



# Instruction Sheet

102-435

## HEC-2 – Variable Speed, ECM High-Efficiency Circulator

SUPERSEDES: November 1, 2011

EFFECTIVE: April 1, 2012

Plant ID No. 001-4049

### DESCRIPTION:

The HEC-2 BumbleBee is a multi-function, variable speed wet rotor circulator with an ECM, permanent magnet motor. Its high efficiency motor reduces power consumption by up to 85% compared to equivalent AC permanent split capacitor circulators.

### APPLICATION:

- Maximum operating pressure: 125 psi (862 kPa)
- Maximum water temperature: 230°F (110°C)
- Electrical specifications:
  - Voltage: 115/230, 50/60 Hz, single phase
  - Operating power range: 9W - 42W
  - Amp rating: 0.67/0.39
- HEC-2 is provided with a cast iron casing and should be used for closed loop systems only.
- Taco circulator pumps are for indoor use only – employer uniquement à l'intérieur.
- Acceptable for use with water or maximum of 50% water/glycol solution.



### FEATURES:

- Programmable PC board with LED display and 3 operating modes:
  - CP – Constant Power Mode (Fixed Speed) (allows for 4 fixed circulator speeds, [SP1, SP2, SP3, SP4])
  - SP – Set Point Mode (Variable Speed, fixed supply temperature, 65°F - 220°F)
  - dE – “Delta T” Mode (Variable Speed, fixed temperature differential ( $\Delta T$ ) range from 5°F - 50°F)
- Can be wired to a Taco ZVC Zone Valve Control or SR Switching Relay for ON/OFF operation.
- Sensor kit includes one long and one short sensor with two tie wraps.
- Integral Flow Check (IFC) is included in carton. Simply press into discharge flange if required.
- Swivel-flanged casing provides 360° rotation mounting flexibility.
- LED displays operating mode (CP, SP, dE), power usage (WATTS) and flow (GPM), alternating every 5 seconds.

### INSTALLATION:

**WARNING:** Do not use in swimming pool or spa areas. Pump has not been investigated for these applications.  
**AVERTISSEMENT:** Ne pas utiliser dans une piscine ou un spa. La pompe n'a pas été étudiée pour ces applications.

**CAUTION:** The addition of petroleum based fluids or certain chemical additives to systems using TACO equipment voids the warranty. Consult factory for fluid compatibility.

**ATTENTION:** L'ajout de liquides à base de pétrole ou de certains additifs chimiques à des systèmes utilisant un équipement TACO annule la garantie. Consultez le fabricant pour connaître la compatibilité de liquides.

**CAUTION:** Installations at elevations over 5000 feet must have higher fill pressure of 20 psi minimum to prevent pump cavitation and flashing. Premature failure may result. Adjust expansion tank pressure to equal fill pressure. A larger size expansion tank may be required.

**ATTENTION:** Des installations à des altitudes de plus de 1600 mètres doivent présenter une pression de remplissage plus élevée de 20 psi au minimum afin d'éviter toute cavitation ou flashing de la pompe. Une défaillance prématurée peut en résulter. Réglez la pression du réservoir d'expansion de façon qu'elle soit égale à la pression de remplissage. Un réservoir d'expansion d'une taille supérieure peut être nécessaire.

#### 1. Location:

The circulator can be installed on the supply or return side of the boiler but for best system performance, it should always pump away from the expansion tank. Sensor location is very important. Refer to Diagrams No.1 and No. 2.

## 2. Mounting position:

Circulator must be mounted with the motor in the horizontal position. See diagrams below for acceptable motor mounting orientations. Swivel flanges allow 360° rotation of pump.

**CAUTION:** To reduce the possibility of noise transmission, be sure to add vibration dampeners to piping when mounting circulator to wall or floor joists.

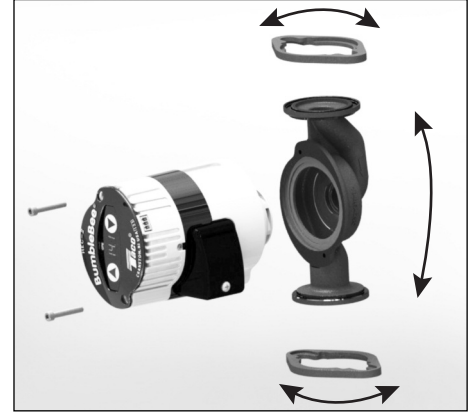
**ATTENTION:** Pour réduire la possibilité de transmission de bruit, veuillez à ajouter des amortisseurs de vibration à la tuyauterie lors du montage du circulateur sur des chevêtres de mur ou de plancher.

### ACCEPTABLE MOUNTING POSITIONS



Electrical box must be located below or on right side of motor housing with opening facing down.

### CASING/FLANGE ROTATION



To rotate the casing, remove the two motor screws and spin the casing 180° to the reverse flow direction. Reattach the two screws. ( $\frac{5}{32}$ " allens wrench required.)

## 3. Fill the system with tap water or a maximum of 50% propylene-glycol and water solution:

The system must be filled before operating the circulator. The bearings are water lubricated and should not be allowed to operate dry. Filling the system will result in immediate lubrication of the bearings. It is always good practice to flush a new system of foreign matter before starting the circulator.

## 4. Wiring the circulator:

**WARNING:** Risk of electric shock. This pump is supplied with a grounding conductor and grounding-type attachment plug. To reduce the risk of electric shock, be certain that it is connected only to a properly grounded, grounding-type receptacle. Follow all local electrical and plumbing codes.

**AVERTISSEMENT:** Risque de choc électrique. Cette pompe est équipée d'un conducteur de mise à la terre et d'une prise de branchement de type mise à la terre. Pour réduire le risque de choc électrique, veuillez à ce qu'elle soit raccordée uniquement à un réceptacle de type mise à la terre proprement mis à la terre. Respectez tous les codes de plomberie et électriques locaux.

**WARNING:** Use supply wires suitable for 90°C,

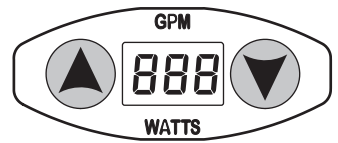
**AVERTISSEMENT:** Employer des fils d'alimentation adéquats pour 90°C.

Disconnect AC power supply. Remove terminal box cover. Connect hot wire to black lead and neutral wire to white lead. Connect ground wire to green ground screw. Replace terminal box cover.



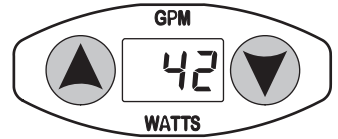
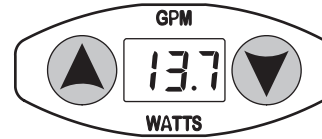
## 5. Start the circulator:

Note: On start-up, when power is applied to the circulator, the red LED will display “888” for 2 seconds prior to entering the pre-set Operating Mode.



The red LED will display operating mode, “GPM” and “WATTS”, alternating every 5 seconds.

**NOTE:** LED displays may vary based on system conditions and the pumps operating mode.



**CAUTION: Never run the circulator dry or permanent damage may result.**

**ATTENTION: Ne laissez jamais le circulateur tourner à sec, des dommages permanents peuvent en résulter.**

The HEC-2 is factory preset for “dE” Delta-T Mode at 20°F ΔT. To change operating mode, see “Programming the HEC-2 Circulator”. Operate the circulator for a minimum of 5 minutes immediately after flushing the system to purge remaining air from the circulator. **NOTE: When set in “dE” or “SP” variable speed operating modes, the circulator will always run at full speed for the first 3 minutes to ensure consistent water temperature for the sensors. Simply power down the pump and restart for an additional 3 minutes of full speed run time to continue purging. Repeat if necessary.**

## PROGRAMMING THE HEC-2 CIRCULATOR:

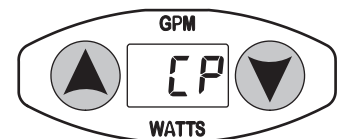
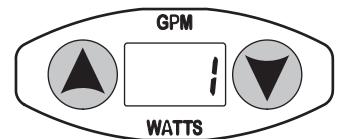
PROGRAMMING CHART					
MODE	OPERATING MODE	MODE NUMBER	DEFAULT SETTING	MINIMUM SETTING	MAXIMUM SETTING
Constant Power (Fixed Speed)	CP	2	SP4	SP1	SP4
Set Point (Variable Speed)	SP	3	105°F	65°F	220°F
“Delta T” (ΔT) (Variable Speed)	dE	4	20°F	5°F	50°F

NOTE: Mode Number 1 is used solely to set the Operating Modes – CP, SP, dE.

### 1. CP – Constant Power Mode (Fixed Speed):

#### 1.1 Setting the circulator to “CP” Mode:

- 1.1.1 Press and release the ▼ arrow button until the number 1 is displayed on the red LED screen.
- 1.1.2 Simultaneously press and hold both the ▲ and ▼ arrow buttons until the number 1 begins to flash – release the arrow buttons.
- 1.1.3 Press and hold the ▲ arrow button. The current mode will display on the red LED screen. After 5 seconds, the modes will begin to scroll through the mode options. Once the “CP” mode is displayed, release the ▲ arrow button.
- 1.1.4 To lock the “CP” mode, simultaneously press and hold the ▲ and ▼ arrow buttons until the red LED stops flashing. The Constant Power mode is now set and locked.

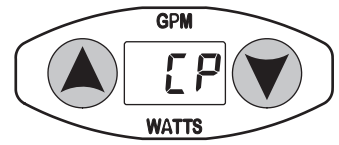
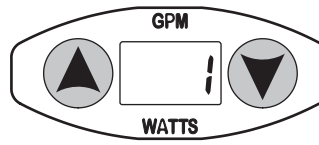


#### QUICKSET PROGRAMMING – Constant Power Mode

1. Press and release ▼ – number 1 should display.
2. Simultaneously press and hold ▲ ▼ buttons – number 1 flashes – release buttons.
3. Press and hold ▲ – scroll to “CP” – release ▲.
4. Press and hold ▲ ▼ arrow buttons until LED stops flashing to save setting.
5. “CP” mode is now locked – proceed to “Verify the circulator is in “CP” mode.

## 1.2 Verify the circulator is in “CP” Mode:

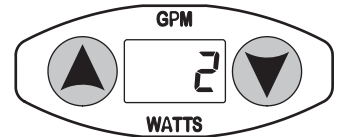
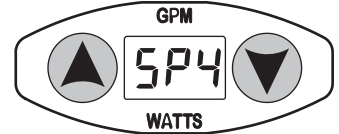
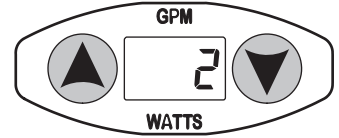
- 1.2.1 Press and release the ▼ arrow button. The number 1 should display in red.
- 1.2.2 Press and hold the ▲ arrow button. The number 1 will change to “CP”.



**NOTE: To determine which speed selection is appropriate for your system, please refer to the family of pump curves on page 8.**

## 1.3 Setting the speed selection when in “CP” Mode:

- 1.3.1 Press and release the ▼ arrow button until the number 2 is displayed on the red LED screen.
- 1.3.2 Simultaneously press and hold the ▲ and ▼ arrow buttons until the number 2 begins to flash – release the arrow buttons.
- 1.3.3 Press and hold the ▲ button. The default SP4 speed number will begin to flash. After 5 seconds, the speed number will scroll from SP1 to SP4. Once the desired speed selection is reached, release the ▲ arrow button. The number 2 will reappear on the LED display.
- 1.3.4 To lock the speed selection, press and hold both ▲ and ▼ buttons until the number 2 stops flashing. The speed selection is now set and locked.



### QUICKSET PROGRAMMING – Constant Power (Fixed Speed) Mode

- 1. Press and release ▼ until number 2 displays.
- 2. Simultaneously press and hold ▲ ▼ buttons – number 2 flashes – release buttons.
- 3. Press and hold ▲ – scroll to desired speed selection – release ▲.
- 4. Press and hold ▲ ▼ arrow buttons until LED stops flashing to save setting.
- 5. Speed selection is locked – proceed to “Verify the circulator speed change”.

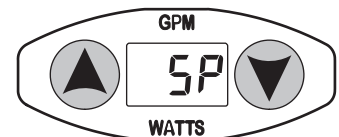
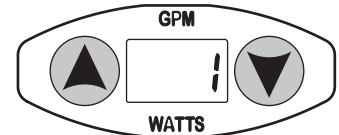
## 1.4 Verify the circulator speed change:

- 1.4.1 Press and release the ▼ arrow button until the number 2 is displayed on the red LED screen.
- 1.4.2 Press the ▲ arrow button and hold. The speed setting will display on the red LED screen.

## 2. SP – Set Point Mode:

### 2.1 Setting the circulator to “SP” Mode:

- 2.1.1 Press and release the ▼ arrow button until the number 1 is displayed on the red LED screen.
- 2.1.2 Simultaneously press and hold both the ▲ and ▼ arrow buttons until the number 1 begins to flash – release the arrow buttons.
- 2.1.3 Press and hold the ▲ arrow button. The current mode will display on the red LED screen. After 5 seconds, the modes will begin to scroll through the mode options. Once the “SP” mode is displayed, release the ▲ arrow button.
- 2.1.4 To lock the “SP” mode, simultaneously press and hold the ▲ and ▼ arrow buttons until the red LED stops flashing. The Set Point mode is now set and locked.

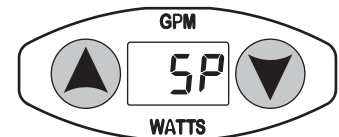
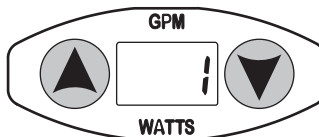


### QUICKSET PROGRAMMING – Set Point Mode

- 1. Press and release ▼ – number 1 should display.
- 2. Simultaneously press and hold ▲ ▼ buttons – number 1 flashes – release buttons.
- 3. Press and hold ▲ – scroll to “SP” – release ▲.
- 4. Press and hold ▲ ▼ arrow buttons until LED stops flashing to save setting.
- 5. “SP” mode is now locked – proceed to “Verify the circulator is in “SP” mode”.

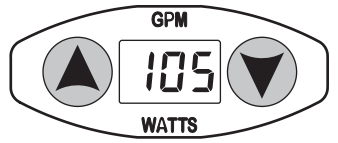
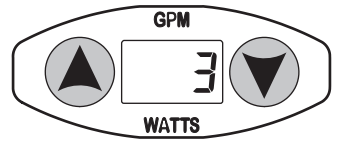
## 2.2 Verify the circulator is in “SP” Mode:

- 2.2.1 Press and release the ▼ arrow button until the number 1 is displayed on the red LED screen.
- 2.2.2 Press and hold the ▲ arrow button and the red LED will display “SP”.



## 2.3 Setting the Set Point Temperature:

- 2.3.1 Press and release the ▼ arrow button until the number 3 is displayed on the red LED screen.
- 2.3.2 Simultaneously press and hold the ▲ and ▼ arrow buttons until the red number 3 begins to flash – release the arrow buttons.
- 2.3.3 Press and hold the ▲ button and the default set point temperature of 105°F will display and flash in red. After 5 seconds the temperature will scroll in increments of 1°F. The set point temperature can be set for any temperature from 65°F to 220°F. Once the desired temperature is reached, release the ▲ arrow button. The number 3 will reappear on the LED screen.
- 2.3.4 To lock the “SP” mode, simultaneously press and hold the ▲ and ▼ arrow buttons until the number 3 stops flashing. The set point temperature is now set and locked.

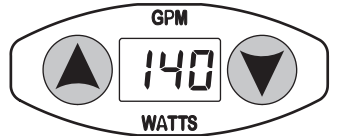
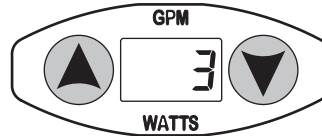


### QUICKSET PROGRAMMING – Set Point Mode Temperature

1. Press and release ▼ until number 3 displays.
2. Simultaneously press and hold ▲ ▼ buttons – number 3 flashes – release buttons.
3. Press and hold ▲ scroll to desired temperature – release ▲.
4. Press and hold ▲ ▼ arrow buttons until LED stops flashing to save setting.
5. Temperature is locked – proceed to “Verify the circulator Set Point Temperature”.

## 2.4 Verify the circulator Set Point Temperature:

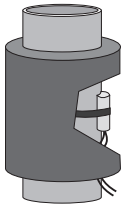
- 2.4.1 Press and release the ▼ arrow button until the number 3 is displayed on the red LED screen.
- 2.4.2 Press and hold the ▲ arrow button and the red LED will display the set temperature (for example 140°F).



**CAUTION: Do not attempt to remove LED panel from circulator. Serious damage to circulator electronics may result.**  
**ATTENTION: N'essayez pas de retirer le panneau de LED du circulateur. Des dommages sérieux à l'électronique du circulateur peuvent en résulter.**

## 2.5 Installing the temperature sensor in “SP” mode:

- 2.5.1 Attach one sensor to supply line using tie wraps provided.  
 (See Diagram No. 1a, 1b, and 1c.)
- 2.5.2 Add insulation to cover sensor.



- 2.5.3 Wire supply sensor to #3 and #2 (COM) connections on terminal plug.
- 2.5.4 Press terminal plug into terminal strip on pump.



Diagram No. 1a: Radiant Injection Mixing

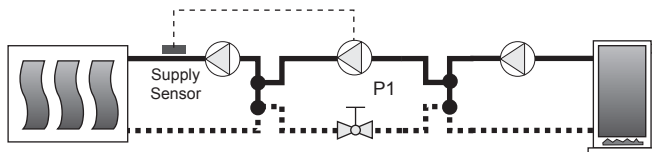


Diagram No. 1b: Boiler Protection By-Pass

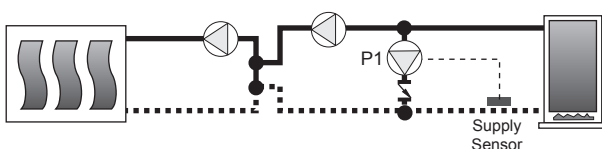
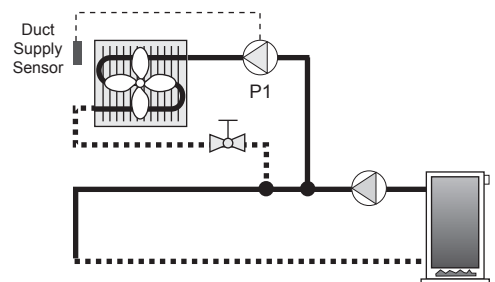









Diagram No. 1c: Fan Coil Fixed Temperature

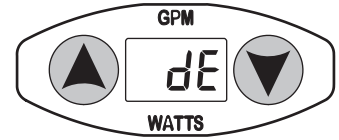
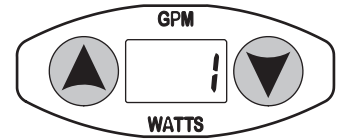











### 3. dE – “Delta T” ( $\Delta T$ ) Mode:

#### 3.1 Setting the circulator to “dE” Mode:



- 3.1.1 Press and release the  arrow button until the number 1 is displayed on the red LED screen.
- 3.1.2 Simultaneously press and hold both the  and  arrow buttons until the number 1 begins to flash – release the arrow buttons.
- 3.1.3 Press and hold the  arrow button. The current mode will display on the red LED screen. After 5 seconds, the modes will begin to scroll through the mode options. Once the “dE” mode is displayed, release the  arrow button and flashing number 1 will reappear.
- 3.1.4 To lock the “dE” mode, simultaneously press and hold the  and  arrow buttons until the red LED stops flashing. The “dE” mode is now set and locked.

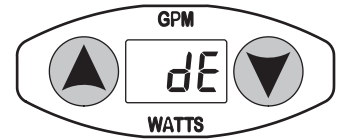
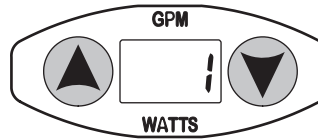


#### QUICKSET PROGRAMMING – “dE” Mode







1. Press and release  – number 1 should display.
2. Simultaneously press and hold   buttons – number 1 flashes – release buttons.
3. Press and hold  – scroll to “dE” – release  – flashing number 1 will reappear.
4. Press and hold   arrow buttons until LED stops flashing to save setting.
5. “dE” mode is now locked – proceed to “Verify the circulator is in “dE” mode”.

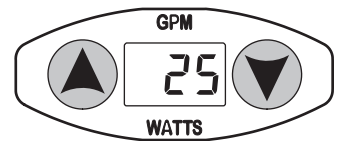
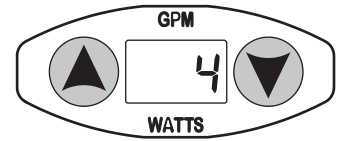
#### 3.2 Verify the circulator is in “dE” Mode:

- 3.2.1 Press and release the  arrow button until the number 1 is displayed on the red LED screen.
- 3.2.2 Press and hold the  arrow button and the red LED will display “dE”.










#### 3.3 Setting the circulator “Delta T” ( $\Delta T$ ) temperature range:



- 3.3.1 Press and release the  arrow button until the number 4 is displayed on the red LED screen.
- 3.3.2 Simultaneously press and hold both the  and  arrow buttons until the number 4 begins to flash – release both arrow buttons.
- 3.3.3 Press and hold the  arrow button and the default “ $\Delta T$ ” temperature of 20°F will begin flashing. After 5 seconds, the number will begin to scroll in increments of 1°F. “ $\Delta T$ ” temperature range can be set from 5°F to 50°F. Once the desired “ $\Delta T$ ” temperature is reached, release the button. The number 4 will reappear on the LED screen.
- 3.3.4 To lock the “ $\Delta T$ ” temperature range, simultaneously press and hold the  and  arrow buttons until the red LED stops flashing. The “ $\Delta T$ ” temperature range is now set and locked.

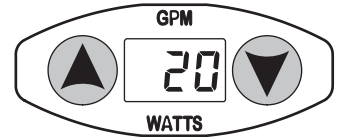
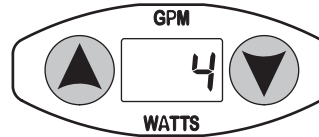


#### QUICKSET PROGRAMMING – “ $\Delta T$ ” Temperature Range

1. Press and release  until number 4 displays.
2. Simultaneously press and hold   buttons – number 4 flashes – release buttons.
3. Press and hold  – scroll to desired “ $\Delta T$ ” temperature range – release .
4. Press and hold   arrow buttons until LED stops flashing to save setting.
5. Temperature range is locked – proceed to “Verify the circulator “ $\Delta T$ ” temperature range”.

#### 3.4 Verify the circulator “ $\Delta T$ ” temperature range:

- 3.4.1 Press and release the  arrow button until the number 4 is displayed on the red LED screen.
- 3.4.2 Press and hold the  arrow button and the set “ $\Delta T$ ” temperature range will be displayed on the red LED (for example, 20°F  $\Delta T$ ).

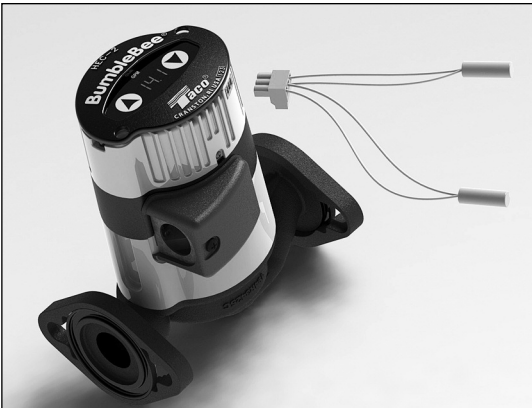
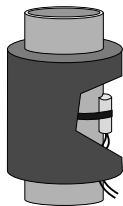


**CAUTION: Do not attempt to remove LED panel from circulator. Serious damage to circulator electronics may result.**

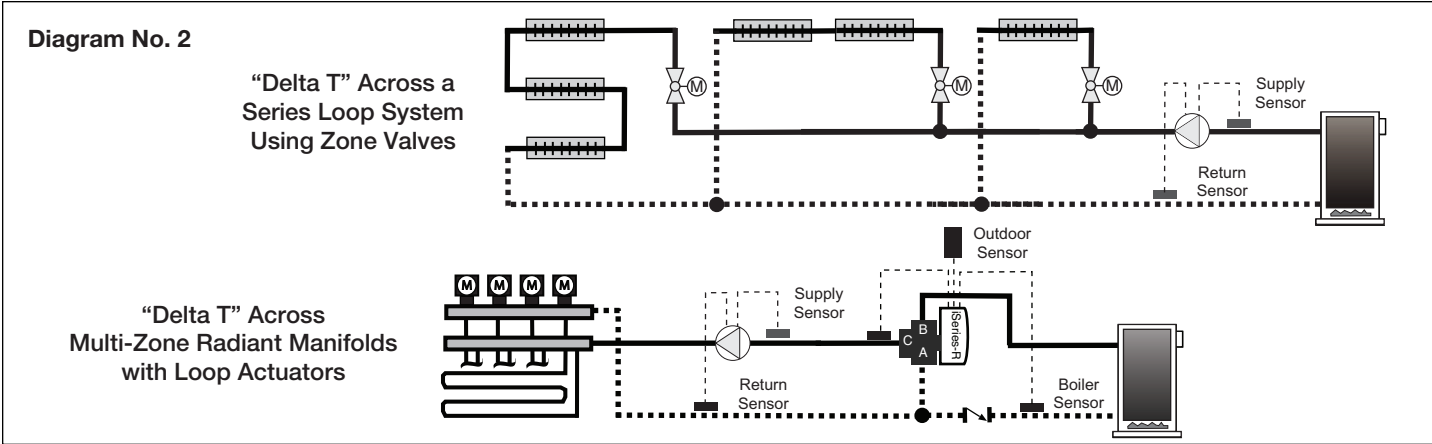
**ATTENTION: N'essayez pas de retirer le panneau de LED du circulateur. Des dommages sérieux à l'électronique du circulateur peuvent en résulter.**

3.5 Installing the temperature sensors in “dE” Delta T Mode:

- 3.5.1 Attach one sensor to supply line and one sensor to return line.  
Refer to Diagram No. 2 for installation.
- 3.5.2 Add insulation to cover sensors.



- 3.5.3 Wire supply sensor to #3 and #2 (COM) connections on terminal plug.
- 3.5.4 Wire return sensor to #1 and #2 (COM) connections on terminal plug.
- 3.5.5 Press terminal plug into terminal strip on pump.

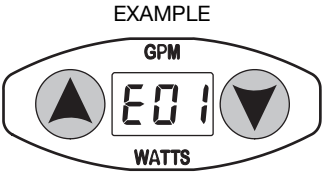


4. Troubleshooting Guide:

The Taco HEC-2 circulator does not require maintenance. Should an error code appear in the red LED display, please contact the Taco factory at (401) 942-8000 and request a technical service representative.

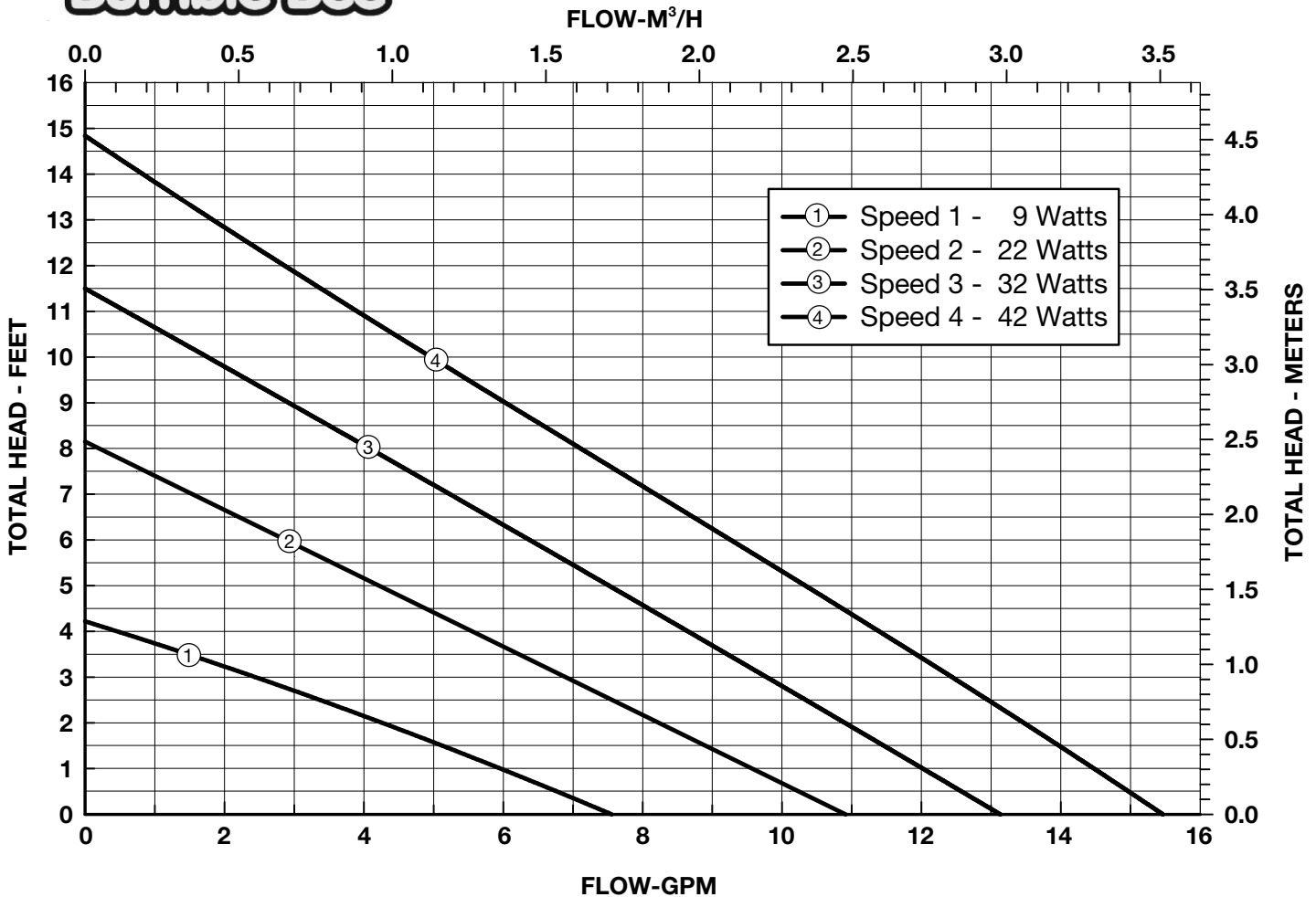
4.1 Troubleshooting Error Codes:

Listed below are potential diagnostic error codes which will appear on the HEC-2 Bumble Bee LED display in case of a malfunction.



ERROR CODE	DESCRIPTION	CORRECTIVE ACTION
E01	Motor over current	Probable debris in rotor. Pump may need to be replaced.
E02	Supply sensor fault	Check wiring connections or install new sensor. (Pins 2 and 3)
E03	Return sensor fault	Check wiring connections or install new sensor. (Pins 1 and 2)
E04	PC board over temperature	Probable malfunction on PC board. Replace pump.
E05	Safety shutdown	Probable locked or seized rotor. Occurs after pump tries to start eight times unsuccessfully. Pump may need to be replaced.

## MODEL HEC-2 PERFORMANCE CURVES



## LIMITED WARRANTY STATEMENT

Taco, Inc. will repair or replace without charge (at the company's option) any Taco HEC-2 High Efficiency circulator or circulator part which is proven defective under normal use within three (3) years from the date of manufacture.

In order to obtain service under this warranty, it is the responsibility of the purchaser to promptly notify the local Taco stocking distributor or Taco in writing and promptly deliver the subject product or part, delivery prepaid, to the stocking distributor. For assistance on warranty returns, the purchaser may either contact the local Taco stocking distributor or Taco. If the subject product or part contains no defect as covered in this warranty, the purchaser will be billed for parts and labor charges in effect at time of factory examination and repair.

Any Taco product or part not installed or operated in conformity with Taco instructions or which has been subject to misuse, misapplication, the

addition of petroleum-based fluids or certain chemical additives to the systems, or other abuse, will not be covered by this warranty.

If in doubt as to whether a particular substance is suitable for use with a Taco product or part, or for any application restrictions, consult the applicable Taco instruction sheets or contact Taco at (401-942-8000).

Taco reserves the right to provide replacement products and parts which are substantially similar in design and functionally equivalent to the defective product or part. Taco reserves the right to make changes in details of design, construction, or arrangement of materials of its products without notification.

**TACO OFFERS THIS WARRANTY IN LIEU OF ALL OTHER EXPRESS WARRANTIES. ANY WARRANTY IMPLIED BY LAW INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS IS IN EFFECT ONLY FOR THE DURA-**

**TION OF THE EXPRESS WARRANTY SET FORTH IN THE FIRST PARAGRAPH ABOVE.**

**THE ABOVE WARRANTIES ARE IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR STATUTORY, OR ANY OTHER WARRANTY OBLIGATION ON THE PART OF TACO.**

**TACO WILL NOT BE LIABLE FOR ANY SPECIAL, INCIDENTAL, INDIRECT OR CONSEQUENTIAL DAMAGES RESULTING FROM THE USE OF ITS PRODUCTS OR ANY INCIDENTAL COSTS OF REMOVING OR REPLACING DEFECTIVE PRODUCTS.**

This warranty gives the purchaser specific rights, and the purchaser may have other rights which vary from state to state. Some states do not allow limitations on how long an implied warranty lasts or on the exclusion of incidental or consequential damages, so these limitations or exclusions may not apply to you.

### COMFORT MADE EASY<sup>®</sup>

TACO, INC., 1160 Cranston Street, Cranston, RI 02920 Telephone: (401) 942-8000 FAX: (401) 942-2360.

TACO (Canada), Ltd., 8450 Lawson Road, Unit #3, Milton, Ontario L9T 0J8. Telephone: 905/564-9422. FAX: 905/564-9436.

Visit our web site at: <http://www.taco-hvac.com>

Printed in USA

Copyright 2012

TACO, Inc.