ZIP Economizer™
Fault Detection & Diagnostics Guide

First Aid for your Economizer
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### ZIP Economizer
**Fault Detection and Diagnostics (FDD) Table**

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<th>Fault Detection</th>
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<th>Diagnostic Action (in addition to alarm stored / transmitted)</th>
<th>Potential Cause</th>
<th>CA Fault Code</th>
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</table>
| OAT sensor out of range | Sensor is returning a value that is out of the predetermined range | • Economizing functionality disabled  
• OA damper returns to minimum position  
• Compressor low temp lockout disabled | • Thermistor failure  
• Damage to wire affecting resistance output | A, B |
| OAT sensor not detected | Sensor previously installed is not detected or sensor has not been installed | • Economizing functionality disabled  
• OA damper returns to minimum position  
• Compressor low temp lockout disabled | • Sensor never installed  
• Installed sensor has open or short  
• Wire harness broken | A, B |
| OAH sensor out of range | Sensor is returning a value that is out of the predetermined range - Single Enthalpy | • Economizing functionality disabled  
• OA damper returns to minimum position  
• Sensor used is not correct range | • Supply voltage too high  
• Sensor electronics failure  
• Sensor element failure | A, B |
| OAH sensor not detected | Sensor is returning a value that is out of the predetermined range - Differential Enthalpy | • Economizing functionality by differential temperature with return air humidity limit | • Sensor inadvertently installed, not deleted  
• Supply power missing  
• Sensor electronics open  
• Wire harness broken | A |
| OAH sensor out of range | Sensor previously installed is not detected or sensor has not been installed - Single Enthalpy | • Economizing functionality disabled  
• OA damper returns to minimum position | • Sensor inadvertently installed, not deleted  
• Supply power missing  
• Sensor electronics open  
• Wire harness broken | A, B |
| OAH sensor not detected | Sensor previously installed is not detected or sensor has not been installed - Differential Enthalpy | • Economizing functionality by differential temperature with return air humidity limit | • Sensor inadvertently installed, not deleted  
• Supply power missing  
• Sensor electronics open  
• Wire harness broken | A |
| RAT sensor out of range | Sensor is returning a value that is out of the predetermined range - Differential Temperature | • Economizing functioning by OAT single dry bulb  
• Change over limit modified to suit single dry bulb  
• Thermistor failure  
• Damage to wire affecting resistance output | • Installed sensor has open or short  
• Wire harness broken | A |
| RAT sensor not detected | Sensor is returning a value that is out of the predetermined range - Differential Temperature | • Economizing functioning by OAE single enthalpy  
• Change over limit modified to 28btu/lb 75°F | • Installed sensor has open or short  
• Wire harness broken | A |
| RAT sensor out of range | Sensor is returning a value that is out of the predetermined range - Differential Temperature | • Economizing functioning by OAE single enthalpy  
• Change over limit modified to 28btu/lb 75°F  
• Supply power too high  
• Sensor electronics failure  
• Sensor element failure | • Installed sensor has open or short  
• Wire harness broken | A |
| RAH sensor out of range | Sensor is returning a value that is out of the predetermined range | • Economizing functioning by OAE single enthalpy  
• Change over limit modified to 28btu/lb 75°F  
• Supply power missing  
• Sensor electronics open  
• Wire harness broken | • Installed sensor has open or short  
• Wire harness broken | A |
| RAH sensor not detected | Sensor previously installed is not detected | • Economizing functioning by OAE single enthalpy  
• Change over limit modified to 28btu/lb 75°F  
• Supply power missing  
• Sensor electronics open  
• Wire harness broken | • Installed sensor has open or short  
• Wire harness broken | A |
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| RAH sensor detected but OAH sensor not detected | Sensor previously installed is not detected or sensor has not been installed - Differential Enthalpy | • Economizing functioning by differential temperature with return air humidity limit | • Intended configuration of differential enthalpy not completed or OAH sensor failed  
• Intended configuration of single enthalpy, OAH sensor inadvertently placed on RAH terminal  
• OAH sensor deleted or set to not installed, but RAH sensor left installed | A, B |
| RAH sensor detected but RAT sensor not detected | Sensor previously installed is not detected or sensor has not been installed - Differential Enthalpy | • Economizing functioning by OAE single enthalpy  
• Change over limit modified to 26 Btu/lb 75°F | • Intended configuration of differential enthalpy not completed or RAT sensor failed  
• RAT sensor deleted, but RAH sensor left installed | A, B |
| SAT sensor out of range | Sensor is returning a value that is out of the predetermined range | • Economizing functionality disabled  
• Freeze detection based on OAT only  
• Low discharge limit control 45°F disabled  
• Compressor SAT drop error detection disabled  
• Limiting 2nd stage operation based on low SAT (SAT Y2 limit) disabled | • Thermistor failure  
• Damage to wire increasing resistance | A, B |
| SAT sensor not detected | Sensor previously installed is not detected or sensor has not been installed | • Economizing functionality disabled  
• Freeze detection based on OAT only  
• Low discharge limit control 45°F disabled  
• Compressor SAT drop error detection disabled  
• Limiting 2nd stage operation based on low SAT (SAT Y2 limit) disabled | • Sensor never installed  
• Installed sensor has open or short  
• Wire harness broken | A, B |
| Y2 present without Y1 | Call for Y2 without call for Y1 | • Enable 1st stage free cooling or mechanical cooling in accordance change over configuration  
• If Y1 follows Y2, 2nd stage integrated or mechanical cooling will be enabled | • Miswired or reverse wired thermostat  
• Miswired ZIP Economizer  
• Thermostat failure  
• Wire harness broken | 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 | • Informational only - no action | • Filters or coils are dirty or blocked – inspect  
• SAT sensor in a location where it is not mixed - perform temperature traverse  
• Indoor fan is inoperable – check relay, belt, motor, bearings  
• Condenser fan is inoperable – check relay, motor, head pressure control  
• Compressor is faulty (internal damage) - check amperage, pressures  
• Contactor energizes but compressor is off on internal/external overload  
• High voltage problem to compressor - check wiring, phases, contactor  
• Low on refrigerant - check charge | N/A |
| Damper Pos value missing | Economizer is not sensing feedback from actuator | • Logic reconfigured to use setpoint as reference for items dependent on actual position (i.e. integrated cooling)  
• Damper stuck fault detection capability is disabled | • Actuator wires not properly terminated  
• Actuator without feedback capability used  
• Wire harness broken  
• Actuator electronic failure | 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 | • Informational only - no action | • Damper linkage failure  
• Actuator clamp / interface between damper is not secure  
• Damper blades are not secured to damper shaft properly  
• Outside air damper and return damper do not stroke properly  
• Return damper does not closes tightly when outdoor damper is full open  
• OAT sensor is poorly located  
• SAT sensor is poorly located | B |
| Damper is stuck | Feedback signal is not within range of commanded position | • If rotation is less than 85%, then integrated cooling will be disabled | • Damper linkage failure  
• Damper blocked with foreign object  
• Actuator limit stop engaged  
• Damper rotation has not been scaled using Economizer Acceptance Test | B, C, D, E |
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| Energy Module is missing | Expansion module previously installed is not detected | • Logic reconfigured to ignore devices attached to Energy Module, although maintains settings in memory  
• Menu reconfigured to remove devices  
• If CO2 sensor attached, lowest minimum position is Vent Min Pos  
• Functionality for pre-occupancy purge, power exhaust, remote damper override, DCV, and low speed fan control not available | • Module was not installed tight initially and became loose  
• Module was intentionally removed | N/A |
| Exhaust fan not detected | Power exhaust fan control circuit is not detected | • Logic reconfigured to ignore exhaust fan operation, although maintains settings in memory | • EF intentionally removed, not deleted  
• Exhaust fan relay coil failure  
• Wire harness broken | N/A |
| Compressor 1 not detected | Control circuit connected to CC1 is not detected | • 1st stage of mechanical cooling is impossible  
• Integrated cooling is impossible  
• Logic and FDD dependent on 1st stage is disabled | • Compressor safety open (LP, HP, current)  
• Compressor contactor coil failure  
• Damage to wire increasing resistance  
• Wire harness broken | N/A |
| Compressor 2 not detected | Control circuit connected to CC2 is not detected | • 2nd stage of mechanical cooling is impossible  
• Logic and FDD dependent on 2nd stage is disabled | • Compressor safety open (LP, HP, current)  
• Compressor contactor coil failure  
• Damage to wire increasing resistance  
• Wire harness broken  
• Only 1 compressor in unit, wiring inadvertently terminated at CC2, not deleted | N/A |
| 2 Speed fan not detected | Control circuit connected to IF is not detected | • Logic reconfigured to high speed fan operation only, although maintains settings in memory | • Low speed fan control circuit failure  
• Wire harness broken  
• Damage to wire increasing resistance  
• Wire harness broken | N/A |
| CO2 sensor not detected | Sensor previously installed is not detected | • Logic reconfigured to ignore DCV configuration, although maintains settings in memory  
• Menu reconfigured to remove DCV associated entities  
• Lowest minimum position is Vent Min Pos | • CO2 sensor loses power  
• Wire harness broken  
• CO2 sensor electronics failure | E |
| CO2 sensor out of range | Sensor is returning a value that is not within 250-2200 ppm range | • Logic reconfigured to ignore DCV configuration, although maintains settings in memory  
• Menu reconfigured to remove DCV associated entities  
• Lowest minimum position is Vent Min Pos | • CO2 sensor out of calibration  
• Wire harness broken  
• CO2 sensor electronics failure | E |
| Heat and cool both present | Signal present on both Y1 and W1 at the same time | • Logic dependencies requiring W1 are disabled  
• Allows Y1 call to be processed | • Miswired thermostat  
• Thermostat failure  
• Wire harness short  
• RTU is a heat pump, but “Heat Pump Op” not set to on in settings menu | N/A |

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