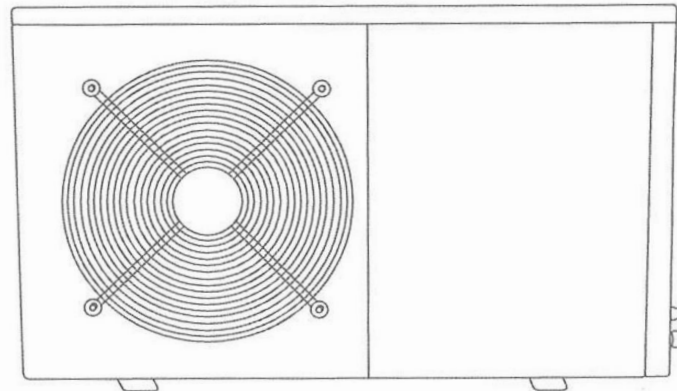




# SPA HEAT PUMP

INSTALLATION &  
OPERATION MANUAL



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## 1. Introduction

Thank you for choosing a Catalina heat pump for your spa heating.

In order to offer qualified, reliable and flexible heat pump unit to our customer, please carefully read this manual before installing, operating and troubleshooting. This manual includes all necessary information.

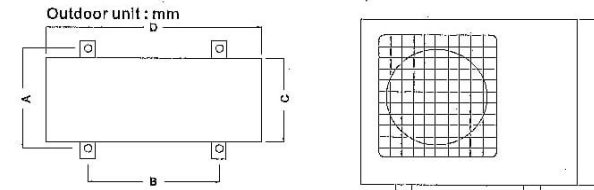
### ATTENTION

- The heat pump unit must be installed by qualified technicians.
- Operation and maintenance must be carried out in accordance with this manual.
- Use only genuine replacement spare parts.

## 2. Specifications

Models		CAT-HP4	CAT-HP8
<b>*Heating Capacity at Air 27°C and Water 27°C, water flow 2200LPH</b>			
Heat Output	KW	4	8
Power Consumption	KW	0.58	1.17
COP		6.9	6.8
<b>*Heating Capacity at Air 27°C and Water 40°C, water flow 1100LPH</b>			
Heat Output	KW	3	6
Power Consumption	KW	0.66	1.33
COP		4.5	4.5
<b>*Heating Capacity at Air 5°C and Water 40°C, water flow 1100LPH</b>			
Heat Output	KW	2	4
Power Consumption	KW	0.69	1.35
COP		2.9	2.9
<b>* Power supply</b>			
Voltage	V	220-240	220-240
Frequency	Hz	50	50
Rated Current	A	3	6
<b>* Water Data</b>			
Advised water flux	LPH	1100-2200	1100-2200
Water pipe in-out spec	Inch	3/4"	3/4"
<b>*General Data</b>			
Compressor		Rotary	Rotary
Air flow		Horizontal	Horizontal
Condenser	Ni/Co Copper High efficient heat exchanger		
Noise at 10m	dB(A)	35	37
Noise at 3m	dB(A)	45	47
Noise at 1m	dB(A)	47	49
Water pressure drop	Kpa	10	10
Refrigerant (R407c)	kg	0.8	1.4
<b>*Dimension &amp; Weight</b>			
Net Dimension	mm	755x295x475	936x360x560
Net Weight	kg	36	49
Packing Dimension	mm	855x345x540	1090x390x580
Gross Weight	kg	40	53

## 3. Dimension

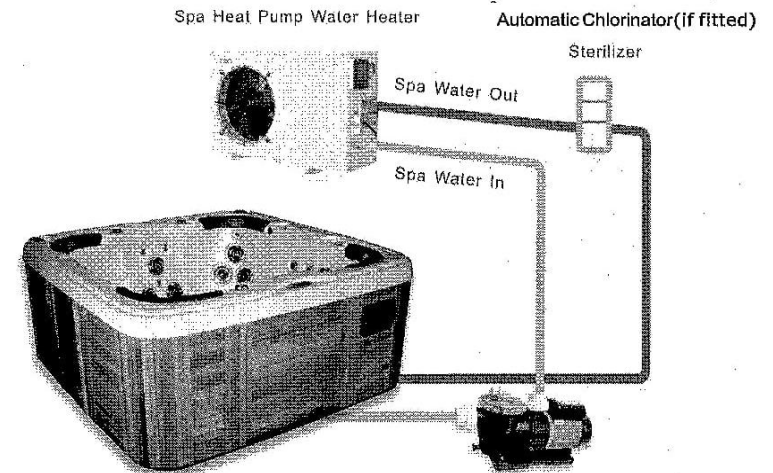


Unit: mm

Models	A	B	C	D	E
CAT-HP4	273	423	260	747	470
CAT-HP8	330	680	280	930	520

## 4. Installation

### 4.1 Installation illustration

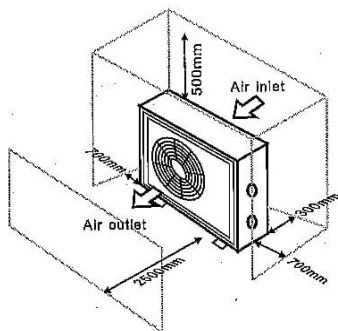


The heatpump is designed to run off the low speed filter pump. In some instances an auxiliary pump might be necessary.

**NOTE:** The Catalina only provides the heat pump unit, the other items in the illustration that provided by users or the installers.

**4.2 Installation Instruction**

- (1) The heat pump unit must be installed by professional technician.
- (2) The heatpump can be installed almost anywhere outdoors for the best performance it need to meet the following criteria:
  - a) Good ventilation
  - b) stable and reliable power supply
  - c) Correct water circulation through unit
- (3) When install a bypass, it should be not exceed 30% of nominal flow rate
- (4) Below picture show the minimum required distance on each side of spa heat pump unit.



- (5) The location of any chemical dosing to your spa is critical to the heatpumps life and warranty. If an automatic chlorinator or brominates is used, it must be located downstream of the heater. A trap must be installed between the chlorinator and the heater to prevent chlorine return into the heat pump.
- (6) The distance required  
Typically, the outdoor unit should be installed beside the spa, less than 1.5 meters distance. If it is installed further away, the pipeline system will cause greater heat loss.
- (7) To get the best performance from your heatpump the water flow rate must meet the requirement and detailed in the specification
- (8) The condensate pipe should be increased in size in freezing conditions and always checked its not blocked. Or damage might occur to the heatpump unit.
- (9) The pipe connections to the heatpump unit should be quick connect unions. The heatpump and all pipe work must be drained down in winter.

**4.3 Refrigerant Pipe Connection**

<p><b>Step 1 : Drainpipe Installation</b></p>		<p>1. When unit running, there will be some condensation water discharged from the bottom, please hold the drainage nozzle (accessory ) into the hole and clip well, and then connect a pipe to drain the condensation water out .</p>
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**5. Electrical Wiring**

All electrical work must be undertaken by a qualified electrician.

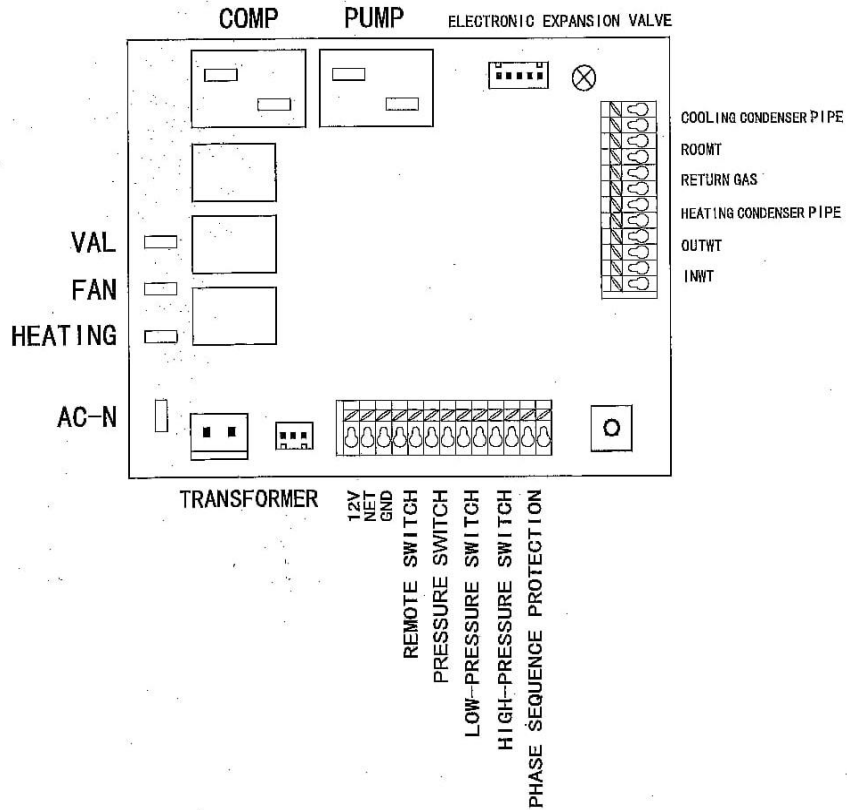
**5.1 Wiring Steps:**

1. Take off the wiring cover
2. Connect inlet water temperature sensor (Heat exchanger)
3. Connect power supply according to wiring diagram

**ATTENTION:**

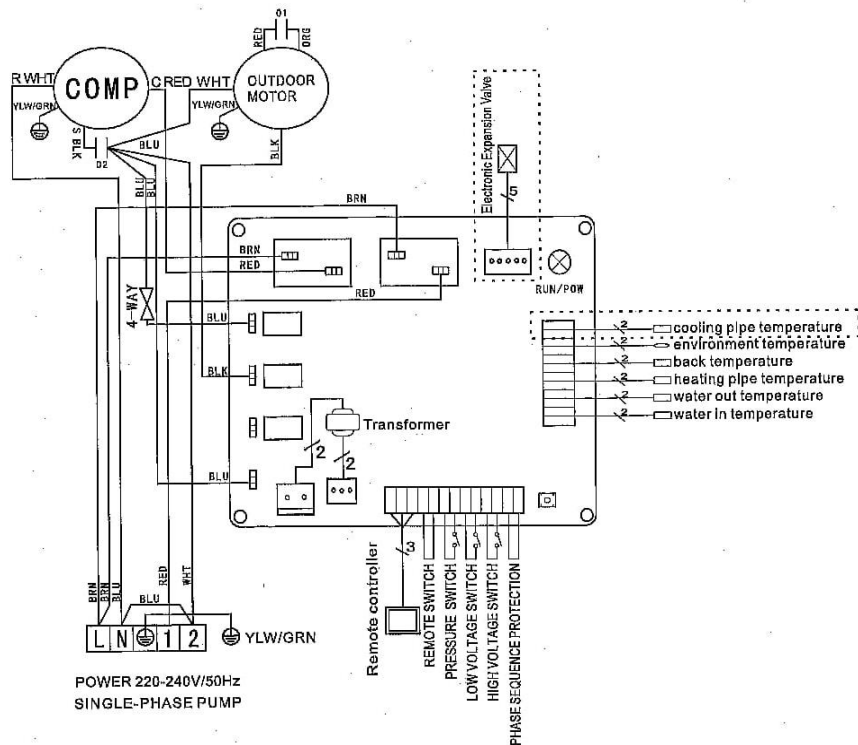
1. Use correct size and type of power cable.
2. Connecting to the wrong terminals could cause damage to the heatpump unit.
3. Check that wiring terminals are tightened to prevent them becoming loose during operation.
4. Check the wiring cover is secure. Do not operate unit without wiring cover.

5.2 Illustration of PCB connection



No.	Symbol	Meaning
1	FAN	Fan speed (5A)
2	PUMP	Water pump(20A)
3	HEATING	Electrical heating (5A)
4	VAL	4 way valve (5A)
5	COMP	Compressor (20A)
6	AC-N	Neutral wire
7	NET GND 12V	Wire Controller
8	HP GND	High-pressure switch (input)(normal close)
9	LP GND	Low-pressure switch (input)(normal close)
10	WATER GND	Current switch (input) (normal close )
11	INWT	Water in temperature(input)
12	OUTWT	Water out temperature(input)
13	HEATING CONDENSER PIPE	Temp. of heating condenser pipe (input)
14	RETURN GAS	Return gas temp.(input)
15	ROOMT	Ambient temperature (input)
16	COOLING CONDENSER PIPE	Temp. of cooling condenser pipe (input)

5.3 Wiring diagram.



**NOTE:**

(1) The spa heat pump must be connected ground wire well, although the unit heat exchanger is electrically isolated from the rest of the unit. Grounding the unit is still required to protect you against short circuits inside the unit. Bonding is also required.

**ISOLATOR.** An isolator must be located within sight of and readily accessible from the unit. This is common practice on commercial and residential heat pumps. It prevents the unit being accidentally being switched on during service intervals

**6. Initial Startup of the unit**

**Note:** Please make sure the water pump is running in circulation with adequate rate of water flow.

**ATTENTION:**

Please follow these steps when operating in the first time :

1. Open valve and charge water
2. Make sure that the pump and the water-in pipe have been filled with water  
Close the valve and start the unit

**Startup Procedure** – after installation is completed, and please follow these steps:

- (1) Turn on your filter pump, check for water leaks and verify flow of Spa.
- (2) Turn on the electrical power supply to the unit, then press the key ON/OFF of wire controller, it should start in several seconds.
- (3) After running a few minutes make sure the air ventilation from the side of the unit is cooler (Between 5°C to 10°C)
- (4) When the unit operates to turn off the filter pump, the unit should also turn off automatically.
- (5) Allow the unit and water pump to run 24 hours per day until the water reached the desired temperature. When the temperature reaches the setting value, the HP unit will shut down, when the spa water temperature drop more than 1°C, please restart (as long as HP unit is running)

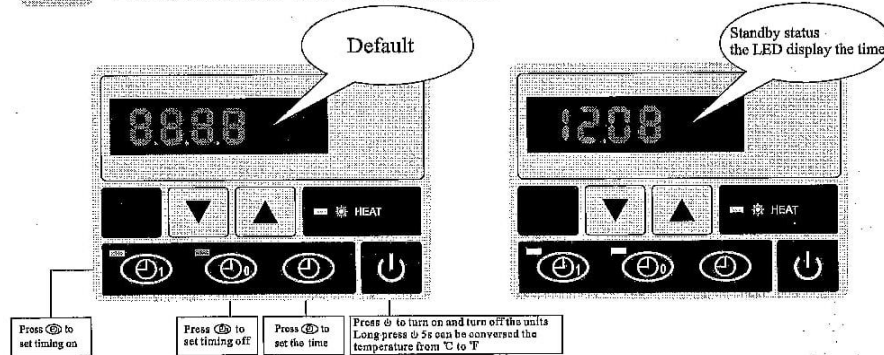
**Time Delay:**

The heatpump is equipped with a 3-minute built-in solid-state re-start delay protection, Time delay control is an integral part of the circuit control, it can eliminate restart cycling and contactor chatter.

The time delay will automatically restart the HP unit approximately 3 minutes after each control circuit interruption. Even a brief power interruption will activate the solid state 3 minute restart delay and prevent the unit from the starting until the 3 minutes countdown is completed.

**7. Operation**

7.1 The functions of LED wire controller



- (1) Under parameter setting, Press [down] and [up] hold for 5 seconds to enter operating parameter setting interface.
- (2) Under parameter setting, Press [power with fan] again to start setting parameter from 0 to A#, (see operation parameter table)
- (3) Under current mode, Press [down] or [up] to modify the water setting temperature.

**Parameter 0**  
To set the water-in temp. under cooling mode (18.5~38°C) default setting: 29.5°C

**Parameter 1**  
To set the water-in temp. under heating mode (4.5~41°C) default setting: 38°C

**Parameter 2**  
Total working time of compressor after frosting (30-90MIN, Default setting: 40MIN)

**Parameter 3**  
Terms of Entry defrosting function (<math>5^{\circ}\text{C}</math> to  $0^{\circ}\text{C}</math>) default setting:  $-7^{\circ}\text{C}</math>$$

**Parameter 4**  
Terms of Exit defrosting function (<math>5^{\circ}\text{C}</math> to  $3^{\circ}\text{C}</math>) default setting:  $13^{\circ}\text{C}</math>$$

**Parameter 5**  
Time of Exit defrosting (1 to 12MIN, default setting 8MIN)

**Parameter 6**  
Mode  
& Cooling (Heat pump)  
1. Cooling & Heating (Heat pump)  
2. Heat pump + electronic valve (Cooling & Heating)  
3. Heat pump + electronic valve (Heating only)

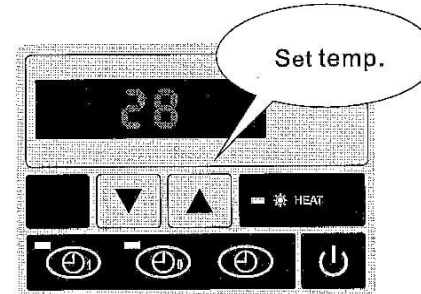
**Parameter 7**  
Mode selection of Electronic expansion valve (0 to 1), default setting: 1 (auto)

**Parameter 8**  
Heating target for superheat ( $-15.0\text{--}15.0^{\circ}\text{C}</math>) default setting:  $3^{\circ}\text{C}</math>$$

**Parameter 9**  
Cooling target for superheat ( $-15.0\text{--}15.0^{\circ}\text{C}</math>) default setting:  $10.0^{\circ}\text{C}</math>$$

**Parameter A**  
Manual adjustment steps of electronic expansion valve (18~54), default setting: 70(\*2)

**7.2 To set the temperature**



- (1) Press  $\downarrow$  or  $\uparrow$  to set temperature.
- (2) LED displays the water-in temperature and current mode when running.

**7.3 Understanding the system status**

- (1) Long press "Ⓞ" 5 seconds to enter operating parameter setting interface
- (2) Press  $\downarrow$  and  $\uparrow$  hold for 5 seconds to enter operating parameter setting interface. You can check water-in/water-out /condenser /ambient temperature.
- (3) Mode can be changed while running
- (4) When the unit is switched off, current time is displayed.

## TIME SETTING

Press **⏸** to set the time, and press **⏴** or **⏵** to adjust the time  
 After pressed the **⏸** again to store the new data.  
 When setting the time, **⏸** and **⏸** can not work.

## TIMER ON SETTING

Press **⏸** to set the time for HP start to run ,and press **⏴** or **⏵** to adjust starting time. After, to press **⏸** again to store the new data.  
 When **⏸** lights, Press **⏸** to cancel the Timer on setting .

## TIME OFF SETTING

Press **⏸** to set the time for HP stop to run, press **⏴** or **⏵** to adjust the time of stop running.  
 After, to press **⏸** again to store the new data.  
 When **⏸** lights, press **⏸** to cancel the Timer Off setting

## 7.4 RUNNING DATA SETTING

### ATTENTION:

HP unit must be checked running parameters after installed before used in the first time.  
 When HP is running, LED displays water inlet temperature  
 When HP is stopping, LED wire controller displays the actual time.  
 When HP is stopping, the parameters can be changed.

Parameter	Meaning	Range	Default	Remarks
0	Return water temp. Setting (Cooling mode )	18.5-38℃	29.5℃	yes
1	Return water temp. Setting (Heating mode )	4.5-41℃	38℃	yes
2	Total working time of compressor after frosting	30-90min	40min	Adjusted by technicians
3	Terms of Entry defrosting function	-30℃to 0℃	-7℃	Adjusted by technicians
4	Terms of Exit defrost under heating model	2-30℃	20℃	Adjusted by technicians
5	Time of Exit defrost under heating model	1-12min	8min	Adjusted by technicians
6	Mode: 0. Cooling (Heat pump) 1. Cooling & Heating (Heat pump) 2. Heat pump +electrical heater (Cooling & Heating) 3. Heat pump + electrical heater (Heating only)	0-3	3	Adjusted by technicians
7	Mode selection of Electronic expansion valve	0-1	1 (auto)	0-manual ,1-automatic
8	Heating target for superheat	-15-15℃	3℃	Adjusted by technicians
9	Cooling target for superheat	-15-15℃	10℃	Adjusted by technicians
A	Manual adjustment steps of electronic expansion valve .	18-94	70	N*5 (parameter 7=0 valid)
b	Inlet water temp.	-9--99℃		Exact Testing Value
c	Outlet water temp.	-9--99℃		Exact Testing Value
d	Heating condenser temp.	-9--99℃		Exact Testing Value
E	Return gas temp.	-9--99℃		Exact Testing Value
F	Ambient temp.	-9--99℃		Exact Testing Value
G	Cooling condenser temp.			Exact Testing Value
H	Step motor position (number of steps)	18-94		Exact testing by value

## 8. Maintenance

- (1) You should check the water supply system regularly as to avoid the air entering the system and occurrence of low water flow, because it would reduce the performance and reliability of Spa heat pump unit.
- (2) Clean your spas and filtration system regularly to avoid the damage of the unit as a result of the dirty of clogged filter.
- (3) Keep the HP unit dry, clean, well-ventilated and always clean air side of the heat exchanger, which can maintain a good heat exchanger and energy saving.
- (4) Only a qualified service technician is allowed to operate pressure of the refrigeration system.
- (5) Check power cable connection, if heat pump starts to operate abnormally, you should turn it off and contact with qualified technicians.
- (6) You should drain the water from water pump and other water system, to prevent from the freezing damage in winter seasons.
- (7) The heatpump and all associated pipe work must be drained down during winter or freezing conditions.
- (8) Always flush with clean water and check thoroughly before recommissioning the heatpump.

## 9. Troubleshooting guide

### WARNING

Incorrect installation could result in personal injury.

- (1) Do not adjust internal control.
- (2) If you are not familiar with your water filtration system and heater
  - (a) Do not try to adjust, consult the professional dealer.
  - (b) Before use, please read the Installation and User's Guide.

**Note:** TURN OFF power supply before any maintenance work



**10. Attachment**

Malfunction	Wire Controller	Reason	Solution
Inlet water temperature sensor failure	PP 1	The sensor in open or short circuit	Check or change the sensor
Outlet water temperature sensor failure	PP 2	The sensor in open or short circuit	Check or change the sensor
Heating condenser sensor failure	PP 3	The sensor in open or short circuit	Check or change the sensor
Gas return sensor failure	PP 4	The sensor in open or short circuit	Check or change the sensor
Ambient sensor failure	PP 5	The sensor in open or short circuit	Check or change the sensor
Temperature difference is too much between water inlet and water outlet	PP 6	Water flow volume not enough, water pressure difference is too low	Check the water flow volume, or water jammed or not
Cooling outlet water temperature is too low	PP 7	Water flow volume is not enough	Check the water flow or water system is jammed or not
First grade antifreeze protection in Winter	PP 7	Water flow volume is not enough	Water pump will run automatically for First grade antifreeze.
Second grade antifreeze protection in Winter	PP 7	Ambient temperature or water inlet temperature is too low	Heat pump will start to heat for second grade antifreeze.
Cooling condenser sensor failure	PP 8	The sensor is open or short circuit	Check or change the sensor
High pressure protection	EE 1	1. Refrigerant is too much 2. Air flow is not enough	1. Discharge redundant refrigerant from HP gas system 2. Clean air exchanger
Low pressure protection	EE 2	1. Refrigerant is not enough 2. Water flow is not enough 3. Filter jammed or capillary jammed	1. Check if there is any gas leakage, re-fill the refrigerant. 2. Clean air exchanger 3. Replace the filter or capillary
Pressure switch failure	EE 3	No water/little water is water system	Check the water flow volume, water pump is failure or not
Power supply connections wrong (3 phase unit)	EE 4	Wrong connection or lack of connection	Check connection of power cable.
Inlet and outlet water temperature difference malfunction	EE 5	Water flow volume is not enough, water pressure difference is too low	Check the water flow rate, or water system is jammed or not
Communication failure	EE 8	Wire connection is not good	Check the wire connection

**FAHR ENHEIT : CELSIUS**

$^{\circ}\text{C} = (^{\circ}\text{F} - 32) * 5/9$

$^{\circ}\text{C}$	$^{\circ}\text{F}$	$^{\circ}\text{C}$	$^{\circ}\text{F}$	$^{\circ}\text{C}$	$^{\circ}\text{F}$	$^{\circ}\text{C}$	$^{\circ}\text{F}$
-9.0	16	5.0	41	19.0	66	33.0	92
-8.5	16	5.5	42	19.5	67	33.5	93
-8.0	17	6.0	43	20.0	68	34.0	93
-7.5	18	6.5	44	20.5	69	34.5	94
-7.0	19	7.0	45	21.0	70	35.0	95
-6.5	20	7.5	46	21.5	71	35.5	96
-6.0	21	8.0	47	22.0	72	36.0	97
-5.5	22	8.5	48	22.5	73	36.5	98
-5.0	23	9.0	48	23.0	74	37.0	99
-4.5	24	9.5	49	23.5	75	37.5	100
-4.0	25	10.0	50	24.0	75	38.0	101
-3.5	25	10.5	51	24.5	76	38.5	102
-3.0	26	11.0	52	25.0	77	39.0	102
-2.5	27	11.5	53	25.5	78	39.5	103
-2.0	28	12.0	54	26.0	79	40.0	104
-1.5	29	12.5	55	26.5	80	40.5	105
-1.0	30	13.0	56	27.0	81	41.0	106
-0.5	31	13.5	57	27.5	82	41.5	107
0.0	32	14.0	57	28.0	83	42.0	108
0.5	33	14.5	58	28.5	84	42.5	109
1.0	34	15.0	59	29.0	84	43.0	110
1.5	35	15.5	60	29.5	85	43.5	111
2.0	36	16.0	61	30.0	86	44.0	111
2.5	37	16.5	62	30.5	87	44.5	112
3.0	38	17.0	63	31.0	88	45.0	113
3.5	39	17.5	64	31.5	89	45.5	114
4.0	39	18.0	65	32.0	90	46.0	115
4.5	40	18.5	66	32.5	91	46.5	116