



USE AND MAINTENANCE HANDBOOK

HL-B Series



This manual has been prepared in compliance with CE certification and it is an essential part to every HL Cooling unit

HL (Europe) Ltd 92 Craven Park Road, London, NW10 4AG United Kingdom

Tel: 0844 56 11 783 Fax: 0844 56 11 780 www.hl-cooling.com sales@hl-cooling.com

Company registration number: 5285108. Registered office: 270 Sutton Road Southend-on-Sea Essex SS2 5ET UK

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THIS MANUAL REFERS TO THE FOLLOWING UNIT:

UNIT

OPTIONAL

SERIAL No.

WIRING DIAGRAM No.

ATTENTION

HL Cooling units are only intended for professional uses.

The instructions contained herein and attached to the unit are to be strictly complied with whenever the unit is installed or serviced.

Any operation on this unit must be carried out by skilled personnel having themselves made fully conversant with these instructions.

The guarantee for this unit shall only be valid as long as the instructions contained herein are duly complied with.

This manual is intended for end users only in case of operations which can be carried out having the panels closed (fixed guards are not removed).

Data on this catalogue are only guideline data. **HL (Europe) Ltd** reserves the right to make changes without prior notice.

Before any operation inside the unit, turn OFF the main power safety switch; then turn OFF the unit main switch SW0.

Operations when power is still supplied to the electrical board and the panel is open are allowed to our skilled technicians only, who have been duly trained. In such conditions some of the system functions are not present.

ATTENTION

Fill the Commissioning Report (see appendix "A") enclosed to the handbook during the first start up and send a copy to HL (Europe) Ltd (Service Dept.) for warranty validity.

SAFETY

These instructions contain basic references to correctly and safely use and service our units. Besides general safety precautions, all specially marked points must be duly observed.

SAFETY MARKS CONTAINED IN THESE INSTRUCTIONS

This manual contains some information and references which are marked by symbols. If the safety precautions marked by the symbol "**danger from general cause**" are not complied with injuries to persons may be caused.



If the safety precautions marked by the symbol "**danger from electrical causes**" are not complied with injuries to persons or damages to things may be caused.



If the safety precautions highlighted by the word



are not complied with, damages to the unit or to its functions may be caused.

DANGERS FROM NON OBSERVANCE OF SAFETY REFERENCES

Non-observance of safety references may cause bodily harm to persons or damage to the equipment. Failure to comply with safety references shall invalidate warranty and/or damage claims.

Non-compliance could have the following dangerous consequences:

- Failure of important system functions;
- Risk for the operators' safety due to electrical and/or mechanical causes.

ACTIVE SAFETY

The operating logic of our units is controlled by a microprocessor.

This microprocessor also manages faults and malfunctions (if any) of every part of the unit, thus ensuring no risks are run by machinery, persons and the environment.

PASSIVE SAFETY

Our units are completely enclosed by panels, which prevent access to dangerous areas from outside, including fans which are equipped with suitable protection grilles.

DECLARATION EC OF CONFORMITY

Standards applied: EN 50366:2003+A1:2006
EN55014-1:2006
EN55014-2:1997+A2:2008
EN60335-1:2002+A13:2008
EN60335-2-40:2003+A1:2006
EN61000-3-2:2006
EN61000-3-3:2008

Report No: Uk091202049
Uk091201050
Uk091201051
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GENERAL INFORMATION

HL-B Series Chillers are available in different sizes and different cooling capacities ranging from 10KW to 90KW.

HL-B Series-Air Cooled Water Chiller with Axial Fans

These chillers are supplied complete with:

- Control microprocessor;
- Water fill & vent tank;
- Special coated condenser fins for longer life;
- Integral stainless steel tank;
- Adjustable LP switch;
- Centrifugal pump;
- Heavy duties condenser fan;
- Reliable compressor.

NAME AND MODEL

The machines described in this manual are called "Air Cooled Water Chillers".

Model Range Code Guide

HL	B50
Company Name	Cooling Capacity(approx.:50 KW)

Example: HL-B50

WORKING CONDITION

- 1). Ambient temperature: From -10°C to 43°C.
- 2). Water temperature: From -5°C to 35°C (LP Switch should be changed if it is below 0°C).

GENERAL SIGN INFORMATION

	Cooled water inlet		Cooled water outlet
	Indications for lifting the unit		Water drainage point from the machine
	Water filling point		Cooling air flow
	Direction of the refrigerant gas and water circuit flow		Direction of pump rotation(if installed) and of fan rotation
	Electric shock risk		Air vent

TRANSPORTATION

INSPECTION

All units are packed with protective materials in order to safeguard the structure and the panels.

Customer is therefore required to exam the exterior package upon delivery.

Any damages shall be immediately notified in details on the carrier's delivery document, and shall report to HL (Europe) Ltd. in writing.

TRANSPORT

To left and move the unit, please refer to **Appendix “B”** – Overall Dimension Diagram for details.

CAUTION: Do not stack the unit even if they are packed.

INSTALLATION

POSITIONING

The unit is designed to be installed both indoor and outdoor.

The following consideration should be taking into account when choose a suitable location

- Length and origin of hydraulic line;
- Length and origin of the power supply;
- Free flow of air in-take;
- Easy service access;
- Strong even surface.

CAUTION: Making sure the discharged air does NOT blow back into the inlet. In some case, vibration dampers may be applied to minimize the vibration been transmitted to the lower level.

HYDRAULIC CONNECTIONS

CAUTION: The inlet and outlet connections are NOT interchangeable, they must be connected as instructed in the overall dimension data (**see Appendix "B"**).

The following suggestions should be considered when connect to the application system:

- Use vibration-damping joints to prevent vibration transmission and allow thermal expansion;
- Apply a shutoff valves on both inlet and outlet;
- Apply a By-pass valve.

IMPORTANT:

- When connection is completed, check for any water leakages;
- Drain the system thoroughly, making sure there is no air in the water circuit as it may damage the pump.

ELECTRICAL CONNECTIONS

Check power supply against name plate data on the unit (voltage, frequency, phase number). Relevant regulations must be strictly adhered to.

Use a power supply cable whose section shall not be smaller than the value indicated in the wiring diagrams (see appendix “C”) and whose length shall be moderate to ensure there won't be excessive voltage drops.

Upstream cable shall be protected by means of an automatic circuit breaker or of three fuses whose nominal current is equal to that of the unit's main disconnecting switch inside the unit's electric panel.

The breaking power of these elements must be at least equal to the maximum short-circuit current which is generated if a failure occurs in the place where the unit is installed.

WORKING LIMITS

The water flow rate supplied by the unit is related to a 5°C temperature jump between input and output which depends on the supplied cooling power. The maximum allowable flow rate entails a 3°C jump (higher flow rates may cause too high evaporating temperatures and damage the evaporator). The minimum allowable flow rate entails a 7°C jump (lower flow rates may cause too low evaporating temperatures, as a consequence the safety devices would be tripped and the unit would stop).

COOL WATER TEMPERATURE:

The minimum outlet temperature of evaporator is 5°C not included "brine" versions (*); the maximum inlet temperature to the evaporator is 30°C.

(*) : Operation with low- temperature water:

If the cool water temperature is lower than 4°C (out of the evaporator) a water-ethyl glycol mixture should be used (see table below). The antifreeze thermostat (always 3-5°C above the mixture freezing point), the operating thermostat and the set point (4°C above the desired water temperature out of the evaporator) must also be set to new values.

OPERATION WITH WATER-ETHYL GLYCOL MIXTURE								
DESCRIPTION	PERCENTAGE OF ETHYL-GLYCOL OUT OF MIXTURE WEIGHT							
	5%	10%	15%	20%	25%	30%	35%	40%
FREEZING TEMPERATURE	-2.1°C	-4.5°C	-7°C	-10°C	-13°C	-17°C	-21°C	-25°C

EXTERNAL AIR TEMPRATURE:

To ensure the unit can properly perform cooling, the external air temperature must be between -10°C and 43°C. For different requirements please contact our Engineering Division.

NOTE: Using the unit improperly forthwith voids the guarantee; moreover it may cause unit failures and the tripping of safety devices

NOTE: If the unit is installed outdoors, it is recommended that a min. 15% of glycol is added into the water circuit..

MAINTENANCE

IMPORTANT: BEFORE ANY OPERATION INSIDE THE UNIT TURN OFF THE MAIN SWITCH UPSTREAM THE UNIT POWER LINE. THEN OPEN THE FRONT PANEL AND TURN OFF THE UNIT MAIN SWITCH TOO.

IMPORTANT: ONLY OUR TRAINED TECHNICIANS ARE DULY QUALIFIED TO SERVICE THE UNIT WHEN POWER IS SUPPLIED TO THE ELECTRICAL BOARD AND THE PANEL IS OPEN. IN THESE CONDITIONS SOME OF THE SYSTEM FUNCTIONS ARE NOT PRESENT.

TYPE AND FREQUENCY OF ROUTINE MAINTENANCE

Periodical maintenance is a good practice to check if the unit works properly.

Please note that these services, including possible maintenance operations, should be carried out by qualified personnel only.

Every month:

- Check if the electrical terminals on the electric board and on the terminal boxes of the various electric parts are correctly clamped;
- Check if the contacts of the remote control switches are clean and in sound conditions (if necessary, replace them);
- Check if the water circuit is uniformly filled (no air inside of it);
- Check if the water differential pressure switch operates correctly;
- Clean fins of condensing coil by blowing compressed air or, if necessary, flushing them with water (operate in the opposite direction with respect to airflow);
- Check if the defrost procedure is correctly performed.

If, after a few working hours, the unit makes anomalous noises an extraordinary check shall be carried out to detect and eliminate their causes.

MAINTENANCE OF THE COOLING CIRCUIT

IMPORTANT: During any operation requiring the cooling circuit to be exhausted, it is necessary, to ensure environmental safety, that the gas is collected into a proper receiver.

After the cooling circuit is repaired, carry out the following operations:

- Tightness test;
- Cooling system draining and drying;
- Refrigerant charge.

TIGHTNESS TEST

Fill the cooling circuit with gaseous R407C and reach a 1 bar pressure. Then add nitrogen through bombs equipped with a reducing valve and reach a 15 bar pressure. Check leaks with the leak detector. If leaks are detected exhaust the cooling circuit before welding (with copper-phosphor alloy and 2% silver).

It is important that the cooling system is completely exhausted before welding, to prevent explosions. Never use oxygen as a substitute of nitrogen, otherwise explosions might occur.

COOLING CIRCUIT DRAINING AND DRYING

For a good vacuum condition use a suitable pump (1.4 mbar absolute pressure, 30 l/min. capacity). When the circuit is opened for a very short time, with this pump you normally need only one vacuum operation to reach the absolute pressure of 1.4 mbar.

If such a vacuum pump is not available, or if the circuit remains open for a long time, we strongly recommend that you follow the three-fold pumping method.

Such method is also advisable if moisture is present in the circuit.

The vacuum pump must be connected to the intake openings.

Comply with the following procedure:

- Evacuate the circuit up to a 35 mbar absolute pressure at least, then fill the cooling circuit with R407 C and reach an about 1 bar pressure;
- Repeat the above described operation and reach an absolute pressure of 35 mbar;
- Repeat the above described procedure a third time and reach an absolute pressure which should be as low as possible.

REFRIGERANT CHARGE

Always follow this procedure:

- Connect the refrigerant bomb to the 1/4" SAE male intake on the liquid line, blow out some gas to exhaust air from the interconnection tube;
- Capsize the bomb and fill the circuit with liquid refrigerant: fill 75% of total charge;
- Now connect it to the intake on the suction line and, holding the bomb upright, fill the line completely until in the chiller the temperature of the liquid tube, before the filter, is 7-8°C lower (or 4°C lower in case of heat pumps) than the °C temperature read on the R407C pressure gauge on the distribution tube.

DISMANTLING

When the unit is to be dismantled, drain the cooling circuit and collect the gas through a suitable receiver. This operation ensures safety to persons and environment.

IMPORTANT: DO NOT DISPOSE OF GAS CONTAINED IN THE COOLING CIRCUIT IMPROPERLY FOR ANY REASON.

When the unit is dismantled or the compressor is replaced carefully pour compressor's oil into a suitable receiver and send it to a specialised centre for oil disposal.

IMPORTANT: DO NOT DISPOSE OF COMPRESSOR OIL IMPROPERLY FOR ANY REASON.

EMERGENCIES

By:

Floods: Immediately cut out the automatic circuit breaker that is located upstream the power supply line to the unit and turn off the water pump (if it is part of the hydraulic system). Then repair the defective part of the water circuit.

Fire: Immediately cut out the automatic circuit breaker which is located upstream the power supply line to the unit and use a powder-based or CO₂-based fire extinguishing product.

MAIN COMPONENTS

PANELS AND FRAME

IMPORTANT: Panels (fixed guards) enclose potentially dangerous areas in case of failure or damage; before they are removed disconnect the unit power supply from the main switch and turn OFF the water inlet supply.

The panels enclosing the various parts of the unit are made up of painted galvanised steel plate.

The technical compartment is closed. It contains the compressors and the main components of the unit.

COMPRESSOR

A highly reliable compressor with high-efficiency in performance, protected by an internal thermal overload.

COATED CONDENSER FINS

The aluminium fins on the condenser are coated with special anti-corrosion material ensuring the endurance of the condenser.

INTEGRAL STAINLESS STEEL WATER TANK

The high volume integral stainless steel tank help maintaining an optimum water temperature to minimise the compressor starts for reaching a longer compressor life.

AXIAL FANS

Axial fans are directly coupled to an electric 8-6 pole motor with overload protection, electronic balancing, and blades with low-sound-level wing contour and complete with a special air conveyor and protection grilles.

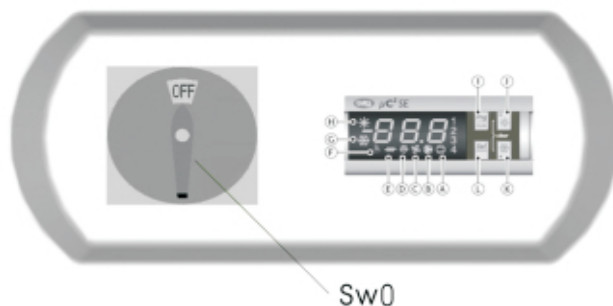
IMPORTANT:

- The protection grille for fans is a fixed guard enclosing a risk zone of the unit;
- Do not remove it, replace it if damaged.

CAREL Controller

It is the same size as a normal thermostat, for the complete management of chillers and heat pumps: it can control air-air, air-water, water-water and condensing units. The user manual of this controller is also supplied to users with this manual.

Display



The display feature 3 digits, with the display of the decimal point between -99.9 to 99.9.

Outside of its range of measurement, the value is automatically displayed without the decimal (even if internally the unit still operates considering the decimal part).

In normal operation, the value displayed corresponds to the temperature read by probe B1, that is, the evaporator water inlet temperature (for water chillers) or the ambient air temperature for direct expansion units.

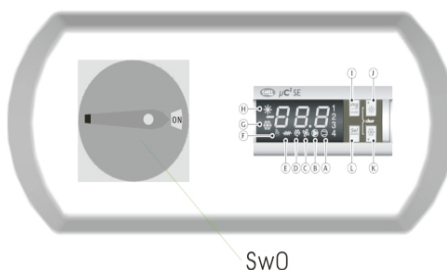
The parameters are divided into 4 different types, according to their level of access by the user (password) and their function.

For each level, only the access to the parameters of the same or lower level can be set. This means that through the "factory" password, accessing the menu "levels" (L-P), it is possible to set the desired level for each parameter.

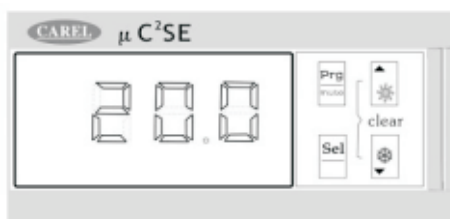
For detailed parameter setting, please refer to the **CAREL μC^2SE User Manual** attached with every unit.

Start up

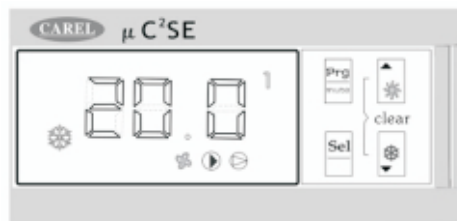
- 1) Turn the main switch SW0 to "ON",



The display shown as:

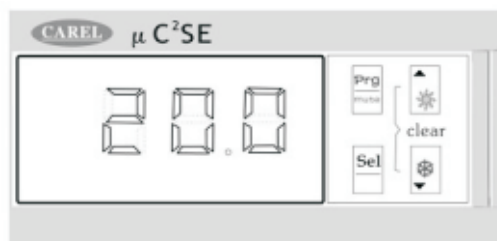


2) Press and hold  for 5 seconds, then wait about 3 minutes, the display shown as:



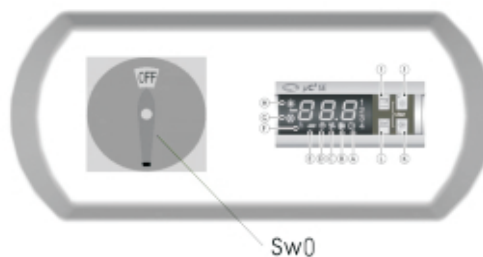
Standby

Press and hold  for 5 seconds, the display shown as:

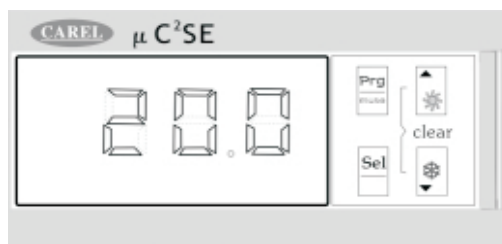


Shut Down

- 1) Press and hold  for 5 seconds;
- 2) Turn the main switch SW0 to “OFF”

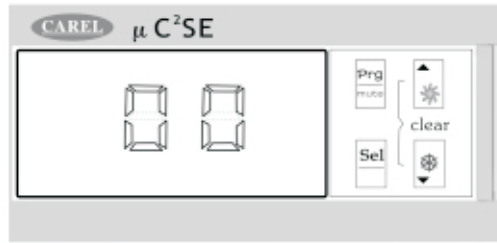


How to change water outlet cooling set point (r01)

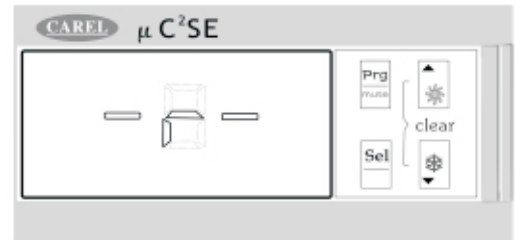


- 1) Turn the sw0 to “ON” →

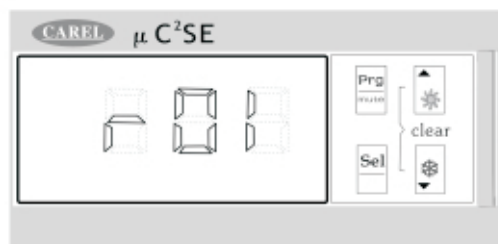
2) Press “sel” for 5s→



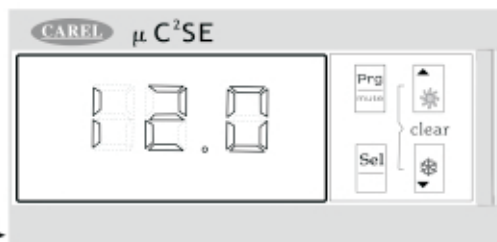
3) Press “▽” or “△” →Until the display →



4) Press “sel” display →



5) Press “sel” display→



(The current set temp)

6) Press “ △ ” or “ ▽ ” Until Set temp

7) Press “sel”, then press “Prg” that is ok .

How to change water outlet different set point (r02)

Repeat steps as r01, select r02, and change the set point accordingly.

How to change antifreeze alarm set point (A01)

Repeat steps as r01, select A01, and change the set point accordingly.

Appendix A

Commissioning Report

Customer	
Address	
Post code	
Site address (if different)	

Product	
Make	
Model	
Serial No:	

PRELIMINARY CHECKS (✓) if checked			
1) Positioning -----surface / access		6) Water system connection	
2) Adequate ventilation to condenser		7) Isolating valves fitted	
3) Power connection		8) Glycol added	
4) Phase rotation		9) Refrigerant leak test	
5) Load available		10) System filled and air vented	

Start up				
1) Control display light up				
2) Pump ON				
3) Compressor ON				
4) Condenser Fan ON				

Control settings				
1). Cooling setting point (r01) °C				
2). Cooling differential point (r02) °C				

Electrical system				
1) Main supply voltage				
2) Control circuit voltage				
3) Compressor running Amps				
4) Compressor Overload setting at				
5) Pump running Amps				
6) Pump Overload setting at				
7) Condenser fan running Amps				
8) Condenser fan overload setting at				

Refrigeration circuit				
1) Liquid line sight glass				
2) Oil level				
3) Refrigeration charge				
4) Suction pressure at (bar)				
5) Discharge pressure at (bar)				
6) Antifreeze cut out point at °c				
7) High pressure cut out at (bar)				
8) Low pressure cut out at (bar)				

Evaporator				
1) Glycol mixture %				
2) Leaving Temperature °c				
3) Return temperature °c				
4) Water pressure in (bar)				
5) Water pressure out (bar)				
6) Pressure drop (bar)				
7) Flow switch operation				
8) Low level sensor				

Condenser				
1) Fin coil condiction				
2) Filter condition				
3) Condenser fan cut in at (bar)				
4) Condenser fan cut out at (bar)				

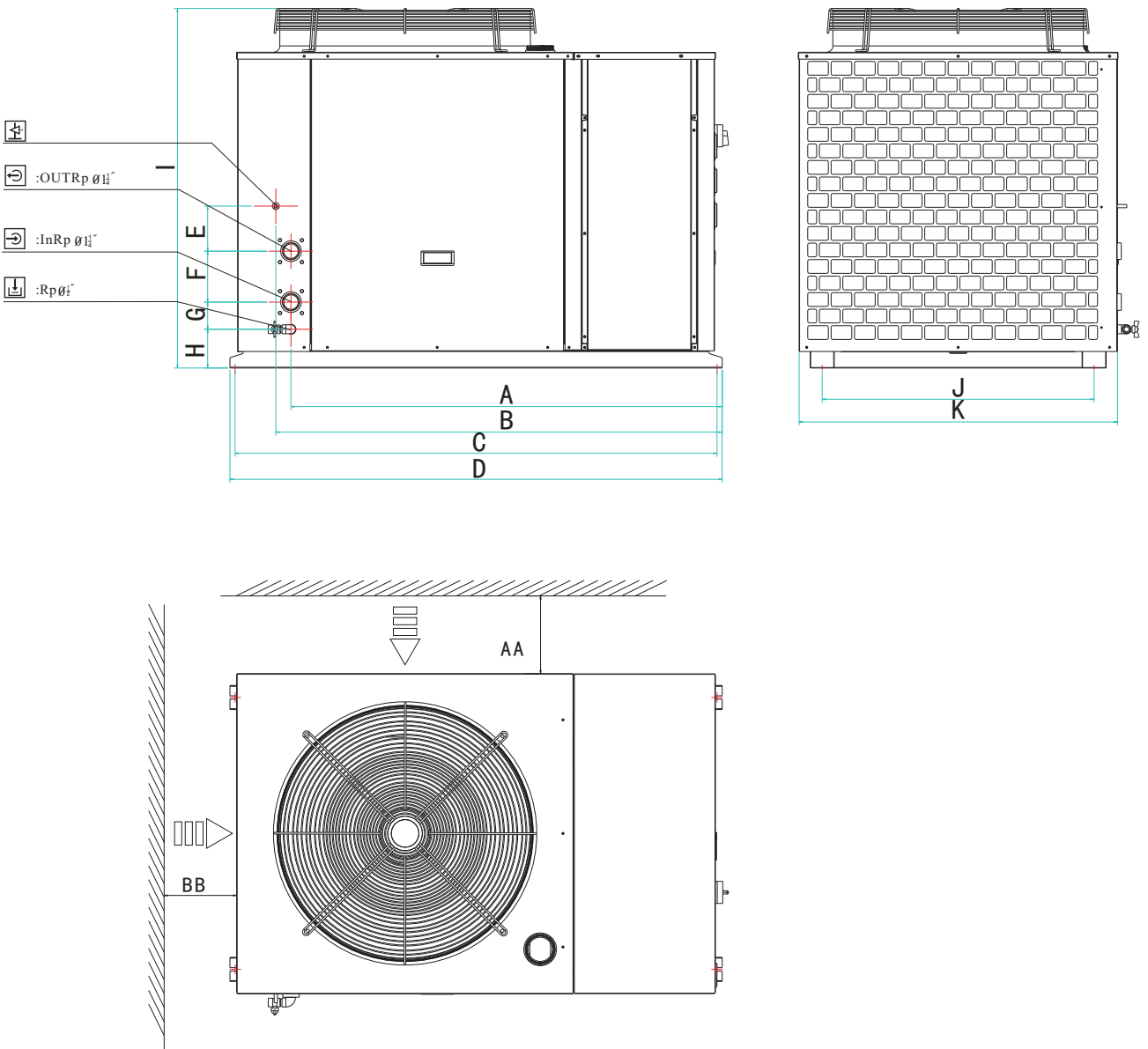
Remarks:

Installed by:			
Company		Print name	
Address		Signed	
post code		Date	

Commissioned by:			
Company		Print name	
Address		Signed	
post code		Date	

OVERALL DIMENSION

1). HL-B15 to HL-B50 Overall Dimension

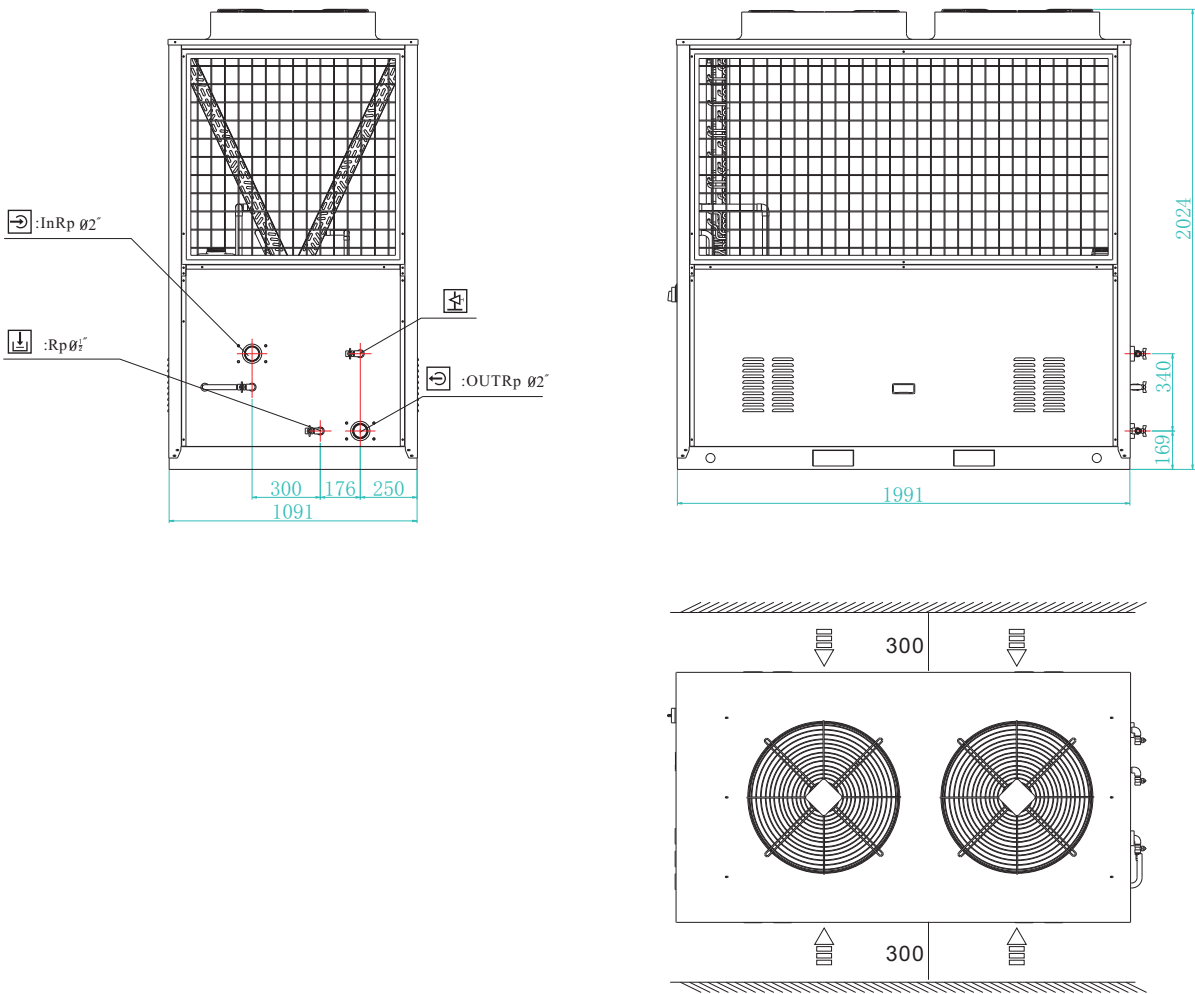


-  :Cooled-water Inlet  : Cooled-water Outlet  :Water discharge ($\phi 1\frac{1}{2}$ ")
-  : Water air vent

MODEL	A	B	C	D	E	F	G	H	NO. OF FAN
15~20	1103	/	1170	1230	/	120	106	87	1
40~50	1253	1297	1400	1430	131	148	79	112.5	1

MODEL	I	J	K	AA	BB
15~20	889.5	590	725	300	300
40~50	1405	790	925	300	300

2). HL-B80 and HL-B90 Overall Dimension



$\rightarrow$:Cooled-water Inlet

$\leftarrow$: Cooled-water Outlet

$\downarrow$:Water discharge ($\Phi 1/2"$)

$\uparrow$: Water air vent

Appendix D

TROUBLESHOOTING

TROUBLE	PROBABLE CAUSE	POSSIBLE CURE
A) The unit doesn't start up	Defective connection or open contacts	Check voltage and close contacts
	The unit doesn't start up	Press and hold  for 5 seconds
	Compress. delay timer	Wait for set delay time
	Safety device response is missing	
	The unit alarms	Check for the Error Code and do the relevant cure
	Wrong parameters setting	Reset
B) Compressor doesn't start	Burned or seized compressor	Replace compressor
	Compressor remote control switch is de-energised	Check voltage at compressor coil's ends and check out for coil continuity
	Power circuit open	Try to find out the reason why protection is activated close compressor's circuit
	The unit alarms	See point A
	Compressor's thermal overload circuit breaker acts	Reset
C) Compressor starts and stops repeatedly	Control temperature return difference setting is too small	Raise the return difference setting ("r02" parameter)
D) Compressor doesn't start Because the max. pressure switch has been actuated (HP1 or HP2 alarm)	Pressure switch out of order	Check and replace
	Excessive refrigerant charge	Recover excessive gas
	Clogged air condenser Too limited air capacity	Clean with compressed air or water jet
	Condenser fans are not working	See point F
	Condenser fans rotate in wrong direction	See Electric Connections paragraph
	Ambient air temperature is too high	Reduce ambient temperature within design limits, for example by increasing local ventilation.
E) Compressor does not start because the min. pressure switch has been actuated	Pressure switch out of order	Check and replace
	Lack of refrigerant	Call a qualified refrigeration engineer to check for leaks and replenish refrigerant
	Water outlet sensor probe sets too low so that the water freezes	Raise the set value or change the LP Switch
	Water pump doesn't work	Check for the water pump
	Water flow isn't enough	Check for whether the water filter is dirty or clogged or not
	Clogged freon filter	Check and replace
	Thermostatic expansion valve is not working correctly	Check, clean or, if necessary, replace

F) Fans don't start	Burned or seized fans	Replace fans
	Pressure sensors are damaged	Replace pressure sensors
	Fans' thermal overload circuit breaker acts	Reset
G) The unit works and never stops	Lack of refrigerant	Call a qualified refrigeration engineer to check for leaks and replenish refrigerant
	Excessive thermal load	Reduce thermal load
	Compressor cooling capacity isn't as high as expected	Check, replace or reset
H) Pump doesn't start	Fans' thermal overload circuit breaker acts	Reset
	Burned pump	Check or replace
	No water inside the circuit	Check for hydraulic system to find leaks, if any, and refill
	The unit alarms	See point A
I) Signal of water differential pressure switch is not present	Pump set for low speed	Increase speed through variator on the pump
	Limited water capacity of the system	Check pressure drops in the system
	Shut-off valve of water circuit is closed	Open the closed valve

T3601-4E



HL (Europe) Ltd 92 Craven Park Road, London, NW10 4AG United Kingdom

Tel: 0844 56 11 783 Fax: 0844 56 11 780 www.hl-cooling.com sales@hl-cooling.com

Company registration number: 5285108. Registered office: 270 Sutton Road Southend-on-Sea Essex SS2 5ET UK