UT-3000 Zoning Control
Agenda

- Zone Control Features
- Installation
- Programming and Set-up
- LCD Screens
- Troubleshooting and Bias Data Voltages
Zone Control Features

- Provides intelligent control of communication or 24V legacy HVAC systems.
- Up to five zones using 24V motorized dampers.
- 100% plug and play when connected to communicating HVAC system and network thermostats.
- Modulating and staged operation, auto equipment recognition, and dual fuel functions.
- Precise control of supply air target and limit set points.
Zone Control Features

Climate Talk

- Controls 2-3 zones with 24Vac power open/close or spring-assisted motorized dampers.
- Can be expanded to five (5) zones by **twinning** two (2) UT 3000 controls together. (refer to EWC TB-241 for instructions on twinning)
- Controls any communicating HVAC system based on Climate Talk open protocol, or any:
  - 24V 2 heat/1 cool gas/electric system.
  - 24v 2 heat/1 cool conventional or dual fuel heat pump.
Zone Control Features

Liquid Crystal Display

The liquid crystal display rotates to show each zones demand.

The display will show the **thermostat demand input**, and the **HVAC system output**. The outside and supply air temperatures are also displayed.
Zone Control Features

4 Button LCD Programming

- Four buttons are provided just below the LCD screen.
- The buttons are used to scroll through the menu on the LCD and make your selections.
- Also, used to program the UT-3000 and select the features you like.
Zone Control Features

System LED’s and Damper LED’s

- System LED’s provide visual indication of the HVAC system status and current mode of operation.
- A total of three (3) green damper LED’s labeled zone 1 through zone 3, indicate which dampers are energized to open.
- Zone 1= LED 12, Zone 2= LED 11, and Zone 3= LED 10.
Zone Control Features

Communicating LED’s

- A total of four (4) green pulsing LED’s are provided to indicate if a communication link has been established between each communicating t-stat, and the communicating HVAC system.

- A series of **rapid** and **random** pulses indicate a successful **comm-link** and data transmission. (LED’s 19, 20, 21, and 22)
Zone Control Features

The UT-3000 comes pre-programmed with default operating parameters for zoned HVAC systems.

The default program settings free the technician from programming, and allows fine tuning of the system to optimize its performance.

The UT-3000 operates in staged and modulating mode at all times.

Minimizes blower speed, maximizes temperature control, and improves system performance.

Table 1. From EWC Controls Technical Bulletin: TB-241

<table>
<thead>
<tr>
<th>Feature</th>
<th>Default</th>
<th>Range to Select</th>
</tr>
</thead>
<tbody>
<tr>
<td>System Type</td>
<td>Heat/Cool</td>
<td>Heat Pump or Heat/Cool</td>
</tr>
<tr>
<td>HP Type</td>
<td>NON Dual Fuel</td>
<td>Dual Fuel or Non-Dual Fuel</td>
</tr>
<tr>
<td>T-Stat Type</td>
<td>Heat/Cool</td>
<td>Heat Pump or Heat/Cool</td>
</tr>
<tr>
<td>Rev Valve</td>
<td>RV ‘O’</td>
<td>‘O’ Type RV or ‘B’ Type RV</td>
</tr>
<tr>
<td>Fan Mode</td>
<td>Gas</td>
<td>GAS or HYDRO (Electric)</td>
</tr>
<tr>
<td>OAS SP</td>
<td>15°</td>
<td>OFF or 7° to 42°F</td>
</tr>
<tr>
<td>O.T. Offset</td>
<td>15°</td>
<td>5° to 20°F</td>
</tr>
<tr>
<td>U.T. Offset</td>
<td>8°</td>
<td>5° to 10°F</td>
</tr>
<tr>
<td>SAS HP TGT</td>
<td>100°</td>
<td>90° to 120°F</td>
</tr>
<tr>
<td>SAS Gas TGT</td>
<td>130°</td>
<td>120° to 170°F</td>
</tr>
<tr>
<td>SAS Cool TGT</td>
<td>50°</td>
<td>42° to 60°F</td>
</tr>
<tr>
<td>SAS RSP DLY</td>
<td>30s</td>
<td>10s – 180s</td>
</tr>
<tr>
<td>W2 Threshold</td>
<td>80%</td>
<td>65-100% (Adj. in 5 point increments)</td>
</tr>
<tr>
<td>PURGE FAN</td>
<td>25%</td>
<td>25-100% (Adj. in 25 point increments)</td>
</tr>
<tr>
<td>Legacy DMD</td>
<td>50%</td>
<td>25%, 50%, 75%, or 100%</td>
</tr>
<tr>
<td>Total Zones</td>
<td>3</td>
<td>2 or 3 zones</td>
</tr>
<tr>
<td>Limit SAS PID</td>
<td>N</td>
<td>Yes or No</td>
</tr>
</tbody>
</table>
Zone Control Features

Ancillary IAQ Dry Relay Provided

- The UT-3000 control board includes a SPDT indoor air quality (IAQ) **dry relay**.
- This relay has a digital or 24v input trigger that can be used to interlock and control ancillary devices.
  - Fresh air damper
  - Whole house humidifier
  - Whole house dehumidifier (via the ComfortNet system)
  - Energy recovery ventilator
Zone Control Features

Ancillary IAQ Dry Relay Operation

- The dry relay operation can be utilized via a auxiliary controller attached to the R, C, and Relay terminals in zone 1.

- When the auxiliary controller initiates the call, terminals NO and C on the dry relay will close.

- This connection will bring on your ancillary IAQ device.
Zone Control Features

Ancillary IAQ Dry Relay Locations on UT-3000
### Zone Control Features

#### Configurations and Types of Thermostats Used

<table>
<thead>
<tr>
<th>Thermostat Type</th>
<th>Additional Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>UT-3000</td>
<td>Communicating T-Stats in all zones</td>
</tr>
<tr>
<td>UT-3000</td>
<td>(1) Communicating T-stat, (2) 24v T-Stats</td>
</tr>
<tr>
<td>UT-3000</td>
<td>24v T-stats in all zones</td>
</tr>
</tbody>
</table>
Agenda

- Zone Control Features
  - Installation
- Programming and Set-up
- LCD Screens
- Troubleshooting and Bias Data Voltages
Installation

Mounting Control Board

- Choose a suitable location to mount the UT-3000 housing.
- **Preferred** locations would be a return duct, nearby wall, or convenient studs where plywood can be installed to support the housing.
- **AVOID:** Supply duct, air handler, furnace housing, evaporator housing, or hot water coils of any type.
- **Follow national and/ or local electrical codes.**
Installation

Power and Wiring

- EWC always recommends to install a separate transformer to power the UT-3000.
- Follow NEC and/or local electrical codes.

**To Protected Line Voltage**

Field Supplied “Dedicated” Listed Transformer
24vac 40va Min/60va Max

**Power Supply**

OPTIONAL
Condensate Pump Safety Float Switch

**To Zone Control Panel**

**Install a Separate Transformer**
To Power the UT3000
Installation

Power and Wiring

- When possible, try to adhere to the Climate Talk color code. (red, green, yellow, white)
- However, if you use standard 18/4 wiring, it might have slightly different colors.
- Choose your color codes, and stick with that same code throughout installation.

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Installation

Wiring Dampers to Board- Terminal Block Designation & Function

- Standard 24vac damper control. (2 or 3 wire)
  - Terminal **PC** - 24vac power to **close** the damper.
  - Terminal **PO** - 24vac power to **open** a damper.
  - Terminal **C** - 24vac common. (neutral)
Installation

Wiring Multiple Dampers Into One Damper Terminal on the UT-3000

- You can connect up to eighteen (18) genuine ND, URD, or SID dampers to a single terminal block before relay isolation is required.
- You can only connect one (1) RSD or competitor’s spring type damper to a single terminal block.
- Three sets of damper wires can terminate (piggyback) into one damper terminal. (two shown here)
Installation

Thermostat Wire Between All Units

When the outdoor unit has a transformer and there are 3 wires available, use the 3\textsuperscript{rd} (spare) wire to connect the two 24v commons together. That will ensure both 24v commons are at the same ground potential.
Agenda

- Zone Control Features
- Installation
- **Programming and Set-up**
- LCD Screens
- Troubleshooting and Bias Data Voltages
Zone Control Set-up

Program- Communication HVAC System

- When connected to a fully **communicating** HVAC system, programming is **not** required. (plug and play)
- The UT3000 will **automatically** configure the entire system and start running as soon as thermostat demands are detected.
- Allow at least 2-4 minutes for all thermostats and the HVAC system to fully configure on the network.
Zone Control Set-up

Program- Conventional HVAC System (Pg. 3 in EWC TB-241)

- When connected to a **conventional** 24v HVAC system, you simply scroll thru the LCD menu and select the type of HVAC system you have.
- Then select the type of thermostats you would like to use.
- The Default Supply air temperature targets and offset limits will be used, or you can adjust your own settings.
Zone Control Set-up

Finish- Observe Zone System in Operation

- When the Installation is complete, run the system thru it’s paces and **observe** the operation of the HVAC system in **all** possible modes of operation.

- Check the zone dampers for proper operation.

- **Example**: Zone 2 is calling for fan, and the remaining zones are idle.
Zone Control Set-up

Finish - Default Operation of Dampers

- All dampers will be **open** when the HVAC system is idle, and **no** zones are calling.

- When a zone calls, the dampers for that zone will remain open and will have a **green light** illuminated on those damper motors.

- The remaining zone dampers (that aren’t calling) will start to close, and a **red light** will illuminate when they are fully **closed**.
Zone Control Set-up

Programming Options

- Once you are up and running, you can still program certain functions.

- Your program changes take effect in real time, and will remain even after a power failure.

- Refer to EWC TB-241 for all programming options and instructions.

<table>
<thead>
<tr>
<th>Option</th>
<th>Code</th>
<th>Option</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z1</td>
<td>h030c000f050</td>
<td>SYS</td>
<td>Hum010 Dh000</td>
</tr>
<tr>
<td>Z2</td>
<td>h025c000f000</td>
<td>Supply</td>
<td>TMP 133</td>
</tr>
<tr>
<td>Z3</td>
<td>h025c000f050</td>
<td>!SAS Sensor Bad!</td>
<td></td>
</tr>
<tr>
<td>SYS</td>
<td>h027c000f027</td>
<td>Outside</td>
<td>TMP 32</td>
</tr>
<tr>
<td>SYS Aux</td>
<td>000 Em000</td>
<td>!OAS Sensor Bad!</td>
<td></td>
</tr>
</tbody>
</table>
Zone Control Set-up

Programming Options

- Use the **forward** and **back** buttons to navigate through the menu features until you reach your selection.

- Once you reach the desired feature, use the **up** or **down** buttons to change that feature.

- When the LCD resumes scrolling, the change will take effect.
Zone Control Set-up

System Cool Demand Starting Output (based on 3 zone demand input)

The UT-3000 starts the HVAC system at a capacity level based on how many zones are calling, and the weight of each zone. (Y1, Y2, W1, W2, and modulating furnaces)

\[
\frac{T}{Z} \times SYS = \text{System Demand Output}
\]

Total Zone Demand Input

| Z1  | h000c030f000 |
| Z2  | h000c030f000 |
| Z3  | h000c050f000 |

\[
\begin{align*}
T &= 30\% + 30\% + 50\% \\
   &= 110\% \\
\end{align*}
\]

System Demand Output

\[
\frac{110}{3} = 37\% \quad Y1 \text{ Cool is active}
\]
Zone Control Set-up

System Cool Staging Scale

Example: ON a 4-ton system, the inverter would start operating at 37% capacity. (48,000 btu’s x 37% = 17,760 btu’s or approximately 1.5tons of cooling required)

37% System cool demand

0% OFF
10% Startup
50% Y2 Threshold
100%

On at 4 ton system, the Inverter would start operating at 37% capacity (17,760btu = 1.5ton)
Zone Control Set-up

STUDENT EXERCISE- System Cool Staging for a 5-Ton HVAC System

1. Calculate **System Demand Output**
2. Calculate percentage of required cooling in btu’s
3. Determine what threshold your HVAC system operate in on start up

```
  Z1  h000c030f000
  Z2  h000c050f000
  Z3  h000c050f000
```
Agenda

- Zone Control Features
- Installation
- Programming and Set-up
- **LCD Screens**
- Troubleshooting and Bias Data Voltages
LED Screens

Understanding LED Screens

- Once the programming is complete and the system is running, the LCD screen will scroll and display data screens continuously.

- Each zone will be displayed in order. (zone 1, zone 2, etc.)

- The **zone screen** will present the demand for each of the following:
  - Heating demand- **h000**
  - Cooling demand- **c000**
  - Fan demand- **f000**
LED Screens

Understanding LED Screens

- Zone 1 is calling for heat @30%, and fan @ 75%.
- This indicates the presence of a communicating thermostat in zone 1 whose demands are given a weighted value due to it’s proportional capability.
- Communicating thermostats have demands of:
  - 0%, 30%, 60%, 85%, 100%, etc
- Zone 2 is calling for heat @ 30%.
  (fan hasn’t been energized yet)
LED Screens

**System Output Percentage**

- This screen displays the **system output percentage** (SYS) to the HVAC equipment.
- In the previous **starting system cool demand output** example, the UT-3000 is demanding 37% cooling capacity and 37% fan capacity. (1st stage cooling- Y1 is active)
- If the cooling target set-point is not satisfied before reaching 51% SYS Output, Y2 will energize.
LED Screens

Lock/ Pause Screen

- You can lock the LCD on a single screen by pushing the program up button one time.
- Then, select the screen you want to view by using the up or down buttons.
- The LCD will stay locked on that screen for 10 minutes, then resume scrolling again.
- You can unlock the screen by pushing the forward button one time.
LED Screens

Supply Air Temperature

- This supply air temperature screen shows the supply air temperature at the location of the supply air sensor in real time.
- The UT-3000 monitors and compares the actual supply air temperature to the HVAC system target set points.
- The UT-3000 will increase (by 1% increments) or decrease (by 2% increments) the system demand output in order to increase or decrease HVAC system capacity.
- If the Supply Air Sensor is disconnected or fails, the UT3000 will display the bad sensor screen and will default to the timed mode staging until the zone thermostat demands are satisfied.
LED Screens

Outside Air Temperature

- This screen shows the **real time** outside air temperature at the location of the outside air sensor. (OAS)

- This **value** can be from the communicating HVAC system, or from a sensor connected to the UT-3000.

- If the OAS sensor fails or is disconnected, the UT-3000 will display the **bad sensor** screen and will default to emergency mode.

- If you do not want to use an OAS to stage the system, adjust/ disable the OAS set-point value down to the **off** position.
LED Screens

Disable Outside Air Temperature Sensor

The following steps will guide you to disable the outside air temperature sensor:

- Press the **forward** button, and scroll through the menu until you reach the **OAS SP** (outdoor air set point) screen.
- Press the **down** button until you reach the **OAS SP OFF** option.
- Select this option, and allow the screen to resume operation.
- This option is now disabled, and the next **OAS SP** screen will display **OAS Sensor N/A**.
Agenda

- Zone Control Features
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- Troubleshooting and Bias Data Voltages
Troubleshooting

Bias Data Voltages

- Only **one** device should set the bias on any ComfortNet controlled system.
- **Never** move the bias switches on the communicating furnace or air handler.
- If necessary, move the bias switches on the outdoor unit.
- Never move the termination switches on the zone controller.
- The zone controller switches should remain in the **off** position.
## Troubleshooting

### Symptom 1

- LCD & LED’s not responding properly, and HVAC system is malfunctioning.
- Communicating thermostat may display fault messages.

### Solutions

- Check HVAC system and UT-3000 24vac transformers for proper voltage.
- Check system wiring for shorts or improper wiring.
- Test damper wires for continuity/shorts.
- Check zone thermostats for shorts/improper wiring.
- Check BIAS DC voltages.
Troubleshooting

Check BIAS DC Voltages to the Thermostats

To the thermostats:
Data 1-C = 2.8 VDC
Data 2-C = 2.2 VDC
Troubleshooting

Check BIAS DC Voltages at the HVAC System Input Terminal

HVAC System Input Terminal:
Data 1-C = 1.9 VDC
Data 2-C = 1.3 VDC

or

Data 1-C = 2.8 VDC
Data 2-C = 2.2 VDC
Troubleshooting

Symptom 2

- LCD & LED’s are responding properly, but HVAC system is malfunctioning.
- Bias DC voltages are incorrect.

Solutions

- Check zone system wiring for shorts/ improper wiring.
- Test wires for continuity/ shorts.
- Check BIAS DC voltages.
- Ensure that BIAS/ terminal switches on the UT-3000 panel and outdoor units should be set to the off position.
- Check HVAC equipment for faults via a communicating thermostat and clear all faults.
Troubleshooting

Check BIAS DC Voltages and Set Dip Switches to Off.

- Make sure that the BIAS/terminal switches on the UT-3000 panel and outdoor units are set to off.
- Check BIAS DC voltages:
  
  Data 1-C = 2.8 VDC
  Data 2-C = 2.2 VDC
  OR
  Data 1-C = 1.9 VDC
  Data 2-C = 1.3 VDC
## Troubleshooting

### Symptom 3

- LCD & LED’s function, and HVAC system functions normally but **dampers do not** respond.

### Solutions

- Check damper motor wiring for proper connections.
- Check damper motor 24volt & **500mA breaker**. (auto reset/ overcurrent protection device located on board)
- Test wires for continuity/shorts.
- Check damper motor wiring for shorts/ improper wiring.
- Test wires for continuity/shorts.
- Refer to page 12 of EWC technical bulletin TB-241 for correct damper wiring.
Troubleshooting

Step 1: Check Damper Motor Voltages

- Adjust thermostat in the zone with dampers not functioning, to call for cool or heat.
- Set meter to ac voltage, and test power at dampers while zone is calling.
- 24VAC should be present at C and PO when the dampers are opening.
Troubleshooting

Step 2: Check Power Being Supplied to Damper via Board

- Set meter to **ac voltage**, and test power at board output to the dampers not responding.
- If **no power**, the 500mA breaker could be **trip**ped.
- Disconnect power to board, remove damper wires, and retest.
- If power is restored, the 500mA breaker **reset** itself.
- Check disconnected wiring back to damper for shorts.
Troubleshooting

Symptom 4

- LCD & LED’s do not function, and HVAC system doesn’t respond.

Solutions

- Check HVAC & UT-3000 system transformer supply voltage.
- Check HVAC & UT-3000 system 24vac transformer voltage, fuse, and breakers.
- Test all wires for continuity/ shorts. (shorts to common or shorts to earth ground)
- Check damper motor wiring for proper connections.
- Check HVAC & UT-3000 system wiring for shorts and improper wiring.
**Troubleshooting**

**Check Transformer Voltage**

- Set meter to ac voltage, and test power at terminals R and C on UT-3000.

- If no 24VAC present, test transformer supplying power to UT-3000.
Symptom 5

- Time delay is active and won’t allow heat or cool to function.

Solutions

- When troubleshooting, simultaneously press the back and forward buttons for one second to bypass any active time delays.
Troubleshooting

EWC Controls- Technical Support

- **EWC Controls** provides superior troubleshooting and assistance for the UT-3000 when you are on the job site.

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QUESTIONS?