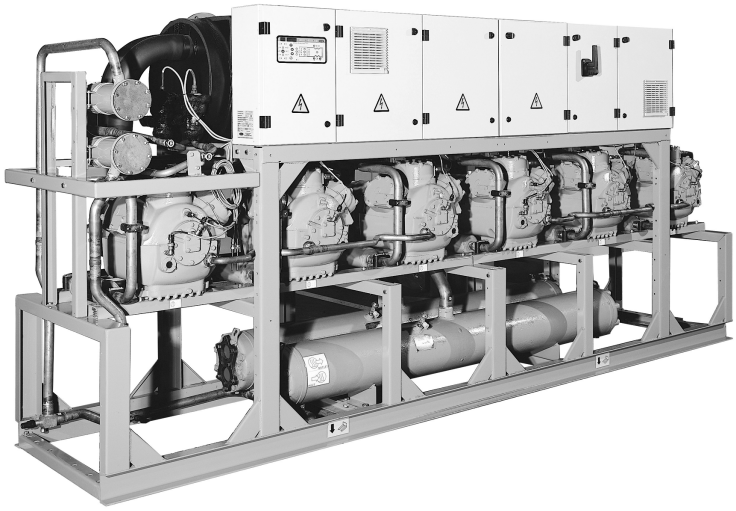
Carrier

# Water-Cooled/Condenserless Liquid Chillers

PRO-DIALOG PLUS



Carrier is participating in the Eurovent Certification Programme. Products are as listed in the Eurovent Directory of Certified Products.

Quality Management System Approval

HFC-407C

# 30HZ/HZV

## Nominal cooling capacity 371-783 kW

The 30HZ/HZV series of liquid chillers is designed for operation with refrigerant HFC-407C to meet new environmental protection requirements. They are available as a water-cooled packaged (30HZ) or condenserless (30HZV) version, and offer an ideal solution for chilled water production.

### Features

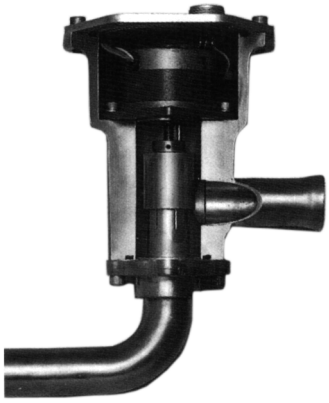
- The new, ecological refrigerant HFC-407C has an ozone depletion potential of zero and is not affected by international regulations on the usage of CFCs and their derivatives. This new refrigerant ensures similar performances to HCFC-22 and offers an economical solution to environmental protection problems.
- HFC-407C is a blend of HFC-32, 125 and 134a. As it is produced and distributed world-wide, there are no availability problems. These new HFC-407C chillers have been designed using specific refrigeration components and new production methods and are backed by thousands of hours of laboratory and field tests. This allows Carrier to offer tomorrow's chiller technology today.
- Excellent part-load energy efficiency through use of multiple compressors and electronic expansion valves (30HZ/HZV 091 to 280). As the chiller rarely operates at full load, significant savings are ensured. This reduced power consumption also contributes to limiting the greenhouse effect, resulting from the generation of thermal energy.
- Two independent refrigerant circuits, the second one takes over automatically when the first one malfunctions, maintaining partial cooling under all circumstances.
- Reduced, compact dimensions: unit can pass through standard 1 m doorways (30HZ/HZV 141 to 225). Space requirements inside the building are also significantly reduced.
- Refrigerant containment - rigorous factory tightness tests and use of temperature or pressure sensors without capillary tubes eliminate the risk of leaks. Compressor suction and discharge shut-off valves permit isolation of the refrigerant charge in the heat exchangers. Maintenance operations become less frequent and more effective.

## PRO-DIALOG Plus control

PRO-DIALOG Plus is an advanced numeric control system that combines complex intelligence with great operating simplicity.

## PRO-DIALOG Plus ensures intelligent leaving water temperature control and optimises energy requirements

- The PID control algorithm with return water temperature compensation anticipates load variations, guarantees leaving water temperature stability and prevents unnecessary compressor cycling.
- The long-stroke electronic expansion valves (EXV) and PID superheat control allow a significant energy efficiency improvement at part load conditions, and faultless chiller operation in a wider temperature range.
- Several capacity loading possibilities ensure improved start-up at low outdoor air temperature, and permit use of one of the refrigerant circuits as a back-up circuit.
- Adjustable ramp loading, according to the inertia of the application, avoids load increases that are too fast and too frequent, increasing unit life and limiting power consumption peaks.



**Electronic expansion valve EXV**

## PRO-DIALOG Plus ensures preventive protection and enhances chiller reliability

- Equalisation of compressor operating hours and number of start-ups.
- No capillary tubes or pressostats (except as safety device).
- PRO-DIALOG Plus monitors all chiller safety parameters. The fault history function and the 80 fault codes facilitate immediate fault location.

## PRO-DIALOG Plus offers extended communications capabilities

- Clear and easy-to-understand operator interface. The LEDs, numeric displays and touch keys are well-positioned on the schematic chiller diagram. The user immediately knows all operating parameters: pressures, temperatures, operating hours, etc.
- The extensive chiller remote control capabilities (wired connection) allow integration into building monitoring systems.
- RS485 series port for connection to the Carrier Comfort Network (CCN) or any other monitoring system (optional communications interface with open protocol allows transfer of almost 50 parameters).
- Parallel piloting of two units as standard, or of several units with Flotronic System Manager (FSM) and Chiller System Manager (CSM III) options.


**Operator interface**

# Options and accessories

| | Option | Accessory |
|---|---|---|
| Condenserless version: 30HZV | X | |
| Non-reversible heat pump version | X | |
| High condensing pressure version: for heat reclaim or application with glycol cooler (condenser entering temperatures 40°C or higher) | X | |
| Low leaving brine temperatures from 5°C to -6°C | X | |
| Very low leaving brine temperatures from -6°C to -15°C | X | |
| Electrical box protection to IP44 | X | |
| High and low pressure manometers | X | |
| Electronic compressor oil pressure protection and display | X | |
| Copper/Nickel condensers | X | |
| Heat reclaim condensers with separate cooling water and heat reclaim circuits | X | |
| Evaporator with fewer or more baffles | X | |
| Condenser with 2 x 3-pass water box | X | X |
| Compressor sound enclosure | | X |
| Air-cooled condenser electronic control kit | | X |
| Evaporator pump starter | X | |
| Condenser pump starter | X | |
| RS485 communications interface with open protocol | | X |
| Condenser three-way valve control | X | |

# Physical data

| 30HZ/HZV | | 141 | 161 | 195 | 225 | 250 | 280 |
|---|---|---|---|---|---|---|---|
| **Net nominal cooling capacity*** | kW | | | | | | |
| 30HZ | | 371 | 415 | 533 | 626 | 719 | 783 |
| 30HZV | | 352 | 388 | 500 | 588 | 677 | 735 |
| **Operating weight** | kg | | | | | | |
| 30HZ | | 2730 | 2830 | 3505 | 3805 | 4470 | 4900 |
| 30HZV | | 2260 | 2300 | 2975 | 3267 | 3780 | 4106 |
| **Refrigerant charge**** | kg | R407C | | | | | |
| Circuit A | | 38.0 | 42.0 | 54.0 | 54.0 | 62.5 | 62.5 |
| Circuit B | | 38.0 | 42.0 | 46.5 | 54.0 | 60.5 | 62.5 |
| **Compressors** | | 06E semi-hermetic. 4 or 6 cylinders. 24.2 r/s | | | | | |
| Quantity - Circuit A | | 2 | 2 | 3 | 3 | 4 | 4 |
| Quantity - Circuit B | | 2 | 2 | 2 | 3 | 3 | 4 |
| **Capacity control** | | PRO-DIALOG Plus control | | | | | |
| No. of control steps | | 11 | 11 | 5 | 6 | 7 | 8 |
| Minimum step capacity | % | 19 | 16 | 20 | 16 | 14 | 12 |
| **Evaporator** | | One. direct expansion. multi-tube shell | | | | | |
| Net water volume | l | 199 | 199 | 242 | 242 | 276 | 276 |
| No. of refrigerant circuits | | 2 | 2 | 2 | 2 | 2 | 2 |
| **Water connections** | in | | | | | | |
| Inlet/outlet | | PN16DN150 NFE29203 | | | | | |
| Drain and vent | in | 3/8 NPT | | | | | |
| Max. water-side operating pressure | kPa | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 |
| **Condenser** | | Shell and multi-tube | | | | | |
| Quantity | | 2 | 2 | 2 | 2 | 2 | 2 |
| Net water volume | l | | | | | | |
| Circuit A | | 25 | 30 | 37 | 37 | 51 | 51 |
| Circuit B | | 25 | 30 | 30 | 37 | 37 | 51 |
| **Water connections** | in | Flat flange. brazed | | | | | |
| Inlet/outlet, circuit A | | 2-1/2 | 2-1/2 | 2-1/2 | 2-1/2 | 3 | 3 |
| Inlet/outlet, circuit B | | 2-1/2 | 2-1/2 | 2-1/2 | 2-1/2 | 2-1/2 | 3 |
| Drain and vent | in | 3/8 NPT | | | | | |
| Max. water-side operating pressure | kPa | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 |

**Notes:**

* Nominal Eurovent conditions:
- evaporator entering/leaving water temperature = 12°C/7°C. Condenser entering/leaving water temperature = 30°C/35°C
- evaporator and condenser fouling factor = 0.000044 $m^2$ K/W
- condensing temperature dew point 45°C
- fluid temperature = condensing temperature at dew point - refrigerant glide - 5 K subcooling.
- Net cooling capacity = gross cooling capacity minus the capacity corresponding to the evaporator pressure drop (flow x drop/0.3)

** The 30HZV units have a nitrogen holding charge only.
The weights given are guidelines only. For the correct unit charge refer to the unit nameplate.

## NOTES for electrical data:

- 30HZ/HZV 141 to 225 units have a single power connection point; 30HZ/HZV 250 to 280 units have two connection points.
- The control box includes the following standard features:
  - Starter and motor protection devices for each compressor
  - Control devices

- **Field connections:**
  All connections to the system and the electrical installations must be in full accordance with all applicable codes.
- The Carrier 30HZ/HZV chillers are designed and built to ensure conformance with local codes. The recommendations of European standard EN 60204-1 (corresponds to IEC 60204-1) (machine safety - electrical machine components - part 1: general regulations) are specifically taken into account, when designing the electrical equipment.

**IMPORTANT:**

- Conformance with EN 60204-1 is the best means of ensuring compliance with the Machines Directive and § 1.5.1. Generally the recommendations of IEC 60364 are accepted as compliance with the requirements of the installation directives.
- Annex B of EN 60204-1 describes the electrical characteristics used for the operation of the machines.

1. The operating environment for the 30HZ/HZV chillers is specified below:
   a. Environment* - Environment as classified in IEC 60364 § 3:
      - ambient temperature range: +5°C to +40°C, class AA4
      - humidity range (non-condensing)*:
        50% relative humidity at 40°C
        90% relative humidity at 20°C
      - altitude: ≤ 2000 m
      - indoor installation*
      - presence of water: class AD2* (possibility of water droplets)
      - presence of hard solids, class AE2* (no significant dust present)
      - presence of corrosive and polluting substances, class AF1 (negligible)
      - vibration and shock, class AG2, AH2

   b. Competence of personnel, class BA4* (trained personnel - IEC 60364)
2. Power supply frequency variation: ± 2 Hz.
3. The neutral (N) conductor must not be connected directly to the unit (if necessary use a transformer).
4. Over-current protection of the power supply conductors is not provided with the unit.
5. The factory-installed disconnect switch(es)/circuit breaker(s) is (are) of a type suitable for power interruption in accordance with EN 60947 (corresponds to IEC 60947).
6. The units are designed for connection to TN networks (IEC 60364). For IT networks the earth connection must not be at the network earth. Provide a local earth, consult competent local organisations to complete the electrical installation.

**NOTE:**
If particular aspects of an actual installation do not conform to the conditions described above, or if there are other conditions which should be considered, always contact your local Carrier representative.

* The protection level required to conform to this class is IP21B (according to reference document IEC 60529). All 30HZ/HZV units are protected to IP23C and fulfil this protection condition.

# Electrical data

| 30HZ/HZV | | 141 | 161 | 195 | 225 | 250 | 280 |
|---|---|---|---|---|---|---|---|
| **Power wiring** | | | | | | | |
| Nominal power supply | V-ph-Hz | 400 - 3 - 50 | | | | | |
| System voltage range | V | 360 - 440 | | | | | |
| **Control circuit power supply** | | The control circuit is supplied via a factory-installed transformer. | | | | | |
| **Nominal operating power input*** | kW | | | | | | |
| **30HZ** | | 112 | 131 | 165 | 201 | 239 | 270 |
| **30HZV** | | 112 | 135 | 165 | 200 | 234 | 266 |
| **Nominal operating current*** | A | | | | | | |
| **30HZ** | | 185 | 217 | 273 | 333 | 396 | 448 |
| **30HZV** | | 185 | 224 | 273 | 332 | 388 | 441 |
| **Maximum operating power input**** | kW | | | | | | |
| **30HZ -** circuit A | | 132 | 155 | 194 | 232 | 155 | 155 |
| **30HZ -** circuit B | | - | - | - | - | 116 | 155 |
| **30HZV -** circuit A | | 155 | 180 | 225 | 270 | 180 | 180 |
| **30HZV -** circuit B | | - | - | - | - | 135 | 180 |
| **Maximum operating current (Un-10%)***** | A | | | | | | |
| **30HZ -** circuit A | | 255 | 299 | 374 | 449 | 299 | 299 |
| **30HZ -** circuit B | | - | - | - | - | 224 | 299 |
| **30HZV -** circuit A | | 293 | 340 | 425 | 509 | 340 | 340 |
| **30HZV -** circuit B | | - | - | - | - | 255 | 340 |
| **Maximum operating current (Un)***** | A | | | | | | |
| **30HZ -** circuit A | | 230 | 269 | 336 | 404 | 269 | 269 |
| **30HZ -** circuit B | | - | - | - | - | 202 | 269 |
| **30HZV -** circuit A | | 264 | 306 | 382 | 458 | 306 | 306 |
| **30HZV -** circuit B | | - | - | - | - | 229 | 306 |
| **Maximum unit starting current (Un)†** | A | | | | | | |
| **30HZ -** circuit A | | 330 | 404 | 470 | 536 | 404 | 404 |
| **30HZ -** circuit B | | - | - | - | - | 338 | 404 |
| **30HZV -** circuit A | | 360 | 436 | 513 | 589 | 436 | 436 |
| **30HZV -** circuit B | | - | - | - | - | 360 | 436 |
| **30HZ Ratio max. starting current/max. current, circ. A** | | 1.44 | 1.50 | 1.40 | 1.33 | 1.50 | 1.50 |
| **30HZ Ratio max. starting current/max. current, circ. B** | | - | - | - | - | 1.68 | 1.50 |
| **30HZV Ratio max. starting current/max. current, circ. A** | | 1.37 | 1.43 | 1.34 | 1.28 | 1.43 | 1.43 |
| **30HZV Ratio max. starting current/max. current, circ. B** | | - | - | - | - | 1.57 | 1.43 |
| **Holding current for three-phase short circuits** | kA | | | | | | |
| **30HZ -** circuit A | | 20 | 20 | 25 | 25 | 25 | 25 |
| **30HZ -** circuit B | | | | | | 25 | 25 |
| **30HZV -** circuit A | | 20 | 20 | 25 | 25 | 25 | 25 |
| **30HZV -** circuit B | | | | | | 25 | 25 |
| **Customer unit standby power for evaporator and condenser pump connections‡** | A | | | | | | |
| Circuit A | | 12 | 15 | 24 | 32 | 25 | 32 |
| Circuit B | | - | - | - | - | 20 | 20 |

* Standard Eurovent conditions: Evaporator entering/leaving water temperature 12°C/7°C. Condenser entering/leaving water temperature 30°C/35°C.
Nominal operating power input: unit power input (compressors, control) plus the capacity corresponding to the evaporator and condenser pressure drop (flow x drop/0.3).

** Power input, compressors, at unit operating limits (saturated evaporating temperature (dew point) = 12°C, saturated condensing temperature (dew point) = 52°C (30HZ)/66°C (30HZV), and a nominal voltage of 400 V (data given on the unit name plate).

*** Maximum unit operating current at maximum unit power input.

† Maximum instantaneous starting current (maximum operating current of the smallest compressor(s) + locked rotor current or reduced starting current of the largest compressor).

‡ Current and power inputs not included in the values above.

## Condenser water flow rates

| 30HZ/HZV | No. of passes | Min. flow rate, l/s* | | Max. flow rate, l/s** |
|---|---|---|---|---|
| | | Closed loop | Open loop | |
| **141** | 2 | 3.54 | 10.62 | 43.0 |
| **161** | 2 | 3.54 | 10.62 | 43.0 |
| **195** | 2 | 4.00 | 12.00 | 48.0 |
| **225** | 2 | 4.46 | 13.40 | 54.0 |
| **250** | 2 | 5.04 | 15.14 | 61.0 |
| **280** | 2 | 5.62 | 16.88 | 68.0 |

* Based on a water velocity of 0.3 m/s in a closed loop, and 0.9 m/s in an open loop.
** Based on a water velocity of 3.6 m/s.

## Minimum cooler flow rates

| 30HZ | Min. water flow rate, l/s |
|---|---|
| **141-161** | 9.9 |
| **195-280** | 12.0 |

## Water loop volume

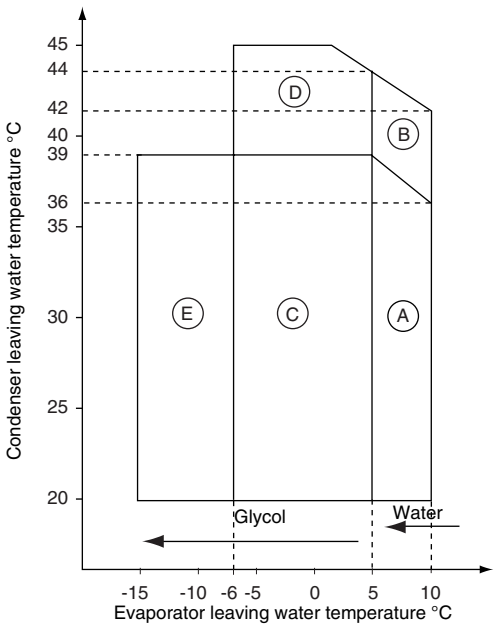
### Minimum system volume

Whatever the size of the system, the water loop minimum volume (litres) is given by the following formula:
Volume = CAP (kW) x N = litres
where CAP is the nominal system capacity (kW) at the nominal operating conditions of the installation.

| Application | N |
|---|---|
| Air conditioning | 3.25 |
| Industrial process cooling | 6.50 |
| Low ambient temperature | 6.50 |

This volume is necessary for stable operation and accurate temperature control. It is often necessary to add a buffer water reservoir to the circuit in order to achieve the required volume.

## 30HZ/HZV Operating range

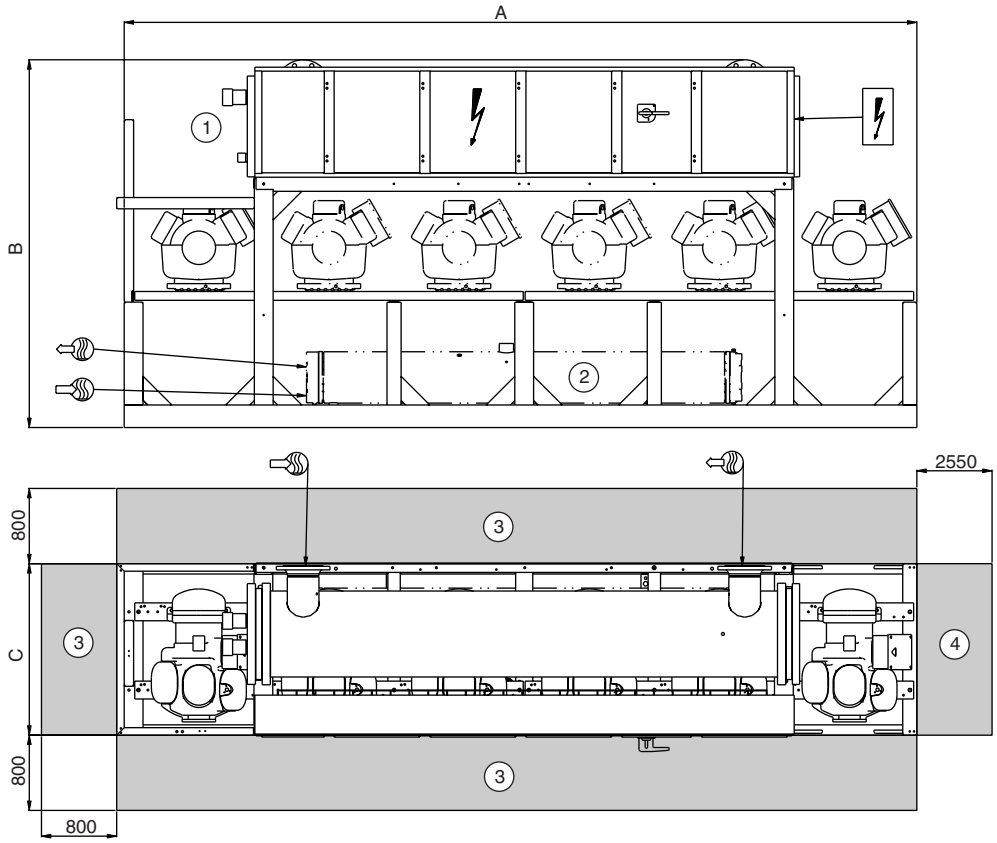



**Legend**
A 30HZ
B 30HZ option 150
C 30HZ option 5
D 30HZ option 150 + 5
E 30HZ option 6

***Note: Evaporator and condenser Δ t= 5 K***

# Dimensions/clearances

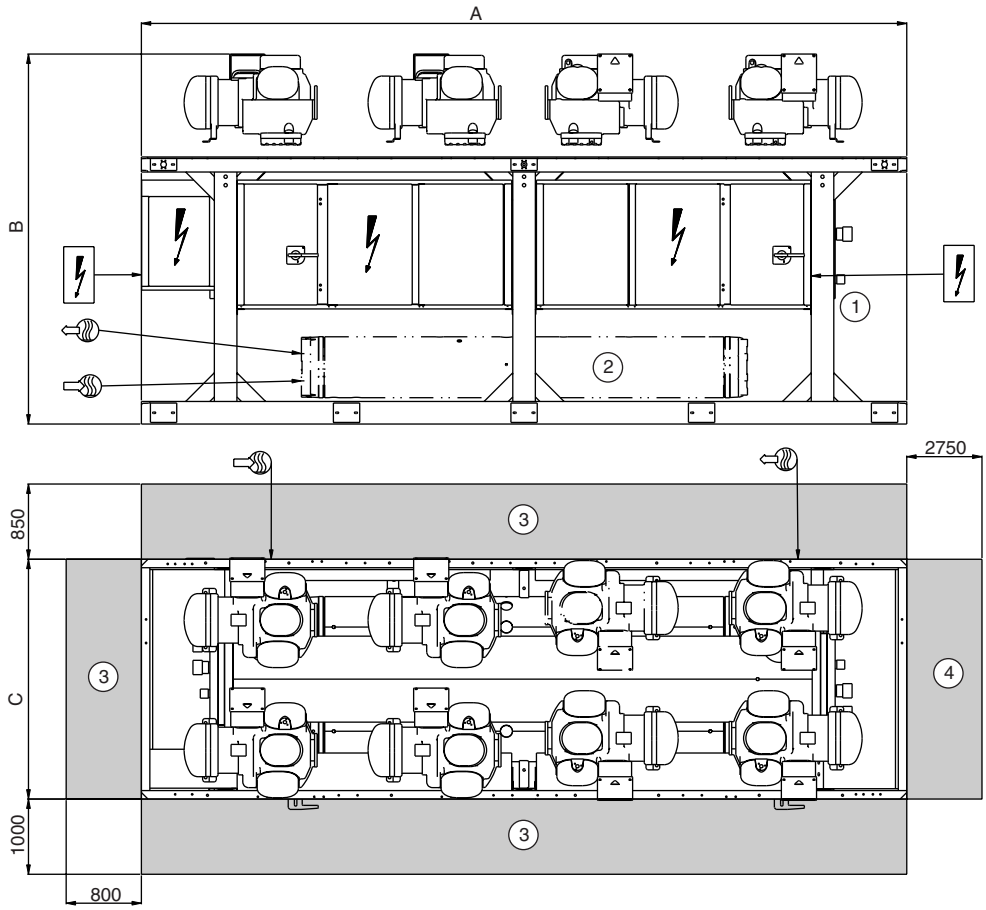
## 30HZ/HZV 141-225




***NOTE: Non-contractual drawings. When designing an installation, refer to the certified dimensional drawings, available on request.***

# Dimensions/clearances

## 30HZ/HZV 250-280




| 30HZ - Units with condenser | A | B | C |
|---|---|---|---|
| 141 | 3550 | 1915 | 950 |
| 161 | 3550 | 1915 | 950 |
| 195 | 4255 | 1950 | 950 |
| 225 | 4255 | 1950 | 950 |
| 250 - 280 | 4070 | 2150 | 1275 |
| **30HZ - Units without condenser** | **A** | **B** | **C** |
| 141 | 3550 | 1300 | 950 |
| 161 | 3550 | 1300 | 950 |
| 195 | 4255 | 1340 | 950 |
| 225 | 4255 | 1340 | 950 |
| 250 - 280 | 4070 | 1830 | 1275 |

**Legend:**

All dimensions are in millimetres

(1) Evaporator

(2) Condensers (30HZ)

(3) Space required for operation and service

(4) Space required for evaporator tube removal

Water outlet

Water inlet

Power supply

**NOTE:**
Non-contractual drawings. When designing an installation, refer to the certified dimensional drawings, available on request.

# Cooling capacities 30HZ

| | | 30HZ | | | | | | | | | | | | | | | Option 150 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LWT | Condenser entering water temperature °C | | | | | | | | | | | | | | | | | | | |
| | | 25 | | | | | 30 | | | | | 35 | | | | | 40 | | | | |
| 30HZ | °C | CAP kW | COMP kW | UNIT kW | COOL kPa | COND kPa | CAP kW | COMP kW | UNIT kW | COOL kPa | COND kPa | CAP kW | COMP kW | UNIT kW | COOL kPa | COND kPa | CAP kW | COMP kW | UNIT kW | COOL kPa | COND kPa |
| 141 | 5 | 383 | 100 | 104 | 23 | 36 | 359 | 106 | 109 | 20 | 33 | 335 | 111 | 114 | 17 | 31 | 311 | 116 | 118 | 15 | 28 |
| 161 | | 427 | 117 | 122 | 28 | 38 | 401 | 124 | 129 | 25 | 36 | 375 | 131 | 135 | 22 | 33 | 350 | 137 | 140 | 19 | 31 |
| 195 | | 549 | 146 | 154 | 32 | 51 | 513 | 155 | 162 | 28 | 47 | 480 | 163 | 169 | 25 | 44 | 447 | 170 | 175 | 22 | 41 |
| 225 | | 643 | 176 | 188 | 44 | 59 | 603 | 186 | 197 | 39 | 56 | 563 | 196 | 205 | 34 | 52 | 524 | 204 | 212 | 29 | 48 |
| 250 | | 746 | 209 | 225 | 54 | 63 | 698 | 220 | 234 | 47 | 58 | 652 | 231 | 243 | 41 | 54 | 606 | 240 | 251 | 35 | 50 |
| 280 | | 812 | 236 | 254 | 64 | 61 | 760 | 249 | 265 | 56 | 56 | 709 | 261 | 274 | 48 | 52 | 660 | 271 | 283 | 42 | 48 |
| 141 | 7 | 396 | 102 | 106 | 24 | 38 | 371 | 108 | 112 | 21 | 35 | 347 | 113 | 116 | 19 | 33 | 322 | 118 | 121 | 16 | 30 |
| 161 | | 442 | 118 | 124 | 30 | 40 | 415 | 126 | 131 | 27 | 38 | 388 | 133 | 137 | 23 | 35 | 362 | 139 | 143 | 20 | 33 |
| 195 | | 570 | 148 | 157 | 35 | 54 | 533 | 157 | 165 | 31 | 50 | 499 | 165 | 172 | 27 | 47 | 465 | 173 | 179 | 23 | 43 |
| 225 | | 667 | 179 | 192 | 47 | 63 | 626 | 189 | 201 | 42 | 59 | 585 | 199 | 210 | 37 | 55 | 545 | 208 | 217 | 32 | 51 |
| 250 | | 768 | 212 | 229 | 57 | 66 | 719 | 224 | 239 | 50 | 61 | 672 | 235 | 247 | 44 | 57 | 625 | 244 | 255 | 38 | 52 |
| 280 | | 836 | 239 | 259 | 67 | 64 | 783 | 252 | 270 | 59 | 59 | 731 | 265 | 280 | 52 | 55 | 681 | 276 | 288 | 45 | 51 |
| 141 | 8 | 409 | 103 | 108 | 26 | 40 | 383 | 109 | 114 | 23 | 37 | 358 | 115 | 119 | 20 | 35 | 334 | 120 | 123 | 17 | 32 |
| 161 | | 456 | 120 | 126 | 33 | 42 | 429 | 128 | 133 | 29 | 40 | 402 | 135 | 140 | 25 | 37 | 375 | 142 | 146 | 22 | 35 |
| 195 | | 591 | 150 | 161 | 37 | 57 | 554 | 160 | 169 | 33 | 53 | 518 | 168 | 176 | 29 | 50 | 483 | 176 | 183 | 25 | 46 |
| 225 | | 691 | 181 | 196 | 51 | 67 | 649 | 193 | 206 | 45 | 63 | 607 | 203 | 214 | 39 | 58 | 566 | 212 | 222 | 34 | 54 |
| 250 | | 790 | 215 | 233 | 60 | 69 | 741 | 227 | 243 | 53 | 65 | 692 | 238 | 252 | 46 | 60 | 644 | 248 | 260 | 40 | 55 |
| 280 | | 859 | 242 | 264 | 71 | 67 | 806 | 256 | 275 | 63 | 62 | 753 | 269 | 285 | 55 | 58 | 702 | 280 | 294 | 48 | 54 |
| 141 | 10 | 436 | 106 | 112 | 30 | 45 | 409 | 113 | 118 | 26 | 41 | 383 | 119 | 123 | 23 | 39 | 357 | 124 | 128 | 20 | 36 |
| 161 | | 487 | 123 | 130 | 37 | 47 | 458 | 131 | 138 | 33 | 44 | 429 | 139 | 145 | 29 | 41 | 401 | 146 | 151 | 25 | 39 |
| 195 | | 634 | 155 | 167 | 43 | 65 | 595 | 165 | 176 | 38 | 59 | 558 | 174 | 183 | 33 | 56 | 521 | 182 | 191 | 29 | 52 |
| 225 | | 740 | 187 | 205 | 58 | 76 | 696 | 199 | 215 | 52 | 71 | 653 | 210 | 224 | 46 | 66 | 610 | 220 | 232 | 40 | 61 |
| 250 | | 836 | 220 | 242 | 68 | 76 | 784 | 234 | 253 | 59 | 71 | 734 | 246 | 262 | 52 | 66 | 684 | 256 | 270 | 45 | 61 |
| 280 | | 909 | 249 | 274 | 80 | 73 | 853 | 264 | 285 | 70 | 69 | 799 | 277 | 296 | 62 | 64 | 745 | 289 | 305 | 54 | 59 |

**Legend:**

**LWT** - Leaving water temperature °C

**CAP kW** - Net cooling capacity = gross cooling capacity minus the capacity corresponding to the evaporator pressure drop (flow x drop/0.3).

**COMP kW** - Compressor power input

**UNIT kW** - Unit power input (compressors, control) plus the capacity corresponding to the evaporator and condenser pressure drop (flow x drop/0.3).

**COOL kPa** - Evaporator water pressure drop

**COND kPa** - Condenser water pressure drop

▭ Capacity at Eurovent conditions

**Application data:**

Refrigerant: R-407C

Condenser and evaporator temperature difference: 5 K

Evaporator fluid: Water

Fouling factor: 0,44 x $10^{-4}$ ($m^2$K)/W

**The published performances are Eurovent certified in accordance with document 6/C/003.**

**Correction factors for Eurovent laboratory test:**

| | |
|---|---|
| Net cooling capacity | 1.000 |
| Energy efficiency ratio (EER) | 1.000 |
| Evaporator pressure drop | 1.000 |
| Condenser pressure drop | 1.000 |

**Notes:**

Evaporator water flow (l/s) = $CAP_{(kW)}$ x 860 / [$5_{(K)}$x 3600]

Condenser water flow (l/s) = [$CAP_{(kW)}$ + $COMP_{(kW)}$] x 860 / ($5_{(K)}$ x 3600)

Total heat rejection $THR_{(kW)}$= $CAP_{(kW)}$+$COMP_{(kW)}$

# Cooling capacities 30HZV

## Condenserless units

| | LWT | Compressor discharge pressure, kPa | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1543 (40.2/35)* | | | | | 1745 (45/40)* | | | | | 1967 (49.85/45)* | | | | | 2208 (54.63/50)* | | | | |
| | °C | CAP | UNIT | COMP | COOL | COOL | CAP | UNIT | COMP | COOL | COOL | CAP | UNIT | COMP | COOL | COOL | CAP | UNIT | COMP | COOL | COOL |
| 30HZV | | kW | kW | kW | l/s | kPa | kW | kW | kW | l/s | kPa | kW | kW | kW | l/s | kPa | kW | kW | kW | l/s | kPa |
| 141 | 6 | 386 | 98 | 97 | 18.5 | 23 | 362 | 104 | 103 | 17.4 | 20 | 339 | 110 | 110 | 16.2 | 18 | 315 | 116 | 115 | 15.1 | 15 |
| 161 | | 422 | 118 | 117 | 20.3 | 28 | 398 | 126 | 124 | 19.1 | 25 | 374 | 133 | 132 | 17.9 | 22 | 350 | 140 | 138 | 16.8 | 19 |
| 195 | | 544 | 145 | 143 | 26.1 | 32 | 512 | 154 | 152 | 24.5 | 28 | 479 | 163 | 161 | 23 | 25 | 447 | 171 | 169 | 21.4 | 22 |
| 225 | | 640 | 176 | 172 | 30.8 | 44 | 602 | 187 | 183 | 28.9 | 39 | 565 | 197 | 194 | 27.1 | 34 | 527 | 206 | 203 | 25.3 | 30 |
| 250 | | 745 | 208 | 201 | 35.9 | 54 | 700 | 220 | 215 | 33.7 | 47 | 655 | 231 | 227 | 31.5 | 41 | 611 | 242 | 238 | 29.3 | 36 |
| 280 | | 809 | 236 | 228 | 39 | 63 | 760 | 250 | 243 | 36.6 | 56 | 711 | 262 | 257 | 34.2 | 49 | 663 | 274 | 269 | 31.9 | 42 |
| 141 | 7 | 400 | 99 | 97 | 19.2 | 25 | 376 | 106 | 104 | 18 | 22 | 352 | 112 | 111 | 16.9 | 19 | 328 | 117 | 117 | 15.7 | 16 |
| 161 | | 438 | 120 | 118 | 21 | 30 | 413 | 127 | 126 | 19.8 | 26 | 388 | 135 | 133 | 18.6 | 23 | 363 | 142 | 140 | 17.4 | 20 |
| 195 | | 566 | 147 | 144 | 27.2 | 35 | 533 | 157 | 154 | 25.6 | 31 | 500 | 165 | 163 | 24 | 27 | 467 | 173 | 172 | 22.4 | 24 |
| 225 | | 665 | 178 | 173 | 32 | 47 | 626 | 189 | 185 | 30.1 | 42 | 588 | 200 | 196 | 28.3 | 37 | 550 | 209 | 206 | 26.4 | 33 |
| 250 | | 769 | 210 | 203 | 37.1 | 57 | 722 | 222 | 217 | 34.8 | 50 | 677 | 234 | 229 | 32.6 | 44 | 631 | 245 | 241 | 30.3 | 39 |
| 280 | | 834 | 239 | 230 | 40.3 | 67 | 784 | 253 | 245 | 37.8 | 59 | 735 | 266 | 259 | 35.4 | 52 | 686 | 277 | 272 | 33 | 45 |
| 141 | 8 | 414 | 100 | 98 | 19.9 | 27 | 390 | 107 | 105 | 18.7 | 24 | 365 | 113 | 112 | 17.5 | 21 | 341 | 119 | 118 | 16.3 | 18 |
| 161 | | 453 | 121 | 119 | 21.8 | 32 | 427 | 129 | 127 | 20.5 | 28 | 402 | 137 | 135 | 19.3 | 25 | 377 | 144 | 142 | 18.1 | 22 |
| 195 | | 589 | 149 | 145 | 28.3 | 37 | 554 | 159 | 156 | 26.6 | 33 | 520 | 168 | 165 | 25 | 29 | 486 | 176 | 174 | 23.3 | 26 |
| 225 | | 691 | 181 | 175 | 33.3 | 51 | 651 | 192 | 187 | 31.4 | 46 | 612 | 203 | 199 | 29.4 | 40 | 572 | 213 | 209 | 27.5 | 35 |
| 250 | | 793 | 212 | 205 | 38.3 | 61 | 746 | 225 | 219 | 35.9 | 54 | 699 | 237 | 232 | 33.7 | 47 | 652 | 248 | 244 | 31.4 | 41 |
| 280 | | 860 | 242 | 232 | 41.6 | 72 | 809 | 256 | 247 | 39.1 | 63 | 758 | 269 | 262 | 36.6 | 56 | 708 | 281 | 276 | 34.1 | 49 |
| 141 | 10 | 444 | 102 | 100 | 21.4 | 31 | 419 | 109 | 107 | 20.1 | 27 | 393 | 116 | 114 | 18.9 | 24 | 367 | 122 | 121 | 17.6 | 21 |
| 161 | | 485 | 124 | 121 | 23.3 | 37 | 458 | 132 | 130 | 22 | 33 | 431 | 140 | 138 | 20.7 | 29 | 405 | 147 | 146 | 19.4 | 25 |
| 195 | | 636 | 152 | 148 | 30.6 | 43 | 599 | 163 | 159 | 28.9 | 39 | 563 | 172 | 169 | 27.1 | 34 | 527 | 182 | 179 | 25.3 | 30 |
| 225 | | 745 | 185 | 178 | 36 | 59 | 703 | 197 | 191 | 33.9 | 53 | 661 | 209 | 204 | 31.9 | 47 | 620 | 219 | 215 | 29.8 | 41 |
| 250 | | 842 | 217 | 208 | 40.7 | 69 | 793 | 230 | 223 | 38.3 | 61 | 744 | 243 | 236 | 35.9 | 54 | 695 | 255 | 249 | 33.5 | 47 |
| 280 | | 913 | 247 | 235 | 44.3 | 81 | 860 | 262 | 252 | 41.7 | 72 | 808 | 276 | 268 | 39 | 63 | 755 | 289 | 282 | 36.4 | 55 |

**Legend:**

**LWT** - Leaving water temperature °C

**CAP kW** - Net cooling capacity = gross cooling capacity minus the capacity corresponding to the evaporator pressure drop (flow x drop/0.3).

**COMP kW** - Compressor power input

**UNIT kW** - Unit power input (compressors, control) plus the capacity corresponding to the evaporator pressure drop (flow x drop/0.3).

**COOL kPa** - Evaporator water pressure drop

**COOL l/s** - Evaporator water flow rate

**THR** - Total heat rejection. THR(kW) = CAP(kW) + COMP(kW)

☐ Capacity at Eurovent conditions

**The published performances are Eurovent certified in accordance with document 6/C/003.**

**Application data:**
Refrigerant: R-407C
Evaporator temperature drop: 5 K
Evaporator fluid: Water
Fouling factor: 0.44 x $10^{-4}$ ($m^2$K)/W

Fluid temperature = condensing temperature dew point - refrigerant glide - 5 K subcooling

* Dewpoint and bubble temperatures corresponding to the compressor discharge pressure

**Correction factors for Eurovent laboratory test:**

| | |
|---|---|
| Net cooling capacity | 1.000 |
| Energy efficiency ratio (EER) | 1.000 |
| Evaporator pressure drop | 1.000 |

**Note:**
Evaporator water flow (l/s): CAP(kW) x 860/(5(K) x 3600)

# Technical description

Water-cooled packaged liquid chillers for outdoor installation
Nominal cooling capacity 371-783 kW
Carrier model: 30HZ/HZV

## Part 1 - General

### System description

- Microprocessor controlled, water-cooled liquid chiller utilizing chlorine-free refrigerant HFC-407C, dual refrigeration circuits, reciprocating compressors, and electronic or thermostatic expansion devices.

### Quality assurance

- Unit shall be rated in accordance with Eurovent standard
- Unit construction shall comply with European directives:
  - Pressurised equipment directive (PED) 97/23/EC
  - Machinery directive 98/37/EC, modified
  - Low voltage directive 73/23/EEC, modified
  - Electromagnetic compatibility directive 89/336/EEC, modified, and the applicable recommendations of European standards:
  - Machine safety: electrical equipment in machines, general regulations EN 60204-1
  - Electromagnetic emission EN 50081-2
  - Electromagnetic immunity EN 50082-2.
- Unit shall be designed, manufactured and tested in a facility with a quality assurance system certified ISO 9001 and with an environment management system certified ISO 14001.

## Part 2 - Products

### Equipment

### General

- Factory assembled, single-piece, water-cooled liquid chiller. Contained within the unit cabinet shall be all factory wiring, piping, controls, refrigerant charge (HFC-407C) and oil charge.
- Unit cabinet
  - Frame shall be made of welded or screwed mechanical steel sections and covered by three protection layers.
  - Cabinet shall be galvanized steel casing with an oven-baked polyester-paint finish.
  - Cabinet shall be capable of withstanding 500-hour salt spray test in accordance with the ASTM B-117 standard (USA).

### Compressors

- Unit shall have reciprocating semi-hermetic compressors lubricated by POE oil and a reversible oil pump.
- Each compressor shall be equipped with a discharge and suction shutoff valve, a crankcase heater with a safety device that stops the compressor in case of a fault.
- The 4-pole electric motor with two windings shall be cooled by suction gas and protected against abnormal operating conditions.
- The compressors are mounted on rubber anti-vibration dampers and equipped with discharge mufflers.

### Evaporator

Unit shall be equipped with a multi-tube evaporator with two refrigerant circuits.

- Evaporator shall be manufactured, tested and stamped in accordance with the European directive for pressurised equipment 97/23/EC. The maximum refrigerant-side operating pressure will be 2100 kPa, and the maximum water-side pressure will be 1000 kPa. The evaporator shall be tested using pressurised dry air; no oil test is necessary.
- Tubes shall be internally-enhanced, seamless-copper type, and shall be rolled into tube sheets.
- The shell shall have thermal insulation, using 19 mm polyurethane foam, be equipped with water drain and vent.

### Condenser

Unit shall be equipped with two multi-tube condensers (one per circuit).

- Condenser shall be manufactured, tested and stamped in accordance with the European directive for pressurised equipment 97/23/EC. The maximum refrigerant-side operating pressure will be 3000 kPa, and the maximum water-side pressure will be 1000 kPa. The condenser shall be tested using non-pressurised dry air; no oil test is necessary.
- Tubes shall be externally-enhanced, seamless-copper type, and shall be rolled into tube sheets.
- The shell shall have thermal insulation, using 19 mm polyurethane foam, be equipped with water drain and vent.

### Refrigerant circuits

- Refrigerant circuit components shall include discharge and suction valves, liquid line shutoff valves, filter driers, moisture indicating sight glasses, electronic or thermostatic expansion devices, high pressure safety switches, and a complete operating charge of both refrigerant HFC-407C and compressor oil.

### Controls, safeties, and diagnostics

- Controls
  a. Unit controls shall include as a minimum: the microprocessor, the LOCAL/OFF/REMOTE/CCN selector and a 6-digit diagnostic display (scroll-down text) with keypad.
  b. Shall be capable of performing the following functions:
  - Automatic change-over between the main circuit and the non-active circuit(s).
  - Capacity control based on leaving chilled fluid temperature with return fluid temperature sensing.
  - Limiting the chilled fluid temperature pull-down rate at start-up to an adjustable range of 0.1°C to 1.1°C per minute to prevent excessive demand spikes at start-up.
  - Enable adjustment of leaving chilled water temperature according to the return water temperature or the outdoor temperature or by means of a 0-10 V signal.
  - Provide a dual set point for the leaving chilled water temperature activated by a remote contact closure signal.
  - Enable a 2-level demand limit control (between 0 and 100%), activated by a remote contact closure or a 0 to 10 V signal.
  - Control evaporator water pump and, if installed, safety pump operation.
  - Enable automatic lead-lag of two chillers in a single system.
  - With two time scheduling programs enable unit start-up control and set-point change.

- Diagnostics
  - The display module shall be capable of displaying set points, system status (including temperatures, pressures, run time and percent loading), and any alarm or alert conditions.
  - The control shall allow a quick test of all machine elements to verify the correct operation of every switch, circuit breaker, contactor etc. before the chiller is started.
  - The control shall be capable of balancing the compressor operating times and the number of compressor start-ups.
- Safeties
  Unit shall be equipped with all necessary components to provide the unit with protection against the following:
  - Loss of refrigerant charge.
  - Low chilled water temperature.
  - Thermal overload.
  - High pressure.
  - Electrical overload.
  - Circuit pumpdown.
  - Low suction temperature.
- Control shall provide general alarm remote indication for each refrigeration circuit.
- Control system shall have a RS485 serial output port.

### Operating characteristics

Unit shall be capable of starting and running at full load at condenser entering and leaving water temperatures from 20°C to 40°C and with an evaporator leaving fluid set point from 5°C to 10°C.

### Electrical data

- Unit electrical power supply shall enter the unit at one (30HZ/HZV 141 to 225) or two locations.
- Unit shall operate on 3-phase power supply without neutral.
- Control voltage shall be supplied by a factory-installed transformer that will allow supply control circuit power from the main unit power supply.
- Unit shall be supplied with factory-installed, non-fused electrical disconnect for the power supply.

### Finishing

- Control box colour: RAL 7035
- Compressor and chassis colour: RAL 7037


Environmental Management System Approval

Order No. 13413-20, 01.2003. Supersedes order No. 13413-20, 04.2001.
Manufacturer reserves the right to change any product specifications without notice.

The cover photo is solely for illustration purposes, and is not contractually binding.

Manufactured by: Carrier SA, Montluel, France.
Printed on Totally Chlorine Free Paper.
Printed in the Netherlands.