

# SERIES 17000 FAULT CODES

## Integrated CHP Faults

### Overview

Series 17000 fault codes relate to the Integrated Combined Heat and Power (ICHP) systems (refer to Model C60 ICHP Technical Reference [410043] for details as required). The ICHP system is supported by the Model C60 software version 4.03 and higher.

There are two fault priorities in the ICHP system, i.e., how it effects the C60 System and how it effects the CHP Module. As shown in the following table, a SSL-3 or higher will cause the MicroTurbine to either stop or prevent from starting. This is required in some cases where we are not able to control or monitor the temperature in the heat exchanger.

For SSL-2, a Warning is generated which can be monitored in the CRMS, but the system continues to generate power. In some cases the system will generate a SSL-2 (Warning), however, the CHP module will remain in Full Bypass to prevent water heating. This is further broken down into two categories:

- FR - requires a “full system shutdown and restart” to clear (should involve maintenance inspection).
- FW - can be cleared automatically if the condition changes (water starts flowing).

Refer to the following table for more details.

CHP Error Category	Action
FR	CHP Down - Must shut down, go to standby, and restart to clear fault. Note that some FR faults will also cause SSL3 which prevents the MicroTurbine from running. Also see Note below.
FW	CHP Down - May run automatically when fault clears. See Note below.
WN	CHP Run - May require further attention.

<b>NOTE</b>	<p>If either the 17003 (CHP NO AUXIN WRN) or 17005 (CHP NO FLOW WRN) fault is detected, three attempts to clear the fault condition are made. Based on the ICHP mode of operation, if the fault condition is present after the third attempt, the faults are handled as follows:</p> <p>ELECTRICAL PRIORITY - The diverter is commanded to move to Full Bypass and MicroTurbine continues to operate.</p> <p>THERMAL PRIORITY - The diverter is commanded to move to Full Bypass and MicroTurbine shuts down.</p> <p>Refer to fault codes 17003 and 17005 for more details.</p>
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**Observe Safety Precautions - Refer to *Safety Instructions* for Details**

## Series 17000 Fault Codes

The following table lists the Series 17000 fault codes, fault description, SSL for the system, SSL for CHP, and isolation message for each fault. Troubleshooting procedures follow the table.

Fault Number	Fault Description	System SSL	CHP SSL	Isolation Message
17000	CHP COMM TO	3	FR	Internal Fault
17001	CHP CONFIG ERR	3	FR	Internal Fault
17002	CHP SLFTST FAIL	3	FR	Internal Fault
17003	CHP NO AUXIN WRN	2	FW	Internal Warning
17004	CHP CORE OTMP	3	FR	Internal Fault
17005	CHP NO FLOW WRN	2	FW	Internal Warning
17006	CHP MTR OC REC	2	FW	Internal Warning
17007	CHP MTR OC BYP	3	FR	Internal Fault
17008	CHP MTR UC REC	2	FW	Internal Warning
17009	CHP MTR UC BYP	3	FR	Internal Fault
17010	CHP MTR OC STNBY	3	FR	Internal Fault
17011	CHP TIN OP SH	3	FR	Internal Fault
17012	CHP TOUT OP SH	3	FR	Internal Fault
17013	CHP TEMP LO	2	WN	Internal Warning
17014	CHP TEMP HI	2	WN	Internal Warning
17015	CHP OVRTEMP LOW	3	FR	Internal Fault
17016	CHP OVRTEMP HIGH	3	FR	Internal Fault
17017	CHP MODE INVALID	3	FW	Internal Fault
17018	NO CHP DEVICE	3	FR	Internal Fault
17019	CHP NO AUXIN FLT	3	FR	Internal Fault
17020	CHP NO FLOW FLT	3	FR	Internal Fault

**Observe Safety Precautions - Refer to *Safety Instructions* for Details**

## 17000 Internal Fault CHP COMM TO

CHP Communication Time Out (CHP Control Board No Communication)

System SSL: 3    CHP SSL: FR

Detects a failure of the system to communicate with the CHP Control Board on the Intra-Bus within five seconds. Without communications, it is not possible to determine the heat exchanger temperature, therefore, the system must not run under this condition.

Symptom	Probable Cause	Analysis	Repair Solution
Communication failure between system and CHP Control Board	Grounding	Incorrect grounding of the system can lead to intermittent communications problems within the system.	Verify system is grounded per installation instructions.
	Intra harness connection	Intra harness carrying messages between CHP Control Board and ECM Control Board could be loose or damaged.	Dry and secure Intra harness at CHP Control Board and ECM Control Board. Replace if damaged.
	Incorrect Software	Software is incompatible.	Reload current software version.
	CHP Control Board	<ol style="list-style-type: none"> <li>1. Check LED's on CHP Control Board. If all LED's are ON, go to 2. If any LED is not ON, go to 3.</li> <li>2. Upload PM's and restart the unit. If the fault clears and the unit operates normally, the problem is solved. If the fault does not clear, go to 4.</li> <li>3. Replace CHP Control Board and restart the unit. If the fault clears and the unit operates normally, the problem is solved. If the fault does not clear, go to 4.</li> </ol>	
	ECM Control Board	<ol style="list-style-type: none"> <li>4. Check LED's on ECM Control Board. If all LED's are ON, go to 5. If any LED is not ON, go to 6.</li> <li>5. Upload PM's on ECM Control Board and restart the unit. If the fault clears and the unit operates normally, the problem is solved. If the fault does not clear, go to 6.</li> <li>6. Replace ECM Control Board and restart the unit. If the fault clears and the unit operates normally, the problem is solved. If the fault does not clear, go to 7.</li> <li>7. Troubleshoot ECM Control Board - Refer to the <i>Troubleshooting a MicroTurbine that Does Not Wake Up</i> section.</li> </ol>	
	Hardware configuration	Display PIC revision not compatible with CHP Control Board	Contact Technical Support for instructions on how to obtain the latest PIC revision.

**Observe Safety Precautions - Refer to Safety Instructions for Details**

## 17001 Internal Fault CHP CONFIG ERR

CHP Configuration Error

System SSL: 3 CHP SSL: FR

Detects an internal failure of the CHP Control Board during its internal startup, or a failure of the self-test which should prevent the system from operating. If this fault is present, the MicroTurbine can not run.

Symptom	Probable Cause	Analysis	Repair Solution
System not available	CHP Control Board not locked	Check to see if CHP Control Board is plugged in.	Plug in the CHP Control Board.
		On the CRMS, check to see if the CHP Installed switch is set to Yes.	Set CHP Installed switch to Yes.

## 17002 Internal Fault CHP SLFTST FAIL

CHP Self-Test Fail

System SSL: 3 CHP SSL: FR

Detects a failure of some part of the self-test procedure within a 20-second timeout. During a self-test, the diverter is moved from Bypass to Recovery and then returned to Bypass. If the self-test finds a fault with the diverter, it will post this fault which will prevent the MicroTurbine from starting.

<b>NOTE</b>	The occurrence of fault code 17002 may result in occurrence of fault codes 17006 through 17009.
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Symptom	Probable Cause	Analysis	Repair Solution
No heated water available	Diverter jammed	Detect by monitoring current in CRMS.	Clear jam in diverter.
	Power harness to actuator failed	Check harness.	Fix harness problem.
	Actuator not controlling diverter	Stuck in Bypass, Recovery, or midpoint.	Replace actuator.
	Linear actuator/motor failed	Problem with actuator/motor	Replace actuator.
	Linkage/frame mechanical connectors failed	Check linkage/frame connectors.	Replace affected parts.
	Motor driver failure on CHP Control Board	Check for drive voltage on actuator harness.	Replace CHP Control Board.

**Observe Safety Precautions - Refer to *Safety Instructions* for Details**

## 17003 Internal Warning CHP NO AUXIN WRN

CHP No Auxiliary Input Warning

System SSL: 2 CHP SSL: FW

The CHP Control Board will not operate unless its AUXIN input is closed. If during operation, the AUXIN input opens for any reason, the CHP system will go to Full Bypass and attempt to resume operation after a 30-second delay. If no AUXIN is detected after the third attempt, then the 17019 fault (CHP NO AUXIN FLT) is reported, the diverter is moved to Full Bypass and no further attempts to control water temperature are made. In addition, in the Thermal Priority mode only, the MicroTurbine is automatically shut down. To restart CHP operation, the unit must be manually shut down and started by the user.

<b>NOTE</b>	The status of AUXIN is not checked if CHP is set to run in Thermal Bypass mode.
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Symptom	Probable Cause	Analysis	Repair Solution
CHP system in Full Bypass mode	AUXIN input	1. Is customer using AUXIN input? If Yes, go to 2. If No, go to 7.	
	Customer input device	2. Check that the input device is connected to pins 1 & 2 (confirm). If connected, go to 4. If not connected, go to 3. 3. Connect input device properly and restart the unit. If the fault clears, the problem is solved. If the fault does not clear, go to 4. 4. Measure continuity of customer input device (e.g., RTD, T/C). If there is no continuity, go to 5. If there is continuity, go to 6. 5. Replace customer input device and restart the unit. If the fault clears, the problem is solved. If the fault does not clear, go to 6.	
	CHP Control Board failure	6. Replace CHP Control Board and restart the unit. If the fault clears, the problem is solved. If the fault does not clear, go to CHP Control Board troubleshooting as explained under the 17000 fault code.	
	External AUXIN not configured correctly	7. Is the jumper installed across input pins 1 & 2? If Yes, go to 8. If No, go to 9. 8. Is there continuity across the jumper? If Yes, go to 10. If No, go to 9. 9. Install new jumper (ensure continuity of jumper after installing it). Restart the unit. If the fault clears, the problem is solved. If the fault does not clear, go to 10. 10. Continue with troubleshooting as explained under the 17000 fault code.	

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## 17004 Internal Fault CHP CORE OTMP

CHP Core Overtemperature

System SSL: 3 CHP SSL: FR

Detects an overtemperature in the heat exchanger core when the core overtemperature switch signal is at 325 °F. It usually indicates a failure of the diverter or an exhaust leak. If this occurs the MicroTurbine is shut down.

Symptom	Probable Cause	Analysis	Repair Solution
Overtemperature in heat exchanger core (Full Recovery/Full Bypass not available)	Lack of adequate flow	<ol style="list-style-type: none"> <li>1. Shut down system and wait for four hours.</li> <li>2. Restart system. If the fault clears, go to 3. If the fault does not clear, go to 8 (thermal switch).</li> <li>3. Turn water flow ON - Does the CHP No Flow fault 17005 occur? If Yes, call Capstone Technical Support. If No, go to 4.</li> <li>4. Turn water flow OFF - Does the CHP No Flow fault 17005 occur? If Yes, go to 7 (this means the thermal switch may be tripping too low). If No, go to 5.</li> <li>5. Replace the flow switch and operate the unit. If the 17005 fault clears, the problem is solved. Note: The unit may have to operate for a length of time to achieve full operating temperature, to ensure HRM operation is O.K. (no faults). If the 17005 fault does not clear, go to 6.</li> <li>6. Replace the flow switch and check the unit's operation. Check water loop for low flow condition.</li> </ol>	
	Thermal switch/ cable	<ol style="list-style-type: none"> <li>7. Is the thermal switch cable connected, and is the length intact? If Yes, go to 8. If No, go to 9.</li> <li>8. Connect or replace cable and restart the unit. If the fault clears, the problem is solved. If the fault does not clear, go to 9.</li> <li>9. Measure continuity across thermal switch (compare to resistance information from vendor). If there is no continuity, go to 10. If there is continuity, go to 11.</li> <li>10. Replace the thermal switch and restart the unit. If the fault clears, the problem is solved. If the fault does not clear, go to 11.</li> <li>11. Contact Technical support: Control Board issue - see troubleshooting procedure for 17000 fault code. Multiple failures. Application issue. HRM leak (Back Pressure).</li> </ol>	

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## 17005 Internal Warning CHP NO FLOW WRN

CHP No Water Flow Warning

System SSL: 2 CHP SSL: FW

Detects a lack of water flow. If CHP is set to run, then the pump will be ON (when used). The diverter will remain in Bypass until flow is detected at which time the temperature can be controlled with the diverter. The CHP system may begin exporting heated water as soon as flow is established.

If during operation, the flow is stopped for some reason, the CHP system will go to Full Bypass and attempt to resume operation after a 30-second delay. If no water flow is detected after the third attempt, then the 17020 fault (CHP NO FLOW FLT) is reported, the diverter is moved to Full Bypass and no further attempts to control water temperature are made. In addition, in the Thermal Priority mode only, the MicroTurbine is automatically shut down. To restart CHP operation, the unit must be manually shut down and started by the user.

Symptom	Probable Cause	Analysis	Repair Solution
No water flow. CHP system in Full Bypass mode	Water inlet flow slows/stops	No heat recovery.	Restore water flow.
		Check to see if water pump in system is operating properly.	Replace water pump (Customer).
		Shut-off valve in system not open.	Open system shut-off valve.
	Flow direction reversed	<ol style="list-style-type: none"> <li>1. Is fluid flowing in the correct direction? (It should be flowing out of the HRM at the flow switch location.) If Yes, go to 3. If No, go to 2.</li> <li>2. Change flow direction in application, and restart the unit. If the fault clears, the problem is solved. If the fault does not clear, go to 3 (flow is not high enough).</li> <li>3. Is flow greater than 20 GPM? If Yes, go to 4. If No, go to 5.</li> </ol>	
	Flow switch misaligned	<ol style="list-style-type: none"> <li>4. Is the flow switch perpendicular to flow direction? (Flow switch can function properly with less than 10° of misalignment.) If Yes, go to 6. If No, go to 5.</li> <li>5. Align flow switch such that it is perpendicular to flow, and restart the unit. If the fault clears, the problem is solved. If the fault does not clear, go to 6.</li> </ol>	
Flow switch harness failed	<ol style="list-style-type: none"> <li>6. Turn OFF both the flow and system. Remove cap on the flow switch. Check resistance between COMM and Normally Open contact. Does it read zero ohm (open condition)? If Yes, go to 8. If No, go to 7.</li> <li>7. Is the harness connected to the Control Board? If No, go to 8. If Yes, go to 10.</li> <li>8. Connect the harness and restart system? If the fault clears, the problem is solved. If the fault does not clear, go to 9.</li> </ol>		

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## 17005 Internal Warning CHP NO FLOW WRN (Continued)

Symptom	Probable Cause	Analysis	Repair Solution
No water flow. CHP system in Full Bypass mode (Continued)	Flow switch paddle eroded	<p>9. Remove the flow switch and inspect for eroded paddle. If eroded, go to 10. If not eroded, go to 11.</p> <p>10. Replace the flow switch, and restart the unit with flow ON. If the fault clears, the problem is solved. If the fault does not clear, go to 11.</p> <p>11. Continue with troubleshooting as explained under the 17000 fault code.</p>	
	Flow switch stuck OFF electrically/ mechanically	MicoTurbine is always set to Bypass. No heat recovery.	Replace flow switch.
	Pressure relief valve stuck OPEN	Water loop loss. Low heat recovery.	Replace relief valve.

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## 17006 Internal Warning CHP MTR OC REC

CHP Diverter Motor Over Current Recovery

System SSL: 2 CHP SSL: FW

This error detects an overcurrent of greater than 2.34 Amps in the linear actuator motor during operation. If overcurrent occurs while moving in the Recovery direction, the 17006 warning is declared, and the linear actuator moves in the Bypass direction only. Movement in the Recovery direction will be allowed again after a successful movement towards the Bypass direction.

Symptom	Probable Cause	Analysis	Repair Solution
Water temperature lower than set point	Linear actuator cable	Remove HRM panel to inspect linkage and linear actuator. Inspect linear actuator cable for short or open fault.	Fix cable problem.
	Linear actuator failure	<ol style="list-style-type: none"> <li>1. Inspect linkage to see if there is anything interfering with the actuator diverter linkage movement. If Yes, go to 2. If No, go to 3.</li> <li>2. Remove foreign object and restart the unit. If the fault clears, the problem is solved (observe linkage movement during self-test to see if linkage is intact). If the fault does not clear, go to 5. (Replace linkage because it is damaged.)</li> <li>3. Disconnect actuator from linkage by removing the fastener on the extended end.</li> <li>4. Start the unit ensuring the linear actuator can travel its full length without interference. Does the unit pass the self-test? If Yes, go to 5. If No, go to 12 (Replace linear actuator).</li> </ol>	
	Linkage/Diverter failure	<ol style="list-style-type: none"> <li>5. Move the bell crank assembly back and forth in the midrange of diverter travel and feel for any binding in linkage. If binding exists, go to 7. If there is no binding, go to 6.</li> <li>6. Rotate actuator on pivot in actuator cradle to check for binding. If binding exists, go to 12 (Cradle could be faulty as well). If binding does not exist, go to 7.</li> <li>7. Disconnect push-rod assembly from diverter link and bell crank - Press push-rod assembly on ground, compressing the springs to see if compression is smooth (the compression motion should be smooth without sticking or friction). If sticking or friction exists, go to 11. If there is no sticking or friction, go to 8.</li> <li>8. Push diverter link through entire travel path pressing diverter link to each end stop. If it reaches end stop without excessive force (greater than 40 lbs), go to 9. If it reaches end stop with excessive force, go to 10.</li> </ol>	

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## 17006 Internal Warning CHP MTR OC REC (Continued)

Symptom	Probable Cause	Analysis	Repair Solution
Water temperature lower than set point (Continued)	Linkage/Diverter failure (Continued)	<p>9. Remove HRM roof assembly panel and inspect diverter for deformation (diverter should be straight) or foreign objects. If diverter is not straight or foreign object exists, go to 10.</p> <p>10. Replace diverter assembly or remove foreign object (Check step 8 again) - reconnect push-rod assembly, diverter link, bell crank, and linear actuator. Restart the unit. If the fault is cleared, the problem is solved. If the fault still exists, go to 12.</p> <p>11. Replace push-rod assembly - reconnect push-rod assembly, diverter link, bell crank, and linear actuator. Restart the unit. If the fault is cleared, the problem is solved. If the fault still exists, go to 12.</p> <p>12. Replace linear actuator - reconnect push-rod assembly, diverter link, bell crank, and linear actuator. Restart the unit. If the fault is cleared, the problem is solved. If the fault still exists, go to 13.</p>	
	CHP Control Board failed	13. Troubleshoot CHP Control Board as explained under the 17000 fault code.	

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## 17007 Internal Fault CHP MTR OC BYP

CHP Diverter Motor Over Current Bypass

System SSL: 3 CHP SSL: FR

This error detects an overcurrent of greater than 2.34 Amps in the linear actuator motor during operation. If at any time an overcurrent condition occurs while moving towards the Bypass direction, the 17007 fault is declared which will cause the MicroTurbine to shut down.

Symptom	Probable Cause	Analysis	Repair Solution
Water temperature high. MicroTurbine shuts down	Linear actuator cable	Remove HRM panel to inspect linkage and linear actuator. Inspect linear actuator cable for short or open fault.	Fix cable problem.
	Linear actuator failure	<ol style="list-style-type: none"> <li>1. Inspect linkage to see if there is anything interfering with the actuator diverter linkage movement. If Yes, go to 2. If No, go to 3.</li> <li>2. Remove foreign object and restart the unit. If the fault clears, the problem is solved (observe linkage movement during self-test to see if linkage is intact). If the fault does not clear, go to 5.</li> <li>3. Disconnect actuator from linkage by removing the fastener on the extended end.</li> <li>4. Start the unit ensuring the linear actuator can travel its full-length without interference. Does the unit pass the self-test? If Yes, go to 5. If No, go to 12 (Replace linear actuator).</li> </ol>	
	Linkage/Diverter failure	<ol style="list-style-type: none"> <li>5. Move the bell crank assembly back and forth in the midrange of diverter travel and feel for any binding in linkage. If binding exists, go to 7. If binding does not exist, go to 6.</li> <li>6. Rotate actuator on pivot in actuator cradle to check for binding. If binding exists, go to 12 (Cradle could be faulty as well). If binding does not exist, go to 7.</li> <li>7. Disconnect push-rod assembly from diverter link and bell crank - Press push-rod assembly on ground, compressing the springs to see if compression is smooth (the compression motion should be smooth without sticking or friction). If sticking or friction exists, go to 11. If there is no sticking or friction, go to 8.</li> <li>8. Push diverter link through entire travel path pressing diverter link to each end stop. If it reaches end stop without excessive force (greater than 40 lbs), go to 9. If it reaches end stop with excessive force, go to 10.</li> </ol>	

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## 17007 Internal Fault CHP MTR OC BYP (Continued)

Symptom	Probable Cause	Analysis	Repair Solution
Water temperature high. MicroTurbine shuts down (Continued)	Linkage/Diverter failure (Continued)	<p>9. Remove HRM roof assembly panel and inspect diverter for deformation (diverter should be straight) or foreign objects. If diverter is not straight or foreign object exists, go to 10.</p> <p>10. Replace diverter assembly or remove foreign object (Check step 8 again) - reconnect push-rod assembly, diverter link, bell crank, and linear actuator. Restart the unit. If the fault is cleared, the problem is solved. If the fault still exists, go to 12.</p> <p>11. Replace push-rod assembly - reconnect push-rod assembly, diverter link, bell crank, and linear actuator. Restart the unit. If the fault is cleared, the problem is solved. If the fault still exists, go to 12.</p> <p>12. Replace linear actuator - reconnect push-rod assembly, diverter link, bell crank, and linear actuator. Restart the unit. If the fault is cleared, the problem is solved. If the fault still exists, go to 13.</p>	
	CHP Control Board failed	13. Troubleshoot the CHP Control Board as explained under the 17000 fault code.	

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## 17008 Internal Warning CHP MTR UC REC

CHP Diverter Motor Under Current Recovery

System SSL: 2 CHP SSL: FW

This error detects an undercurrent in the linear actuator motor when it is at Full Bypass and is commanded to move to Recovery. If undercurrent occurs while moving in the Recovery direction, the 17008 warning is declared, the linear actuator is stopped, and allowed to move in the Bypass direction only. Movement in the Recovery direction will be allowed again after a successful movement toward the Bypass direction.

Symptom	Probable Cause	Analysis	Repair Solution
Water temperature low	Actuator cable	Remove panel on the actuator side of the HRM unit. 1. Is actuator cable connected? If No, go to 2. If Yes, go to 3. 2. Connect cable and start the unit. If the unit starts without faults, the problem is solved. If the unit still has faults, go to 3.	
	Actuator linkage failure	3. Inspect actuator linkage at pivot points to see if any connections are broken or fasteners have fallen out. If Yes, go to 4. If No, go to 5. 4. Replace or repair linkage assembly and start the unit. If the unit starts without faults, the problem is solved. If the unit still has faults, go to 5.	
	Power harness to actuator failed	5. Test power harness - disconnect from actuator and CHP Control Board, and check continuity. If there is no continuity, go to 6. If there is continuity, go to 7. 6. Replace harness and start the unit. If the unit starts without faults, the problem is solved. If the unit starts with faults, go to 7.	
	Actuator motor failed	7. Check actuator motor for shorts. If shorted, go to 8. If no shorts, go to 9. 8. Replace actuator and start the unit. If the unit starts without faults, the problem is solved. If the unit starts with faults, go to 9.	
	CHP Control Board failed	9. Replace the CHP Control Board. If the unit starts without faults, the problem is solved. If the unit starts with faults, troubleshoot the CHP Control Board as explained under the 17000 fault code.	

**Observe Safety Precautions - Refer to *Safety Instructions* for Details**

## 17009 Internal Fault CHP MTR UC BYP

CHP Diverter Motor Under Current Bypass

System SSL: 3 CHP SSL: FR

This error detects an undercurrent in the linear actuator motor when it is at Full Recovery and is commanded to move to Bypass. If at any time an undercurrent condition occurs while moving towards Bypass direction, the 17009 fault is declared which will cause the MicroTurbine to shut down.

Symptom	Probable Cause	Analysis	Repair Solution
Water temperature high. MicroTurbine shuts down.	Actuator cable	Remove panel on the actuator side of the HRM unit. 1. Is actuator cable connected? If No, go to 2. If Yes, go to 3. 2. Connect cable and start the unit. If the unit starts without faults, the problem is solved. If the unit still has faults, go to 3.	
	Actuator linkage failure	3. Inspect actuator linkage at pivot points to see if any connections are broken or fasteners have fallen out. If Yes, go to 4. If No, go to 5. 4. Replace or repair linkage assembly and start the unit. If the unit starts without faults, the problem is solved. If the unit still has faults, go to 5.	
	Power harness to actuator failed OPEN	5. Test power harness - disconnect from actuator and CHP Control Board and check continuity. If there is no continuity, go to 6. If there is continuity go to 7. 6. Replace harness and start the unit. If the unit starts without faults, the problem is solved. If the unit starts with faults, go to 7.	
	Actuator motor failed	7. Check actuator motor for shorts. If it is shorted, go to 8. If no shorts, go to 9. 8. Replace actuator and start the unit. If the unit starts without faults, the problem is solved. If the unit starts with faults, go to 9.	
	CHP Control Board failed	9. Replace the CHP Control Board. If the unit starts without faults, the problem is solved. If the unit starts with faults, troubleshoot the CHP Control Board as explained under the 17000 fault code.	

**Observe Safety Precautions - Refer to *Safety Instructions* for Details**

## 17010 Internal Fault CHP MTR OC STNBY

CHP Diverter Motor Over Current Standby

System SSL:3 CHP SSL: FR

Detects an overcurrent of greater than 2.34 Amps in the CHP Control Board while the diverter is not commanded to move.

Symptom	Probable Cause	Analysis	Repair Solution
Overcurrent of CHP Control Board	CHP Control Board failed	Inspect CHP Control Board for component failure.	Replace CHP Control Board.
	CHP Control Board component(s) shorted	Inspect CHP Control Board for shorted component(s).	Replace CHP Control Board.

## 17011 Internal Fault CHP TIN OP SH

CHP Temperature Sensor In Open/Short

System SSL: 3 CHP SSL: FR

This error detects a failure of the water temperature measurement. The 17011 and 17012 faults are the most critical measurements in the CHP system. Without these parameters, it is not possible to avoid an overtemperature. When these faults occur, the MicroTurbine must shut down.

Open circuit  $\leq 21$  °F (-6 °C) Short circuit  $\geq 246$  °F (119 °C).

Symptom	Probable Cause	Analysis	Repair Solution
Water temperature exceeds limits. System unavailable	Inlet RTD harness failed	Remove the back panel of the HRM unit (where water input and outputs are located). 1. Is the inlet RTD cable connected? If No, go to 2. If Yes, go to 3. 2. Connect cable and start the unit. If the unit starts without faults, the problem is solved. If faults exist, go to 3. 3. Test RTD cable - disconnect from inlet RTD and CHP Control Board and check continuity of cable. If there is no continuity, go to 4. If there is continuity, go to 5. 4. Replace cable and start the unit. If the unit starts without faults, the problem is solved. If faults exist, go to 5.	
	Inlet water temperature sensor failed	5. Replace the inlet RTD and start the unit. If the unit starts without faults, the problem is solved. If faults exist, contact Capstone Technical Support.	
	Water temperature is below 21 °F (-6 °C)	Check water temperature by an independent means. Note: Surface temperature of the Header is a close approximation.	Raise water temperature.

**Observe Safety Precautions - Refer to Safety Instructions for Details**

## 17012 Internal Fault CHP TOUT OP SH

CHP Temperature Sensor Out Open/Short

System SSL: 3    CHP SSL: FR

This error detects a failure of the water temperature measurement. The 17011 and 17012 faults are the most critical measurements in the CHP system. Without these parameters, it is not possible to avoid an overtemperature. When these faults occur, the MicroTurbine must shut down.

Open circuit  $\leq 21$  °F (-6 °C)    Short circuit  $\geq 246$  °F (119 °C).

Symptom	Probable Cause	Analysis	Repair Solution
Water temperature exceeds limits. System unavailable	Outlet RTD harness failed	<ol style="list-style-type: none"> <li>1. Is the outlet RTD cable connected? If No, go to 2. If Yes, go to 3.</li> <li>2. Connect cable and start the unit. If the unit starts without faults, the problem is solved. If the unit still has faults, go to 3.</li> <li>3. Test RTD cable - disconnect from outlet RTD and CHP Control Board and check continuity of cable. If there is no continuity, go to 4. If there is continuity, go to 5.</li> <li>4. Replace cable and start the unit. If the unit starts without faults, the problem is solved. If faults exist, go to 5.</li> </ol>	
	Outlet water temperature sensor failed	<ol style="list-style-type: none"> <li>5. Replace the outlet RTD and start the unit. If the unit starts without faults, the problem is solved. If faults exist, contact Capstone Technical Support.</li> </ol>	
	Water temperature is above 246 °F (119 °C)	Check water temperature by an independent means. Note: Surface temperature of the Header is a close approximation.	Raise water temperature.

**Observe Safety Precautions - Refer to *Safety Instructions* for Details**

## 17013 Internal Warning CHP TEMP LO

CHP Control Temperature Low

System SSL: 2 CHP SSL: WN

Detects a water control temperature which has fallen 10 °F or more below the set point (Warning only).

Symptom	Probable Cause	Analysis	Repair Solution
Current operating temperature is below user's defined set point	Transient water inlet flow increases suddenly.	Water flow changes faster than system can respond.	Review system water loop design.
	Transient electronic power decreases suddenly.	Power demand changes faster than system can respond.	Limit rate of power change.
	Transient inlet water (feed water) temperature decreases suddenly.	Water heat requirements change faster than system can respond.	Review system water loop design.
	Diverter blade warped/failed - does not seal.	Inspect diverter blade.	Replace diverter blade.
	Heat recovery desired is too high and is not achievable	<b>Analysis and Repair Solution.</b> Observe diverter location. 1. If in midtravel - linkage is not connected or RTD is damaged. 2. If in Thermal Priority mode: A. You are at the Thermal Priority of the system at these conditions. Solve the integration issues. B. Remove HRM panels and check for leaks in HRM unit with wind gauge. If leak is found, replace HRM unit. C. Diverter blade is warped or obstructed. Remove lid on HRM unit and inspect for warping or blockage. If it is warped replace diverter. If it is blocked remove blockage and start the unit.	

Observe Safety Precautions - Refer to *Safety Instructions* for Details

## 17014 Internal Warning CHP TEMP HI

CHP Control Temperature High

System SSL: 2 CHP SSL: WN

Detects a water control temperature which has risen 10 °F or more above the set point. This remains a warning only as long as the temperature is below CHP OVRTEMP LOW limit (see 17015).

Symptom	Probable Cause	Analysis	Repair Solution
Current operating temperature is above user's defined set point	Transient water inlet flow drops suddenly.	Water flow changes faster than system can respond. Perform heat balance on system.	Review system water loop design.
	Transient electronic power increases suddenly.	Power demand changes faster than system can respond.	Limit rate of power change.
	Transient inlet water (feed water) temperature increases suddenly.	Water heat requirements change faster than system can respond.	Review system water loop design.
	Set point temperature of external T/C input not set up properly	Check input device set up parameters (ranges, etc.)	Reset input device set up
	External set point temperature out of calibration or damaged	Check T/C operation with an external meter	Replace external T/C
	Diverter blade warped/ failed - does not seal.	Inspect diverter blade.	Replace diverter blade.
	Flow switch stuck ON electrically/mechanically.	Water flow is low contrary to system indication.	Replace flow switch.

**Observe Safety Precautions - Refer to *Safety Instructions* for Details**

## 17015 Internal Fault CHP OVRTEMP LOW

CHP Water Overtemperature Low

System SSL: 3    CHP SSL: FR

Detects a failure to control the CHP outlet water temperature. If this fault occurs, the temperature has exceeded the Overtemperature Low Limit for a total of 120 seconds. The Overtemperature Low Limit is user-adjustable (120 to 224 °F) and is set using CHPOTP command. This fault requires the MicroTurbine to shut down.

<b>NOTE</b>	Water temperature refers to the inlet, outlet, or external sensor temperature feedback condition.
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Symptom	Probable Cause	Analysis	Repair Solution
Water temperature has exceeded Maximum Water Temperature Low limit	CHP Over-temperature Low limit exceeded	<ol style="list-style-type: none"> <li>1. Is CHP Overtemperature Low setting lower than the highest expected operational water temperature? (Default setting = 120 °F.) If Yes, go to 2. If No, go to 3.</li> <li>2. Set CHP Overtemperature Low limit to the desired value. If the unit operates without faults, the problem is solved. If the unit still has a fault, go to 3.</li> <li>3. Is CHP Overtemperature Low setting at maximum value of 224 °F or greater? If Yes, go to 10. If No, go to 4.</li> </ol>	
	Power demand increased suddenly.	<ol style="list-style-type: none"> <li>4. Did power demand to the MicroTurbine increase rapidly? If Yes, go to 12. If No, go to 5.</li> </ol>	
	Fluid flow changed suddenly	<ol style="list-style-type: none"> <li>5. Did fluid flow change suddenly in the water side of the system (e.g., 60 GPM to 20 GPM)? If Yes, go to 10. If No, go to 6.</li> </ol>	
	Fluid inlet temperature changed suddenly	<ol style="list-style-type: none"> <li>6. Did fluid inlet temperature to HRM increase suddenly (e.g., 100 °F to 150 °F)? If Yes, go to 12. If No, go to 7.</li> </ol>	
	Flow switch harness failed	<ol style="list-style-type: none"> <li>7. Turn OFF both the flow and system. Remove cap on the flow switch. Check resistance between COMM and Normally Open contact. Does it read zero ohm (open condition)? If Yes, go to 9. If No, go to 10.</li> <li>8. Check for short on flow switch harness. If no short, go to 11. If there is a short, go to 9.</li> <li>9. Replace flow switch harness and start the unit. If the fault clears, the problem is solved. If the fault does not clear, go to 11.</li> </ol>	
	Flow switch failed	<ol style="list-style-type: none"> <li>10. Replace flow switch and start the unit. If the fault clears, problem is solved. If the fault does not clear, go to 11.</li> <li>11. Check application. Contact Capstone Technical Support.</li> </ol>	
	Linear actuator failure	<ol style="list-style-type: none"> <li>12. Verify that the linear actuator is at/or moving toward Full Bypass. If this is not the case, go to 13.</li> <li>13. Shut down the MicroTurbine and verify that the linear actuator can be commanded to Full Recovery and Full Bypass by open-loop commands. If not successful, replace the linear actuator.</li> </ol>	

**Observe Safety Precautions - Refer to Safety Instructions for Details**

## 17016 Internal Fault CHP OVRTEMP HIGH

CHP Water Overtemperature High

System SSL: 3    CHP SSL: FR

Detects a failure to control the CHP water temperature. If this fault occurs, the temperature has exceeded the Max Water Temperature High value of 235 °F. This fault requires the MicroTurbine to shut down.

<b>NOTE</b>	Water temperature refers to the inlet, outlet, or external sensor temperature feedback condition.
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Symptom	Probable Cause	Analysis	Repair Solution
Water temperature has exceeded Maximum Water Temperature High limit	Maximum Water Temperature High value	1. Is water temperature at/or above 235 °F? If Yes, go to 7. If No, go to 2.	
	Power demand increased suddenly.	2. Did power demand to the MicroTurbine increase rapidly? If Yes, go to 9. If No, go to 3.	
	Fluid flow changed suddenly	3. Did fluid flow change suddenly in the water side of the system (e.g., 60 GPM to 20 GPM)? If Yes, go to 7. If No, go to 4.	
	Flow switch harness failed	4. Turn OFF both the flow and system. Remove cap on the flow switch. Check resistance between COMM and Normally Open contact. Does it read zero ohm (open condition)? If Yes, go to 6. If No, go to 7. 5. Check for short on flow switch harness. If no short, go to 8. If there is a short, go to 6. 6. Replace flow switch harness and start the unit. If the fault clears, the problem is solved. If the fault does not clear, go to 8.	
	Flow switch failed	7. Check and replace the flow switch and start the unit. If the fault clears, the problem is solved. If the fault does not clear, go to 8. 8. Check application. Contact Capstone Technical Support.	
Linear actuator failure	9. Verify that the linear actuator is at/or moving toward Full Bypass. If this is not the case, go to 10. 10. Shut down the MicroTurbine and verify that the linear actuator can be commanded to Full Recovery and Full Bypass by open-loop commands. If not successful, replace the linear actuator.		

**Observe Safety Precautions - Refer to Safety Instructions for Details**

## 17017 Internal Fault CHP MODE INVALID

System SSL: 3    CHP SSL: FW

Reported when the CHP mode setting is invalid for the unit's utility connection configuration. The fault clears when correct CHP mode is detected.

Symptom	Probable Cause	Analysis	Repair Solution
CHP Mode setting does not match Utility connection configuration	CHP Mode is not set properly	Check CHP Mode setting against Utility connection. Note: Thermal Priority is only available in Grid Connect mode. Electric Priority and Thermal Bypass options are available in both Grid Connect and Stand Alone modes.	Select correct CHP Mode setting.

## 17018 Internal Fault NO CHP DEVICE

System SSL: 3    CHP SSL: FR

Detects a loss of communication to a CHP device. Reported when the feedback from a CHP Control Board is not received for 10 seconds continuously.

Symptom	Probable Cause	Analysis	Repair Solution
Communication failure between system and CHP device	Grounding	Incorrect grounding of the system can lead to intermittent communications problems within system.	Verify system is grounded per installation instructions.
	Intra harness connection	Intra harness carrying messages between CHP Control Board and ECM Control Board could be loose or damaged.	Dry and Secure Intra harness at CHP Control Board and ECM Control Board.  Replace if damaged.
	ECM Control Board	ECM Control Board can have damaged circuitry that prevents it from receiving correct message data.	Attempt an ECM Control Board PM upload.  Replace ECM Control Board.
	CHP Control Board	CHP Control Board can have damaged circuitry that prevents it from transmitting correct message data.	Replace CHP Control Board.

**Observe Safety Precautions - Refer to *Safety Instructions* for Details**

## 17019 Internal Fault CHP NO AUXIN FLT

CHP No Auxiliary Input Fault

System SSL: 3 CHP SSL: FR

This fault is reported after the 17003 warning (CHP NO AUXIN WRN) is posted for three times.

The CHP Control Board will not operate unless its AUXIN input is closed. If during operation, the AUXIN input opens for any reason, the CHP system will go to Full Bypass and attempt to resume operation when AUXIN input is restored. If no AUXIN is detected after the third attempt, then the 17019 fault is reported, the diverter is moved to Full Bypass, and no further attempts to control water temperature are made. In addition, in the Thermal Priority mode only, the MicroTurbine is automatically shut down. To restart CHP operation, the unit must be manually shut down and started by the user.

<b>NOTE</b>	The status of AUXIN is not checked if CHP is set to run in Thermal Bypass mode.
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Symptom	Probable Cause	Analysis	Repair Solution
CHP system in Full Bypass mode	AUXIN input	1. Is customer using AUXIN input? If Yes, go to 2. If No, go to 7.	
	Customer input device	2. Check that the input device is connected to pins 1 & 2 (confirm). If connected, go to 4. If not connected, go to 3. 3. Connect input device properly and restart the unit. If the fault clears, the problem is solved. If the fault does not clear, go to 4. 4. Measure continuity of customer input device (e.g., RTD, T/C). If there is no continuity, go to 5. If there is continuity, go to 6. 5. Replace customer input device and restart the unit. If the fault clears, the problem is solved. If the fault does not clear, go to 6.	
	CHP Control Board failure	6. Replace CHP Control Board and restart the unit. If the fault clears, the problem is solved. If the fault does not clear, go to CHP Control Board troubleshooting as explained under the 17000 fault code.	
	External AUXIN not configured correctly	7. Is the jumper installed across input pins 1 & 2? If Yes, go to 8. If No, go to 9. 8. Is there continuity across the jumper? If Yes, go to 10. If No, go to 9. 9. Install new jumper (ensure continuity of jumper after installing it). Restart the unit. If the fault clears, the problem is solved. If the fault does not clear, go to 10. 10. Continue with troubleshooting as explained under the 17000 fault code.	

**Observe Safety Precautions - Refer to Safety Instructions for Details**

## 17020 Internal Fault CHP NO FLOW FLT

CHP No Water Flow Fault

System SSL: 3      CHP SSL: FR

This fault is reported after the 17005 warning (CHP NO FLOW WRN) is posted for three times.

If during operation, the flow is stopped for some reason, the CHP system will go to Full Bypass and attempt to resume operation when flow is restored. If no water flow is detected after the third attempt, then the 17020 fault is reported, the diverter is moved to Full Bypass, and no further attempts to control water temperature are made. In addition, in the Thermal Priority mode only, the MicroTurbine is automatically shut down. To restart CHP operation, the unit must be manually shut down and started by the user.

Symptom	Probable Cause	Analysis	Repair Solution
No water flow. CHP system in Full Bypass mode	Water inlet flow slows/stops	No heat recovery.	Restore water flow.
		Check to see if water pump in system is operating properly.	Replace water pump (Customer).
		Shut-off valve in system not open.	Open system shut-off valve.
	Flow direction reversed	<ol style="list-style-type: none"> <li>1. Is fluid flowing in the correct direction? (It should be flowing out of the HRM at the flow switch location.) If Yes, go to 3. If No, go to 2.</li> <li>2. Change flow direction in application, and restart the unit. If the fault clears, the problem is solved. If the fault does not clear, go to 3 (flow is not high enough).</li> <li>3. Is flow greater than 20 GPM? If Yes, go to 4. If No, go to 5.</li> </ol>	
	Flow switch misaligned	<ol style="list-style-type: none"> <li>4. Is the flow switch perpendicular to flow direction? (Flow switch can function properly with less than 10° of misalignment.) If Yes, go to 6. If No, go to 5.</li> <li>5. Align flow switch such that it is perpendicular to flow, and restart the unit. If the fault clears, the problem is solved. If the fault does not clear, go to 6.</li> </ol>	
Flow switch harness failed	<ol style="list-style-type: none"> <li>6. Turn OFF both the flow and system. Remove cap on the flow switch. Check resistance between COMM and Normally Open contact. Does it read zero ohm (open condition)? If Yes, go to 8. If No, go to 7.</li> <li>7. Is the harness connected to the Control Board? If No, go to 8. If Yes, go to 10.</li> <li>8. Connect the harness and restart system? If the fault clears, the problem is solved. If the fault does not clear, go to 9.</li> </ol>		

Continued on next page

**Observe Safety Precautions - Refer to Safety Instructions for Details**

## 17020 Internal Fault CHP NO FLOW FLT (Continued)

Symptom	Probable Cause	Analysis	Repair Solution
No water flow. CHP system in Full Bypass mode (Continued)	Flow switch paddle eroded	<p>9. Remove the flow switch and inspect for eroded paddle. If eroded, go to 10. If not eroded, go to 11.</p> <p>10. Replace the flow switch, and restart the unit with flow ON. If the fault clears, the problem is solved. If the fault does not clear, go to 11.</p> <p>11. Continue with troubleshooting as explained under the 17000 fault code.</p>	
	Flow switch stuck OFF electrically/ mechanically	MicoTurbine is always set to Bypass. No heat recovery.	Replace flow switch.
	Pressure relief valve stuck OPEN	Water loop loss. Low heat recovery.	Replace relief valve.

**Observe Safety Precautions - Refer to *Safety Instructions* for Details**