

6. The Control must be capable of automatically calculating and resetting the heating storage tank target temperature based on Outdoor Temperature.

7. The Control must be modular in design. Capable of staging up to 14 compressor stages using optional Expansion Modules and one single microprocessor managing the control logic for potential future upgrades:

- a. Multi-Stage Heatpumps/ Chillers can be selected for Hi/Lo or Lo/Lo stage configurations.
- b. A fixed first or fixed last option must exist within the control menu.
- c. Optional Heatpump Rotation must be available to rotate heatpumps automatically every 48 hours of actual running time.
- d. The control must directly interface, without any cross wiring, with expansion modules that provide:
 - i. extra dry contacts (EXP-0100)
 - ii. extra powered contacts (EXP-0300)
 - iii. zoning capability (ZON-0500)

8. The Control must have a cooling interlock feature.

9. The Control must have separate programming parameters for operating a backup heat source.

10. The Control must use a 128 x 64 pixel full graphic display. The display must be capable of showing the following information in one single screen

- a. Heat Demand
- b. Cooling Demand
- c. Fault Indicator
- d. 3 separate Set Point Demands
- e. WWSD (Warm Weather Shut Down)
- f. Tank Temperature (Actual vs. Target)
- g. GND Loop (Actual vs. Target)
- h. Outdoor Temperature
- i. Set Point Temperature
- j. Time, Month, Day and Year

11. A screen must be available to display and read each of the accumulated run times for each heatpump (stage).

12. In addition to the 3 standard Thermistor/sensor inputs 3 more optional (requires expansion modules) Thermistor values must be available for viewing in the standard control screen. The optional Thermistor/sensors may be used for; set point loads, return water temp, DHW, floor warming, Room/Zone sensing etc.

13. In the event of Thermistor sensor problems the main display will indicate an “open” or “short” condition in plain text.



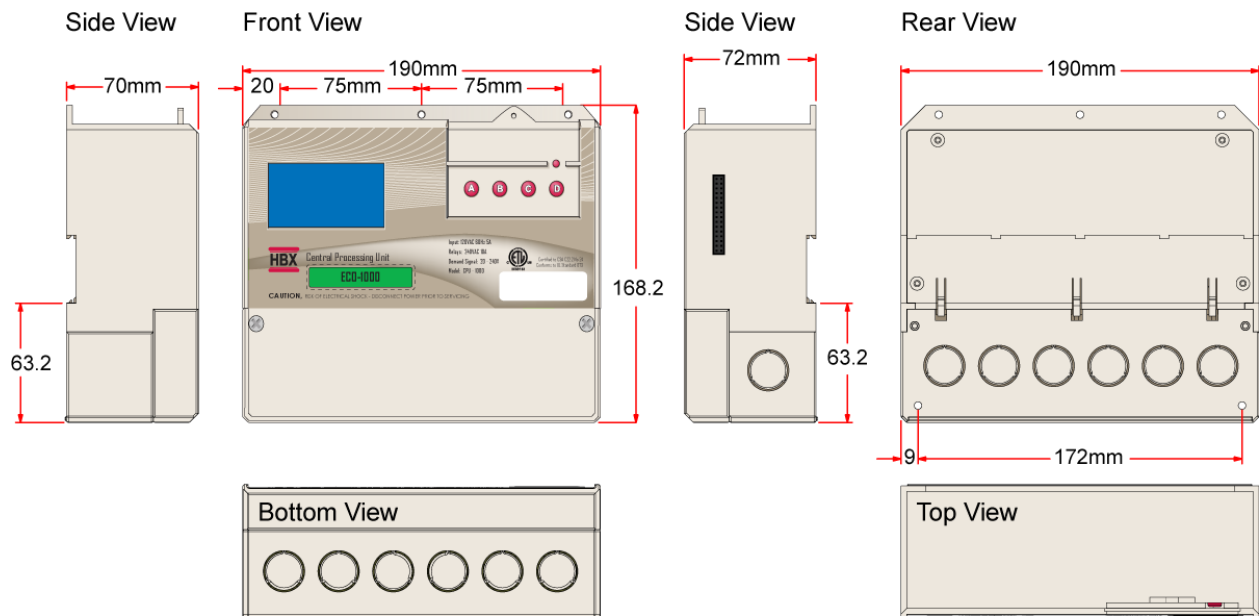
14. The Control must be capable of retrieving from its memory both the minimum and maximum temperature extremes that each of the 6 Thermistors have been subjected to. The month, day, year and actual time of the recorded temperature must be displayed to assist in system diagnoses and troubleshooting.
15. A Test function must be present to test and cycle each relay independently for troubleshooting and commissioning purposes. Each relay must be able to stay on for at least 30 seconds.
16. The Control must have a lock-out feature to avoid unauthorized tampering with the programming menu.
17. The Control must have a standard RS232 communications port for optional remote communication
18. The Control must be capable of interfacing with optional Communications software and capable of at least the following functions:
 - a. Real-Time Data Logging
 - b. System Status viewing
 - c. Control Reconfiguration
 - d. Alarm function
19. The Control must be capable of running multiple applications
 - a. Geothermal
 - b. Solar
20. The Control must be ETL approved.



Part 2: Acceptable Products

1. HBX ECO-1000 Geothermal/Solar Control

Part 3: Physical Dimensions



Part 4: Technical Data, Main Parts & Labels

Inputs / Outputs:

3 x Thermistor Input (10K Ohm)
3 x Miscellaneous Optically Isolated Powered (Relay) Inputs (20-240 VAC)
2 x Relay Dry Contact (120VAC, 10A) Outputs
3 x Pump Output Relays (120 VAC, 10 A)
1 x RJ-11 (RS-232 Communication)

Power Supply:

120 VAC, $\pm 10\%$, 60Hz

Real Time Clock Battery:

Lithium-Ion

Microprocessor:

16Bit, 20MHz

Languages:

English

Graphic Display:

128 x 64 pixels (2.17" x 1.10" (55mm x 28mm) viewable area)

Weight:

0.95 KG (2.1 lbs)

Supplied Parts:

2 x HBX 029-0022 – 10K Ohm Thermistor, 12" lead wire
1 x HBX OUT-0100 – 10K Ohm Outdoor Sensor
2 x Tie Wrap
1x Terminal Screwdriver (2.5mm)

Dimensions:

7.48" x 6.69" x 2.76" (190mm x 170mm x 70mm)

ETL Listings:

Meets CSA C22.2 No. 24
Meets UL Standard 873
ETL Control No. 3068143

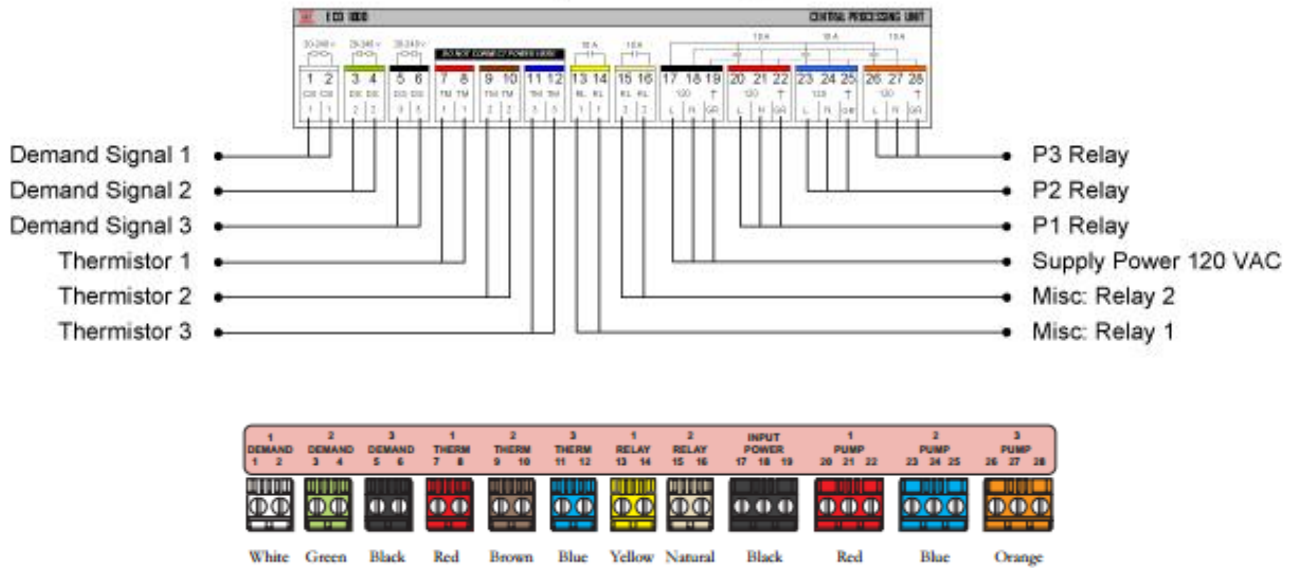
Storage:

50°F to 104°F (10°C to 40°C)



Pin Out / Terminal Block Labels:

Terminal Designations for ECO-1000



Wiring

White (1-2) Demand 1: 2 wire control input 20-240VAC

Green (3-4) Demand 2: 2-wire control input 20-240VAC

Black (5-6) Demand 3: 2-wire control input 20-240VAC

Red (7-8) Therm 1: 2-wire thermistor E.g. tank sensor

Brown (9-10) Therm 2: 2-wire thermistor E.g. GND sensor

Blue (11-12) Therm 3: 2-wire thermistor Eg. Outdoor sensor

***Terminals 7-12 must not be subjected to any external power.**

Black (17-19) Input Power: 3-wire. This is the main input power supply connection. 17 is line, 18 is neutral and 19 is earth ground.

Red (20-22) Pump 1: 3-wire 120VAC output power to pump or fan number 1. 20 is line, 21 is neutral and 22 is earth ground.

Blue (23-25) Pump 2: 3-wire 120VAC output power to pump or fan number 1. 23 is line, 24 is neutral and 25 is earth ground.

Orange (26-28) Pump 3: 3-wire 120VAC output power to pump or fan number 1. 26 is line, 27 is neutral and 28 is earth ground. For Geothermal applications this terminal is used for controlling reversing valves.



Part 5: HBX Sensor Temperature Conversion / Resistance Table

Celsius	Fahrenheit	Ohms	Celsius	Fahrenheit	Ohms	Celsius	Fahrenheit	Ohms
-30	-22	177,000	15	59	15,714	60	140	2,488
-29	-20.2	166,342	16	60.8	15,000	61	141.8	2,400
-28	-18.4	156,404	17	62.6	14,323	62	143.6	2,315
-27	-16.6	147,134	18	64.4	13,681	63	145.4	2,235
-26	-14.8	138,482	19	66.2	13,071	64	147.2	2,157
-25	-13	130,402	20	68	12,493	65	149	2,083
-24	-11.2	122,807	21	69.8	11,942	66	150.8	2,011
-23	-9.4	115,710	22	71.6	11,418	67	152.6	1,943
-22	-7.6	109,075	23	73.4	10,921	68	154.4	1,876
-21	-5.8	102,868	24	75.2	10,449	69	156.2	1,813
-20	-4	97,060	25	77	10,000	70	158	1,752
-19	-2.2	91,588	26	78.8	9,571	71	159.8	1,693
-18	-0.4	86,463	27	80.6	9,164	72	161.6	1,637
-17	1.4	81,662	28	82.4	8,776	73	163.4	1,582
-16	3.2	77,162	29	84.2	8,407	74	165.2	1,530
-15	5	72,940	30	86	8,056	75	167	1,480
-14	6.8	68,957	31	87.8	7,720	76	168.8	1,431
-13	8.6	65,219	32	89.6	7,401	77	170.6	1,385
-12	10.4	61,711	33	91.4	7,096	78	172.4	1,340
-11	12.2	58,415	34	93.2	6,806	79	174.2	1,297
-10	14	55,319	35	95	6,530	80	176	1,255
-9	15.8	52,392	36	96.8	6,266	81	177.8	1,215
-8	17.6	49,640	37	98.6	6,014	82	179.6	1,177
-7	19.4	47,052	38	100.4	5,774	83	181.4	1,140
-6	21.2	44,617	39	102.2	5,546	84	183.2	1,104
-5	23	42,324	40	104	5,327	85	185	1,070
-4	24.8	40,153	41	105.8	5,117	86	186.8	1,037
-3	26.6	38,109	42	107.6	4,918	87	188.6	1,005
-2	28.4	36,182	43	109.4	4,727	88	190.4	974
-1	30.2	34,367	44	111.2	4,544	89	192.2	944
0	32	32,654	45	113	4,370	90	194	915
1	33.8	31,030	46	114.8	4,203	91	195.8	889
2	35.6	29,498	47	116.6	4,042	92	197.6	861
3	37.4	28,052	48	118.4	3,889	93	199.4	836
4	39.2	26,686	49	120.2	3,743	94	201.2	811
5	41	25,396	50	122	3,603	95	203	787
6	42.8	24,171	51	123.8	3,469	96	204.8	764
7	44.6	23,013	52	125.6	3,340	97	206.6	742
8	46.4	21,913	53	127.4	3,217	98	208.4	721
9	48.2	20,883	54	129.2	3,099	99	210.2	700
10	50	19,903	55	131	2,986	100	212	680
11	51.8	18,972	56	132.8	2,787	101	213.8	661
12	53.6	18,090	57	134.6	2,774	102	215.6	643
13	55.4	17,255	58	136.4	2,675	103	217.4	626
14	57.2	16,464	59	138.2	2,579	104	219.2	609

