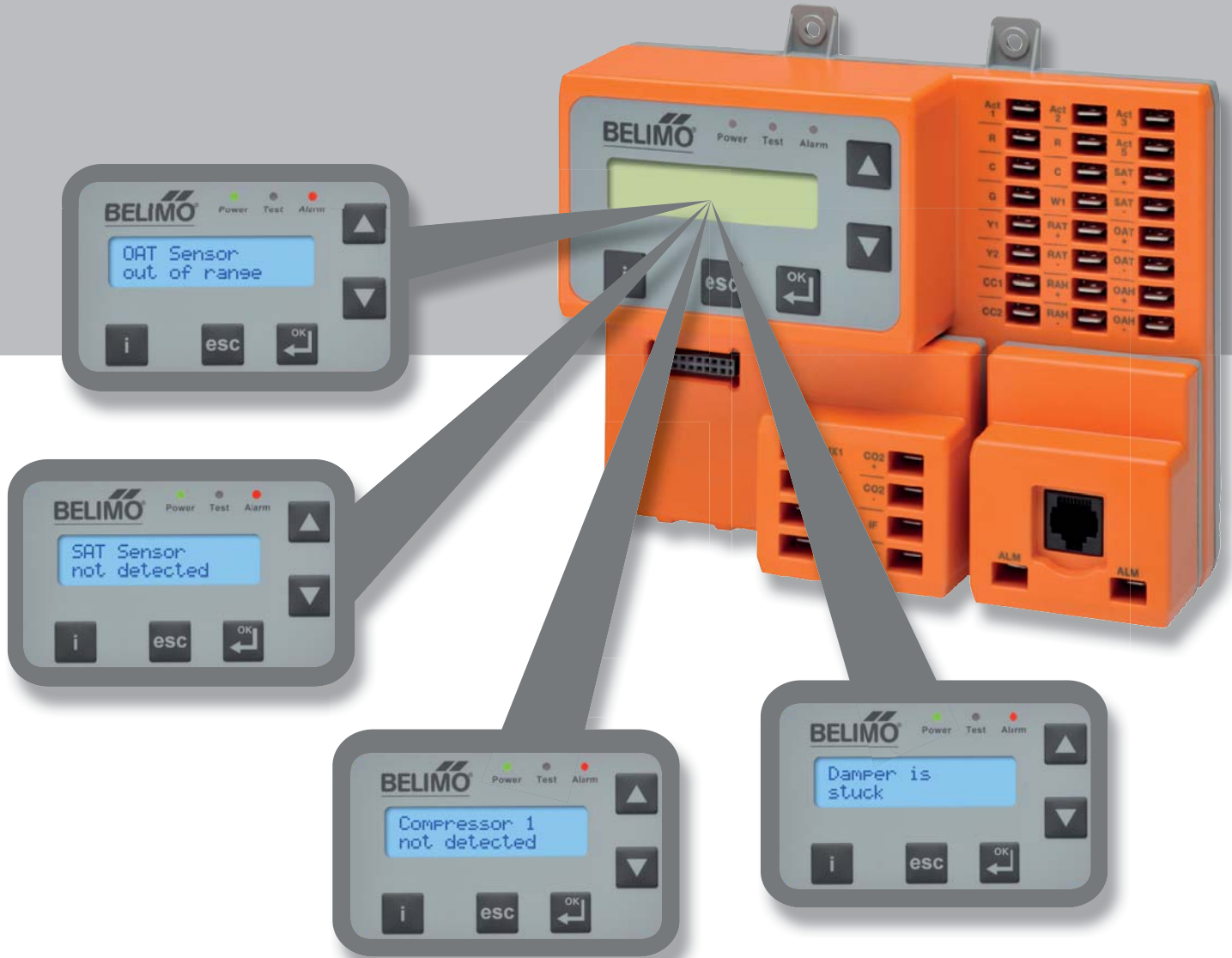


# ZIP Economizer™

## Fault Detection & Diagnostics Guide



First Aid for your Economizer  
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Fault Detection	Problem	Diagnostic Action (in addition to alarm stored / transmitted)	Potential Cause	CA Fault Code
OAT sensor out of range	Sensor is returning a value that is out of the predetermined range	<ul style="list-style-type: none"> <li>Economizing functionality disabled</li> <li>OA damper returns to minimum position</li> <li>Compressor low temp lockout disabled</li> </ul>	<ul style="list-style-type: none"> <li>Thermistor failure</li> <li>Damage to wire affecting resistance output</li> </ul>	A, B
OAT sensor not detected	Sensor previously installed is not detected or sensor has not been installed	<ul style="list-style-type: none"> <li>Economizing functionality disabled</li> <li>OA damper returns to minimum position</li> <li>Compressor low temp lockout disabled</li> </ul>	<ul style="list-style-type: none"> <li>Sensor never installed</li> <li>Installed sensor has open or short</li> <li>Wire harness broken</li> </ul>	A, B
OAH sensor out of range	Sensor is returning a value that is out of the predetermined range - <b>Single Enthalpy</b>	<ul style="list-style-type: none"> <li>Economizing functionality disabled</li> <li>OA damper returns to minimum position</li> </ul>	<ul style="list-style-type: none"> <li>Supply voltage too high</li> <li>Sensor electronics failure</li> <li>Sensor element failure</li> <li>Sensor used is not correct range</li> </ul>	A, B
	Sensor is returning a value that is out of the predetermined range - <b>Differential Enthalpy</b>	<ul style="list-style-type: none"> <li>Economizing functioning by differential temperature with return air humidity limit</li> </ul>		A
OAH sensor not detected	Sensor previously installed is not detected or sensor has not been installed - <b>Single Enthalpy</b>	<ul style="list-style-type: none"> <li>Economizing functionality disabled</li> <li>OA damper returns to minimum position</li> </ul>	<ul style="list-style-type: none"> <li>Sensor inadvertently installed, not deleted</li> <li>Supply power missing</li> <li>Sensor electronics open</li> <li>Wire harness broken</li> </ul>	A, B
	Sensor previously installed is not detected or sensor has not been installed - <b>Differential Enthalpy</b>	<ul style="list-style-type: none"> <li>Economizing functioning by differential temperature with return air humidity limit</li> </ul>		A
RAT sensor out of range	Sensor is returning a value that is out of the predetermined range - <b>Differential Temperature</b>	<ul style="list-style-type: none"> <li>Economizing functioning by OAT single dry bulb</li> <li>Change over limit modified to suit single dry bulb</li> </ul>	<ul style="list-style-type: none"> <li>Thermistor failure</li> <li>Damage to wire affecting resistance output</li> </ul>	A
	Sensor is returning a value that is out of the predetermined range - <b>Differential Enthalpy</b>	<ul style="list-style-type: none"> <li>Economizing functioning by OAE single enthalpy</li> <li>Change over limit modified to 28btu/lb 75°F</li> </ul>		A
RAT sensor not detected	Sensor is returning a value that is out of the predetermined range - <b>Differential Temperature</b>	<ul style="list-style-type: none"> <li>Economizing functioning by OAT single dry bulb</li> <li>Change over limit modified to suit single dry bulb</li> </ul>	<ul style="list-style-type: none"> <li>Installed sensor has open or short</li> <li>Wire harness broken</li> </ul>	A
	Sensor is returning a value that is out of the predetermined range - <b>Differential Enthalpy</b>	<ul style="list-style-type: none"> <li>Economizing functioning by OAE single enthalpy</li> <li>Change over limit modified to 28btu/lb 75°F</li> </ul>		A
RAH sensor out of range	Sensor is returning a value that is out of the predetermined range	<ul style="list-style-type: none"> <li>Economizing functioning by OAE single enthalpy</li> <li>Change over limit modified to 28btu/lb 75°F</li> </ul>	<ul style="list-style-type: none"> <li>Supply power too high</li> <li>Sensor electronics failure</li> <li>Sensor element failure</li> </ul>	A
RAH sensor not detected	Sensor previously installed is not detected	<ul style="list-style-type: none"> <li>Economizing functioning by OAE single enthalpy</li> <li>Change over limit modified to 28btu/lb 75°F</li> </ul>	<ul style="list-style-type: none"> <li>Supply power missing</li> <li>Sensor electronics open</li> <li>Wire harness broken</li> </ul>	A

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Fault Detection	Problem	Diagnostic Action (in addition to alarm stored / transmitted)	Potential Cause	CA Fault Code
RAH sensor detected but OAH sensor not detected	Sensor previously installed is not detected or sensor has not been installed - <b>Differential Enthalpy</b>	<ul style="list-style-type: none"> <li>Economizing functioning by differential temperature with return air humidity limit</li> </ul>	<ul style="list-style-type: none"> <li>Intended configuration of differential enthalpy not completed or OAH sensor failed</li> <li>Intended configuration of single enthalpy, OAH sensor inadvertently placed on RAH terminal</li> <li>OAH sensor deleted or set to not installed, but RAH sensor left installed</li> </ul>	A, B
RAH sensor detected but RAT sensor not detected	Sensor previously installed is not detected or sensor has not been installed - <b>Differential Enthalpy</b>	<ul style="list-style-type: none"> <li>Economizing functioning by OAE single enthalpy</li> <li>Change over limit modified to 28 Btu/lb 75°F</li> </ul>	<ul style="list-style-type: none"> <li>Intended configuration of differential enthalpy not completed or RAT sensor failed</li> <li>RAT sensor deleted, but RAH sensor left installed</li> </ul>	A, B
SAT sensor out of range	Sensor is returning a value that is out of the predetermined range	<ul style="list-style-type: none"> <li>Economizing functionality disabled</li> <li>Freeze detection based on OAT only</li> <li>Low discharge limit control 45°F disabled</li> <li>Compressor SAT drop error detection disabled</li> <li>Limiting 2nd stage operation based on low SAT (SAT Y2 limit) disabled</li> </ul>	<ul style="list-style-type: none"> <li>Thermistor failure</li> <li>Damage to wire increasing resistance</li> </ul>	A, B
SAT sensor not detected	Sensor previously installed is not detected or sensor has not been installed	<ul style="list-style-type: none"> <li>Economizing functionality disabled</li> <li>Freeze detection based on OAT only</li> <li>Low discharge limit control 45°F disabled</li> <li>Compressor SAT drop error detection disabled</li> <li>Limiting 2nd stage operation based on low SAT (SAT Y2 limit) disabled</li> </ul>	<ul style="list-style-type: none"> <li>Sensor never installed</li> <li>Installed sensor has open or short</li> <li>Wire harness broken</li> </ul>	A, B
Y2 present without Y1	Call for Y2 without call for Y1	<ul style="list-style-type: none"> <li>Enable 1st stage free cooling or mechanical cooling in accordance change over configuration</li> <li>If Y1 follows Y2, 2nd stage integrated or mechanical cooling will be enabled</li> </ul>	<ul style="list-style-type: none"> <li>Miswired or reverse wired thermostat</li> <li>Miswired ZIP Economizer</li> <li>Thermostat failure</li> <li>Wire harness broken</li> </ul>	N/A
SAT drop for CC1 or CC2 insufficient	SAT sensor determined that temperature downstream of evaporator did not drop by at least 5°F after 4 min of CC1 or CC2 being energized	<ul style="list-style-type: none"> <li>Informational only - no action</li> </ul>	<ul style="list-style-type: none"> <li>Filters or coils are dirty or blocked – inspect</li> <li>SAT sensor in a location where it is not mixed - perform temperature traverse</li> <li>Indoor fan is inoperable - check relay, belt, motor, bearings</li> <li>Condenser fan is inoperable - check relay, motor, head pressure control</li> <li>Compressor is faulty (internal damage) - check amperage, pressures</li> <li>Contactor energizes but compressor is off on internal/external overload</li> <li>High voltage problem to compressor - check wiring, phases, contactor</li> <li>Low on refrigerant - check charge</li> </ul>	N/A
Damper Pos value missing	Economizer is not sensing feedback from actuator	<ul style="list-style-type: none"> <li>Logic reconfigured to use setpoint as reference for items dependent on actual position (i.e. integrated cooling)</li> <li>Damper stuck fault detection capability is disabled</li> </ul>	<ul style="list-style-type: none"> <li>Actuator wires not properly terminated</li> <li>Actuator without feedback capability used</li> <li>Wire harness broken</li> <li>Actuator electronic failure</li> </ul>	E
SAT should be lower	When damper is greater than 85% open, and in free cooling, SAT sensor determined that temperature is not within 10°F of OAT	<ul style="list-style-type: none"> <li>Informational only - no action</li> </ul>	<ul style="list-style-type: none"> <li>Damper linkage failure</li> <li>Actuator clamp / interface between damper is not secure</li> <li>Damper blades are not secured to damper shaft properly</li> <li>Outside air damper and return damper do not stroke properly</li> <li>Return damper does not closes tightly when outdoor damper is full open</li> <li>OAT sensor is poorly located</li> <li>SAT sensor is poorly located</li> </ul>	B
Damper is stuck	Feedback signal is not within range of commanded position	<ul style="list-style-type: none"> <li>If rotation is less than 85%, then integrated cooling will be disabled</li> </ul>	<ul style="list-style-type: none"> <li>Damper linkage failure</li> <li>Damper blocked with foreign object</li> <li>Actuator limit stop engaged</li> <li>Damper rotation has not been scaled using Economizer Acceptance Test</li> </ul>	B, C, D, E

Fault Detection	Problem	Diagnostic Action (in addition to alarm stored / transmitted)	Potential Cause	CA Fault Code
Energy Module is missing	Expansion module previously installed is not detected	<ul style="list-style-type: none"> <li>Logic reconfigured to ignore devices attached to Energy Module, although maintains settings in memory</li> <li>Menu reconfigured to remove devices</li> <li>If CO2 sensor attached, lowest minimum position is Vent Min Pos</li> <li>Functionality for pre-occupancy purge, power exhaust, remote damper override, DCV, and low speed fan control not available</li> </ul>	<ul style="list-style-type: none"> <li>Module was not installed tight initially and became loose</li> <li>Module was intentionally removed</li> </ul>	N/A
Exhaust fan not detected	Power exhaust fan control circuit is not detected	<ul style="list-style-type: none"> <li>Logic reconfigured to ignore exhaust fan operation, although maintains settings in memory</li> </ul>	<ul style="list-style-type: none"> <li>EF intentionally removed, not deleted</li> <li>Exhaust fan relay coil failure</li> <li>Wire harness broken</li> </ul>	N/A
Compressor 1 not detected	Control circuit connected to CC1 is not detected	<ul style="list-style-type: none"> <li>1st stage of mechanical cooling is impossible</li> <li>Integrated cooling is impossible</li> <li>Logic and FDD dependent on 1st stage is disabled</li> </ul>	<ul style="list-style-type: none"> <li>Compressor safety open (LP, HP, current)</li> <li>Compressor contactor coil failure</li> <li>Damage to wire increasing resistance</li> <li>Wire harness broken</li> </ul>	N/A
Compressor 2 not detected	Control circuit connected to CC2 is not detected	<ul style="list-style-type: none"> <li>2nd stage of mechanical cooling is impossible</li> <li>Logic and FDD dependent on 2nd stage is disabled</li> </ul>	<ul style="list-style-type: none"> <li>Compressor safety open (LP, HP, current)</li> <li>Compressor contactor coil failure</li> <li>Damage to wire increasing resistance</li> <li>Wire harness broken</li> <li>Only 1 compressor in unit, wiring inadvertently terminated at CC2, not deleted</li> </ul>	N/A
2 Speed fan not detected	Control circuit connected to IF is not detected	<ul style="list-style-type: none"> <li>Logic reconfigured to high speed fan operation only, although maintains settings in memory</li> </ul>	<ul style="list-style-type: none"> <li>Low speed fan control circuit failure</li> <li>Wire harness broken</li> <li>Damage to wire increasing resistance</li> <li>Wire harness broken</li> </ul>	N/A
CO2 sensor not detected	Sensor previously installed is not detected	<ul style="list-style-type: none"> <li>Logic reconfigured to ignore DCV configuration, although maintains settings in memory</li> <li>Menu reconfigured to remove DCV associated entities</li> <li>Lowest minimum position is Vent Min Pos</li> </ul>	<ul style="list-style-type: none"> <li>CO2 sensor loses power</li> <li>Wire harness broken</li> <li>CO2 sensor electronics failure</li> </ul>	E
CO2 sensor out of range	Sensor is returning a value that is not within 250-2200 ppm range	<ul style="list-style-type: none"> <li>Logic reconfigured to ignore DCV configuration, although maintains settings in memory</li> <li>Menu reconfigured to remove DCV associated entities</li> <li>Lowest minimum position is Vent Min Pos</li> </ul>	<ul style="list-style-type: none"> <li>CO2 sensor out of calibration</li> <li>Wire harness broken</li> <li>CO2 sensor electronics failure</li> </ul>	E
Heat and cool both present	Signal present on both Y1 and W1 at the same time	<ul style="list-style-type: none"> <li>Logic dependencies requiring W1 are disabled</li> <li>Allows Y1 call to be processed</li> </ul>	<ul style="list-style-type: none"> <li>Miswired thermostat</li> <li>Thermostat failure</li> <li>Wire harness short</li> <li>RTU is a heat pump, but "Heat Pump Op" not set to on in settings menu</li> </ul>	N/A

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**California Title 24 Fault Detection & Diagnostics Fault Categories**

- A. Air temperature sensor failure/fault.
- B. Not economizing when it should.
- C. Economizing when it should not.
- D. Damper not modulating.
- E. Excess outdoor air.

Refer to California Energy Commission (CEC) 2013 Building Energy Efficiency Standard/2013 Title 24/Part 6/Section 120.2

California Title 24 FDD Certification Number BZE1245