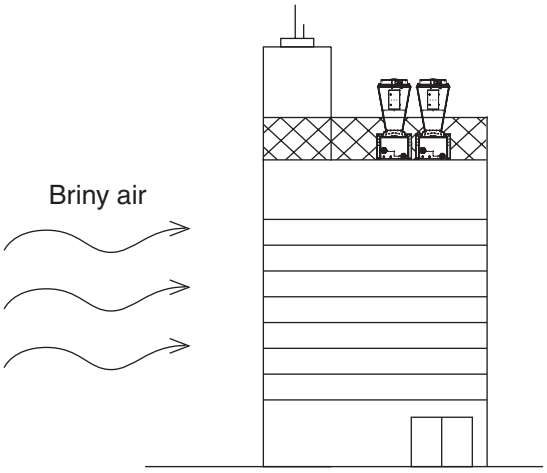

| Center of Gravity G (mm) | | | Load Distribution (kg) | | | Weight |
|---|---|---|---|---|---|---|
| X | Y | Z | A | B | C | (kg) |
| 430.2 | 1824.7 | 797.0 | 396 | 404 | 662 | 1462 |

## 7-5. Other Notes

[1] Installation of handrails and fences
Please install a handrail or fence around the unit if installing the Chiller above a building in order to safely carry, commission and maintain the machine.
Also provide adequate scaffolding of the same height as the machine if it is to be located at high locations relative to ground.

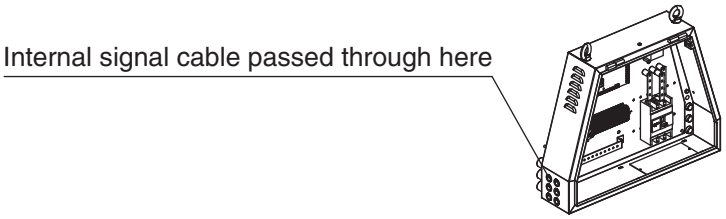


[2] Protection of aluminum fins
If coil surfaces on the air side become exposed to sea air from the coast or sulfides from hot springs or operate in atmospheres with ammonia, there may be damage to the air side coil aluminum fins in particular, so they should be installed in a direction and location to limit such direct exposure. Salt-resistant specifications may need to be prepared when installing in coastal areas with high salinity.

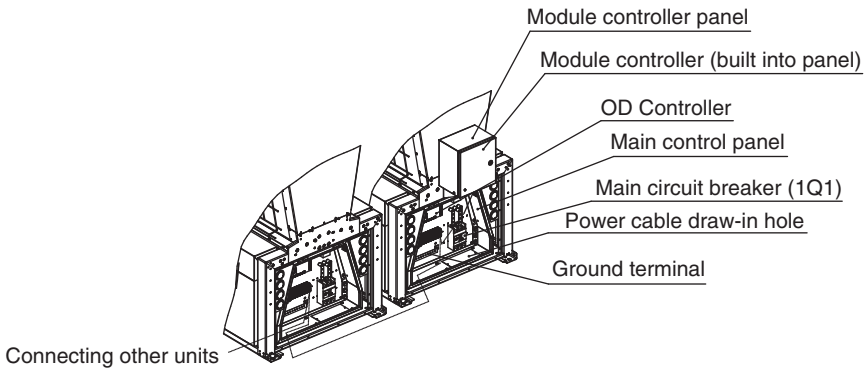


## 7-6. Signal Cable Connections Between Units

Signal Cables Between Units
Refer to the following diagram regarding signal cable structure.
∗Signal cables are configured before shipping from the factory.
[1] Signal cables run from wiring ports to the control panel. Signal cables are attached to the panel before packaging.
[2] As indicated by the figure below, signal connections are made via the left side of the main control panel.




[3] Signal cables are connected using the 1X3-33, 1X3-34 and 1X3-35 terminals on each panel. Terminals 1X3-33, 1X3-34 and 1X3-35 are connected to the CN24 sockets on the OD controller built into the panel. The module controller board also connects to terminals 1X3-33, 1X3-34 and 1X3-35.




[4] Signal cables should be 0.75mm$^2$ or larger shielded twisted pair cables. The wire colors should match and the shield must be continuously connected along the entire length. The user should construct a cable protector for the cables running between units.

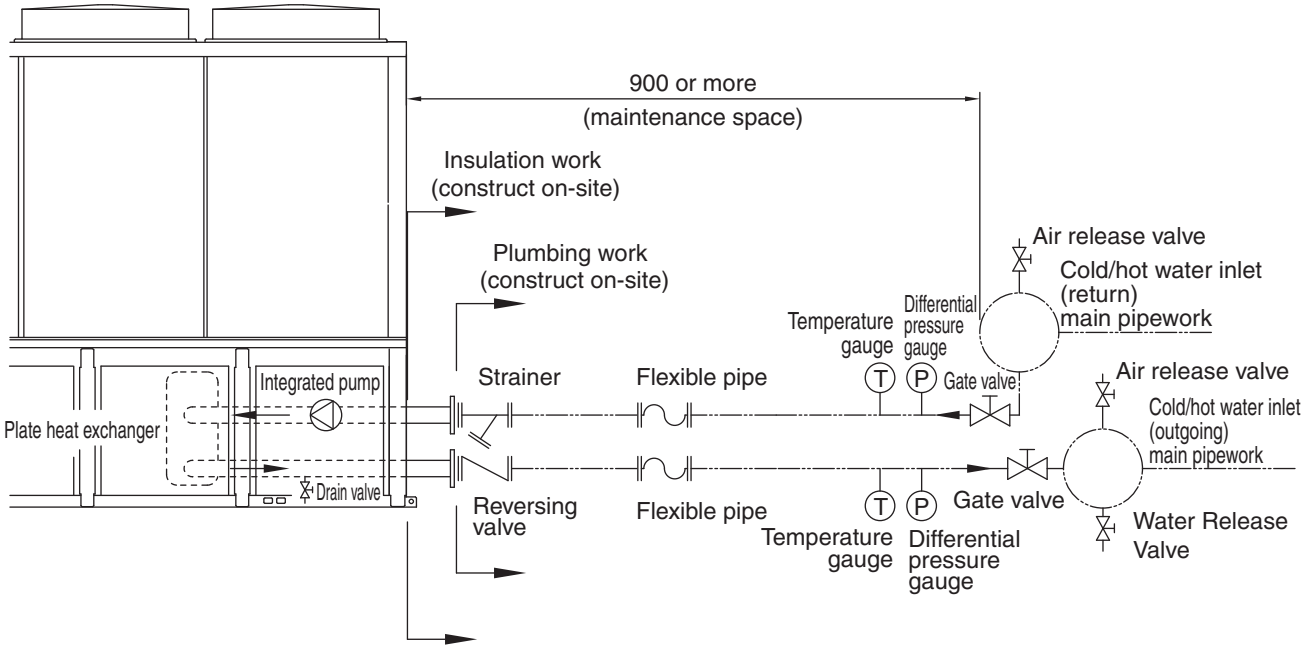
[5] Follow the circuit diagram when installing the terminating resistor required for the unit at the end of the Modular Control communication chain.

# 8 Water Pipework Construction Procedure

Note:
In order to prevent damage to facilities and property, be sure to read the following precautions and follow the instructions. Follow the stipulated regulations when designing the water system and constructing the water piping.

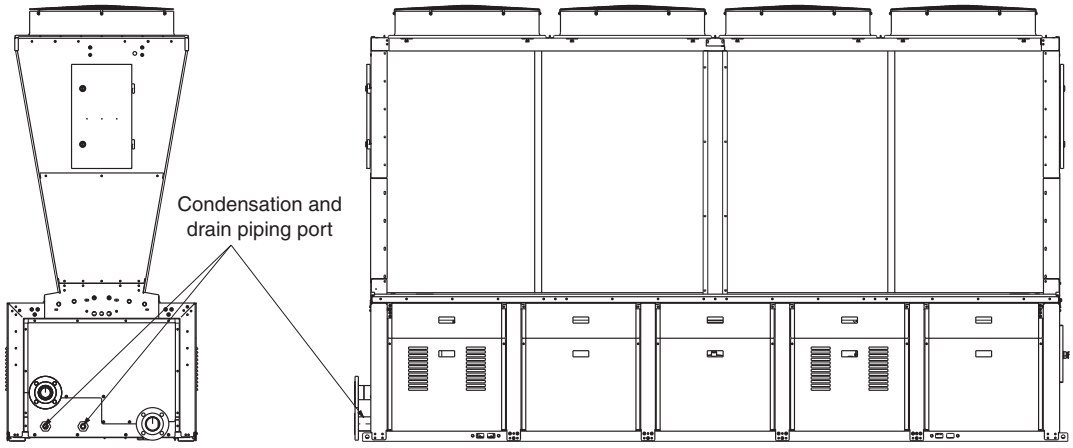
## 8-1. Notes on Installation

The figure below describes the piping structure of a typical Trane Module Chiller as an example. Parts and layout differ depending on the connection port installation position and water source.
The components below are mounted in the factory.
Pump (optional)
Safety valve
The components below must be mounted on-site.
Strainer
Flow switch
Reversing valve
Other components which require on-site mounting.

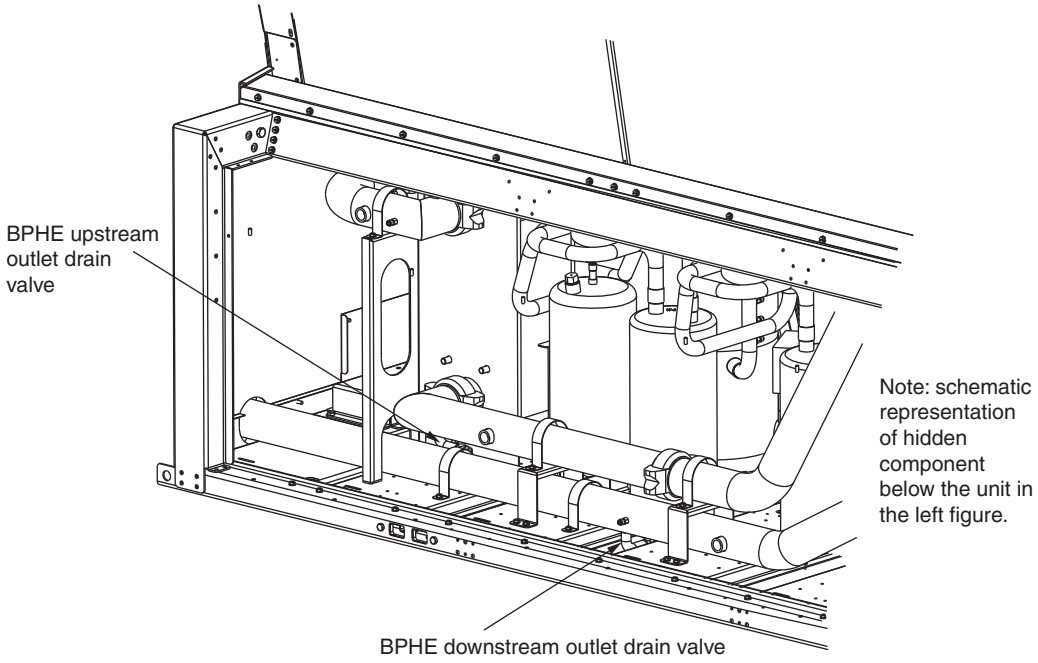



1. The heat exchanger may be damaged, corroded, or suffer buildup of water stains and algae if untreated or inappropriately treated water is used.
2. Be sure to wash the pipes before operating the unit.
3. The water of the BPHE (plate heat exchanger) may contain traces of foreign matter such as rust. Regularly treat the BPHE with chemicals to remove this foreign matter.
4. Hot water should have a temperature of 55°C or less. Using water above 55°C may result in damage to the compressor. Damage to the compressor is not covered by our warranty.
5. Be sure to install a 20 or greater mesh strainer at an appropriate position on the inlet cold (hot) water piping.
6. Use corrosion-resistant materials for the pipes. We recommend stainless steel pipes or standard-conforming carbon steel or PVC pipes.
7. Do not install water pipes to the unit in the incorrect direction. Water should enter from the designated inlet and exit from the outlet.
8. Do not force the Trane Module Chiller to receive the weight of the piping. Receive the weight of the piping with dedicated supports.
9. Cold (hot) water piping should always be coated with an insulating coating. Pipes, filters and check valves etc. that are left exposed by the Trane Module Chiller should also be covered in thermal insulation.
10. Select a suitable material for cooling and heating modes if using PVC pipes. Cracks or damage may result in water damage.
11. Consider installing an automatic air releasing valve at the highest point along the water piping.

12. Pipework is required not only for cold (hot) water pipe connections but also for condensation and rain water drainage.




13. Units that will be shut down long-term or left inactive during the winter should conduct "Anti-Freeze Operation", be completely drained of water, or be filled with anti-freeze agent to prevent them freezing over.




14. Airtight testing of water pipes should be conducted at 0.7MPa or less.
15. The amount of water kept in the water pipework of each module is the same.
16. To prevent back flow of water if the Trane Module Chiller suddenly stops, the cold (hot) water piping system should contain a certain amount of held water. The amount of water held within the system should be greater than or equal to the minimum required water volume.

## 8-2. Recommended Dimensions of Main Water Pipes

Based on values found in the Air-Conditioning and Sanitary Engineering Handbook

| Model | Main Pipe Nominal Diameter | | | | | | Bypass Piping | |
|---|---|---|---|---|---|---|---|---|
| | Design Temperature Difference | Design Temperature Difference | Design Temperature Difference | Design Temperature Difference | Design Temperature Difference | Design Temperature Difference | Nominal Diameter | Bypass Flow Volume [L/min] |
| | 5°C | 6°C | 7°C | 8°C | 9°C | 10°C | | |
| CX(G)AV085*1 | 65A | 65A | 65A | 50A | 50A | 50A | 25A | 40 |
| CX(G)AV085*2 | 80A | 65A | 65A | 65A | 65A | 65A | 40A | 120 |
| CX(G)AV085*3 | 90A | 80A | 80A | 80A | 65A | 65A | 50A | 225 |
| CX(G)AV085*4 | 100A | 90A | 90A | 80A | 80A | 80A | 50A | 250 |
| CX(G)AV085*5 | 125A | 100A | 100A | 90A | 90A | 80A | 65A | 330 |
| CX(G)AV085*6 | 125A | 125A | 125A | 100A | 90A | 90A | 65A | 400 |
| CX(G)AV085*7 | 125A | 125A | 125A | 125A | 100A | 100A | 65A | 460 |
| CX(G)AV085*8 | 125A | 125A | 125A | 125A | 125A | 100A | 65A | 525 |
| CX(G)AV085*9 | 150A | 125A | 125A | 125A | 125A | 125A | 80A | 620 |
| CX(G)AV085*10 | 150A | 125A | 125A | 125A | 125A | 125A | 80A | 690 |
| CX(G)AV085*11 | 150A | 150A | 125A | 125A | 125A | 125A | 80A | 760 |
| CX(G)AV085*12 | 150A | 150A | 150A | 125A | 125A | 125A | 80A | 830 |
| CX(G)AV085*13 | 200A | 150A | 150A | 125A | 125A | 125A | 100A | 890 |
| CX(G)AV085*14 | 200A | 150A | 150A | 150A | 125A | 125A | 100A | 930 |
| CX(G)AV085*15 | 200A | 200A | 150A | 150A | 125A | 125A | 100A | 960 |
| CX(G)AV085*16 | 200A | 200A | 150A | 150A | 150A | 125A | 100A | 1000 |
| CX(G)AV085*17 | 200A | 200A | 150A | 150A | 150A | 150A | 100A | 1050 |
| CX(G)AV085*18 | 200A | 200A | 200A | 150A | 150A | 150A | 100A | 1150 |
| CX(G)AV085*19 | 200A | 200A | 200A | 150A | 150A | 150A | 100A | 1200 |
| CX(G)AV085*20 | 200A | 200A | 200A | 200A | 150A | 150A | 100A | 1500 |

| Model | Main Pipe Nominal Diameter | | | | | | Bypass Piping | |
|---|---|---|---|---|---|---|---|---|
| | Design Temperature Difference 5°C | Design Temperature Difference 6°C | Design Temperature Difference 7°C | Design Temperature Difference 8°C | Design Temperature Difference 9°C | Design Temperature Difference 10°C | Nominal Diameter | Bypass Flow Volume [L/min] |
| CX(G)AV150*1 | 65A | 65A | 65A | 65A | 50A | 50A | 25A | 65 |
| CX(G)AV150*2 | 90A | 90A | 80A | 80A | 80A | 65A | 40A | 170 |
| CX(G)AV150*3 | 125A | 100A | 100A | 90A | 90A | 90A | 65A | 350 |
| CX(G)AV150*4 | 125A | 125A | 125A | 100A | 100A | 100A | 65A | 465 |
| CX(G)AV150*5 | 125A | 125A | 125A | 125A | 125A | 125A | 65A | 580 |
| CX(G)AV150*6 | 150A | 125A | 125A | 125A | 125A | 125A | 80A | 730 |
| CX(G)AV150*7 | 150A | 150A | 125A | 125A | 125A | 125A | 80A | 850 |
| CX(G)AV150*8 | 200A | 150A | 150A | 125A | 125A | 125A | 100A | 900 |
| CX(G)AV150*9 | 200A | 200A | 150A | 150A | 125A | 125A | 100A | 980 |
| CX(G)AV150*10 | 200A | 200A | 150A | 150A | 150A | 125A | 100A | 1070 |
| CX(G)AV150*11 | 200A | 200A | 200A | 150A | 150A | 150A | 100A | 1180 |
| CX(G)AV150*12 | 200A | 200A | 200A | 200A | 150A | 150A | 100A | 1285 |
| CX(G)AV150*13 | 200A | 200A | 200A | 200A | 150A | 150A | 100A | 1400 |
| CX(G)AV150*14 | 250A | 200A | 200A | 200A | 200A | 150A | 125A | 1500 |
| CX(G)AV150*15 | 250A | 200A | 200A | 200A | 200A | 200A | 125A | 1610 |
| CX(G)AV150*16 | 250A | 250A | 200A | 200A | 200A | 200A | 125A | 1715 |
| CX(G)AV150*17 | 250A | 250A | 200A | 200A | 200A | 200A | 125A | 1820 |
| CX(G)AV150*18 | 250A | 250A | 200A | 200A | 200A | 200A | 125A | 1930 |
| CX(G)AV150*19 | 250A | 250A | 250A | 200A | 200A | 200A | 125A | 2035 |
| CX(G)AV150*20 | 250A | 250A | 250A | 200A | 200A | 200A | 125A | 2570 |

Note: Do not use pipes with a diameter smaller than the nominal diameter when constructing bypass piping. This may result in cold (hot) water piping damage or unit failure.

## 8-3. Calculation of the Minimum Water Volume to be held in the System

The minimum holding water volume is the water held including all equipment. To minimize changes in water temperature, the amount of water held within the system should be greater than or equal to the minimum required water volume. The minimum holding water volume is the sum of the amount of water in the unit, in the main pipe and in sub-piping.

The minimum amount of holding water for the Trane Module Chiller is shown in the table below.

| Model | Pipe Connection Port | Water Held in Machine [L] |
|---|---|---|
| CX(G)AV085 | 65A | 30 |
| CX(G)AV150 | 65A | 30 |

The table below has reference values for the amount of pipe (for carbon steel SGP pipes) holding water as calculated.

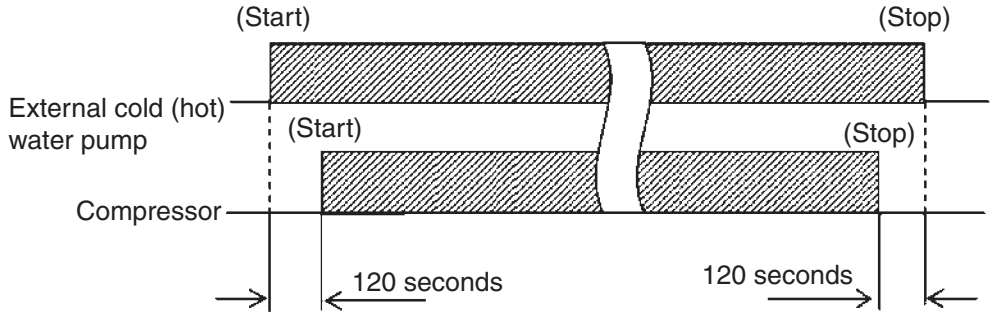
| Nominal Diameter | Water held in a 1m length |
|---|---|
| 20A | 0.4L |
| 25A | 0.6L |
| 32A | 1.0L |
| 40A | 1.4L |
| 50A | 2.2L |
| 65A | 3.6L |
| 80A | 5.1L |

| Nominal Diameter | Water held in a 1m length |
|---|---|
| 90A | 6.8L |
| 100A | 8.7L |
| 125A | 13.4L |
| 150A | 19.8L |
| 200A | 34.4L |
| 250A | 53.1L |
| 300A | 76.3L |

Flow switch (mounted on-site) mounting notes:
1. We recommend replacing the flow switch with a differential pressure switch. Attach the master valve to the differential pressure switch.
2. Mount the flow switch to the inlet of the cold (hot) water pipe work if using a paddle type flow switch.
3. Pipe length of at least 5 times the piping diameter should be present in front of and behind the flow switch.
4. The flow switch mounting direction is the same as the water flow.
5. Do not install in the vicinity of pipe bends, exit port, or near installed valves.
6. Keep flow switch adjustments and removal in mind when choosing an installation location.

## 8-4. Control Method for Externally Mounted Pumps

If using an external pump, the interlock order should be continuous operation after pump start --> stop. Minimum start-up time is 120 seconds and the minimum continuous operating time after stopping is 120 seconds. Refer to [5. Application Example] for details.




Note
1. When controlling an external pump, be sure that the water circuit components such as solenoids are not clogged, in order to protect the pump and the unit.
2. When controlling an external pump, be sure that the pump control signals and unit are correctly connected to ensure stable communication.

# 9 Electrical Wiring Diagram

## 9-1. Heat Pump and Cooler

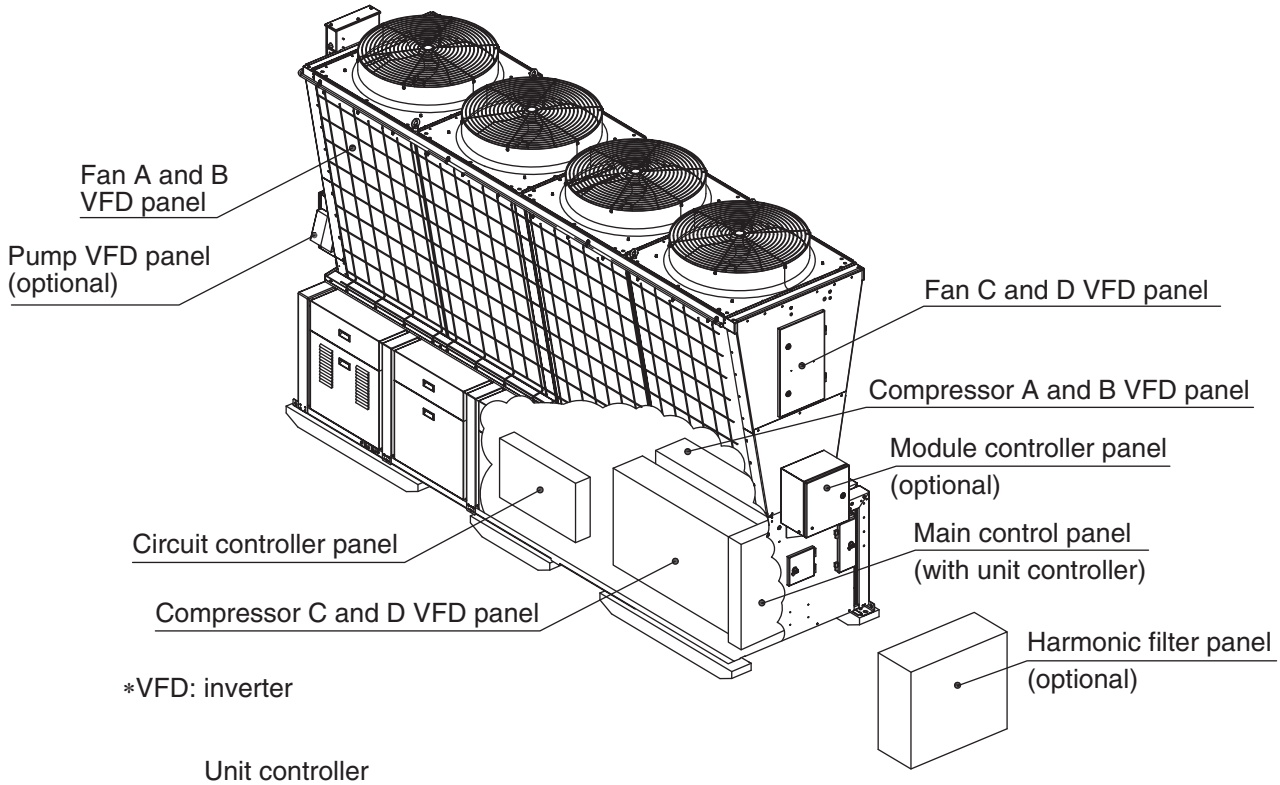
### 9-1-1. Heat Pump 200V, 85, 150kW

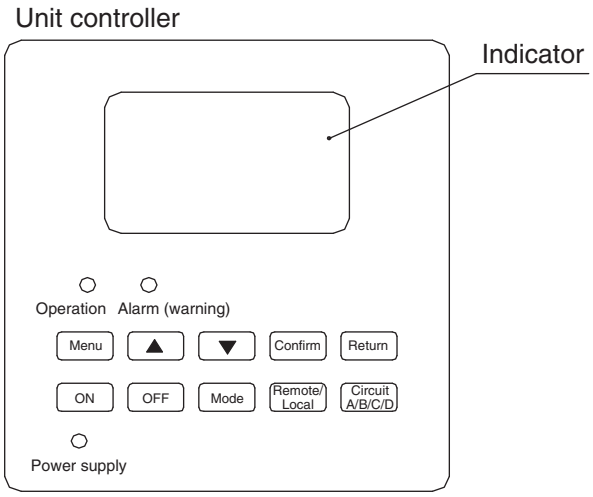
Component Number Table (Including Options)

| | | | | | |
|---|---|---|---|---|---|
| 1A1 | OD Controller Board | 3F9 | Compressor VFD C VFD fuse (80A) | 8U1 | Harmonic filter 1 |
| 1Q1 | Main circuit breaker (250A) | 3F10 | Compressor VFD D VFD fuse (80A) | 8U2 | Harmonic filter 2 |
| 1X1 | Power Terminal * | 3F11 | Compressor VFD D VFD fuse (80A) | 8F25 | Harmonic filter 1 fuse (160A) |
| 1X2 | Power Terminal * | 3F12 | Compressor VFD D VFD fuse (80A) | 8F26 | Harmonic filter 1 fuse (160A) |
| 1F23 | Secondary circuit fuse (10A) * | 3X1 | Control terminal | 8F27 | Harmonic filter 1 fuse (160A) |
| 1F24 | Secondary circuit fuse (10A) * | 4A2 | Circuit controller A | 8F28 | Harmonic filter 2 fuse (160A) |
| 1T1 | Control transformer | 4A3 | Circuit controller B | 8F29 | Harmonic filter 2 fuse (160A) |
| 1K1 | Auxiliary relay | 4A4 | Circuit controller C | 8F30 | Harmonic filter 2 fuse (160A) |
| 1X3 | Control terminal | 4A5 | Circuit controller D | 8K1 | Auxiliary relay |
| 1R1 | Terminating resistor value | 4T2 | Control transformer | 8K2 | Auxiliary relay |
| 2A6 | Compressor VFD A | 4T3 | Control transformer | 8S1 | Automatic thermostat |
| 2A7 | Compressor VFD B | 4T4 | Control transformer | 8X1 | Control terminal |
| 2F1 | Compressor VFD A VFD fuse (80A) | 4T5 | Control transformer | 9A15 | Modular Controller |
| 2F2 | Compressor VFD A VFD fuse (80A) | 4X4 | Control terminal | 9A16 | DC power supply |
| 2F3 | Compressor VFD A VFD fuse (80A) | 5A10 | Fan VFD A | 9A17 | Modular Controller display |
| 2F4 | Compressor VFD B VFD fuse (80A) | 5A11 | Fan VFD B | 9A18 | BACnet Interface Board |
| 2F5 | Compressor VFD B VFD fuse (80A) | 5F14 | Compressor VFD A, B fuse (25A) | 9K3 | Auxiliary relay |
| 2F6 | Compressor VFD B VFD fuse (80A) | 5F15 | Compressor VFD A, B fuse (25A) | 9K4 | Auxiliary relay |
| 2X1 | Control terminal | 6A12 | Fan VFD C | 9X1 | Control terminal |
| 3A8 | Compressor VFD C | 6A13 | Fan VFD D | 10A14 | Water pump VFD |
| 3A9 | Compressor VFD D | 6F16 | Fan VFD C, D fuse (25A) | 10F21 | Water pump VFD fuse (25A) |
| 3F7 | Compressor VFD C VFD fuse (80A) | 6F17 | Fan VFD C, D fuse (25A) | 10F22 | Water pump VFD fuse (25A) |
| 3F8 | Compressor VFD C VFD fuse (80A) | 8Q1 | Main circuit breaker (250A) | 10F23 | Water pump VFD fuse (25A) |

* VFD: Inverter

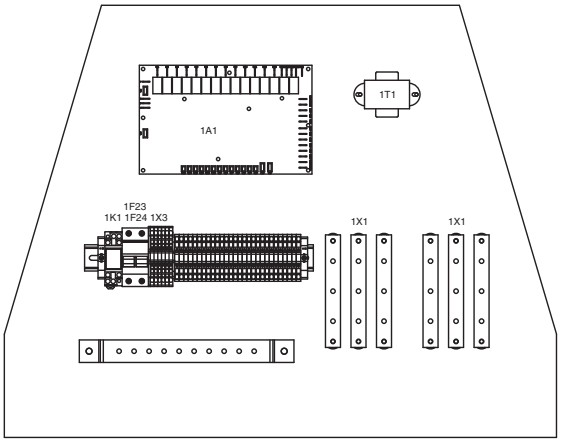
Electrical / Control Panel Layout Diagram



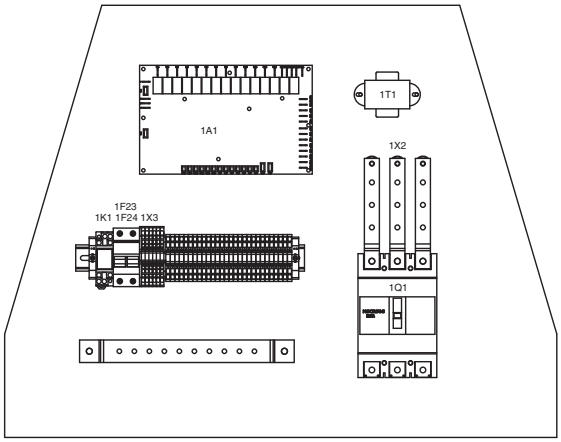




Note: 1. The harmonic filter panel, Modular Controller panel and water pump panel are all optional. You can select any combination of these parts. If use of a Modular Controller is required, then a Modular Controller panel must be configured for one unit only
2. Components with a legend prefix of 8, 9 or 10 are all for any control panel.
3. Components marked with an asterisk indicate that if a harmonic filter panel is used, the main circuit breaker should be installed on the harmonic filter panel and the 1x1 terminal on the main control panel. In other situations the 1x2 terminal and main circuit breaker should be installed on the main control panel.

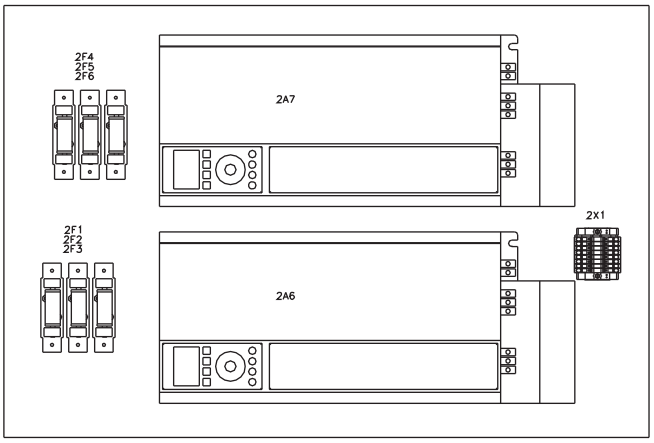
Control Panel Layout Diagram Structural Components



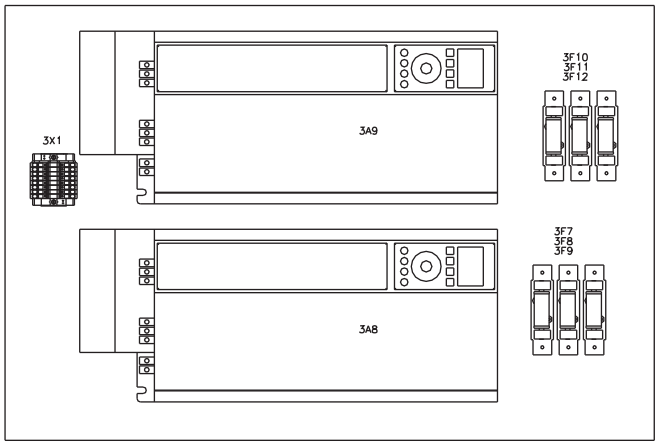

Main Control Panel (with harmonic filter)



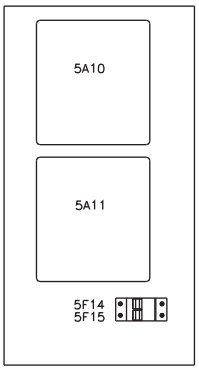

Main Control Panel (without harmonic filter)



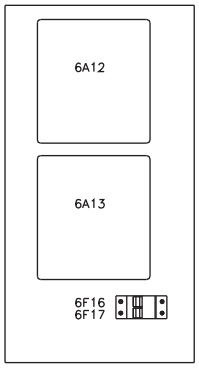

Compressor A and B VFD panel



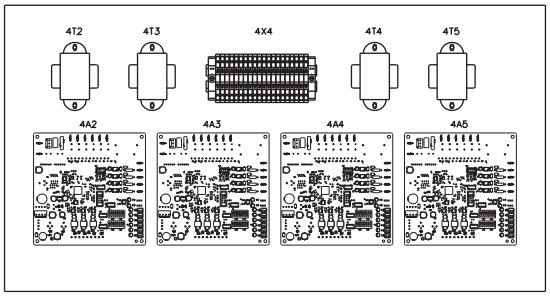

Compressor C and D VFD panel



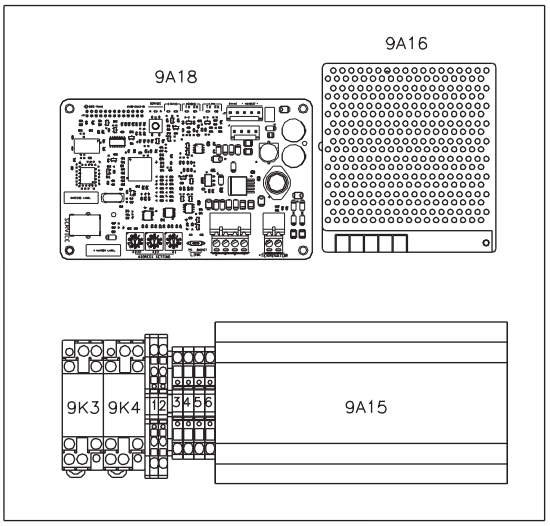

Fan A and B VFD panel



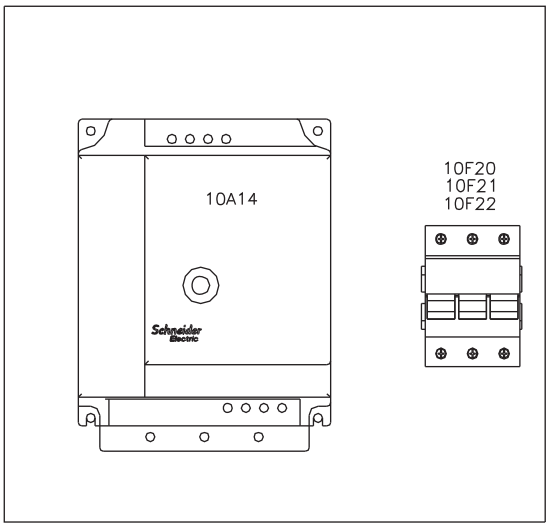

Fan C and D VFD panel



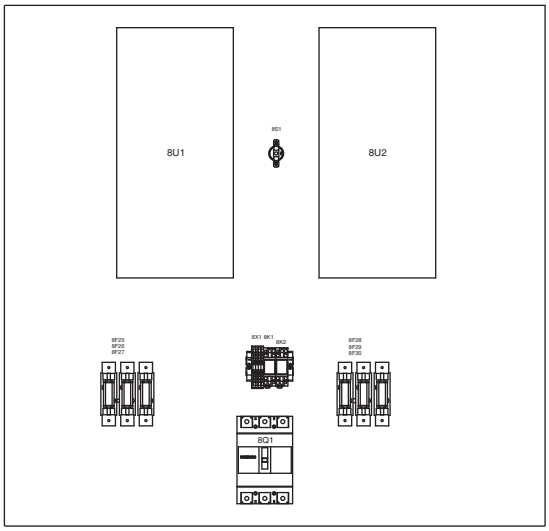

Circuit controller panel

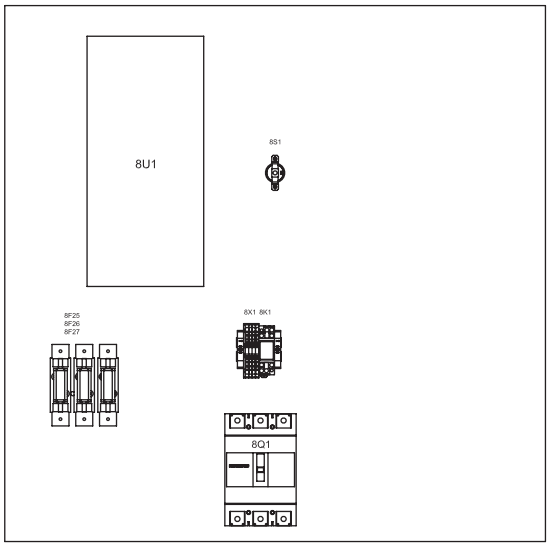



Module controller panel




Pump VFD panel




Harmonic filter panel

| Legend | | |
|---|---|---|
| Device identification | Description | Line number |
| 1A1 | OD Controller | 86 |
| 1A19 | Unit controller | 94 |
| 1Q1 | Main circuit breaker | 54 |
| 1X1,1X2 | Power terminal | 14,56 |
| 1F23,1F24 | Secondary circuit fuse | 59 |
| 1T1 | Main control panel transformer | 89 |
| 1K1 | Water side solenoid relay | 89 |
| 1R1 | Terminating resistor value | 99 |
| 1X3 | Control terminal | |
| 2M10,2M11 | A and B VFD panel cooling fan | 224,230 |
| 2A6 | Compressor VFD A | 222 |
| 2A7 | Compressor VFD B | 228 |
| 2F1,2F2,2F3 | Compressor VFD A fuse | 14,15,16 |
| 2F4,2F5,2F6 | Compressor VFD B fuse | 20,21,22 |
| 3X1 | Cooling fan and oil valve control terminal | |
| 3M12,3M13 | C and D VFD panel cooling fan | 236,242 |
| 3A8 | Compressor VFD C | 234 |
| 3A9 | Compressor VFD D | 240 |
| 3F7,3F8,3F9 | Compressor VFD C fuse | 45,46,47 |
| 3F10,3F11,3F12 | Compressor VFD D fuse | 51,52,53 |
| 2X1 | Cooling fan and oil valve control terminal | |
| 4A2 | Circuit controller A | 159 |
| 4A3 | Circuit controller B | 159 |
| 4A4 | Circuit controller C | 190 |
| 4A5 | Circuit controller D | 190 |
| 4T2,4T3,4T4,4T5 | Circuit control panel transformer | 162,193 |
| 4X4 | Circuit control terminal | |
| 5A10 | Fan VFD A | 27 |
| 5A11 | Fan VFD B | 30 |
| 5F14,5F15 | Fan VFD A and B fuse | 26,27 |
| 6A12 | Fan VFD C | 58 |
| 6A13 | Fan VFD D | 62 |
| 6F16,6F17 | Fan VFD C and D fuse | 57,58 |
| 7B1,7B2,7B3,7B4 | High pressure switch | 224,230,236,242 |
| 7M1,7M3,7M5,7M7 | Compressor | 15,21,46,52 |
| 7M2,7M4,7M6,7M8 | Fan | 27,31,58,62 |
| 7M9 | Water pump | 36 |
| 7Y1,7Y2,7Y3,7Y4 | Compressor oil valve | 222,228,234,240 |
| 7Y6,7Y8,7Y10,7Y12 | 4-way valve | 153,184 |
| 7Y13~7Y20 | Electronic expansion valve | 168,169,199,200 |
| 7Y21 | Water injecting valve | 80 |
| 7H1,7H2,7H3,7H4 | Electric heater | 153,184 |
| 7P5,7P7,7P9,7P11 | High pressure sensor | 163,194 |
| 7P6,7P8,7P10,7P12 | Low pressure sensor | 164,195 |
| 7T1,7T5,7T9,7T13 | Ejection temperature sensor | 165,196 |
| 7T2,7T6,7T10,7T14 | Intake temperature sensor | 166,197 |
| 7T3,7T7,7T11,7T15 | Coil 1 gas side temperature sensor | 167,198 |
| 7T4,7T8,7T12,7T16 | Coil 2 gas side temperature sensor | 168,199 |
| 7T17 | Inlet water temperature sensor | 97 |
| 7T18 | Intermediate water temperature sensor | 97 |
| 7T19 | Outlet water temperature sensor | 97 |
| 7T20 | Ambient temperature sensor | 97 |
| 7T21 | Main water outlet temperature sensor | 126 |
| 7T22 | Main water inlet temperature sensor | 126 |
| 8Q1 | Main circuit breaker | 7 |
| 8U1,8U2 | Harmonic filter | 246,250 |
| 8M14,8M15,8M16 | Harmonic filter panel cooling fan | 256,258,260 |
| 8F25~8F30 | Harmonic filter fuse | 14,45 |
| 8X1 | Harmonic filter panel control terminal | |
| 8K1,8K2 | Harmonic filter overload output relay | 246,250 |
| 8S1 | Automatic thermostat | 253 |
| 9A15 | Modular controller | 120 |
| 9A16 | DC power supply | 115 |
| 9A17 | Module display | 119 |
| 9A18 | BACnet converter | 104 |
| 9K3 | Alarm output relay | 129 |
| 9K4 | Group ON/OFF relay | 128 |
| 9X1 | Modular controller terminal | |
| 9T1 | Isolating transformer | 114 |
| 10A14 | Water pump VFD | 36 |
| 10F21,10F22,10F23 | Water pump fuse | 35,36,37 |
| 10S1 | Automatic thermostat | 41 |
| 10M17 | Water pump panel cooling fan | 41 |
| 11Y1 | Water side solenoid | 262 |
| 11S1 | Flow switch | 83 |

| Equipment specified prefix | |
|---|---|
| Prefix | Device position |
| 1 | Main control panel |
| 2 | Compressor A and B VFD control panel |
| 3 | Compressor C and D VFD control panel |
| 4 | Circuit control panel |
| 5 | Fan A and B VFD control panel |
| 6 | Fan C and D VFD control panel |
| 7 | Unit attachment |
| 8 | Harmonic filter panel |
| 9 | Modular controller panel |
| 10 | Water pump VFD panel |
| 11 | Provided by customer |

| Color Code | | | |
|---|---|---|---|
| Code | Color | Code | Color |
| R | Red | BR | Brown |
| W | White | OR | Orange |
| BK | Black | BL | Blue |
| GY | Gray | Y | Yellow |
| GR | Green | | |

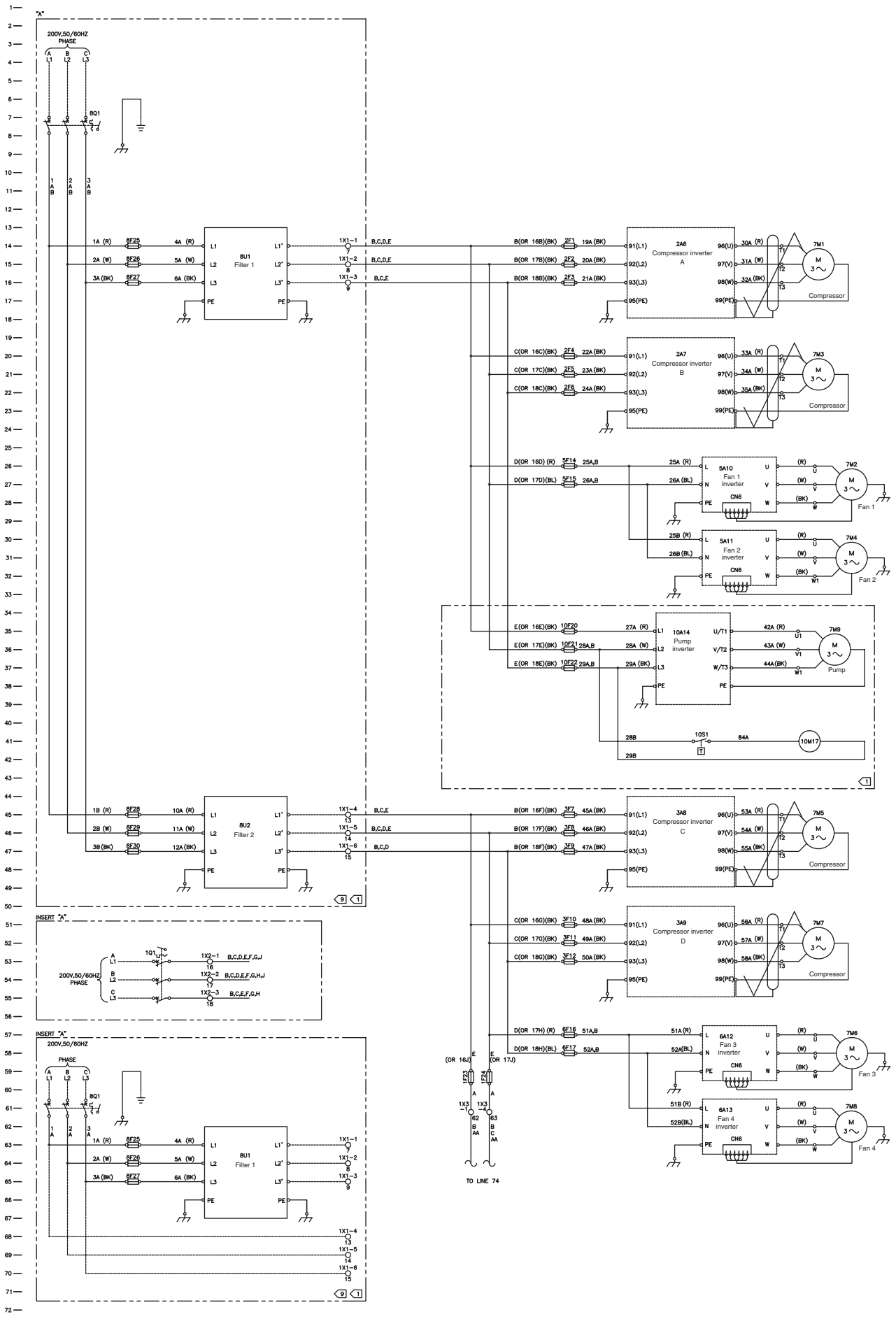
| | |
|---|---|
| ———— | Trane wiring |
| - - - - - - - - - - - - | Customer wiring |
| ———— — — ———— | Options |

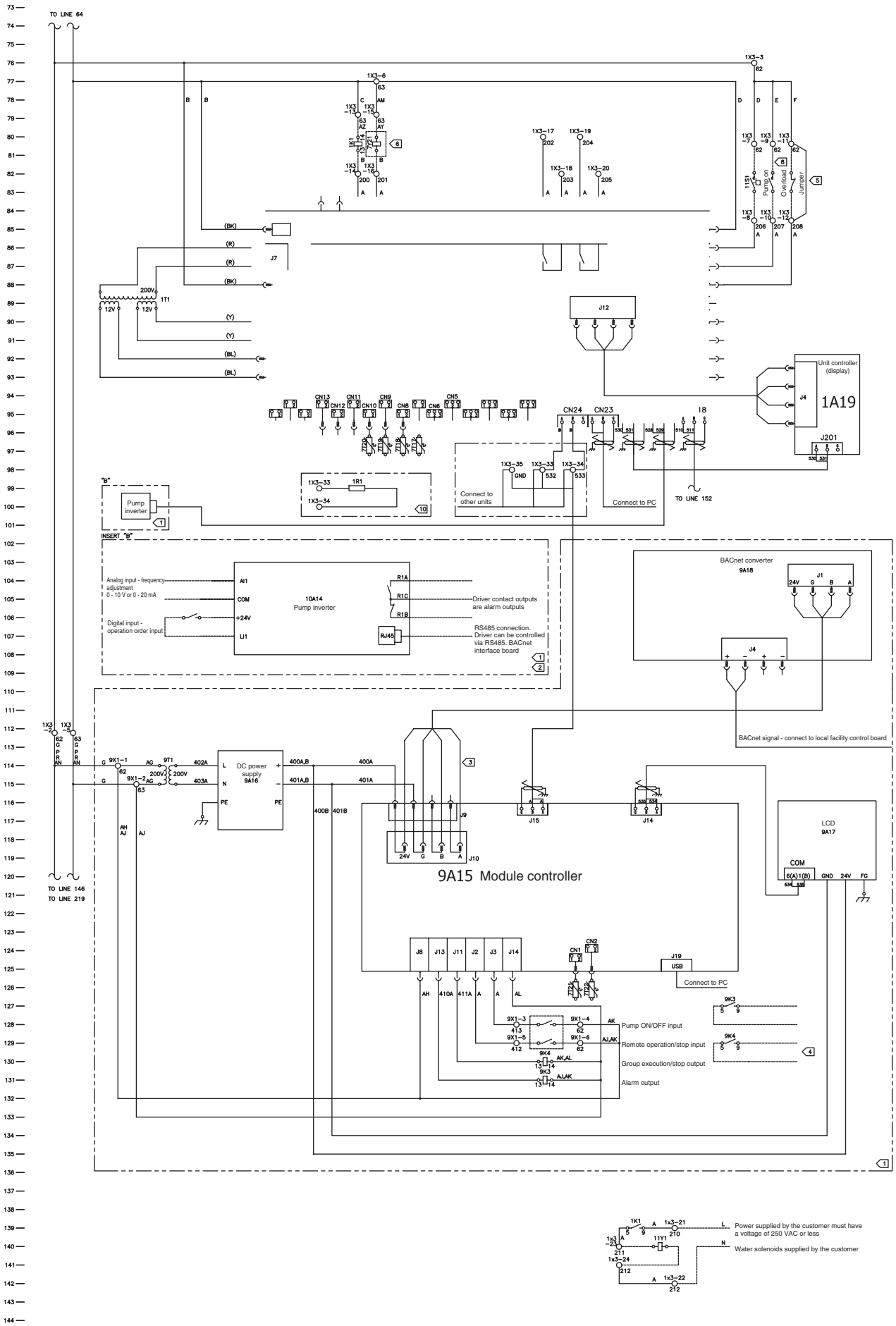
General Precautions

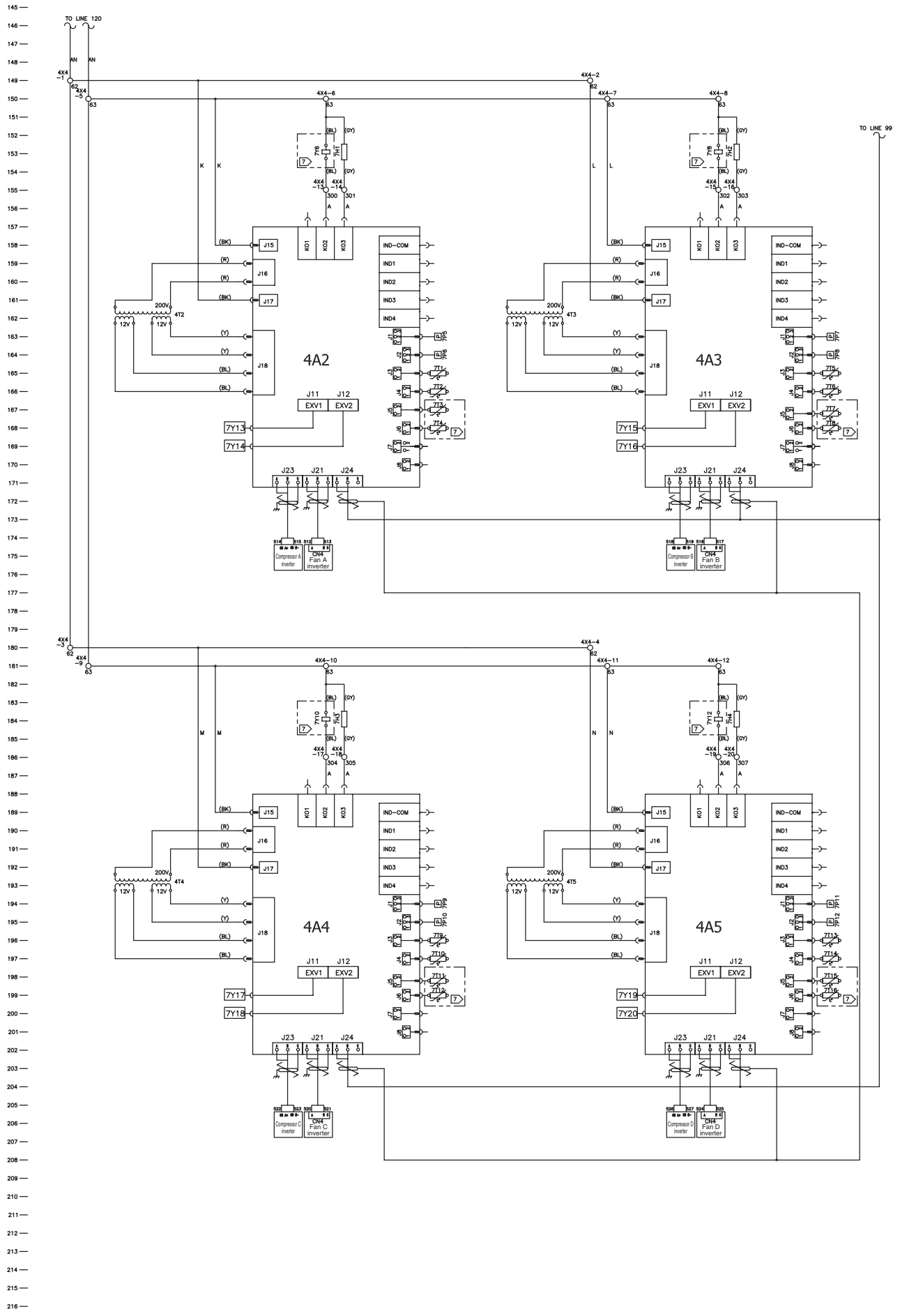
1. Unless noted otherwise, all switches are at 25°C (77°F), atmospheric pressure, 50% relative humidity, all utilities turned OFF and in the state after regular shutdown.
2. The dashed lines show the field wiring recommended by other companies.
   The dashed line enclosure / dashed line device outlines show the components provided in the field.
   The solid lines show wiring by Trane.
3. The numbers to the right of the circuit diagram specify the contact positions for the line number.
   Underlined numbers signify usually closed contacts.
4. All field wiring must meet the requirements of the National Electric Code (NEC) and each state or region.
5. Class 1 field wiring insulation rating must be equal to or greater than that required for the rated voltage of all equipment supplied.
   Class 2 field wiring insulation is rated to 300 V or higher.

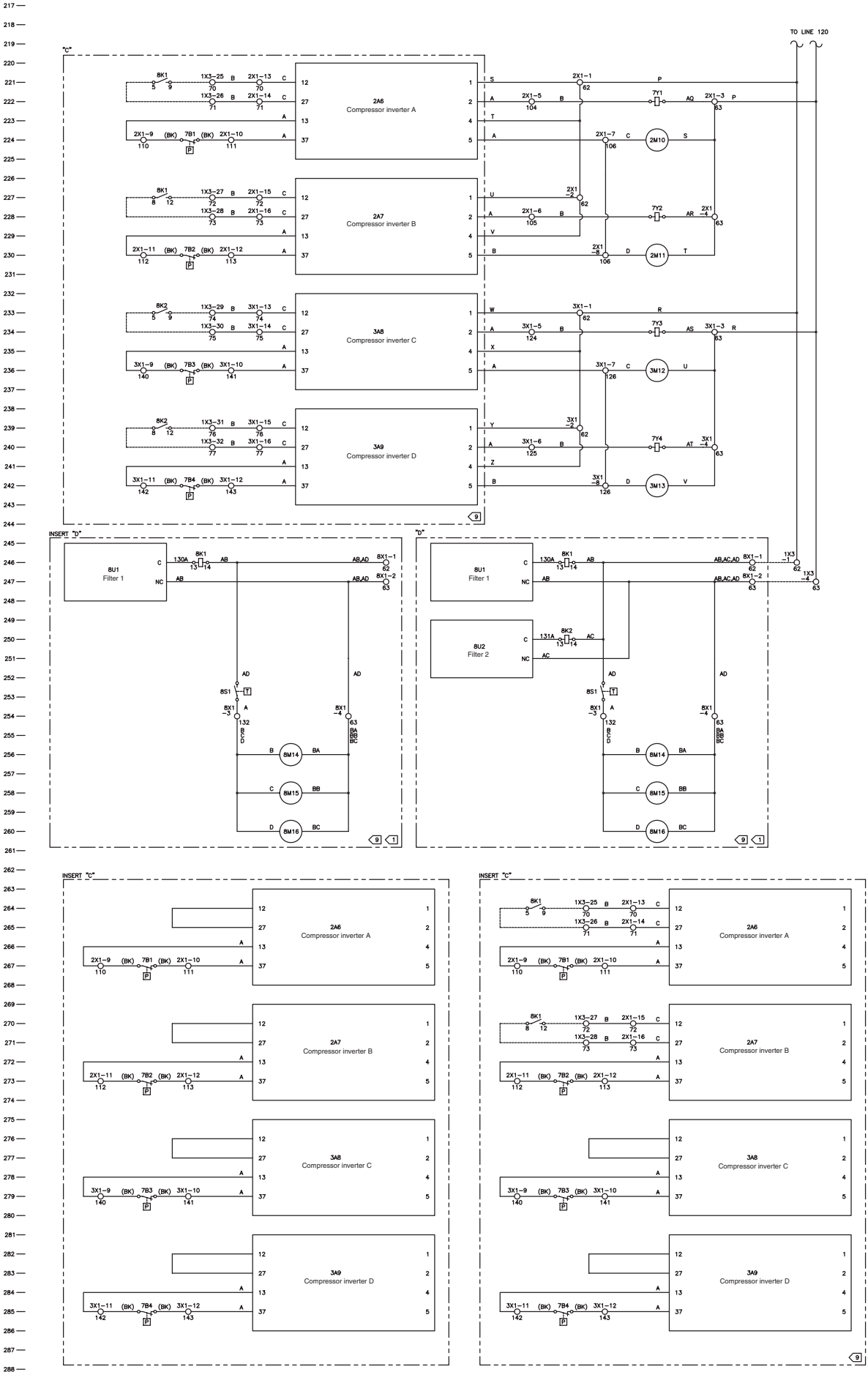
Notes

1. Select optional control panel parts to suit customer requirements.
2. If the customer requires VFD control of the pump, then control is possible using a terminal connection or RS485 cable.
3. It is possible to connect to a host computer without a BACnet converter by using Modbus protocol.
4. Dry contact functionality is for 250 V/5A AC or 24 V/5A DC resistive loads or else for 250 V/3A AC or 24 V/3A DC conductive loads.
5. The pump overload contact has had a jumper installed at time of factory shipping in order to make the unit operational.
   If the customer is to control the pump, then remove the jumper and input pump operation and overload signals.
6. Water injection valves are only used with premium units.
7. Only used with heat pump units.
8. The input pump is opened prior to shipping.
   If the customer is to control the pump, be sure to input the appropriate signals in order to enable unit operation.
9. Total harmonic treatment or partial harmonic treatment (circuits A and B) can be selected.
10. A terminating resistor must be connected to the unit at the end of the module control signal chain.


"A"
200V,50/60HZ
PHASE
8Q1
8U1
Filter 1
8U2
Filter 2
2A6
Compressor inverter
A
2A7
Compressor inverter
B
3A8
Compressor inverter
C
3A9
Compressor inverter
D
5A10
Fan 1
inverter
5A11
Fan 2
inverter
10A14
Pump
inverter
6A12
Fan 3
inverter
6A13
Fan 4
inverter
7M1
7M2
7M3
7M4
7M5
7M6
7M7
7M8
7M9
Compressor
Fan 1
Fan 2
Pump
Fan 3
Fan 4
10S1
10M17
INSERT "A"
200V,50/60HZ
PHASE
TO LINE 74


TO LINE 64
TO LINE 146
TO LINE 219
TO LINE 152
Pump inverter
INSERT "B"
10A14
Pump inverter
Analog input - frequency adjustment
0 - 10 V or 0 - 20 mA
Digital input - operation order input
Driver contact outputs are alarm outputs
RS485 connection. Driver can be controlled via RS485. BACnet interface board
BACnet converter
9A18
BACnet signal - connect to local facility control board
DC power supply
9A16
9A15 Module controller
Unit controller (display)
1A19
LCD
9A17
Connect to other units
Connect to PC
Pump ON/OFF input
Remote operation/stop input
Group execution/stop output
Alarm output
Power supplied by the customer must have a voltage of 250 VAC or less
Water solenoids supplied by the customer


TO LINE 120
TO LINE 99
4A2
4A3
4A4
4A5
EXV1
EXV2
IND-COM
IND1
IND2
IND3
IND4
Compressor A inverter
Fan A inverter
Compressor B inverter
Fan B inverter
Compressor C inverter
Fan C inverter
Compressor D inverter
Fan D inverter


TO LINE 120
"C"
2A6
Compressor inverter A
2A7
Compressor inverter B
3A8
Compressor inverter C
3A9
Compressor inverter D
INSERT "D"
8U1
Filter 1
"D"
8U2
Filter 2
INSERT "C"
8M14
8M15
8M16
2M10
2M11
3M12
3M13

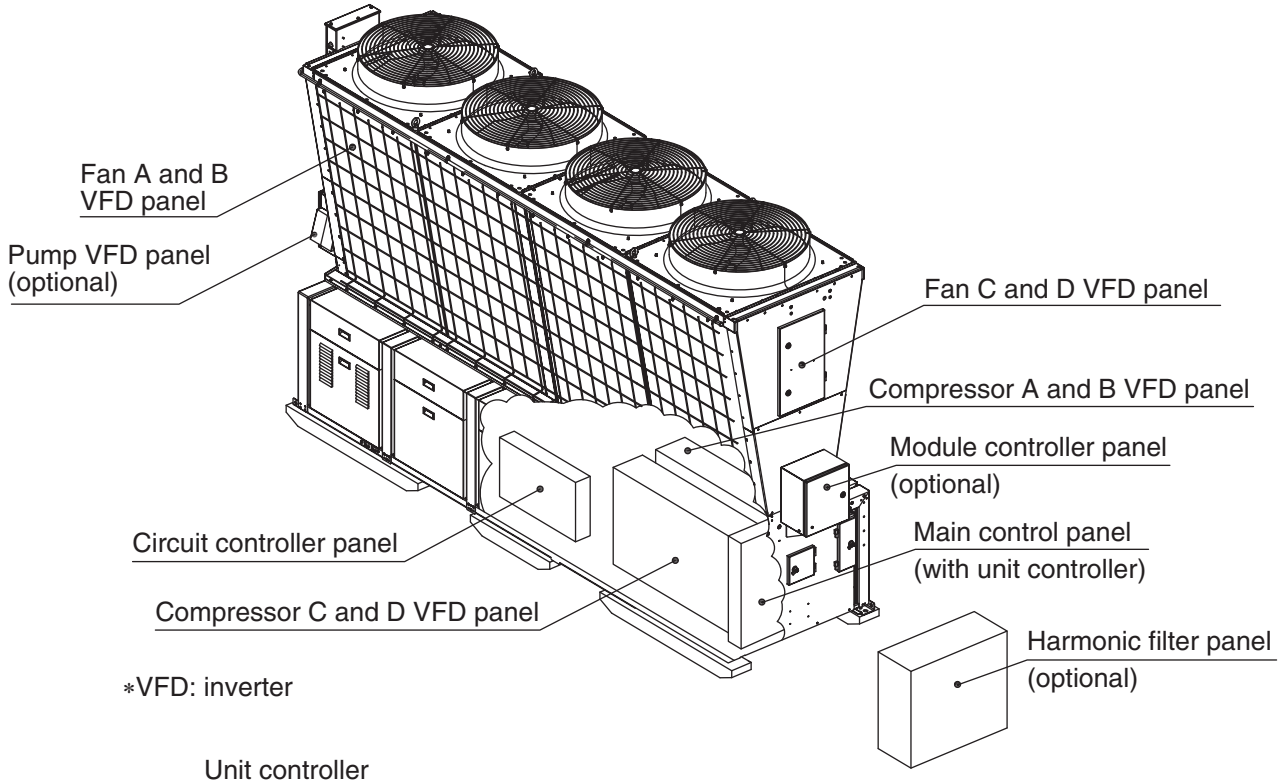
## 9-1-2. Cooler 200V, 85, 150kW

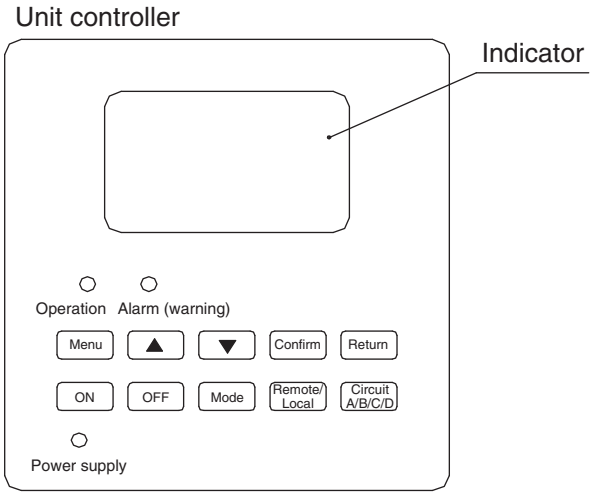
Component Number Table (Including Options)

| | | | | | |
|---|---|---|---|---|---|
| 1A1 | OD Controller Board | 3F9 | Compressor VFD C VFD fuse (80A) | 8U1 | Harmonic filter 1 |
| 1Q1 | Main circuit breaker (250A) | 3F10 | Compressor VFD D VFD fuse (80A) | 8U2 | Harmonic filter 2 |
| 1X1 | Power Terminal ∗ | 3F11 | Compressor VFD D VFD fuse (80A) | 8F25 | Harmonic filter 1 fuse (160A) |
| 1X2 | Power Terminal ∗ | 3F12 | Compressor VFD D VFD fuse (80A) | 8F26 | Harmonic filter 1 fuse (160A) |
| 1F23 | Secondary circuit fuse (10A) ∗ | 3X1 | Control terminal | 8F27 | Harmonic filter 1 fuse (160A) |
| 1F24 | Secondary circuit fuse (10A) ∗ | 4A2 | Circuit controller A | 8F28 | Harmonic filter 2 fuse (160A) |
| 1T1 | Control transformer | 4A3 | Circuit controller B | 8F29 | Harmonic filter 2 fuse (160A) |
| 1K1 | Auxiliary relay | 4A4 | Circuit controller C | 8F30 | Harmonic filter 2 fuse (160A) |
| 1X3 | Control terminal | 4A5 | Circuit controller D | 8K1 | Auxiliary relay |
| 1R1 | Terminating resistor value | 4T2 | Control transformer | 8K2 | Auxiliary relay |
| 2A6 | Compressor VFD A | 4T3 | Control transformer | 8S1 | Automatic thermostat |
| 2A7 | Compressor VFD B | 4T4 | Control transformer | 8X1 | Control terminal |
| 2F1 | Compressor VFD A VFD fuse (80A) | 4T5 | Control transformer | 9A15 | Modular Controller |
| 2F2 | Compressor VFD A VFD fuse (80A) | 4X4 | Control terminal | 9A16 | DC power supply |
| 2F3 | Compressor VFD A VFD fuse (80A) | 5A10 | Fan VFD A | 9A17 | Modular Controller display |
| 2F4 | Compressor VFD B VFD fuse (80A) | 5A11 | Fan VFD B | 9A18 | BACnet Interface Board |
| 2F5 | Compressor VFD B VFD fuse (80A) | 5F14 | Compressor VFD A, B fuse (25A) | 9K3 | Auxiliary relay |
| 2F6 | Compressor VFD B VFD fuse (80A) | 5F15 | Compressor VFD A, B fuse (25A) | 9K4 | Auxiliary relay |
| 2X1 | Control terminal | 6A12 | Fan VFD C | 9X1 | Control terminal |
| 3A8 | Compressor VFD C | 6A13 | Fan VFD D | 10A14 | Water pump VFD |
| 3A9 | Compressor VFD D | 6F16 | Fan VFD C, D fuse (25A) | 10F21 | Water pump VFD fuse (25A) |
| 3F7 | Compressor VFD C VFD fuse (80A) | 6F17 | Fan VFD C, D fuse (25A) | 10F22 | Water pump VFD fuse (25A) |
| 3F8 | Compressor VFD C VFD fuse (80A) | 8Q1 | Main circuit breaker (250A) | 10F23 | Water pump VFD fuse (25A) |

∗ VFD: Inverter

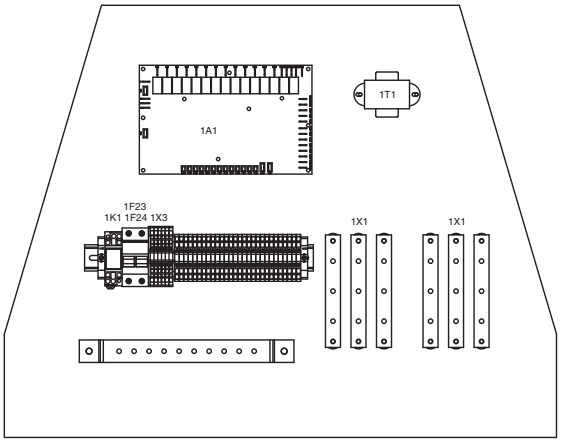
Electrical / Control Panel Layout Diagram



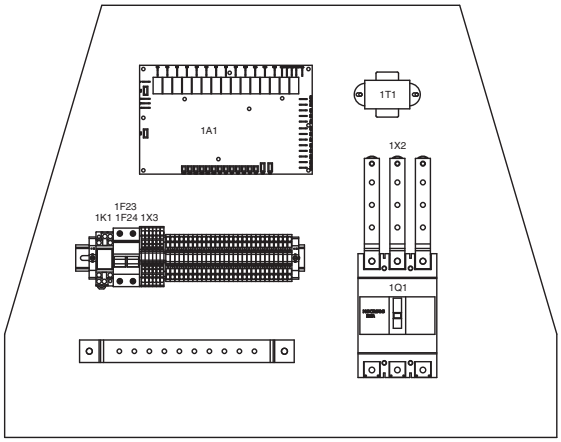




Note: 1. The harmonic filter panel, Modular Controller panel and water pump panel are all optional. You can select any combination of these parts. If use of a Modular Controller is required, then a Modular Controller panel must be configured for one unit only
2. Components with a legend prefix of 8, 9 or 10 are all for any control panel.
3. Components marked with an asterisk indicate that if a harmonic filter panel is used, the main circuit breaker should be installed on the harmonic filter panel and the 1x1 terminal on the main control panel. In other situations the 1x2 terminal and main circuit breaker should be installed on the main control panel.

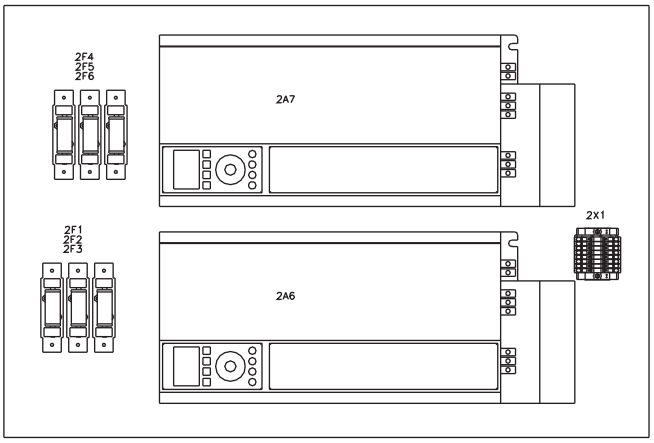
## Control Panel Layout Diagram Structural Components



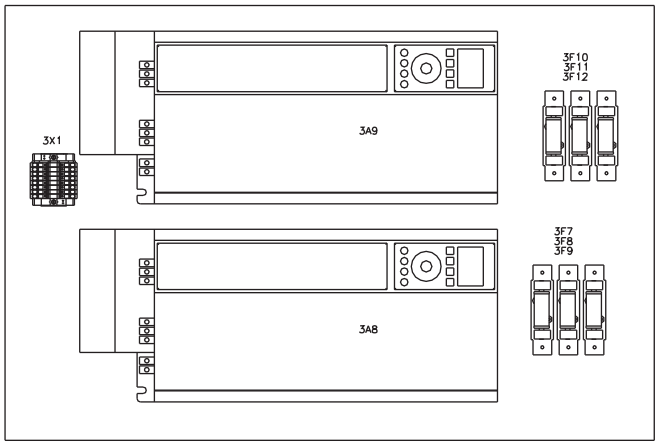

Main Control Panel (with harmonic filter)



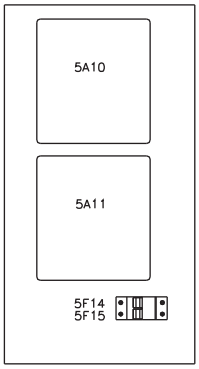

Main Control Panel (without harmonic filter)



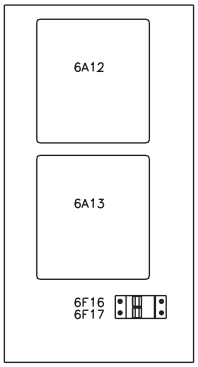

Compressor A and B VFD panel



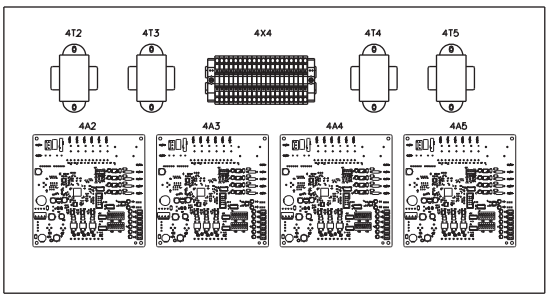

Compressor C and D VFD panel



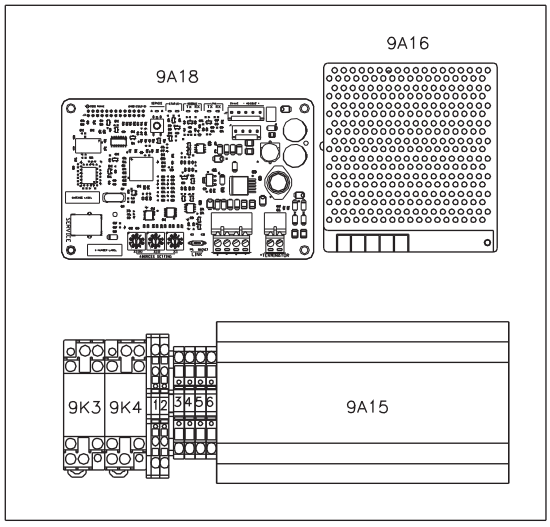

Fan A and B VFD panel



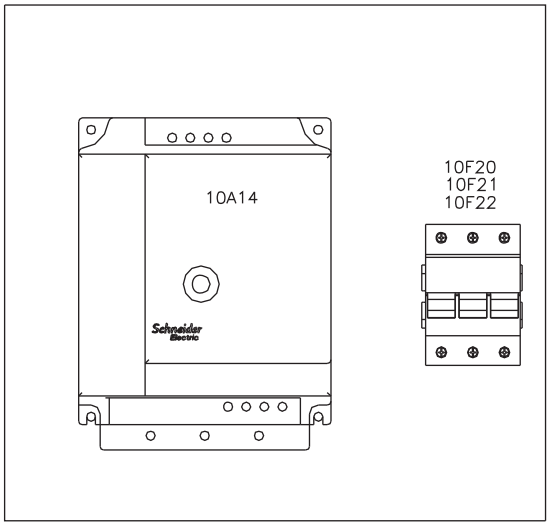

Fan C and D VFD panel



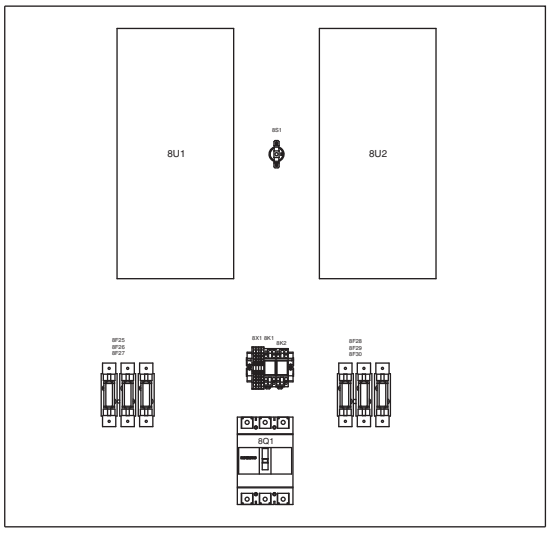

Circuit controller panel

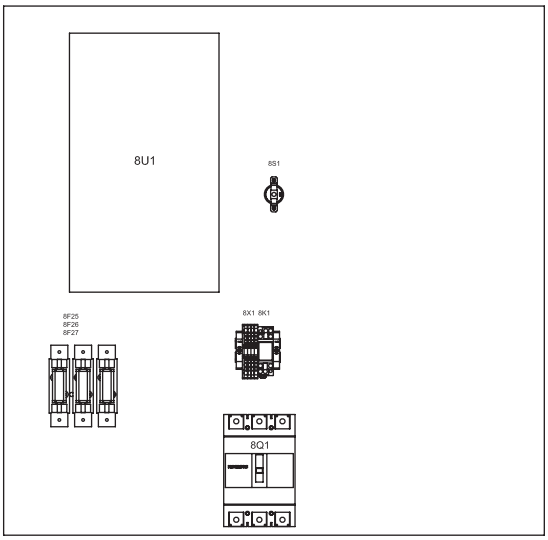



Module controller panel




Pump VFD panel




Harmonic filter panel

# Electrical Wiring Diagram

| Legend | | |
|---|---|---|
| Device identification | Description | Line number |
| 1A1 | OD Controller | 86 |
| 1A19 | Unit controller | 94 |
| 1Q1 | Main circuit breaker | 54 |
| 1X1,1X2 | Power terminal | 14,56 |
| 1F23,1F24 | Secondary circuit fuse | 59 |
| 1T1 | Main control panel transformer | 89 |
| 1K1 | Water side solenoid relay | 89 |
| 1R1 | Terminating resistor value | 99 |
| 1X3 | Control terminal | |
| 2M10,2M11 | A and B VFD panel cooling fan | 224,230 |
| 2A6 | Compressor VFD A | 222 |
| 2A7 | Compressor VFD B | 228 |
| 2F1,2F2,2F3 | Compressor VFD A fuse | 14,15,16 |
| 2F4,2F5,2F6 | Compressor VFD B fuse | 20,21,22 |
| 3X1 | Cooling fan and oil valve control terminal | |
| 3M12,3M13 | C and D VFD panel cooling fan | 236,242 |
| 3A8 | Compressor VFD C | 234 |
| 3A9 | Compressor VFD D | 240 |
| 3F7,3F8,3F9 | Compressor VFD C fuse | 45,46,47 |
| 3F10,3F11,3F12 | Compressor VFD D fuse | 51,52,53 |
| 2X1 | Cooling fan and oil valve control terminal | |
| 4A2 | Circuit controller A | 159 |
| 4A3 | Circuit controller B | 159 |
| 4A4 | Circuit controller C | 190 |
| 4A5 | Circuit controller D | 190 |
| 4T2,4T3,4T4,4T5 | Circuit control panel transformer | 162,193 |
| 4X4 | Circuit control terminal | |
| 5A10 | Fan VFD A | 27 |
| 5A11 | Fan VFD B | 30 |
| 5F14,5F15 | Fan VFD A and B fuse | 26,27 |
| 6A12 | Fan VFD C | 58 |
| 6A13 | Fan VFD D | 62 |
| 6F16,6F17 | Fan VFD C and D fuse | 57,58 |
| 7B1,7B2,7B3,7B4 | High pressure switch | 224,230,236,242 |
| 7M1,7M3,7M5,7M7 | Compressor | 15,21,46,52 |
| 7M2,7M4,7M6,7M8 | Fan | 27,31,58,62 |
| 7M9 | Water pump | 36 |
| 7Y1,7Y2,7Y3,7Y4 | Compressor oil valve | 222,228,234,240 |
| 7Y6,7Y8,7Y10,7Y12 | 4-way valve | 153,184 |
| 7Y13~7Y20 | Electronic expansion valve | 168,169,199,200 |
| 7Y21 | Water injecting valve | 80 |
| 7H1,7H2,7H3,7H4 | Electric heater | 153,184 |
| 7P5,7P7,7P9,7P11 | High pressure sensor | 163,194 |
| 7P6,7P8,7P10,7P12 | Low pressure sensor | 164,195 |
| 7T1,7T5,7T9,7T13 | Ejection temperature sensor | 165,196 |
| 7T2,7T6,7T10,7T14 | Intake temperature sensor | 166,197 |
| 7T3,7T7,7T11,7T15 | Coil 1 gas side temperature sensor | 167,198 |
| 7T4,7T8,7T12,7T16 | Coil 2 gas side temperature sensor | 168,199 |
| 7T17 | Inlet water temperature sensor | 97 |
| 7T18 | Intermediate water temperature sensor | 97 |
| 7T19 | Outlet water temperature sensor | 97 |
| 7T20 | Ambient temperature sensor | 97 |
| 7T21 | Main water outlet temperature sensor | 126 |
| 7T22 | Main water inlet temperature sensor | 126 |
| 8Q1 | Main circuit breaker | 7 |
| 8U1,8U2 | Harmonic filter | 246,250 |
| 8M14,8M15,8M16 | Harmonic filter panel cooling fan | 256,258,260 |
| 8F25~8F30 | Harmonic filter fuse | 14,45 |
| 8X1 | Harmonic filter panel control terminal | |
| 8K1,8K2 | Harmonic filter overload output relay | 246,250 |
| 8S1 | Automatic thermostat | 253 |
| 9A15 | Modular controller | 120 |
| 9A16 | DC power supply | 115 |
| 9A17 | Module display | 119 |
| 9A18 | BACnet converter | 104 |
| 9K3 | Alarm output relay | 129 |
| 9K4 | Group ON/OFF relay | 128 |
| 9X1 | Modular controller terminal | |
| 9T1 | Isolating transformer | 114 |
| 10A14 | Water pump VFD | 36 |
| 10F21,10F22,10F23 | Water pump fuse | 35,36,37 |
| 10S1 | Automatic thermostat | 41 |
| 10M17 | Water pump panel cooling fan | 41 |
| 11Y1 | Water side solenoid | 262 |
| 11S1 | Flow switch | 83 |

| Equipment specified prefix | |
|---|---|
| Prefix | Device position |
| 1 | Main control panel |
| 2 | Compressor A and B VFD control panel |
| 3 | Compressor C and D VFD control panel |
| 4 | Circuit control panel |
| 5 | Fan A and B VFD control panel |
| 6 | Fan C and D VFD control panel |
| 7 | Unit attachment |
| 8 | Harmonic filter panel |
| 9 | Modular controller panel |
| 10 | Water pump VFD panel |
| 11 | Provided by customer |

| Color Code | | | |
|---|---|---|---|
| Code | Color | Code | Color |
| R | Red | BR | Brown |
| W | White | OR | Orange |
| BK | Black | BL | Blue |
| GY | Gray | Y | Yellow |
| GR | Green | | |

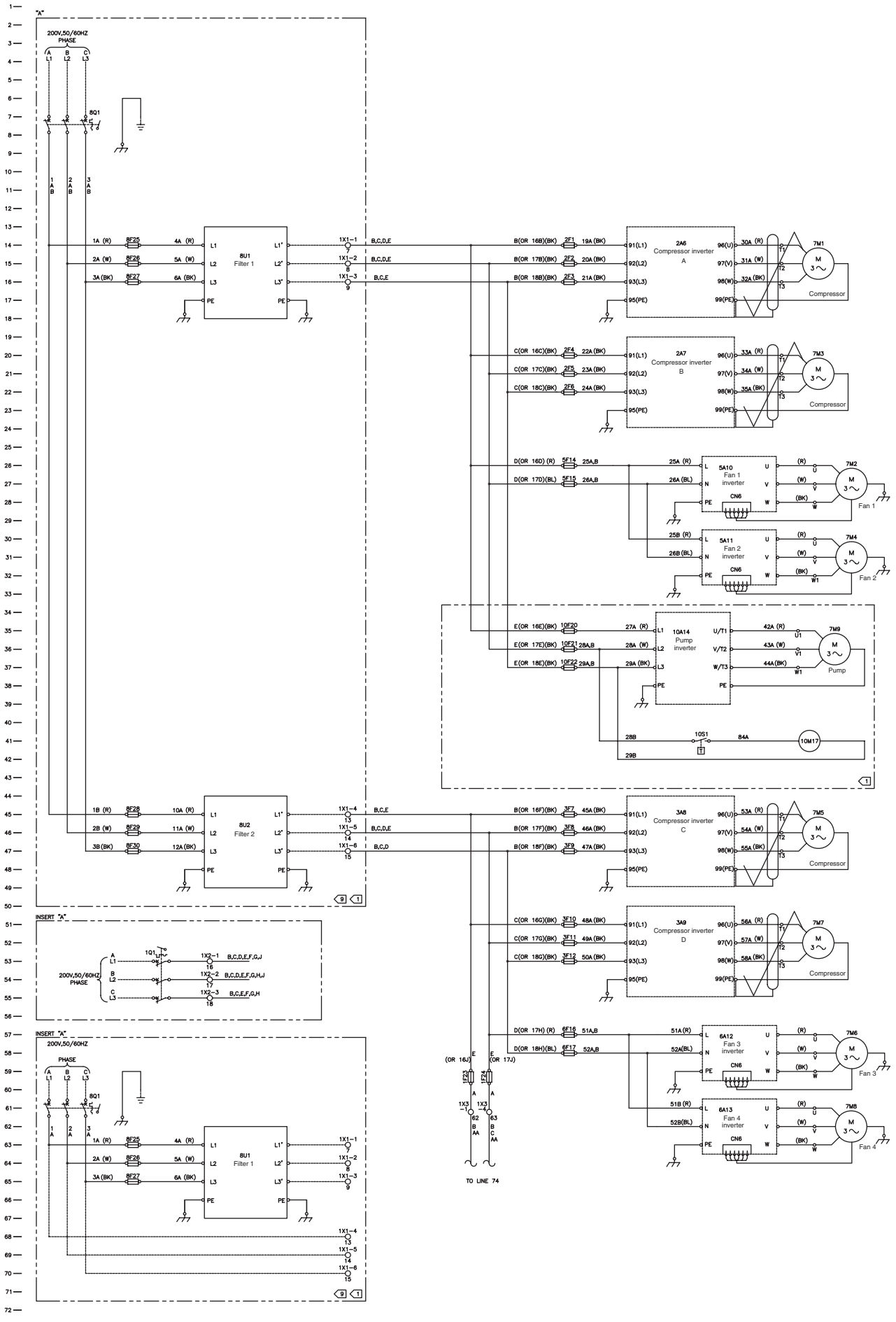
| | |
|---|---|
| ———— | Trane wiring |
| - - - - - - - - - - - - | Customer wiring |
| ———— — — ———— | Options |

General Precautions

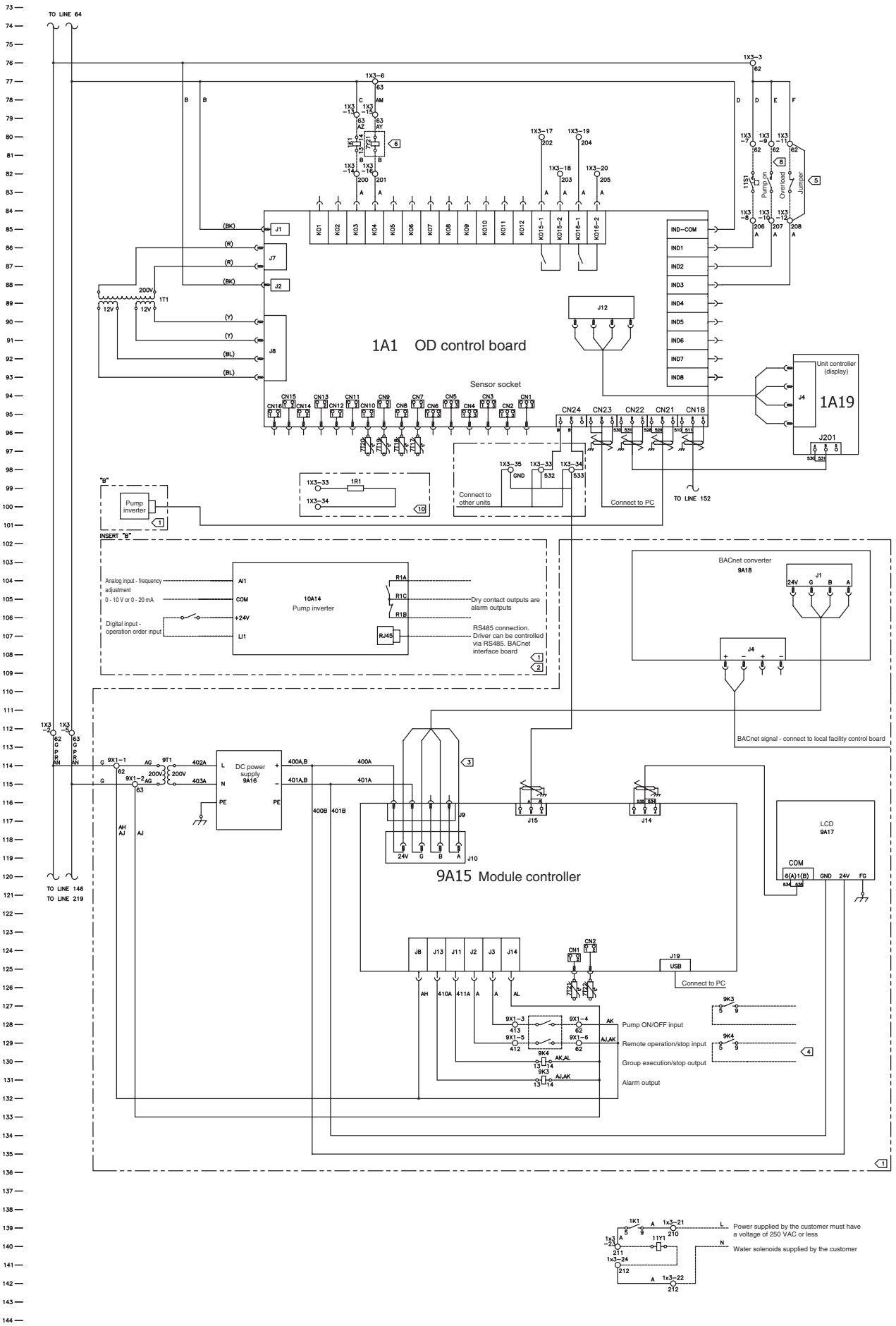
1. Unless noted otherwise, all switches are at 25°C (77°F), atmospheric pressure, 50% relative humidity, all utilities turned OFF and in the state after regular shutdown.
2. The dashed lines show the field wiring recommended by other companies.
   The dashed line enclosure / dashed line device outlines show the components provided in the field.
   The solid lines show wiring by Trane.
3. The numbers to the right of the circuit diagram specify the contact positions for the line number.
   Underlined numbers signify usually closed contacts.
4. All field wiring must meet the requirements of the National Electric Code (NEC) and each state or region.
5. Class 1 field wiring insulation rating must be equal to or greater than that required for the rated voltage of all equipment supplied.
   Class 2 field wiring insulation is rated to 300 V or higher.

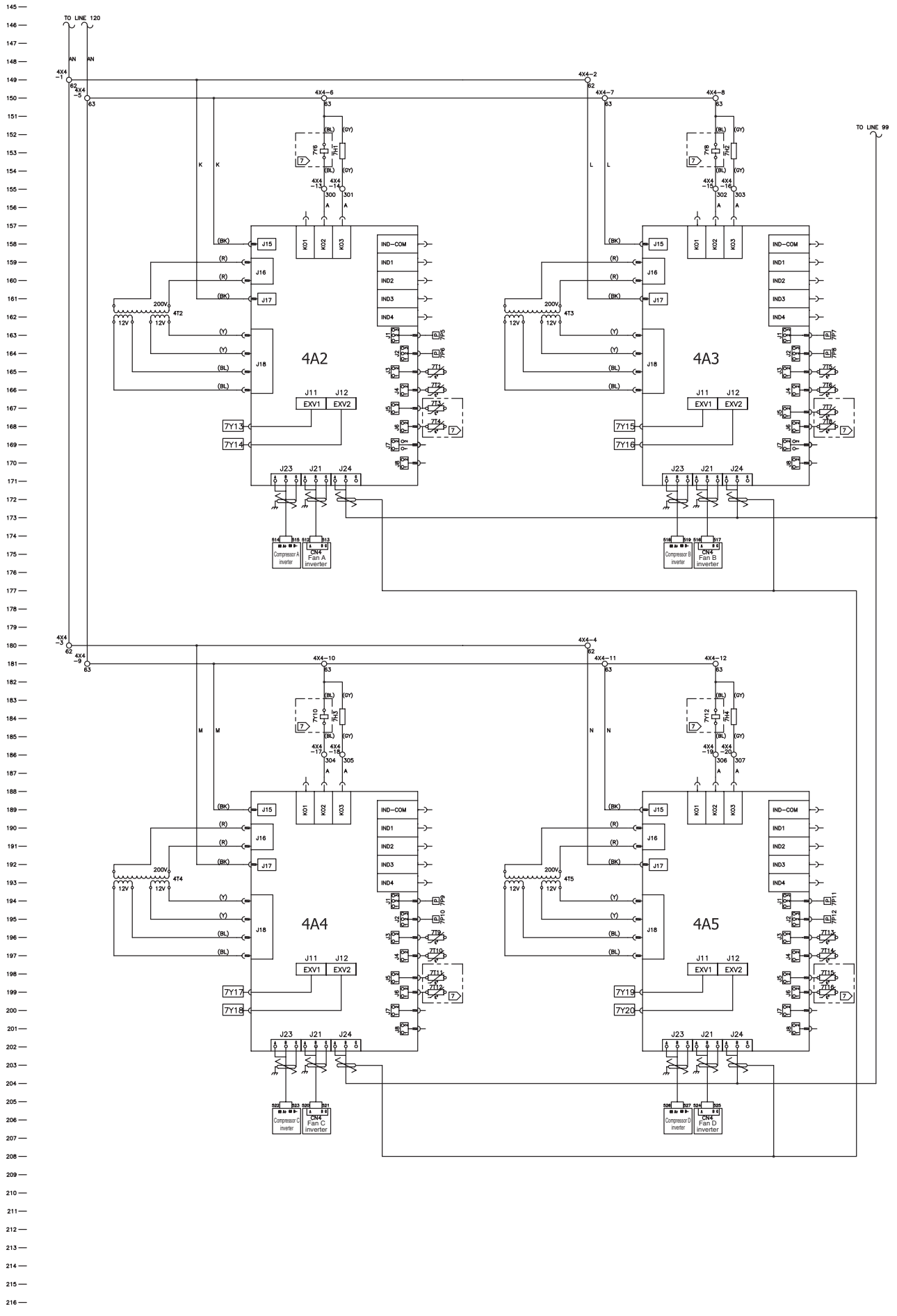
Notes

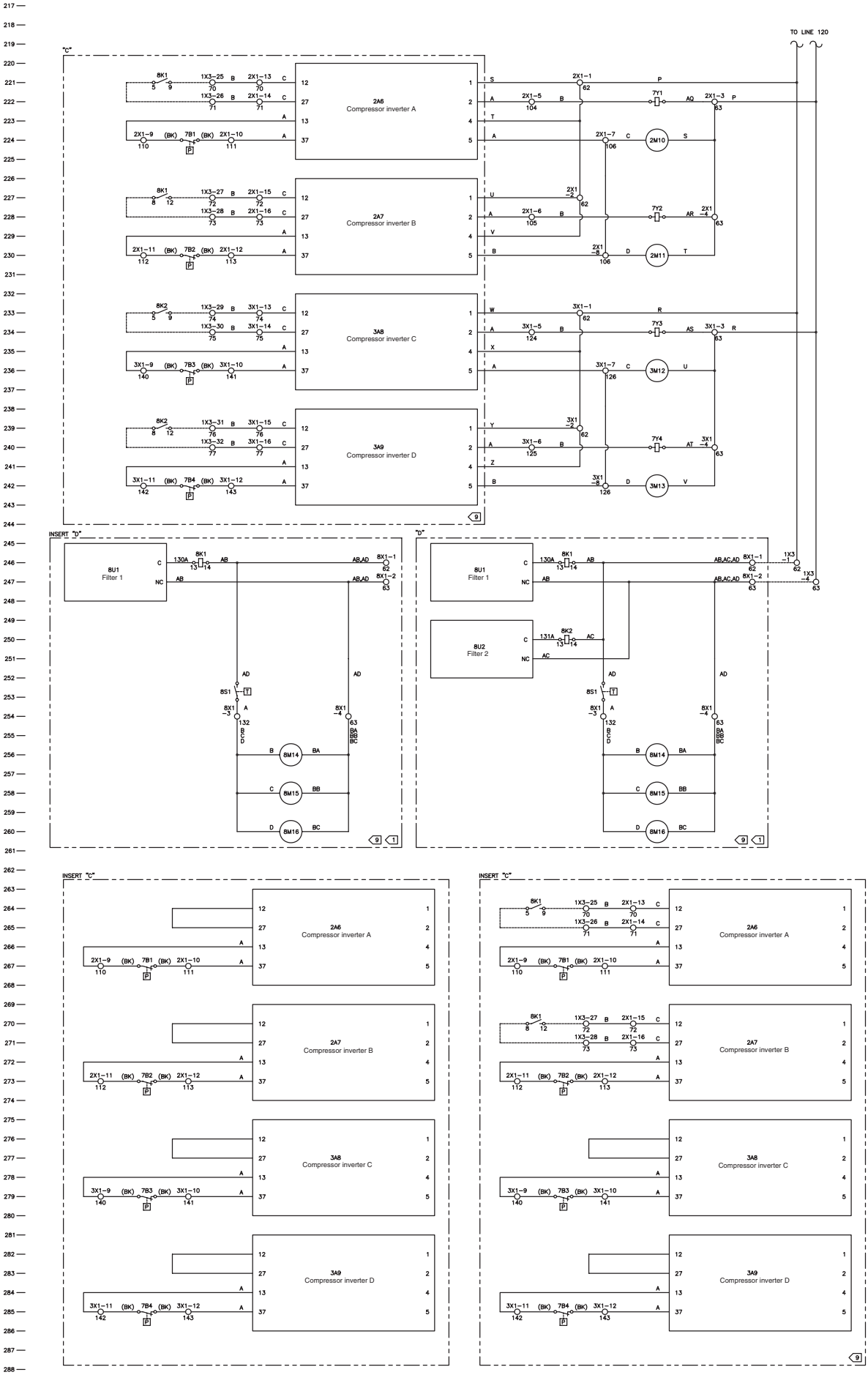
1. Select optional control panel parts to suit customer requirements.
2. If the customer requires VFD control of the pump, then control is possible using a terminal connection or RS485 cable.
3. It is possible to connect to a host computer without a BACnet converter by using Modbus protocol.
4. Dry contact functionality is for 250 V/5A AC or 24 V/5A DC resistive loads or else for 250 V/3A AC or 24 V/3A DC conductive loads.
5. The pump overload contact has had a jumper installed at time of factory shipping in order to make the unit operational.
   If the customer is to control the pump, then remove the jumper and input pump operation and overload signals.
6. Water injection valves are only used with premium units.
7. Only used with heat pump units.
8. The input pump is opened prior to shipping.
   If the customer is to control the pump, be sure to input the appropriate signals in order to enable unit operation.
9. Total harmonic treatment or partial harmonic treatment (circuits A and B) can be selected.
10. A terminating resistor must be connected to the unit at the end of the module control signal chain.


"A"
200V,50/60HZ
PHASE
8Q1
8U1
Filter 1
8U2
Filter 2
2A6
Compressor inverter
A
2A7
Compressor inverter
B
3A8
Compressor inverter
C
3A9
Compressor inverter
D
10A14
Pump
inverter
5A10
Fan 1
inverter
5A11
Fan 2
inverter
6A12
Fan 3
inverter
6A13
Fan 4
inverter
CN6
Compressor
Pump
Fan 1
Fan 2
Fan 3
Fan 4
10S1
10M17
INSERT "A"
TO LINE 74

# Electrical Wiring Diagram




TO LINE 120
TO LINE 99
4A2
4A3
4A4
4A5
EXV1
EXV2
IND-COM
IND1
IND2
IND3
IND4
Compressor A inverter
Fan A inverter
Compressor B inverter
Fan B inverter
Compressor C inverter
Fan C inverter
Compressor D inverter
Fan D inverter


TO LINE 120
"C"
2A6
Compressor inverter A
2A7
Compressor inverter B
3A8
Compressor inverter C
3A9
Compressor inverter D
INSERT "D"
"D"
8U1
Filter 1
8U2
Filter 2
INSERT "C"
8M14
8M15
8M16
2M10
2M11
3M12
3M13
7Y1
7Y2
7Y3
7Y4

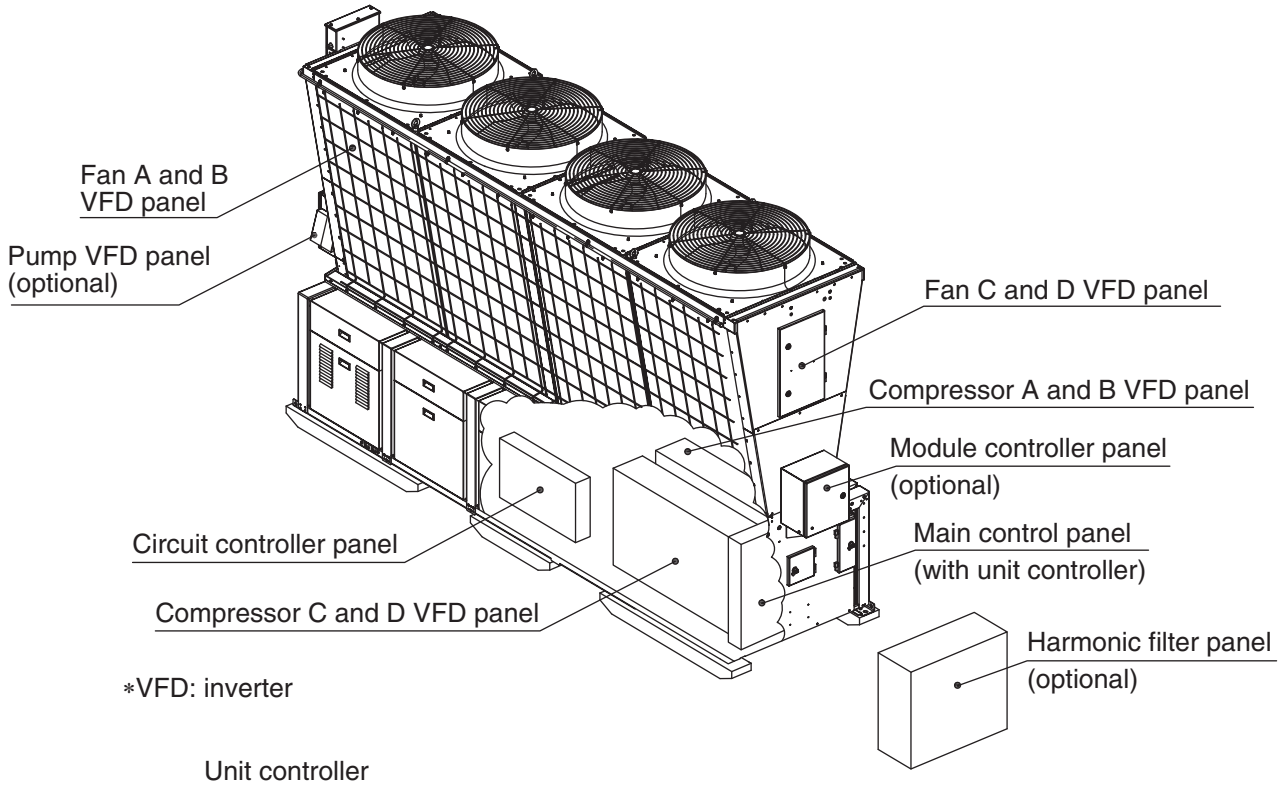
## 9-1-3. Heat Pump 400V, 85, 150kW

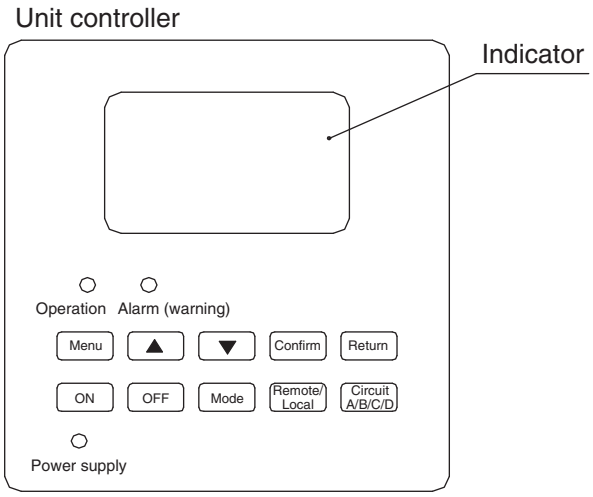
Component Number Table (Including Options)

| | | | | | |
|---|---|---|---|---|---|
| 1A1 | OD Controller Board | 3F9 | Compressor VFD C fuse (40A) | 8U1 | Harmonic filter 1 |
| 1Q1 | Main circuit breaker (200A) * | 3F10 | Compressor VFD D fuse (40A) | 8U2 | Harmonic filter 2 |
| 1X1 | Power Terminal * | 3F11 | Compressor VFD D fuse (40A) | 8U25 | Harmonic filter 1 fuse (80A) |
| 1X2 | Power Terminal * | 3F12 | Compressor VFD D fuse (40A) | 8U26 | Harmonic filter 1 fuse (80A) |
| 1F23 | Secondary circuit fuse (10A) * | 3X1 | Control terminal | 8U27 | Harmonic filter 1 fuse (80A) |
| 1F24 | Secondary circuit fuse (10A) * | 3T1 | Control transformer | 8U28 | Harmonic filter 2 fuse (80A) |
| 1T1 | Control transformer | 4A2 | Circuit controller A | 8U29 | Harmonic filter 2 fuse (80A) |
| 1K1 | Auxiliary relay | 4A3 | Circuit controller B | 8U30 | Harmonic filter 2 fuse (80A) |
| 1X3 | Control terminal | 4A4 | Circuit controller C | 8K1 | Auxiliary relay |
| IR1 | Terminating resistor value | 4A5 | Circuit controller D | 8K2 | Auxiliary relay |
| 2A6 | Compressor VFD A | 4T2 | Control transformer | 8S1 | Automatic thermostat |
| 2A7 | Compressor VFD B | 4T3 | Control transformer | 8X1 | Control terminal |
| 2F1 | Compressor VFD A fuse (40A) | 4T4 | Control transformer | 9A15 | Modular Controller |
| 2F2 | Compressor VFD A fuse (40A) | 4T5 | Control transformer | 9A16 | DC power supply |
| 2F3 | Compressor VFD A fuse (40A) | 4X4 | Control terminal | 9A17 | Modular Controller display |
| 2F4 | Compressor VFD B fuse (40A) | 5A10 | Fan VFD A | 9A18 | BACnet Interface Board |
| 2F5 | Compressor VFD B fuse (40A) | 5A11 | Fan VFD B | 9K3 | Auxiliary relay |
| 2F6 | Compressor VFD B fuse (40A) | 5F14 | Compressor VFD A, B fuse (25A) | 9K4 | Auxiliary relay |
| 2X1 | Control terminal | 5F15 | Compressor VFD A, B fuse (25A) | 9X1 | Control terminal |
| 2T1 | Control transformer | 6A12 | Fan VFD C | 10A14 | Water pump VFD |
| 3A8 | Compressor VFD C | 6A13 | Fan VFD D | 10F21 | Water pump VFD fuse (25A) |
| 3A9 | Compressor VFD D | 6F16 | Fan VFD C, D fuse (25A) | 10F22 | Water pump VFD fuse (25A) |
| 3F7 | Compressor VFD C fuse (40A) | 6F17 | Fan VFD C, D fuse (25A) | 10F23 | Water pump VFD fuse (25A) |
| 3F8 | Compressor VFD C fuse (40A) | 8Q1 | Main circuit breaker (200A) * | | |

* VFD: Inverter

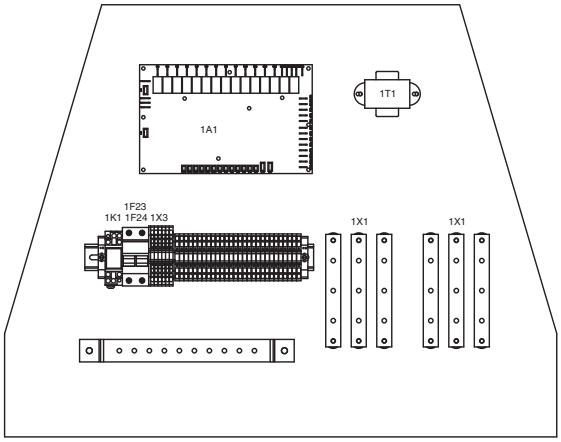
Electrical / Control Panel Layout Diagram



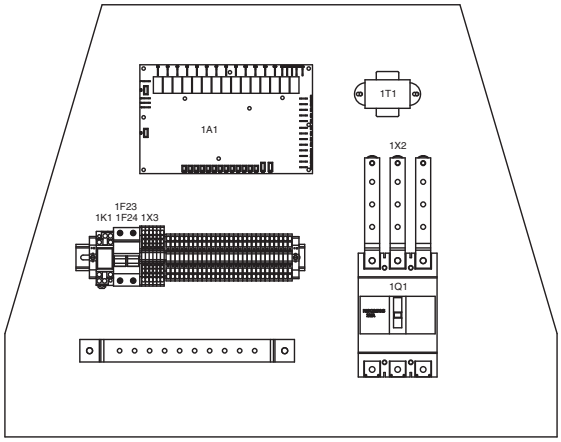




Note: 1. The harmonic filter panel, Modular Controller panel and water pump panel are all optional. You can select any combination of these parts. If use of a Modular Controller is required, then a Modular Controller panel must be configured for one unit only
2. Components with a legend prefix of 8, 9 or 10 are all for any control panel.
3. Components marked with an asterisk indicate that if a harmonic filter panel is used, the main circuit breaker should be installed on the harmonic filter panel and the 1x1 terminal on the main control panel. In other situations the 1x2 terminal and main circuit breaker should be installed on the main control panel.

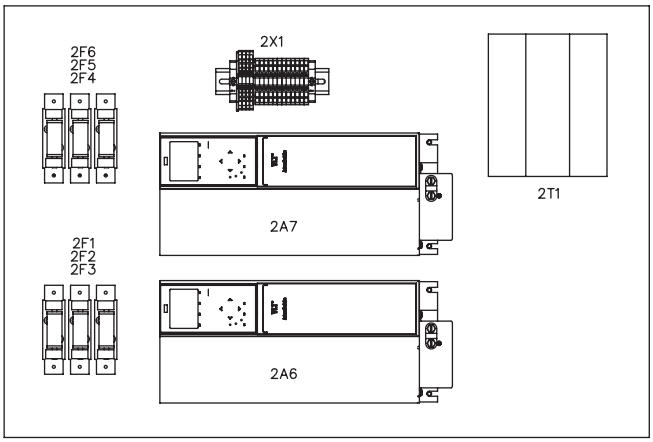
Control Panel Layout Diagram Structural Components



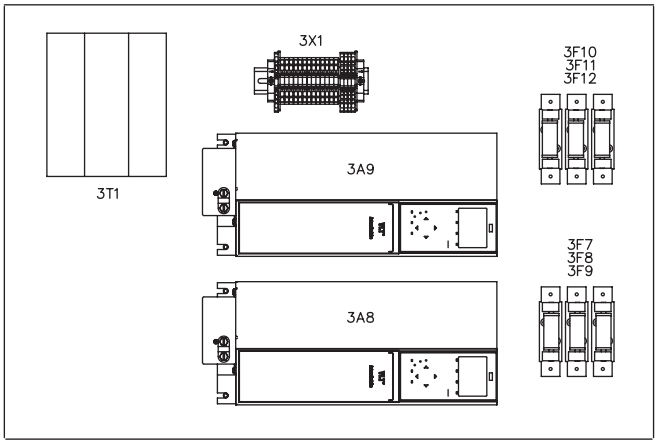

Main Control Panel (with harmonic filter)



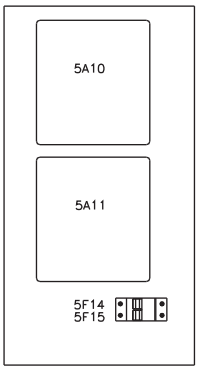

Main Control Panel (without harmonic filter)



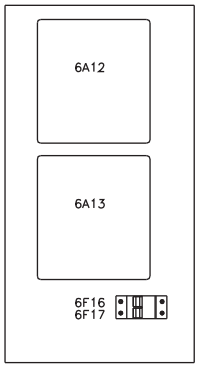

Compressor A and B VFD panel



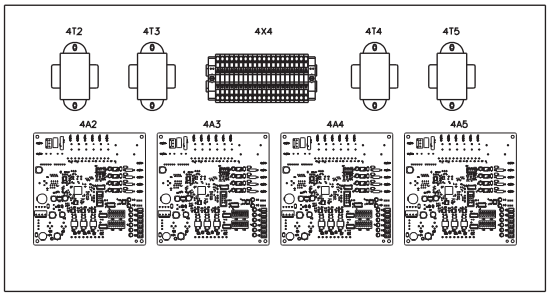

Compressor C and D VFD panel



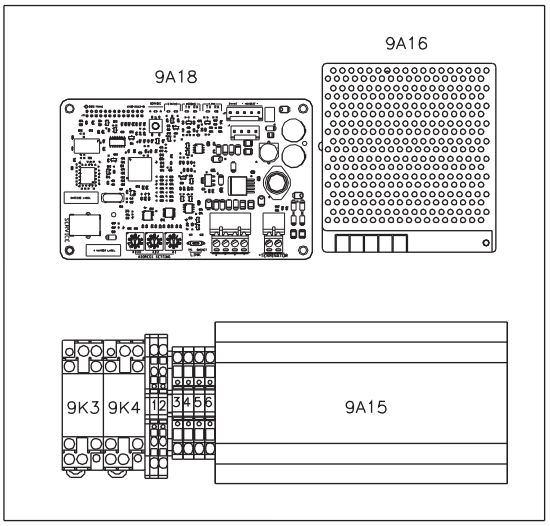

Fan A and B VFD panel



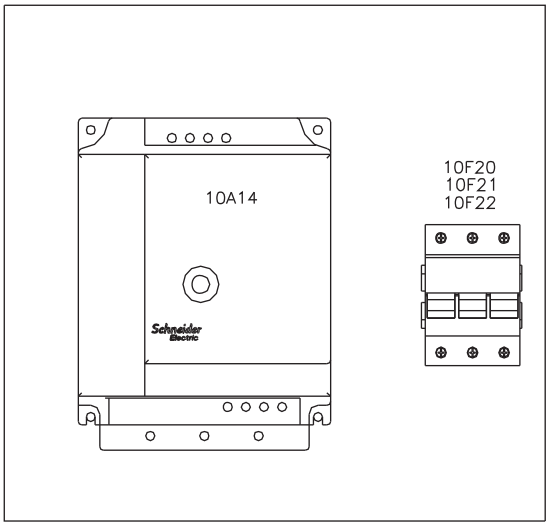

Fan C and D VFD panel



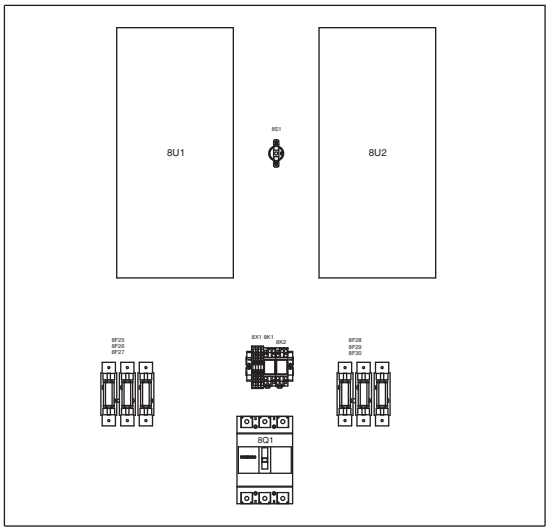

Circuit controller panel

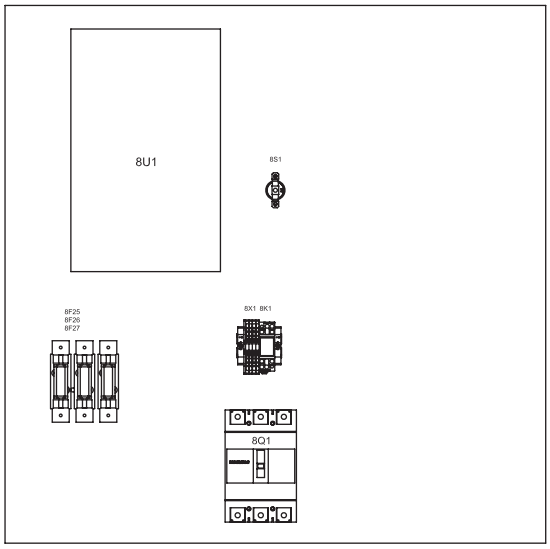



Module controller panel




Pump VFD panel




Harmonic filter panel

| Legend | | |
|---|---|---|
| Device identification | Description | Line number |
| 1A1 | OD Controller | 86 |
| 1A19 | Unit controller | 94 |
| 1Q1 | Main circuit breaker | 54 |
| 1X1,1X2 | Power terminal | 14,56 |
| 1F23,1F24 | Secondary circuit fuse | 28 |
| 1T1 | Main control panel transformer | 89 |
| 1K1 | Water side solenoid relay | 89 |
| 1R1 | Terminating resistor value | 99 |
| 1X3 | Control terminal | |
| 2M10,2M11,2M18 | A and B VFD panel cooling fan | 224,230,226 |
| 2A6 | Compressor VFD A | 222 |
| 2A7 | Compressor VFD B | 228 |
| 2F1,2F2,2F3 | Compressor VFD A fuse | 14,15,16 |
| 2F4,2F5,2F6 | Compressor VFD B fuse | 20,21,22 |
| 2X1 | Cooling fan and oil valve control terminal | |
| 2T1 | Control transformer | 26 |
| 3M12,3M13,3M19 | C and D VFD panel cooling fan | 236,242,238 |
| 3A8 | Compressor VFD C | 234 |
| 3A9 | Compressor VFD D | 240 |
| 3F7,3F8,3F9 | Compressor VFD C fuse | 45,46,47 |
| 3F10,3F11,3F12 | Compressor VFD D fuse | 51,52,53 |
| 3X1 | Cooling fan and oil valve control terminal | |
| 3T1 | Control transformer | 57 |
| 4A2 | Circuit controller A | 159 |
| 4A3 | Circuit controller B | 159 |
| 4A4 | Circuit controller C | 190 |
| 4A5 | Circuit controller D | 190 |
| 4T2,4T3,4T4,4T5 | Circuit control panel transformer | 162,193 |
| 4X4 | Circuit control terminal | |
| 5A10 | Fan VFD A | 27 |
| 5A11 | Fan VFD B | 30 |
| 5F14,5F15 | Fan VFD A and B fuse | 26,27 |
| 6A12 | Fan VFD C | 58 |
| 6A13 | Fan VFD D | 62 |
| 6F16,6F17 | Fan VFD C and D fuse | 57,58 |
| 7B1,7B2,7B3,7B4 | High pressure switch | 224,230,236,242 |
| 7M1,7M3,7M5,7M7 | Compressor | 15,21,46,52 |
| 7M2,7M4,7M6,7M8 | Fan | 27,31,58,62 |
| 7M9 | Water pump | 36 |
| 7Y1,7Y2,7Y3,7Y4 | Compressor oil valve | 222,228,234,240 |
| 7Y6,7Y8,7Y10,7Y12 | 4-way valve | 153,184 |
| 7Y13~7Y20 | Electronic expansion valve | 168,169,199,200 |
| 7Y21 | Water injecting valve | 80 |
| 7H1,7H2,7H3,7H4 | Electric heater | 153,184 |
| 7P5,7P7,7P9,7P11 | High pressure sensor | 163,194 |
| 7P6,7P8,7P10,7P12 | Low pressure sensor | 164,195 |
| 7T1,7T5,7T9,7T13 | Ejection temperature sensor | 165,196 |
| 7T2,7T6,7T10,7T14 | Intake temperature sensor | 166,197 |
| 7T3,7T7,7T11,7T15 | Coil 1 gas side temperature sensor | 167,198 |
| 7T4,7T8,7T12,7T16 | Coil 2 gas side temperature sensor | 168,199 |
| 7T17 | Inlet water temperature sensor | 97 |
| 7T18 | Intermediate water temperature sensor | 97 |
| 7T19 | Outlet water temperature sensor | 97 |
| 7T20 | Ambient temperature sensor | 97 |
| 7T21 | Main water outlet temperature sensor | 126 |
| 7T22 | Main water inlet temperature sensor | 126 |
| 8Q1 | Main circuit breaker | 7 |
| 8U1,8U2 | Harmonic filter | 246,250 |
| 8M14,8M15,8M16 | Harmonic filter panel cooling fan | 256,258,260 |
| 8F25~8F30 | Harmonic filter fuse | 14,45 |
| 8X1 | Harmonic filter panel control terminal | |
| 8K1,8K2 | Harmonic filter overload output relay | 246,250 |
| 8S1 | Automatic thermostat | 253 |
| 9A15 | Modular controller | 120 |
| 9A16 | DC power supply | 115 |
| 9A17 | Module display | 119 |
| 9A18 | BACnet converter | 104 |
| 9K3 | Alarm output relay | 129 |
| 9K4 | Group ON/OFF relay | 128 |
| 9X1 | Modular controller terminal | |
| 9T1 | Isolating transformer | 114 |
| 10A14 | Water pump VFD | 36 |
| 10F21,10F22,10F23 | Water pump fuse | 35,36,37 |
| 10S1 | Automatic thermostat | 41 |
| 10M17 | Water pump panel cooling fan | 41 |
| 11Y1 | Water side solenoid | 262 |
| 11S1 | Flow switch | 83 |

| Equipment specified prefix | |
|---|---|
| Prefix | Device position |
| 1 | Main control panel |
| 2 | Compressor A and B VFD control panel |
| 3 | Compressor C and D VFD control panel |
| 4 | Circuit control panel |
| 5 | Fan A and B VFD control panel |
| 6 | Fan C and D VFD control panel |
| 7 | Unit attachment |
| 8 | Harmonic filter panel |
| 9 | Modular controller panel |
| 10 | Water pump VFD panel |
| 11 | Provided by customer |

| Color Code | | | |
|---|---|---|---|
| Code | Color | Code | Color |
| R | Red | BR | Brown |
| W | White | OR | Orange |
| BK | Black | BL | Blue |
| GY | Gray | Y | Yellow |
| GR | Green | | |

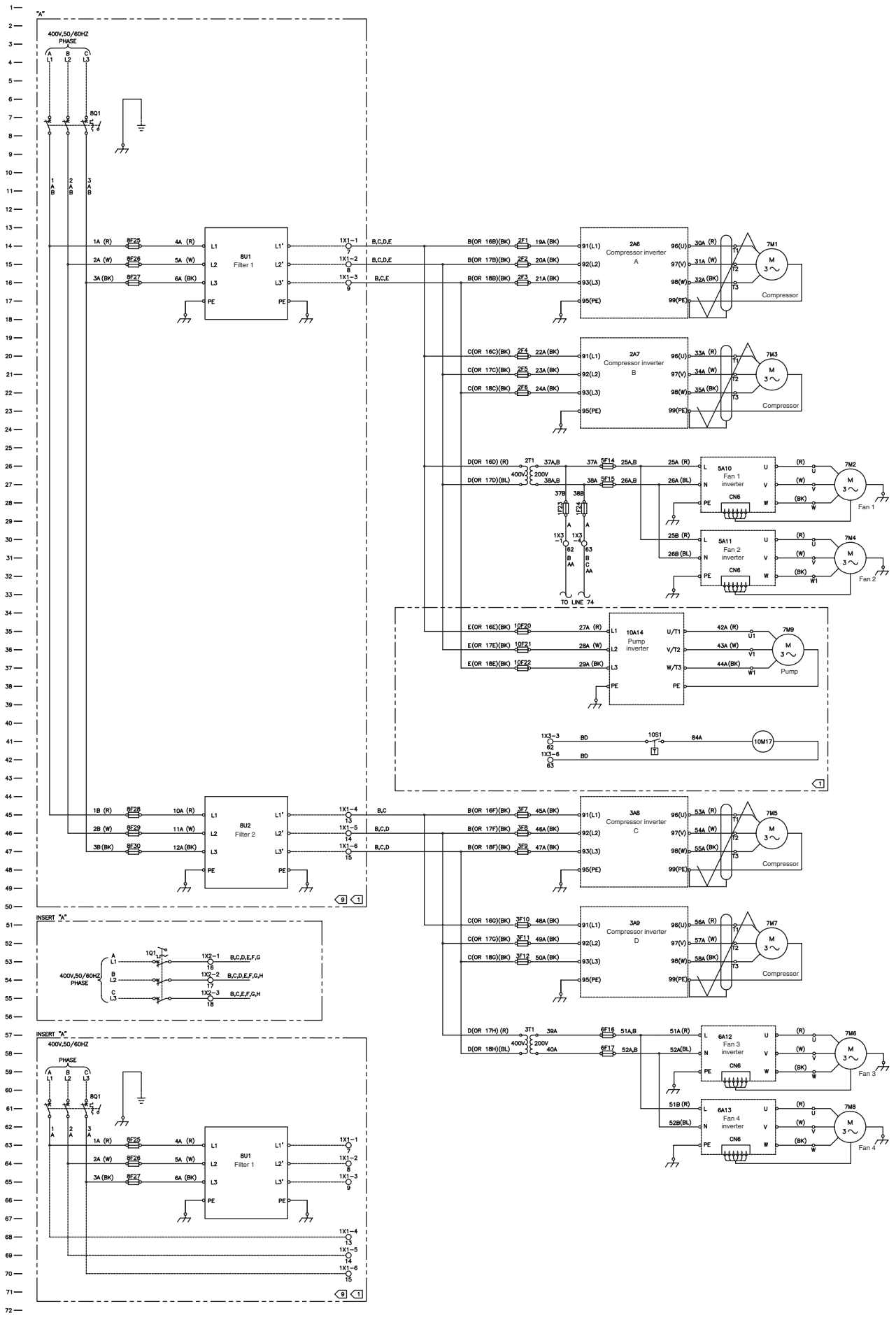
| | |
|---|---|
| ———— | Trane wiring |
| - - - - - - - - - - - - | Customer wiring |
| ——— – – ——— | Options |

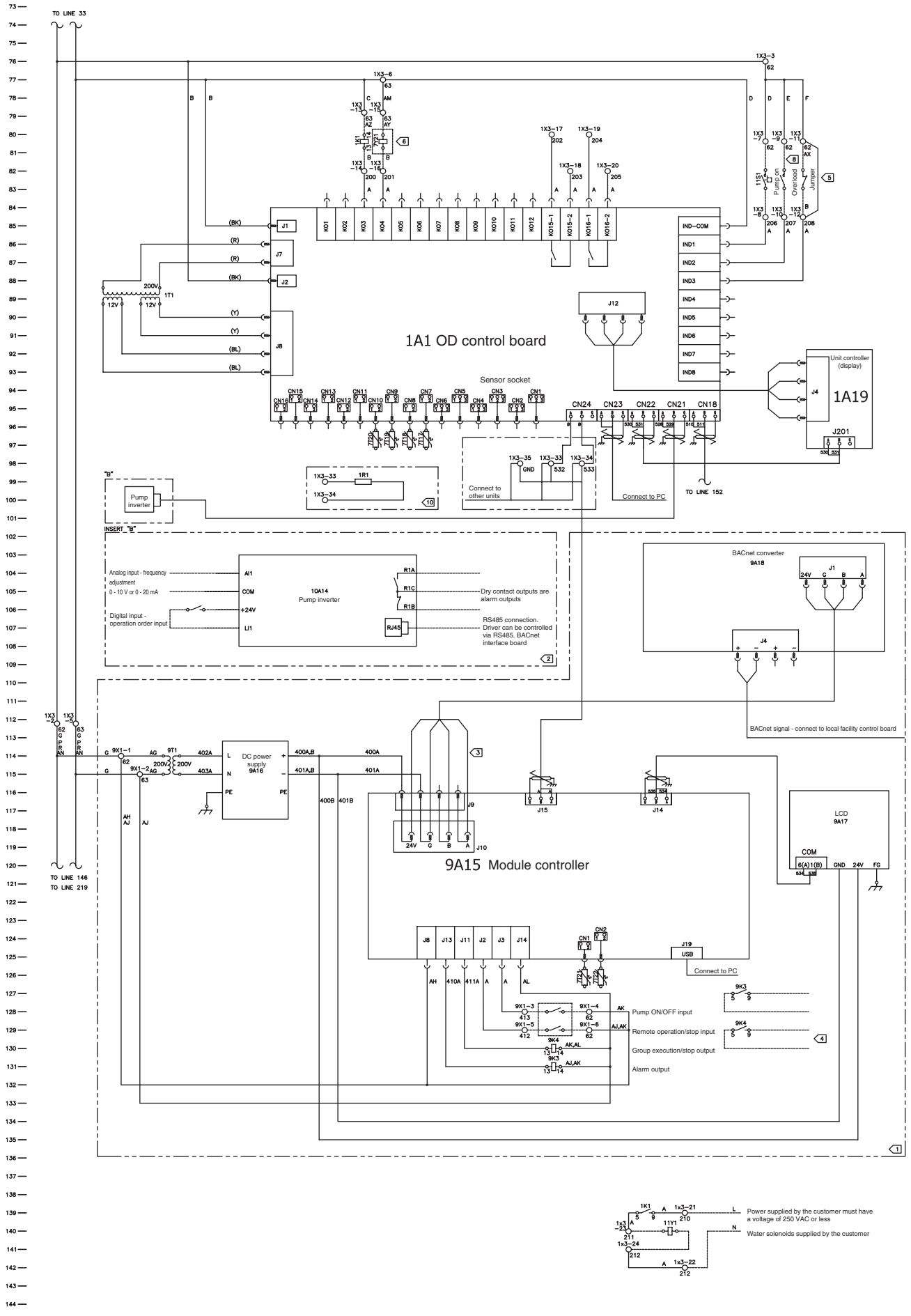
General Precautions

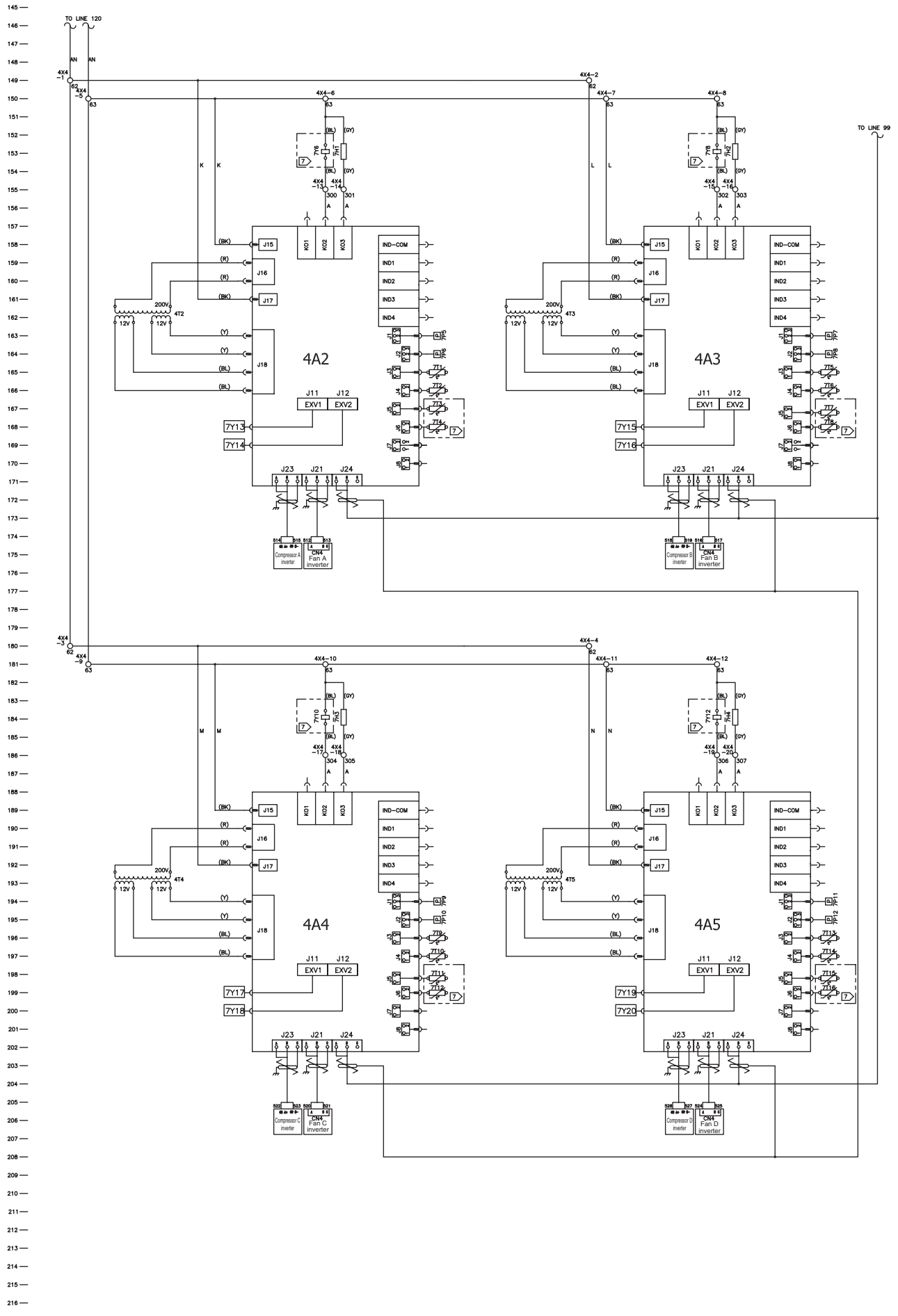
1. Unless noted otherwise, all switches are at 25°C (77°F), atmospheric pressure, 50% relative humidity, all utilities turned OFF and in the state after regular shutdown.
2. The dashed lines show the field wiring recommended by other companies.
   The dashed line enclosure / dashed line device outlines show the components provided in the field.
   The solid lines show wiring by Trane.
3. The numbers to the right of the circuit diagram specify the contact positions for the line number.
   Underlined numbers signify usually closed contacts.
4. All field wiring must meet the requirements of the National Electric Code (NEC) and each state or region.
5. Class 1 field wiring insulation rating must be equal to or greater than that required for the rated voltage of all equipment supplied.
   Class 2 field wiring insulation is rated to 300 V or higher.

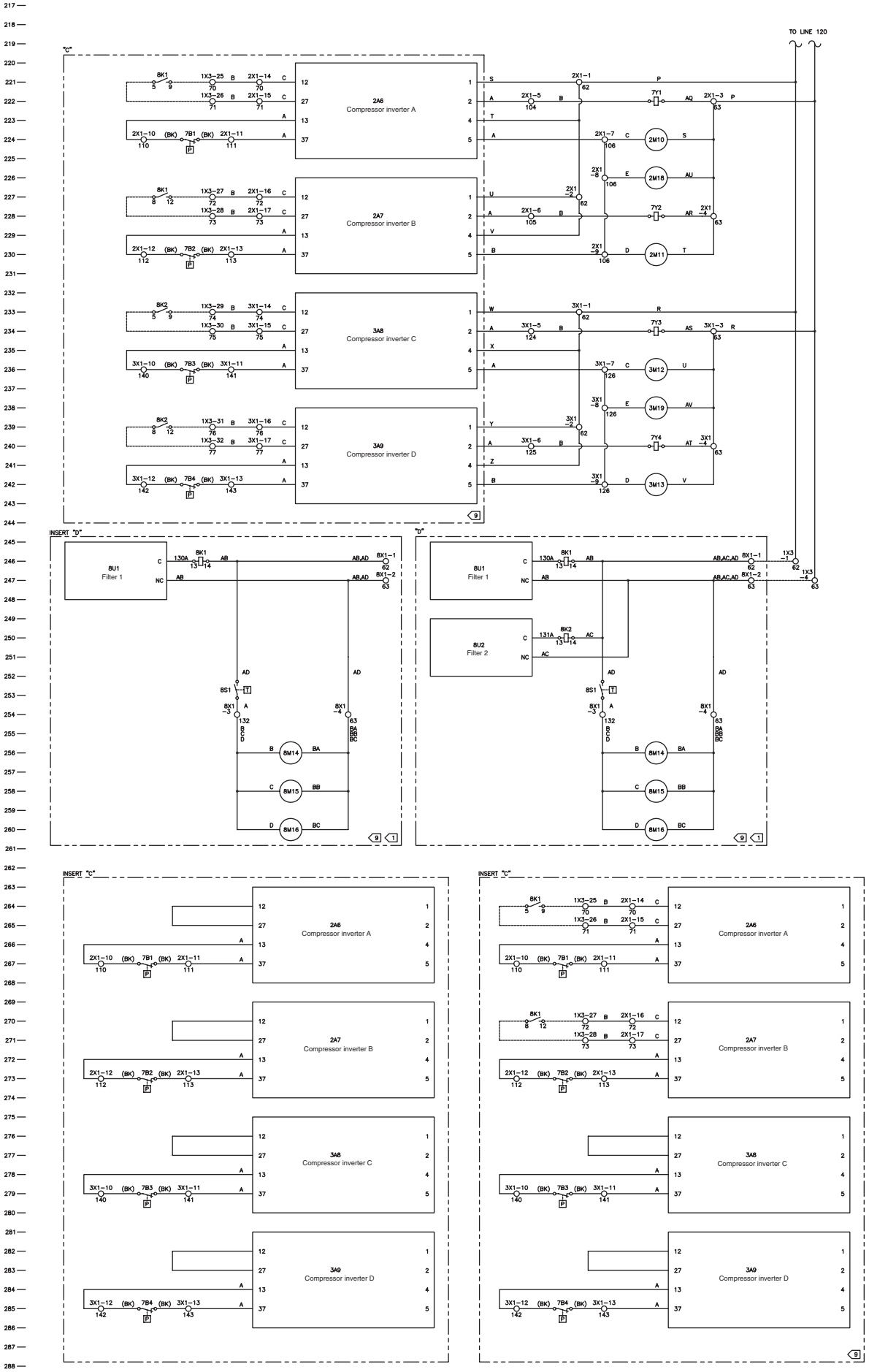
Notes

1. Select optional control panel parts to suit customer requirements.
2. If the customer requires VFD control of the pump, then control is possible using a terminal connection or RS485 cable.
3. It is possible to connect to a host computer without a BACnet converter by using Modbus protocol.
4. Dry contact functionality is for 250 V/5A AC or 24 V/5A DC resistive loads or else for 250 V/3A AC or 24 V/3A DC conductive loads.
5. The pump overload contact has had a jumper installed at time of factory shipping in order to make the unit operational.
   If the customer is to control the pump, then remove the jumper and input pump operation and overload signals.
6. Water injection valves are only used with premium units.
7. Only used with heat pump units.
8. The input pump is opened prior to shipping.
   If the customer is to control the pump, be sure to input the appropriate signals in order to enable unit operation.
9. Total harmonic treatment or partial harmonic treatment (circuits A and B) can be selected.
10. A terminating resistor must be connected to the unit at the end of the module control signal chain.


"A"
400V,50/60HZ
PHASE
8Q1
8U1
Filter 1
8U2
Filter 2
2A6
Compressor inverter
A
2A7
Compressor inverter
B
3A8
Compressor inverter
C
3A9
Compressor inverter
D
10A14
Pump
inverter
5A10
Fan 1
inverter
5A11
Fan 2
inverter
6A12
Fan 3
inverter
6A13
Fan 4
inverter
CN6
7M1
7M2
7M3
7M4
7M5
7M6
7M7
7M8
7M9
10M17
Compressor
Fan 1
Fan 2
Fan 3
Fan 4
Pump
TO LINE 74
INSERT "A"
400V,50/60HZ
PHASE


1A1 OD control board
Sensor socket
1A19
Unit controller (display)
9A15 Module controller
10A14 Pump inverter
9A16 DC power supply
9A18 BACnet converter
9A17 LCD
Pump inverter
Connect to other units
Connect to PC
TO LINE 33
TO LINE 146
TO LINE 219
TO LINE 152
Analog input - frequency adjustment 0 - 10 V or 0 - 20 mA
Digital input - operation order input
Dry contact outputs are alarm outputs
RS485 connection. Driver can be controlled via RS485. BACnet interface board
BACnet signal - connect to local facility control board
Pump ON/OFF input
Remote operation/stop input
Group execution/stop output
Alarm output
Power supplied by the customer must have a voltage of 250 VAC or less
Water solenoids supplied by the customer


TO LINE 120
TO LINE 99
4A2
4A3
4A4
4A5
4T2
4T3
4T4
4T5
J15
J16
J17
J18
J11
J12
EXV1
EXV2
J23
J21
J24
KO1
KO2
KO3
IND-COM
IND1
IND2
IND3
IND4
200V
12V
Compressor A inverter
Fan A inverter
Compressor B inverter
Fan B inverter
Compressor C inverter
Fan C inverter
Compressor D inverter
Fan D inverter
CN4


TO LINE 120
"C"
2A6
Compressor inverter A
2A7
Compressor inverter B
3A8
Compressor inverter C
3A9
Compressor inverter D
INSERT "D"
"D"
8U1
Filter 1
8U2
Filter 2
8M14
8M15
8M16
INSERT "C"

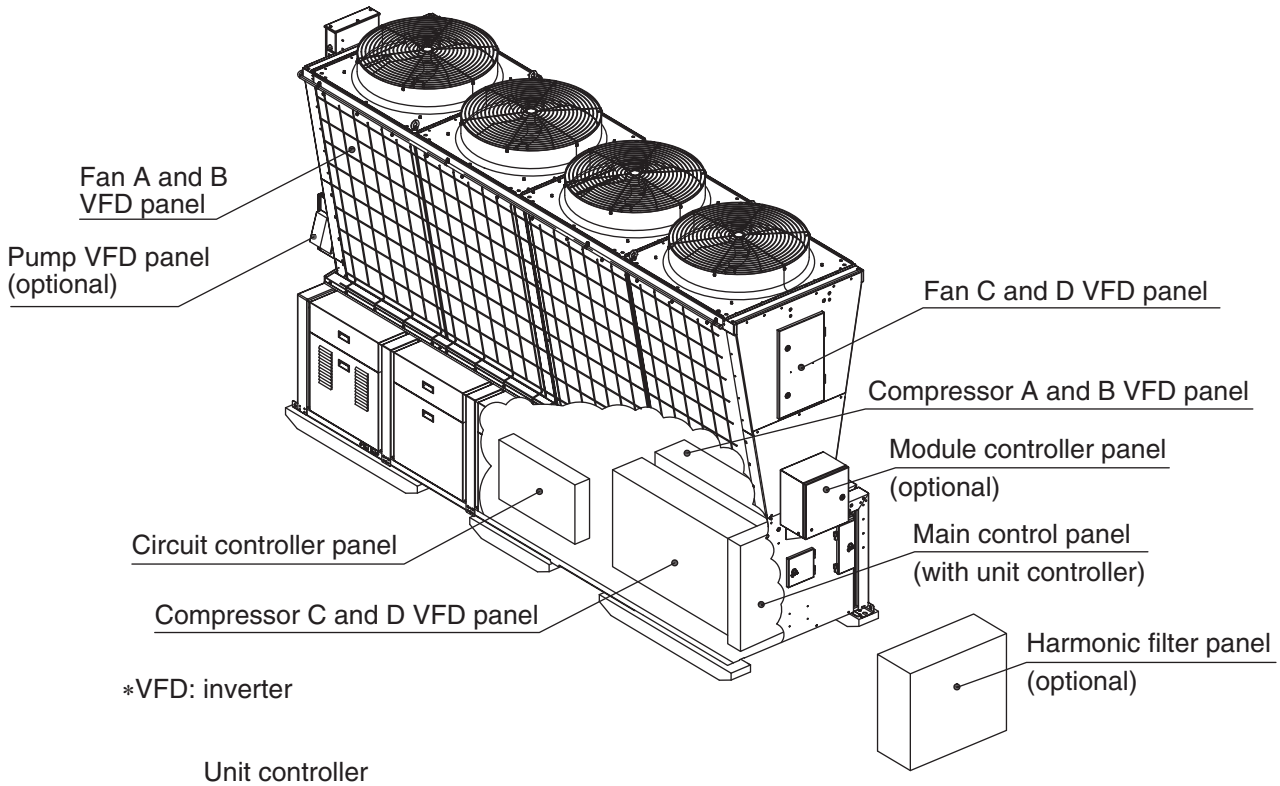
## 9-1-4. Cooler 400V, 85, 150kW

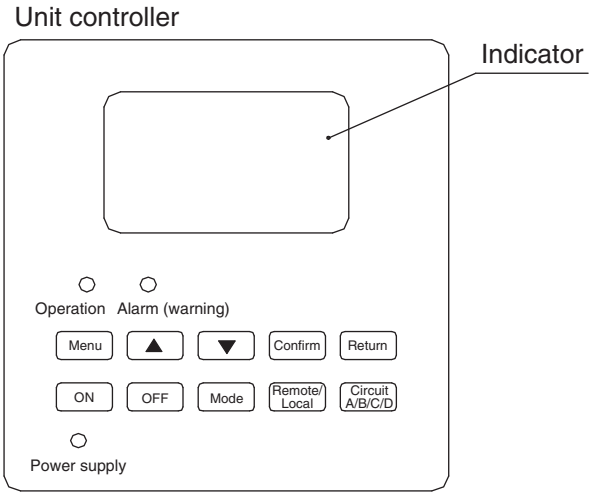
Component Number Table (Including Options)

| | | | | | |
|---|---|---|---|---|---|
| 1A1 | OD Controller Board | 3F9 | Compressor VFD C fuse (40A) | 8U1 | Harmonic filter 1 |
| 1Q1 | Main circuit breaker (200A) ∗ | 3F10 | Compressor VFD D fuse (40A) | 8U2 | Harmonic filter 2 |
| 1X1 | Power Terminal ∗ | 3F11 | Compressor VFD D fuse (40A) | 8U25 | Harmonic filter 1 fuse (80A) |
| 1X2 | Power Terminal ∗ | 3F12 | Compressor VFD D fuse (40A) | 8U26 | Harmonic filter 1 fuse (80A) |
| 1F23 | Secondary circuit fuse (10A) ∗ | 3X1 | Control terminal | 8U27 | Harmonic filter 1 fuse (80A) |
| 1F24 | Secondary circuit fuse (10A) ∗ | 3T1 | Control transformer | 8U28 | Harmonic filter 2 fuse (80A) |
| 1T1 | Control transformer | 4A2 | Circuit controller A | 8U29 | Harmonic filter 2 fuse (80A) |
| 1K1 | Auxiliary relay | 4A3 | Circuit controller B | 8U30 | Harmonic filter 2 fuse (80A) |
| 1X3 | Control terminal | 4A4 | Circuit controller C | 8K1 | Auxiliary relay |
| IR1 | Terminating resistor value | 4A5 | Circuit controller D | 8K2 | Auxiliary relay |
| 2A6 | Compressor VFD A | 4T2 | Control transformer | 8S1 | Automatic thermostat |
| 2A7 | Compressor VFD B | 4T3 | Control transformer | 8X1 | Control terminal |
| 2F1 | Compressor VFD A fuse (40A) | 4T4 | Control transformer | 9A15 | Modular Controller |
| 2F2 | Compressor VFD A fuse (40A) | 4T5 | Control transformer | 9A16 | DC power supply |
| 2F3 | Compressor VFD A fuse (40A) | 4X4 | Control terminal | 9A17 | Modular Controller display |
| 2F4 | Compressor VFD B fuse (40A) | 5A10 | Fan VFD A | 9A18 | BACnet Interface Board |
| 2F5 | Compressor VFD B fuse (40A) | 5A11 | Fan VFD B | 9K3 | Auxiliary relay |
| 2F6 | Compressor VFD B fuse (40A) | 5F14 | Compressor VFD A, B fuse (25A) | 9K4 | Auxiliary relay |
| 2X1 | Control terminal | 5F15 | Compressor VFD A, B fuse (25A) | 9X1 | Control terminal |
| 2T1 | Control transformer | 6A12 | Fan VFD C | 10A14 | Water pump VFD |
| 3A8 | Compressor VFD C | 6A13 | Fan VFD D | 10F21 | Water pump VFD fuse (25A) |
| 3A9 | Compressor VFD D | 6F16 | Fan VFD C, D fuse (25A) | 10F22 | Water pump VFD fuse (25A) |
| 3F7 | Compressor VFD C fuse (40A) | 6F17 | Fan VFD C, D fuse (25A) | 10F23 | Water pump VFD fuse (25A) |
| 3F8 | Compressor VFD C fuse (40A) | 8Q1 | Main circuit breaker (200A) ∗ | | |

∗ VFD: Inverter

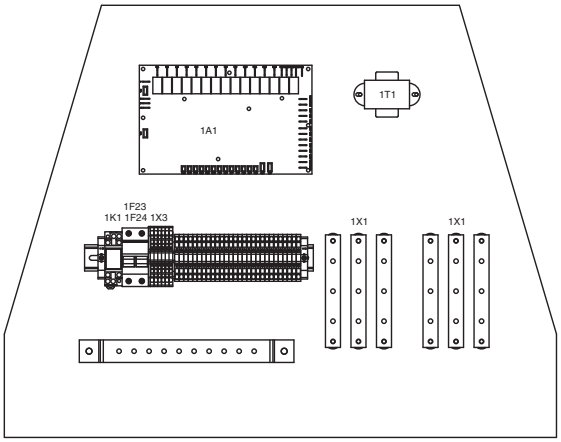
Electrical / Control Panel Layout Diagram



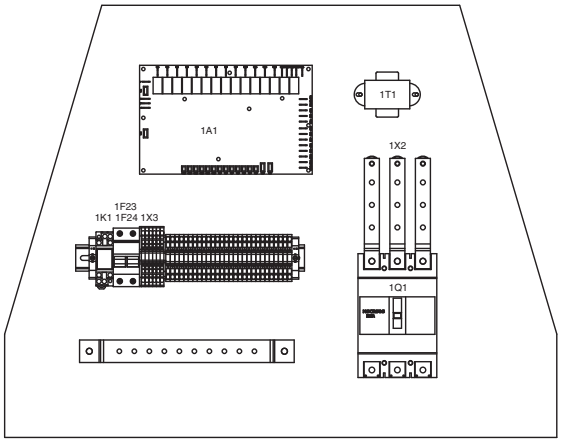




Note: 1. The harmonic filter panel, Modular Controller panel and water pump panel are all optional. You can select any combination of these parts. If use of a Modular Controller is required, then a Modular Controller panel must be configured for one unit only
2. Components with a legend prefix of 8, 9 or 10 are all for any control panel.
3. Components marked with an asterisk indicate that if a harmonic filter panel is used, the main circuit breaker should be installed on the harmonic filter panel and the 1x1 terminal on the main control panel. In other situations the 1x2 terminal and main circuit breaker should be installed on the main control panel.

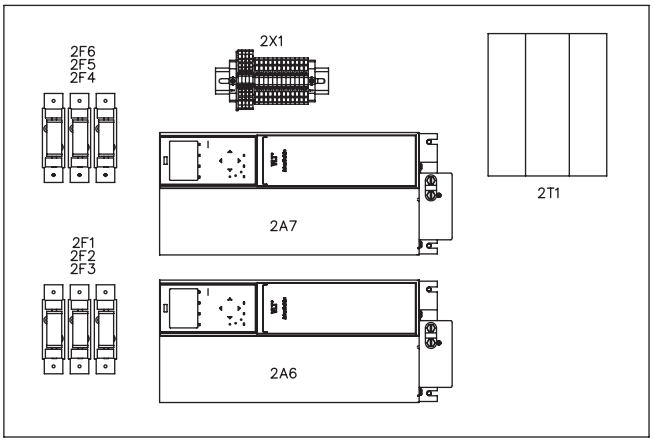
## Control Panel Layout Diagram Structural Components



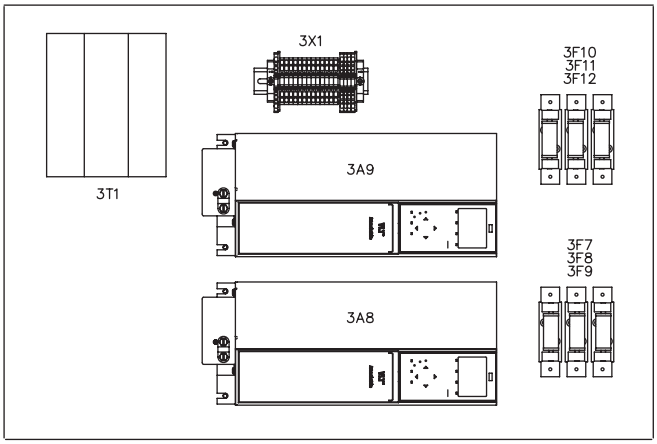

Main Control Panel (with harmonic filter)



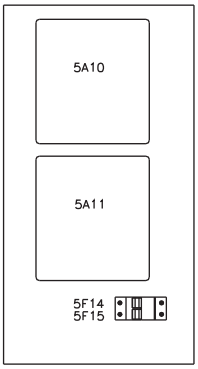

Main Control Panel (without harmonic filter)



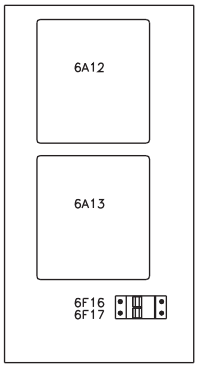

Compressor A and B VFD panel



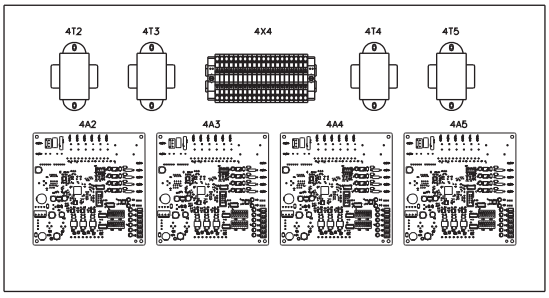

Compressor C and D VFD panel



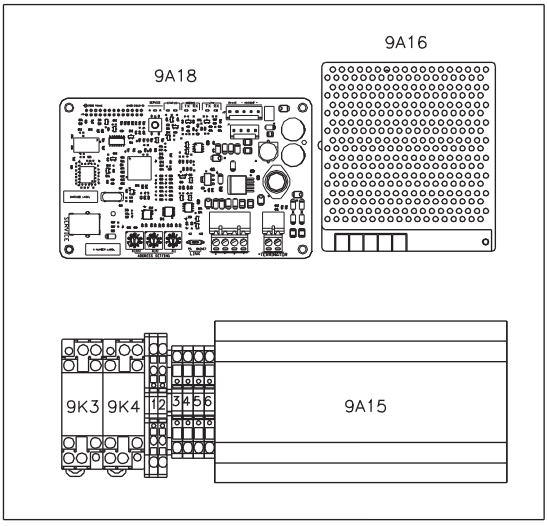

Fan A and B VFD panel



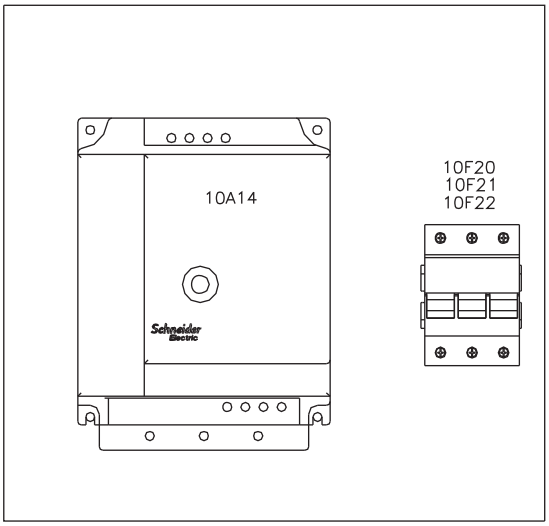

Fan C and D VFD panel



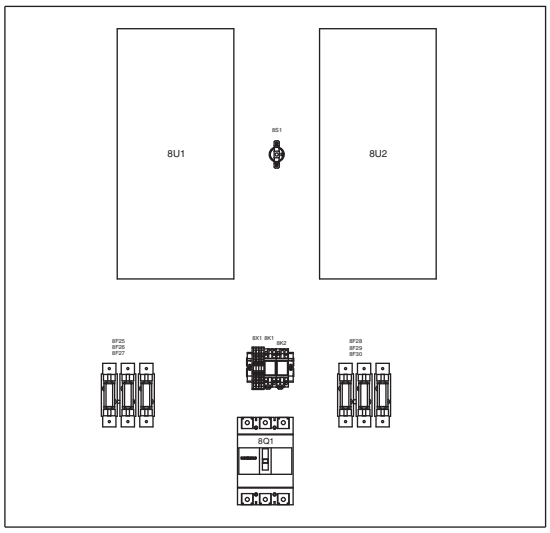

Circuit controller panel

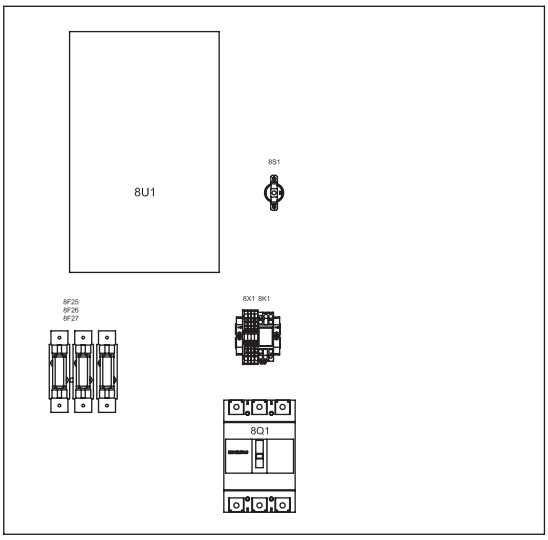



Module controller panel




Pump VFD panel




Harmonic filter panel

# Electrical Wiring Diagram

| Legend | | |
|---|---|---|
| Device identification | Description | Line number |
| 1A1 | OD Controller | 86 |
| 1A19 | Unit controller | 94 |
| 1Q1 | Main circuit breaker | 54 |
| 1X1,1X2 | Power terminal | 14,56 |
| 1F23,1F24 | Secondary circuit fuse | 28 |
| 1T1 | Main control panel transformer | 89 |
| 1K1 | Water side solenoid relay | 89 |
| 1R1 | Terminating resistor value | 99 |
| 1X3 | Control terminal | |
| 2M10,2M11,2M18 | A and B VFD panel cooling fan | 224,230,226 |
| 2A6 | Compressor VFD A | 222 |
| 2A7 | Compressor VFD B | 228 |
| 2F1,2F2,2F3 | Compressor VFD A fuse | 14,15,16 |
| 2F4,2F5,2F6 | Compressor VFD B fuse | 20,21,22 |
| 2X1 | Cooling fan and oil valve control terminal | |
| 2T1 | Control transformer | 26 |
| 3M12,3M13,3M19 | C and D VFD panel cooling fan | 236,242,238 |
| 3A8 | Compressor VFD C | 234 |
| 3A9 | Compressor VFD D | 240 |
| 3F7,3F8,3F9 | Compressor VFD C fuse | 45,46,47 |
| 3F10,3F11,3F12 | Compressor VFD D fuse | 51,52,53 |
| 3X1 | Cooling fan and oil valve control terminal | |
| 3T1 | Control transformer | 57 |
| 4A2 | Circuit controller A | 159 |
| 4A3 | Circuit controller B | 159 |
| 4A4 | Circuit controller C | 190 |
| 4A5 | Circuit controller D | 190 |
| 4T2,4T3,4T4,4T5 | Circuit control panel transformer | 162,193 |
| 4X4 | Circuit control terminal | |
| 5A10 | Fan VFD A | 27 |
| 5A11 | Fan VFD B | 30 |
| 5F14,5F15 | Fan VFD A and B fuse | 26,27 |
| 6A12 | Fan VFD C | 58 |
| 6A13 | Fan VFD D | 62 |
| 6F16,6F17 | Fan VFD C and D fuse | 57,58 |
| 7B1,7B2,7B3,7B4 | High pressure switch | 224,230,236,242 |
| 7M1,7M3,7M5,7M7 | Compressor | 15,21,46,52 |
| 7M2,7M4,7M6,7M8 | Fan | 27,31,58,62 |
| 7M9 | Water pump | 36 |
| 7Y1,7Y2,7Y3,7Y4 | Compressor oil valve | 222,228,234,240 |
| 7Y6,7Y8,7Y10,7Y12 | 4-way valve | 153,184 |
| 7Y13~7Y20 | Electronic expansion valve | 168,169,199,200 |
| 7Y21 | Water injecting valve | 80 |
| 7H1,7H2,7H3,7H4 | Electric heater | 153,184 |
| 7P5,7P7,7P9,7P11 | High pressure sensor | 163,194 |
| 7P6,7P8,7P10,7P12 | Low pressure sensor | 164,195 |
| 7T1,7T5,7T9,7T13 | Ejection temperature sensor | 165,196 |
| 7T2,7T6,7T10,7T14 | Intake temperature sensor | 166,197 |
| 7T3,7T7,7T11,7T15 | Coil 1 gas side temperature sensor | 167,198 |
| 7T4,7T8,7T12,7T16 | Coil 2 gas side temperature sensor | 168,199 |
| 7T17 | Inlet water temperature sensor | 97 |
| 7T18 | Intermediate water temperature sensor | 97 |
| 7T19 | Outlet water temperature sensor | 97 |
| 7T20 | Ambient temperature sensor | 97 |
| 7T21 | Main water outlet temperature sensor | 126 |
| 7T22 | Main water inlet temperature sensor | 126 |
| 8Q1 | Main circuit breaker | 7 |
| 8U1,8U2 | Harmonic filter | 246,250 |
| 8M14,8M15,8M16 | Harmonic filter panel cooling fan | 256,258,260 |
| 8F25~8F30 | Harmonic filter fuse | 14,45 |
| 8X1 | Harmonic filter panel control terminal | |
| 8K1,8K2 | Harmonic filter overload output relay | 246,250 |
| 8S1 | Automatic thermostat | 253 |
| 9A15 | Modular controller | 120 |
| 9A16 | DC power supply | 115 |
| 9A17 | Module display | 119 |
| 9A18 | BACnet converter | 104 |
| 9K3 | Alarm output relay | 129 |
| 9K4 | Group ON/OFF relay | 128 |
| 9X1 | Modular controller terminal | |
| 9T1 | Isolating transformer | 114 |
| 10A14 | Water pump VFD | 36 |
| 10F21,10F22,10F23 | Water pump fuse | 35,36,37 |
| 10S1 | Automatic thermostat | 41 |
| 10M17 | Water pump panel cooling fan | 41 |
| 11Y1 | Water side solenoid | 262 |
| 11S1 | Flow switch | 83 |

| Equipment specified prefix | |
|---|---|
| Prefix | Device position |
| 1 | Main control panel |
| 2 | Compressor A and B VFD control panel |
| 3 | Compressor C and D VFD control panel |
| 4 | Circuit control panel |
| 5 | Fan A and B VFD control panel |
| 6 | Fan C and D VFD control panel |
| 7 | Unit attachment |
| 8 | Harmonic filter panel |
| 9 | Modular controller panel |
| 10 | Water pump VFD panel |
| 11 | Provided by customer |

| Color Code | | | |
|---|---|---|---|
| Code | Color | Code | Color |
| R | Red | BR | Brown |
| W | White | OR | Orange |
| BK | Black | BL | Blue |
| GY | Gray | Y | Yellow |
| GR | Green | | |

| | |
|---|---|
| ———— | Trane wiring |
| - - - - - - - - - - - - | Customer wiring |
| ——— – – ——— | Options |

General Precautions

1. Unless noted otherwise, all switches are at 25°C (77°F), atmospheric pressure, 50% relative humidity, all utilities turned OFF and in the state after regular shutdown.
2. The dashed lines show the field wiring recommended by other companies.
   The dashed line enclosure / dashed line device outlines show the components provided in the field.
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3. The numbers to the right of the circuit diagram specify the contact positions for the line number.
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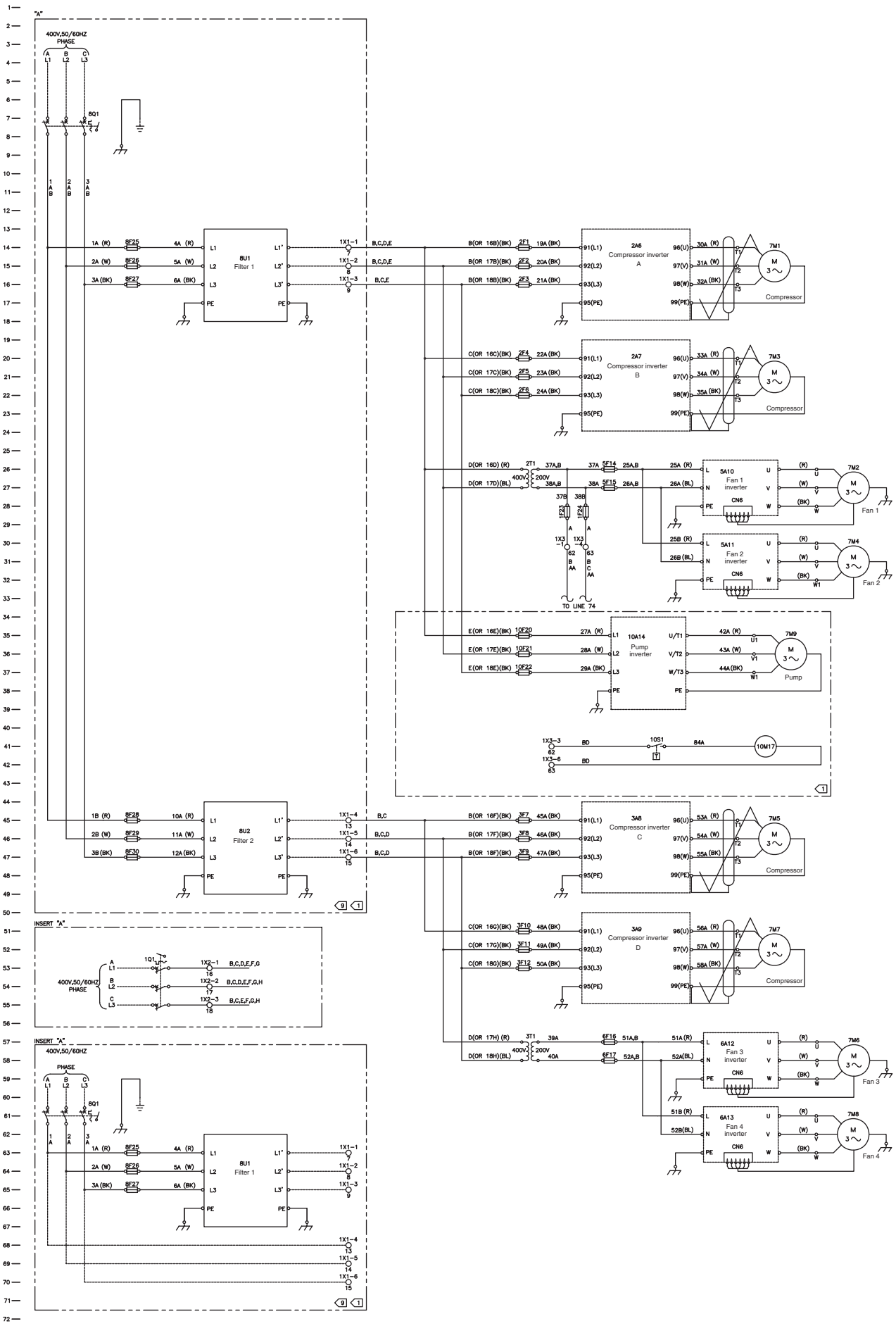
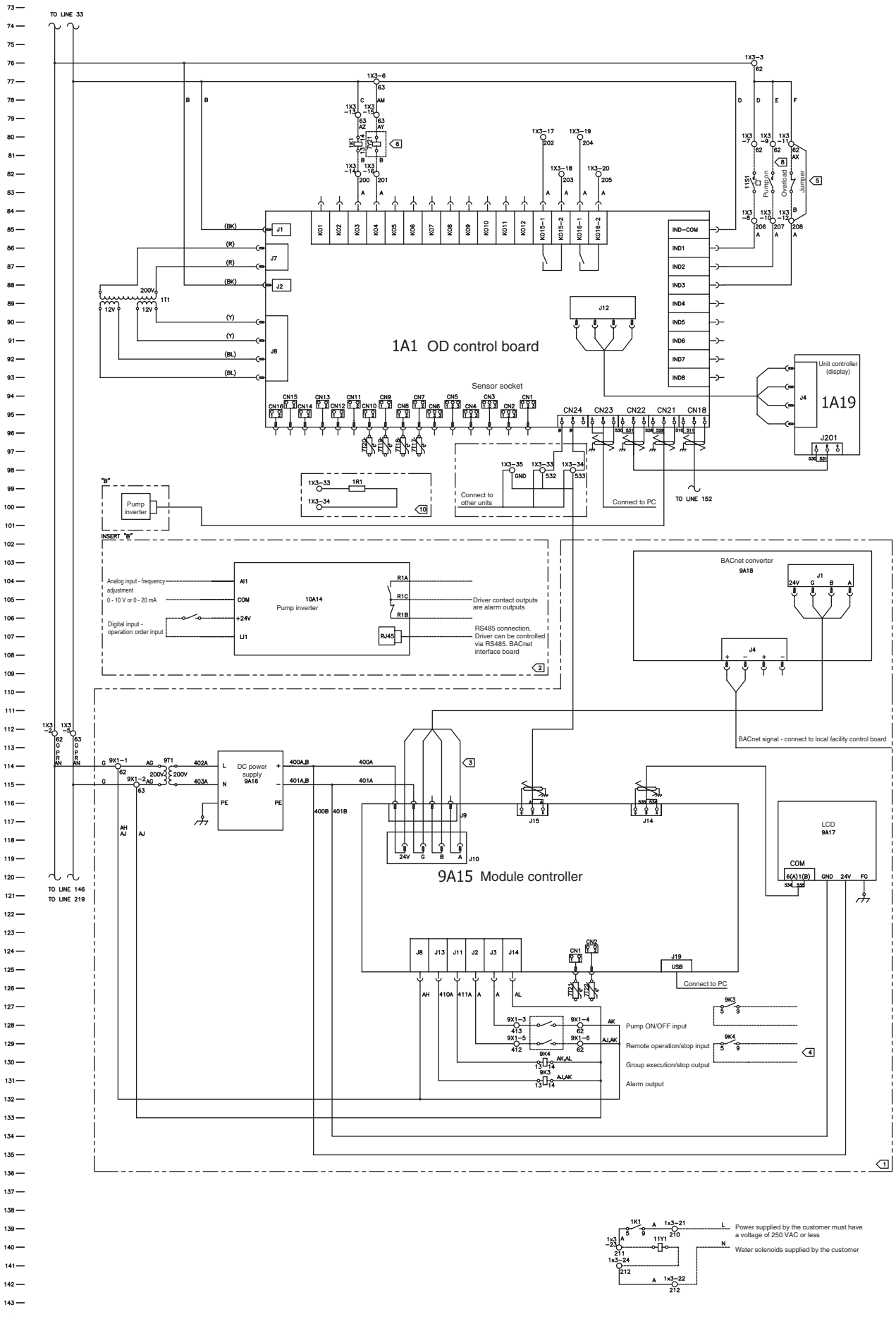
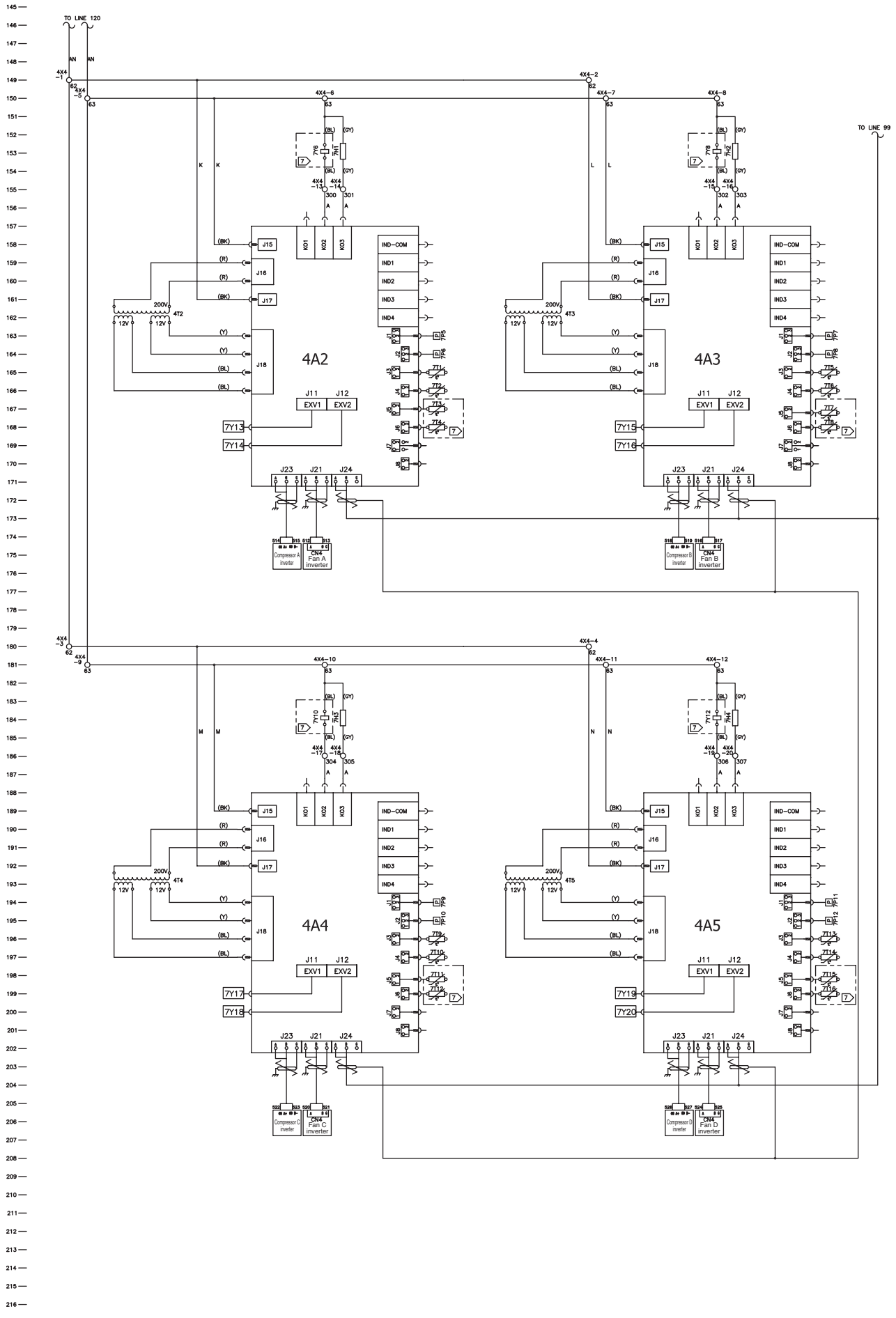
5. Class 1 field wiring insulation rating must be equal to or greater than that required for the rated voltage of all equipment supplied.
   Class 2 field wiring insulation is rated to 300 V or higher.

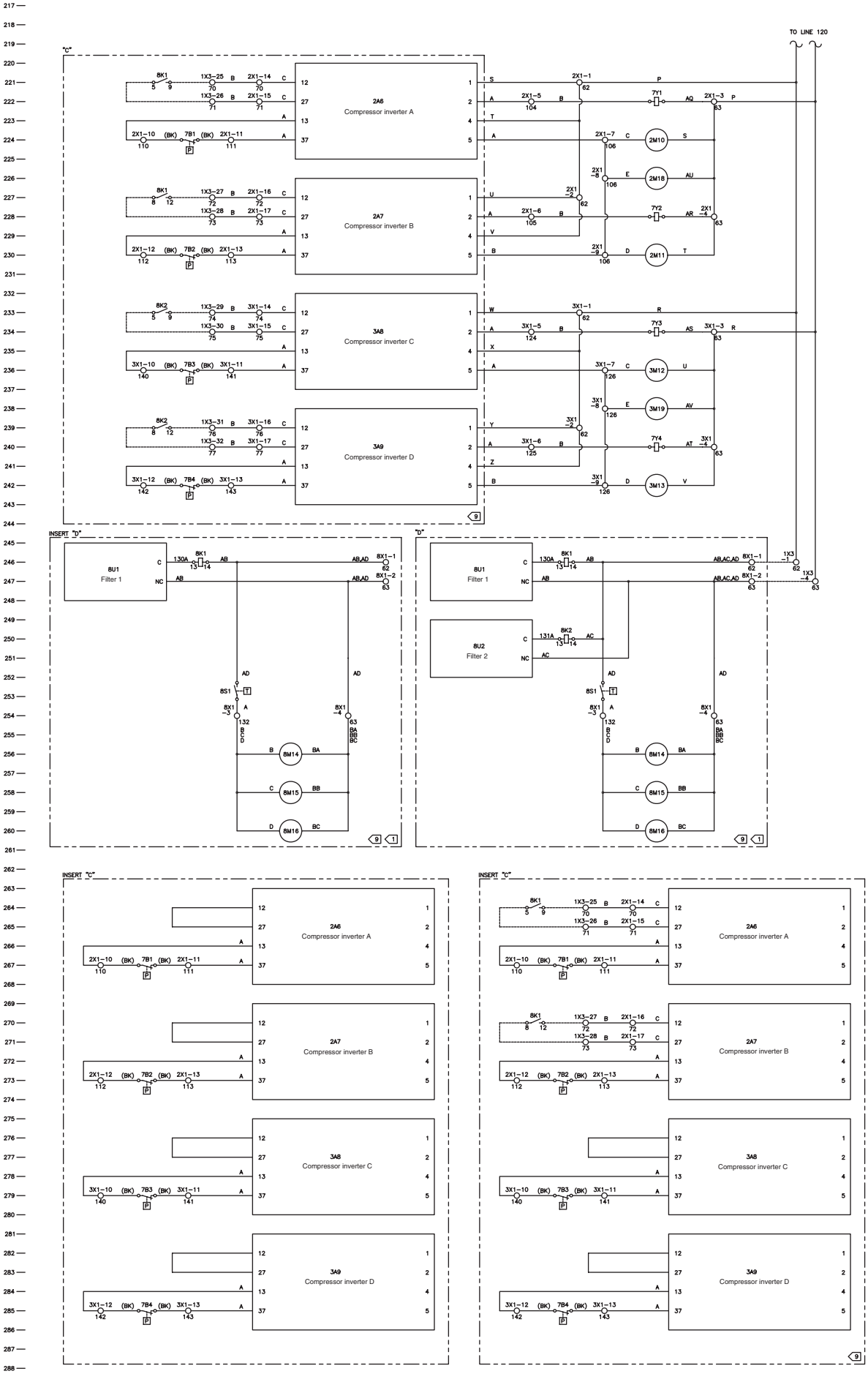
Notes

1. Select optional control panel parts to suit customer requirements.
2. If the customer requires VFD control of the pump, then control is possible using a terminal connection or RS485 cable.
3. It is possible to connect to a host computer without a BACnet converter by using Modbus protocol.
4. Dry contact functionality is for 250 V/5A AC or 24 V/5A DC resistive loads or else for 250 V/3A AC or 24 V/3A DC conductive loads.
5. The pump overload contact has had a jumper installed at time of factory shipping in order to make the unit operational.
   If the customer is to control the pump, then remove the jumper and input pump operation and overload signals.
6. Water injection valves are only used with premium units.
7. Only used with heat pump units.
8. The input pump is opened prior to shipping.
   If the customer is to control the pump, be sure to input the appropriate signals in order to enable unit operation.
9. Total harmonic treatment or partial harmonic treatment (circuits A and B) can be selected.
10. A terminating resistor must be connected to the unit at the end of the module control signal chain.


"A"
400V,50/60HZ
PHASE
8Q1
8U1
Filter 1
8U2
Filter 2
2A6
Compressor inverter
A
2A7
Compressor inverter
B
3A8
Compressor inverter
C
3A9
Compressor inverter
D
Pump
inverter
5A10
Fan 1
inverter
5A11
Fan 2
inverter
6A12
Fan 3
inverter
6A13
Fan 4
inverter
Compressor
Pump
Fan 1
Fan 2
Fan 3
Fan 4
TO LINE 74
INSERT "A"


TO LINE 33
1A1 OD control board
Sensor socket
Unit controller (display)
1A19
Pump inverter
INSERT "B"
Analog input - frequency adjustment
0 - 10 V or 0 - 20 mA
Digital input - operation order input
10A14 Pump inverter
Driver contact outputs are alarm outputs
RS485 connection. Driver can be controlled via RS485. BACnet interface board
BACnet converter
9A18
BACnet signal - connect to local facility control board
Connect to other units
Connect to PC
TO LINE 152
DC power supply 9A16
9A15 Module controller
LCD 9A17
Pump ON/OFF input
Remote operation/stop input
Group execution/stop output
Alarm output
Power supplied by the customer must have a voltage of 250 VAC or less
Water solenoids supplied by the customer
TO LINE 146
TO LINE 219


TO LINE 120
TO LINE 99
4A2
4A3
4A4
4A5
J11 J12
EXV1 EXV2
J23 J21 J24
IND–COM
IND1
IND2
IND3
IND4
KO1 KO2 KO3
Compressor A inverter
Fan A inverter
Compressor B inverter
Fan B inverter
Compressor C inverter
Fan C inverter
Compressor D inverter
Fan D inverter


TO LINE 120
"C"
2A6
Compressor inverter A
2A7
Compressor inverter B
3A8
Compressor inverter C
3A9
Compressor inverter D
INSERT "D"
"D"
8U1
Filter 1
8U2
Filter 2
INSERT "C"
INSERT "C"

## 9-2. Power and Signal Cable Wiring Between Modules - On-Site Wiring Diagram

Note 1: The power wiring input location will differ depending on whether or not the (optional) harmonic filter is used. It will be at the harmonic filter panel if a harmonic filter is used, and at the main controller panel otherwise.
Note 2: Be sure to take waterproofing measures as required for the pull-through port.
Note 3: Refer to figure 3 for signal cable connections between units.
Note 4: Follow the circuit diagram when installing the terminating resistor required for the unit at the end of the Modular Control communication chain.

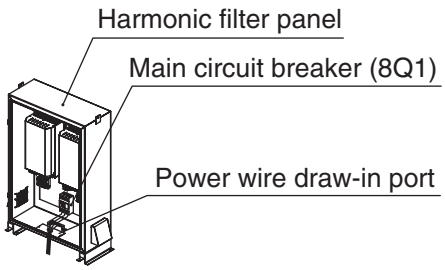



Figure 1. Power input via the harmonic filter panel (from base)

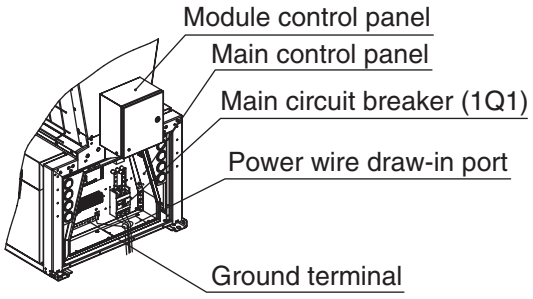



Figure 2. Power input via the main control panel (from base) (if there is no harmonic filter)

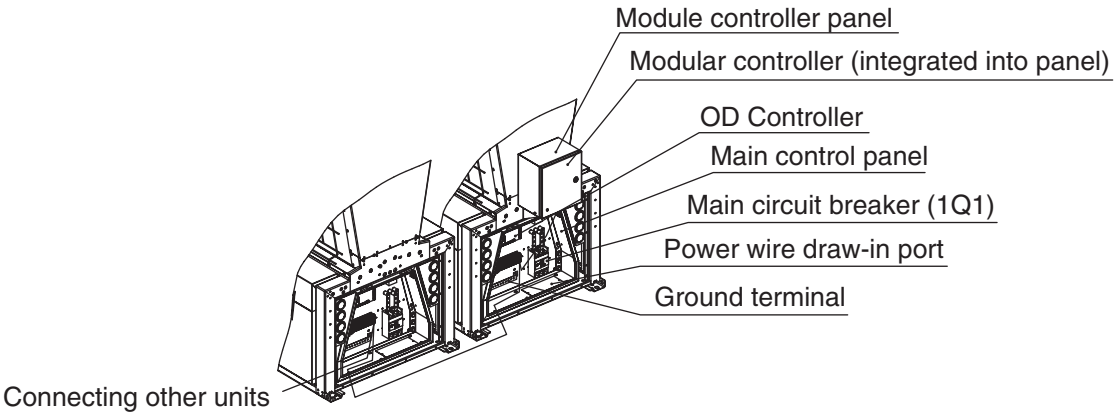



Figure 3. Signal cable connections between units

# 10 Power Cable Configuration

## 10-1. Power Cable Configuration Cautionary Notes

(1) Refer to Trane circuit diagrams, wiring diagrams and configuration tables.
(2) Apply power to the unit according to the nameplate. Measure the phase-to-phase voltages and check they are within the voltage tolerance (±10%) listed on the nameplate. If the voltage between two phases exceeds the tolerance range, then modify the voltages to be within the range before starting the unit. If incorrect voltages are applied the controller may function abnormally, causing burnout or reduced lifetime in various electrical components such as compressors.
(3) Perform all wiring work in accordance with all relevant electrical wiring standards, laws and regulations.
(4) The earth (ground) wire for 200V is D-type grounding (100Ω or less).
Connect in accordance with all relevant electrical wiring standards, laws and regulations.
(5) Always use an earth leakage breaker. As this unit contains an inverter, choose a breaker that handles harmonics.

## 10-2. Power Plan

Open a power cable draw-in hole on the user side for the power source and take waterproofing countermeasures as necessary to suit the site.
∗The power supply for the pump frequency converter is 4kW.
Power Supply Design Tables
Note: the following 4 types of water pumps are available.
FSSH: Fixed Speed - Standard Head
FSHH: Fixed Speed - High Head
VFSH: Variable Flow - Standard Head
VFHH: Variable Flow - High Head

### 10-2-1. 200V 85kW Heat Pump

| | | 85kW, heat pump | | | | |
|---|---|---|---|---|---|---|
| Pump | Power supply | 200V-50Hz/60Hz/3P | | | | |
| | Pump type | Without pump | FSSH | FSHH | VFSH | VFHH |
| | Rated power (kW) | --- | 1.5 | 3 | 1.5 | 1.85 |
| | Model - | --- | Variable frequency - | Variable frequency - | Variable frequency - | Variable frequency - |
| | Max. operating current (A) | --- | 7.2 | 11.8 | 7.2 | 9 |
| Power supply design | Power supply input location | Main circuit breaker of main control panel or harmonic filter panel | | | | |
| | Rated current (A) | 120 | 128 | 132 | 128 | 130 |

### 10-2-2. 200V 85kW Cooler

| | | 85kW, cooler | | | | |
|---|---|---|---|---|---|---|
| Pump | Power supply | 200V-50Hz/60Hz/3P | | | | |
| | Pump type | Without pump | FSSH | FSHH | VFSH | VFHH |
| | Rated power (kW) | --- | 1.5 | 3 | 1.5 | 1.85 |
| | Model - | --- | Variable frequency - | Variable frequency - | Variable frequency - | Variable frequency - |
| | Max. operating current (A) | --- | 7.2 | 11.8 | 7.2 | 9 |
| Power supply design | Power supply input location | Main circuit breaker of main control panel or harmonic filter panel | | | | |
| | Rated current (A) | 120 | 128 | 132 | 128 | 130 |

## 10-2-3. 200V 150kW Heat Pump

| | | 150kW, heat pump | | | | |
|---|---|---|---|---|---|---|
| Pump | Power supply | 200V-50Hz/60Hz/3P | | | | |
| | Pump type | Without pump | FSSH | FSHH | VFSH | VFHH |
| | Rated power (kW) | --- | 3 | 4 | 3 | 4 |
| | Model - | --- | Variable frequency - | Variable frequency - | Variable frequency - | Variable frequency - |
| | Max. operating current (A) | --- | 11.8 | 15.3 | 11.8 | 15.3 |
| Power supply design | Power supply input location | Main circuit breaker of main control panel or harmonic filter panel | | | | |
| | Rated current (A) | 180 | 192 | 196 | 192 | 196 |

## 10-2-4. 200V 150kW Cooler

| | | 150kW, cooler | | | | |
|---|---|---|---|---|---|---|
| Pump | Power supply | 200V-50Hz/60Hz/3P | | | | |
| | Pump type | Without pump | FSSH | FSHH | VFSH | VFHH |
| | Rated power (kW) | --- | 3 | 4 | 3 | 4 |
| | Model - | --- | Variable frequency - | Variable frequency - | Variable frequency - | Variable frequency - |
| | Max. operating current (A) | --- | 11.8 | 15.3 | 11.8 | 15.3 |
| Power supply design | Power supply input location | Main circuit breaker of main control panel or harmonic filter panel | | | | |
| | Rated current (A) | 180 | 192 | 196 | 192 | 196 |

| Cable end connection | Provided by Trane Installed on-site | Provided by customer Installed on-site | No. Pcs. | Optional | Length |
|---|---|---|---|---|---|
| Pump panel* | --- | Control cable, analog in, (2)2 × 1mm² | 1 | ✓ | Determined on-site |
| | --- | Control cable, digital in (2)2 × 1mm² | 1 | ✓ | Determined on-site |
| | --- | Control cable, digital out (2)2 × 1mm² | 1 | ✓ | Determined on-site |
| | --- | Signal cable(2) | 1 | ✓ | Determined on-site |
| Modular controller panel* | --- | Modbus/BACnet signals | 2 | ✓ | Determined on-site |
| Harmonic filter panel* | --- | Power supply to unit, 4 × 35mm² | 1 | ✓ | Determined on-site |
| | --- | Control cable to unit, 10(6)(3) × 1mm² | 1 | ✓ | Determined on-site |
| | --- | Power supply, 4 × 95mm² | 1 | ✓ | Determined on-site |
| Main Control Panel | P1, VFD power supplies | --- | 1 | ✓ | Fixed |
| | P3, signal(1) | --- | 1 | ✓ | Fixed |
| | M1, panel power supplies | --- | 1 | ✓ | Fixed |
| | M2, signals | --- | 1 | ✓ | Fixed |
| | UCC, modular signals | --- | 1 | ✓ | Fixed |
| | --- | Power supply(4), 4 × 95mm² | 1 | | Determined on-site |
| | --- | Flow switch, 2 × 1mm² | 1 | | Determined on-site |
| | --- | Pump on, 2 × 1mm² | 1 | ✓ | Determined on-site |
| | --- | Pump overload, 2 × 1mm² | 1 | ✓ | Determined on-site |
| | --- | Water-side SV, 2 × 1mm² | 1 | | Determined on-site |
| | --- | Water-side SV power supply, 2 × 1mm² | 1 | | Determined on-site |
| | --- | Operating status output, 2 × 1mm² | 1 | ✓ | Determined on-site |
| | --- | Alarm output, 2 × 1mm² | 1 | ✓ | Determined on-site |
| Pump* | P2, pump power supply | --- | 1 | ✓ | Fixed |

*Optional control panels and pump

(1) Not available for variable speed pump panels
(2) Available only for variable speed pump panels
(3) Overall harmonic content treatment occupies 10 × 1mm², partial harmonic treatment occupies 6 × 1mm²
(4) Connect the power supply to the harmonic filter panel if available

## 10-2-5. 400V 85kW Heat Pump

| | | 85kW, heat pump | | | | |
|---|---|---|---|---|---|---|
| Pump | Power supply | 400V-50Hz/60Hz/3P | | | | |
| | Pump type | Without pump | FSSH | FSHH | VFSH | VFHH |
| | Rated power (kW) | --- | 1.5 | 3 | 1.5 | 1.85 |
| | Model - | --- | Variable frequency - | Variable frequency - | Variable frequency - | Variable frequency - |
| | Max. operating current (A) | --- | 3.5 | 5.9 | 3.5 | 4.5 |
| Power supply design | Power supply input location | Main circuit breaker of main control panel or harmonic filter panel | | | | |
| | Rated current (A) | 60 | 64 | 66 | 64 | 64 |

## 10-2-6. 400V 85kW Cooler

| | | 85kW, cooler | | | | |
|---|---|---|---|---|---|---|
| Pump | Power supply | 400V-50Hz/60Hz/3P | | | | |
| | Pump type | Without pump | FSSH | FSHH | VFSH | VFHH |
| | Rated power (kW) | --- | 1.5 | 3 | 1.5 | 1.85 |
| | Model - | --- | Variable frequency - | Variable frequency - | Variable frequency - | Variable frequency - |
| | Max. operating current (A) | --- | 3.5 | 5.9 | 3.5 | 4.5 |
| Power supply design | Power supply input location | Main circuit breaker of main control panel or harmonic filter panel | | | | |
| | Rated current (A) | 60 | 64 | 66 | 64 | 64 |

## 10-2-7. 400V 150kW Heat Pump

| | | 150kW, heat pump | | | | |
|---|---|---|---|---|---|---|
| Pump | Power supply | 400V-50Hz/60Hz/3P | | | | |
| | Pump type | Without pump | FSSH | FSHH | VFSH | VFHH |
| | Rated power (kW) | --- | 3 | 4 | 3 | 4 |
| | Model - | --- | Variable frequency - | Variable frequency - | Variable frequency - | Variable frequency - |
| | Max. operating current (A) | --- | 5.9 | 7.7 | 5.9 | 7.7 |
| Power supply design | Power supply input location | Main circuit breaker of main control panel or harmonic filter panel | | | | |
| | Rated current (A) | 90 | 96 | 98 | 96 | 98 |

## 10-2-8. 400V 150kW Cooler

| | | 150kW, cooler | | | | |
|---|---|---|---|---|---|---|
| Pump | Power supply | 400V-50Hz/60Hz/3P | | | | |
| | Pump type | Without pump | FSSH | FSHH | VFSH | VFHH |
| | Rated power (kW) | --- | 3 | 4 | 3 | 4 |
| | Model - | --- | Variable frequency - | Variable frequency - | Variable frequency - | Variable frequency - |
| | Max. operating current (A) | --- | 5.9 | 7.7 | 5.9 | 7.7 |
| Power supply design | Power supply input location | Main circuit breaker of main control panel or harmonic filter panel | | | | |
| | Rated current (A) | 90 | 96 | 98 | 96 | 98 |

| Cable end connection | Provided by Trane Installed on-site | Provided by customer Installed on-site | No. Pcs. | Optional | Length |
|---|---|---|---|---|---|
| Pump panel* | --- | Control cable, analog in, (2)2 × 1mm$^2$ | 1 | ✓ | Determined on-site |
| | --- | Control cable, digital in (2)2 × 1mm$^2$ | 1 | ✓ | Determined on-site |
| | --- | Control cable, digital out (2)2 × 1mm$^2$ | 1 | ✓ | Determined on-site |
| | --- | Signal cable(2) | 1 | ✓ | Determined on-site |
| Modular controller panel* | --- | Modbus/BACnet signals | 1 | ✓ | Determined on-site |
| Harmonic filter panel* | --- | Power supply to unit, 4 × 16mm$^2$ | 2 | ✓ | Determined on-site |
| | --- | Control cable to unit, 10(6)(3) × 1mm$^2$ | 1 | ✓ | Determined on-site |
| | --- | Power supply, 4 × 50mm$^2$ | 1 | ✓ | Determined on-site |
| Main control panel | P1, VFD power supplies | --- | 1 | ✓ | Fixed |
| | P3, signal(1) | --- | 1 | ✓ | Fixed |
| | M1, panel power supplies | --- | 1 | ✓ | Fixed |
| | M2, signals | --- | 1 | ✓ | Fixed |
| | UCC, modular signals | --- | 1 | ✓ | Fixed |
| | --- | Power supply(4), 4 × 50mm$^2$ | 1 | | Determined on-site |
| | --- | Flow switch, 2 × 1mm$^2$ | 1 | | Determined on-site |
| | --- | Pump on, 2 × 1mm$^2$ | 1 | ✓ | Determined on-site |
| | --- | Pump overload, 2 × 1mm$^2$ | 1 | ✓ | Determined on-site |
| | --- | Water-side SV, 2 × 1mm$^2$ | 1 | | Determined on-site |
| | --- | Water-side SV power supply, 2 × 1mm$^2$ | 1 | | Determined on-site |
| | --- | Operating status output, 2 × 1mm$^2$ | 1 | ✓ | Determined on-site |
| | --- | Alarm output, 2 × 1mm$^2$ | 1 | ✓ | Determined on-site |
| Pump* | P2, pump power supply | --- | 1 | ✓ | Fixed |

*Optional control panels and pump

(1) Not available for variable speed pump panels
(2) Available only for variable speed pump panels
(3) Overall harmonic content treatment occupies 10 × 1mm$^2$, partial harmonic treatment occupies 6 × 1mm$^2$
(4) Connect the power supply to the harmonic filter panel if available

## 10-3. Harmonic Current Cautionary Notes

All compressor, fan and pump drives have inverters and may cause the unit to generate harmonic currents against the guard. Harmonic currents may have a negative effect on the guard. Efficiency of electrical appliances may decrease. In particular, capacitors may become overheated and reduce the lifetime of the product. Harmonic currents can be reduced by using Trane's harmonic filter panel available as a product option.
The table below shows the harmonic currents used by the 5th to 25th harmonics with and without the harmonic filter.

With harmonic filter (total harmonic processing)

| nth harmonic (n) | 1 | 5 | 7 | 11 | 13 | 17 | 19 | 23 | 25 |
|---|---|---|---|---|---|---|---|---|---|
| Harmonic current (In%) | 100 | 1.8 | 0.9 | 1.9 | 1.2 | 0.5 | 0.6 | 0.4 | 0.4 |

With harmonic filter (partial harmonic processing)

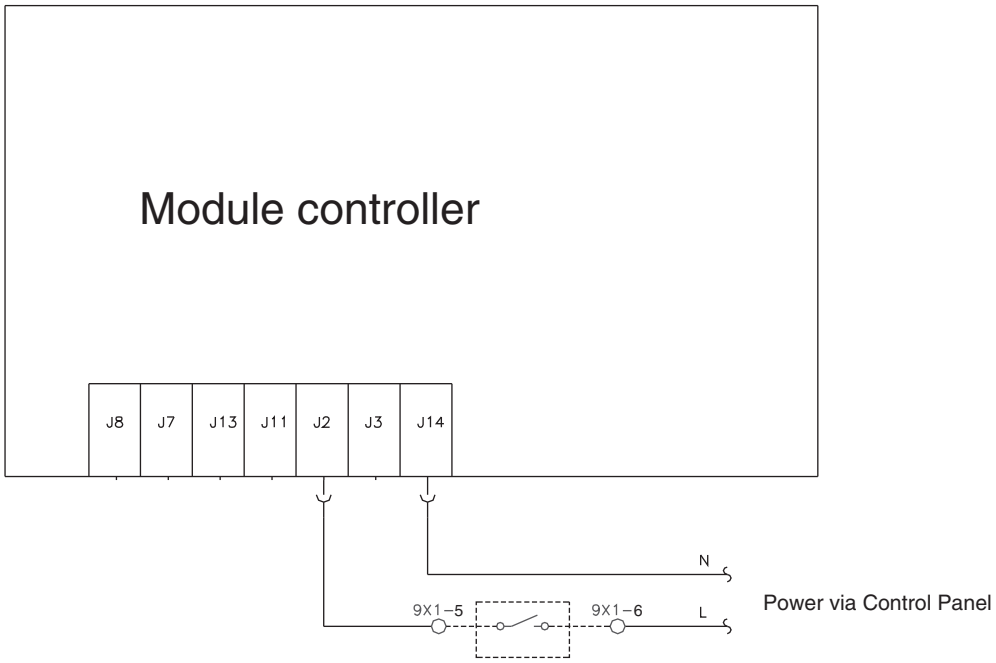
| Harmonic stage (n) | 1 | 5 | 7 | 11 | 13 | 17 | 19 | 23 | 25 |
|---|---|---|---|---|---|---|---|---|---|
| Harmonic current (In%) | 100 | 12.4 | 8.2 | 6.0 | 4.5 | 3.0 | 2.7 | 2.1 | 1.9 |

Without harmonic filter

| Harmonic stage (n) | 1 | 5 | 7 | 11 | 13 | 17 | 19 | 23 | 25 |
|---|---|---|---|---|---|---|---|---|---|
| Harmonic current (In%) | 100 | 23 | 15.5 | 10.1 | 7.9 | 5.5 | 4.8 | 3.7 | 3.4 |

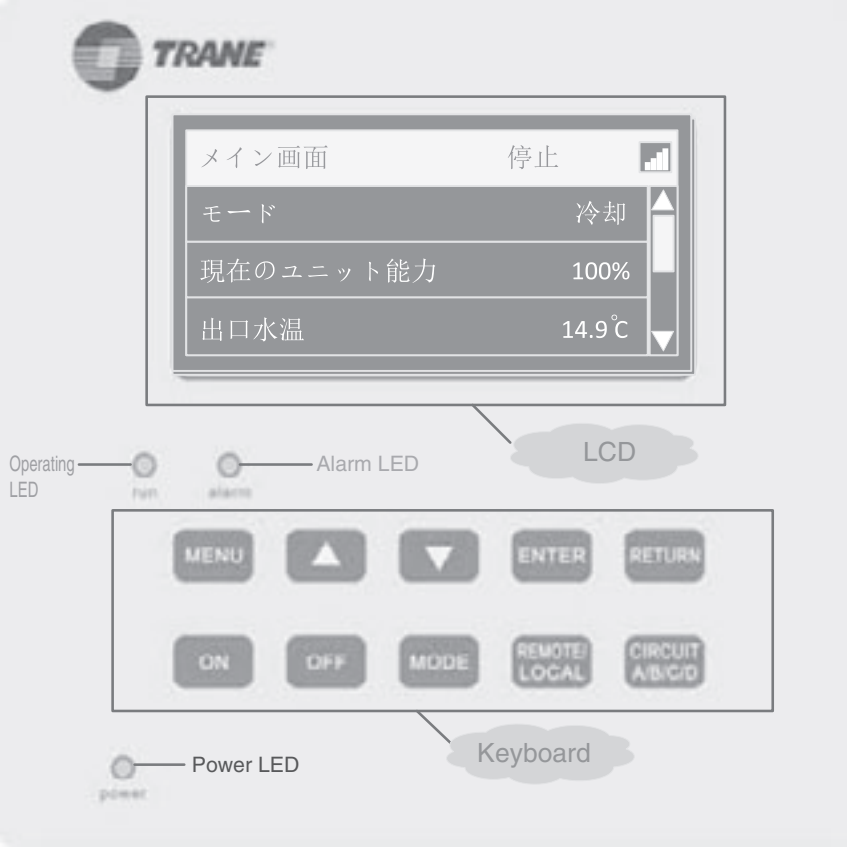
## 10-4. Remote operation/Stopping

Module controller signals allow for remote operation/stopping.



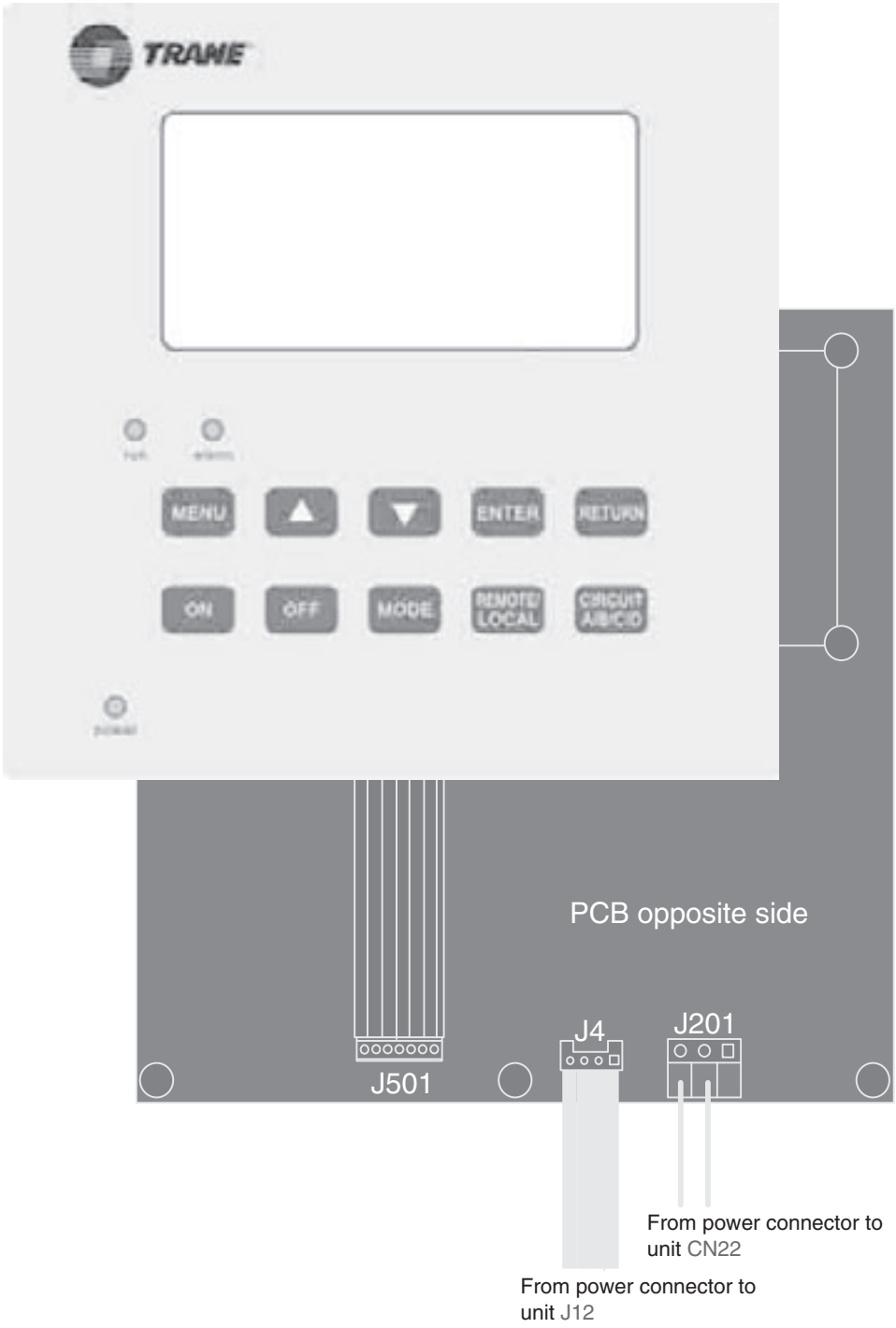
# 11 Electrical Wiring Diagram

## 11-1. Unit Controller Operation Panel and Summary




- Supplying power illuminates the Power LED.
- The Run LED blinks when the Module Chiller is operating.
- The Alarm LED blinks when an abnormality occurs.

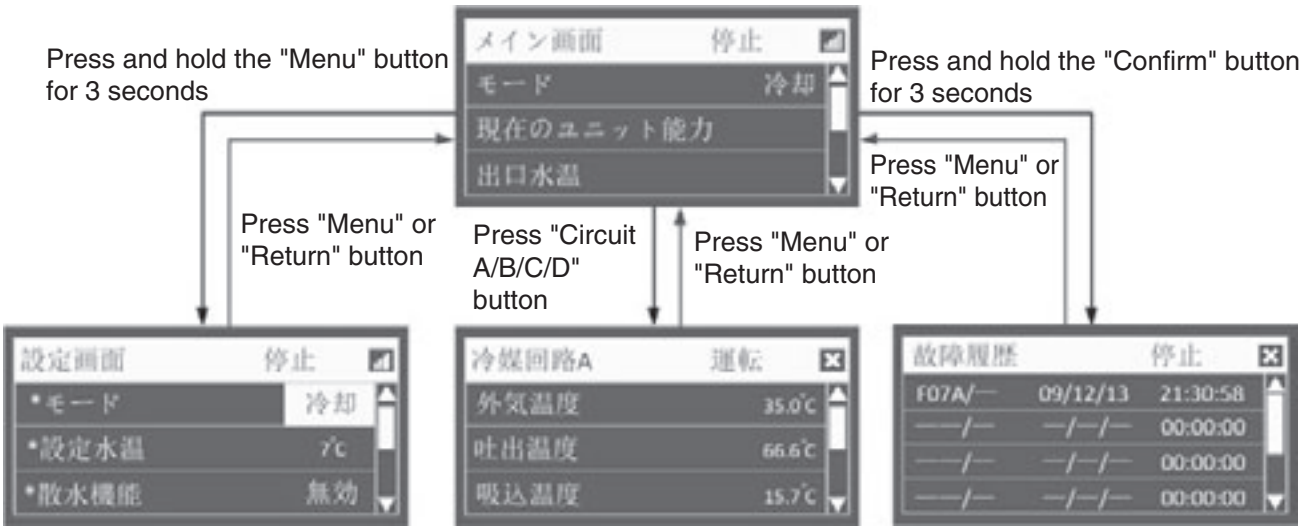
## 11-2. Unit Controller Wiring Diagram



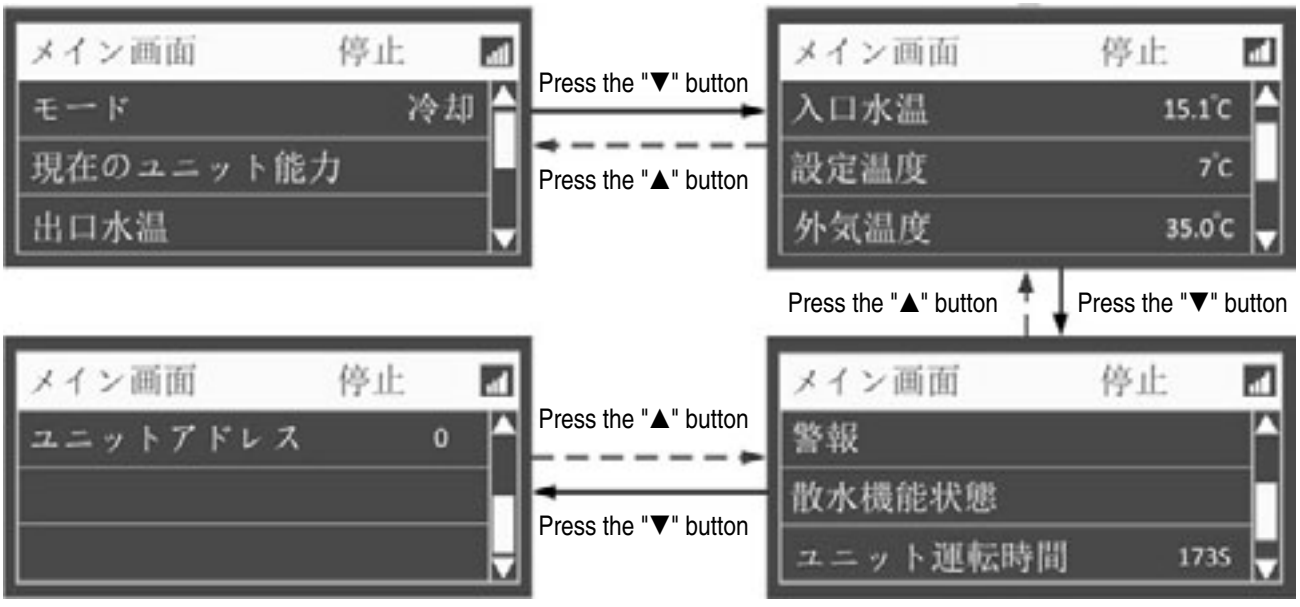
# 11-3. Unit Controller Screen and Function Summary

## 11-3-1. Screen

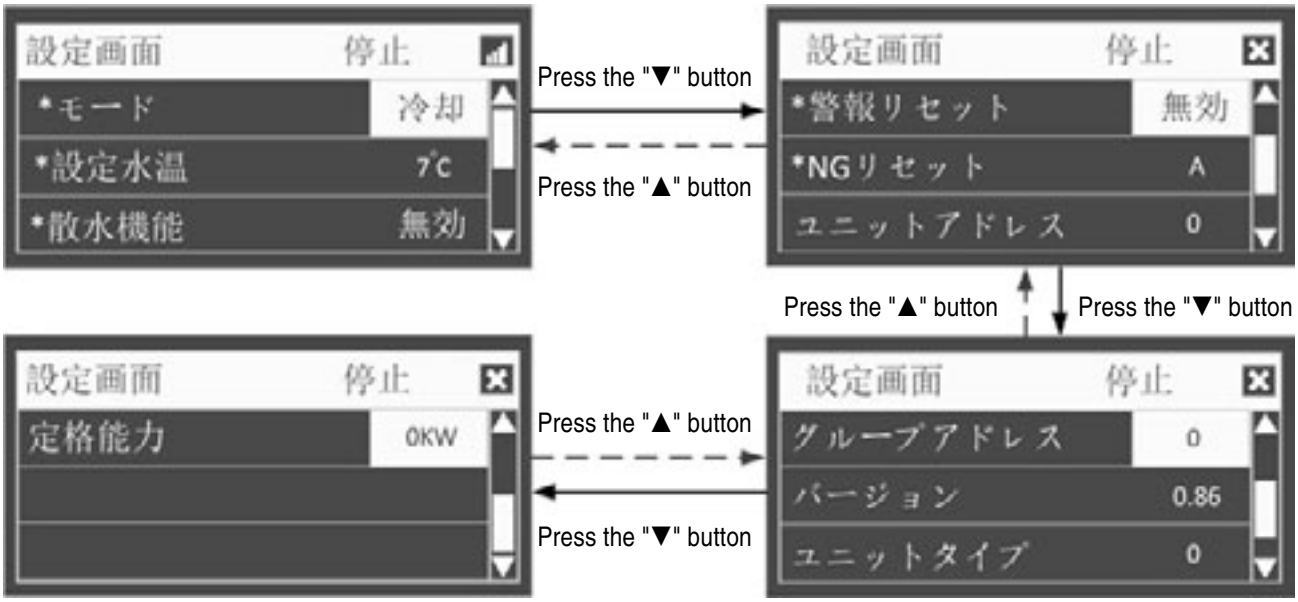
• Traverse from the main screen to Settings, Circuit and Failure History screens




• Main Screen
The Unit Controller consists of 4 main screens.
[▲] or [▼] buttons can be used to switch between screens.

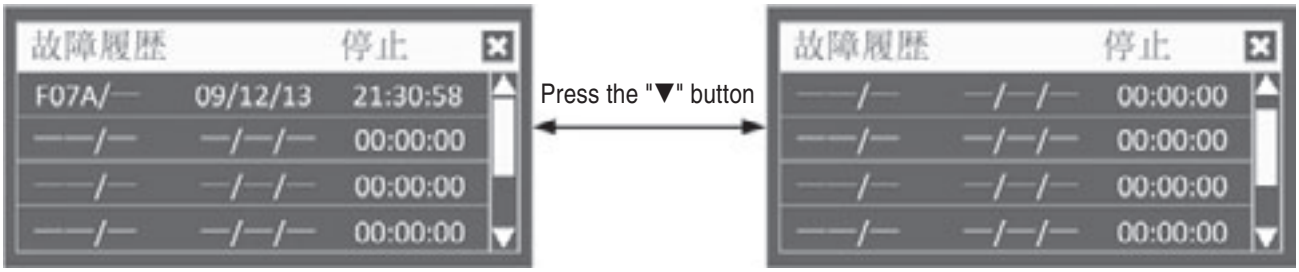


• Settings Screen
The Unit Controller consists of 4 settings screens.
[▲] or [▼] buttons can be used to switch between screens and information displayed.

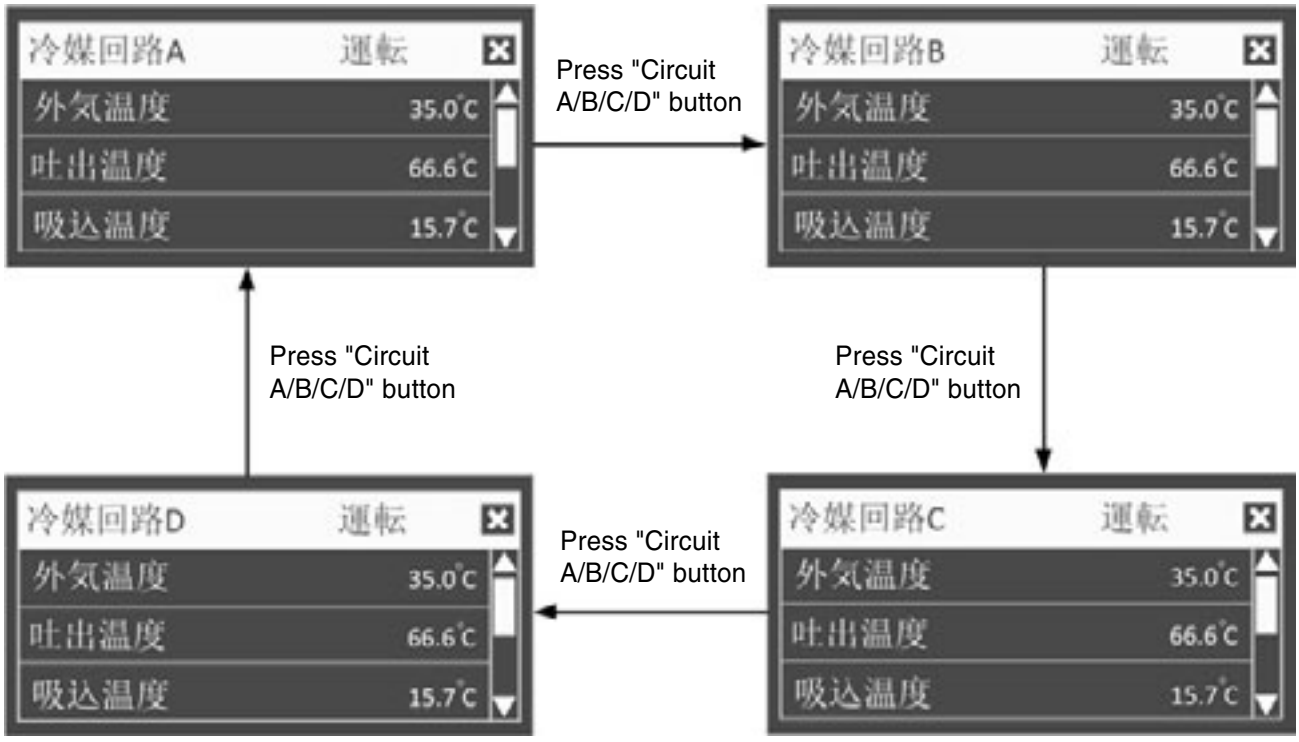


• Circuit Screen
Each circuit of the Unit Controller consists of 8 circuit screens.
[▲] or [▼] buttons can be used to switch between screens and information displayed.

• Failure History Screen
The Unit Controller consists of 5 failure history screens.
[▲] or [▼] buttons can be used to switch between screens and information displayed.




• Traversing from the "Circuit A" screen to "Circuit B/C/D" screens




## 11-3-2. Keyboard

| Key | | Description |
|---|---|---|
| MENU | Menu | 1. Return to the "MainPage (Main Screen)" from a different page<br>2. Pressing for 3 seconds navigates to "ConfigPage (Configuration Screen)" |
| ▼ | Up | 1. Next page<br>2. Next setting (within "ConfigPage (Configuration Screen)")<br>3. LWT plus 1 |
| ▲ | Down | 1. Next page<br>2. Next setting (within "ConfigPage (Configuration Screen)")<br>3. LWT minus 1 |
| ENTER | Confirm | 1. Confirm selected item<br>2. Send command<br>3. Pressing for 3 seconds navigates to "ErrRecord (Error Records)" |
| RETURN | Return | Return to the "Main Page (Main Screen)" from a different page |

| | | |
|---|---|---|
|  | ON | Operate the Module Chiller |
|  | OFF | Stop the Module Chiller |
|  | Mode | Change Module Chiller mode |
|  | Remote/Local | Switch the Module Chiller between "Remote" and "Local" |
|  | Circuit | Switch the Module Chiller refrigerant circuit display among A - D |

## 11-3-3. Parameters

| Parameter | r/w Property | Location on Screen | Description |
|---|---|---|---|
| Mode | r/w | Main screen / Configuration screen | Value: "cool" or "heat" |
| Capacity % | r | Main screen / Refrigerant circuit | 0 - 100% |
| Outlet water temperature | r | Main screen / Refrigerant circuit | Refrigerant outlet temperature |
| Inlet water temperature | r | Main screen / Refrigerant circuit | Refrigerant inlet temperature |
| Configured temperature | r/w | Main screen / Configuration screen | Refrigerant outlet temperature configuration |
| Ambient temperature | r | Main screen / Refrigerant circuit | Ambient temperature |
| Warning | r | Main screen / Refrigerant circuit | Module Chiller error code |
| Aspersion status | r | Main screen | Aspersion functionality |
| Unit operating hours | r | Main screen | Module Chiller operating hours |
| Unit address | r | Main screen / Configuration screen | Module Chiller address |
| Group address | r | Configuration screen | Group address |
| Compressor speed | r | Refrigerant circuit | Compressor speed (RPS) |
| Fan speed | r | Refrigerant circuit | Fan speed (RPM) |
| Pump / solenoid status | r | Refrigerant circuit | Pump status (ON/OFF) |
| Intermediate water temperature | r | Refrigerant circuit | Intermediate water temperature |
| Ejection temperature | r | Refrigerant circuit | Ejection temperature |
| Intake temperature | r | Refrigerant circuit | Intake temperature |
| Air heat exchanger gas temperature 1 | r | Refrigerant circuit | Gas pipe temperature 1 |
| Air heat exchanger gas temperature 2 | r | Refrigerant circuit | Gas pipe temperature 2 |
| Ejection pressure | r | Refrigerant circuit | High pressure |
| Intake pressure | r | Refrigerant circuit | Low pressure |
| Expansion valve 1 | r | Refrigerant circuit | Electronic expansion valve 1 step |
| Expansion valve 2 | r | Refrigerant circuit | Electronic expansion valve 2 step |
| Defrost | r | Refrigerant circuit | Circuit defrost status |
| Oil recovery | r | Refrigerant circuit | Circuit oil return status |
| Compressor INV abnormality | r | Refrigerant circuit | Compressor driver error code |

| | | | |
|---|---|---|---|
| Fan INV abnormality | r | Refrigerant circuit | Fan driver error code |
| Refrigerant circuit status | r | Refrigerant circuit | Circuit status is OK or NG (restricted) |
| Aspersion functionality | r/w | Configuration screen | Aspersion enable/disable |
| Warning reset | w | Configuration screen | Clear alarm |
| Restriction reset | w | Configuration screen | Clear restricted circuit failure |
| Version | r | Configuration screen | Refrigerator software version |
| Unit type | r | Configuration screen | Refrigerator type |
| Rated performance | r | Configuration screen | Refrigerator performance |
| F11A/58 | r | Warning history | F11A - system error code<br>58 - compressor (fan) driver error code |
| 09/21/13 | r | Warning history | MM/DD/YY |
| 21:30:58 | r | Warning history | HH:MM:SS |
|  | r/w | All screens |  Local,  remote |
| Operation | r/w | All screens | Module Chiller status<br>(Stop / Running / Defrost / Alarm / Limit) |

## 11-4. Unit Controller Operating Commands

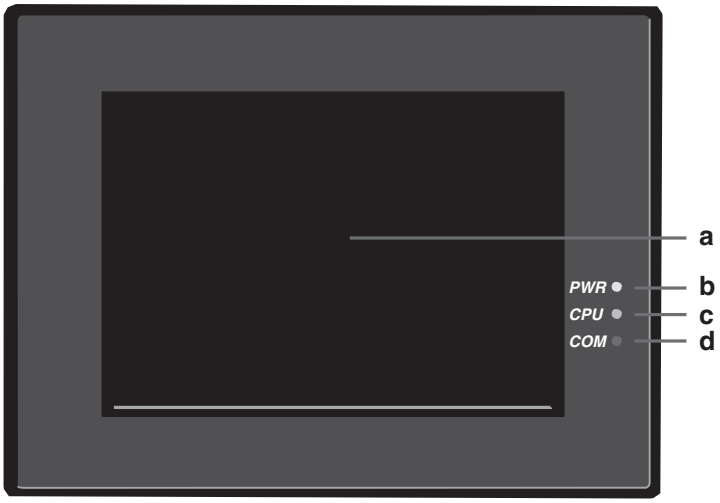
- Viewing or changing circuit information
  a. Press the [Menu] or [Return] key to return to the main menu.
  b. Press the CIRCUIT A/B/C/D key to enter refrigerant circuit A page.
  c. Press the [UP] or [DOWN] keys to change refrigerant circuit A information.
  d. Press the CIRCUIT A/B/C/D key to switch among refrigerant circuits A - D.
- Viewing error history records
  a. Press the [Menu] or [Return] key to return to the main menu.
  b. Press and hold the [ENTER] key for 3 seconds to enter the warning history screen.
  c. The most recent 20 errors are listed across 5 screens. Use the [UP] or [DOWN] buttons to switch between screens. Each record has a system failure code, compressor or fan driver failure code, year, month, day, hour, minute and second associated with the failure occurrence.
- Viewing, configuring or changing parameters of clearing error codes
  a. Press the [Menu] or [Return] key to return to the main menu.
  b. Press and hold the [ENTER] key for 3 seconds to enter the configuration screen.
  c. Press the [ON] or [OFF] keys to change the Module Chiller status.
  d. Press the [REMOTE/LOCAL] key to change the Module Chiller control to module specific or local.
  e. Press the [UP] or [DOWN] keys to select the parameter to be configured. Mode, configured temperature, aspersion functionality, warning reset, restriction reset.
  f. Press the [ENTER] to confirm the selected contents. The selected parameter will blink.
  g. Press the [MODE] key to change modes. Use the [UP] or [DOWN] keys to change the outlet water temperature. Press the [UP] or [DOWN] keys to switch aspersion between enabled/disabled.
  h. Press the [ENTER] key to confirm changes.
  i. If an abnormality has occurred, press the [UP] or [DOWN] keys to select Warning Reset and press [ENTER] to clear the error code.
  j. If a failure occurs in one circuit, causing restrictions, then use the [UP] or [DOWN] keys to select the restricted circuit and press the [Confirm] button to confirm the operation.

# 12 Module Controller

## 12-1. Display Specifications, Appearance and Function List

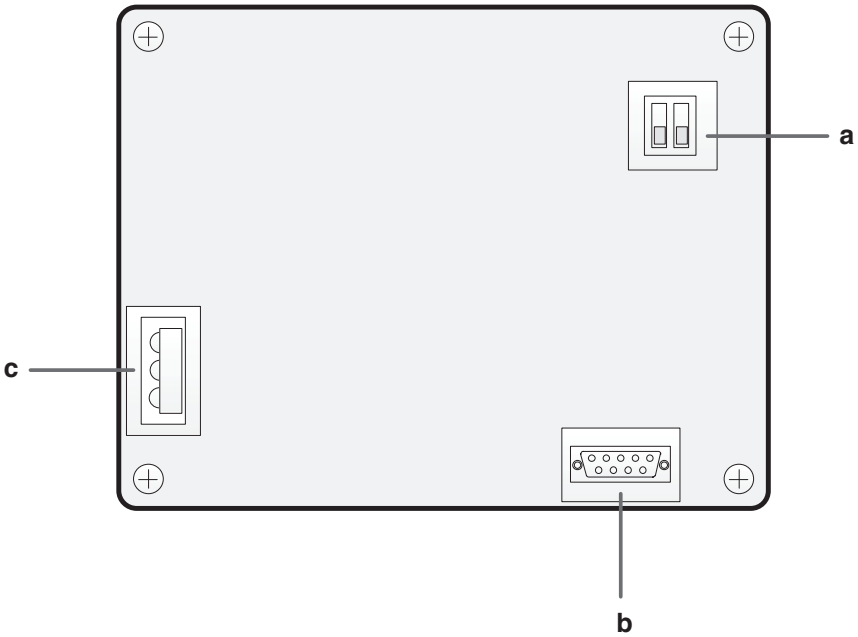
### 12-1-1. Appearance

Front:




a. Screen display / touch area
b. PWR LED
c. CPU LED
d. COM LED

Rear:




a. DIP switch
b. COM0 & COM2 (male)
c. DC24V power supply input terminal

# 12-2. User Interface Overview

## Screen Description

The user interface (UI) displayed on the 7-inch screen is broadly partitioned into the following areas.

### 1) Uppermost fixed display area

The uppermost fixed display area is comprised of the following 4 regions.

1. Return:
2. Home:
3. Head data area:
4. Auto/Stop area:

An example of the uppermost fixed display area is shown below.


The contents of the uppermost fixed display area are shown in the table below.

| Upper fixed display area component: | Return | Home | Data area | Auto/Stop | |
|---|---|---|---|---|---|
| Fixed display data and navigation | Return to the previous page | Home screen | Status: Running or stopped<br>Mode: Cooling or heating<br>MM/DD/YY<br>HH:MM | Auto button | Stop button |

• Auto button operation: configures module Auto commands.
• Stop button operation: configures module Stop commands.

### Auto button and Stop button confirmation screen:

Pressing the Auto or Stop buttons displays the confirmation pop-up screen.
An example is shown below.


Actual text:

| **Text** | Are you sure you want to do this operation? | |
|---|---|---|
| **Button** | Yes | No |

**Button:**

Yes button: Confirms sending of Auto or Stop commands to the module.
No button: Cancels the operation.

**2) Bottommost fixed display area**

Bottom region navigation:
An example of the bottommost navigation screen is shown below.

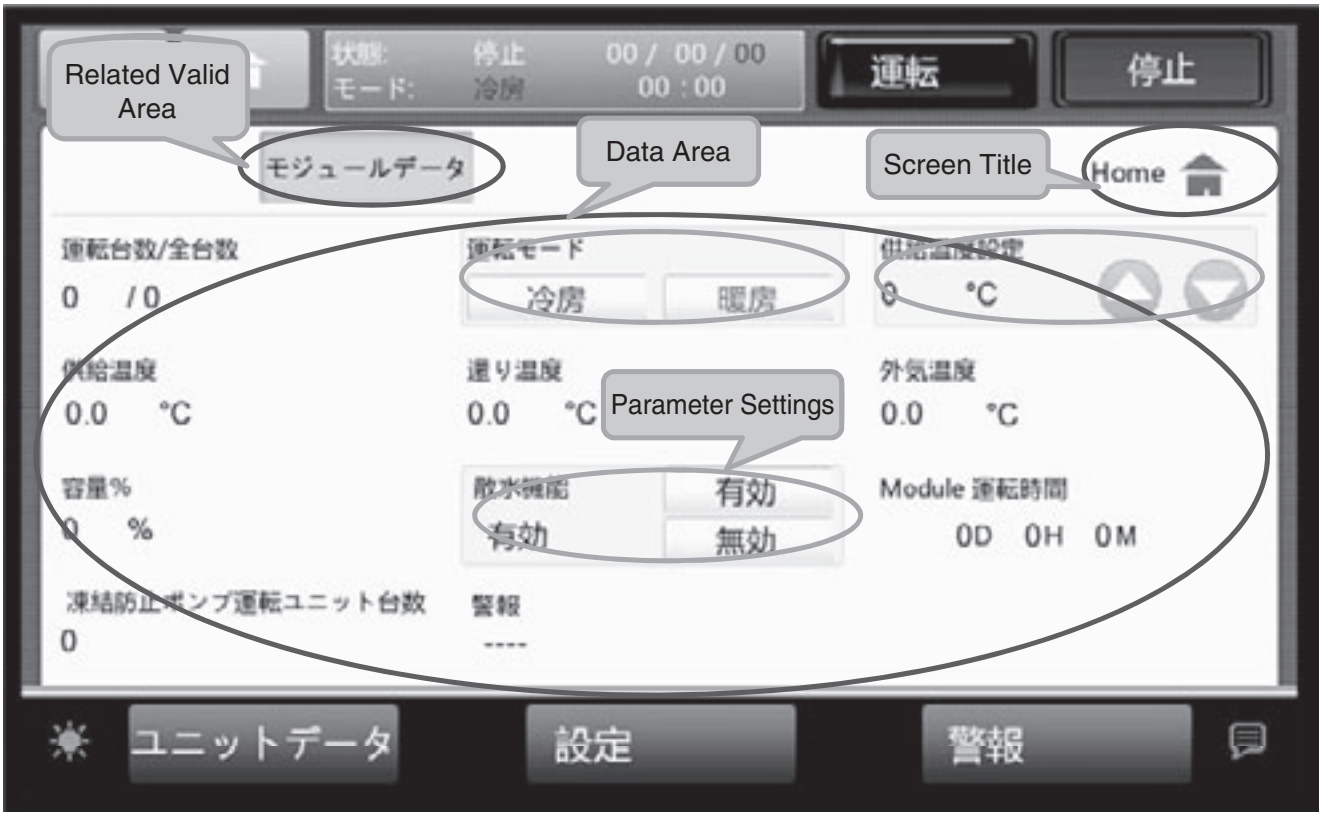

The contents of the bottommost fixed display area are shown in the table below.

| | | | | |
|---|---|---|---|---|
| Bottommost fixed display elements |  | Report | Settings |  |
| Navigation | Backlight settings Page | Report Landing page | Settings Landing page | Language settings Page |

**3) Home screen**

The Home screen is comprised of the following 3 regions.

1. Related operations area
2. Screen title
3. Data area



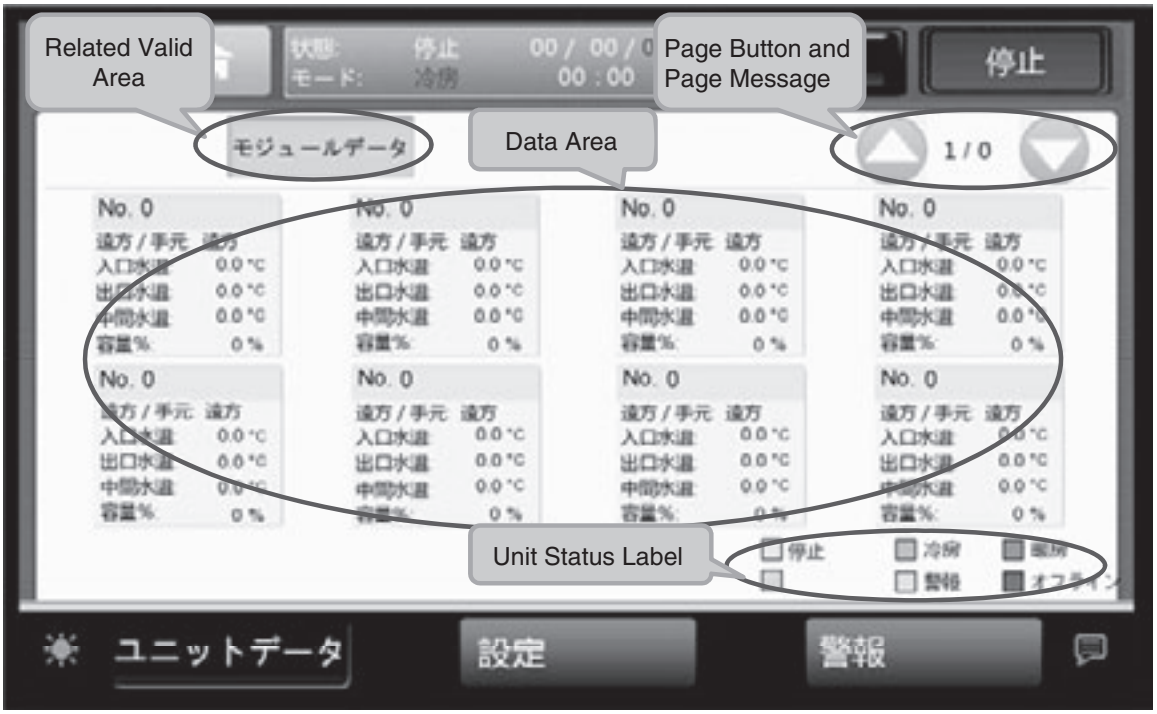

The home screen displays an overview of the module and relevant operations.
Home screen data values:

| Business card | **Chiller** | | |
|---|---|---|---|
| **Description** | Running/Total number of Chillers **XX/XX** | Module mode settings: **Cooling** or **heating** | Module outlet temperature settings **XX°C** or configure |
| | Outlet water temperature **XXX.X°C** | Inlet water temperature **XXX.X°C** | Ambient temperature **XXX.X°C** |
| | Total capacity output **XXX%** | Aspersion status **Enable** or **disable** Or configure | Module operating time **XXXX D XX M XX H** |

**4) Report:**

The Home screen is comprised of the following 4 regions.

1. Related operations area
2. Screen bottom and screen message
3. Data area
4. Unit status label



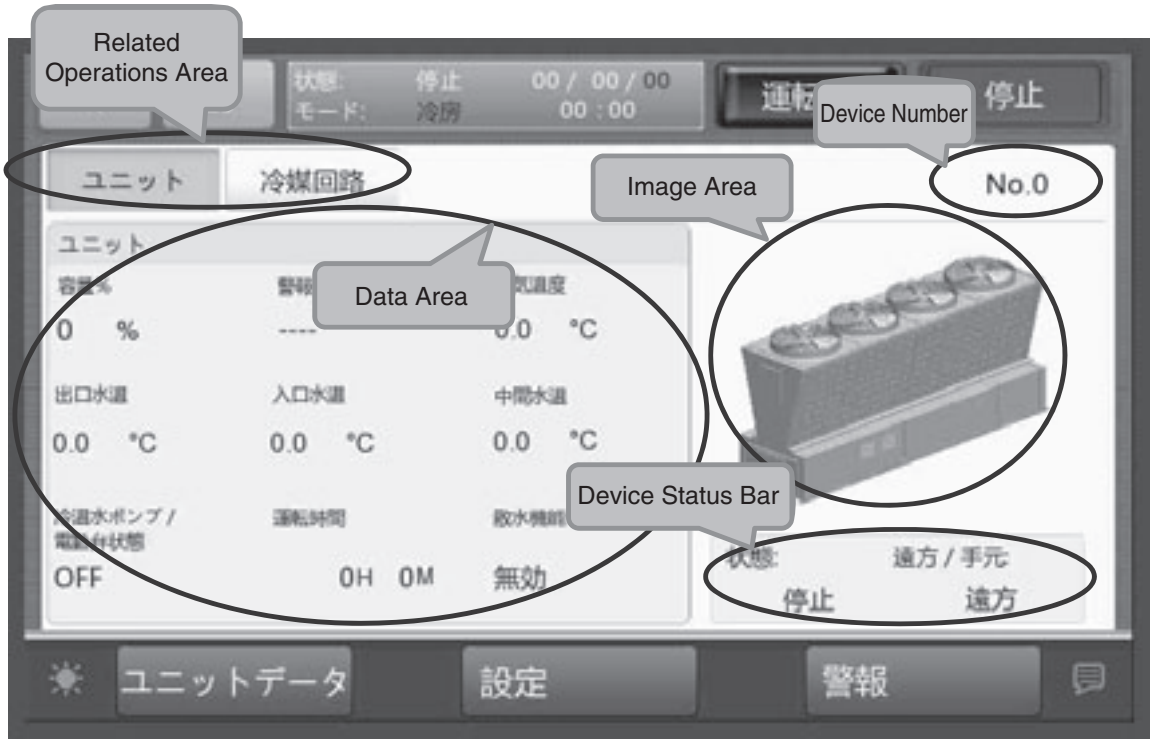

Up to 8 Chiller navigation cards can be displayed in the data area. Clicking a Chiller navigation card navigates to the Overview and Circuit pages.


The data for each Chiller navigation card is described below.

| Navigation card | **No. XXX** |
|---|---|
| Description | Source control<br>**Remote** or **Local** |
| | Inlet water temperature<br>**XXX.X°C** |
| | Outlet water temperature<br>**XXX.X°C** |
| | Intermediate water temperature<br>**XXX.X°C** |
| | Capacity output<br>**XXX%** |

The Overview and Circuit screens are comprised of the following 5 regions.

1. Related operations area
2. Unit number
3. Data area
4. Display area
5. Status bar




Business card data unit - data value overview:

| Card overview | **Overview** | | |
|---|---|---|---|
| **Description** | POC<br>**XXX%** | Failure code<br>**XXXX** | Atmospheric temperature<br>**XXX.X°C** |
| | Outlet temperature<br>**XXX.X°C** | Inlet water temperature<br>**XXX.X°C** | Intermediate water temperature<br>**XXX.X°C** |
| | Pump / valve status<br>**ON** or **OFF** | Unit operating hours<br>**XXXX H XX M XX S** | Aspersion status<br>**Disabled, enabled** |
| Card overview | **Unit status bar** | | |
| **Description** | Status<br>**Stop / Running / Warning / Offline / Antifreeze** | Control method<br>**Remote/Local** | |

The circuit card holds information about 4 circuits from 1 to 4.

Circuit data value:

| Circuit card | **Circuit X** |
|---|---|
| **Description** | High pressure<br>**X.X kPa** |
| | Low pressure<br>**X.X kPa** |
| | Intake temperature<br>**XXX.X°C** |
| | Ejection temperature<br>**XXX.X°C** |
| | Compressor speed<br>**XXX%** |
| | Compressor current<br>**XXX.X A** |
| | Fan speed<br>**XXX%** |
| | Fan temperature<br>**XXX.X°C** |

1) Settings:
The Settings landing page is separated into the following categories.

| Settings | **Settings** | | |
|---|---|---|---|
| Data | System conf. | Sensor calibration | Touch screen calibration |
| | Backlight | Date and time | Backup data |
| | Sound | Schedule | Language |

An example of the Settings landing page is shown below.

a) System conf.
An example of the System Conf. page is shown below.


System configuration parameters are displayed as buttons on the System Conf. screen.
Please order the items within the System Conf. screen as per the table below:

| System configuration | Configuration parameter | | |
|---|---|---|---|
| Data | Source channel selection | Remove errors | |
| | | Restore Factory settings | |
| | | Bind | |

The System Conf. screen consists of 1 read only system configuration parameter and 3 control parameters.
Press the [Remove errors] button to remove warnings from all units and modules.

Press the [Factory settings] button to restore module parameters to their initial values.

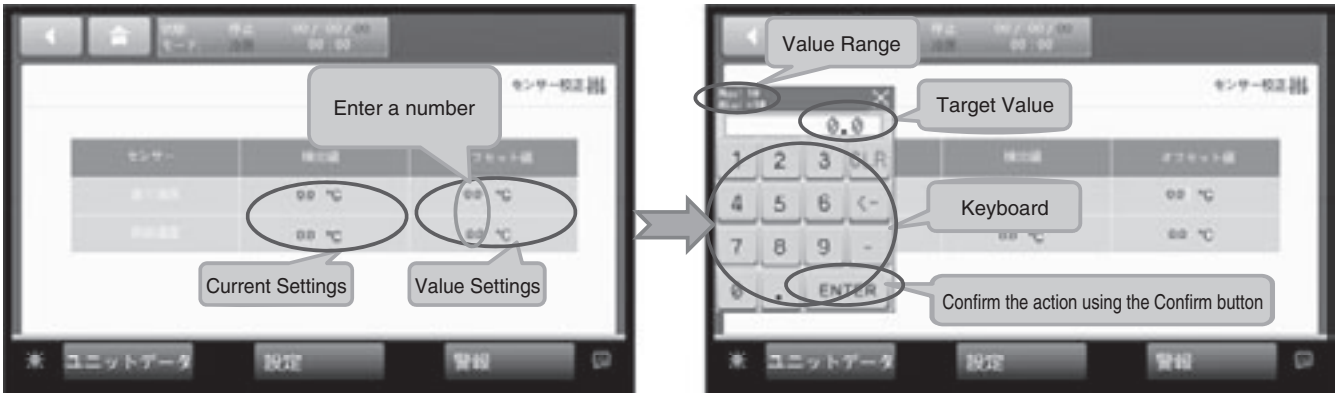
Pressing the [Bind] button causes the modules to search out all refrigerator units and records them.

The sheet below shows the values of read-only parameters.

Current source channel data:

| Current source channel | Value |
|---|---|
| Data | Service tool |
| | BACnet |
| | 7-inch screen |
| | Digital Cmd |

b) Sensor calibration




The Sensor Calibration page is separated into the following categories.

| Sensor calibration | Sensor | Current value | Configured value |
|---|---|---|---|
| Data | Return temperature | **XX.X°C** | **XX.X°C** |
| | Outgoing water temperature | **XX.X°C** | **XX.X°C** |

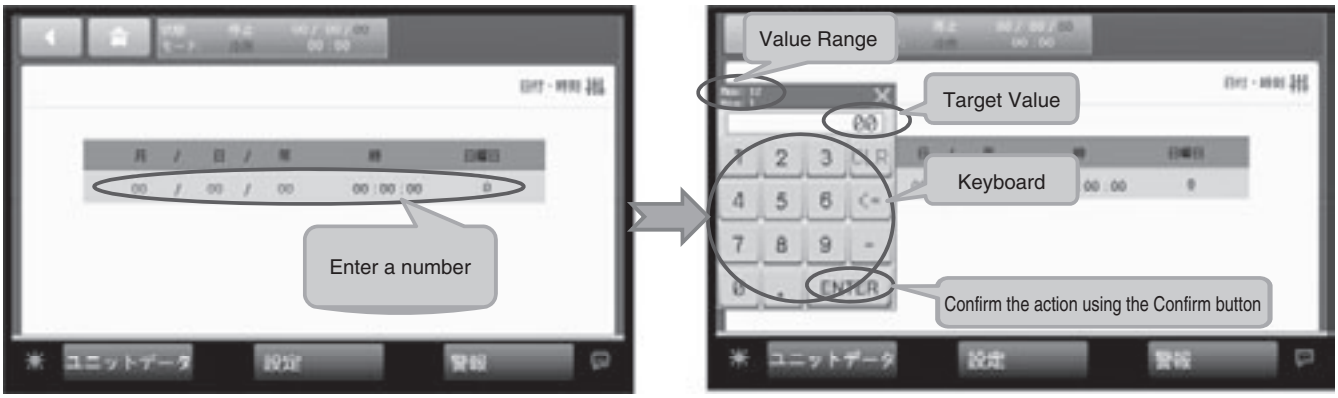
Sensor calibration value configuration operations:

- Clicking the configured value displays a numeric keyboard pop-up.
- Input the target value and press the [ENTER] button to confirm.
- When the calibrated value is correctly configured it will be displayed in the Current Value row.

c) Date and Time

The Date and Time page is separated into the following categories.

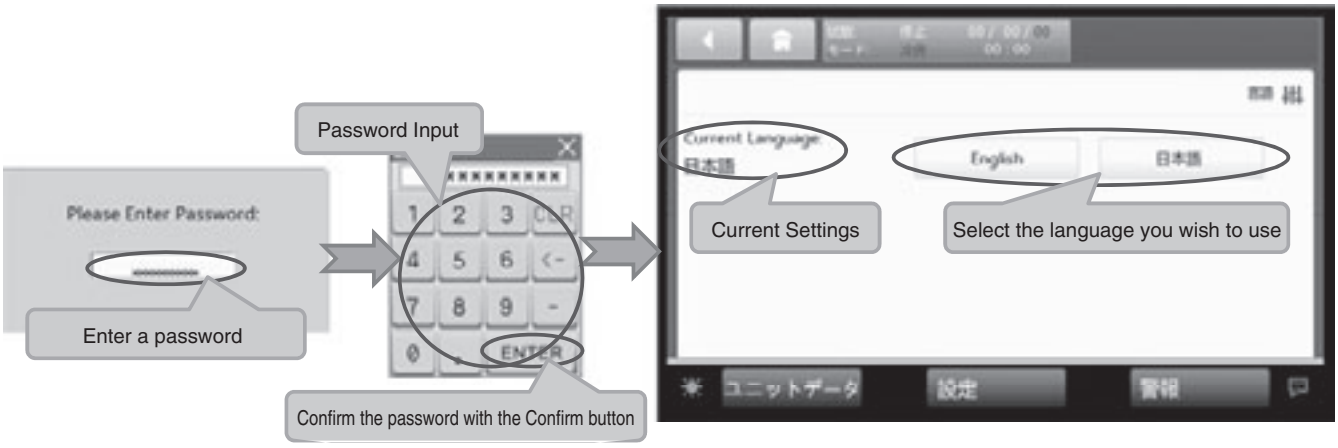
| Date and time | Month | Day | Year | Hour | Sunday - Saturday |
|---|---|---|---|---|---|
| Data | **XX** | **XX** | **XX** | **XX: XX: XX** | **X** |




Date and Time configuration operations:

- Press the number associated with month, day, year, hour or Sunday. A numeric keyboard pop-up will display.
- Input the target value and press the [ENTER] button to confirm. The new date and time will be configured.

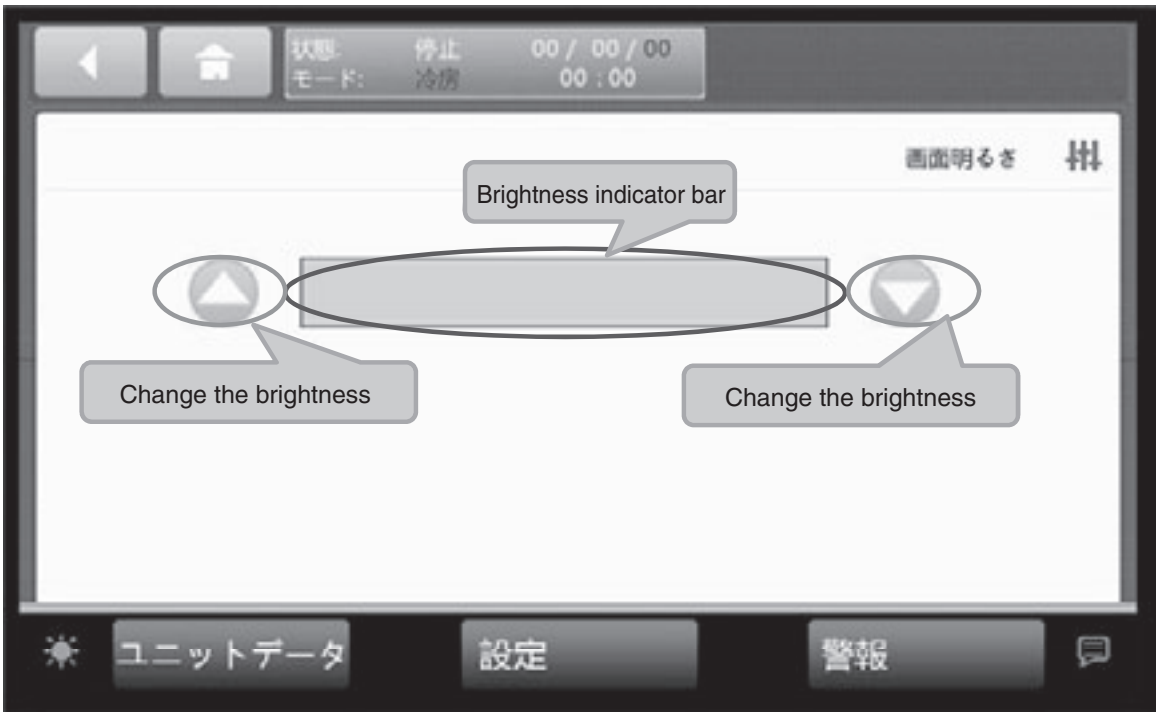
d) Language




Language selection:

- Pressing the Language label of the Settings page displays a password input box.
- Clicking the input label displays a numeric keyboard pop-up.
- Input "888888" as a password and press the [ENTER] button to move to the Languages page.
- Select the target language by pressing [English] or [日本語].

e) Brightness




Press the up/down arrows while on the Backlight Control page to adjust the brightness of the backlight.

f) Warnings
The Modular Controller records up to 10 failure events.
Each record contains the following in its message:

| Catalog | Address / Warning | Warning Description | Date / Time |
|---|---|---|---|
| 1 - 10 | Unit number / Failure code | Failure contents | MM/DD/YY<br>HH:MM:SS |

# 12-3. Display I/O Chart

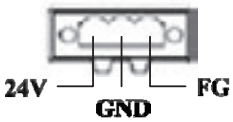
## 12-3-1. Screen Display / Touch Area: Allows touch-panel input operations and output display.

## 12-3-2. LED Lights

| LED | Action |
|---|---|
| PWR | Illuminates/extinguishes yellow LED with power ON/OFF |
| CPU | Green LED illuminated at regular CPU operation |
| COM | Red LED blinks rapidly or is fully illuminated during regular serial port communication |

## 12-3-3. Power Supply

Input voltage: DC24V±15%




24V: Connect to the DC24V+ connection of power supply
GND: Connect to the COM or 0V connection of power supply
FG: Ground connection

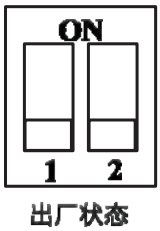
## 12-3-4. Serial Port

Note
Do not plug or unplug signal cables while the power is on. Doing so may result in damage to the signal port.

z Serial Port COM0/COM2
COM0/COM2 ports are D-Sub9P (male) and support RS-485 signal functionality

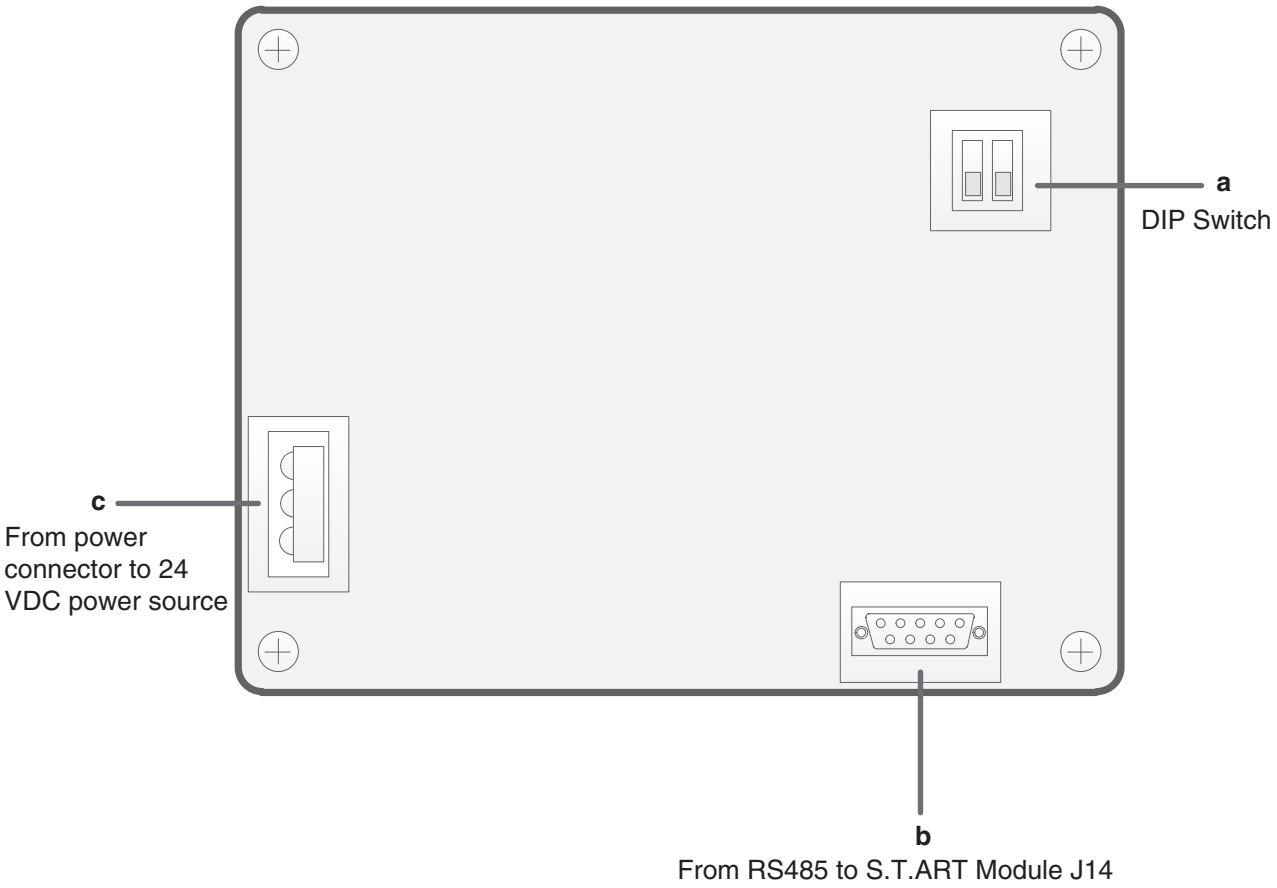
## 12-3-5. DIP Switches

By configuring the DIP switches in different positions the HMI system can run in different operating modes. The operating modes corresponding to settings or configuration positions are as below.



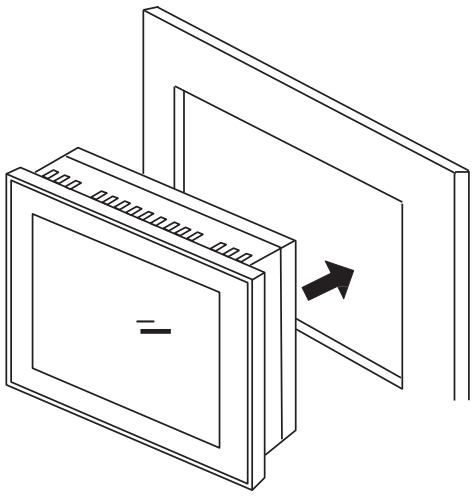

| SW1 | SW2 | Operating Mode |
|---|---|---|
| OFF | OFF | Normal operation mode |
| ON | OFF | Firmware update mode |
| OFF | ON | Touch control calibration mode |
| ON | ON | System configuration mode |

## 12-4. Display Wiring Diagram

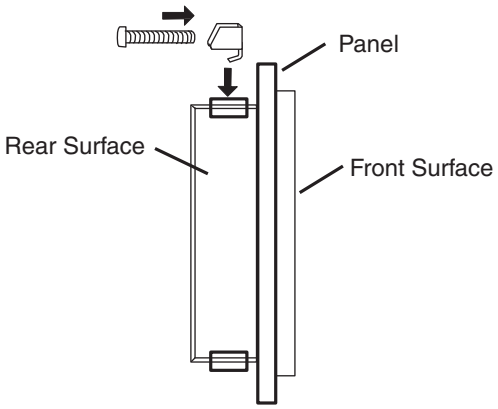



## 12-5. Display Mounting (if required)

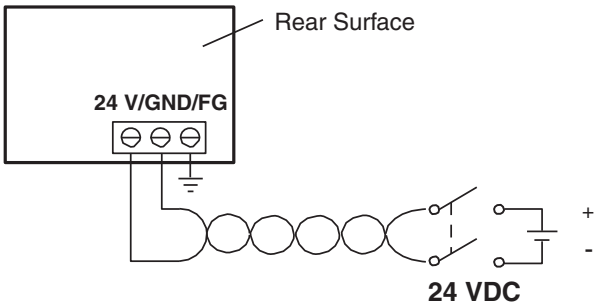
### 12-5-1. Insert the display into the hole of the metal sheet from the front.



**12-5-2. Press-fit the four fixing bracket accessories into the holes at the top and bottom of the display rear. Set the included bolts and fasten with a Phillips screwdriver.**




**12-5-3. Power Supply Connections**



# 13 Control Operations

## 13-1. Control Controller and Layout

### 13-1-1. Control Controller Configuration

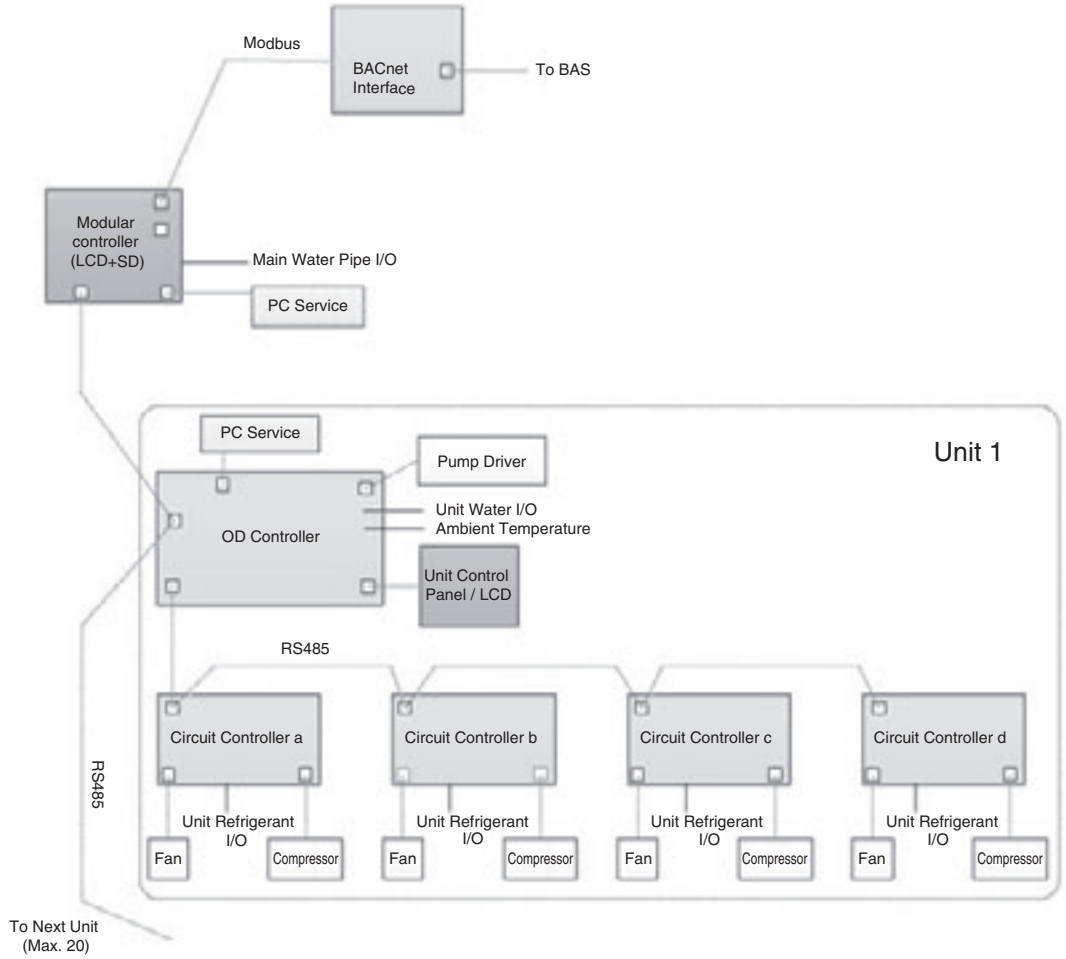


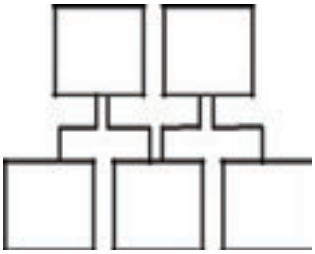

Figure 8.1 Controller configuration

A single unit consists of 1 OD Controller, 4 Circuit Controllers and a unit control panel. OD and Circuit Controllers communicate via RS485 within a single unit.

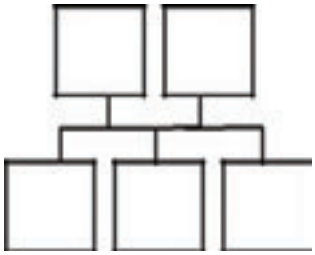
One Module Chiller Module Controller can connect up to 20 single units each. Single units can communicate with each other via RS485. Each single unit can also communicate with the Module Controller via RS485.

The PC service tool can connect to either a single unit OD Controller or a Module Controller.

RS485 Cable Connection
All OD Controllers and Circuit Controllers have RS485 communication link A and B terminals for communication within a single unit. As the figure above shows, the device connected at the final position of the RS485 communication link must be an OD Controller.
Within Module Chillers (up to 20 single units), all OD Controllers and Circuit Controllers have RS485 communication link A and B terminals. As the figure above shows, the device connected at the final position of the RS485 communication link must be a Module Controller.
Please use daisy-chain wiring. Star wiring configurations cannot be used. (Refer to the following figure.)



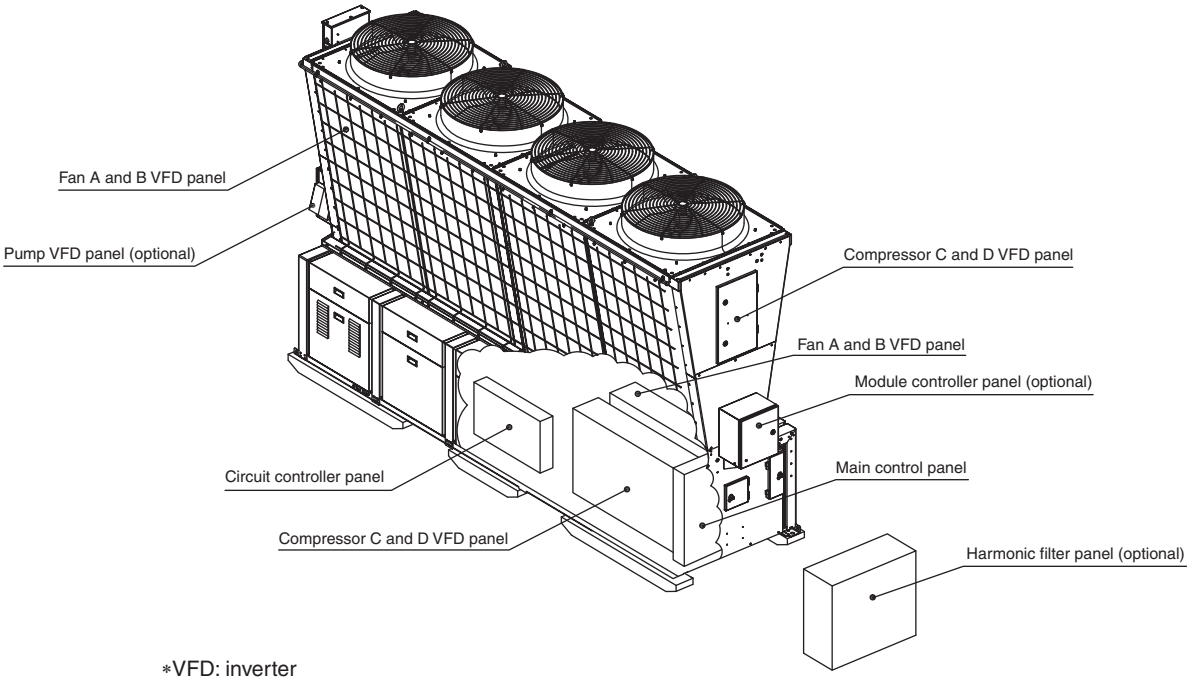
Daisy chain wiring



Star wiring (cannot be used)

Twisted-pair cables are covered in a shield and must have a twist pitch of less than 5 centimeters. Cable sizes of 0.75mm$^2$ or larger are recommended. The cable shield must be terminated with a G terminal. To maintain electrical connection continuity, do not connect the cable shield to devices other than the Module Chiller or at other locations.

## 13-1-2. Electrical/Control Panel Layout




∗VFD: inverter

Figure 8.2 Electrical panel overview

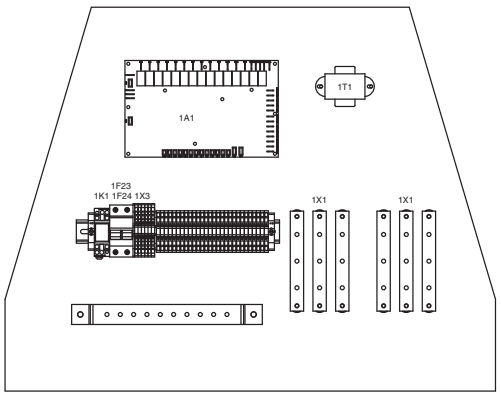



Figure 8.3 Main control panel OD Controller (1A1) with harmonic filter panel

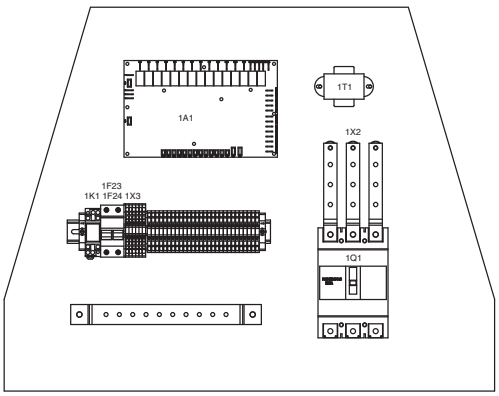



Figure 8.4 Main control panel OD Controller (1A1) without harmonic filter panel

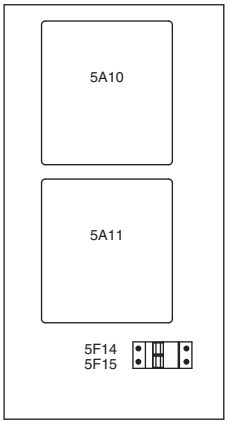



Figure 8.5 Fan VFD panel

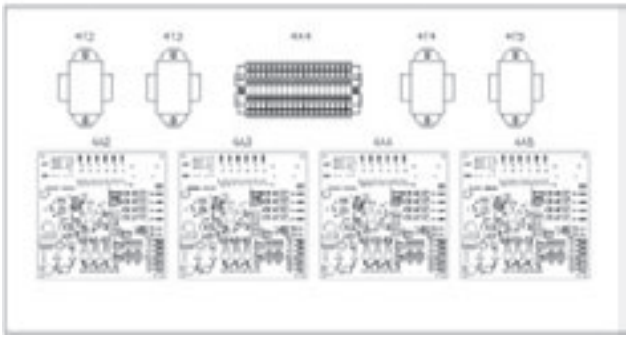


Figure 8.6 Circuit Controller panel
4A2, 4A3, 4A4, 4A5 (Circuit Controllers)

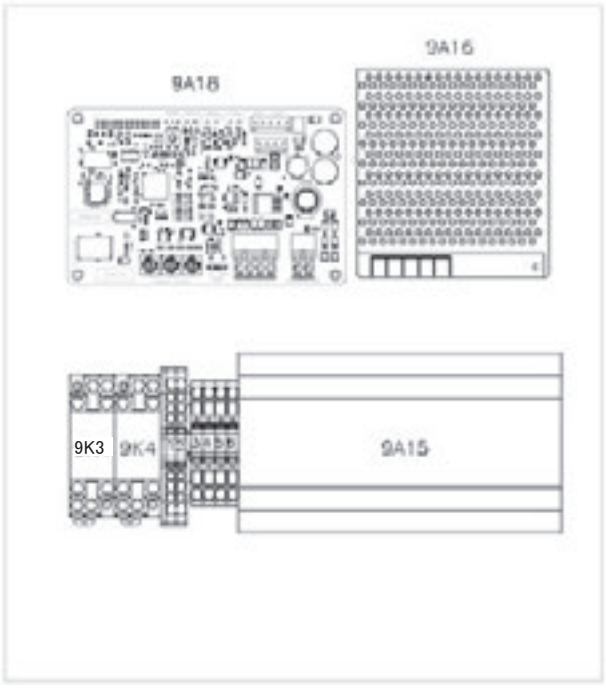



Figure 8.7 Module Controller panel (optional)
9A18 (BACnet Interface) 9A15 (Module Controller)

# 13-2. OD Controller Board (1A1)

## 13-2-1. OD Controller Board Details

Power Supply: AC12V ±10%, max. 12W

The OD Controller controls the operation of a single unit including pump control. It also links the 4 Circuit Controller boards within a single unit.

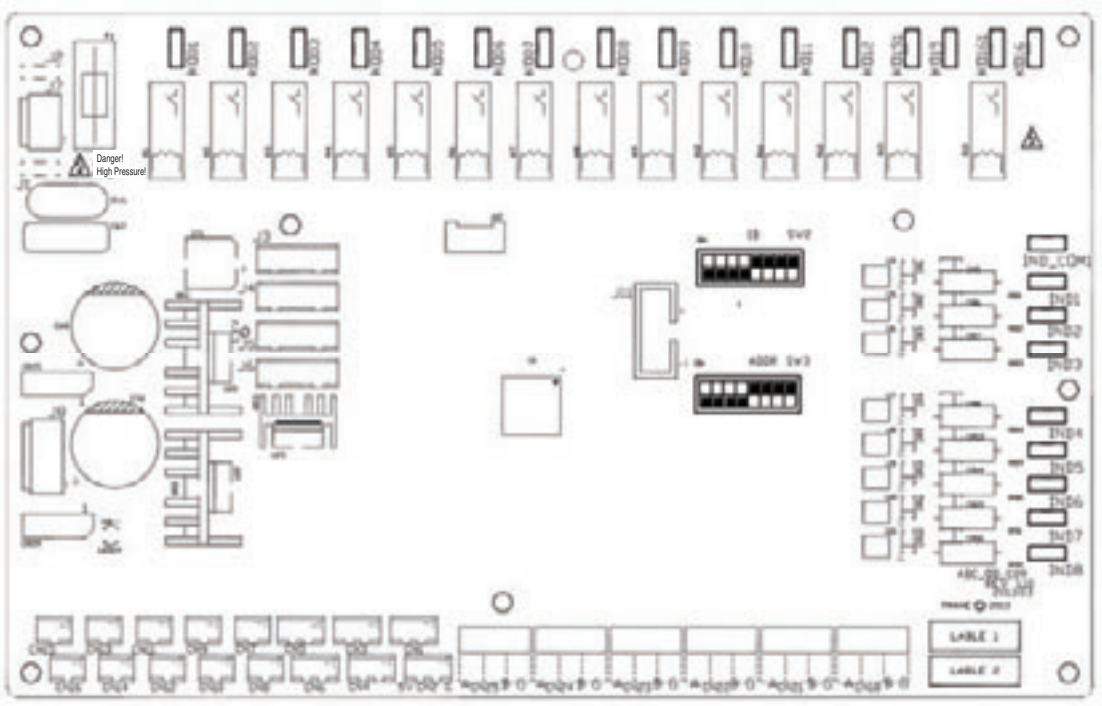



Figure 8.3 OD Controller PCB diagram

## 13-2-2. I/O Port Description

Refer to the I/O ports in the table below.

| Port | Name | Details |
|---|---|---|
| CN7 | Thermistor input 1 | Inlet water temperature |
| CN8 | Thermistor input 2 | Intermediate water temperature |
| CN9 | Thermistor input 3 | Outlet water temperature |
| CN10 | Thermistor input 4 | Ambient temperature |
| CN18 | Internal signal bus 1 | Connects to Circuit Controller board J24 |
| CN21 | Internal signal bus 2 | Connects to pump driver COM |
| CN22 | Internal signal bus 3 | Connects to a Unit Controller |
| CN23 | External signal bus 1 | Connects to PC service tool |
| CN24 | External signal bus 1 | Connects to a Module Controller |
| KO3 | Relay output 3 | Water-side solenoid |
| KO4 | Relay output 4 | Fountain valve |
| KO15 | Relay output 15 | Dry contact - unit ON/OFF and customer pump ON/OFF output |
| KO16 | Relay output 16 | Dry contact - alarm output |
| IND-COM | AC200V power supply | AC line N |
| IND1 | AC200V power supply | Flow switch |
| IND2 | AC200V power supply | User side pump ON input |
| IND3 | AC200V power supply | Pump overload |

| | | |
|---|---|---|
| J1 | AC200V power supply | AC line L |
| J2 | AC200V power supply | AC line N |
| J7 | AC200V power supply | Transformer primary coil |
| J8 | AC12V power supply | Transformer secondary coil |
| J12 | DC12V power supply | DC12V output |

## 13-2-3. Control Mode DIP Switch (SW2) Configurations

| Switch Number | Scope | Position | Details |
|---|---|---|---|
| 1 | Category | [0]<br>1 | Heat pump<br>Cooler |
| 2 | Pump | [0]<br>1 | No<br>Yes |
| 5 | Aspersion | [0]<br>1 | No aspersion<br>Aspersion |
| 8 | Application | [0]<br>1 | Module applicable<br>Single applicable |

## 13-2-4. Address DIP Switch (SW3) Configurations

| Position | Scope | Sequence<br>54321 | Details |
|---|---|---|---|
| 54321 | Unit address | 00000<br>00001<br>00010<br>00011<br>· · ·<br>10011 | Address 0<br>Address 1<br>Address 2<br>Address 3<br>Address x<br>Address 19 |

Note: [1] = ON, [0] = OFF for all switch configurations below. The address must be configured on-site according to the application. Switch the unit off before configuring the unit address.

# 13-3. Refrigerant Circuit Controller Boards (4A2, 4A3, 4A4, 4A5)

## 13-3-1. Refrigerant Circuit Controller Details

Power Supply: AC12V ±10%, max. 12W

The Circuit Controllers control each refrigerant pathway for compressors, fans, EXV components etc. A single units consists of 4 Circuit Controllers.

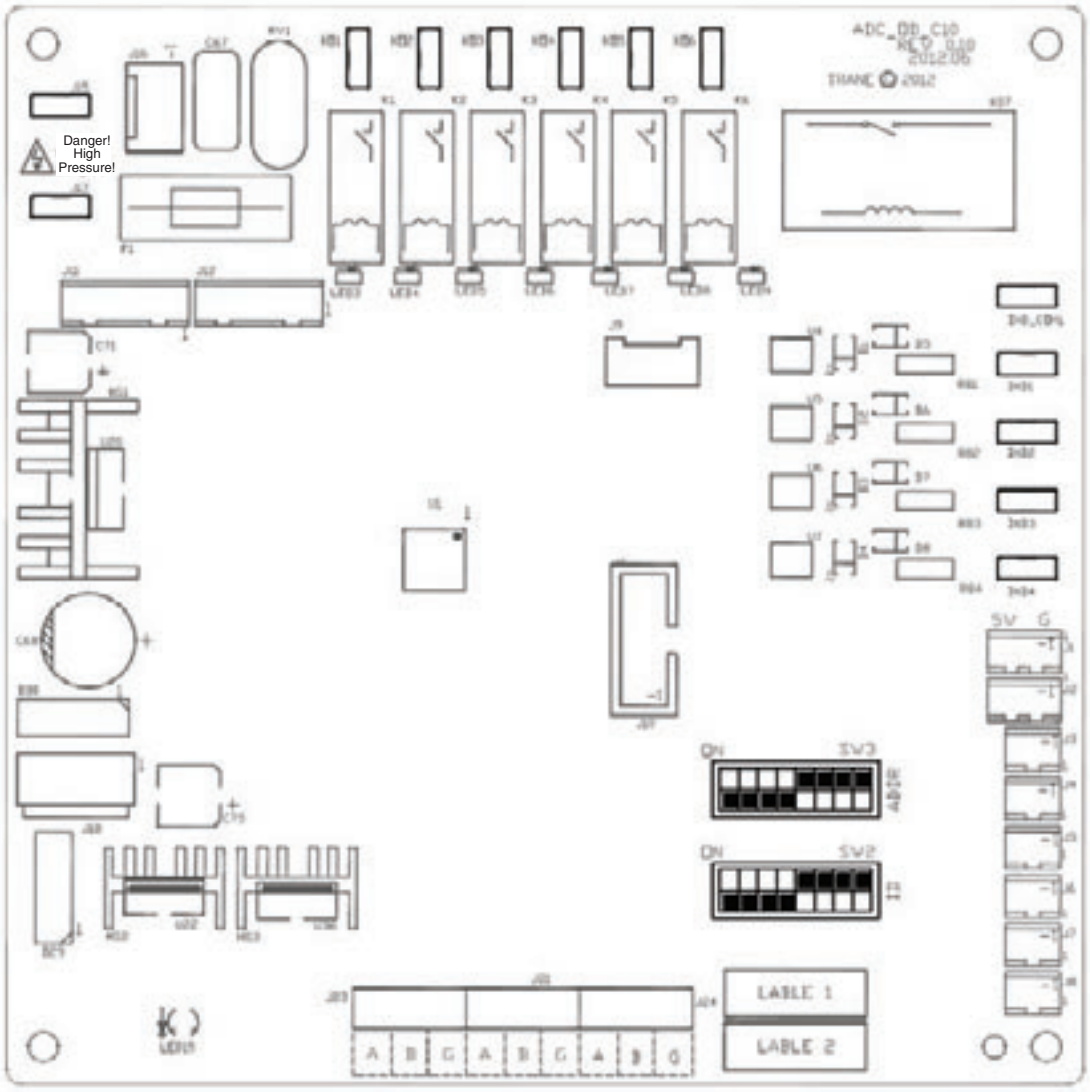



Figure 8.4 Circuit Controller PCB diagram

## 13-3-2. I/O Port Description

Refer to the I/O ports in the table below.

| Port | Name | Details |
|---|---|---|
| J1 | Pressure sensor input 1 | High pressure sensor |
| J2 | Pressure sensor input 2 | Low pressure sensor |
| J3 | Thermistor input 1 | Ejection temperature |
| J4 | Thermistor input 2 | Intake temperature |
| J5 | Thermistor input 3 | Coil 1 gas temperature |
| J6 | Thermistor input 4 | Coil 2 gas temperature |
| J11 | Stepping motor output 1 | EXV 1 output |

| | | |
|---|---|---|
| J12 | Stepping motor output 2 | EXV 2 output |
| J21 | Internal signal bus 1 | Connects to fan motor driver CN4 |
| J23 | Internal signal bus 2 | Connects to compressor driver COM |
| J24 | External signal bus 1 | Connects to OD Controller CN18 |
| KO2 | Relay output 2 | 4-way valve output |
| KO3 | Relay output 3 | Crank coil heater |
| J15 | AC200V power supply | AC line N |
| J16 | AC200V power supply | Transformer primary coil |
| J17 | AC200V power supply | AC line L |
| J18 | AC12V power supply | Transformer secondary coil |

### 13-3-3. Address DIP Switch (SW3) Configurations

| Position | Scope | Sequence<br>21 | Details |
|---|---|---|---|
| 21 | Circuit Controller address | 00<br>01<br>10<br>11 | Address 0<br>Address 1<br>Address 2<br>Address 3 |

## 13-4. Module Controller (9A15)

### 13-4-1. Module Controller Details

Power Supply: DC24V

Module Controllers can control up to 20 module units in module operation. The human interface consists of a 7-inch touch screen display. A 4GB or 8GB MicroSD card can be inserted into MicroSD card slot J6 to record data. Module Controllers can connect to the centralized facility monitoring and control system of a building via Modbus.

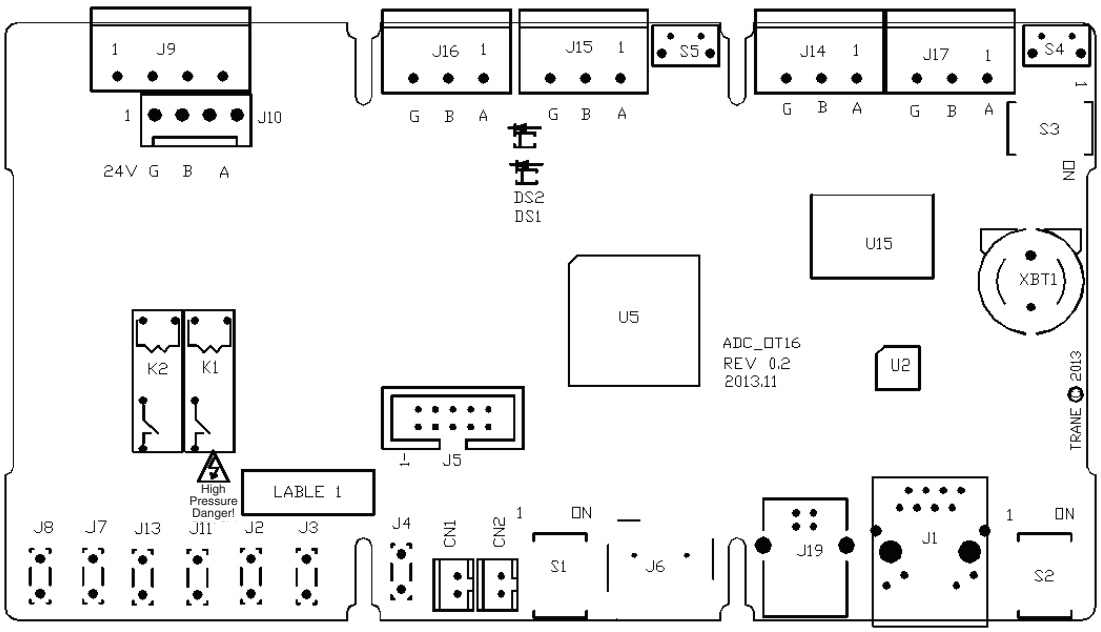



Figure 8.1 Module Controller PCB diagram

## 13-4-2. I/O Port Description

| Port | Name | Details |
|---|---|---|
| J9-1, 2 | Power supply | DC24V power supply |
| J10-1, 2 | Power supply | DC24V power supply to BACnet J1-1, 2 |
| J10-3, 4 | External COM bus 1 | Connects to BACnet J1-3, 4 |
| J14 | Internal signal bus 1 | Connects to COM0/COM2 of 7-inch monitor display |
| J15 | External signal bus 2 | Connects to outdoor controller CN24 |
| J19 | External signal bus 3 | Connects to PC service tool |
| J2 | Digital input | Remote operation/Stop command |
| J3 | Digital input | External pump ON signal |
| J11 | Relay output | Module operation/Stop signal, customer pump ON/OFF request |
| J13 | Relay output | Alarm output |
| CN1 | Thermistor input 1 | Return water temperature |
| CN2 | Thermistor input 2 | Outgoing water temperature |

## 13-4-3. Remote Control DIP Switch (S1) Configurations

| Switch Number | Scope | Value | Details |
|---|---|---|---|
| 1 | Category | [0]<br>1 | Remote operation/stop disabled<br>Remote operation/stop enabled |

Note: Remote operation/stop is set to 0 - disabled at time of shipping

## 13-4-4. Modbus/BACnet Address DIP Switch (S3) Configurations

| Switch Number | Scope | Sequence 4321 | Details |
|---|---|---|---|
| 4321 | Modbus address | 0000<br>[0001]<br>0010<br>0011<br>. . .<br>1111 | Address 0<br>Address 1<br>Address 2<br>Address 3<br>Address x<br>Address 15 |

Factory default configuration is address 1

## 13-4-5. Modbus (RTU) Point:

**Address:** 1 - 15
**Baud rate:** 9600 bps

**Unit level point:**

| Logical address Upper | Logical address Lower | Type | Details | Category | Access | Unit | Scope |
|---|---|---|---|---|---|---|---|
| 0xA0 - 0xBF | 0x07 | WORD (Enum) | Indicates the unit is operating | Status parameter | R | - | - |
| 0xA0 - 0xBF | 0x08 | WORD (Enum) | Indicates the unit is operating as a cooler/ heater | Status parameter | R | - | - |
| 0xA0 - 0xBF | 0x0C | INT (signed 16-bit) | Unit input water temperature | Status parameter | R | 0.1°C | -255°C - +255°C |
| 0xA0 - 0xBF | 0x0D | INT (signed 16-bit) | Unit outgoing water temperature | Status parameter | R | 0.1°C | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 0xA0 - 0xBF | 0x10 | UINT (unsigned 16-bit) | Unit output | Status parameter | R | 1% | |
| 0xA0 - 0xBF | 0x1B | bit8 | Indicates the unit is remotely controlled | Status parameter | R | | |
| | | bit9 | Indicates the unit has an error | Status parameter | | | |
| | | bit11 | Indicates the unit is in anti-freeze status | Status parameter | | | |

**Module level point:**

| Logical address Upper | Logical address Lower | Type | Name | Category | Access | Unit | Scope |
|---|---|---|---|---|---|---|---|
| 0xF0 | 0x07 | WORD (Enum) | Module device ON/ OFF status | Status parameter | R | - | - |
| 0xF0 | 0x08 | WORD (Enum) | Module device mode | Status parameter | R | - | - |
| 0xF0 | 0x09 | WORD (Enum) | Module device error code | Failure parameter | R | - | - |
| 0xF0 | 0x0A | INT (signed 16-bit) | Module configured temperature | Status parameter | R/W | | |
| 0xF0 | 0x0B | INT (signed 16-bit) | Module outgoing water temperature | Status parameter | R | | |
| 0xF0 | 0x0C | INT (signed 16-bit) | Module incoming water temperature | Status parameter | R | | |
| 0xF0 | 0x0D | INT (signed 16-bit) | Module ambient temperature | Status parameter | R | 0.1°C | |
| 0xF0 | 0x0F | INT (unsigned 16-bit) | Module performance output | Status parameter | R | 1% | |
| 0xF0 | 0x13 | INT (unsigned 16-bit) | Module online number of units | Status parameter | R | | |
| 0xF0 | 0x15 | INT (unsigned 16-bit) | Module operating number of units | Status parameter | R | | |
| 0xF0 | 0x17 | INT (unsigned 16-bit) | Module winter anti-freeze number of units | Status parameter | R | | |
| 0xF0 | 0x21 | WORD (Enum) | Module CMD source channel | Configuration parameter | R | | |
| 0xF0 | 0x22 | WORD (Enum) | Module scheduling enabled | Configuration parameter | R/W | | |
| 0xF0 | 0xEF | WORD (Enum) | Module HVAC ON/ OFF CMD | Control parameter | W | - | - |
| 0xF0 | 0xEE | WORD (Enum) | Module HVAC mode CMD | Control parameter | W | - | - |
| 0xF0 | 0xED | WORD (Enum) | Module HVAC restraint CMD | Control parameter | W | - | - |
| 0xF0 | 0xEC | WORD (Enum) | Module HVAC error reset | Control parameter | W | - | - |

# 13-5. BACnet (9A18)

## 13-5-1. BACnet Board Details

Power Supply: DC24V

BACnet boards are a communication interface that allows Module Controllers with Modbus protocol to communicate with centralized facility monitoring and control systems using BACnet protocol.

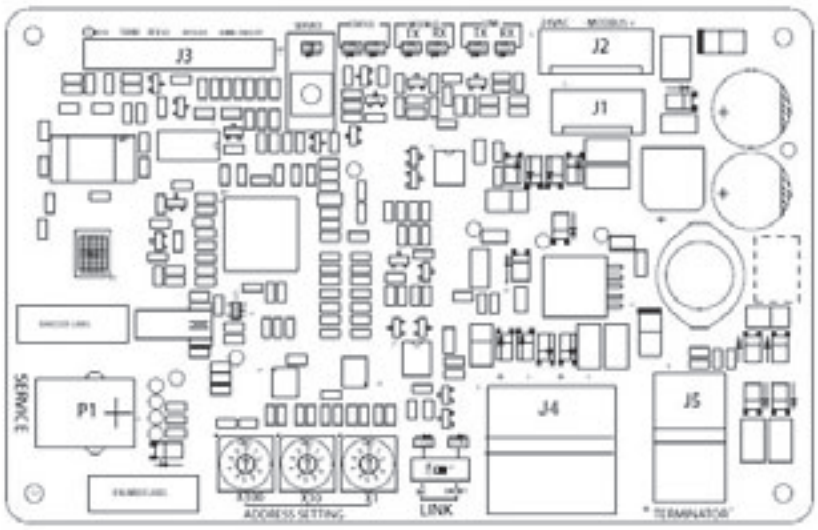



Figure 8.2 BACnet Module PCB diagram

## 13-5-2. LEDs:

| LED Type | LED Operation | Description |
|---|---|---|
| SERVICE LED | Normally green | Gateway is in boot mode. Holding down the service pin during power up configures the gateway in boot mode. The gateway will not operate in boot mode and is on standby while new main applications are downloaded. System applications cannot be launched while in boot mode. |
| | Off | Application code launch and normal operation possible. |
| STATUS LED | Normally green | Normal operation |
| | Blinking green | Refreshing gateway flash. |
| | Normally red | Gateway error |
| | Blinking red | Alarm, point failure occurred |
| | Off | Gateway off |
| Modbus Tx/Rx | Blinking | Modbus data transfer, reception, transmission |
| | Off | No Modbus operation |
| LINK Tx/Rx | Blinking | BACnet data transfer, reception, transmission |
| | Off | No BACnet operation |

## 13-5-3. I/O Port Description:

| Switch/Button | Function |
|---|---|
| Rotary switch | Use the rotary switch to configure a unique MS/TP MAC address |
| Service button | Push the service button to restart the controller and launch boot code |

| Port | Purpose |
|---|---|
| J1 (left 2 pins) | DC24V power supply, connect modular controller J10-1, 2 |
| J1 (right 2 pins) | Modbus communication port, connect modular controller J10-3, 4 |
| J4 | BACnet communication, connect BAS [+] or [-] pair |

## 13-5-4. BACnet Point:

Module level point:

| Name | Details | Point Type | Unit |
|---|---|---|---|
| Module status | Displays Module Chiller ON/OFF. | Binary input | NA |
| S.T.ART module scheduling enabled | Indicates S.T.ART module scheduling functionality is enabled. | Binary input | NA |
| Module mode | Indicates Module Chiller operating mode. | Multi-state input | NA |
| Module command source | Indicates a command from a valid source. | Multi-state input | NA |
| Module configured temperature | Module Chiller configured temperature (read) | Analog input | °C (62) |
| Module outlet water temperature | Module level outlet water temperature | Analog input | °C (62) |
| Module inlet water temperature | Module level inlet water temperature | Analog input | °C (62) |
| Module output | Module level output | Analog input | Percentage (98) |
| Number online | Number of units online | Analog input | NA |
| Number of units operating | Number of outdoor units operating | Analog input | None |
| Number of units in anti-freeze mode | Number of outdoor units in anti-freeze mode | Analog input | None |
| Module status command | This command is used to turn the Module Chiller ON/OFF. | Binary output | NA |
| Enable S.T.ART module scheduling command | This command is used to enable/disable S.T.ART module scheduling functionality. | Binary output | NA |
| Module level mode command | This command is used to change the Module Chiller mode. | Multi-state output | NA |
| Module configure temperature command | This command is used to change the configured temperature. | Analog output | °C (62) |

The BACnet points below are created for each module unit connected to the system.

| Name | Details | Point Type | Unit |
|---|---|---|---|
| OD XX[1] status | Indicates the module unit is ON. | Binary input | NA |
| OD XX[1] error status | Indicates the module unit is in error status. | Binary input | NA |
| OD XX[1] error code | Indicates the outdoor unit error code. | Multi-value input | NA |
| OD XX[1] anti-freeze status | Indicates the module unit is in anti-freeze status. | Binary input | NA |
| OD XX[1] ambient temperature | Indicates the outdoor unit ambient temperature. | Analog input | °C (62) |
| OD XX[1] outlet water temperature | Module unit outlet water temperature | Analog input | °C (62) |
| OD XX[1] inlet water temperature | Module unit inlet water temperature | Analog input | °C (62) |
| OD XX[1] output | Module unit output | Analog input | Percentage (98) |
| OD XX[1] remote/local status | Indicates whether the module unit is remotely controlled | Binary input | NA |

# 13-6. Fan Motor Driver (5A10, 5A11)

## 13-6-1. Fan Motor Driver Details

The fan motor driver controls the outdoor fan speed. A single unit consists of 4 motor drivers (A/B/C/D).

Power Supply: AC200 - 240V ±10%, 50/60Hz, max. 1100W

## 13-6-2. I/O Port Description

| Port | Name | Details |
|---|---|---|
| CN4 | External signal bus 1 | Connects to Circuit Controller board J21 |
| CN6 | Hall sensor input | Motor hall sensor signal |
| CN7 | N | Power supply line N |
| CN8 | Earth | Earth |
| CN9 | L | Power supply line L |
| CON1 | Power supply 200V | Motor output (U, V, W) |

# 13-7. Module Control

Module control is based upon sequenced control and has 3 main operating modes (soft start mode, normal mode and anti-freeze mode).

## 13-7-1. Soft Start Mode

Entering soft start mode:
**Outgoing water temperature must be greater than the configured system cold water set point + dead zone**

Follow the steps below to add a single unit in soft start mode.

1. **Skip to 2 if module start mode is 0**. **Skip to 3 if module start mode is 1**.
2. Continuously monitor the operating capacity until it exceeds the **refrigeration soft start capacity** and then move to step 3.
3. Continuously monitor the **system return water temperature**. **If the rate at which temperature is decreasing while the** incremental delay timer is operating **is slower than the minimum soft start cooling rate**, then the number of units can be increased.

Exception: Only 1 single unit being added

**If the return water temperature is less than the configured system cold water set point + soft start + dead zone for 1 unit**, then only 1 unit can be added.

Exiting soft start mode:
**If outgoing water temperature is less than the configured system cold water set point + dead zone**

Note: Increase the number of units as required by the module size.

## 13-7-2. Normal mode

Exiting start mode switches the module control to normal mode. The procedure for increasing/decreasing the number of units is outlined below.

Increasing number of units

1. **Skip to 2 if module increase mode is 0**. **Skip to 3 if module increase mode is 1**.
2. Continuously monitor the operating capacity of units until they exceed the **normal refrigeration capacity**. Then move on to step 3.
3. Continuously monitor the **system outgoing water temperature**. **If the system outgoing water temperature is greater than the** normal refrigeration incremental delay timer (cold water set point + incremented temperature dead time), then another unit can be added.

Note: Only add 1 unit at a time

Decreasing number of units

1. **Skip to 2 if module decrease mode is 0**. **Skip to 3 if module decrease mode is 1**.
2. After decreasing the capacity, continuously monitor the capacity of operating units until it falls below the **desired average refrigeration capacity**. Then move on to step 3.
3. Continuously monitor the **system outgoing water temperature**. **If the system outgoing water temperature is lower than the** normal refrigeration decremental delay timer (cold water set point - normal refrigeration decremental dead zone), then another unit can be removed.

Note: Only remove 1 unit at a time

## 13-7-3. Anti-Freeze Mode

In order to prevent the water from over cooling in the winter months, the Module Controller can be switched to anti-freeze mode.

Switching to anti-freeze mode:

If A or B is true then C is true

A: The outgoing water or inlet water temperature of a single unit is lower than the **anti-freeze temperature set point** required to enter **standby**

B: The module's outgoing water or return water temperature is lower than the **anti-freeze temperature set point** required to enter **standby**

C: The Module Controller is in stop mode or heating mode

Anti-freeze operating procedure:

1. Open the water solenoid or pump for the single unit that requires anti-freeze operation
2. If water temperature is below the **anti-freeze temperature set point** after the **heater standby time**, then commence operation in heating mode.

Exiting anti-freeze mode:
If the outlet water or inlet water temperature of the unit in anti-freeze mode is equal to or greater than the (**anti-freeze set point + exit dead zone**), then close the water solenoid or pump and halt operation in heating mode. If the outgoing water or return water temperature is still less than the (**anti-freeze set point + exit dead zone**), then keep one module unit in anti-freeze mode until the temperature exceeds (**anti-freeze set point + exit dead zone**) and then exit anti-freeze mode.

## 13-7-4. List of Configurable Values

Enable module
Module start mode
Module incremental mode
Module decremental mode
Dead zone cooling soft start (°C)
Non-dead zone cooling soft start (°C)
Cooling soft start minimum cool down rate (°C/min)
Cooling start interval soft start time (s)
Cooling soft start capacity (%)
Soft start + 1 unit dead zone (°C)
Normal cooling incremental capacity (%)
Normal cooling incremental dead zone (°C)
Normal cooling incremental delay time (s)
Desired average cooling capacity after decrementing (%)
Normal cooling decremental dead zone (°C)
Normal cooling decremental delay time (s)
Dead zone heating soft start (°C)
Non-dead zone heating soft start (°C)
Heating soft start minimum cool down rate (°C/min)
Heating start interval soft start time (s)
Heating soft start capacity (%)
Heating soft start + 1 unit dead zone (°C)

Normal heating incremental capacity (%)
Normal heating incremental dead zone (°C)
Normal heating incremental delay time (s)
Desired average heating capacity after decrementing (%)
Normal heating decremental dead zone (°C)
Normal heating decremental delay time (s)
Anti-freeze set point (°C)
Standby time input (min)
Heating standby time (min)
Exit dead zone (°C)

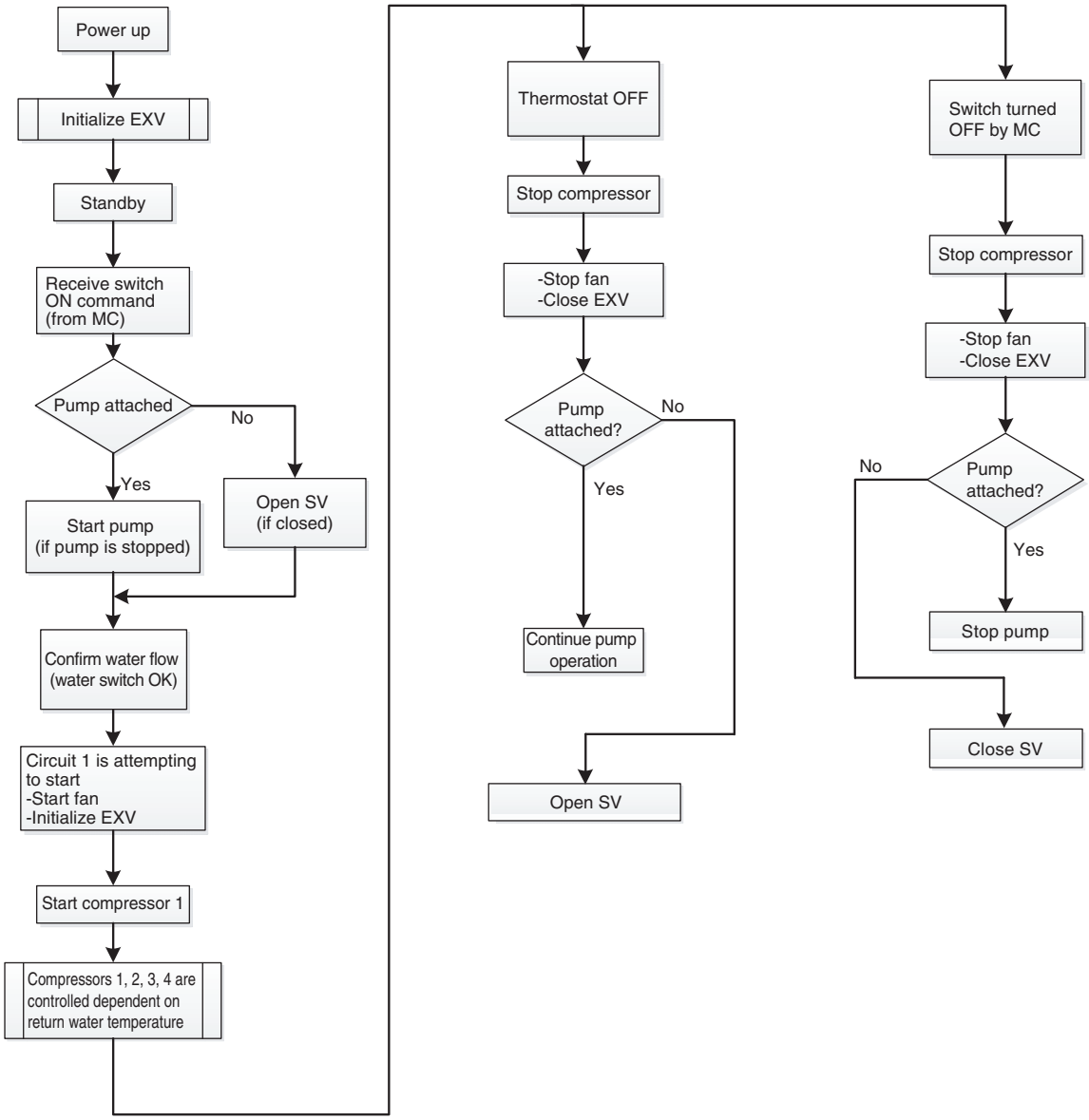
Annotation:
All of the settings above can be configured at unit installation. Consult one of our technicians for operational details.

## 13-8. Error Code Overview

| Code (display) | Details | Action |
|---|---|---|
| M01 | Module outgoing water temperature sensor error | Stop the module |
| M02 | Module return water temperature sensor error | Stop the module |
| E15 | Customer pump is not ready (modular) | Stop the module |
| C00 | Communication with Module Controller failed | Stop the device |
| C10 | Communication with OD Controller failed | Stop the device |
| F01 | Inlet water temperature sensor error | Stop the unit |
| F03 | Intermediate water temperature sensor error | Stop the unit |
| F02 | Outlet water temperature sensor error | Stop the unit |
| F10 | Ambient temperature sensor error | Stop the unit |
| LLWT | Cooling anti-freeze alarm | When the error is cleared the unit stops and is automatically restored. If 3 or more errors occur within 1 hour, the unit will not be restored. |
| E12 | Pump driver error | Stop the unit |
| E11 | Pump overload alarm | Stop the unit |
| E10 | Flow switch alarm | When the error is cleared the unit stops and is automatically restored. If 3 or more errors occur within 1 hour, the unit will not be restored. |
| E14 | Customer pump is not ready (unit) | Stop the unit |
| C05 | Communication error between OD Controller and pump | Stop the unit |
| C01 | Communication error between OD Controller and circuit | Stop the unit |
| F11A | High pressure sensor error: Circuit A | Stop circuit A |
| F12A | Low pressure sensor error: Circuit A | Stop circuit A |
| F06A | Ejection temperature sensor error: Circuit A | Stop circuit A |
| F07A | Intake temperature sensor error: Circuit A | Stop circuit A |
| F08A | Coil gas temperature sensor 1 error: Circuit A | Stop circuit A |
| F09A | Coil gas temperature sensor 2 error: Circuit A | Stop circuit A |
| E04A | Ejection temperature abnormality lock: Circuit A | Stop circuit A |
| E05A | High pressure abnormality lock: Circuit A | Stop circuit A |
| E06A | Low pressure abnormality lock: Circuit A | Stop circuit A |
| E13A | High pressure switch trigger: Circuit A | Stop circuit A |
| E07A | Cooler LRTC lock: Circuit A | Stop circuit A |
| E36A | Compressor mains power abnormality: Circuit A | Stop circuit A |
| E08A | Compressor start-up abnormality: Circuit A | Stop the device |
| CP01 | Compressor error: Circuit A | Stop circuit A |
| FD01 | Fan motor error: Circuit A | Stop the unit |
| C02A | Communication error between Circuit Controller and compressor: Circuit A | Stop circuit A |
| C03A | Communication error between Circuit Controller and fan: Circuit A | Stop circuit A |
| F11B | High pressure sensor error: Circuit B | Stop circuit B |

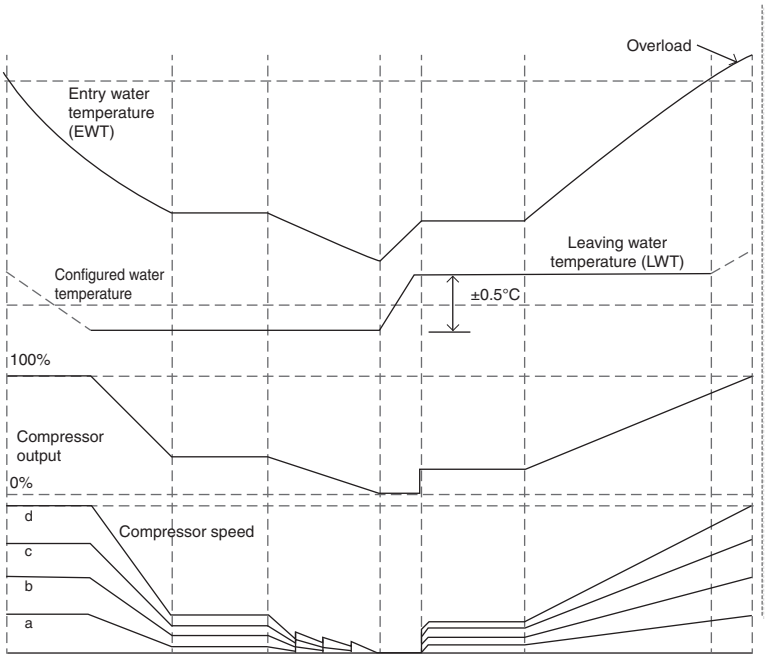
| | | |
|---|---|---|
| F12B | Low pressure sensor error: Circuit B | Stop circuit B |
| F06B | Ejection temperature sensor error: Circuit B | Stop circuit B |
| F07B | Intake temperature sensor error: Circuit B | Stop circuit B |
| F08B | Coil gas temperature sensor 1 error: Circuit B | Stop circuit B |
| F09B | Coil gas temperature sensor 2 error: Circuit B | Stop circuit B |
| E04B | Ejection temperature abnormality lock: Circuit B | Stop circuit B |
| E05B | High pressure abnormality lock: Circuit B | Stop circuit B |
| E06B | Low pressure abnormality lock: Circuit B | Stop circuit B |
| E13B | High pressure switch trigger: Circuit B | Stop circuit B |
| E07B | Cooler LRTC lock: Circuit B | Stop circuit B |
| E36B | Compressor mains power abnormality: Circuit B | Stop circuit B |
| E08B | Compressor start-up abnormality: Circuit B | Stop the device |
| CP02 | Compressor error: Circuit B | Stop circuit B |
| FD02 | Fan motor error: Circuit B | Stop the unit |
| C02B | Communication error between Circuit Controller and compressor: Circuit B | Stop circuit B |
| C03B | Communication error between Circuit Controller and fan: Circuit B | Stop circuit B |
| F11C | High pressure sensor error: Circuit C | Stop circuit C |
| F12C | Low pressure sensor error: Circuit C | Stop circuit C |
| F06C | Ejection temperature sensor error: Circuit C | Stop circuit C |
| F07C | Intake temperature sensor error: Circuit C | Stop circuit C |
| F08C | Coil gas temperature sensor 1 error: Circuit C | Stop circuit C |
| F09C | Coil gas temperature sensor 2 error: Circuit C | Stop circuit C |
| E04C | Ejection temperature abnormality lock: Circuit C | Stop circuit C |
| E05C | High pressure abnormality lock: Circuit C | Stop circuit C |
| E06C | Low pressure abnormality lock: Circuit C | Stop circuit C |
| E13C | High pressure switch trigger: Circuit C | Stop circuit C |
| E07C | Cooler LRTC lock: Circuit C | Stop circuit C |
| E36C | Compressor mains power abnormality: Circuit C | Stop circuit C |
| E08C | Compressor start-up abnormality: Circuit C | Stop the device |
| CP03 | Compressor error: Circuit C | Stop circuit C |
| FD03 | Fan motor error: Circuit C | Stop the unit |
| C02C | Communication error between Circuit Controller and compressor: Circuit C | Stop circuit C |
| C03C | Communication error between Circuit Controller and fan: Circuit C | Stop circuit C |
| F11D | High pressure sensor error: Circuit D | Stop circuit D |
| F12D | Low pressure sensor error: Circuit D | Stop circuit D |
| F06D | Ejection temperature sensor error: Circuit D | Stop circuit D |
| F07D | Intake temperature sensor error: Circuit D | Stop circuit D |
| F08D | Coil gas temperature sensor 1 error: Circuit D | Stop circuit D |
| F09D | Coil gas temperature sensor 2 error: Circuit D | Stop circuit D |
| E04D | Ejection temperature abnormality lock: Circuit D | Stop circuit D |
| E05D | High pressure abnormality lock: Circuit D | Stop circuit D |
| E06D | Low pressure abnormality lock: Circuit D | Stop circuit D |
| E13D | High pressure switch trigger: Circuit D | Stop circuit D |
| E07D | Cooler LRTC lock: Circuit D | Stop circuit D |
| E36D | Compressor mains power abnormality: Circuit D | Stop circuit D |
| E08D | Compressor start-up abnormality: Circuit D | Stop the device |
| CP04 | Compressor error: Circuit D | Stop circuit D |
| FD04 | Fan motor error: Circuit D | Stop the unit |
| C02D | Communication error between Circuit Controller and compressor: Circuit D | Stop circuit D |
| C03D | Communication error between Circuit Controller and fan: Circuit D | Stop circuit D |

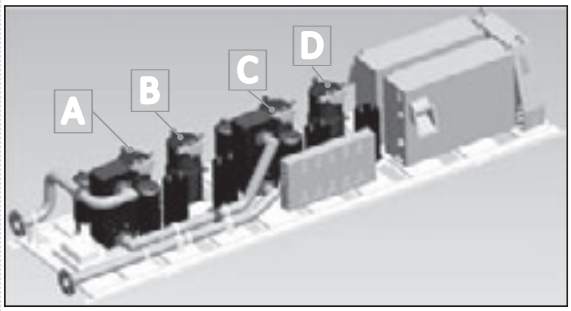
## 13-9. Unit Operation/Stop Procedure



## 13-10. Module Unit Control

1) Compressor Control
The Unit Controller controls variable speed compressor output and confirms that the outlet water temperature (LWT) has reached the set point.
Each compressor is driven by a compressor driver which in turn receives commands from the Unit Controller.
The compressor operating sequence differs between each compressor based on their operating time.



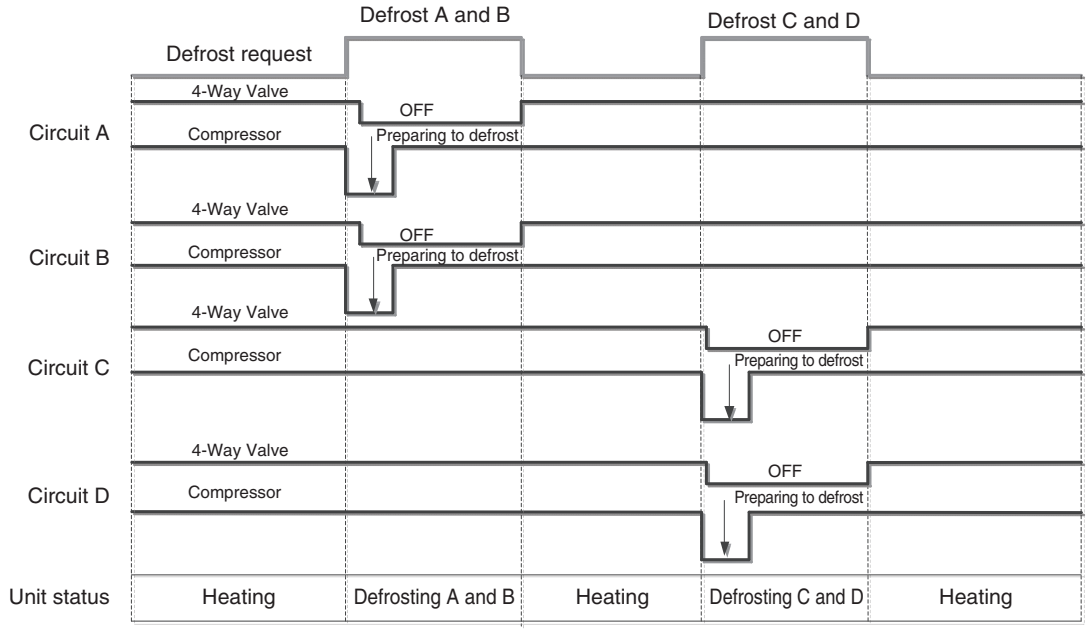

Module Unit Control
2) EXV Control
Each circuit is comprised of 2 EXV units that can be operated independently. EXV control helps to maintain a stable heating state in cooling and heating modes. This allows for maximally efficient operation of each unit.

3) Fan Control
Each fan is driven by a variable speed driver. Fan control helps to maintain ideal condensation pressure in cooling and heating modes and also optimal evaporation pressure in overheating mode.

4) Aspersion Control (optional)
Aspersion functionality is enabled when the condensation temperature is above 40°C in cooling mode and compressor output is 60% or more. Lowering the condensation temperature allows for an increase in efficiency.

5) Defrost

The defrosting start time is determined by the evaporation temperature and ambient temperature. Circuits A and B are connected to BPHE1 while C and D are connected to BPHE2, meaning that if either circuit requires defrosting then both circuits attached to the same BPHE will be defrosted. If circuits A and B are being defrosted, then circuits C and D cannot be defrosted until A and B complete.



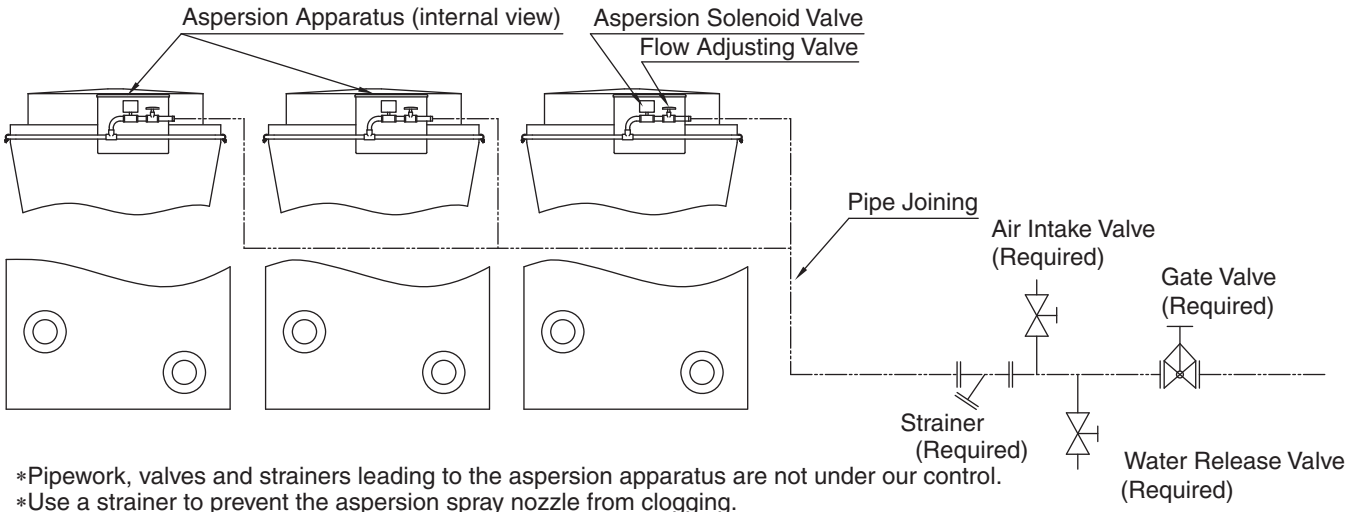
- Vibration-proof materials are optional.
- Water from the heat pump during the defrost cycle should be appropriately drained from the unit. Check to see there are no water puddles or ice on the foundation.
- If installing units in areas receiving heavy snowfall, consider using a snow hood etc. to prevent damage due to accumulated snow.

[Aspersion Device] High COP Option

- Water used should comply with water quality standard TRA-GL-02-1994.
  However, this does not guarantee suppression of dirt in the air heat exchanger.
  If dirt has accumulated in the air heat exchanger please remove it with a brush, water or other device that will not damage the coils.
- Use a 50 mesh filter on the parent water pipe as per the figure below to prevent the nozzle from clogging.
- Install a valve and filter (strainer) as per Figure 21-1.

Aspersion Specifications

Aspersion Rate: 13.3 L/min, Aspersion Pressure: 0.2 MPa
Connection: R3/4 (male)




∗Pipework, valves and strainers leading to the aspersion apparatus are not under our control.
∗Use a strainer to prevent the aspersion spray nozzle from clogging.
∗Use a strainer with a mesh of 50 or so.
∗Water quality standards and guidelines for aspersion supply are outlined in “Refrigeration and Air Conditioning Equipment Water Quality Guides” issued by the Japan Air Conditioning and Refrigeration Industry Association
Be sure to use cooling water with transient flow and quality that meet these standards.

- Recommended outgoing water pressure is 0.2MPa. Adjust the pressure as required with a pressure reducing valve or relief valve. Install a pressurizing pump if the pressure is too low.
- If the aspersion volume of each module differs then adjust each module with a ball valve.
- If vibrations or leaks occur due to water hammering then mount a water hammer suppressor (arranged on-site) close to the aspersion device.

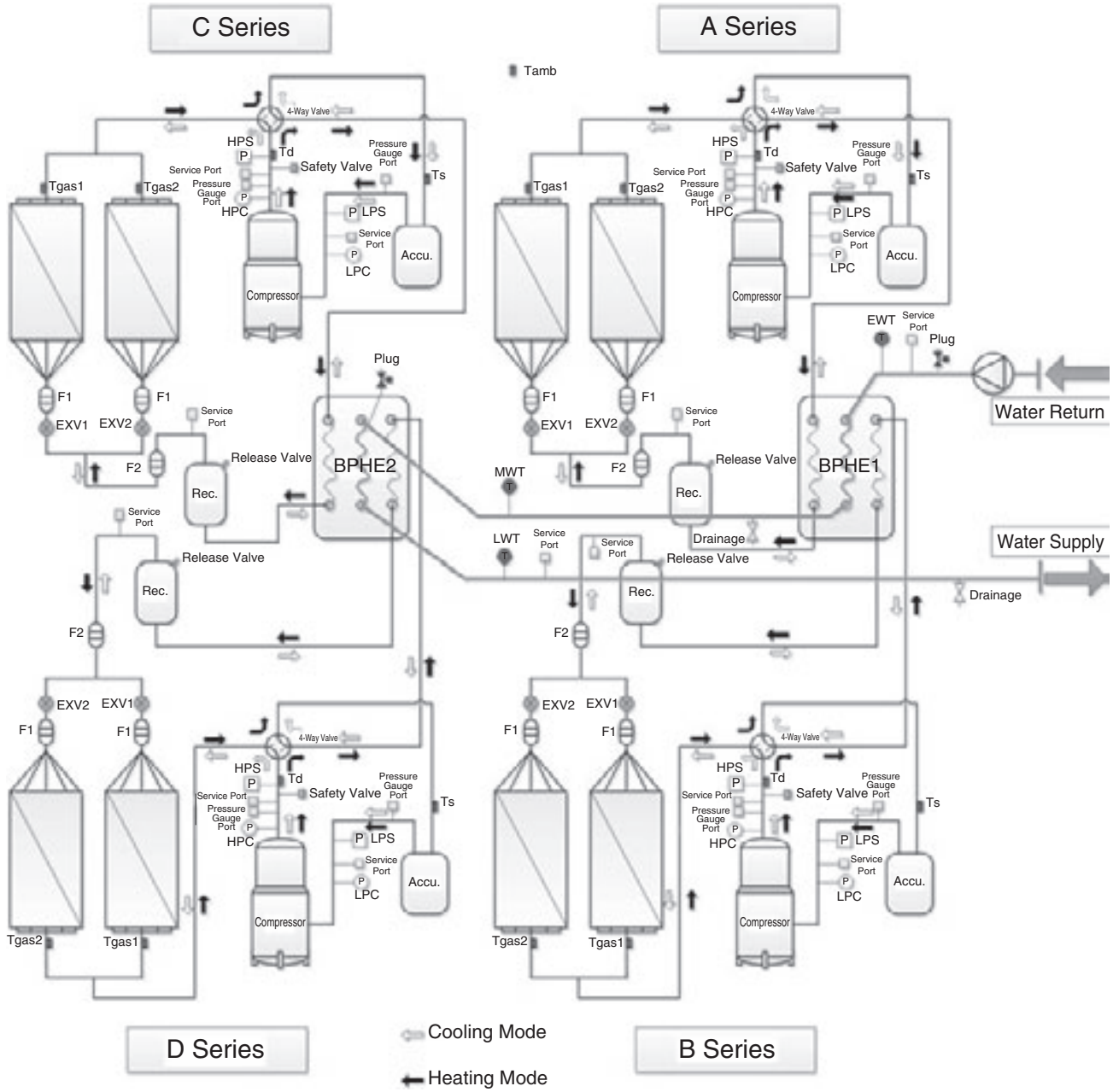
# 14 Parts Rating

## 14-1. Heat Pump Unit CXAV085, CXAV150

| No. | Main Component | Amount | | Specification |
|---|---|---|---|---|
| | | 85kW | 150kW | |
| 1 | Compressor | 4 | <-- | Danfoss VZH088J |
| 2 | Compressor driver | 4 | <-- | CDS: 15kW |
| 3 | Crank case heater | 4 | <-- | 200V 90W |
| 4 | Compressor coating | 4 | <-- | Multi-layer |
| 5 | Low pressure adapter | 4 | <-- | 45CP2-5 |
| 6 | High pressure adapter | 4 | <-- | 45CP2-7 |
| 7 | High pressure switch | 4 | <-- | 4.15MPa OFF / 3.3MPa ON |
| 8 | Reversing valve | 4 | <-- | – |
| 9 | Electronic expansion valve | 8 | <-- | – |
| 10 | Receiver tank with fusible plug | 4 | <-- | – |
| 11 | Accumulator | 4 | <-- | – |
| 12 | BPHE | 2 | <-- | – |
| 13 | OD coil | 4 | <-- | |
| 14 | OD fan blade | 4 | <-- | – |
| 15 | OD fan motor | 4 | <-- | 1kW |
| 16 | OD fan driver | 4 | <-- | 1kW |
| 17 | Relief valve | 4 | <-- | 75°C open |
| 18 | Pump (optional) | 1 | <-- | – |
| 19 | Pump driver (optional) | 1 | <-- | 4kW |
| 20 | Aspersion nozzle (optional) | 24 | <-- | – |

# 15 Refrigerant Piping Network Diagram

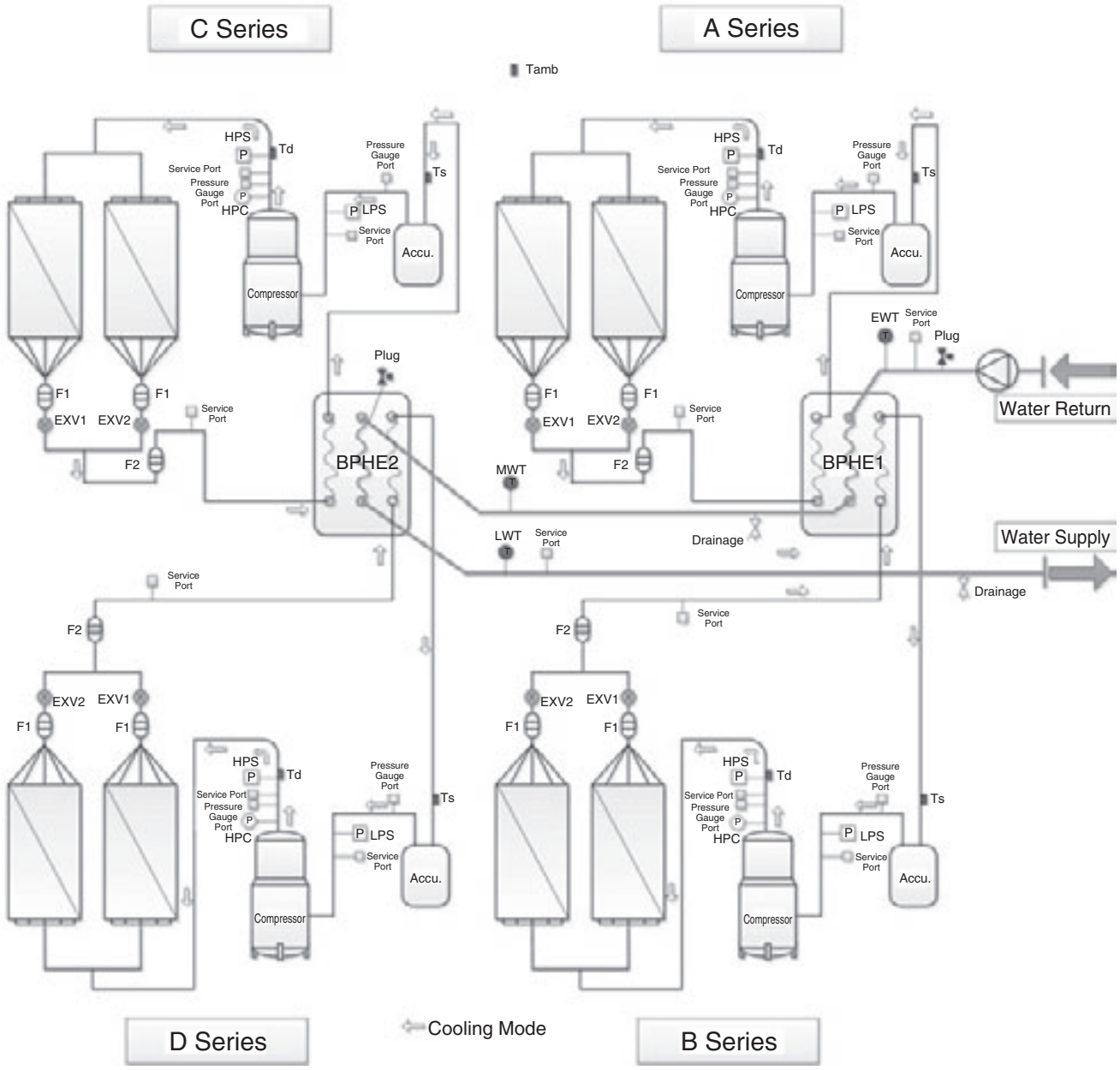
## 15-1. Heat Pump




| Symbol | Name | Amount | Function |
|---|---|---|---|
| Td | Ejection temperature | 4 | Refrigerant network temperature measurement |
| Ts | Air intake temperature | 4 | Refrigerant network temperature measurement |
| Tgas1 | Coil gas temperature 1 | 4 | Refrigerant network temperature measurement |
| Tgas2 | Coil gas temperature 2 | 4 | Refrigerant network temperature measurement |
| Tamb | Ambient temperature | 1 | Environment temperature measurement |
| HPS | High pressure sensor | 4 | Refrigerant network pressure measurement |
| LPS | Low pressure sensor | 4 | Refrigerant network pressure measurement |
| HPC | High pressure switch | 4 | High pressure safety shut-off |
| EXV1, 2 | Expansion valve | 8 | Refrigerant control |
| Comp | Compressor | 4 | Refrigerant compression |
| Pressure gauge | Pressure gauge port | 8 | Connects to pressure gauge |

| Symbol | Name | Amount | Function |
|---|---|---|---|
| Accu. | Accumulator | 4 | Gas and liquid separator |
| Rec. | Receiver tank | 4 | Liquid receiving tank |
| BPHE | Brass plate heat exchanger | 2 | Refrigerant / water heat exchanger |
| F1, 2 | Filter | 12 | Filter |
| Service port | Service port | 11 | Refrigerant / water system service port |
| Release valve | Release valve | 4 | Safety protection |
| Drainage | Drain port | 2 | Drainage |
| Plug | Air release port | 2 | Air vent |
| EWT | Inlet water temperature | 1 | Water temperature measurement |
| MWT | Intermediate water temperature | 1 | Water temperature measurement |
| LWT | Outlet water temperature | 1 | Water temperature measurement |
| 4W valve | 4-way valve | 4 | Cooling/heating switchable |

## 15-2. Cooler

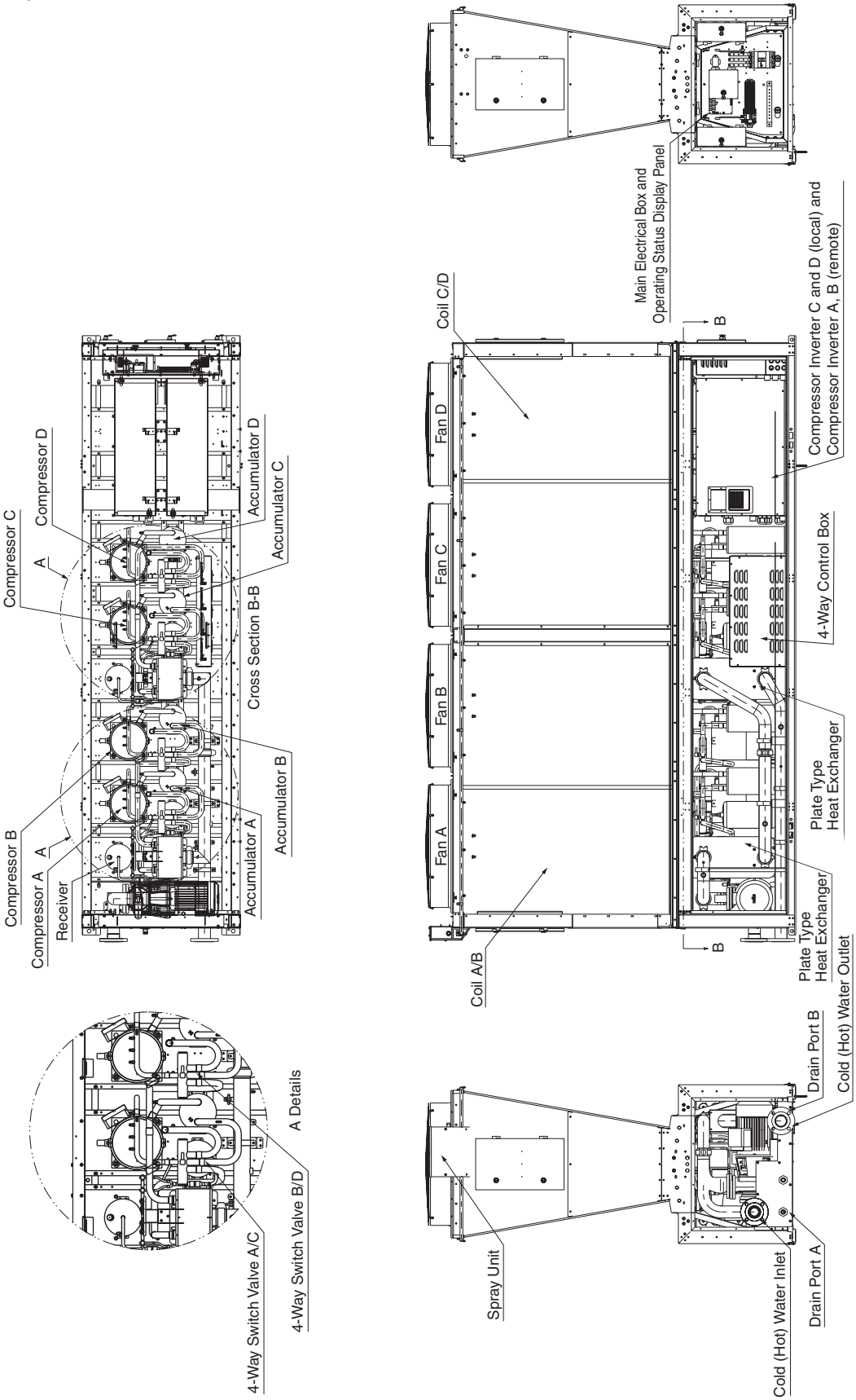



| Symbol | Name | Amount | Function |
|---|---|---|---|
| Td | Ejection temperature | 4 | Refrigerant network temperature measurement |
| Ts | Air intake temperature | 4 | Refrigerant network temperature measurement |
| Tamb | Ambient temperature | 1 | Environment temperature measurement |
| HPS | High pressure sensor | 4 | Refrigerant network pressure measurement |
| LPS | Low pressure sensor | 4 | Refrigerant network pressure measurement |
| HPC | High pressure switch | 4 | High pressure safety shut-off |
| EXV1, 2 | Expansion valve | 8 | Refrigerant control |
| Comp | Compressor | 4 | Refrigerant compression |
| Pressure gauge | Pressure gauge port | 8 | Connects to pressure gauge |

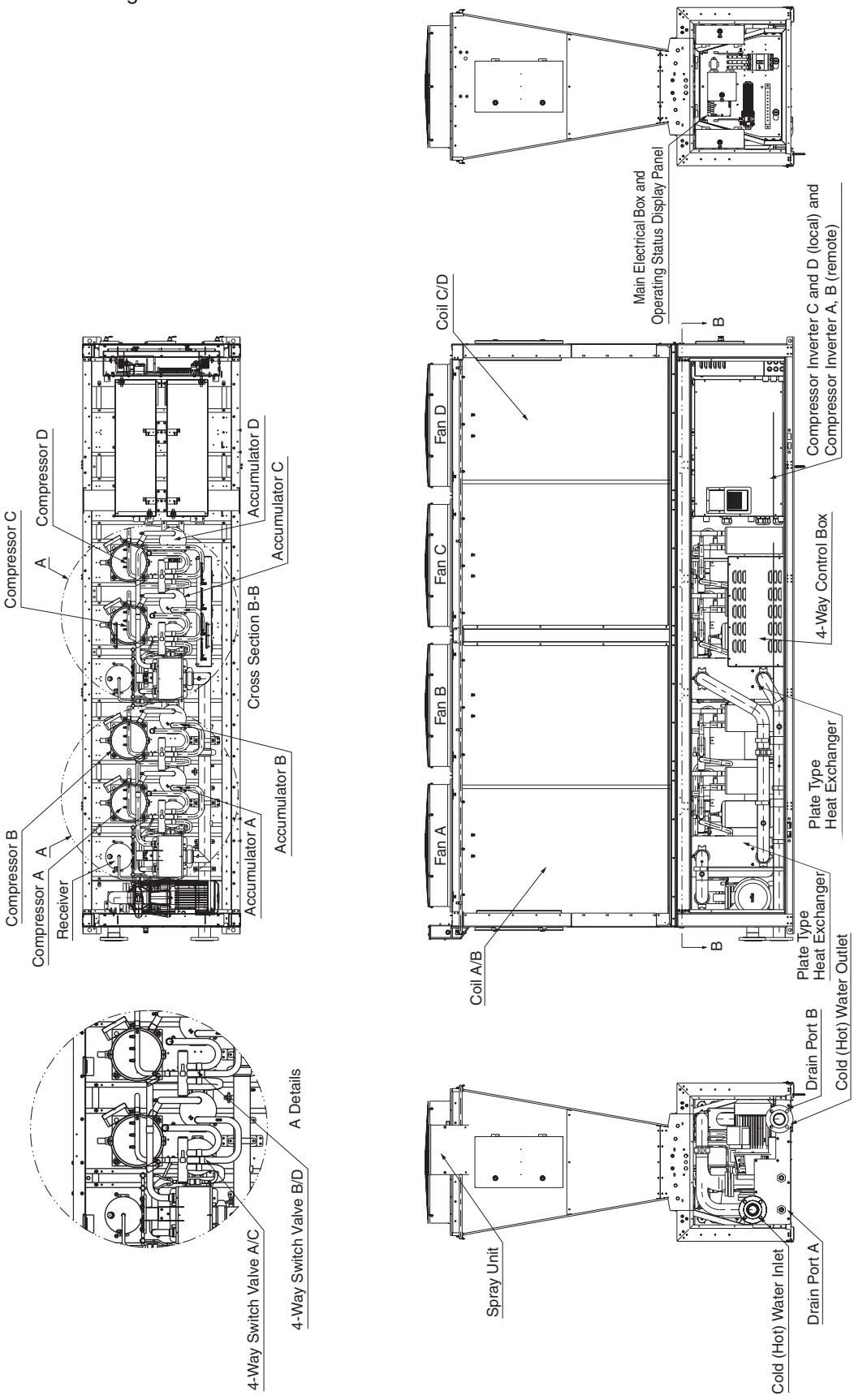
| Symbol | Name | Amount | Function |
|---|---|---|---|
| Accu. | Accumulator | 4 | Gas and liquid separator |
| BPHE | Brass plate heat exchanger | 2 | Refrigerant / water heat exchanger |
| F1, 2 | Filter | 12 | Filter |
| Service port | Service port | 11 | Refrigerant / water system service port |
| Release valve | Release valve | 4 | Safety protection |
| Drainage | Drain port | 2 | Drainage |
| Plug | Air release port | 2 | Air vent |
| EWT | Inlet water temperature | 1 | Water temperature measurement |
| MWT | Intermediate water temperature | 1 | Water temperature measurement |
| LWT | Outlet water temperature | 1 | Water temperature measurement |

# 16 Internal Structure Diagram

• Heat Pump Mode



• Dedicated for Cooling




❖ Cooling unit data is renewed the year after the cooling unit becomes available for purchase.

# 17 Optional Parts

## 17-1. Tabular List

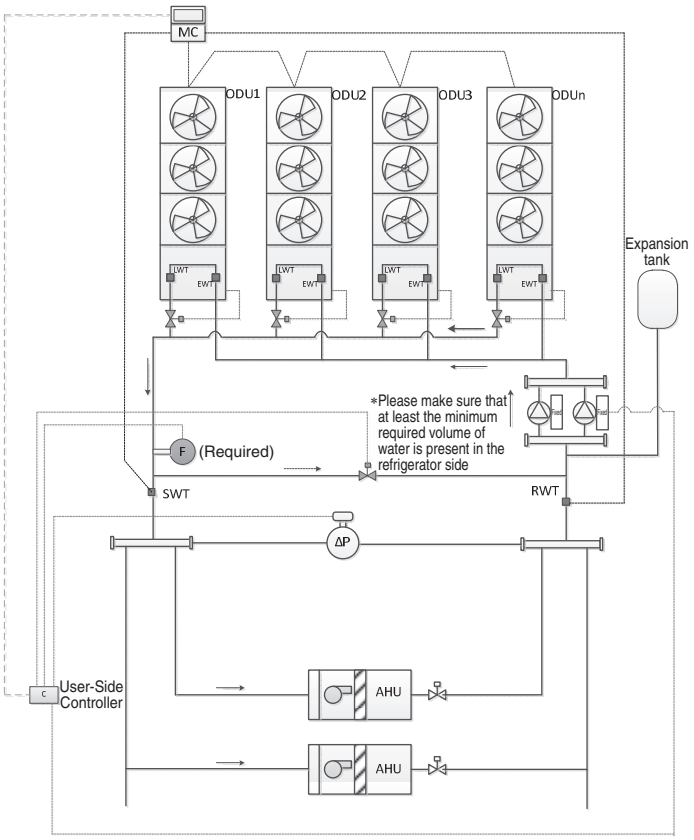
| No. | Item | Procurement | Installation | | Reference |
|---|---|---|---|---|---|
| | | | Factory | On-Site | |
| 1 | Module Controller (touch screen) | Purchase when assembling the module | | ○ | |
| | BACnet Interface[Note] | Purchase as an option when assembling the module | | ○ | |
| 2 | Externally mounted mains water circuit temperature sensor | Module Controller accessory | | ○ | |
| 3 | Differential pressure gauge | Optional part | ○ | | |
| 4 | Harmonic filter | Optional part | | ○ | |
| 5 | Connecting fitting | Module Controller accessory | | ○ | |
| 6 | Condenser coil guard | Optional part | ○ | | |
| 7 | Pump | Optional part | ○ | | |
| 8 | Compressor silencer | Optional part | ○ | | |
| 9 | Rubber pad | Optional part | | ○ | |
| 10 | Vibration damping spring | Optional part | | ○ | |
| 11 | Snow-proof hood | Optional part | | ○ | |
| 12 | Anti-salt-damage coating | Optional part | ○(domestically) | | |
| Others | Please contact us for information about optional parts. | | | | |

Note: Module Controller has unified Modbus communication protocol. Centralized facility monitoring and control systems have unified BACnet communication protocol. BACnet boards are a communication interface between the Modbus and BACnet protocols. BACnet boards are optional parts. Refer to chapter 8.5 for information regarding BACnet board installation.

# 17-2. Externally Mounted Mains Water Circuit Temperature Sensor

## 17-2-1. Mounting Position

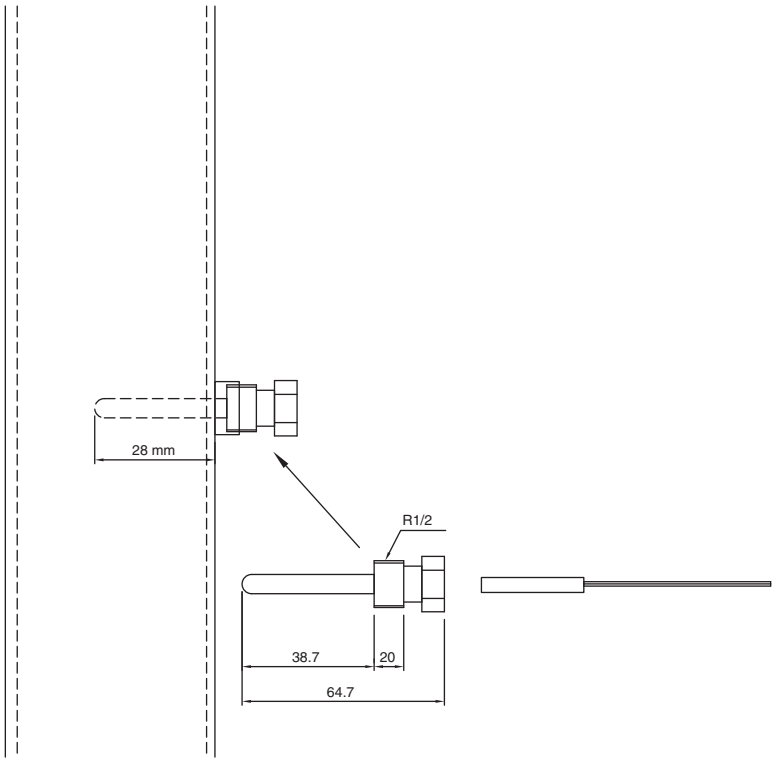
- ☐ There are two sensors for mounting externally to mains water circuits. One is SWT and the other is RWT, for mains sent water and return water respectively.
- ☐ Be sure to mount the SWT sensor between the bypass and user side AHU outgoing water pipework.
- ☐ Be sure to mount the RWT sensor between the bypass and Module Chiller return water pipework.
- ☐ Make sure the temperature sensor can achieve accurate measurements of the water temperature.



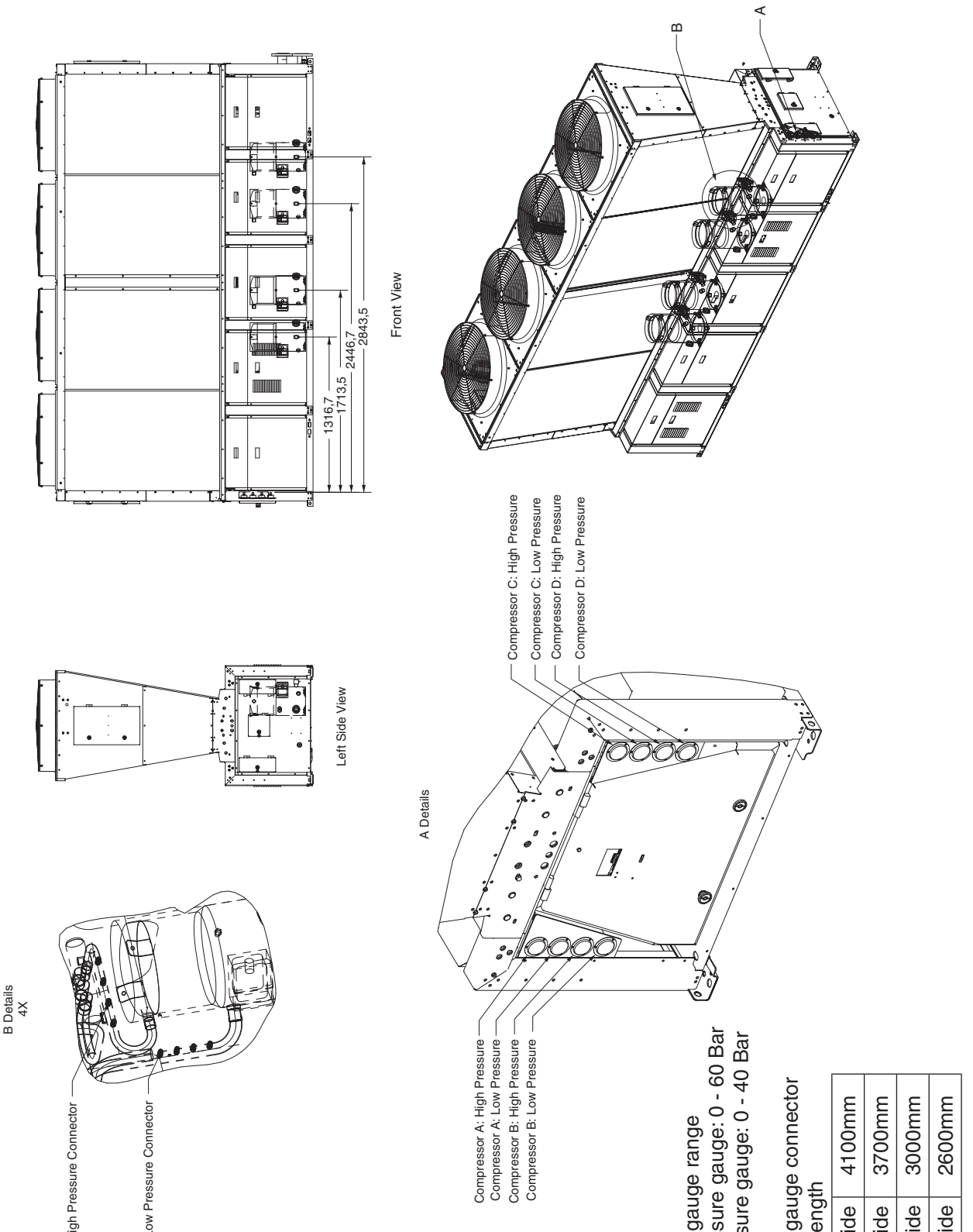
## 17-2-2. Mounting Method

4.1. Weld to a 1/2 PT welding socket on the main pipe.
4.2. Avoid placing elbows, tees or other joints near to position installed.
4.3. Wrap sealing tape around the protective pipe and screw it into the welded socket.
4.4. Insert the temperature sensitive part of the sensor deep into the protective pipe.
4.5. Tighten the screw with a waterproof clamp.
Also wrap sealing tape around the thread of the clamp.
4.6. Connect the wires to CN1 (return temperature sensor) and CN2 (outgoing temperature sensor) of the Module Controller. Use a pipe or other material to protect the wires and take appropriate noise countermeasures.

* Make sure the sensor can achieve accurate readings by installing the sensor at least 1m from the joints of bypass circuits etc.



## 17-3. Pressure Gauge Options




Note 1: Pressure gauge range
High pressure gauge: 0 - 60 Bar
Low pressure gauge: 0 - 40 Bar

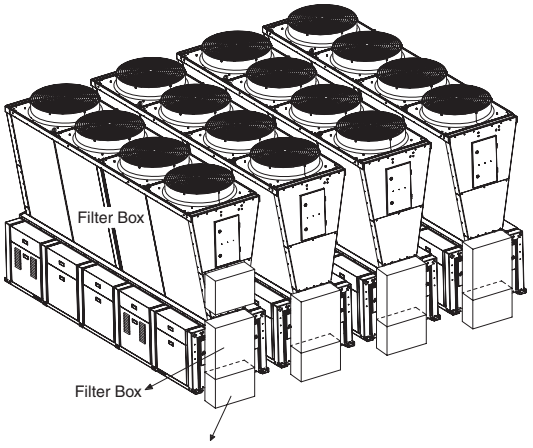
Note 2: Pressure gauge connector capillary length

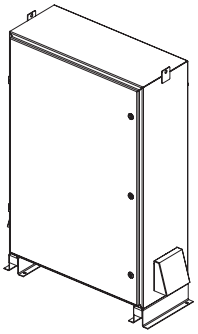
| | |
|---|---|
| Compressor A side | 4100mm |
| Compressor B side | 3700mm |
| Compressor C side | 3000mm |
| Compressor D side | 2600mm |

## 17-4. Harmonic Filter Panel

Harmonic Filter Panel 200V (optional)

1. Harmonic filter panels should be installed above the foundation at an appropriate distance in front of the unit.
2. Power supply input is located at the base of the panel.
3. The harmonic filter panel should be shipped as a separate package to the installation site.
4. All wiring and wire diameters etc. should comply with the requirements of electrical installation standards.
5. Earth wiring and connections should comply with the requirements of electrical installation standards.
6. Use an earth leakage breaker for the power supply.

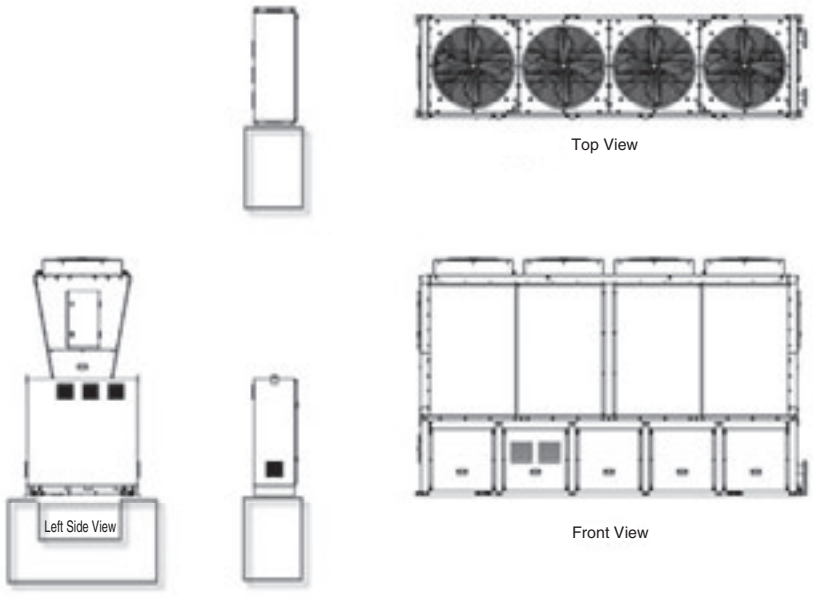


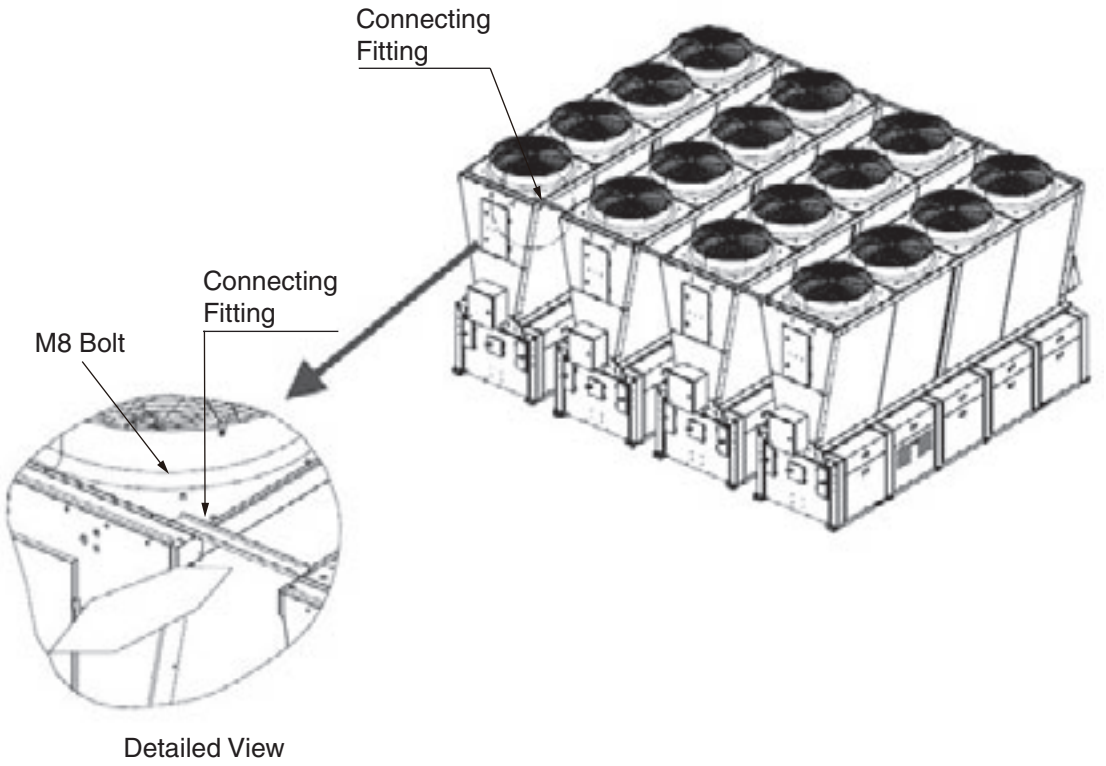
∗A filter box is located in front of each unit,
but only one unit has the Module Control Box installed.

The protective guard for the harmonic filter panel can be selected for the user side. Remember the following points when mounting the panel.

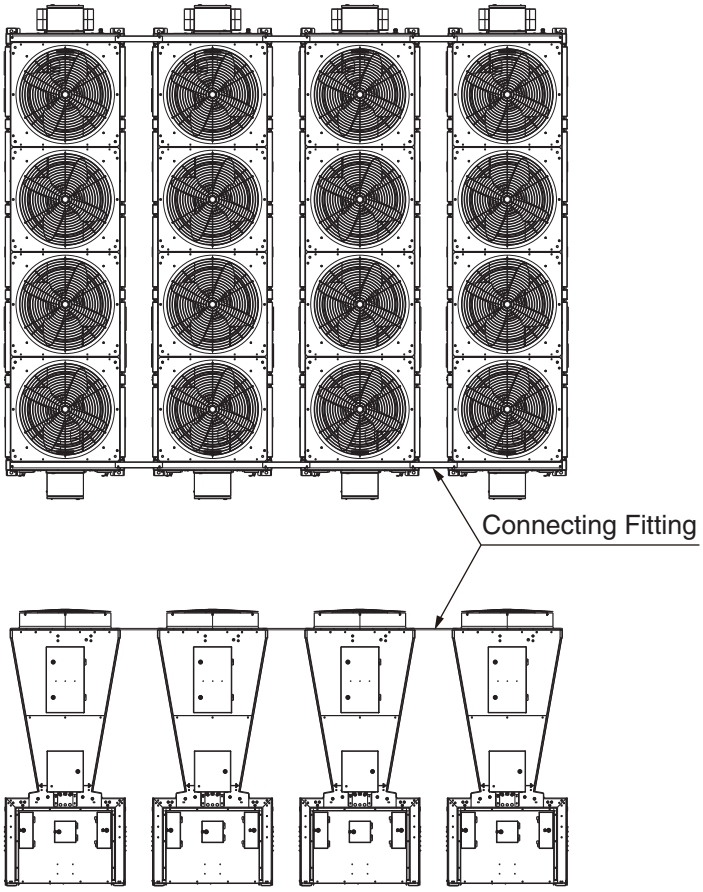
1. Foundation
   Install the panel above the foundation. The foundation shape should be in accordance with the figure below.
2. The harmonic filter panel and unit should be separated by a minimum distance of 930mm.
3. The harmonic filter panel doesn't necessarily require installation in front of the unit and can be mounted at a location suiting site requirements.



## 17-5. Connecting Fitting

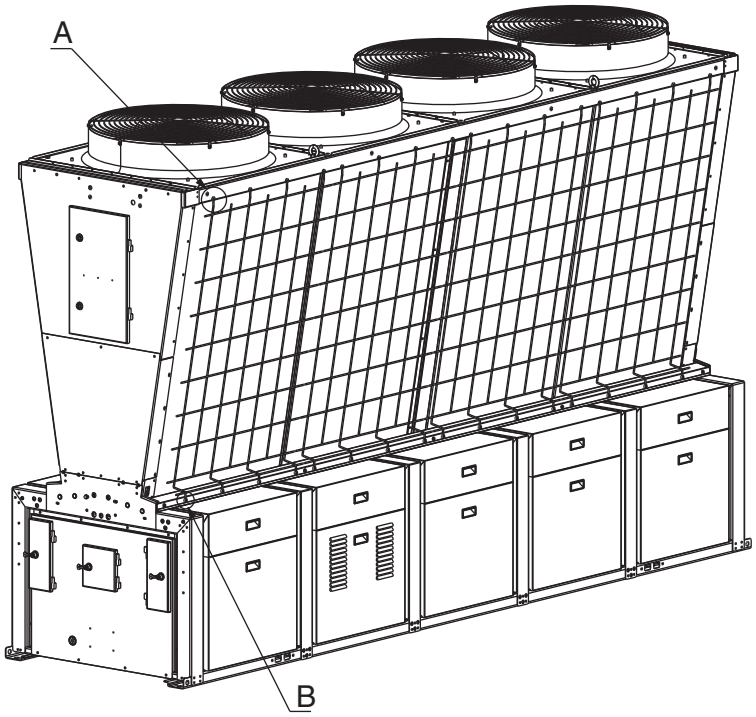



Detailed View

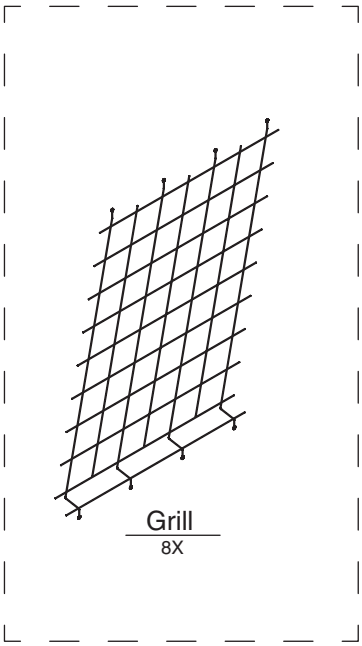



Note 1: If using a single unit then connecting fittings are not required.
Note 2: Connecting fittings are mounted with regular M8 bolts.

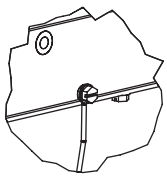
## 17-6. Coil Guard



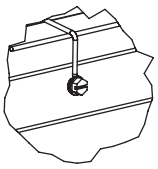

ISO Figure

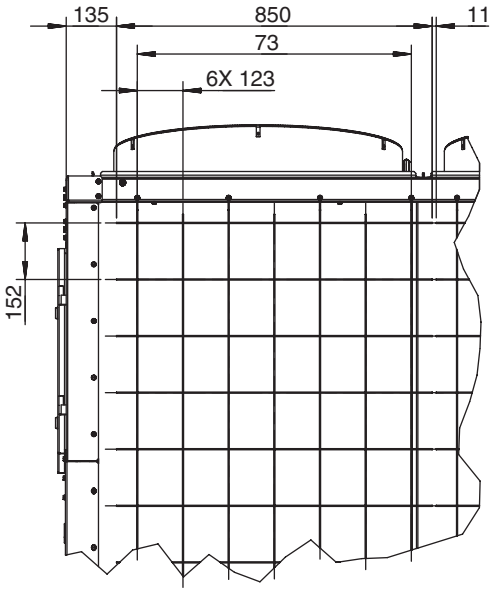



A Details
32X



B Details
32X

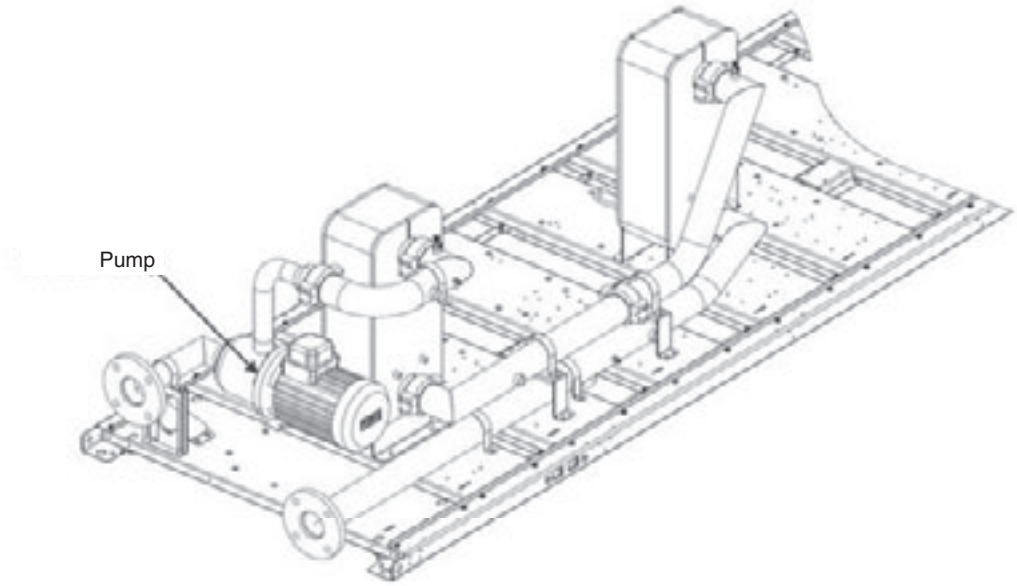





C
Typical Example

Note 1: Coil guard uses a versatile material that can be used with all types.
Note 2: Mount using M6 tapping screws. 64 are required in total.
Note 3: Guard wire is 5mm in diameter.

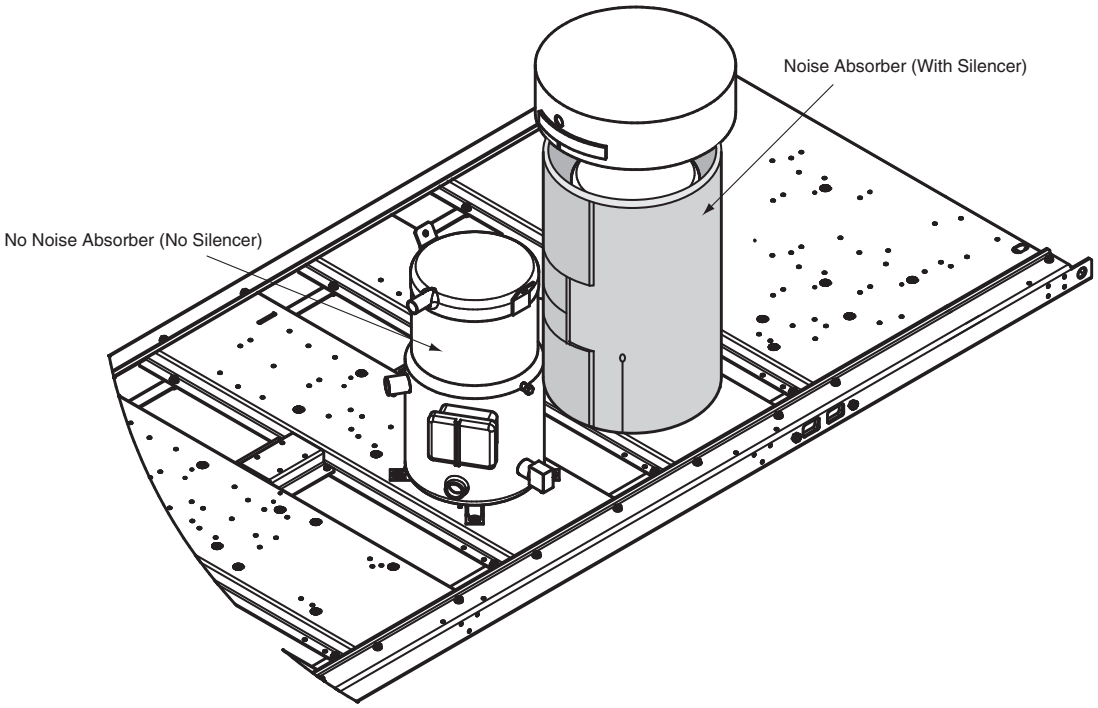
## 17-7. Pump Options




Standard type Trane Module Chillers do not contain pumps; pumps can be chosen from the optional parts to suit the application. Refer to chapter 5 for information regarding pump applications.

| Pump Option | Pump and Pump Driver | | Control Type |
|---|---|---|---|
| | CX(G)AV085 | CX(G)AV150 | |
| 0 = None | - | - | No control logic |
| 1 = Fixed speed water pump Pump - standard head | 1.5kW pump + 4kW driver | 3kW pump + 4kW driver | Driver output is 60Hz fixed |
| 2 = Fixed speed water pump Pump - high head | 3kW pump + 4kW driver | 4kW pump + 4kW driver | Driver output is 60Hz fixed |
| 3 = Variable water flow pump Pump - standard head | 1.5kW pump + 4kW driver | 3kW pump + 4kW driver | Driver output varies according to control logic |
| 4 = Variable water flow pump Pump - high head | 3kW pump + 4kW driver | 4kW pump + 4kW driver | Driver output varies according to control logic |

## 17-8. Compressor Silencer

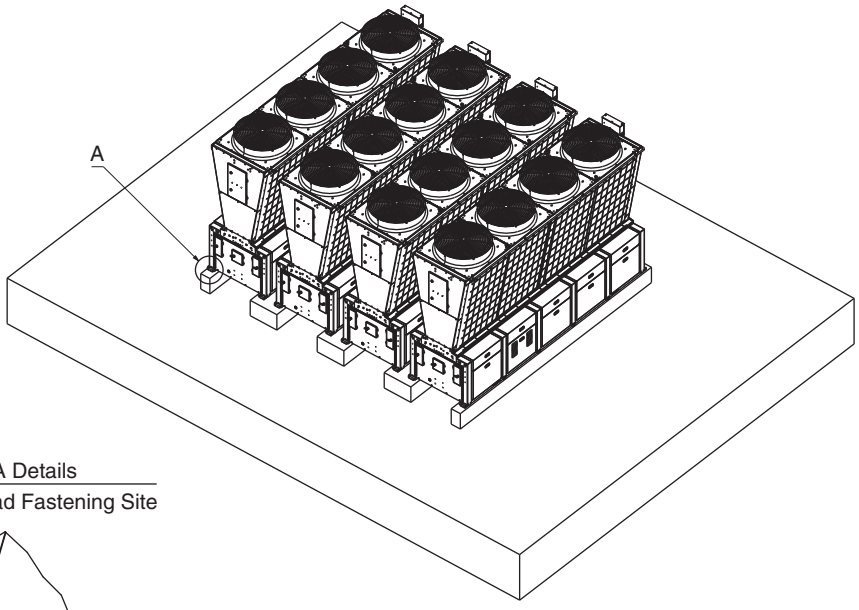


# 17-9. Rubber Pad

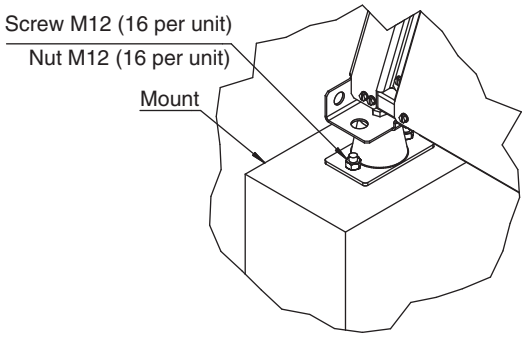
## Vibration Absorption

· Install the optional rubber pad between the fixing screws and installation foundation if vibration dampening is required.
Use a spring mount as necessary.

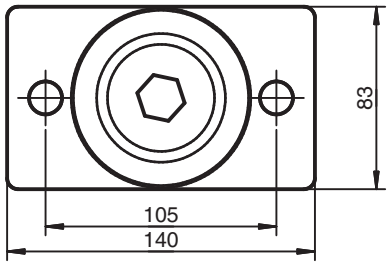
Rubber Pad Options

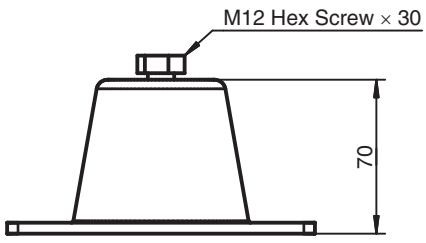



A Details
Rubber Pad Fastening Site




ISO Face
Rubber Pad Fastening Site




Rubber Pad
Details

Notes:

1. Each unit includes 8 optional rubber pads.
2. Load of each rubber pad: 240kg / 529lb
3. Deflection of each rubber pad: 10±2mm
4. Vertical stiffness of each rubber pad: 24.00k (kg/mm)

Rubber Pad Installation

· If the unit is to be installed on the roof or balcony then fix the unit above the foundation in order to attenuate noise. If the roof is not particularly sturdy, then a steel bar bracket may be used to support the unit. Refer to chapter 13 for information regarding pump applications.
· After installation, measure how level the unit is and ensure these is less than 10mm difference in level between ends.

# 18 Operation

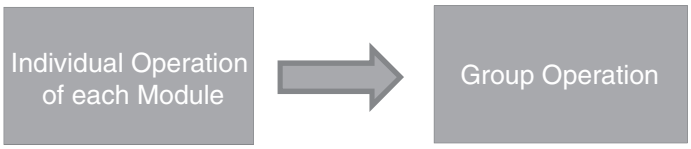
## 18-1. Test Run

Test Run

Check the following points before connecting power for the first time.
1. Do the machinery models and power supply match?
2. Do the power cables, signals cables, and dry contacts comply with the wiring diagram criteria (see chapter 9)?
3. Are all of the components required for plumbing correctly installed?
4. If operating as a group, is the temperature sensor correctly mounted on the main return water pipe and has it been connected to the Module Controller?
5. Are the addresses correctly configured on each module's OD Controller PCB (see chapter 8-2-4)?
6. Does the number of controllers displayed on the Module Controller match the actual number of controllers? If the numbers do not match, then check that the breakers for each module are ready.
7. Sufficiently fill the water system with water. Operating dry may result in damage to the pump.
8. Are the SWT/RWT temperature sensors installed correctly in their correct locations?

Test Run

The procedure for a test run is outlined below.




Note:
1. Do not use the unit outside of its predetermined range.

Single Unit
1. Climate conditions permitting, increase the load as far as possible beyond that of one unit to operate all four systems in order to confirm the unit is operating normally.
2. Press the Remote/Local button of the unit to test and set the mode to "Local".
3. Configure the operating mode and temperature.
4. Press the ON switch to begin test run mode.
5. Confirm the operating parameters of the four systems.
6. After the test run has completed, press the OFF button to stop operation.
7. Test the operation of each unit using the same method.

Group Control
1. First, try to operate as many units as possible.
   Hint
   Climate conditions permitting, increase the load as far as possible beyond 2/3 of system total load to operate nearly all of the modules in order to confirm the system is operating normally.
2. Configure the Remote/Local operating modes of each units to "Remote" to allow module loading/unloading to be controlled by the Module Controller.
3. Configure the operating mode and temperature with the Module Controller.
4. Press the "Auto" switch to begin test run mode.
5. Confirm the operating status of the entire system is normal.
6. After operation has completed, press the "Stop" button on the Module Controller to stop the system.

## 18-2. Maintenance and Inspection

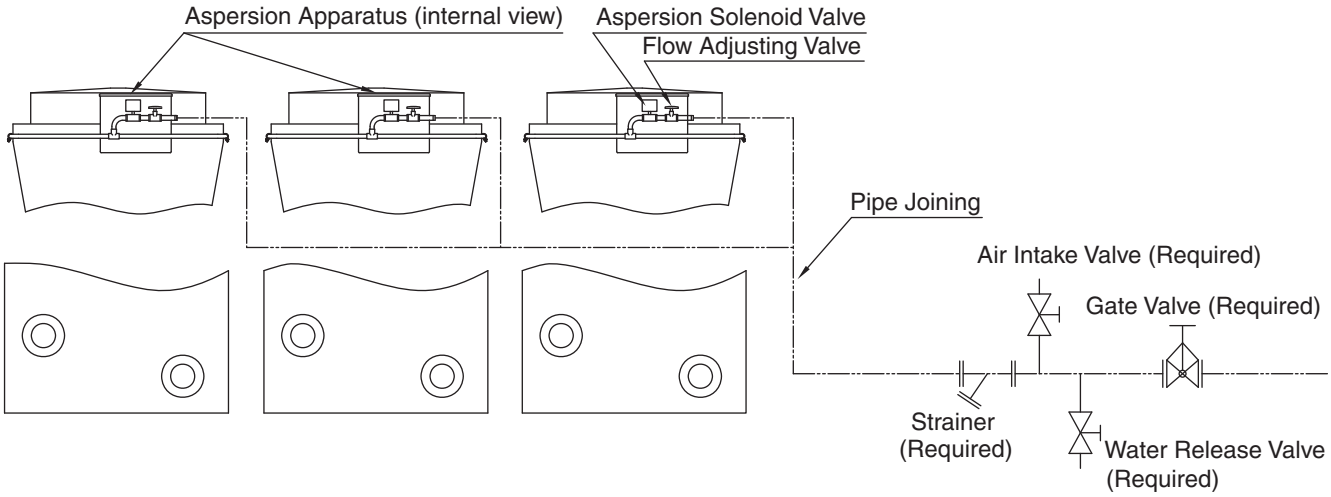
| Category | Part Name | Amount | Inspection Target | Inspection Method | Condition | Repair Method |
|---|---|---|---|---|---|---|
| General Parts | Exterior panel Frame | - | Rust | Visual | Has no severe rust | Touch-up |
| | | | Warping | Touch | Is not loose | Tightening |
| | Copper pipes | - | Cracks | Visual | Has no cracks | Replace |
| | Water pipes | - | Leakage | Visual | Has no leaks | Tightening |
| | OD coil (aspersion) | 4 | Water stain, blockages | Visual | Has no severe water stains or blockages | Clean |
| | | | Leakage | Leak tester/ Pressure reading | Has no leaks | Repair leak, replace |
| | OD coil (non-aspersion) | 4 | Water stain, blockages | Visual | Has no severe water stains or blockages | Clean |
| | | | Leakage | Leak tester/ Pressure reading | Has no leaks | Repair leak, replace |
| | BPHE (water heat exchanger) | 2 | Blockages | Check pressure drop and flow | Has no blockages | Clean |
| | Compressor | 4 | Running noise, vibrations | Listen, touch | Has no abnormal vibrations or noise | Replace |
| | | | Oil leakage | Visual | Has no oil leaks | |
| | | | Insulation | Test | Satisfies insulation requirements | |
| | | | Current | Ammeter | Has no significant increase | |
| | | | Wiring | Visual, touch | Wiring is correct, not loose | Tightening |
| | Compressor driver VFD | 4 | Wiring | Visual, touch | Wiring is correct, not loose | Replace |
| | Crank case heater | 4 | Wiring | Visual, touch | Wiring is correct, not loose | Tightening |
| | Compressor silencer (optional) | 4 | Damage | Visual | Has no damage | Replace |
| | Receiver tank with fusible plug | 4 | Leakage | Leak tester/ Pressure reading | Has no leaks | Replace |
| | | | Rust | Visual | Has no severe rust | Touch-up |
| | Accumulator | 4 | Leakage | Leak tester/ Pressure reading | Has no leaks | Replace |
| | | | Rust | Visual | Has no severe rust | Touch-up |
| Valve | Reversing valve | 4 | Confirm action | Listen, touch | Operates normally | Replace |
| | Electronic expansion valve | 8 | Confirm action | Listen, touch | Operates normally | Replace |
| | Relief valve | 4 | External inspection | Visual | Has no damage | Replace |
| Sensor | Low pressure transducer | 4 | Reading | Pressure calibrator | Reading within tolerance | Replace |
| | High pressure transducer | 4 | Reading | Pressure calibrator | Reading within tolerance | Replace |
| | High pressure switch | 4 | Wiring | Visual, touch | Wiring not loose | Replace |
| | Temperature detection transducer | 20 | Reading | Temperature calibrator | Reading within tolerance | Replace |
| Fan System | OD fan blade | 4 | External inspection | Visual, touch | Has no damage or cracks | Replace |
| | OD fan motor | 4 | Noise, vibrations, action | Visual, listen, rev. counter | Has no abnormal vibrations or noise, normal rotation speed. | Replace |
| | | | Insulation | Test | Satisfies insulation requirements | |
| | | | Current | Ammeter | Has no significant increase | |
| | OD fan driver | 4 | Wiring | Visual, touch | Wiring is correct, not loose | Replace |
| Pump | Pump (optional) | 1 | Noise, vibrations, action | Visual, listen, rev. counter | Has no abnormal vibrations or noise, normal rotation speed. | Replace |
| | | | Insulation | Test | Satisfies insulation requirements | |
| | | | Current | Ammeter | Has no significant increase | |
| | Pump driver (VFD) | 1 | Wiring | Visual, touch | Wiring is correct, not loose | Replace |
| Aspersion | Aspersion nozzle (optional) | 24 | Leakage | Visual | Has no leaks | Replace |
| | | | Aspersion function | Aspersion test | Has no blockages | |

## 18-3. Aspersion Device (optional)

Using Aspersion Devices

1. Aspersion devices operate when the compressor output is greater than or equal to the starting capacity, the condensation pressure reaches or exceeds the configured value, and the atmospheric temperature is higher than the starting temperature.
   The aspersion function can be [Enabled] or [Disabled] using buttons on the Unit Controller, so select [Disabled] if you do not want to use this function.

Aspersion Specifications
Aspersion Rate: 13.3 L/min, Aspersion Pressure: 0.2 MPa
Connection: R3/4 (male)



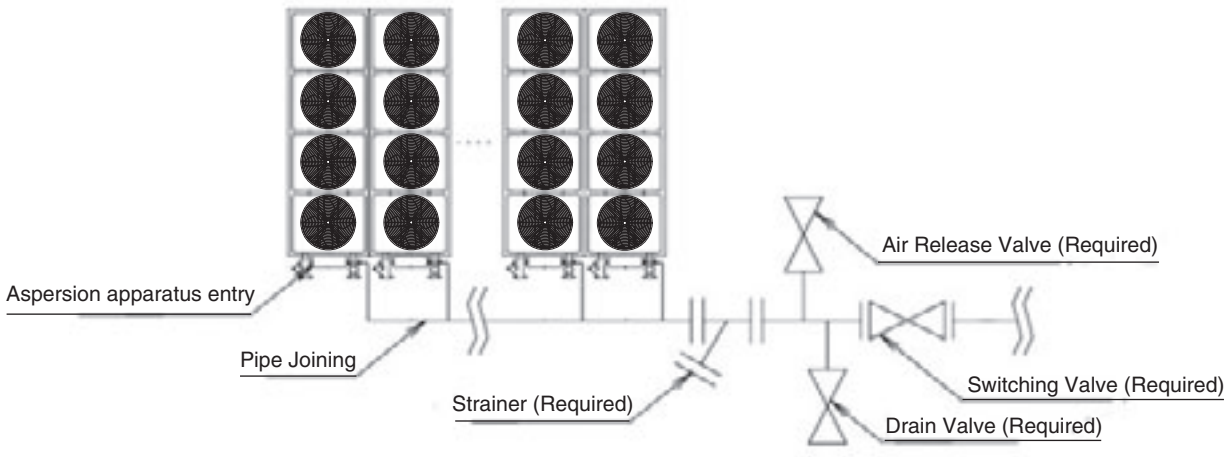

∗Pipework, valves and strainers leading to the aspersion apparatus are not under our control.
∗Use a strainer to prevent the aspersion spray nozzle from clogging.
∗Use a strainer with a mesh of 50 or so.
∗Water quality standards and guidelines for aspersion supply are outlined in "Refrigeration and Air Conditioning Equipment Water Quality Guides" issued by the Japan Air Conditioning and Refrigeration Industry Association
Be sure to use cooling water with transient flow and quality that meet these standards.

Air Heat Exchanger Aspersion Device Specifications

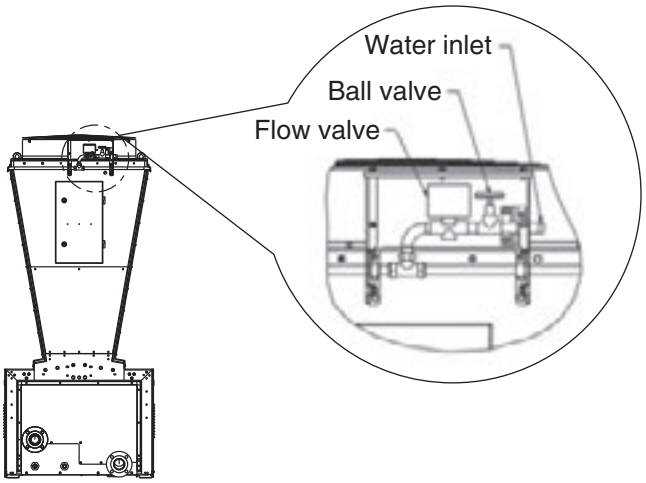
| | |
|---|---|
| Spray volume (L/min) | 13.3 (data from 1 unit) |
| Water supply pressure (MPa) | 0.2 |
| Water temperature range (°C) | 10 to 30 |
| Control method | Compressor output greater than or equal to starting capacity<br>Condensation pressure reaches or exceeds configured value<br>Atmospheric temperature higher than start temperature |

2. Use a 50 mesh strainer on the parent water pipe (as per the figure below) to prevent the nozzle from clogging.

Piping Example

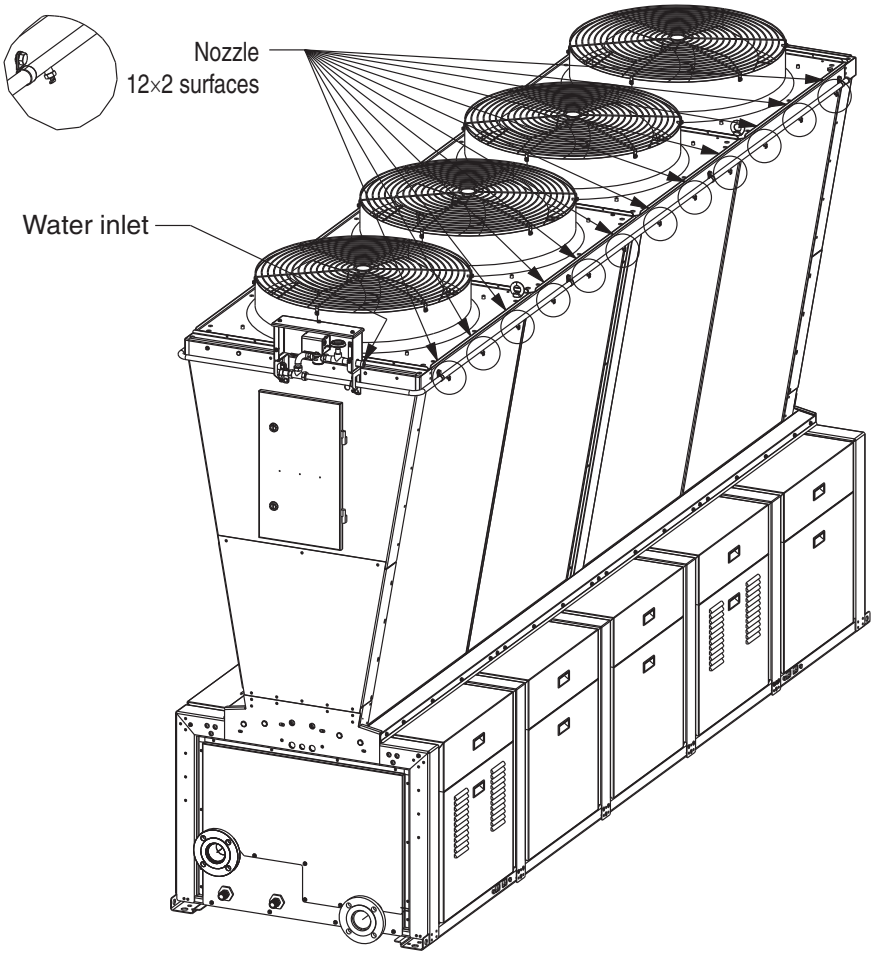


3. Adjust the ball valve of each unit such that the water supply pressure and aspersion volume match the required values. If the supply pressure cannot reach the required value, then installation of a pressurizing pump may be required (arranged on site).




4. If the supply pressure is too high, then a pressure-reducing valve or relief valve (arranged on site) can be installed to modify the pressure.
5. If vibrations or leaks occur due to water hammer, then mount a water hammer suppressor (arranged on-site) close to the aspersion device.
6. If the aspersion on surfaces of the air heat exchanger is uneven, then the nozzle may be clogged. Remove the nozzle with a wrench as per the figure below and clean or replace it.

Aspersion Device Structure

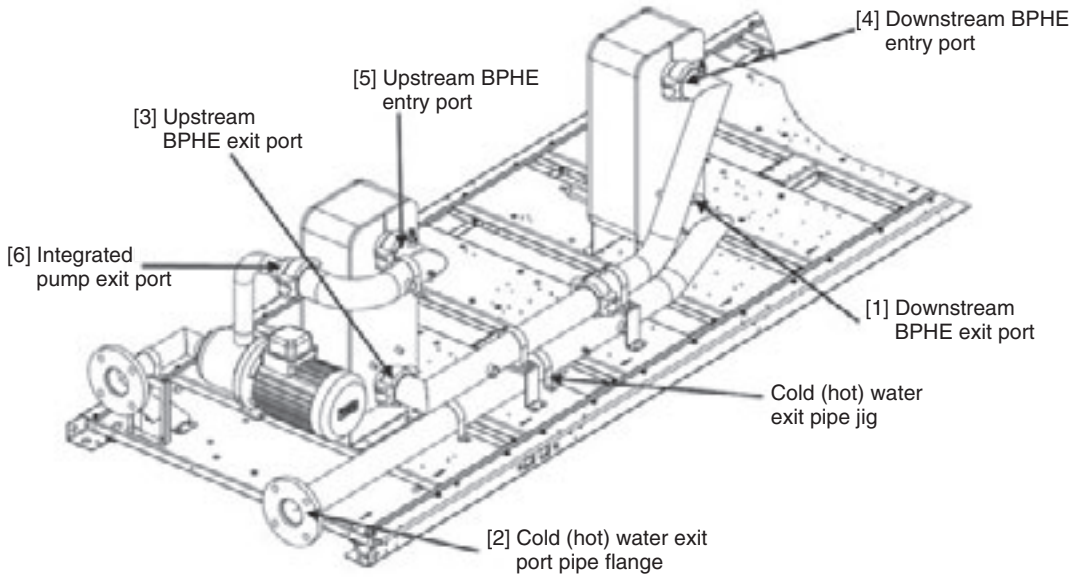



After cleaning, check that there is no leakage and operation is normal.

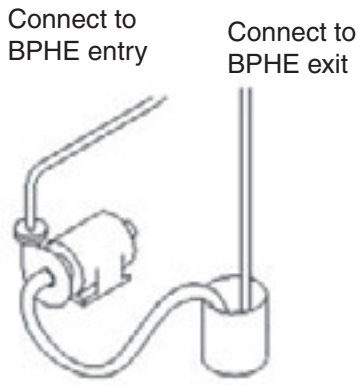
## 18-4. Brazing Plate Heat Exchanger (BPHE) Cleaning

Follow the steps in this chapter in order to clean the Brazing Plate Heat Exchanger (BPHE).
***Note:*** *If the difference in cooling mode outlet temperature and evaporation temperature, or the difference in heating mode outlet temperature and condensation temperature is 9°C or more, then we recommend cleaning the Brazing Plate Heat Exchanger.*

1. Close the water inlet and outlet valves to the unit in order to prevent water penetrating inside.
2. Use a drain plug on the water drain (see chapter 14)
3. After the water has drained, remove the BPHE water entry ( [5] in figure) and exit ([1] in figure) pipes.




4. Connect the cleaning system to the BPHE.



5. Use the cleaning system circulating pump to circulate cleaning solution through the BPHE for 10 minutes.

***Important:*** *Check that the pipes are full of water and air has been removed before applying power to the circulation pump.*

6. Prepare a 5 - 10% solution of acid compound cleaner to a volume 1.5 times greater than the BPHE volume.

***Important:*** *Do not expose the pump to the cleaning solution. Doing so will shorten the lifetime of the pump.*

| Unit Model | BPHE Water Volume (L) |
|---|---|
| CX(G)AV085 | 7 |
| CX(G)AV150 | 7 |

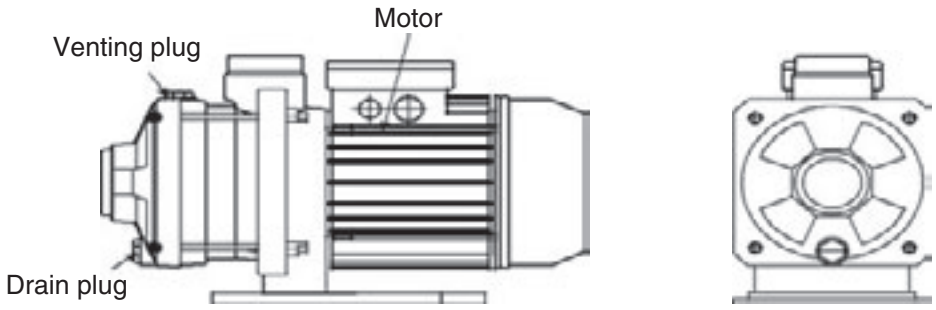
7. Use the cleaning system circulating pump to circulate cleaning solution (1.5 times BPHE volume) through the BPHE. Continue to circulate the solution until the BPHE is sufficiently clean. Stop the pump during the washing cycle and check how clean the BPHE is. Cleaning is usually completed within 1 hour.
8. Use the cleaning system circulating pump to circulate clean water through the BPHE for five minutes to wash out the cleaning solution.
9. To prevent rust from forming while cleaning, circulate a 3 - 5% solution of passivating agent through the BPHE for 30 minutes. Use a solution of volume 1.5 times that of the BPHE.

## 18-5. Long-Term Disuse

If the indoor equipment or unit will be out of use for a long period of time, follow the steps below to drain the system to prevent freezing/freeze-related damage.

1. Close the auxiliary water supply valve.
2. Open the water supply circuit exhaust valve.
3. Remove the panel without intake louvers and pull the drainage plug from the bottom of the pump. Check that the circulation water has completely drained.

***Note:*** *If draining during winter, then open all evaporator water supply valves. Open the drainage valve and exhaust valve of the unit pipeline and drain the fluid from the evaporator. Re-attach the drain plug. If the water in the cool water pipes cannot be drained completely, then fill the pipeline with an appropriate anti-freeze solution to prevent the remaining water from freezing. Failure to do so may result in damage to the unit. Consult your sales representative when purchasing anti-freeze and do not allow the system or pipelines to corrode.*




4. After the circulated water has completely drained from the system, cut the power to the unit and indoor equipment.

# 18-6. Maintenance

- Before starting the heat pump unit in the winter, turn on the main power supply and allow the crank case heater to stay connected for at least 24 hours before starting the compressor.
- If the heat pump unit will not be used in the winter, leave the main power supply connected in order to prevent freezing. The unit has embedded control logic for monitoring atmospheric, input water, and return temperatures that allow the pump and cooling system to operate and prevent the unit interior from freezing.
- Wash the Y-shaped strainer for the water system frequently.
- Take care to ensure that the air release valve and auxiliary water supply valve are functioning correctly.

Take one of the following actions if the cooling unit is not to be used in the winter.

- Drain all fluid from the water circuit and Brazing Plate Heat Exchanger.
- Fill the water circuit with anti-freeze.

If you intend to operate the heat pump unit in the winter, then leave the main power supply connected in order to prevent freezing.

# 18-7. Troubleshooting

## 18-7-1. Troubleshooting the Water System

- If the resistance of the water system is too high (pipework is too long or pipe diameter is too small), then the specified amount of water may not flow.
- Air has not been completely removed. The cause may be an improperly functioning air release valve. There may also be a problem with the location of the air release valve.
- Strainer has clogged due to impurities.
- Plate heat exchanger has clogged due to impurities.
- Pipe valve port or diameter is too small (especially with PVC piping).

## 18-7-2. Troubleshooting Codes

| Abnormality | Display | Symptom | Recovery Method | Possible Cause | Action |
|---|---|---|---|---|---|
| Module outgoing water temperature Sensor error | M01 | Complete system stoppage | Manual | 1. Faulty connections<br>2. Sensor failure<br>3. Circuit PCB failure | 1. Repair faulty connections<br>2. Replace sensor<br>3. Replace PCB |
| Module return water temperature Sensor error | M02 | Complete system stoppage | Manual | | |
| Communication with Module Controller failed | C10 | Equipment stoppage | Manual | 1. Faulty connections<br>2. Cut wires<br>3. PCB failure | 1. Repair faulty connections<br>2. Replace cables<br>3. Replace PCB |
| EWT sensor abnormality | F01 | Equipment stoppage | Manual | 1. Faulty connections<br>2. Sensor failure<br>3. Main control PCB failure | 1. Repair faulty connections<br>2. Replace sensor<br>3. Replace main control PCB |
| MWT sensor abnormality | F03 | | | | |
| LWT sensor abnormality | F02 | | | | |
| Tamb sensor abnormality | F10 | | | | |
| Output water temperature low when cooling | LLWT | Equipment stoppage | Auto → Manual | 1. Water flow volume too low<br>2. Water volume too low<br>3. LWT, MWT or EWT sensor incorrect connection position<br>4. LWT sensor abnormality<br>5. PCB failure | 1. Check water flow volume<br>2. Increase volume of water in system<br>3. Fix sensor position<br>4. Replace sensor<br>5. Replace PCB |
| Pump overload | E11 | Equipment stoppage | Manual | 1. Faulty pump selection<br>2. Problem with pump motor | 1. Re-select pump<br>2. Replace pump |
| Pump driver abnormality | E12 | Equipment stoppage | Manual | 1. Pump driver failure<br>2. Main control PCB failure | 1. Replace pump driver<br>2. Replace PCB |
| Flow switch warning | E10 | Equipment stoppage | Auto → Manual | 1. Water flow volume too low<br>2. Faulty flow switch selection<br>3. Imbalanced water system<br>4. Flow switch failure<br>5. Main control PCB failure | 1. Check water flow volume<br>2. Re-select flow switch<br>3. Check water system design<br>4. Replace flow switch<br>5. Replace PCB |
| Communication error between UC and pump driver | C05 | Equipment stoppage | Manual | 1. Faulty connections<br>2. Cut cables<br>3. PCB failure | 1. Repair faulty connections<br>2. Replace cables<br>3. Replace PCB |
| Communication error between UC and CC | C01 | Equipment stoppage | Manual | 1. Faulty connections<br>2. Cut cables<br>3. PCB failure | 1. Repair faulty connections<br>2. Replace cables<br>3. Replace PCB |

| Abnormality | Display for Each Circuit | | | | Symptom | Recovery Method | Possible Cause | Action |
|---|---|---|---|---|---|---|---|---|
| | A | B | C | D | | | | |
| High pressure sensor abnormality | F11A | F11B | F11C | F11D | Equipment stoppage | Manual | 1. Faulty connections<br>2. Sensor failure<br>3. Circuit PCB failure | 1. Repair faulty connections<br>2. Replace sensor<br>3. Replace PCB |
| Low pressure sensor abnormality | F12A | F12B | F12C | F12D | Equipment stoppage | Manual | | |
| Ejection temperature sensor abnormality | F06A | F06B | F06C | F06D | Equipment stoppage | Manual | | |
| Intake temperature sensor abnormality | F07A | F07B | F07C | F07D | Equipment stoppage | Manual | | |
| Tgas 1 sensor abnormality | F08A | F08B | F08C | F08D | Equipment stoppage | Manual | | |
| Tgas 2 sensor abnormality | F09A | F09B | F09C | F09D | Equipment stoppage | Manual | | |
| Ejection temperature abnormality | E04A | E04B | E04C | E04D | Equipment stoppage | Manual | 1. Not enough refrigerant<br>2. Compressor failure<br>3. Sensor failure<br>4. Circuit PCB failure | 1. Add more refrigerant<br>2. Replace compressor<br>3. Replace sensor<br>4. Replace PCB |
| High pressure lock | E05A | E05B | E05C | E05D | Equipment stoppage | Manual | 1. Fan motor failure<br>2. Coil blocked or dirty<br>3. Ambient temperature too high<br>4. Shorted airflow<br>5. Electronic expansion valve failure<br>6. System blocked<br>7. PCB failure<br>8. Sensor failure | 1. Replace motor<br>2. Clean coils<br>3. Avoid use in environments exceeding the ambient temperature range<br>4. Avoid short-circuiting the airflow<br>5. Replace electronic expansion valve<br>6. Clear system blockage<br>7. Replace PCB<br>8. Replace sensor |
| Low pressure lock | E06A | E06B | E06C | E06D | Equipment stoppage | Manual | 1. Not enough refrigerant<br>2. Ambient temperature too low in heating mode<br>3. Fan motor failure in heating mode<br>4. Electronic expansion valve failure<br>5. Sensor failure<br>6. PCB failure | 1. Add more refrigerant<br>2. Avoid using the refrigerator in environments colder than the lower temperature limit<br>3. Replace fan motor<br>4. Replace electronic expansion valve<br>5. Replace sensor<br>6. Replace PCB |
| High pressure switch abnormality | E13A | E13B | E13C | E13D | Equipment stoppage | Manual | 1. Fan motor abnormality<br>2. Coil blocked or dirty<br>3. Ambient temperature too high<br>4. Short-circuited airflow<br>5. EXV failure<br>6. Internal system blockage<br>7. PCB failure<br>8. Pressure switch failure | 1. Replace motor<br>2. Remove coils<br>3. Avoid use in environments outside of valid temperature range.<br>4. Avoid short-circuiting the airflow.<br>5. Replace EXV<br>6. Clear internal system blockage.<br>7. Replace PCB<br>8. Replace pressure switch. |
| Compressor driver failure | CP01 | CP02 | CP03 | CP04 | Equipment stoppage | Manual | 1. Unstable input voltage<br>2. Problem with other power supply<br>3. Problem with driver | 1. Connect a correct power supply<br>2. Check wiring connections<br>3. Replace driver |
| Fan driver failure | FD01 | FD02 | FD02 | FD04 | Equipment stoppage | Manual | 1. Problem with power supply<br>2. Motor overloaded<br>3. Driver failure | 1. Check power supply<br>2. Replace motor<br>3. Replace driver |
| Communication error between CC and pump driver | C02A | C02B | C02C | C02D | Equipment stoppage | Manual | 1. Faulty connections<br>2. Cut cables<br>3. PCB failure | 1. Repair faulty connections<br>2. Replace cables<br>3. Replace PCB |
| Communication error between CC and fan driver | C03A | C03B | C03C | C03D | Equipment stoppage | Manual | 1. Faulty connections<br>2. Cut cables<br>3. PCB failure | 1. Repair faulty connections<br>2. Replace cables<br>3. Replace PCB |
| LRTC protection when cooling | E07A | E07B | E07C | E07D | Equipment stoppage | Manual | 1. Not enough refrigerant<br>2. Electronic expansion valve failure<br>3. Sensor failure<br>4. PCB failure | 1. Add more refrigerant<br>2. Replace electronic expansion valve<br>3. Replace sensor<br>4. Replace PCB |
| Compressor start-up abnormality | E08A | E08B | E08C | E08D | Equipment stoppage | Manual | 1. Harmonic filter abnormality<br>2. Faulty wiring | 1. Inspect the harmonic filter<br>2. Repair faulty wiring |
| Compressor mains power abnormality | E36A | E36B | E36C | E36D | Equipment stoppage | Manual | 1. Problem with power supply | 1. Fix the problem with power supply. |

## 18-8. High Pressure Gas Safety Act

In order to prevent disasters caused by high pressure gas, the High Pressure Gas Safety Act restricts the manufacturing, storage, sale, import, export, transport, consumption, and disposal etc. of high pressure gas, as well as promoting voluntary safety measures taken by private operators and the High Pressure Gas Safety Institute, for the purpose of ensuring public safety. If any of the classifications in the table below apply, you are required to submit a "High Pressure Gas Production Notification" or a "High Pressure Gas License Application" to your local governing body.
If you fall under category 1, you are required to submit applications and notifications relating to harm prevention regulations and safety education. If you fall under category 2, safety education is required.

| Category | Procedures | Procedure Description |
|---|---|---|
| Statutory cooling capacity<br>20 tons or more but less than 50 tons<br>(Category 2 production) | Notification | 20 days before commencing operation, the operator must fill in the "High Pressure Gas Production Notification" included with the product and submit it to the local governing body. |
| Statutory cooling capacity<br>50 tons or more<br>(Category 1 production) | License application | Refer to the High Pressure Gas Safety Act License application form.<br>(Category 1 producer) |

This heat source has independent refrigerant circuitry structure within each module as shown in the table below and is a single-installation chiller with statutory cooling capacity of less than 20 tons. Accordingly, such "Notifications" or "Applications" are not required. However, please take note of the following points.

If using water pipework that is also used for refrigeration facilities with a statutory cooling capacity of 50 tons or more (category 1 production), then a Producer License application may be required.

| Connected number of units | Statutory cooling capacity [Ton] | |
|---|---|---|
| | CX(G)AV085 | CX(G)AV150 |
| 1 | 10.62 | 16.64 |
| 2 | 10.62 × 2 | 16.64 × 2 |
| 3 | 10.62 × 3 | 16.64 × 3 |
| 4 | 10.62 × 4 | 16.64 × 4 |
| 5 | 10.62 × 5 | 16.64 × 5 |
| 6 | 10.62 × 6 | 16.64 × 6 |
| 7 | 10.62 × 7 | 16.64 × 7 |
| 8 | 10.62 × 8 | 16.64 × 8 |
| 9 | 10.62 × 9 | 16.64 × 9 |
| 10 | 10.62 × 10 | 16.64 × 10 |
| 11 | 10.62 × 11 | 16.64 × 11 |
| 12 | 10.62 × 12 | 16.64 × 12 |
| 13 | 10.62 × 13 | 16.64 × 13 |
| 14 | 10.62 × 14 | 16.64 × 14 |
| 15 | 10.62 × 15 | 16.64 × 15 |
| 16 | 10.62 × 16 | 16.64 × 16 |
| 17 | 10.62 × 17 | 16.64 × 17 |
| 18 | 10.62 × 18 | 16.64 × 18 |
| 19 | 10.62 × 19 | 16.64 × 19 |
| 20 | 10.62 × 20 | 16.64 × 20 |
| | | |

## 18-9. Water Quality Management

Brazing plate type water heat exchangers cannot be disassembled for cleaning or replacement of parts. Pay careful attention to the quality of water used by the water heat exchanger in order to prevent adhesion of water stains or corrosion.
The water quality of water used by the water heat exchanger should comply with the Japanese Refrigeration and Air Conditioning Association's Air Conditioning Equipment Water Quality guidelines (JRA-GL-02-1994).
If using rust inhibitors and anti-scale agents, be sure to use types that do not corrode cast iron, stainless steel, copper, bronze, rubber or gaskets.

E.g. (Hot) Water / Auxiliary Water Quality Standard Values

| | Criterion (1)(6) | Cooling Systems | | | Cold Water System | | Hot Water Systems(3) | | | | Tendency | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Circulatory Water | | Transient Water | | | Low Position Hot Water Systems | | High Position Hot Water Systems | | | |
| | | Circulatory Water | Auxiliary Water | Transient Water | Circulatory Water [20°C or less] | Auxiliary Water | Circulatory Water [20 - 60°C] | Auxiliary Water | Circulatory Water [60 - 90°C] | Auxiliary Water | Corrosion | Scale Form |
| Standard Criteria | pH (25°C) | 6.5 - 8.2 | 6.0 - 8.0 | 6.8 - 8.0 | 6.8 - 8.0 | 6.8 - 8.0 | 7.0 - 8.0 | 7.0 - 8.0 | 7.0 - 8.0 | 7.0 - 8.0 | Yes | Yes |
| | Electrical Conductivity | ≤ 80<br>≤ 800 | ≤ 30<br>≤ 300 | ≤ 40<br>≤ 400 | ≤ 40<br>≤ 400 | ≤ 30<br>≤ 300 | ≤ 30<br>≤ 300 | ≤ 30<br>≤ 300 | ≤ 30<br>≤ 300 | ≤ 30<br>≤ 300 | Yes | Yes |
| | Chloride Ions | ≤ 200 | ≤ 50 | ≤ 50 | ≤ 50 | ≤ 50 | ≤ 50 | ≤ 50 | ≤ 30 | ≤ 30 | Yes | |
| | Sulfide Ions | ≤ 200 | ≤ 50 | ≤ 50 | ≤ 50 | ≤ 50 | ≤ 50 | ≤ 50 | ≤ 30 | ≤ 30 | Yes | |
| | Alkalinity | ≤ 100 | ≤ 50 | ≤ 50 | ≤ 50 | ≤ 50 | ≤ 50 | ≤ 50 | ≤ 50 | ≤ 50 | | Yes |
| | Total Hardness | ≤ 200 | ≤ 70 | ≤ 70 | ≤ 70 | ≤ 70 | ≤ 70 | ≤ 70 | ≤ 70 | ≤ 70 | | Yes |
| | Calcium Hardness | ≤ 150 | ≤ 50 | ≤ 50 | ≤ 50 | ≤ 50 | ≤ 50 | ≤ 50 | ≤ 50 | ≤ 50 | | Yes |
| | Ionized Silica | ≤ 50 | ≤ 30 | ≤ 30 | ≤ 30 | ≤ 30 | ≤ 30 | ≤ 30 | ≤ 30 | ≤ 30 | | Yes |
| Reference Criteria | Iron | ≤ 1.0 | ≤ 0.3 | ≤ 1.0 | ≤ 1.0 | ≤ 0.3 | ≤ 1.0 | ≤ 0.3 | ≤ 1.0 | ≤ 0.3 | Yes | Yes |
| | Copper | ≤ 0.3 | ≤ 0.1 | ≤ 1.0 | ≤ 1.0 | ≤ 0.1 | ≤ 1.0 | ≤ 0.1 | ≤ 1.0 | ≤ 0.1 | Yes | |
| | Iodide Ions | Not Det. | Not Det. | Not Det. | Not Det. | Not Det. | Not Det. | Not Det. | Not Det. | Not Det. | Yes | |
| | Ammonium Ions | ≤ 1.0 | ≤ 0.1 | ≤ 1.0 | ≤ 1.0 | ≤ 0.1 | ≤ 0.3 | ≤ 0.1 | ≤ 0.1 | ≤ 0.1 | Yes | |
| | Residual Chlorine | ≤ 0.3 | ≤ 0.3 | ≤ 0.3 | ≤ 0.3 | ≤ 0.3 | ≤ 0.25 | ≤ 0.3 | ≤ 0.1 | ≤ 0.3 | Yes | |
| | Free Carbon | ≤ 4.0 | ≤ 4.0 | ≤ 4.0 | ≤ 4.0 | ≤ 4.0 | ≤ 0.4 | ≤ 4.0 | ≤ 0.4 | ≤ 4.0 | Yes | |
| | Stability Index | 6.0 - 7.0 | - | - | - | - | - | - | - | - | Yes | Yes |

Note: (1) Criteria names, definitions and units are those of JIS K 0101. However, units or values inside of { } are conventional units so have been included for reference purposes.
(2) The "Yes" indication implies that these could be a cause of corrosion or scale formation.
(3) If the temperature is high (above 40°C) then corrosion may be significant. In particular, when steel materials without any protective coating are allowed to come in direct contact with water, add anti-corrosion agents and take anti-corrosion measures such as degassing.
(4) Water systems that use a sealed cooling tower have water quality standards according to hot water systems for closed circuit circulation water and its auxiliary water and to circulatory cooling systems for water spray and its auxiliary water.
(5) Outgoing water and auxiliary water sources are tap water, factory water or underground water, excluding purified water, irrigation water and softened water.
(6) The above 15 items are typical causes of corrosion and scale damage.
∗For details see the Japanese Refrigeration and Air Conditioning Association's Air Conditioning Equipment Water Quality guidelines (JRA-GL-02-1994).

## 18-10. Warranty and After-Service

Warranty Information

(1) Standard Warranty and Service

1. Warranty Period
   1 year from first test run or 18 months from shipping, whichever is the earlier.
2. Test run of machinery is to be completed within 3 months of delivery to the installation site.
3. Standard Coverage during Warranty Period
   1) 1 maintenance inspection 3 months after test run (optional)
   2) Operation instruction (1 time, 4 hours) (optional)
   3) Provision of parts and repair work based on calls to customer service
      • If parts to be provided are not in stock, standard delivery dates will apply
      • Repair work provided is limited to within our standard working hours (9:00 - 17:00).
   4) Provision of technical advice based on calls to customer service
4. Standard Coverage after Warranty Period Completion
   1) Provision of technical advice within our standard office hours (9:00 - 17:00) based on calls to customer service
   2) Proposal to customers of our multiple-year contract extension and maintenance contract options
   3) Provision of repair quotes based on chiller's operating condition

(2) Items not included in the "Standard Warranty and Service" above.

1. We accept no responsibility for defects resulting from improper operation, use, or repairs of equipment by the customer, tenant, or third party contractor. We also accept no responsibility for losses (including loss of profits) and will not be held responsible for any direct, indirect, or secondary damage. Any repairs or replacements required resulting from the actions above, including emergency repair services, will incur applicable fees.
   Our responsibility is limited to the repair of equipment and replacement of parts.
2. Services of all contracts, other than the Emergency Servicing contact, are to be conducted within our standard working hours. Repair work provided outside of our standard working hours at the request of a customer is subject to our standard after-hours rate.
3. Addition or subtraction of service items will not invalidate the contract but will be handled with corresponding price alterations.
4. We allow the customer to access the equipment for the purposes of servicing operations by us and such actions are covered by the warranty.