

Economizer Troubleshooting and Startup Tips

FIRST THINGS FIRST: Before you attempt to start up, install or repair an economizer, you need to know what the goals and purposes of using an economizer are for. Unfortunately, most people who work on them do not know much about them. Should you find yourself working on one and you truly don't know what you are doing, Please stop. Do not call tech support to walk you through it. Go get the info you need.

What are the effects of an economizer that is not set up correctly?

1. Guess what, it could be deadly.
2. Should you create such a negative pressure in the building that you overcome natural draft on gas fired appliances like water heaters or furnaces, then you could cause Carbon monoxide to build up inside the building.
3. Another bad side effect is increasing the infiltration of unwanted outside air, thus increasing the cost of operation and possibly exceeding the equipment's capability to condition the space.
4. Be advised, Packaged heat pump units cannot take much outside air at all without lowering leaving air temperatures to a point where it's very uncomfortable to the occupants. There are also codes about how much you could lower the incoming air temp below room temp. Usually no more than 10 degrees
5. How do you know how to set minimum position on relief air dampers and minimum outside air dampers. You cannot guess at it or use a rule of thumb. There is a way to calculate it. Should it not be specified on a blueprint somewhere. Usually on a large job the guy that does the testing and balancing will take care of it but if you find yourself on a design build or replacement unit, you need to calculate it. That requires going to the manual to do it. No other way is safe or acceptable.
6. Before you leave the job, go down and make sure you have a little positive pressure in the building usually +0.01 to +0.03 inches water column. All building pressures are relative to outside pressure.
7. Too much negative pressure makes doors hard to open. Too much positive pressures make them blow open or close slower than normal.
8. Our main goal is to allow as much free cooling as possible while ventilating the building to applicable codes. Consider CO2 sensors as a way to control how much and how often the fresh air needs to come in. They can save a ton of money by only flushing the building air when a lot of people come in and the CO2 starts rising. That's called Demand Controlled Ventilation and requires a more complex controller and extra sensors but it's well worth it.
9. Please do not set up manual outside air dampers for 25% outside air just because you think that's where it needs to be. You would be correct 1 time out of 100.
10. Also be aware of exhaust fans of all types being turned on at the same time, such as kitchen exhaust fans and bathroom fans. Probably 80 % of all commercial kitchen exhausts are set up or installed incorrectly and they have a major influence on your economizer operation.
11. Kitchen exhaust systems should bring in 90% of all the air they exhaust only 10% should come from the building or through your economizer. Be aware in real life this seldom happens

12. especially in small food retail businesses like pizza parlors. Should you find yourself in a position where some salesman just threw an economizer on the job to increase the dollars and yoPur left with setting it up, you better know your stuff or you will find out real fast through call backs that it was a bad idea to begin with. Most common example would be a pizza joint where somebody put a five ton rooftop with an economizer and the kitchen exhaust people put in a 2000 cfm exhaust fan with no make up outside air. Your unit now becomes the make up air and trust me, it cannot handle it.
13. OK, if this hasn't stopped you in your tracks, go ahead and proceed with the setup and service tips below. Should you really get stumped just go to the web and search out Honeywell economizer controls videos. They have it covered. Also MicroMetI has good info available.

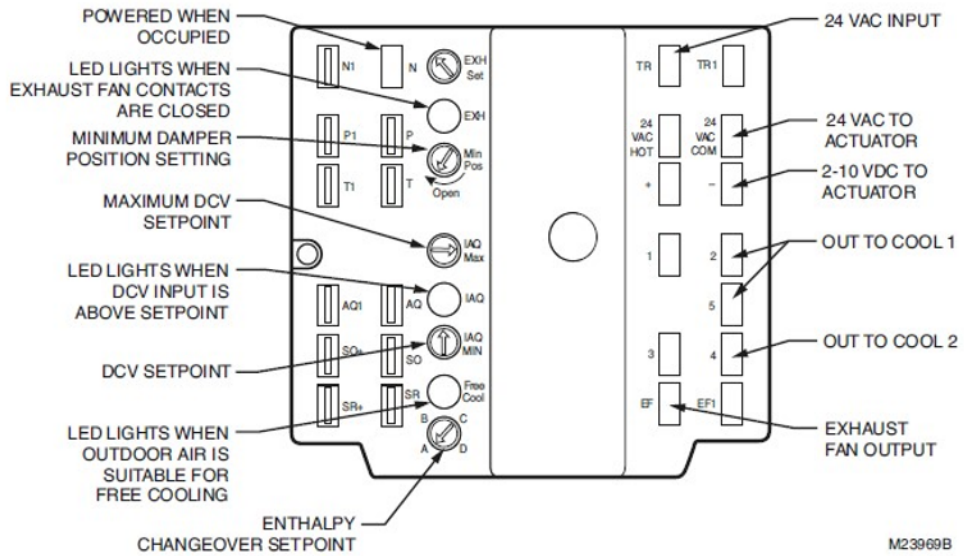
Basic Economizer: NO MIXED AIR SENSOR, OUTSIDE AIR TEMP ONLY, NO HONEYWELL DIGITAL JADE W7220 CONTROLLER. You only have terminal board on front of damper motor actuator and one outside air temp stat.

Problem :No operation: At all times remove power when applying jumpers.

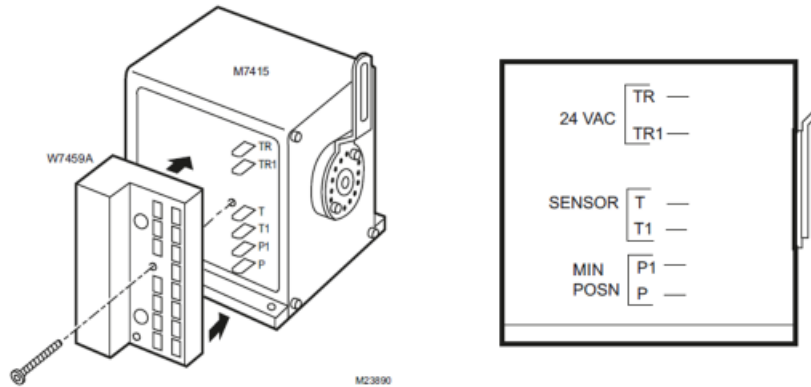
1. Turn off power to unit, On economizer control, remove wires on **TR and / Term #1** and isolate them with electric tape, then Jumper **TR to terminal #1** to simulate a call for Cool 1stg, repower unit.
2. Go to **MIN DAMPER POSITION SETTING** screw pot and turn to see if dampers move, if it does you know motor is good. This is slow acting. Outside air and return air dampers move together. Watch gear mechanisms for hang ups.
3. If motor still doesn't work, it could be the OAT holding it off.
4. Leave the above jumper on and then add one from **T to T1 or a 5.6 K resistor**
5. Add another jumper from **S+ to So**
6. Motor should drive wide open, if it does then OAT is the problem.
7. 9 times out of 10 However it's usually a bad motor.
8. The terminal board separates from the actuator motor, 2 different part numbers.
W7212 CONTROLLER M7215A ACTUATOR/ MOTOR

Economizer Components – W7212

Economizer Control Module



Economizer Components - Actuator



Honeywell W7212 Economizer Control Module, Terminal Designations

- **TR & TR1** – 24v power to control
- **N** – When 24v is applied to this terminal, the economizer will operate to minimum position
- **P & P1** – Jumpered from the factory. May be used with a remote potentiometer
- **T & T1** – Connection points for discharge air sensor. Controls varies actuator to maintain discharge air temp
- **AQ & AQ1** – Connection points for CO2 sensor for demand ventilation
- **So- & So+** - Outdoor sensor connection for evaluating outside air for free cooling
- **Sr- & Sr+** - Return air sensor connection for dual enthalpy control. If dual enthalpy is not used, a 620 Ohm resistor is installed across the terminals
- **1** – This terminal receives a 24 v signal from the control board, when there is a call for first stage cooling (Y or Y1)
- **2** – This is an output to the unit's control board to initiate compressor cooling, when conditions are not suitable for free cooling
- **EF & EF1** – Normally open set of contacts which close when the economizer position meets or exceeds the exhaust air set point on the module (set via potentiometer). Sends voltage to exhaust fan relay.
- **ExH** – Potentiometer used to set when the exhaust fan will energize in relation to the economizer position
- **Min Pos** – Potentiometer used to set the minimum position. The economizer will move to the minimum position whenever terminals Tr, T and N are receiving 24v
- **DCV MAX & DCV Set** – Potentiometers used to set economizer position in relation to an input from a CO2 sensor installed on terminals AQ1 & AQ
- **ABCD** – Enthalpy Set point for free cooling

PAGE 5

Economizer Set Up with Honeywell JADE Controller W7220

1. Familiarize yourself with the four buttons on controller. Up/down keys to move around in menu, Arrow left symbol for Enter and Arrow up symbol for return to menu.
2. Enter **System Set Up** Mode
3. First screen is **Install**. Set Date and Time. Very important for later troubleshooting.
4. Second screen is **Units DEG** Set Fahrenheit or Celsius.
5. Third screen is **Equipment** Either Conventional or Heat Pump. **Always choose CONV even if it's a Heat Pump**
6. Next is the **Aux 2 Input** Usually set up for "SD" SHUTDOWN for Fire Use. Or "W" for heat or if you have a 2 Speed Fan like a VFD, Could also be used to set O/B for reversing valves on Heat Pump Applications.
7. Next is **Fan Speed** 1 speed or 2 speed which then gives you two min position settings. This does not control the fan speed but positions the dampers for the proper mode Heat or Cool. Note: 2 speed fan option requires W1 programmed in AUX 2 Input and CONV in Step 5. Shutdown not available in 2 Speed mode.
8. Next is **Fan CFM** Infrequently used requires 5 sensors used on demand control ventilation (DCV) Actual CFM entered from Manufacturer info but only needed when using the DCV mode
9. Next is **Aux 1 Out** Configurable, Could be used to include ERV, Exhaust fan 2 or occupancy input or alarms to third party, if you put it to Always it acts as a virtual jumper that assumes it's occupied.
10. **Factory Default** Use to go back to start over and wipe out entries.

Advanced Set Up

1. Most items are normally not changed.
2. First is **MAT Low Set** which is mixed air temp low set, it defaults to 45deg and that is usually good, economizer is trying for 53 deg air and that should be low enough to mix with return air to get 56 deg leaving temp. it's adj from 35-65. Should the mixed air temp get below the setting then the machine will go into the freeze protection mode.
3. **Freeze Position** You would want OA Damper to go fully closed usually. You could change it to minimum position. Screen will show +CLO FOR CLOSED
4. **CO2 0 AND CO2 SPAN** help you find what type of sensor you are using. If you are using the normal 2-10 volt sensor that relates to 0 to 2000 PPM then you don't have to do anything. You only need to change this if you are using a different sensor that has a different curve.
5. **Stage 3 Delay** This is used when you have 2 compressors. Stg 1 is the economizer and if can't provide enough cooling then Stg 2 will bring on the first compressor, In rare instances you might have Stg3 bring on the second compressor but it makes you wait for a time delay. Usually set at 2 hours, it is configurable from ½ to 4 hrs. When you service a unit that can't keep up with free

PAGE 6

6. outside cooling and first stage compressor and then it goes to 2nd stage compressor, it usually means your first stage compressor isn't really working.
7. **SD DAMPER POSITION** means shut down damper position When you get that smoke detector input for shutting down, normally you would want the damper to shut down. In some specialty application you could make the damper go open.
8. **DCVCAL ENABLE** This allows you to calibrate your demand controlled ventilation however it requires all five sensors and a single speed fan only. It also allows automatic operation so it can track itself. This feature is pretty special and hardly ever used.
9. **SENSOR CALIBRATION** The next five screens allow you to take actual readings and then calibrate the various sensors listed below in order. **MAT, OA Hum, RA Temp, RA Hum and Discharge Temp** You can add or subtract off degrees to make the screen match your actual readings. Make sure your instrument is accurate first or you could compound a problem.
10. **2 Speed Fan Delay** Has a 5 min default when you get a call for 2nd Stage Cooling and need High Speed Fan it will delay the output of the damper for that many minutes.

LAST SECTION IS CALLED SET POINTS

1. **MAT** Mixed Air Temp default is 53 which is perfect. The fan motor heat will add about 2 degrees and bring it up to 55 deg which is what we usually strive for on leaving air temp.
2. **LOW T LOCKOUT** This set point determines the outside temperature where we disable mechanical cooling 45 Degrees is a pretty normal amount we would strive for.
3. **DRY BULB SET POINT** This is only set if your just using the dry bulb and no enthalpy sensors, it is usually set at 63 degrees. Some people use 55 deg but that is not aggressive enough to obtain real energy savings. Some municipalities have codes as to where you need to set that so check them when before you start.
4. **ENTHALPY CURVE** You only see this when you are using the enthalpy sensors. You could have one or two. There are 5 curves ES2 is where you usually set it for 2015 Code Compliance and is 75 deg change over point and 26 enthalpy Older units have a dial saying ABCD. D is always used on that for differential enthalpy control.
5. **DCV SET POINT** 1100 ppm is a good one to use unless local code says otherwise. Most places want 700 ppm above the outdoor air ppm which is usually 400 to 450 ppm. This is referring to CO2
6. **MINIMUM POSITION** Only see this if you are **not using** a CO@ sensor with DCV Controls. Default is usually 10% outside air. This equates to 2.8 volts The voltage range is 2 to 10 volts
7. **VENT MAX AND VENT MIN** These are set **when you do have a DCV system and a CO2 sensor.** 10% code requirement would again be the 2.8 volts the Vent Min would be set lower than the max say 2.54 volts and that is based on square footage codes. When you use this feature, you won't see the previous screen. It's one or the other.
8. **ERV OAT SET POINT** This is only used if you have an Energy Recovery Ventilator and it would be the temp setting that you want it to cut out at.
9. **EXH FAN 1** This is used if you have a 1 speed exhaust fan and is the position you want the OUTSIDE AIR damper to reach before you start the fan. Usually defaults to 50 % range is 40-60

PAGE 7

10. after you set this and operate the unit, go down and make sure your not blowing the doors open.
11. **EXH FAN 2** If you have a 2 speed fan it would allow you to set the damper up at 2 set points like 1st speed at 40% and 2nd speed at 60%

STATUS, CHECKOUT AND ALARMING

STATUS SCREEN IS NOT EDITABLE IT IS A VIEW ONLY SCREEN THAT TELLS YOU WHATS HAPPENING

NOW ALSO Alarms may be displayed in an individual status screen

CHECKOUT Allows you to go in and check damper positions and actually drive them open or closed where you can go watch them move to make sure they are not binding or not working etc.

This is good for doing PM checks. Also regardless of what the thermostat or any other sensor says, you can make the compressors turn on and off by overriding the Y1 out selection. A lot of other things can also be energized to check them.

ALARMS There are about 15 different alarms that can show up on the screen Usually the JADE controller will push down the alarm to the thermostat screen and then your called out for service.

Just go to the alarm screen to read the specified alarm. Get the book that should be left with the unit to further investigate the alarm so you don't waste time trying to diagnose it.

