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# Controls User Manual

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DHI-060  
DHI-180

Industrial Dehumidifier  
Fan and Compressor Controls  
And Setup Manual

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**Table of Contents**

Controller Basics ..... 3  
Controller Keypad ..... 4  
USER MODE..... 4  
ADMIN MODE..... 4  
Adjusting Fan Speeds ..... 5  
Compressor Operation ..... 5  
“Test Mode” or Commissioning Mode ..... 5  
Alarm Conditions and Lockout ..... 6  
Troubleshooting alarms ..... 6  
    High Discharge Temperature (HotRef) ..... 6  
    Refrigerant Pressure (RefPress) ..... 7  
    Temperature Sensor Error (SensErr) ..... 7  
    Freeze Protection Alarm (ColdAir) ..... 7  
    Freeze Protection Alarm (ColdRef)..... 7  
    Too Much Airflow ..... 8  
User Mode Parameters..... 9  
Admin Mode Parameters ..... 10

This document describes usage and operation of the **Inverter Dehumidifier Controller** for the Ecologix 060 & 200 Series variable capacity Dehumidifier units with Temco controls. It is recommended that the installing contractor read through this short manual in order to become familiar with correct system setup and to take advantage of the various features available.

## *Controller Basics*

The Dehumidifier Controller monitors incoming thermostat calls and measures a number of refrigerant and air temperatures in order to control the fans and the compressor capacity. Through its LCD display and keypad, important system parameters may be configured and operating conditions may be monitored.

When the controller keypad has not been pressed for a few minutes, the backlight will turn off and the display may go blank. Simply hit any one of the buttons to wake the controller up. By default, the controller will display a short message describing the operating status of the system. *Table 1* provides a list of the different possible status messages and their meaning. There are also a number of small icons that may appear around the edges of the display according to the current operating status.

*Table 2* below gives an explanation of the different icons.

*Table 1 - status messages*

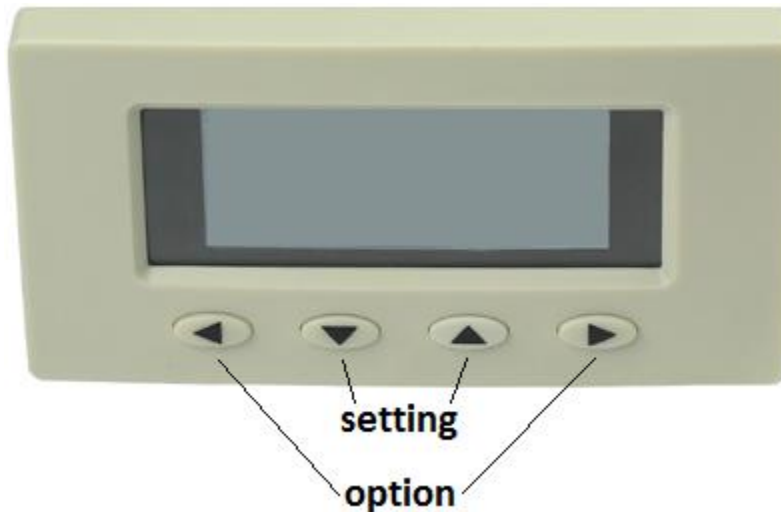
<b>Message</b>	<b>Meaning</b>
Ready	System is not currently receiving a call
CompOn	The compressor is operating.
Delay	Compressor call delayed to prevent short-cycling
HotRef	Refrigerant discharge temperature has exceeded limit, compressor stopped
RefPress	Refrigerant pressure has exceeded limit or electrical ratings exceed limits, compressor
LockOut	System has been locked due to recurring alarm conditions, call for service.
ColdAir	Air is too cold, freeze protection has been activated
ColdRef	Refrigerant suction is too cold, freeze protection has been activated
SensErr	Temperature sensor error, check sensor wiring

*Table 2 - display icons*

<b>Icon</b>	<b>Meaning</b>
Flame	Call for compressor
Snowflake	Cooling Mode
Fan1	Call for continuous fan (G)
Fan2	Call for fan in dehumidifier mode

### ***Controller Keypad***

By using the *option* and *setting* keys, different parameters and their current settings may be displayed and modified. Use the *option* keys to scroll through the available parameters, and use the *setting* keys to modify the parameter's current setting (if applicable). By default, the control will remain in 'user' mode, in which a limited selection of parameters may be accessed. By entering 'admin' mode, additional parameters may be made available. Please exercise caution while in 'admin' mode, as these settings are meant to be accessed by the experienced user or installing contractor. A description of each of the modes is found below.



### ***USER MODE***

This is the basic display and operating mode, in which only a limited selection of parameters may be accessed and modified. Refer to

**Table 3** for a description of each item displayed.

### ***ADMIN MODE***

This is the advanced display and configuration mode. It is intended only for the properly trained contractor. To enter 'admin' mode, press any button to illuminate the display backlight, then press and hold the two *option* buttons at the same time ('user' will be displayed at first, hold until 'admin' is displayed). You can now scroll through the display items by using the two *option* buttons, and adjust certain values using the two *setting* buttons. To return the control to 'user' mode simply wait a few minutes or press and hold both *option* buttons.

Use **Table 4** as a quick reference on the items available in this mode. Detailed descriptions on important parameters are found below.

## *Adjusting Fan Speeds*

The variables below can be modified to adjust dehumidifier and continuous fan airflows. All values are specified as a percentage of the full blower capacity.

**DEH\_SPD** (default is 75%) – Dehumidifier mode airflow.

**G\_SPD** (default is 40%) – The amount of airflow used for a continuous fan call (G).

**FAN\_MIN** (default is 20%) – If the compressor reaches 100% and is unable to reduce the air temperature off of the evaporator coil to the desired setpoint **DEH\_SP** (see below) within **FT\_DLY** (default 2 min.), the fan speed will reduce from **DEH\_SPD** to **FAN\_MIN** and the controller will lock the compressor at 100%. The controller will then modulate the fan speed to target the **DEH\_SP** temperature setpoint by starting at **FAN\_MIN** speed. Note that the fan will not be able to run lower than the **FAN\_MIN** setting.

## *Compressor Operation*

When the system receives a call on 'Y', the controller automatically adjusts compressor capacity in order to maintain a desired intermediate air temperature (**T\_IA**), which can be adjusted using the set-point settings described below. This helps ensure the dehumidifier is removing the maximum amount of moisture from the air at the specified air flow. The following parameters are used to control this operation:

**DEH\_SP** (default is 2°C) – Temperature set-point when in dehumidification mode. It is not recommended to decrease this setting in order to protect the evaporator from freezing. Increasing this set-point will decrease the amount of moisture removal of the unit.

**OFF\_MIN** (default=5 minutes) – This parameter is used to prevent the compressor from short cycling. During testing or commissioning, this parameter can be adjusted to '0' temporarily in order to bypass the delay but shouldn't be done repeatedly. NOTE: DO NOT leave this set to '0'. 5 minutes is the recommended setting for normal operation.

## *“Test Mode” or Commissioning Mode*

Because the compressor capacity is constantly adjusting under normal operation, it can be difficult to measure refrigerant temperatures and pressures in order to measure superheat and subcool level. For this reason, the system controls have a “test mode”, in which the compressor capacity and fan speed can be set manually.

Note that although while in test mode the normal system protection and alarms will still function, it is important to closely monitor system pressures and temperatures in order to prevent damage to system components due to out-of-control conditions. Do not allow discharge pressure to exceed 600 psi or discharge temperature to exceed 120°C.

**COMP\_AUTO** (default=ON) – “Automatic” compressor mode - set this to OFF to prevent the compressor from running. This may be useful in basic system troubleshooting. Be sure to set back to ON when done to allow the system to operate normally.

**TEST\_MODE** (default=OFF) – Set this to ON to run the system in “test mode”. In test mode, compressor capacity and fan speed will be set based on the parameters **TEST\_COMP** and **TEST\_FAN**. Ensure these are set at appropriate levels before changing to test mode. Note that a dehumidifier call from the thermostat or a jumper between R-Y is still required in order for the compressor to run but is not required to bring the fans on.

**TEST\_CMP** (default=40%) – The compressor capacity to use while running in test mode. Care should be taken to ensure the system pressures and temperatures stay within the recommended operating limits.

**TEST\_FAN** (default=50%) – The fan speed to use while running in test mode.

### **Alarm Conditions and Lockout**

There are a number of possible operating conditions which can result in a system alarm, causing an interruption to the compressor call. When an alarm occurs, a short status message will be displayed, as outlined in **Error! Reference source not found.** and described in detail below. If ten alarm conditions occur within 24 hours of one another, the system controls will “lock out” and no longer allow the dehumidifier to run. If this occurs, there may be an issue with the unit and a qualified technician should be contacted for service.

**LOCK-OUT** – The system has locked out due to a recurring alarm condition. Note that the **HotRef**, **RefPress**, and **freeze protection** alarms (see below) will cause a Lock Out. Contact a qualified technician for service. Qualified technicians may reset alarms and lockouts using the parameters below:

**LAST\_TXT** – will display the last alarm message that occurred. To reset this, set **LAST\_RST** to ON for a few seconds, and then set back to OFF. It is important to write this down before resetting, in order to help with system troubleshooting.

**ALM\_CTR** – will count the number of alarm conditions encountered over the last 24 hours. If the alarm counter reaches ten, the system will be locked out. To reset the alarm counter, set **ALM\_RST** to ON for a few seconds, and then set back to OFF. Compressor should then be allowed to come back on once the delay period has passed.

### ***Troubleshooting alarms***

**High Discharge Temperature (HotRef)** – occurs when the refrigerant discharge temperature **T\_DIS** has exceeded the allowable limit **DIS\_MAX** (default set to 120°C). This may occur due to the following:

- System may be overcharged.
- Suction pressure is too low. Ensure adequate airflow over the refrigerant coils.
- May be an issue with EX valve (electronic expansion valve). Ensure suction temperature sensor (small silver bullet with grey wire) is making good contact with pipe.

**Refrigerant Pressure (RefPress)** – This alarm will occur when the system pressure reaches its high- or low-pressure limit. This may occur due to the following:

- System is operating outside of its limits. Incoming air temperature may be excessively high.
- There may be inadequate airflow. Check for any blockage or debris. Ensure the fan/blower is operating. Ensure the air filter is not plugged.
- System is undercharged or overcharged. Measure suction and discharge pressures to determine whether or not system is shutting off on low or high pressure limit. Measure superheat and subcool level to determine if more refrigerant needs to be added or if some must be removed.

### **Temperature Sensor Error (SensErr)**

Reading on one or more of the temperature sensors indicates a malfunctioning sensor or a wiring issue. Scroll through the *admin* parameters to identify the issue. A sensor reading  $-40^{\circ}\text{C}$  indicates an open circuit, which could be due to a loose or broken wire. A reading of  $125^{\circ}\text{C}$  indicates a short circuit, which could be due to damaged wire insulation or a shorted terminal at the sensor or controller.

### **Freeze Protection Alarm (ColdAir)**

Indicates the intermediate air temperature **T\_IA** has dropped below the freeze protection setting **FRZ\_TMP** (default is  $0^{\circ}\text{C}$ ) for more than **FRZ\_TIME** seconds (default is 30 sec). This may occur due to the following:

- Insufficient air flow. Ensure the air filter isn't plugged and the fans are working.
- Dehumidifier setpoint temperature set too low. It is recommended to leave **DEH\_SP** at the default value.
- Incorrect reading on intermediate air sensor. Ensure that the intermediate air sensor is located after the evaporator coil and in the air stream. A reading of  $-40^{\circ}\text{C}$  indicates a disconnected or failed sensor.

### **Freeze Protection Alarm (ColdRef)**

Indicates the refrigerant suction temperature **T\_SUC** has dropped below the freeze protection setting **FRZ\_TMP2** (default is  $-4^{\circ}\text{C}$ ) for more than **FRZ\_TIME** seconds (default is 30 sec). This may occur due to the following:

- Insufficient air flow. Ensure the air filter isn't plugged and the fans are working.
- Dehumidifier setpoint temperature set too low. It is recommended to leave **DEH\_SP** at the default value.

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- Low refrigerant charge in the system or malfunctioned EX valve. Check the refrigerant pressures and subcooling level of the system.
  - Incorrect reading on the suction temperature sensor. Ensure that the sensor wires haven't come loose at the controller or shorted.

## **Too Much Airflow**

This can occur due to undersized ductwork or improper setup of the dehumidifier fan speeds. The fan speeds can be adjusted to reduce the amount of airflow, refer to "Adjusting Fan Speeds" section above for details on setting airflows for both dehumidifier mode and continuous fan.

*User Mode Parameters*

*Table 3 - User Mode Parameters for Single and Multi-Zone*

Line 1	Line 2	Set.	Description	Notes
Dehum	####	D	Displays current status message.	
CMP_SPD	#### %	D	Displays current compressor speed	
ProgName	####	D	Displays program in the control. <b>DH-VS</b>	
T_SUC	###.# C	D	Refrigerant suction temperature	
T_IA	###.# C	D	Intermediate air temperature	
T_DIS	#### C	D	Refrigerant discharge temperature	
ALM_CTR	#### C	D	Alarm counter	
LAST_TXT	####	D	Stores the last alarm message displayed	

\* Note: “D” in the set column indicates this parameter is for display only, and cannot be modified using the controller.

*Admin Mode Parameters*

*Table 4 – Admin Mode Parameters for Single Zone*

Line 1	Line 2	Set.	Description	Notes
Dehum	####	D	Displays current status message.	
ProgName	####	D	Displays program in the control. <b>DH-VS</b>	
COMP_AUTO	(0)Off/(1)On		For testing: should the compressor be allowed to run?	Default setting is ON
OFF_MIN	#### m		Setting for anti-short cycle delay (counts from end of last call)	Default setting is 5
TEST_MODE	(0)Off/(1)On		Set to ON to activate "test mode"	Default setting is OFF
TEST_CMP	#### %		Compressor capacity to use while in test mode	Default setting is 40
TEST_FAN	#### %		Fan speed to use while in test mode	Default setting is 50
DEH_SPD	#### %		Dehumidifier mode fan speed	Default setting is 75
DEH_SP	#### C		Dehumidification setpoint temperature	Default setting is 2
G_SPD	#### %		Continuous fan speed	Default setting is 40
FAN_MIN	#### %		Minimum allowable fan speed	Default setting is 20
FT_DLY	#### min		Time delay until fan modulation mode initiates with compressor at 100%	Default setting is 2
FRZ_TMP	#### C		Temperature below which freeze protection is activated for T IA	Default setting is 0
FRZ_TMP2	#### C		Temperature below which freeze protection is activated for T SUC	Default setting is -4
FRZ_TIME	#### sec		Time delay before activating freeze protection 1 or 2	Default setting is 30
CMP_SPD	#### %	D	Displays current compressor speed	
PID_PROP	###.# %/C		PID parameter	Default setting is 3
PID_INT	##.## %/sec/C		PID parameter	Default setting is 0.03
PID_RAMP	###.# %/sec		PID parameter	Default setting is 5
T_SUC	###.# C	D	Refrigerant suction temperature	
T_IA	###.# C	D	Intermediate air temperature	
T_DIS	#### C	D	Refrigerant discharge temperature	
Y_IN	(0)Off/(1)On	D	Is there a call for dehumidication from t?	
ALM_CTR	#### C	D	Alarm counter	
ALM_RST	(0)Off/(1)On		Temporarily set to ON to reset the alarm counter & remove lock-out	Default setting is OFF
LAST_TXT	####	D	Stores the last alarm message displayed	
LAST_RST	(0)Off/(1)On		Temporarily set to ON to reset the last alarm message	Default setting is OFF

Note: "D" in the set column indicates this parameter is for display only, and cannot be modified using the controller.