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USER GUIDE

UGD014-0919

GasTrac™

Process Air Heater

Please record your equipment's model and serial number(s) and the date you received it in the spaces provided.

It's a good idea to record the model and serial number(s) of your equipment and the date you received it in the User Guide. Our service department uses this information, along with the manual number, to provide help for the specific equipment you installed.

Please keep this User Guide and all manuals, engineering prints, and parts lists together for documentation of your equipment.

Date:

Manual Number: UGD014-0919

Serial Number(s):

Model Number(s):

DISCLAIMER: Conair shall not be liable for errors contained in this User Guide or for incidental, consequential damages in connection with the furnishing, performance or use of this information. Conair makes no warranty of any kind with regard to this information, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose.

Table of Contents

Introduction

Purpose of the User Guide

This User Guide describes the GasTrac process air heater and explains step-by-step how to install, operate, maintain and repair this equipment.

Before installing this product, please take a few moments to read the User Guide and review the diagrams and safety information in the instruction packet. You also should review manuals covering associated equipment in your system. This review won't take long, and it could save you valuable installation and operating time later.

How the Guide is Organized

Symbols have been used to help organize the User Guide and call your attention to important information regarding safe installation and operation.

⚠ Symbols within triangles warn of conditions that could be hazardous to users or could damage equipment. Read and take precautions before proceeding.

1 Numbers indicate tasks or steps to be performed by the user.

◆ A diamond indicates the equipment's response to an action performed by the user or a situation.

❒ An open box marks items in a checklist.

• A circle marks items in a list.

Indicates a tip. A tip is used to provide you with a suggestion that will help you with the maintenance and the operation of this equipment.

✎ Indicates a note. A note is used to provide additional information about the steps you are following throughout the manual.

Your Responsibility as a User

You must be familiar with all safety procedures concerning installation, operation, and maintenance of this equipment. Responsible safety procedures include:

- Thorough view of this User Guide, paying particular attention to hazard warnings, appendices, and related diagrams.
- Thorough review of the equipment itself, with careful attention to voltage sources, intended use, and warning labels.
- Thorough review of instruction manuals for associated equipment.
- Step-by-step adherence to instructions outlined in this User Guide.

ATTENTION:
Read This So No One Gets Hurt

We design equipment with the user's safety in mind. You can avoid the potential hazards identified on this machine by following the procedures outlined below and elsewhere in the User Guide.

⚠ WARNING: Follow instructions carefully.

Incorrect installation, operation or maintenance of this product can result in a fire, explosion or other hazards causing property damage, severe personal injury or loss of life.

Only licensed electrical/mechanical contractors, or individuals experienced with the installation of natural gas piping, process air ducting, thermal insulation, exhaust ducting and regional codes for industrial gas appliances, should install the GasTrac.

The GasTrac should be maintained and repaired by qualified technicians who are equipped with the correct tools and are experienced in the maintenance and repair of industrial gas appliances.

Inspection and testing of gas supply piping, exhaust ducting and the GasTrac gas controls and safety features should be performed periodically to ensure safe operation.

⚠ WARNING:If gas odor is detected...

- ❒ **Open doors and/or windows to vent the gas.**
- ❒ **Do not touch electrical switches.**
- ❒ **Extinguish all open flames.**
- ❒ **Immediately have qualified personnel determine the source of the gas leak and repair it.**

⚠ WARNING: Do not store or place aerosol, compressed gas or flammable materials on or near this equipment.

The hot temperatures associated with the drying process may cause aerosols or other flammable materials placed or stored near the GasTrac to explode.

(Continued)

ATTENTION:
Read This So No One Gets Hurt (Continued)

WARNING: Hot surfaces.

Temperatures inside the GasTrac can reach more than 800° F. Always shut down the GasTrac and host dryer and wait for them to cool before servicing. Do not remove the safety guard covering the GasTrac burner and heat exchanger.

WARNING: Disconnect and lock out main power before servicing.

The GasTrac is connected to high voltage. Always disconnect and lock out the main power source to the GasTrac before servicing. Also disconnect and lock out main power to the host dryer before servicing the GasTrac. Failure to disconnect and lock out this voltage source could result in severe personal injury.

WARNING: Shut off main gas supply and purge heat exchanger and gas lines before servicing.

If the fuel train, burner, ultraviolet sensor, sight glass or ignition are to be serviced, it is important that the GasTrac heat exchanger and gas lines are purged of natural gas. Failure to eliminate this potential source of a gas leak could result in severe damage, personal injury or loss of life.

WARNING: Do not operate the GasTrac with safety features disabled or removed.

The GasTrac has been equipped with numerous guards, controls and devices to ensure safe operation. Never remove or disable these devices to sustain production. Operating without these devices could lead to hazardous conditions that can damage the facility or cause severe injury or loss of life.

How to Use the Lockout Device

CAUTION:

Before performing maintenance or repairs on this product, you should disconnect and lockout electrical power sources to prevent injury from unexpected energization or start-up. A lockable device may be provided to isolate this product from potentially hazardous electricity.

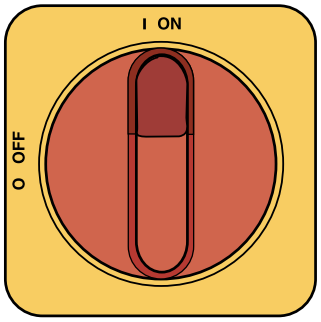
WARNING:

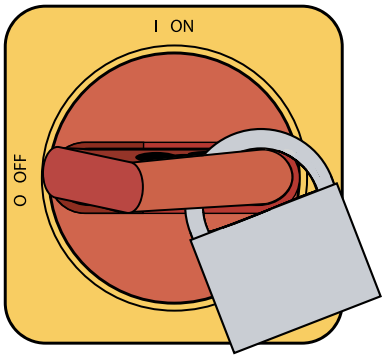
Before removing lockout devices and returning switches to the ON position, make sure that all personnel are clear of the machine, tools have been removed and all safety guards reinstalled.

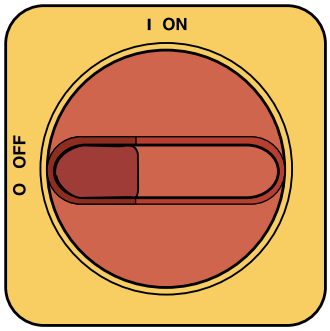
NOTE: Your disconnect may appear slightly different than the one shown here.

Lockout is the preferred method of isolating machines or equipment from energy sources. Your Conair product may be equipped with the lockout device pictured below. To use the lockout device:

1. **Stop or turn off the equipment.**
2. **Isolate the equipment from the electric power.**
3. **Turn the rotary disconnect switch to the OFF, or "O" position**
4. **Secure the device** with an assigned lock or tag.
5. The equipment is now **locked out**.







If the equipment has no included lockout device, perform the same procedure at the upstream device as part of premises electrical system.

SECTION
2

Description

What is the GasTrac?

The GasTrac Process Air Heater is a stand-alone, gas-fired heater designed to replace the electric process air heater in an existing dehumidifying dryer or crystalizer. The GasTrac allows plastics processors to convert existing electric equipment to a less-expensive gas source.

The GasTrac contains a metal-ceramic burner, heat exchanger, combustion system and temperature controller to set and maintain the temperature of the air entering a drying hopper. The host dryer's desiccant beds dry the air. The host dryer's process blower circulates air through the GasTrac heat exchanger and the hopper.

Typical Applications

The GasTrac can be used successfully in applications that require:

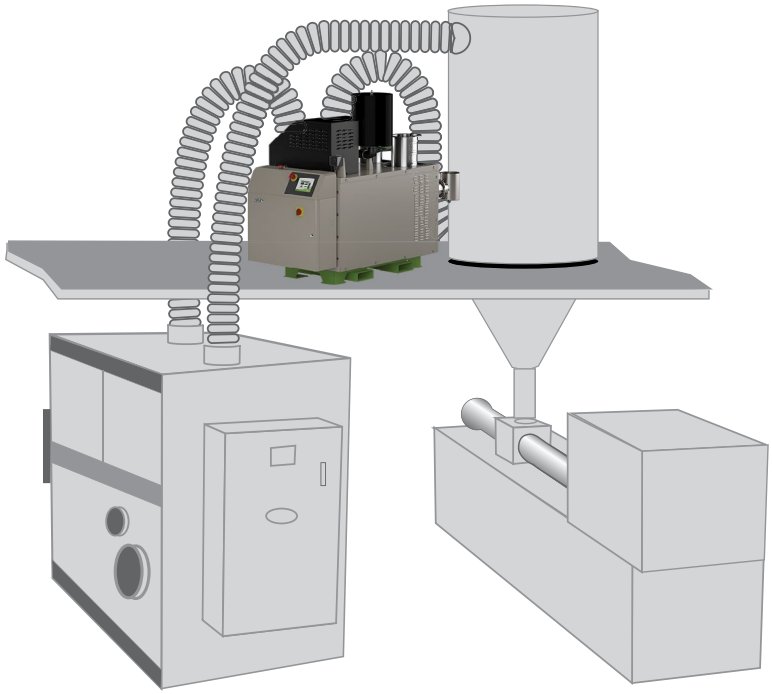
- Drying of hygroscopic plastics at temperatures ranging from 250° F to 350° F.
- Hot air drying of non-hygroscopic plastics.
- Process, or drying, air flow of 600 to 1800 cfm. Higher or lower air flow ranges may be achieved, depending on the model of the host dryer and the GasTrac selected.
- Central drying, using an existing electric dryer with a single GasTrac or multiple GasTrac units.

The GasTrac has been designed and configured at the factory for use with natural gas only. If you want to use a different gas fuel source, such as propane, you must contact Conair.

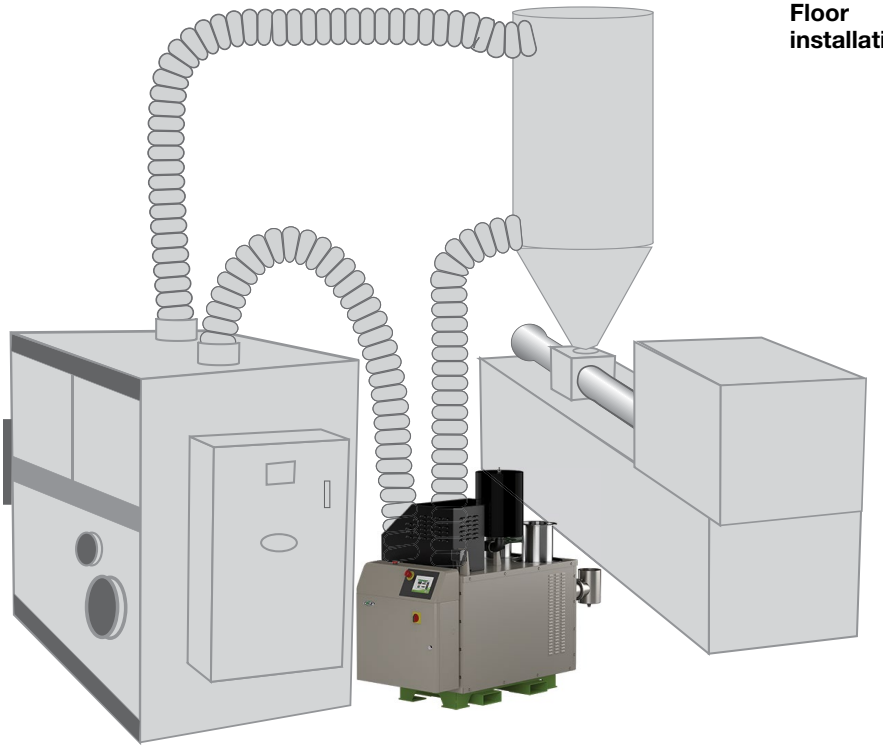
Typical Applications (Continued)

The GasTrac may be installed on a mezzanine or on the floor between the host dryer and the drying hopper. You can use flexible hose or pipe to deliver air between the host dryer, the GasTrac and the drying hopper

Mezzanine installation



Floor installation



How It Works

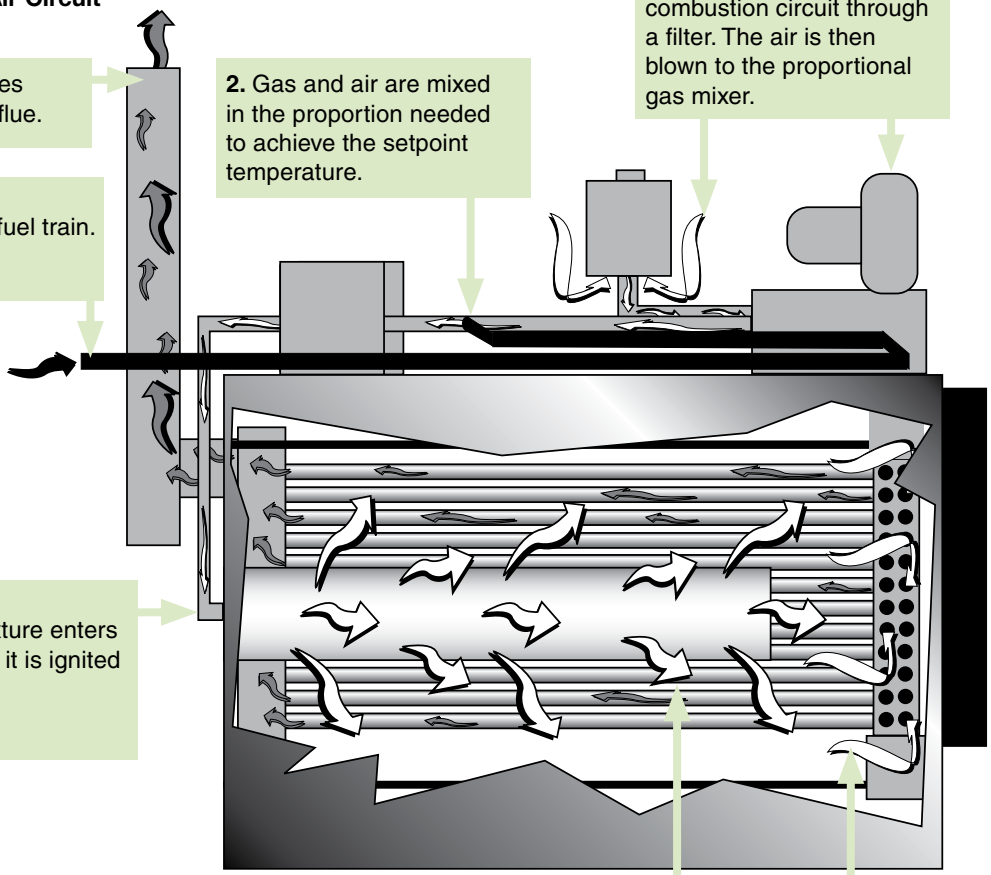
The GasTrac has multiple interfaced controls that:

- Ignite the metal-ceramic burner and monitor the GasTrac combustion circuit.
- Heat the dry air to the setpoint temperature.
- Monitor the air temperature as it enters the drying hopper.
- Automatically adjust the mixture of combustion air and gas to maintain the setpoint temperature.

How It Works (Continued)

The GasTrac has two separate air circuits: the combustion air circuit and the process air circuit.

The Combustion Air Circuit



1a. The combustion blower pulls ambient air into the combustion circuit through a filter. The air is then blown to the proportional gas mixer.

5. Combustion gases exhaust through a flue.

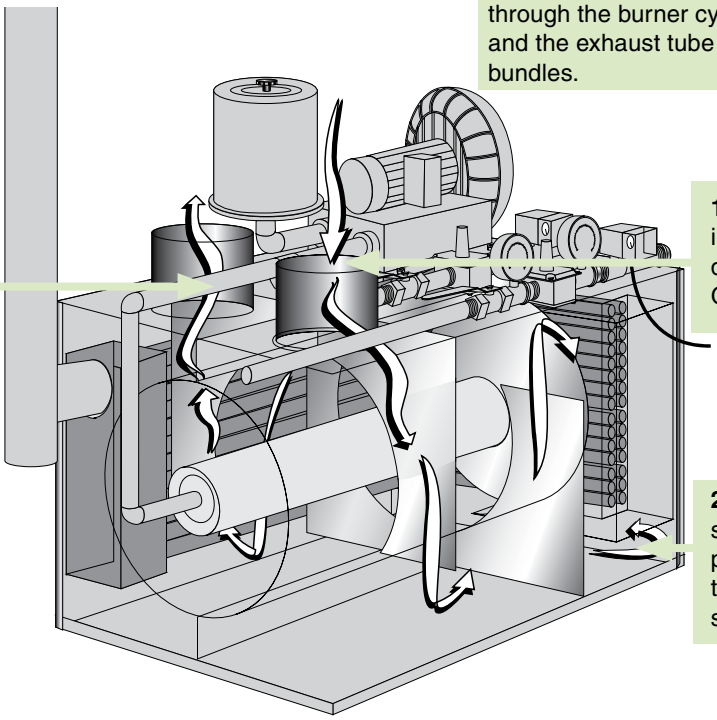
2. Gas and air are mixed in the proportion needed to achieve the setpoint temperature.

1b. Gas enters the fuel train.

3. The air/gas mixture enters the burner, where it is ignited by a spark.

4. Combustion air flows through the burner cylinder and the exhaust tube bundles.

The Process Air Circuit



1. The process blower in the host dryer sends dehumidified air into the GasTrac heat exchanger.

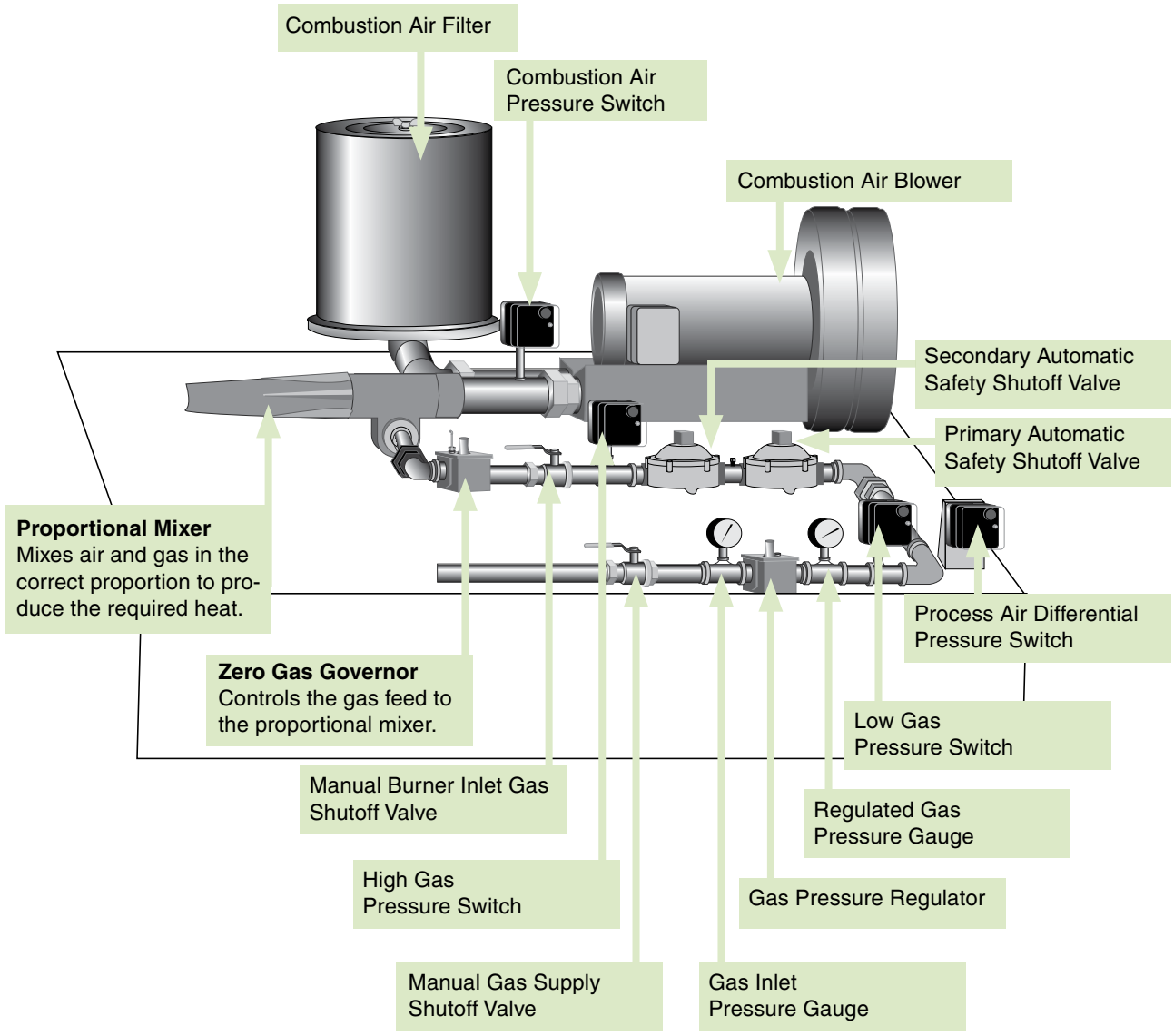
3. The heated dry air exits the GasTrac. The air is blown by the host dryer to the drying hopper.

2. The air is heated to the setpoint temperature as it passes over and around the burner cylinder and surrounding baffles.

Fuel Train Features and Controls

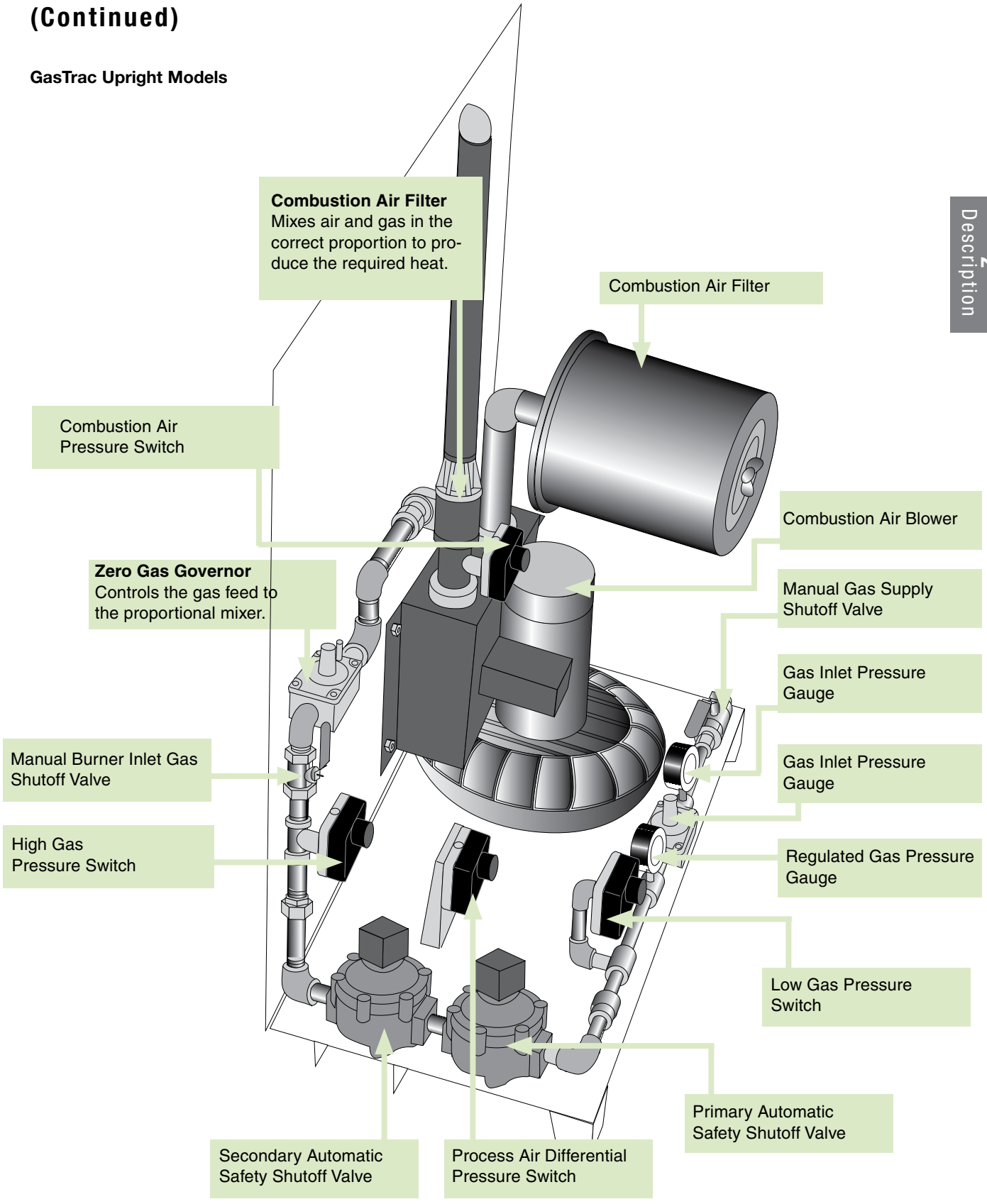
The fuel train includes two automatic and manual safety gas shutoff valves, four pressure switches, and a gas regulator and governor to assure safe feeding of gas to the combustion burner. The four pressure switches monitor gas pressure and process air flow. The GasTrac will automatically shut down if a pressure switch senses an unsafe condition.

The Process Air Circuit

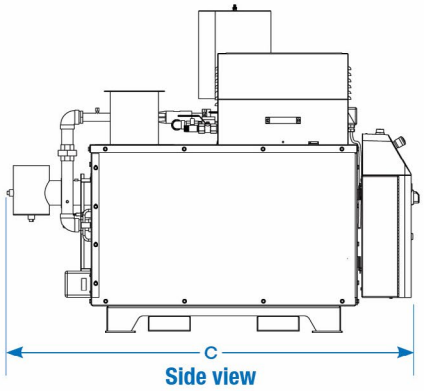


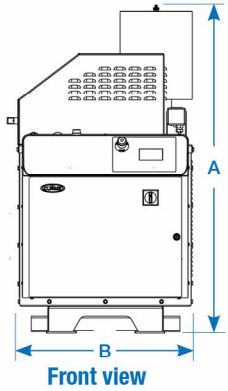
Fuel Train Features and Controls
(Continued)

GasTrac Upright Models



Specifications: GasTrac





Emissions	
Primary excess air	10 - 30%
Oxygen (O_2) (ideal 3 - 4%)	2 - 5%
Carbon Dioxide (CO_2)	9 - 10.5%
Carbon Monoxide (CO)	<10 ppm corrected to 3% O_2
NOX	<20 ppm corrected to 3% O_2
Unburned hydrocarbons	<10 ppm corrected to 3% O_2

All GasTrac components meet:

UL372, UL795, FM, CGA, AGA, NFPA 54, NFPA 79, NFPA 86 and IAS

Models	CGT150	CGT250	CGT350	CGT500	CGT700
Performance characterstics					
Temperature range °F {°C}	250 - 350 {122 - 177}				
Maximum flue temperature °F {°C}	750 {399}				
Combustion blower	0.5 Hp peripheral		1 Hp peripheral		
Ignition source	Spark igniter, interrupted				
Burner type	Metal-ceramic				
Minimum burner capacity BTU/hr	40,000	75,000	90,000	125,000	150,000
Maximum burner capacity BTU/hr	150,000	225,000	350,000	500,000	700,000
Gas consumption *					
CFH @250°F {121°C} L/hour	50 {1416}	90 {2549}	105 {2973}	150 {4248}	230 {6513}
CFH @350°F {177°C} L/hour	140 {3964}	215 {6088}	325 {9203}	465 {13167}	675 {19114}
Gas pressure to regulator In. H_2O {kPa}	10 - 20 {2.49 - 4.98}				
Gas pressure from regulator In. H_2O {kPa}	4 - 7 {0.99 - 1.74}				
Gas heating rate BTU/ft³	1000				
Dimensions inches {mm}					
A - Height	54 {1372}	61{1549}			
B - Width	29 {737}	37 {940}			
C - Depth	66 {1676}	64 {1626}	74 {1880}		
Air inlet/outlet, OD	8 {203}				12 {300}
Gas inlet size (NPT) inches	3/4				1
Exhaust flue, OD	6 {152}				
Approximate weight lb {kg}					
Installed	600 {272}				
Shipping	700 {317}				600 {272}
Voltage Full load amps †					
400 V/3 phase/50 Hz	5.4				
230 V/3 phase/60 Hz	9.6				
460 V/3 phase/60 Hz	5.1				

Specification Notes

* Designed for natural gas. For alternate fuel, contact your Conair representative.

† FLA data for reference purposes only. Does not include any options or accessories on equipment. For full FLA detail for power circuit design of specific machines and systems, refer to the electrical diagrams of the equipment order and the nameplate applied to the machine.

Specifications may change without notice. Consult a Conair representative for the most current information.

Specifications: Exhaust Flue

The Conair GasTrac is classified under the National Fuel Gas Code [ANSI Z233.1] as a Category III gas appliance. An exhaust flue is required to vent the combustion gases produced by this appliance. The purchaser is responsible for installing an exhaust flue that meets all local, regional and national codes in the installation area. For you safety, Conair recommends that you consult a licensed mechanical contractor who is familiar with gas flue and ducting codes in your area.

GasTrac Operating Characteristics

Maximum flue temperature	750° F / 399° C
Minimum vent size (single unit installation)	CGT350: 4 in. / 10.2 cm
	CGT500: 6 in. / 15 cm
	CGT700: 6 in. / 15 cm
Vent pressure at flue collar	1 to 2 in. water column

Installation Recommendations

- ❒ Provide each GasTrac with a dedicated, vertical stack that exits the building vertically through a rain-protected roof penetration. Limit any horizontal ducting runs to 4 feet.
- ❒ Use a stainless steel, fabricated chimney flue.
- ❒ Vent size should be 6 inches {15 cm.} in diameter. If you connect multiple GasTrac units to a stack manifold, adjust the stack size accordingly.
- ❒ Static pressure at the flue collar **must not exceed 1 to 2 inches water column.**
- ❒ Install an induced draft fan between the GasTrac exhaust outlet and stack ducting, if you have more than 1 to 2 inches water column pressure at the flue collar while the GasTrac is operating.

Specifications: Main Power Supply Wire

The main power wire must be:

- Grounded and secured with a strain relief.
- Correctly sized for the current drawn.

Allowable Ampacities of Copper Conductors					
	USA 75° C Insulation 30° C Ambient Air	**Canada** 90° C Insulation 40° C Ambient Air		**European Community** 70° C Insulation: 40° C Ambient Air	
Conductor Size AWG	**Maximum Full Load Amps**		**Ground Wire Size AWG**	**Conductor Size mm2**	**Maximum Full Load Amps**
14	15	13	14	2.5	16
12	20	17	12	4	23
10	30	27	10	6	29
8	43	47	10	10	40

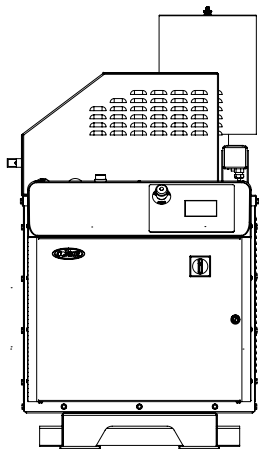
✎ **NOTE:** Local or regional electrical guidelines may have specifications that differ from the above national codes. You should comply with the codes for your area.

SECTION
3

Installation

Unpacking the Boxes

The GasTrac Process Air Heater arrives assembled. The RTD temperature probe is packaged inside the electrical enclosure. Depending on the model and options ordered, you also should receive boxes containing V clamps and piping to attach the GasTrac exhaust to a customer-installed flue.



CGT

1. **Carefully remove the GasTrac and components** from their shipping containers.
2. **Remove all packing material,** protective paper, tape and plastic. Be sure to examine packing material before discarding. What looks like filler may contain parts, hardware or instructional materials.
3. **Carefully inspect all components.** Make sure you have the correct model and all necessary hardware. Check for any damage that may have occurred during shipping. If you do find freight damage, you should immediately file a damage claim against the delivering carrier.
4. **Take a moment to record serial numbers,** electrical power and gas specifications in the blanks provided on the back of the User Guide title page. This information will be helpful if you ever need service or parts.
5. **You are now ready to begin installation.** Follow all preparation steps beginning on the next page.

Preparing for Installation

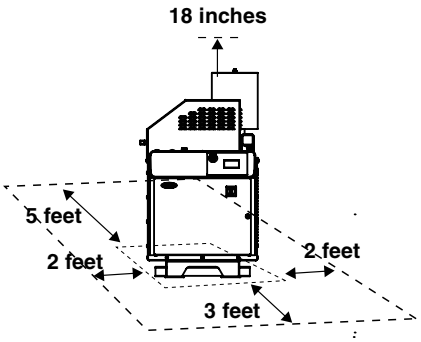
⚠ WARNING: Follow instructions carefully.
Incorrect installation of this product can result in a **fire, explosion or other hazards** causing property damage, severe personal injury or loss of life. Only licensed electrical/mechanical contractors, or individuals experienced with the installation of natural gas piping, process air ducting, thermal insulation and exhaust ducting, should install the GasTrac.

1 **Select a location for the GasTrac. The location:**

❒ **Should be between the host dryer and the hopper.** For minimal heat loss, the GasTrac should be no more than 10 feet from the drying hopper. The GasTrac control must be within 10 feet of the drying hopper inlet, unless optional cable extensions for the RTD temperature probe have been purchased.

❒ **Must allow for installation of an exhaust flue** that meets all local, regional and national codes. Ideally, each GasTrac should have a dedicated vertical stack that exits the building through a rain-protected roof penetration.

❒ **Must provide minimum clearance for safe operation and maintenance.** For efficient combustion, you must not obstruct air flow around the unit.



2 **Install electrical power to the selected location.**
The GasTrac requires a grounded, three-phase power source. Check the GasTrac's serial tag for the correct amps, voltage and cycles for your model. All electrical wiring should be completed by qualified personnel and should comply with government codes in your region.

3 **Install gas piping to the selected location.**
Gas delivery piping should be sized to provide the rated gas flow to the GasTrac at a delivery pressure of about 12 inches water column (about 1/2 psig). All gas piping should be completed by qualified personnel and should comply with government codes in your region.

✎ **NOTE:** For reliable longterm performance, the gas supply line should include:

❒ A water trap to collect water condensing in the gas line.

❒ An in-line, basket-type filter to collect rust, pipe scale or welding slag.

Installing the GasTrac

⚠ **WARNING: You are responsible for the structural integrity of this installation.**
If you are installing the GasTrac on a mezzanine, the host dryer or another device, be sure that the mounting surface can support the weight of the GasTrac. See the specification tables for weights.

⚠ **CAUTION: Use a suitable lifting device to move the GasTrac.**
The GasTrac models weigh up to 1,400 pounds {635 kg}. Always use a forklift or other
suitable lifting device to move the unit. The GasTrac has been equipped with forklift rails.

1 **Move the GasTrac to the selected location.**
Be sure to position the GasTrac so that you can easily:

❒ Connect the gas and main power supplies.

❒ Install the flue stack.

❒ Connect process air hoses or lines between the host dryer, GasTrac and drying hopper.

2 **Secure the GasTrac to the mounting surface.** We have provided 1 3/8-inch diameter holes in the base of the GasTrac for bolting the unit to a mounting surface.

Disconnecting the Dryer's Process Air Heater

You must disconnect the host dryer's process heater because the GasTrac replaces it. You will need the wiring diagrams and instruction manuals for your host dryer to determine which wires to disconnect and which air lines to remove or reroute.

1 **Disconnect and lock out power to the host dryer.** If the dryer has been operating recently, wait for the dryer too cool down before continuing to Step 2.

2 **Disconnect the electrical wires** between the host dryer control and the process heating elements.

3 **Disconnect and reroute the process air lines.** The host dryer's process air outlet must be connected to the GasTrac instead of the drying hopper. To reduce the pressure drop in the process air circuit, you may need to remove the process heater or reroute process air lines within the dryer to bypass the process heater. Refer to the manuals and diagrams that came with your dryer.

Installing the Exhaust Flue

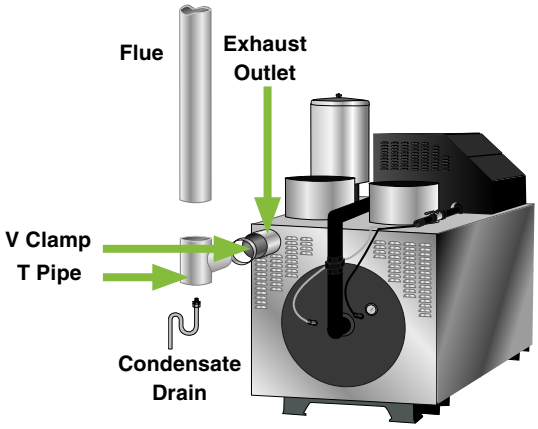
⚠ WARNING: Do not operate the GasTrac without a properly installed exhaust flue.

You must install an exhaust flue to vent the combustion gases produced by the GasTrac. The installation should comply with government codes in your area and be done by a qualified mechanical contractor familiar with industrial flue and ducting systems.

The GasTrac is a forced draft system, using a variable speed combustion blower and a sealed combustion chamber. The temperature of combustion gases in the flue can reach 800° F {427° C}.

1 **Install the exhaust ducting and flue.** Consult government codes and a qualified mechanical contractor for detailed installation instructions and assistance. *See the Specifications pages of this User Guide for GasTrac operating characteristics and general recommendations.*

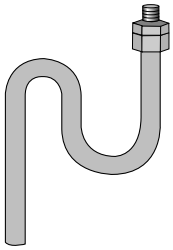
2 **Connect the flue to the GasTrac's exhaust outlet.** Attach the T pipe to the GasTrac's exhaust outlet using the V clamp provided. Connect the T pipe to the exhaust flue.



3 **Insulate the flue and exhaust T assembly.**
Exhaust flue and T temperatures can reach 800° F {427° C}.

4 **Install a condensate trap and drain.**
Condensate occurs where flue gases cool below their dew point. This condensate can be highly corrosive. Draining and disposal should be done in compliance with applicable safety and environmental codes in your area.

TIP: A condensate trap and drain can be made by bending a piece of stainless steel tubing. Secure the drain to the T pipe using the appropriate compression fitting.

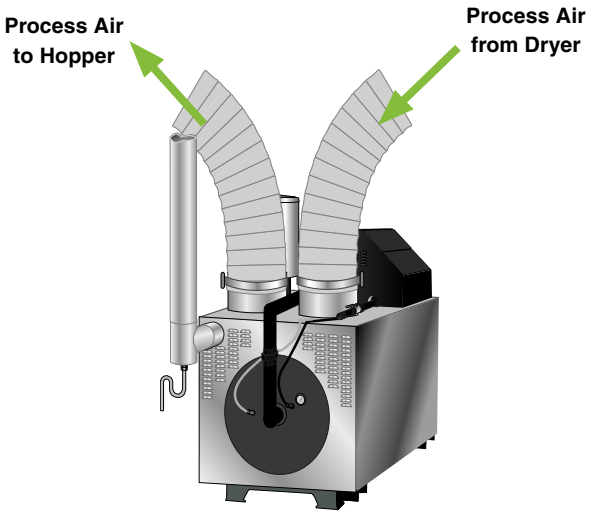


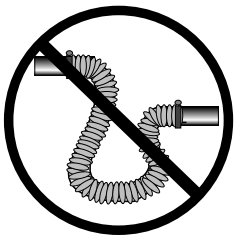
Connecting Process Air Lines

The process air lines carry dehumidified air from the host dryer to the GasTrac, and from the GasTrac to the drying hopper. These air lines can be flexible hose or pipe. The air line between the GasTrac and host dryer can be uninsulated. We recommend an insulated air line between the GasTrac and the drying hopper to minimize heat loss.

1 **Connect the GasTrac process air inlet to the host dryer's process air outlet.** Secure the air lines with hose or pipe clamps.

2 **Connect the GasTrac process air outlet to the drying hopper air inlet.** Secure the air lines with hose or pipe clamps.





NOTE: Do not allow the flexible hoses to kink or crimp.

Connecting the Gas Supply

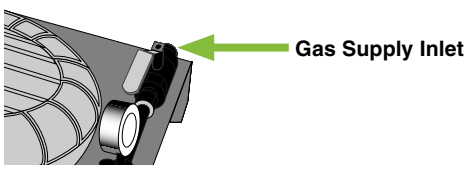
WARNING: For your safety, we recommend that these steps be completed by a qualified mechanical contractor in compliance with all applicable natural gas codes in your region.

1 **Check all gas lines for leaks.** Use a gas detecting device or apply soapy water around pipe and fittings.

2 **Purge the gas lines after pipe and fittings are known to be free of leaks.** The lines must be free of air, rust, scale, pipe dope and welding slag.

3 **Connect the gas supply line to the inlet** on the GasTrac fuel train. Make sure that a water trap and inline basket filter has been installed on the supply line.

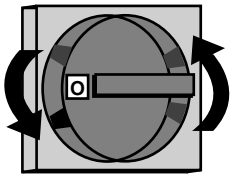
Gas Inlet Fitting Sizes	
Model	**NPT Size**
CGT350	3/4 in.
CGT500	3/4 in.
CGT700	1 in.



Upright Model

Connecting Main Power

CAUTION: Electrical hazard.
Always disconnect and lock out the main power sources before making electrical connections. Electrical connections should be made only by qualified personnel.

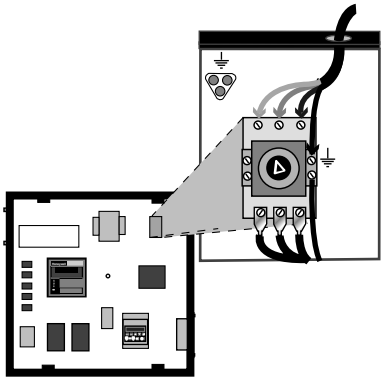


1 **Open the GasTrac electrical enclosure.**
Turn the disconnect dial on the GasTrac's door to the Off position. Turn the captive screw, and swing the door open.

2 **Insert the main power wire** through the knockout in the electrical enclosure. Secure the wire with a rubber compression fitting or strain relief.

3 **Connect the power wires** to the three terminals at the top of the disconnect holder.

4 **Connect the ground wire** to either grounding point shown in the diagram.

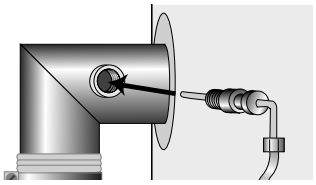


IMPORTANT: Always refer to the wiring diagrams that came with the GasTrac for the most accurate information about electrical components and connections.

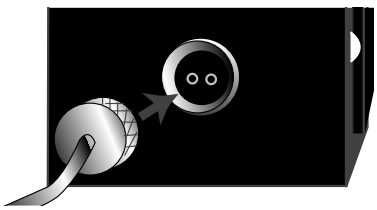
Installing the RTD Probe

The RTD probe monitors the temperature of the drying air as it enters the hopper. If the probe is not installed correctly, temperature readings will be inaccurate.

1 **Insert the probe in the delivery air inlet** of the hopper. The end of the probe must not touch the walls of the inlet pipe. Most hoppers provide a hole that is compatible with the probe's 1/8-inch NPT compression fitting.



2 **Plug the probe's cable into the GasTrac control box.**
Coil any excess cable and secure with a wire tie.



Gas and Electrical System Checks

You have completed the installation. Now its time to make sure everything works. Qualified electrical and mechanical personnel should be available during the systems check and the installation test.

1 Check all electrical connections.

❒ Shut off power to the unit and verify that the GasTrac and its burner controller are adequately grounded. Inadequate grounding can cause controller error messages and nuisance alarms.

❒ With power off to the GasTrac and the host dryer, verify that all terminal connections are tight and all new wiring has adequate strain relief.

2 Check gas piping and ducting.

❒ Verify that the gas delivery piping is rigidly supported.

❒ Verify that exhaust gas ducting is secured, adequately insulated and free of leaks.

3 Check the GasTrac fuel train for leaks.

Turn on the gas supply to the GasTrac. Open the primary gas shutoff valve. Use a gas leak detection device or a squirt bottle of soapy water to detect leaks around gas pipe and fitting joints. Open the secondary gas shutoff valve, and continue checking for leaks using the same procedure.

⚠ **WARNING: Be sure lines are free of leaks.**
To prevent accident or injury, all gas lines, including the GasTrac's factory-mounted gas train, should be checked for leaks before firing the burner.

Testing the Installation

1 Start the host dryer.

Monitor the dryer during the first few minutes of operation to verify that the start-up operating sequences are correct.

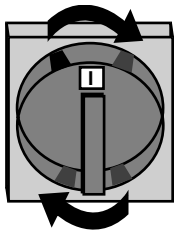
2 Turn on the gas supply to the GasTrac.

All manual shut-off valves in the gas supply line and the GasTrac fuel train must be in the open position. Before proceeding, use a detection device or soapy water to check for gas leaks in the GasTrac fuel train.

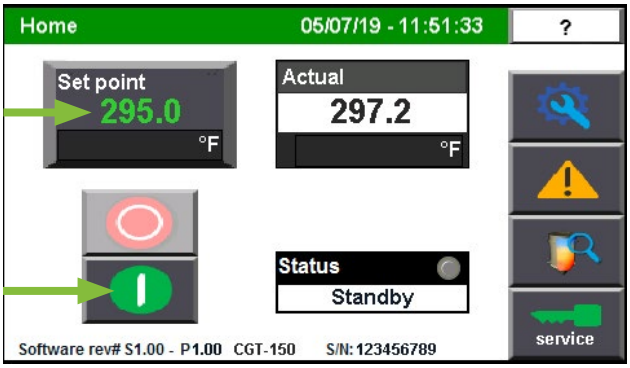
3 Turn on main power to the GasTrac.

Turn the main disconnect dial to the I or ON position.
If everything is installed correctly:

- The variable speed control's display will illuminate.



Testing the Installation (Continued)



4 Press the Power switch to ON.

- The temperature controller begins a 3-second self-test. The display will flash between standby and the setpoint temperature.
- The Burner Controller begins a 10-second initiation, which ends when the display indicates STANDBY.

5 Set the drying temperature.

- The combustion blower will start and run for 90 seconds to purge any residual gas from the burner.
- After the 90-second purge, the burner will ignite on low fire (low blower speed) for about 15 seconds. The burner will alternate between high and low fire as required to maintain the setpoint temperature.

6 Verify the combustion blower is rotating in the correct direction.
The combustion blower uses three-phase blower. Hold a strip of paper or piece of string near the blower inlet filter. If the paper or string blows away from the filter, the blower is rotating in the wrong direction. Stop the GasTrac. Disconnect and lock out the main power source. Reverse any two incoming electrical leads on the blower and repeat the test procedure.

7 Allow the actual temperature to reach setpoint.

8 Press the STOP button.

- The gas inlet valves should close.
- The combustion blower should stop.
- The burner and temperature controllers should display STANDBY.

9 Allow the actual temperature to reach setpoint.

NOTE: If the burner fails to ignite and the red alarm light illuminates, there may still be air in the gas lines. Check the burner controller display. If the alarm LED is illuminated, press the reset button on the front of the electrical enclosure. If not, refer to the Troubleshooting section of the User Guide and the burner controller manual.

SECTION
4

Operation

GasTrac Operating Features

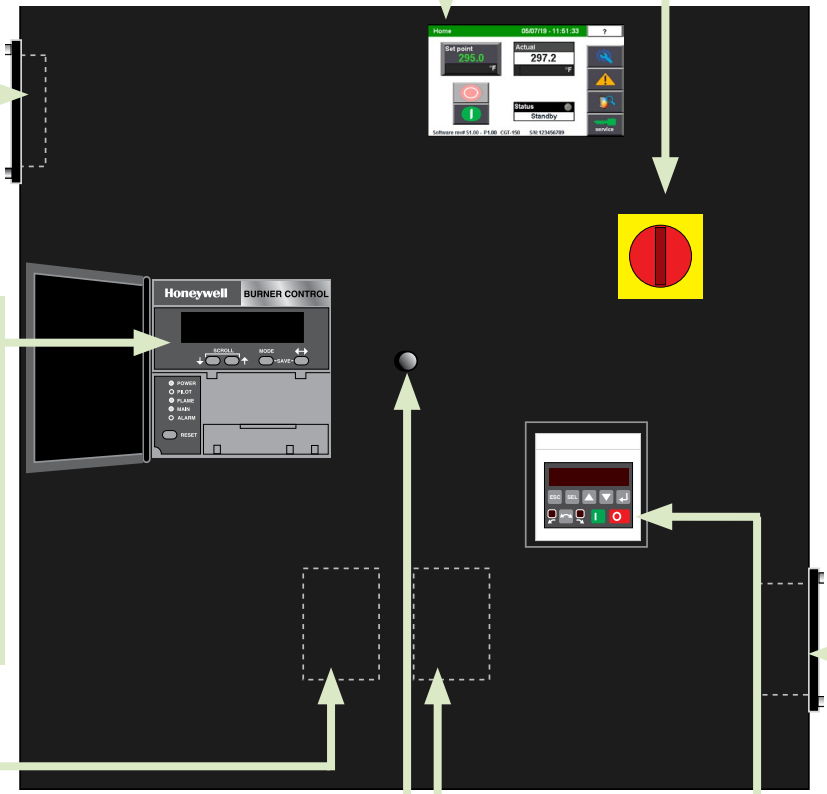
The operating section introduces the GasTrac operating features and explains how to use the primary GasTrac control to start and stop drying. For detailed information about the Temperature, Burner and Variable Speed Controllers, see the manufacturer's manuals in the instruction packet.

The GasTrac Control
This is the primary operating control. You turn the GasTrac on or off, enter the setpoint drying temperature and start or stop the GasTrac using this control.

Main Power Disconnect Switch
Turn the lockable dial to provide or disconnect electrical power to the GasTrac.

Electrical Enclosure Cooling Fan and Filter
Draws outside air through the enclosure to cool electrical components.

Cooling Exhaust Filter
Prevents contaminants from entering the electrical enclosure through the exhaust vent.



Burner Controller- (Inside)
The Burner Controller is activated when you press the RUN button on the main GasTrac control. The burner controller sends a signal to the spark igniter, which fires the metal-ceramic burner. This controller continues to monitor the fuel train, combustion blower and other combustion components for possible problems.

Flue Gas High Temperature Limit Switch
Shuts down the GasTrac when the combustion exhaust temperature exceeds 800° F.

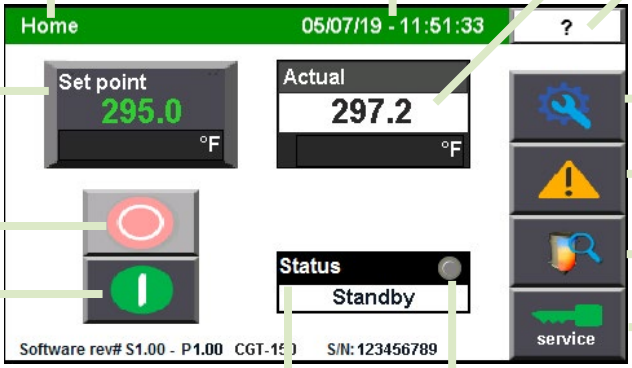
High Temperature Limit Switch Reset Button
Push to reset the flue gas and process high temperature limit switches.

Process High Temperature Limit Switch
Shuts down the GasTrac when the process, or drying, temperature exceeds 450° F.

Variable Speed Controller
The Variable Speed Controller automatically adjusts the speed of the combustion blower by varying the frequency and voltage of the signal. Increasing the speed increases the air-to-fuel mixture and the heat output of the burner.

The GasTrac Control Panel

The GasTrac control is the primary operator interface.



Screen Name
Indicates what screen you are currently looking at.

Date and Time
This area displays the current date and time.

Actual Temperature Window
This area displays the current temperature of the dryer.

Help button
Help for current screen.

Setpoint Display
Shows the temperature setpoint value

Wrench button
(visible when logged in as admin)
Go to Set-up screen.

Stop button
Select to stop and go into standby mode.

Alarm button
Go to Alarms screen.

Start button
Select to start or wait for air flow.

Hopper Settings button
Go to Alarms screen.

Login/Logout button
This button is used to log in or log out as a user.

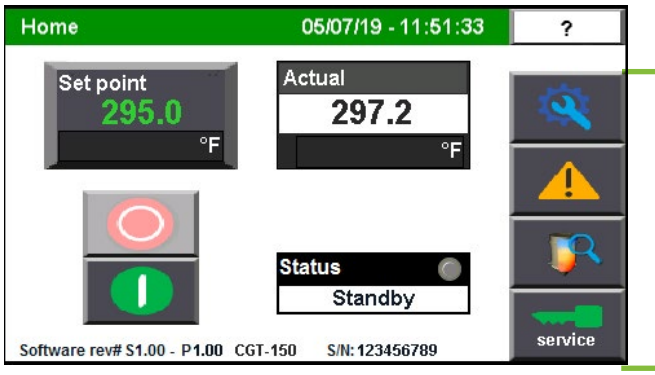
System Status
This area displays messages to let you know the current level of the hopper.

Indicator
This indicator turns green indicating air is available and the dryer is running.

How to Navigate the Control Screens

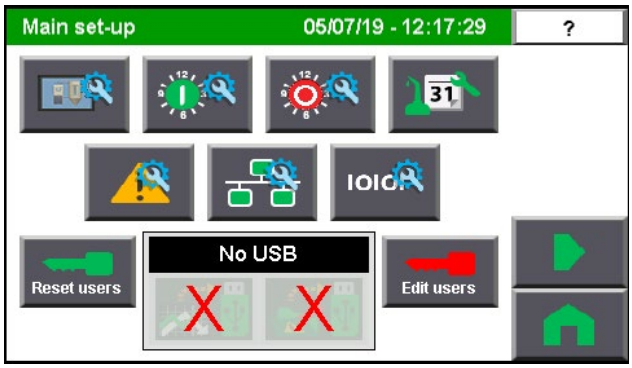
Navigate through the control screens by touching any navigation “buttons”.

NOTE: Depending on options ordered, software revision level, and user login levels, your screen may appear different than what is shown in this manual.



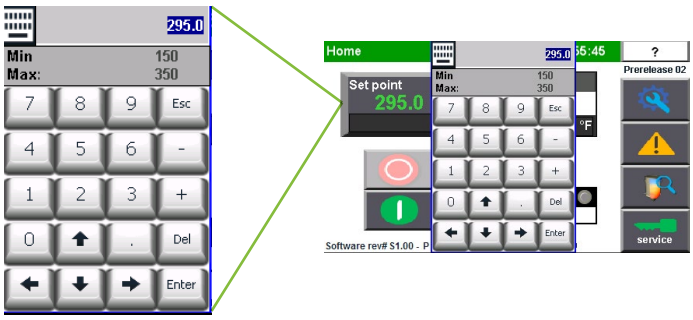
Navigation Buttons
Touching the navigation buttons will take the user to the control screen selected

All beveled grey buttons on the GasTrac control screen are selectable and will direct you to another screen. At any point, pressing the Home button will return you to the home screen.

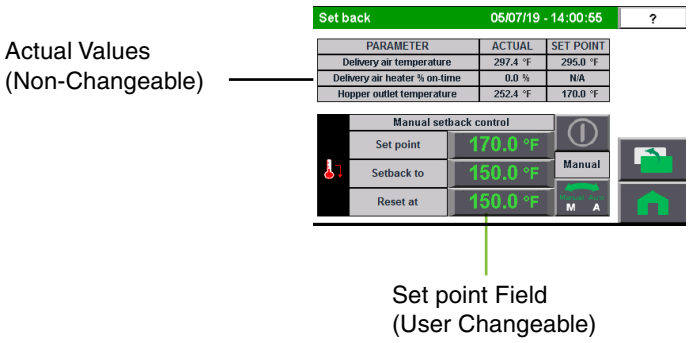


How to Navigate the Control Screens (continued)

The user name, password and other information can be entered using the pop-up keyboard window that appears when an appropriate field is touched.



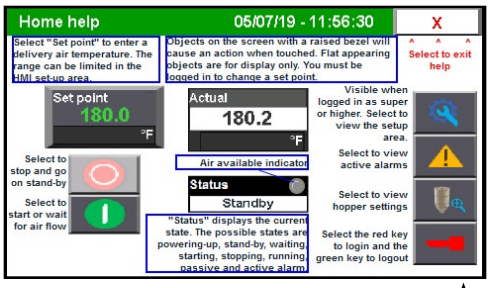
Set points can be entered within fields with raised beveled edges with green values. Values shown within flat rectangles are “actual” values and can not be changed.



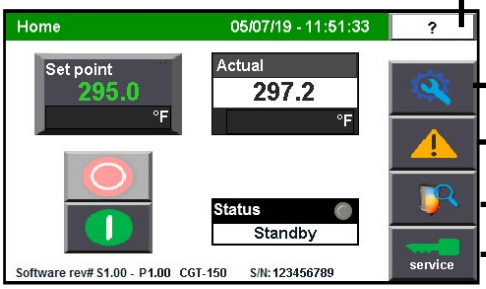
Control Function Flow Charts

The following flow charts provide a quick summary of the control functions. For an explanation of each control function, *see Operation section entitled, Control Function Descriptions.*

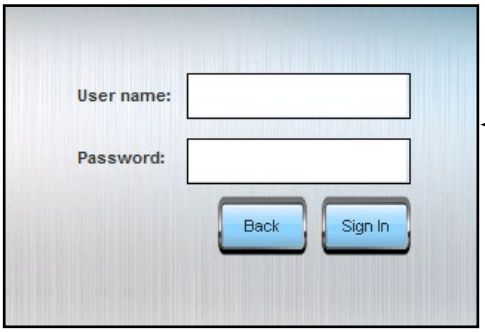
Home Help

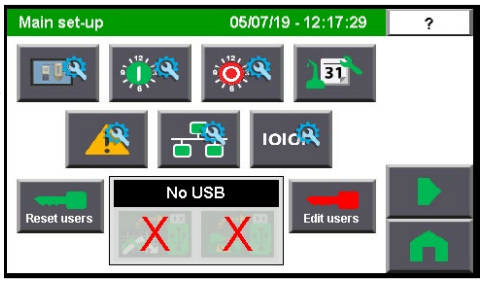


GasTrac Home
(Logged in as admin - wrench shows up)

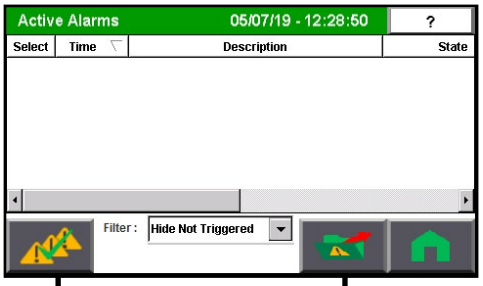


Login





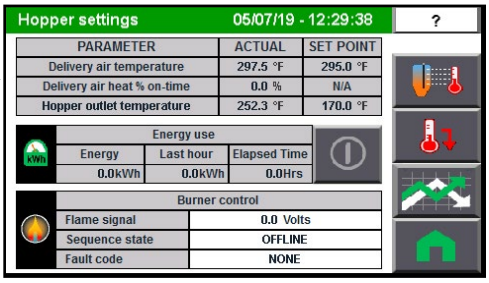
Main Setup



Active Alarms

Acknowledge Alarm

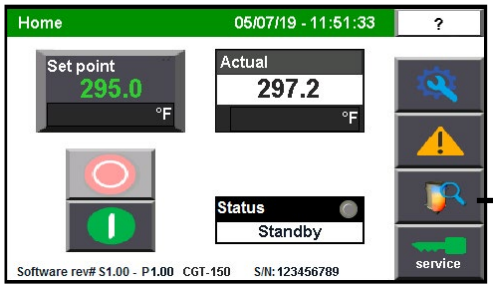
Alarm History



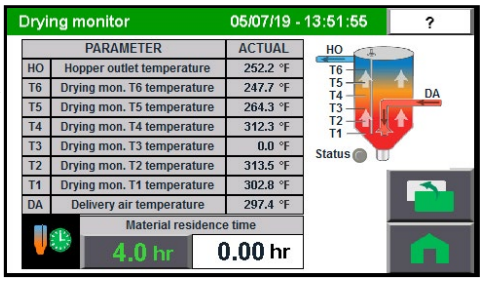
Hopper Settings

Control Function Flow Charts (Continued)

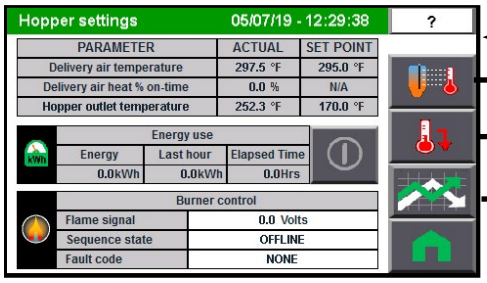
GasTrac Home



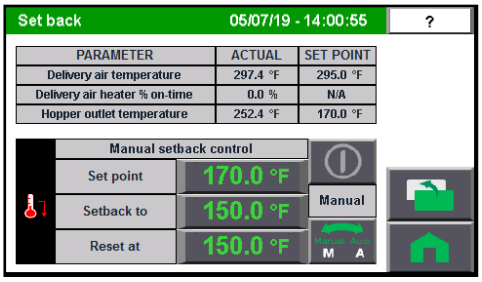
Drying Monitor



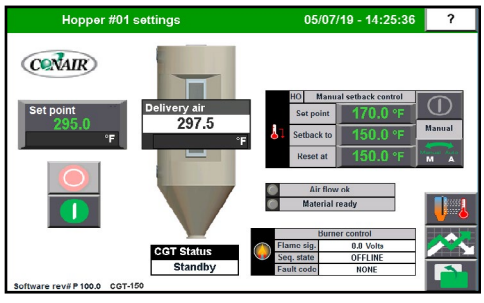
Hopper Settings



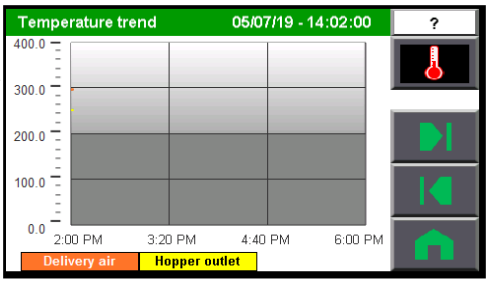
Setback



D Series dryer hopper screen when connected to GasTrac

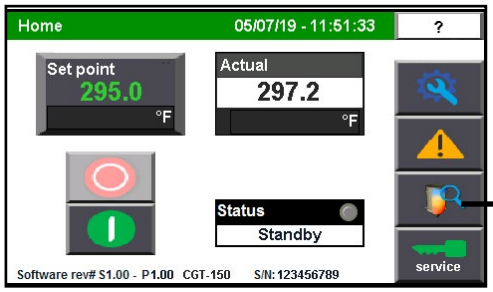


Trends

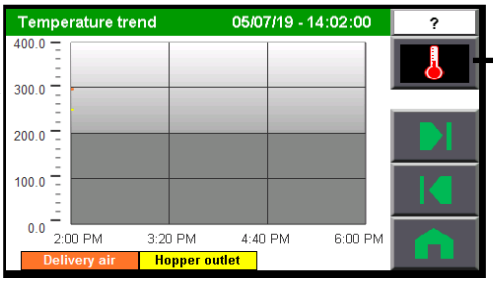


Control Function Flow Charts (Continued)

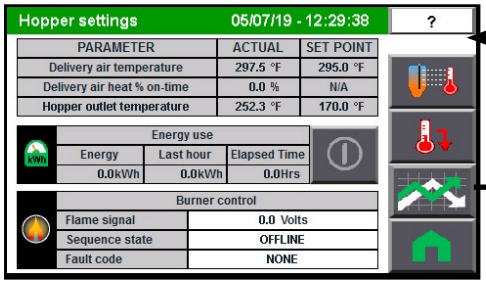
GasTrac Home



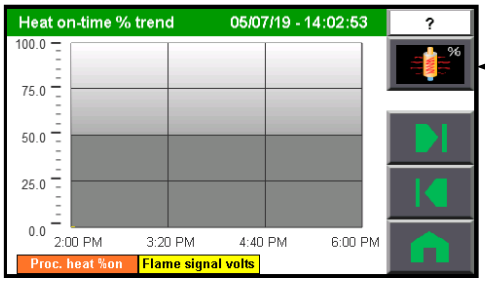
Temperature



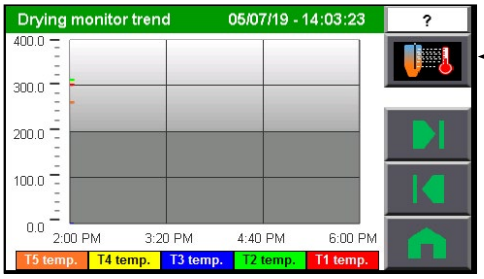
Hopper Settings



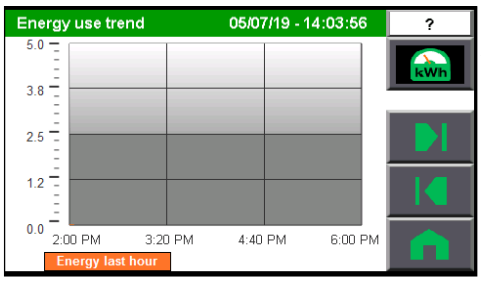
Heat On-time % Trend



Drying Monitor (when installed)

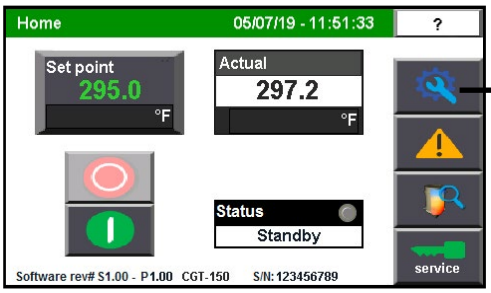


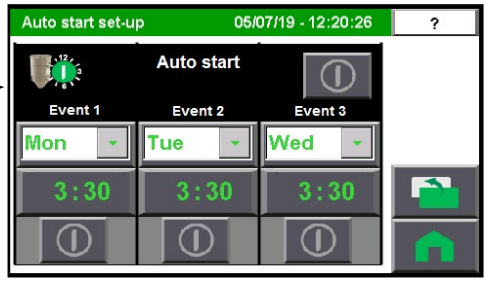
Energy Use



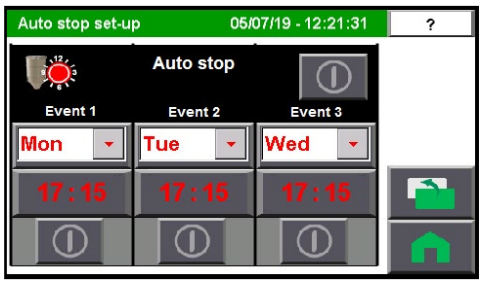
Control Function Flow Charts (Continued)

GasTrac Home



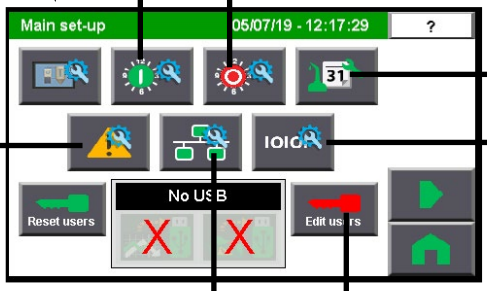


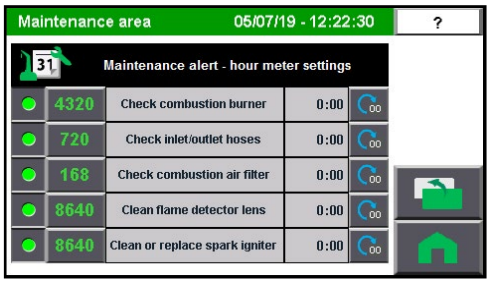
Auto Start Settings



Auto Stop Settings

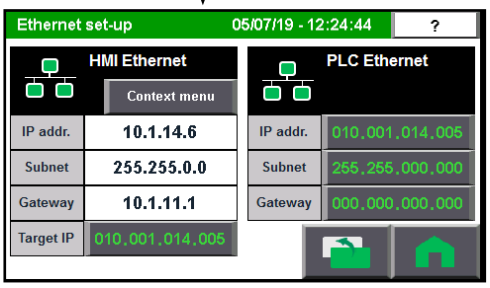
Main Set-up

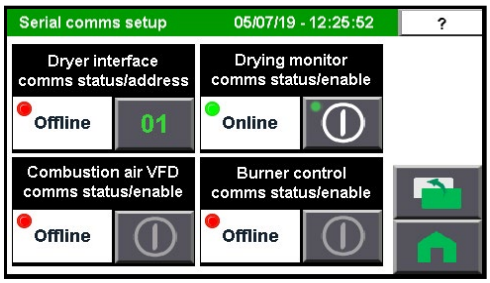




Maintenance Settings

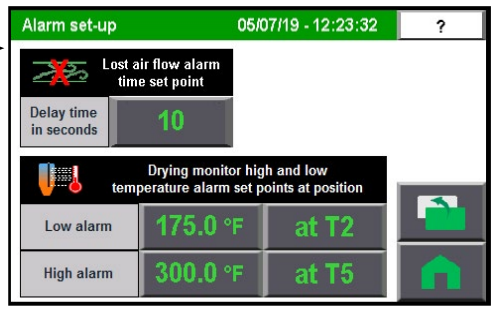
Ethernet Set-up

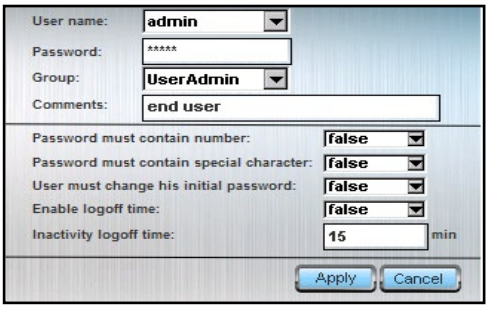




Serial Communication

Alarm Set-up

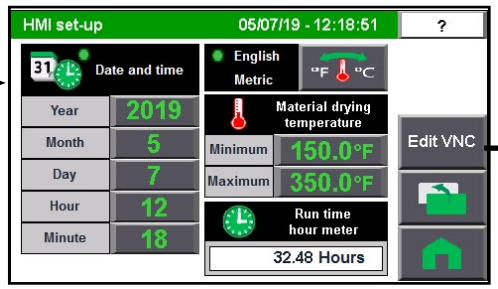


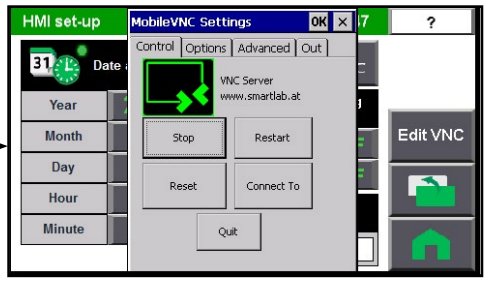


User Settings when in Admin mode.

Control Function Flow Charts (Continued)

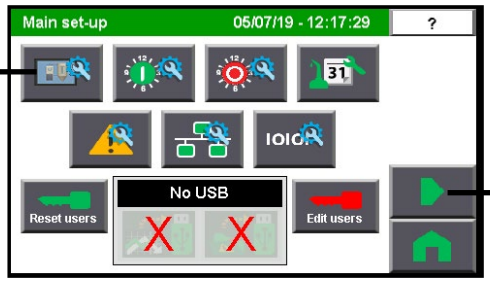
HMI Set-up

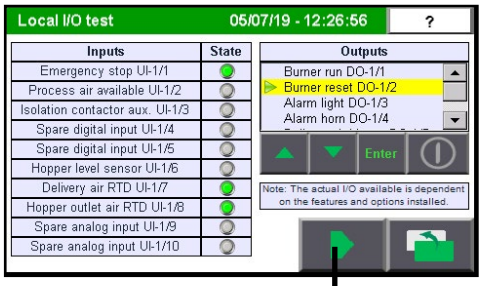




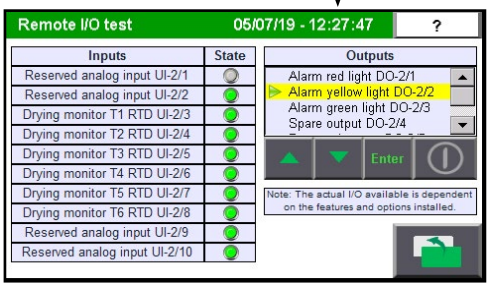
Edit VNC

Main Set-up





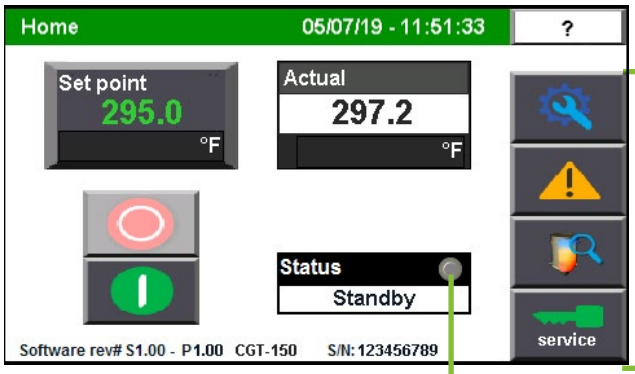
Local I/O Test



Remote I/O Test

Control Function Descriptions

Home Screen



Navigation Buttons
Touching the navigation buttons will take the user to the control screen selected

Status Indicator
This indicator shows the current status of the GasTrac.

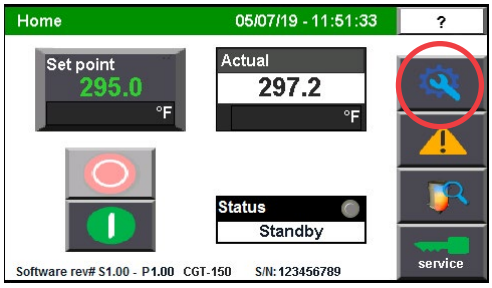
The Home screen provides the user with the current live information concerning the processes within the dehumidifying dryer including:

- Setpoint
- Actual Temperature
- Dryer Status

It tells the user the current status of the dryer blower (powering up, standby, starting or stopping, passive and shutdown alarms).

If the user is logged-in at the proper security level, changes can be made to:

- Setpoint - (Active material exit temperature) The setpoint is limited by the delivery air min/max located on the HMI setup screen.



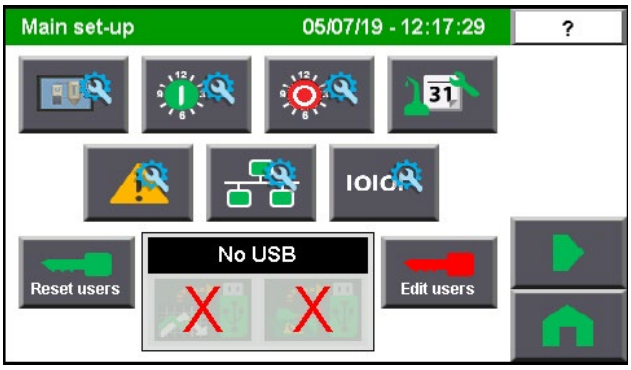
When logged in as “super or higher” the wrench button appears and when selected will give you access to the Setup Screen.

This screen also allows the user to start or stop the dryer. The user can also view the other system parameters, view alarms, view hopper settings, or log in by pressing the applicable buttons on the right of the screen

NOTE: Live data is displayed as text inside a box. Set point boxes have beveled edge borders and green text. Set points can be changed, if the user has logged in at the proper security level, by pressing the set point boxes. This will launch a pop-up keypad window that can be used to change the set point. See Operation section entitled, How to Navigate Control Screens. After the new set point value has been entered, press the “Enter” key to lock in the new set point.

Control Function Descriptions (Continued)

Main Set-up Screen



Access the Main Setup screen by pressing the Wrench button on the Home screen. The Main Setup screen provides the user with access to function screens including:

- HMI Setup to set time, limits or units
- Auto start and stop setup
- Maintenance Setup to enable /disable maintenance alerts
- Serial Comm Setup to monitor and enable/disable installed serial communications
- Ethernet Setup to monitor and change Ethernet communication settings
- Alarm Setup to access the alarm setup area

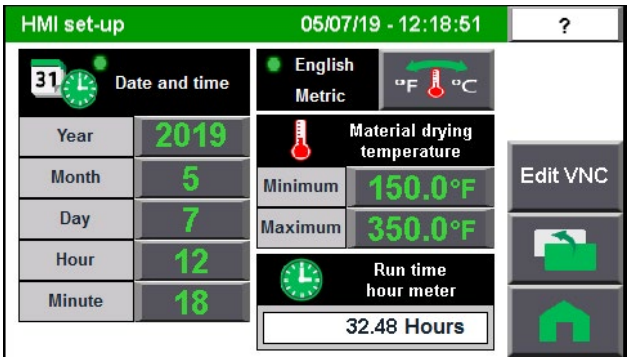
When visible in “Standby” selecting the green arrow button will give you access to the I/O test screen

The Edit User button allows you to set up security when signed in as “Admin”.

Inserting a USB flash dive into the HMI, enables saving the trend and alarm history. The files are saved in CSV format.

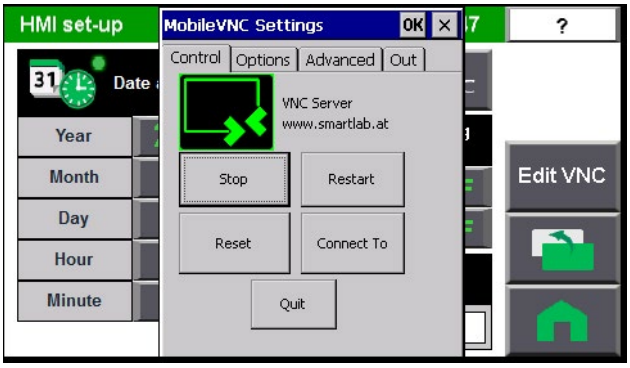
Control Function Descriptions (Continued)

HMI Set-up Screen



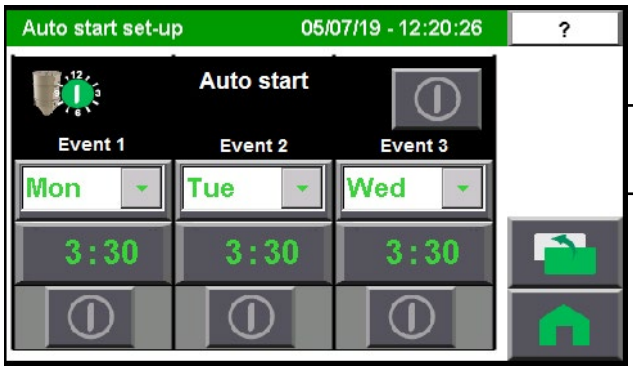
The HMI Set-up screen lets you set the Date and Time, Language, Run Time, and Material drying temperature

1 Press the Edit VNC button to access a pop up window to set the VNC Server. Requires “Admin” log-in.



Control Function Descriptions (Continued)

Auto Start Set-up Screen

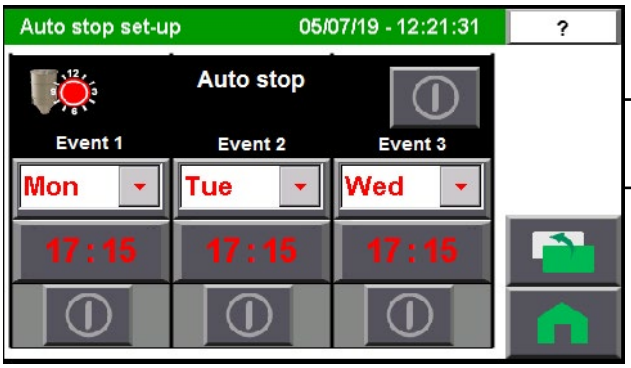


Select to enable or disable the entire auto start function

Drop down list to set the day of the week or daily for every day

The Auto Start function will automatically start the heat source on a predetermined day and time. Up to three different start events can be individually setup and enabled/disabled.

Auto Stop Set-up Screen



Select to enable or disable the entire auto stop function

Drop down list to set the day of the week or daily for every day

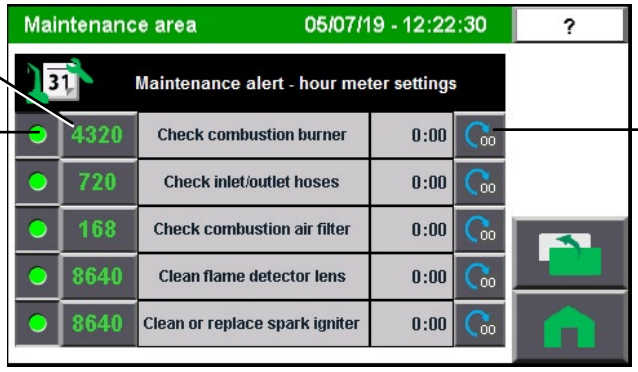
The Auto Stop function will automatically stop the heat source on a predetermined day and time. Up to three different stop events can be individually setup and enabled/disabled.

Control Function Descriptions (Continued)

Maintenance Area Set-up Screen

Select to enter the hours of run time for each alert.

Select push button to enable or disable each alert. Indicator is green when enabled and grey when disabled.



Select to manually reset the accumulated time to zero

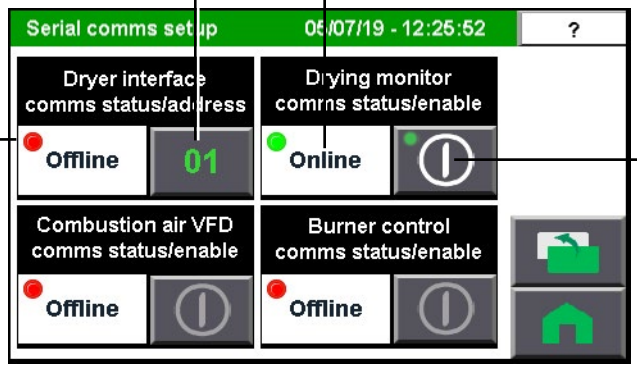
Maintenance alerts will sound a passive alarm when the accumulated hours reach the set point. Acknowledging the alert automatically resets the accumulated time.

Serial Communication Set-up Screen

Select to enter the address ID for this hopper. Range 1-32

Displays the current communications status of the device, online or offline.

The indicator light for each device turns red when the communications are offline or have errors. The light turns green when online without errors.



Select to manually enable or disable communications to the device

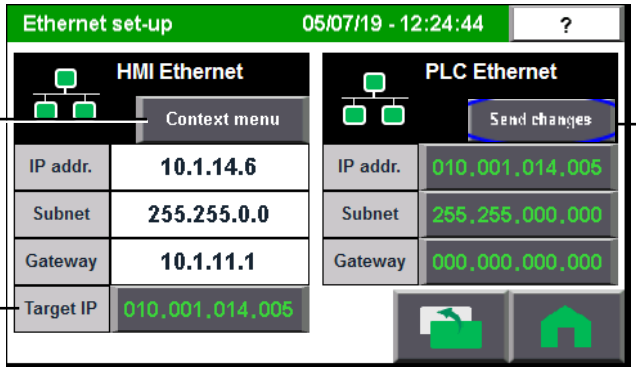
The Serial Comms Setup screen provides a way to monitor and controls all the installed devices. The serial protocol is Modbus RTU. All devices must be set to 38.4K Baud, 8-Data bits, 1-Stop bit and Parity -None.

Control Function Descriptions (Continued)

Ethernet Set-up Screen

Step 3
Press this button, then on the menu select “show system settings”. Under network set the new HMI IP address.

Step 2
Set the target IP to the new PLC IP address.



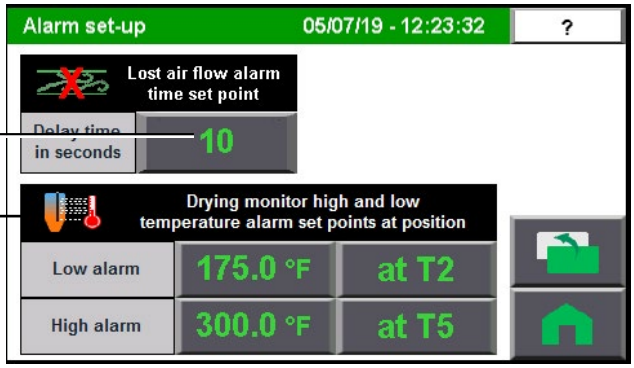
Step 1
Visible when settings are different. Verify new PLC settings before sending.

Changing the Ethernet settings requires the admin login. Only qualified personnel should attempt changes. Always record your new settings before making any changes. Select the individual octets to change the values. Always set the PLC first! Warning, communications will be lost after step #1. It will return after step #3 is completed.

Alarm Set-up Screen

Select to enter the amount of time that the system waits while running before shutting sown on a loss of air flow. Range 5-15 seconds.

Only visible when drying monitor is installed.

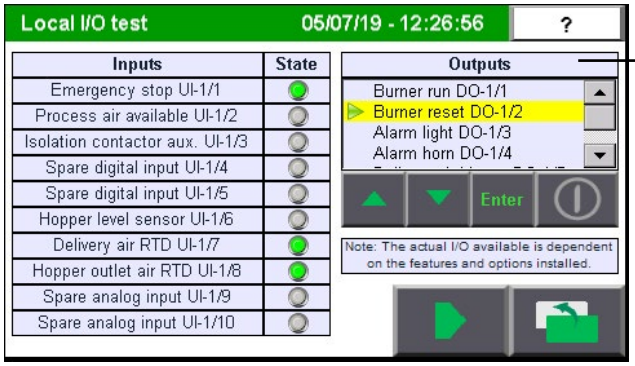


The Alarm Set-up Screen enables you to set low and high temperature alarms at the same or different points in the drying hopper.

1 Press the “at T” button to change the location in the drying hopper each time it is released with T2 the lowest and T5 the highest position in the hopper. The alarms are passive.

Control Function Descriptions (Continued)

I/O Test Screen



1 To turn on an output, use the up/down arrow buttons to move the green position indicator to the desired output.

2 Press the enter button to select the output. The selected output is highlighted yellow.

3 Once selected, press and hold the on/off button to energize the output.

4 Release the on/off button and the output turns back off.

The I/O Test Screen displays a list of the controls digital and analog inputs. The status indicators are green when a digital input is on or when an analog input is ok. The indicator is gray when a digital input is off or when an analog input is out of range, not connected or short circuited.

Edit User Screen

Basic User Level Information:

User	Real name	Password	Change password
oper1	Oper1	oper1	No
oper2	Oper2	oper2	Yes
oper3	Oper3	oper3	Yes
maint1	Maint1	maint1	Yes
maint2	Maint2	maint2	Yes
maint3	Maint3	maint3	Yes
admin	Admin	admin	Yes

The Edit User Screen allows you set up security measures.
The green key at the bottom of the home page will have a number on it representing your current security level. Pressing the Login button again will log the user out of the system. Also, inactivity for 10 minutes will log you out of the control. The control will return to security level guest.

NOTE: Proper login may be required to view certain screens or make changes to various settings. Conair recommends that the administrator logs in first and changes the admin password.

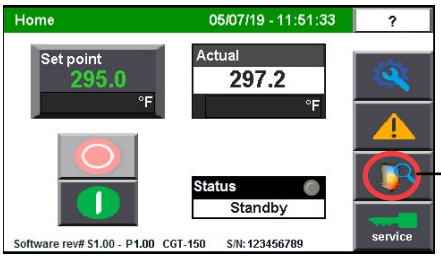
Control Function Descriptions (Continued)

NOTE: Depending on which options your dryer has been configured with, and whether or not you have the Drying Monitor enabled, your screens and icons may be different from what is shown here. For example, if your system is Drying Monitor equipped, your hoppers will display as Drying Monitor hoppers (as shown in these graphics).

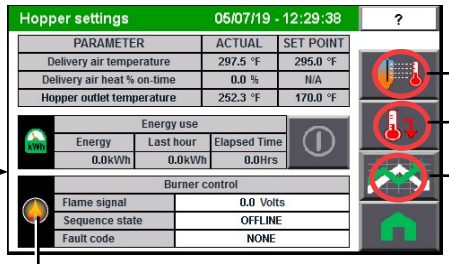
NOTE: A faded out or not vibrant stop button indicates that it is already stopped or stopping. A grayed out start button indicates it is already running or starting.

NOTE: *See the Appendix of this User Guide for more information about using the Drying Monitor.*

Home Screen

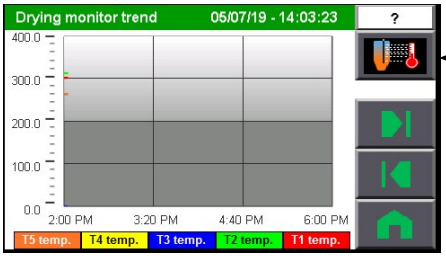


Hopper Settings Screen



The flame signal has a range of 0-25 volts. The sequence state indicates the current state of the burner (offline, lockout, initiate, standby, purge, pilot ignition, main ignition, and run. The fault code displays up to 255 possible faults.

To access the Hopper Set-up screen:

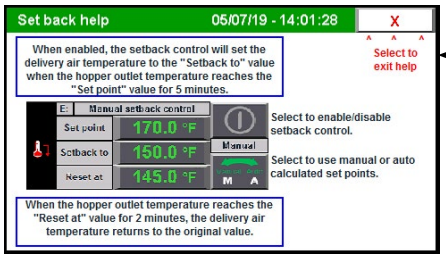


1 **From the Home screen Press the Hopper Settings button.** The Hopper Settings screen provides the user with the list of hopper parameters, energy usage, and burner control.

2 **From the Hopper Settings screen Press the navigation buttons on the right side of the screen.**

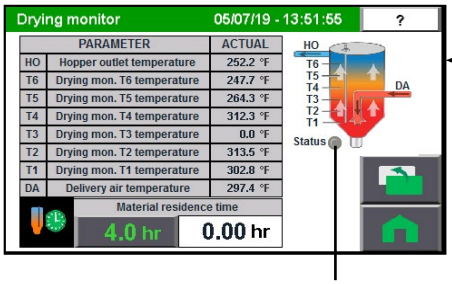
From the Hopper Settings screen the user can navigate to:

The Drying Monitor Trend screen to see four hours of trend data. Up to 14 days of data are stored for viewing.



The Set back screen to adjust set points manually.

The Drying monitor screen to see dryer parameters, set Material residence time, and see the status light turn green when the material residence time set point is reached.

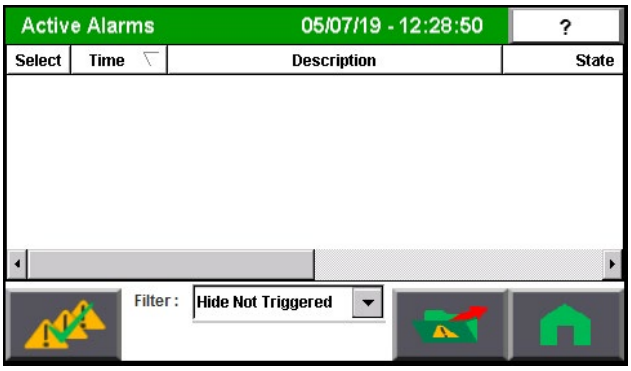


Status Light

Available trends are:
- Temperature
- % On Time
- Drying Monitor
- Energy Use

Control Function Descriptions (Continued)

Active Alarms Screen

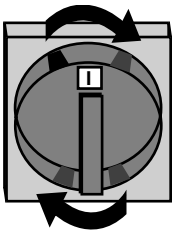


Access the Active Alarms screen by pressing the Alarm button on the Home screen. The alarms displayed on the Active Alarm screen can be filtered between the default view "hide not triggered" or inactive alarms and "show all" alarms.

Select the Acknowledge/reset button to acknowledge an alarm.

Select the Alarm History button to view the Alarm History screen.

To Start Drying

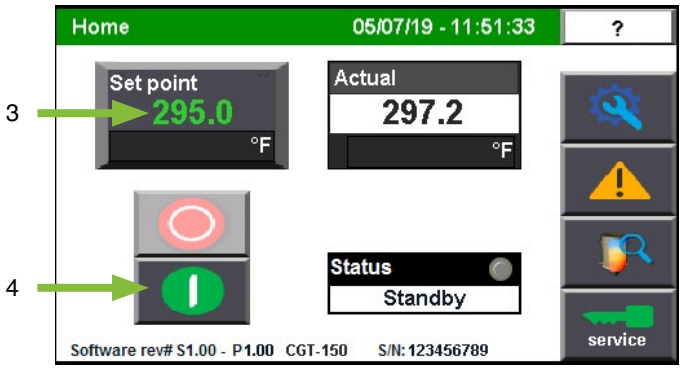


The temperature controller is factory configured to start and operate in automatic mode.

1 Start the host dryer.

2 Turn the main power disconnect to the I or ON position.

- The variable speed controller turns on.



3 Set the drying temperature.

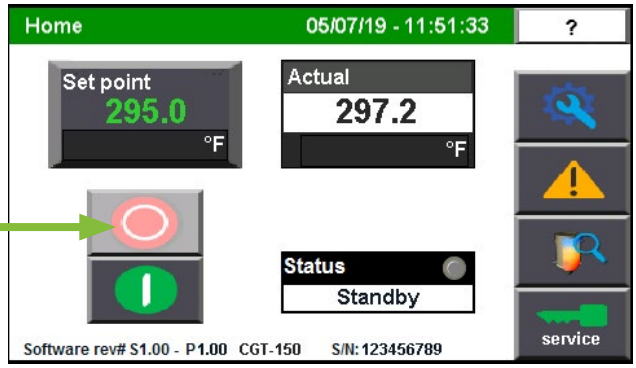
4 Press the START button.

- The temperature controller begins a 3-second self-test. The display will flash between STANDBY and the setpoint temperature.
- The Burner Controller begins a 10-second initiation, which ends when the display indicates STANDBY.
- The combustion blower will start and run for 90 seconds to purge any residual gas from the burner.
- After the purge, the burner will ignite on low fire (low blower speed) for about 15 seconds. The burner will alternate between high and low fire as required to maintain the setpoint temperature.

NOTE: The temperature units were set at the factory in °F or °C, as specified in the order.

To Stop Drying

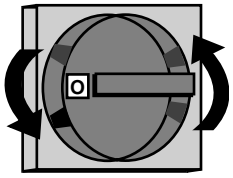
IMPORTANT: Do not shut down the host dryer before stopping the GasTrac. After stopping the GasTrac, allow the host dryer's process blower to continue running for a minimum of 2 minutes. This prevents excessive heat from building up in the GasTrac



1 Press the STOP button.

- The gas inlet valves should close.
- The combustion blower should stop.
- The burner control turns off.
- The temperature controller turns off.

2 Turn the main power disconnect off.



- The variable speed control display remains lit for a brief period. Then it becomes blank.

CAUTION: Voltage present

Some voltage will be present in the variable speed drive for a brief period after power has been turned off. When the voltage is gone, the variable speed control display will become blank.

3 Turn the host dryer off after at least 2 minutes.

SECTION
5

Maintenance

Maintenance Features

The GasTrac needs regular, scheduled maintenance for peak performance.

Warnings and Cautions

To maintain the best performance of the GasTrac it must be cleaned and inspected regularly. Maintenance includes a monthly and annual (every 6 months) schedule.

Use this maintenance schedule as a guide. You may need to shorten the time of the maintenance schedule, depending on how often you use the GasTrac, and the types of material flowing through it. Follow all precautions and warnings when working on the equipment.

WARNING: Improper installation, operation, or servicing may result in equipment damage or personal injury.

This equipment should be installed, adjusted, and serviced by qualified technical personnel who are familiar with the construction, operation, and potential hazards of this type of machine.

All wiring, disconnects, and fuses should be installed by qualified electrical technicians in accordance with electrical codes in your region. Always maintain a safe ground. Do not operate the equipment at power levels other than what is specified on the machine serial tag and data plate.

WARNING: Voltage hazard

This equipment is powered by three-phase current, as specified on the machine serial tag and data plate.

A properly sized conductive ground wire from the incoming power supply must be connected to the chassis ground terminal inside the electrical enclosure. Improper grounding can result in severe personal injury and erratic machine operation.

Always disconnect and lock out the incoming main power source before opening the electrical enclosure or performing non-standard operating procedures, such as routine maintenance. Only qualified personnel should perform troubleshooting procedures that require access to the electrical enclosure while power is on.

Preventative Maintenance Schedule

Routine maintenance will ensure optimum operation and performance of the GasTrac. We recommend the following maintenance schedule and tasks.

- **Weekly, or as often as needed**
  - ❒ **Clean the GasTrac combustion air filter.**
    You may need to clean the filter more often than weekly. Frequency depends on the amount of dust in your facility's air.
  - ❒ **Clean the GasTrac electrical enclosure filters.**
    You may need to clean the filters more often than weekly. Frequency depends on the amount of dust in your facility's air.
- **Monthly**
  - ❒ **Inspect air hoses and hose connections.**
    Check for damage, kinks or loose hose clamps. Replace any hoses that show signs of damage or wear. Reposition and tighten loose hose clamps.
  - ❒ **Inspect and test safety controls.**
    Fuel safety shutoff valves, combustion safeguards and temperature and pressure switches should be inspected and tested by trained personnel.
  - ❒ **Inspect the burner sight glass.**
    Clean the sight glass, if needed. Replace the sight glass if you see cracks or any other defect.
- **Every six months**
  - ❒ **Inspect the GasTrac metal-ceramic burner.**
    While the unit is fired, look through the sight glass at the burner. The burner surface should be glowing orange with an even flame. Blue flames, flames projecting from the burner surface, or cracks or dark spots on the burner surface indicate damage. You may need to replace the burner.
  - ❒ **Inspect piping, wiring and electrical connections.**
    Check for leaks, corrosion and loose connections. Replace any component that shows signs of damage or wear. Tighten loose connections.
- **Annually**
  - ❒ **Replace the spark igniter.**
    To assure optimum performance, you should replace the spark igniter once a year.
  - ❒ **Clean the ultraviolet flame detector lens.**
    Use alcohol and a soft cloth.

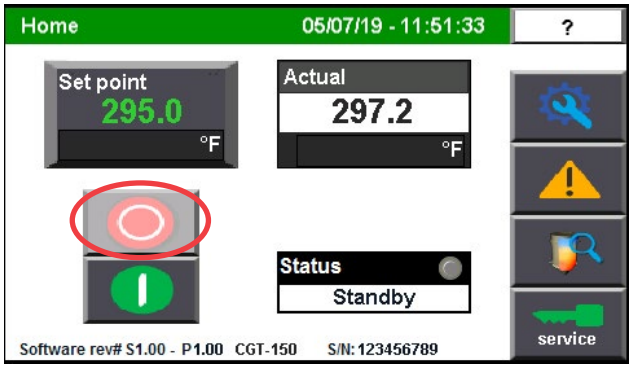
⚠ WARNING: Electrical hazard

Before performing maintenance or repairs on this product, disconnect and lock out electrical power sources to prevent injury from unexpected energization or start-up. A lockable device has been provided to isolate this product from potentially hazardous electricity.

Cleaning the Combustion Filter

You must clean the combustion air intake filter periodically. A clogged filter reduces air flow through the combustion circuit, which reduces burner efficiency and heat output.

1 **Stop the GasTrac.**
Press the STOP button.



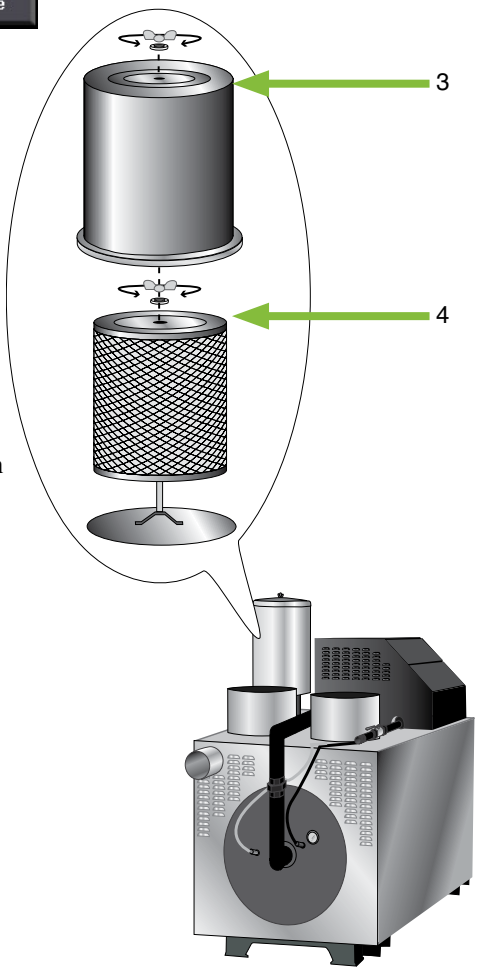
2 **Disconnect and lock out main power.**

3 **Remove the filter shroud.**
Remove the wing nut and washer that holds the shroud in place. Lift the shroud up and off.

4 **Remove the filter.**
Remove the wing nut and washer that holds the filter in place. Lift the filter up and off.

5 **Clean the filter.**
Vacuum or blow dirt and debris from the filter using vacuum or low-pressure compressed air. When using compressed air, blow from inside the filter toward the outside.

6 **Reassemble.**
Repeat steps 3 and 4 in reverse order to replace the filter.



NOTE: Replace any filter that has cracked end gaskets or is torn, worn or clogged with so much dirt that it cannot be cleaned.

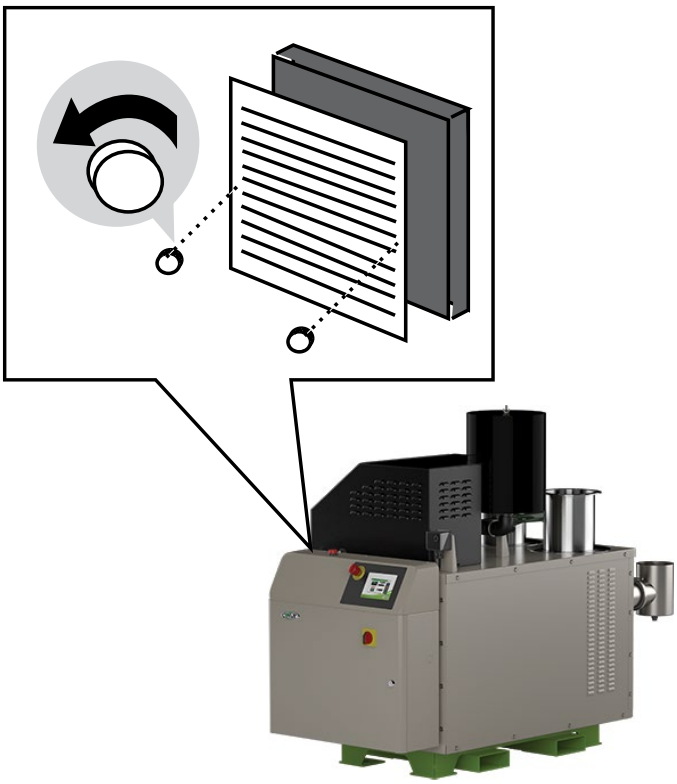
Cleaning The Electrical Enclosure Filters

Periodically, you should clean the filters covering the cooling fan inlet and outlet on the electrical enclosure.

1 **Remove the the thumb screws and filters.**

2 **Clean the filters.**
Use vacuum or low-pressure compressed air to remove loose debris. Wash the filters in warm, soapy water, then rinse and air dry. Replace torn or worn filters.

3 **Reassemble.**



Replacing the Spark Igniter

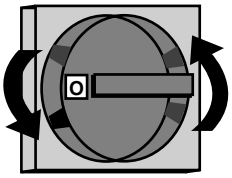
The spark igniter should be replaced at least once a year to assure trouble-free operation. You should replace the igniter before the annual period, if you inspect it and find:

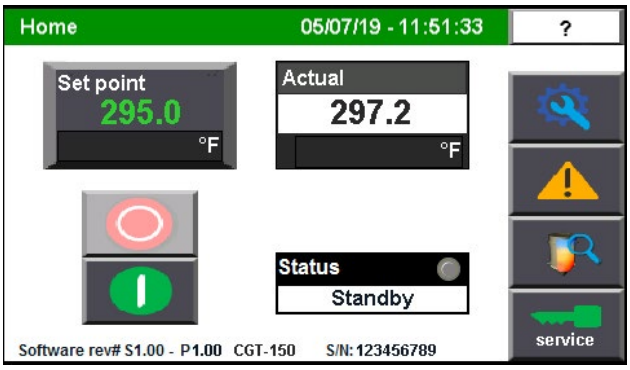
- The spark gap is less than 0.125 inch. The gap should be between 0.07 and 0.09 inch.
- The igniter insulation is cracked
- The spark electrodes are warped or taper to a needle-like shape.

Do not operate the GasTrac with a worn or damaged spark igniter. A badly burned or warped igniter can cause burner ignition failure.

WARNING: Hot surfaces

Allow the GasTrac to cool before removing the burner guard to perform maintenance.





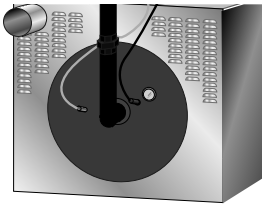
1 **Stop the GasTrac.**
Press the STOP button.

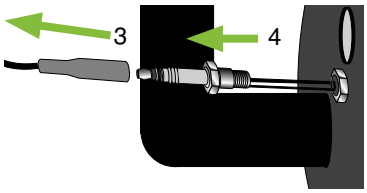
2 **Disconnect and lock out main power.**

3 **Remove the igniter wire.**
Pull the wire boot, not the wire, away from the spark igniter. If the wire or its boot is cracked, you should replace it.

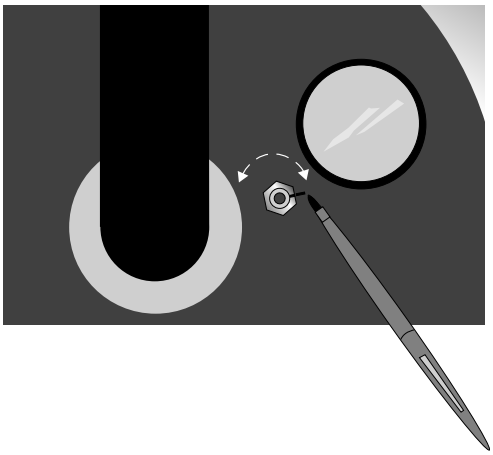
IMPORTANT: When removing or inserting the spark igniter, **do not** allow the igniter electrode or grounding rod to touch the burner. You could damage the burner surface.

4 **Remove the spark igniter.**
Use a 7⅛8 inch spark plug socket and ratchet to loosen the igniter. Pull the igniter straight out of the GasTrac. Do not allow the spark igniter to touch the burner surface.



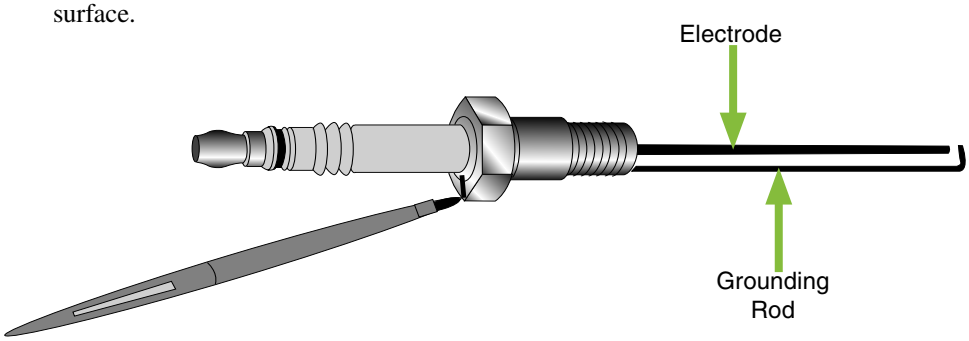


TIP: Before removing the spark igniter for inspection, use a felt tip marker to mark the position of the igniter in its threaded hole. By indexing the position, you will able to return the igniter to the correct position after inspection. The igniter must be installed so that the ground rod is 180° away from the burner surface.



Replacing the Spark Igniter (Continued)

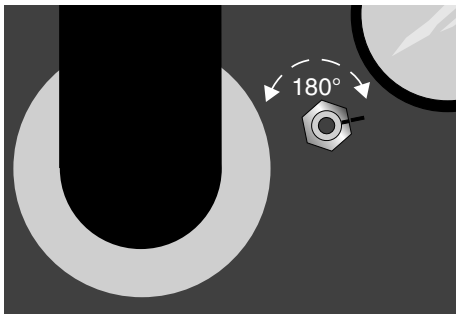
5 **Mark the position of the grounding rod** on the new spark igniter, using a felt tip marker. This index mark must end up 180° away from the burner surface when the spark igniter is inserted and tightened. The electrode should be closest to the burner surface.



6 Coat the threads of the igniter with a high-temperature conductive anti-seize compound.

7 **Carefully insert the igniter into GasTrac.**
Insert the igniter straight into the threaded fitting. Do not bend the electrode, and do not allow the spark igniter to touch the burner surface.

8 **Screw the igniter into the threaded fitting.**
Tighten by hand first. Then use a socket and ratchet to tighten the igniter one turn or a partial turn until the index mark on the igniter is 180° away from the burner surface.



⚠ **WARNING:**
Do not over tighten the spark igniter. You could damage the porcelain insulator.

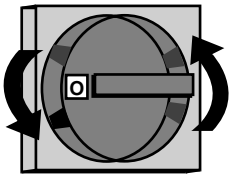
9 **Push the boot and wire onto the spark igniter.**
Push until you feel the boot snap into place.

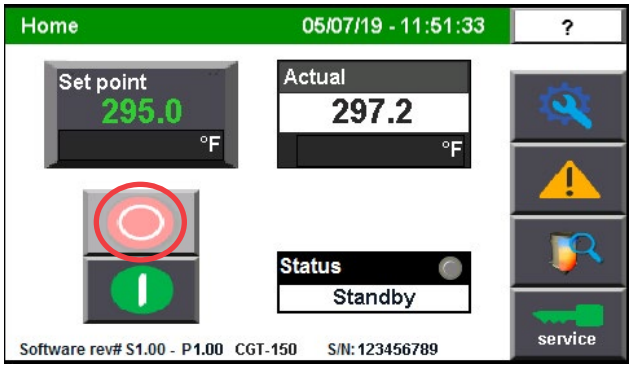
Cleaning the Ultraviolet Flame Detector

A dirty ultraviolet flame detector may fail to recognize burner ignition, which will cause the GasTrac to alarm and shut down automatically.

WARNING: Hot surfaces

Allow the GasTrac to cool before removing the burner guard to perform maintenance.





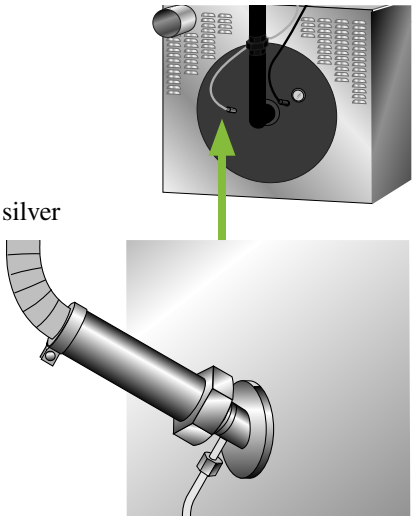
1. **Stop the GasTrac.**
   Press the STOP button.

2. **Disconnect and lock out main power.**

3. **Remove the flame detector.**
   Loosen the mounting nut while holding the flame detector, then pull the detector away from the viewing hole.

4. **Clean the viewing hole lens.**
   Use a soft cloth or cotton swab moistened with alcohol.

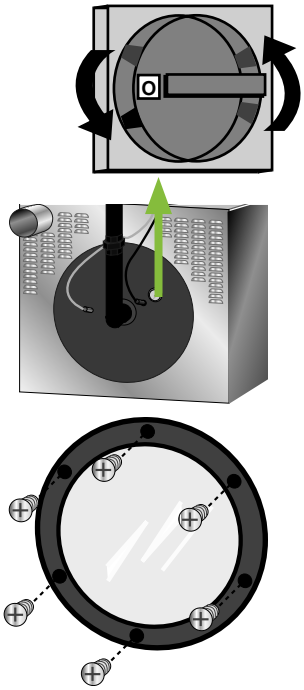
5. **Replace the flame detector.**
   Align the detector over the viewing hole, and thread the silver mounting nut onto the coupling. Hand tighten first. Then use a wrench to tighten the nut an additional quarter turn.



Cleaning the Burner Sight Glass

A dirty sight glass prohibits inspection or viewing of the metal-ceramic burner during operation.

WARNING: Hot surfaces
Allow the GasTrac to cool before removing the burner guard to perform maintenance.



1. **Stop the GasTrac.**
2. **Disconnect and lock out main power.**
3. **Remove the screws on the sight glass bracket.**
4. **Clean the sight glass.**
   Use a clean soft cloth or cotton swab moistened with alcohol.
5. **Coat the screw threads** with a high-temperature anti-seize compound.
6. **Replace the sight glass.**
   Tighten the screws in the bracket to hold the glass in place.

SECTION
6

Troubleshooting

Before Beginning

You can avoid most problems by following the recommended installation, operation and maintenance procedures outlined in this User Guide. If you have a problem, this section will help you determine the cause and tell you how to fix it.

Before you begin troubleshooting:

- ❒ **Find the wiring and assembly diagram** you received with your GasTrac. These diagrams will note any custom features such as special wiring or alarm capabilities not covered in the User Guide.
- ❒ **Find the instruction manuals and diagrams** that were shipped with the GasTrac and your host dryer.
- ❒ **Find any installation diagrams** or notes which may have been generated at the time the GasTrac was installed.

A Few Words of Caution

WARNING:
The GasTrac should be maintained and repaired by qualified technicians who are equipped with the correct tools and are experienced in the maintenance and repair of industrial gas appliances.

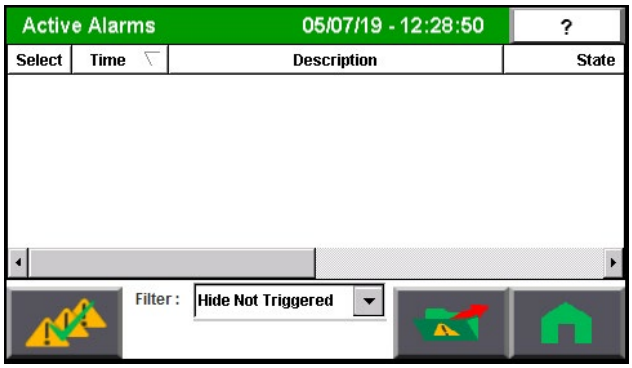
WARNING: Hot surfaces.
Temperatures inside the GasTrac can reach more than 800° F. Always shut down the GasTrac and host dryer and wait for them to cool before servicing.

WARNING: Disconnect and lock out main power before servicing.
The GasTrac is connected to high voltage. Always disconnect and lock out the main power source to the GasTrac before servicing. Also disconnect and lock out the main power to the host dryer before servicing the GasTrac. Failure to disconnect and lock out this voltage source could result in severe personal injury.

WARNING: Shut off main gas supply and purge heat exchanger and gas lines before servicing.
Failure to eliminate this potential source of a gas leak could result in severe damage, personal injury or loss of life.

When an Alarm Occurs

When there is a problem with the GasTrac the alarm light will illuminate and the GasTrac will shutdown.



How to Identify the Cause of an Alarm

The single alarm may be caused by any one of five major control components or another device within the GasTrac.

Control components and indications of failure:

- **Temperature controller**
  Displays an alarm message.
- **Burner controller**
  Displays an alarm message.
- **Variable speed controller**
  Displays an alarm message.
- **Process outlet high temperature limit switch**
  Verify switch contact closure.
- **Flue gas high temperature limit switch**
  Verify switch contact closure.

1 **Check the controllers for alarm messages.**
Causes of the more probable alarm messages can be found in this section of the User Guide. If you don't find the alarm message here, then see the manufacturer's manual for that particular controller. These manuals can be found in the instruction packet that came with your GasTrac.

2 **Check the limit switches for contact closure.**
Possible causes of switch failure can be found in this section of the User Guide.

3 **Check the GasTrac electrical and gas systems.**
These checks should be performed only by trained electrical and gas technicians equipped with the proper tools.

Troubleshooting: Temperature Controller Alarms

The Control will flash an alarm message in the display window.

⚠ **WARNING:**
The GasTrac should be maintained and repaired by qualified technicians who are equipped with the correct tools and are experienced in the maintenance and repair of industrial gas appliances.

Alarm	Possible Cause	Solution
Deviation Band **The drying, or process circuit, temperature is higher or lower than the setpoint alarm band allows.**	Is something blocking or restricting the flow of drying, or process, air?	❒ Check the process filter in the host dryer. Clean or replace the filter if it is clogged or damaged. ❒ Check the process air hoses for leaks, crimps, blockage or loose connections. Remove obstructions. Repair leaks or loose connections. ❒ Check the process air blower in the host dryer. If it is not running correctly, see the dryer's manual.
	Is the RTD temperature probe installed correctly?	Make sure the sensing end of the RTD probe is positioned near the center of the process air line at the hopper inlet. Temperature readings will be incorrect if the sensing end is too close to the wall of the inlet hose or pipe.
	Is the temperature range for the deviation band too narrow?	Increase the deviation band 5° F at a time. The default setting is 20° F. To avoid nuisance alarms, do not adjust this band more than necessary.
Sensor Break **The sensor input for RTD temperature probe has failed.**	Is the RTD temperature probe connection loose or incorrectly installed?	❒ Verify that the RTD temperature probe is installed. ❒ Check for a loose RTD connection at the GasTrac control or the process air inlet of the hopper.
	Is the RTD temperature probe damaged?	Replace the RTD temperature probe.

Troubleshooting: Temperature Controller Alarms (Continued)

The Control will flash an alarm message in the display window.

WARNING:
The GasTrac should be maintained and repaired by qualified technicians who are equipped with the correct tools and are experienced in the maintenance and repair of industrial gas appliances.

Alarm	Possible Cause	Solution
Loop Break **The actual drying temperature did not approach the setpoint within the loop break time. There may be a problem in the combustion or process air circuit.**	Is something blocking or restricting the flow of drying, or process, air?	❒ Check the process filter in the host dryer. Clean the filter, or replace it if it is damaged. ❒ Check the process air hoses for leaks, crimps, blockage or loose connections. Remove obstructions. Repair leaks or loose connections. ❒ Check the process air blower in the host dryer. If it is not running correctly, see the dryer's manual.
	Is the GasTrac combustion air filter dirty?	Clean the combustion air filter. Replace the filter if it is torn or too clogged with dirt to clean.
	Is the Variable Speed Controller operating correctly?	Check the Variable Speed Controller for error or alarm messages. See the Variable Speed Controller pages in this *Troubleshooting* section and in the Allen-Bradley controller manual.
	Is the setpoint correct?	Make sure the setpoint is within the range specified for your GasTrac unit.
Power Failure **The line voltage to the Temperature Controller is too low.**	Is the GasTrac being supplied with the correct voltage? Is there a loose or faulty connection in the electrical circuit?	Check the main power supply to the GasTrac and the electrical circuits supplying power to the control panel and the temperature controller.

(Continued)

Troubleshooting: Temperature Controller Alarms (Continued)

The Control will flash an alarm message in the display window.

WARNING:
The GasTrac should be maintained and repaired by qualified technicians who are equipped with the correct tools and are experienced in the maintenance and repair of industrial gas appliances.

Alarm	Possible Cause	Solution
Error 1 **The ROM self test failed.**	The temperature controller is defective.	Replace the temperature controller, or return it to the factory for repair.
Error 2 **The RAM self test failed.**	The temperature controller is defective.	Replace the temperature controller, or return it to the factory for repair.
Error 3 **Watchdog Failure**	The temperature controller is defective.	Replace the temperature controller, or return it to the factory for repair.
Error 4 **Keyboard Failure**	A button on the temperature controller keypad is stuck or was pressed during power up.	Switch the power to the GasTrac control off and the on using the POWER ON/OFF switch. Do not touch any buttons on the temperature controller.
Error 5 **Input Circuit Failure**	The temperature controller is defective.	Replace the temperature controller, or return it to the factory for repair.

Burner Controller Alarms

When there is a problem related to the burner or ignition, the burner controller displays a fault code and illuminates an alarm light. To restart the GasTrac after a burner controller alarm:

1. Press the GasTrac STOP button.
2. Press the burner RESET button.
3. Press the GasTrac RUN button.

Alarm	Possible Cause	Solution
LOCKOUT #16 *Flame Out Timer*	Is the spark igniter providing a spark?	Restart the GasTrac while watching through the sight glass. If you don't see a spark during the 4-second ignition period: ❒ Verify there is power supplied to the transformer during the ignition period. ❒ Check the wire and connections between the transformer and spark igniter. ❒ Check the spark igniter. Replace if damaged.
Flame did not occur within the 4-second flame establishing period. ⚠ **WARNING:** The GasTrac should be tested and repaired only by qualified technicians equipped with the correct tools and trained in the maintenance and repair of electrical systems and industrial gas appliances.	Is there a problem with the gas supply?	If the burner fails to light even though you can see a spark: ❒ Verify that the gas supply is on and that the gas shutoff valves are open during the ignition period. ❒ Restart the GasTrac 4 or 5 times to purge any air that may be in the gas lines. ❒ Verify that the gas pressure regulator is set to supply the correct pressure.
	Is the lens of the ultraviolet sensor dirty?	If the burner ignites and then goes out, check the lens for dirt. Clean if necessary.
	Is negative pressure in the building affecting static pressure of the combustion exhaust flue?	Verify that the static pressure of the combustion exhaust flue is 1 to 2 inches of water column. If not, you may need to add a draft fan to the flue to create the correct static pressure.
	Is the burner controller defective?	If none of the solutions above can resolve the problem, you may need to replace the burner controller.

(Continued)

Burner Controller Alarms (Continued)

When there is a problem related to the burner or ignition, the burner controller displays a fault code and illuminates an alarm light. To restart the GasTrac after a burner controller alarm:

1. Press the GasTrac STOP button.
2. Press the burner RESET button.
3. Press the GasTrac RUN button.

Alarm	Possible Cause	Solution
LOCKOUT #17 ***Main Flame Fail*** **The main flame failed after RUN was pushed and the flame had been established for at least 10 seconds.** ⚠ **WARNING:** The GasTrac should be tested and repaired only by qualified technicians equipped with the correct tools and trained in the maintenance and repair of electrical systems and industrial gas appliances.	Are the gas shutoff valves open?	❒ Verify that the manual gas shutoff valves are open. ❒ Verify that the automatic gas shutoff valves remain open after burner ignition. If automatic shutoff valves are not opening, check the solenoid electrical connections.
	Did the ultraviolet flame detector fail to send an adequate signal?	During operation, the flame signal should fluctuate between 1.25V and 5V D.C. ❒ Verify that the ultraviolet flame detector lens is clean. ❒ Check for blockage in the cooling air line between the ultraviolet sensor and combustion air blower. The temperature at the sensor must be less than 215° F. ❒ The sensor or flame amplifier may need to be replaced.
	Are the safety pressure switches malfunctioning or detecting incorrect pressures?	Reset the GasTrac, press RUN and check the LED lights on the process air, combustion air, low gas and high gas pressure switches during the 90-second purge cycle. If a light is not green, check for leaks, blockage or other problems that could interfere with air or gas flow detected by that switch.
	Is the gas pressure regulator adjusted correctly?	Make sure the gas pressure regulator is adjusted to supply the pressure outlined in the *Specifications* pages.

Burner Controller Alarms (Continued)

When there is a problem related to the burner or ignition, the burner controller displays a fault code and illuminates an alarm light. To restart the GasTrac after a burner controller alarm:

1 Press the GasTrac STOP button.

2 Press the burner RESET button.

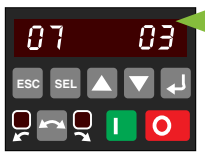
3 Press the GasTrac RUN button.

Alarm	Possible Cause	Solution
LOCKOUT #23 OR **LOCKOUT #32**	Is the combustion blower intake filter clogged?	Clean the filter. Replace the filter if it is worn, torn or so clogged with dirt that it can't be cleaned.
	Are the safety pressure switches malfunctioning or detecting incorrect pressures?	Reset the GasTrac, press RUN and check the LED lights on the process air, combustion air, low gas and high gas pressure switches during the 90-second purge cycle. If a light is not green, check for leaks, blockage or other problems that could interfere with air or gas flow detected by that switch.
	Did the airflow interlock fail closed?	Switch the burner controller RUN/TEST button to TEST. Press the RUN button on the GasTrac control. Measure the voltage between terminal 7 and G (ground). You should find 120V present if the interlock is working.

⚠ **WARNING:**
The GasTrac should be tested and repaired only by qualified technicians equipped with the correct tools and trained in the maintenance and repair of electrical systems and industrial gas appliances.

Variable Speed Controller Alarms

When a problem occurs, the variable speed controller displays the parameter 07 and a two-digit fault code. You must correct the problem before restarting the GasTrac. To restart after an alarm:



Fault Code

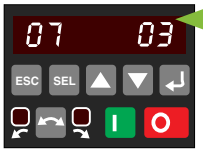
1. Turn the power disconnect OFF then ON.
2. Press the GasTrac RUN button.

WARNING:
The GasTrac should be tested and repaired only by qualified technicians equipped with the correct tools and trained in the maintenance and repair of electrical systems and industrial gas appliances.

Alarm	Possible Cause	Solution
07 03 **Power Loss**	DC Bus Voltage remained below 85% nominal for more than 5 seconds on power up.	Check for proper incoming AC voltage.
07 04 **Under Voltage**	DC Bus Voltage fell below the minimum.	Check for low incoming AC voltage or power interruption. The under voltage trip point for 200-240 VAC units is: 210 VDC, which is equal to 150 VAC incoming voltage. The under voltage trip point for 380-460 VAC units is: 390 VDC, which is equal to 275 VAC incoming voltage.
07 05 **Over Voltage**	DC Bus Voltage exceeded the maximum.	Bus over voltage may be caused by motor regeneration. Check for high incoming AC voltage. The over voltage trip point for 200-240 VAC units is: 410 VDC, which is equal to 290 VAC incoming voltage. The under voltage trip point for 380-460 VAC units is: 815VDC, which is equal to 575 VAC incoming voltage.
07 06 **Motor Stall**	Motor has stalled.	Check for physical or mechanical blockage of the combustion blower fan.

Variable Speed Controller Alarms (Continued)

When a problem occurs, the variable speed controller displays the parameter 07 and a two-digit fault code. You must correct the problem before restarting the GasTrac. To restart after an alarm:



Fault Code

1 Turn the power disconnect OFF then ON.

2 Press the GasTrac RUN button.

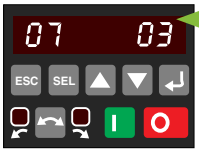
WARNING:
The GasTrac should be tested and repaired only by qualified technicians equipped with the correct tools and trained in the maintenance and repair of electrical systems and industrial gas appliances.

Alarm	Possible Cause	Solution
07 07 **Motor Overload**	The internal electronic overload tripped.	❒ Check for physical or mechanical blockage of the combustion blower fan. ❒ Check for a faulty combustion blower motor.
07 08 **Over Temperature**	Excessive heat was detected in the variable speed control.	❒ Clean the air filters on both sides of the GasTrac electrical enclosure. Verify that the cooling fan in the electrical enclosure is operating correctly. ❒ Check for dirty or blocked heat sink passages or a faulty fan inside the variable speed controller.
07 12 **Over Current**	Excessively high current was detected in the hardware trip circuit.	❒ Check for a short circuit at the variable speed control output. ❒ Check for physical or mechanical blockage of the combustion blower fan.
07 32 **EEPROM Fault**	The controller EEPROM has invalid data.	Reset EEPROM. See *Resetting Factory Defaults* in the Allen Bradley variable speed controller manual.

(Continued)

Variable Speed Controller Alarms (Continued)

When a problem occurs, the variable speed controller displays the parameter 07 and a two-digit fault code. You must correct the problem before restarting the GasTrac. To restart after an alarm:



1. Turn the power disconnect OFF then ON.
2. Press the GasTrac RUN button.

WARNING:
The GasTrac should be tested and repaired only by qualified technicians equipped with the correct tools and trained in the maintenance and repair of electrical systems and industrial gas appliances.

Alarm	Possible Cause	Solution
07 38 **Phase U Fault**	The controller has detected a phase U-to-ground fault between the controller and combustion blower motor.	❒ Check the wiring between the control and motor for damage or incorrect connections. ❒ Make sure the motor ground is wired correctly.
07 39 **Phase V Fault**	The controller has detected a phase V-to-ground fault between the controller and combustion blower motor.	❒ Check the wiring between the control and motor for damage or incorrect connections. ❒ Make sure the motor ground is wired correctly.
07 40 **Phase W Fault**	The controller has detected a phase W-to-ground fault between the controller and combustion blower motor.	❒ Check the wiring between the control and motor for damage or incorrect connections. ❒ Make sure the motor ground is wired correctly.
07 41 **Phase UV Fault**	Excessive voltage was detected between the U and V controller output phases.	❒ Check for a shorted condition in the wiring to the controller. ❒ Check motor wiring for a shorted condition.
07 42 **Phase UW Fault**	Excessive voltage was detected between the U and W controller output phases.	❒ Check for a shorted condition in the wiring to the controller. ❒ Check motor wiring.

Variable Speed Controller Alarms (Continued)

When a problem occurs, the variable speed controller displays the parameter 07 and a two-digit fault code. You must correct the problem before restarting the GasTrac. To restart after an alarm:

Fault Code

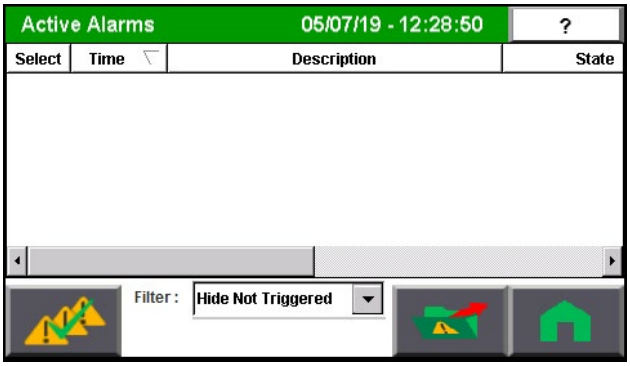
1. Turn the power disconnect OFF then ON.
2. Press the GasTrac RUN button.

WARNING:
The GasTrac should be tested and repaired only by qualified technicians equipped with the correct tools and trained in the maintenance and repair of electrical systems and industrial gas appliances.

Alarm	Possible Cause	Solution
07 43 **Phase VW Fault**	Excessive voltage was detected between the V and W controller output phases.	❒ Check for a shorted condition in the wiring to the controller. ❒ Check motor wiring. .
07 48 **Phase Test Fault**	An electrical fault was detected during the initial start-up sequence.	❒ Check wiring to the controller. ❒ Check wiring to the motor.

Flue Gas High Temperature Limit Switch

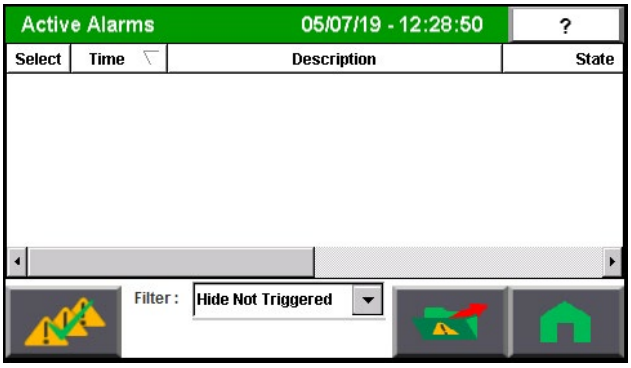
The flue gas high temperature switch monitors the temperature of a type J thermocouple mounted in the flue gas outlet. When the combustion exhaust gas temperature exceeds 800° F, the GasTrac shuts down and the alarm light illuminates.



Alarm	Possible Cause	Solution
The control panel alarm light is on, but no other controller alarm messagesor lights are displayed. ⚠ **WARNING:** The GasTrac should be tested and repaired only by qualified technicians equipped with the correct tools and trained in the maintenance and repair of electrical systems and industrial gas appliances.	Is the temperature limit switch faulty?	Push the reset button on the GasTrac electrical enclosure and restart the GasTrac. If the alarm occurs again, a qualified electrician should verify that the latching alarm contacts of the flue gas high temperature limit switch are closed.
	Does the combustion air/fuel train need tuning?	This must be done by a qualified technician who is trained in the maintenance of industrial gas appliances, and who is familiar with tuning procedures outlined in the various controller, valve and switch manuals that came with the GasTrac. If the alarm persists, call the Conair Service Department.

Process High Temperature Limit Switch

The process high temperature switch monitors the temperature of a type J thermocouple mounted in the GasTrac process air outlet. If the process air outlet temperature exceeds 450° F, the GasTrac shuts down and the alarm light illuminates.



Alarm	Possible Cause	Solution
The control panel alarm light is on, but no other controller alarm messagesor lights are displayed. ⚠ **WARNING:** The GasTrac should be tested and repaired only by qualified technicians equipped with the correct tools and trained in the maintenance and repair of electrical systems and industrial gas appliances.	Is something blocking or restricting the flow of drying, or process, air?	❒ Check the process filter in the host dryer. Clean or replace the filter if it is clogged or damaged. ❒ Check the process air hoses for leaks, crimps, blockage or loose connections. Remove obstructions. Repair leaks or loose connections. ❒ Make sure the process air blower in the host dryer is running correctly.
	Is the drying temperature setpoint incorrect?	Check the setpoint on the temperature controller. Enter a new setpoint, if necessary. Press the reset button on the GasTrac electrical enclosure and restart the GasTrac.
	Is the temperature limit switch faulty?	Press the reset button on the GasTrac electrical enclosure and restart the GasTrac.If the alarm occurs again, a qualified electrician should verify that the latching alarm contacts of the process high temperature limit switch are closed.
	Is the temperature controller faulty?	If the alarm persists, replace the temperature controller.

We're Here to Help

Conair has made the largest investment in customer support in the plastics industry. Our service experts are available to help with any problem you might have installing and operating your equipment. Your Conair sales representative also can help analyze the nature of your problem, assuring that it did not result from misapplication or improper use.

Additional manuals and prints for your Conair equipment may be ordered through the Customer Service or Parts Department for a nominal fee.
Most manuals can be downloaded free of charge from the product section of the Conair website.
www.conairgroup.com

How to Contact Customer Service

To contact Customer Service personnel, call:

NOTE: Normal operating hours are 8:00 am - 5:00 pm EST. After hours emergency service is available at the same phone number.

From outside the United States, call: 814-437-6861

You can commission Conair service personnel to provide on-site service by contacting the Customer Service Department. Standard rates include an on-site hourly rate, with a one-day minimum plus expenses.

Before You Call...

If you do have a problem, please complete the following checklist before calling Conair:

- ❒ Make sure you have all model, control type from the serial tag, and parts list numbers for your particular equipment. Service personnel will need this information to assist you.
- ❒ Make sure power is supplied to the equipment.
- ❒ Make sure that all connectors and wires within and between control systems and related components have been installed correctly.
- ❒ Check the troubleshooting guide of this manual for a solution.
- ❒ Thoroughly examine the instruction manual(s) for associated equipment, especially controls. Each manual may have its own troubleshooting guide to help you.

Equipment Guarantee

Conair guarantees the machinery and equipment on this order, for a period as defined in the quotation from date of shipment, against defects in material and workmanship under the normal use and service for which it was recommended (except for parts that are typically replaced after normal usage, such as filters, liner plates, etc.). Conair's guarantee is limited to replacing, at our option, the part or parts determined by us to be defective after examination. The customer assumes the cost of transportation of the part or parts to and from the factory.

Performance Warranty

Conair warrants that this equipment will perform at or above the ratings stated in specific quotations covering the equipment or as detailed in engineering specifications, provided the equipment is applied, installed, operated, and maintained in the recommended manner as outlined in our quotation or specifications.

Should performance not meet warranted levels, Conair at its discretion will exercise one of the following options:

- Inspect the equipment and perform alterations or adjustments to satisfy performance claims. (Charges for such inspections and corrections will be waived unless failure to meet warranty is due to misapplication, improper installation, poor maintenance practices, or improper operation.)
- Replace the original equipment with other Conair equipment that will meet original performance claims at no extra cost to the customer.
- Refund the invoiced cost to the customer. Credit is subject to prior notice by the customer at which time a Return Goods Authorization Number (RGA) will be issued by Conair's Service Department. Returned equipment must be well crated and in proper operating condition, including all parts. Returns must be prepaid.

Purchaser must notify Conair in writing of any claim and provide a customer receipt and other evidence that a claim is being made.

Warranty Limitations

Except for the Equipment Guarantee and Performance Warranty stated above, Conair disclaims all other warranties with respect to the equipment, express or implied, arising by operation of law, course of dealing, usage of trade or otherwise, including but not limited to the implied warranties of merchantability and fitness for a particular purpose.

Description of Modbus Communications

The common controls series of products from Conair use standard Modbus communications protocol to allow the user to access the control boards for supervisory type functions. For example, you may want to display the drying temperature for all hoppers in a facility in one central location. By connecting all the dryers to a central computer, the temperatures and setpoints can be displayed in one location using a standard SCADA software program such as Wonderware or RSView.

All ResinWorks hoppers are provided with a Modbus TCP/IP Ethernet interface. When connected to a Conair dryer the hopper parameters are available at the dryer. Getting the data from the dryer greatly reduces the number of connections required.

Installing the Modbus Communication Hardware

The hardware required for Modbus communications is included with the product when it is shipped. Connectors and cabling must be supplied by the user or ordered from Conair.

Using the Modbus Parameter List

The Modbus interface uses standard Modbus protocol to communicate with a common controls system. The data that may be retrieved is arranged in a parameter list. By using the Modbus register read and write commands, the desired data may be read from or written to the controller. The list of data that may be set or retrieved with the common controls system is arranged in Modbus registers.

⚠ **CAUTION**: The list of data that may be read and written to by the user is arranged in a specific location. Writing to a location with improper data, or writing to an incorrect location outside of the specified range may cause your common controls system to become inoperative or to operate in a manner that may damage your process. Be certain that you understand each parameter and its effect before changing anything. Conair recommends that you initially attempt to read from the registers and do not attempt any writes. Once the information you are trying to read has been
confirmed as accurate, you can program your new/additional data. All Conair remote heat sources “ResinWorks, HTC, CGT and HAD” use the same registers. All registers are not active on all products.

Modbus Parameter / TAG List

RHS-C CAREL remote heat source
HMI/Remote Configuration Tags 03/05/2019
CAREL mini series PLC w/CAREL pcd HMI
PLC Default IP Adress 10.1.14.5
HMI Default IP Adress 10.1.14.6

Data Types:
Bool
Int
Uint
Real

Access
RW = Read Write, Modbus 4X and 0X
RO = Read Only, Modbus 3X and 1X

Tag Name	Modbus	Type	E/U	Access	Notes
	1X			RO	**Modbus 1X discrete inputs**
Gx_User_Status.	1X	Bool Structure	NA	RO	Modbus 100001 - 100036
RhsStatus	100001	Bool			Remote heat source status, True=On, False=Off
SetBkEnabled	100002	Bool			Setback control enabled when true
SetBkActv	100003	Bool			Setback control active when true
AutoStartEnabled	100004	Bool			Main auto start enabled when true
AutoStopEnabled	100005	Bool			Main auto stop enabled when true
HopperLowLevel	100006	Bool			Drying hopper low level, (True = low)
DryMonCommsActv	100007	Bool			Drying monitor expansion I/O communications (True=Active)
TrueRateCommsActv	100008	Bool			TrueRate communications active when true
VfdCommsActv	100009	Bool			Delivery air VFD communications online without errors
VfdRemoteActv	100010	Bool			Delivery air VFD keypad/remote, (True = remote active)
NetChgActv	100011	Bool			Network settings have changed (True=Yes)
BurnerCommsActv	100012	Bool			Burner control communications online without errors
HostCommsOnline	100013	Bool			Host interface communicating without errors
HostCommsError	100014	Bool			Host interface communication error
MaterialRdy	100015	Bool			Marerial ready to use when true
ProcAirAvail	100016	Bool			Process air available when true
UI1_1	100017	Bool			Universal input 1/2 state (True=On or Ok), Process air available
UI1_2	100018	Bool			Universal input 1/2 state (True=On or Ok), Process air available
UI1_3	100019	Bool			Universal input 1/3 state (True=On or Ok), Isolation contactor aux.
UI1_4	100020	Bool			Universal input 1/4 state (True=On or Ok), Spare digital
UI1_5	100021	Bool			Universal input 1/5 state (True=On or Ok), Delivery air blower aux.
UI1_6	100022	Bool			Universal input 1/6 state (True=On or Ok), Hopper level
UI1_7	100023	Bool			Universal input 1/7 state (True=On or Ok),Delivery air temperature
UI1_8	100024	Bool			Universal input 1/8 state (True=On or Ok), Hopper outlet air temperature
UI1_9	100025	Bool			Universal input 1/9 state (True=On or Ok), Delivery air dew point
UI1_10	100026	Bool			Universal input 1/10 state (True=On or Ok), Spare analog
UI2_1	100027	Bool			Universal input 2/1 state (True=On or Ok), Reserved 4-20mA
UI2_2	100028	Bool			Universal input 2/2 state (True=On or Ok), Reserved PT1000 RTD
UI2_3	100029	Bool			Universal input 2/3 state (True=On or Ok), Drying monitor T1 RTD
UI2_4	100030	Bool			Universal input 2/4 state (True=On or Ok), Drying monitor T2 RTD
UI2_5	100031	Bool			Universal input 2/5 state (True=On or Ok), Drying monitor T3 RTD
UI2_6	100032	Bool			Universal input 2/6 state (True=On or Ok), Drying monitor T4 RTD
UI2_7	100033	Bool			Universal input 2/7 state (True=On or Ok), Drying monitor T5 RTD
UI2_8	100034	Bool			Universal input 2/8 state (True=On or Ok), Drying monitor T6 RTD
UI2_9	100035	Bool			Universal input 2/9 state (True=On or Ok), Reserved PT1000 RTD
UI2_10	100036	Bool			Universal input 2/10 state (True=On or Ok), Reserved 4-20mA
Gb_UserAutoStartStatus[1..7]	1X	Bool Array	NA	RO	Auto start event status, Modbus 100065 - 100067
[1]	100065	Bool			Event #1 start enable status, (True = enabled)
[2]	100066	Bool			Event #2 start enable status, (True = enabled)
[3]	100067	Bool			Event #3 start enable status, (True = enabled)
Gb_UserAutoStopStatus[1..7]	1X	Bool Array	NA	RO	Auto stop event status, Modbus 100068 - 100070
[1]	100068	Bool			Event #1 stop enable status, (True = enabled)
[2]	100069	Bool			Event #2 stop enable status, (True = enabled)
[3]	100070	Bool			Event #3 stop enable status, (True = enabled)
Gx_User_BurnerStates.	1X	Bool Structure	NA	RO	Burner control states, bool structure
Initiate	100079	Bool			Burner control initiate state active when true
Standby	100080	Bool			Burner control standby state active when true
Purge	100081	Bool			Burner control purge state active when true

Modbus Parameter / TAG List (Continued)

Tag Name		Modbus	Type	E/U	Access	Notes	
	PilotIgnition	100082	Bool			Burner control pilot-ignition state active when true	
	MainIgnition	100083	Bool			Burner control main-ignition state active when true	
	Run	100084	Bool			Burner control run state active when true	
	PostPurge	100085	Bool			Burner control post purge state active when true	
	PreIgnition	100086	Bool			Burner control pre-ignition state active when true	
	ValveProving	100087	Bool			Burner control valve proving state active when true	
	Alarm	100088	Bool			Burner control alarm state active when true, lockout also true	
	Hold	100089	Bool			Burner control hold state active when true, one other may also be true	
	Lockout	100090	Bool			Burner control lockout state active when true, alarm also true	
Gb_Alarms_Shutdown[1..24]		1X	Bool Array	NA	RO	Shutdown alarms, Modbus 100101 - 100124	
	[1]	100101	Bool			E-stop pressed - Shutdown	
	[2]	100102	Bool			Process temperature control fault- Shutdown	(loop break)
	[3]	100103	Bool			Process heater safety switch - Shutdown	
	[4]	100104	Bool			Air flow switch loss - Shutdown	
	[5]	100105	Bool			Process RTD fault- Shutdown	
	[6]	100106	Bool			PLC error detected - Shutdown	
	[7]	100107	Bool			Process blower overload- Shutdown	(Optional)
	[8]	100108	Bool			Variable speed drive fault - Shutdown	(Optional)
	[9]	100109	Bool			Startup failed at process blower - Shutdown	(Optional)
	[10]	100110	Bool			Startup failed at isolation contactor - Shutdown	(electric heat)
	[11]	100111	Bool			Startup failed at PID enable - Shutdown	(both heats)
	[12]	100112	Bool			Startup failed at interlocks - Shutdown	(gas heat)
	[13]	100113	Bool			Startup failed at purge - Shutdown	(gas heat)
	[14]	100114	Bool			Startup failed at pilot ignition - Shutdown	(gas heat)
	[15]	100115	Bool			Startup failed at main ignition - Shutdown	(gas heat)
	[16]	100116	Bool			Delivery air VFD communications fault - Shutdown	(Optional)
	[17]	100117	Bool			Combustion air VFD communications fault - Shutdown	(gas heat)
	[18]	100118	Bool			Burner control communications fault - Shutdown	(gas heat)
	[19]	100119	Bool			Burner control lockout - Shutdown	(gas heat)
	[20]	100120	Bool			Material exit temperature RTD fault - Shutdown	(ES1 dryer only)
	[21]	100121	Bool			Spare - Shutdown	
	[22]	100122	Bool			Spare - Shutdown	
	[23]	100123	Bool			Spare - Shutdown	
	[24]	100124	Bool			Spare - Shutdown	
Gb_Alarms_Passive[1..24]		1X	Bool Array	NA	RO	Passive alarms, Modbus 100201 - 100224	
	[1]	100201	Bool			Drying monitor low temperature - Passive	(Optional)
	[2]	100202	Bool			Drying monitor high temperature - Passive	(Optional)
	[3]	100203	Bool			Dewpoint high - Passive	(Optional)
	[4]	100204	Bool			Drying hopper low level - Passive	(Optional)
	[5]	100205	Bool			Material is ready to use - Passive	(Optional)
	[6]	100206	Bool			Dew point sensor fault - Passive	(Optional)
	[7]	100207	Bool			Hopper outlet RTD fault - Passive	(Optional)
	[8]	100208	Bool			Drying monitor T1 RTD fault - Passive	(Optional)
	[9]	100209	Bool			Drying monitor T2 RTD fault - Passive	(Optional)
	[10]	100210	Bool			Drying monitor T3 RTD fault - Passive	(Optional)
	[11]	100211	Bool			Drying monitor T4 RTD fault - Passive	(Optional)
	[12]	100212	Bool			Drying monitor T5 RTD fault - Passive	(Optional)
	[13]	100213	Bool			Drying monitor T6 RTD fault - Passive	(Optional)
	[14]	100214	Bool			Remote I/O communications fault - Passive	(Optional)
	[15]	100215	Bool			TrueRate communications fault - Passive	(Optional)
	[16]	100216	Bool			Burner control initialization failed - Passive	(GasTrac only)
	[17]	100217	Bool			Continuous level sensor fault - Passive	
	[18]	100218	Bool			Delivery air flow sensor fault - Passive	(ES1 dryer only)
	[19]	100219	Bool			Spare - Passive	
	[20]	100220	Bool			Spare - Passive	
	[21]	100221	Bool			Spare - Passive	

Modbus Parameter / TAG List (Continued)

Tag Name		Modbus	Type	E/U	Access	Notes
	[22]	100222	Bool			Spare - Passive
	[23]	100223	Bool			Spare - Passive
	[24]	100224	Bool			Spare - Passive
Gx_MaintAlert[1..16].State		1X	Bool Array	NA	RO	Maintenance alert triggers to the HMI or Remote
	[1]	100301	Bool			Check process heater
	[2]	100302	Bool			Check combustion burner
	[3]	100303	Bool			Check inlet/outlet hoses
	[4]	100304	Bool			Clean or replace blower filter
	[5]	100305	Bool			Clean or replace combustion air filter
	[6]	100306	Bool			Clean flame detector lens
	[7]	100307	Bool			Clean or replace spark igniter
	[8]	100308	Bool			Spare - Alert
	[9]	100309	Bool			Spare - Alert
	[10]	100310	Bool			Spare - Alert
	[11]	100311	Bool			Spare - Alert
	[12]	100312	Bool			Spare - Alert
	[13]	100313	Bool			Spare - Alert
	[14]	100314	Bool			Spare - Alert
	[15]	100315	Bool			Spare - Alert
	[16]	100316	Bool			Spare - Alert
		3X			**RO**	**Modbus 3X input registers**
Gx_MaintAlert[1..16].ActualHours		3X	Uint Array	Hrs	RO	Maintenance alert actual hours to the HMI or Remote
	[1]	300301	Uint			Maintenance alert 1 actual hours
	[2]	300302	Uint			Maintenance alert 2 actual hours
	[3]	300303	Uint			Maintenance alert 3 actual hours
	[4]	300304	Uint			Maintenance alert 4 actual hours
	[5]	300305	Uint			Maintenance alert 5 actual hours
	[6]	300306	Uint			Maintenance alert 6 actual hours
	[7]	300307	Uint			Maintenance alert 7 actual hours
	[8]	300308	Uint			Spare maintenance alert 8 actual hours
	[9]	300309	Uint			Spare maintenance alert 9 actual hours
	[10]	300310	Uint			Spare maintenance alert 10 actual hours
	[11]	300311	Uint			Spare maintenance alert 11 actual hours
	[12]	300312	Uint			Spare maintenance alert 12 actual hours
	[13]	300313	Uint			Spare maintenance alert 13 actual hours
	[14]	300314	Uint			Spare maintenance alert 14 actual hours
	[15]	300315	Uint			Spare maintenance alert 15 actual hours
	[16]	300316	Uint			Spare maintenance alert 16 actual hours
		300317 to 300350 Reserved				
Gx_MaintAlert[1..16].ActualMinutes		3X	Uint Array	Min	RO	Maintenance alert actual minutes to the HMI or Remote
	[1]	300351	Uint			Maintenance alert 1 actual minutes
	[2]	300352	Uint			Maintenance alert 2 actual minutes
	[3]	300353	Uint			Maintenance alert 3 actual minutes
	[4]	300354	Uint			Maintenance alert 4 actual minutes
	[5]	300355	Uint			Maintenance alert 5 actual minutes
	[6]	300356	Uint			Maintenance alert 6 actual minutes
	[7]	300357	Uint			Maintenance alert 7 actual minutes
	[8]	300358	Uint			Spare maintenance alert 8 actual minutes
	[9]	300359	Uint			Spare maintenance alert 9 actual minutes
	[10]	300360	Uint			Spare maintenance alert 10 actual minutes
	[11]	300361	Uint			Spare maintenance alert 11 actual minutes
	[12]	300362	Uint			Spare maintenance alert 12 actual minutes
	[13]	300363	Uint			Spare maintenance alert 13 actual minutes
	[14]	300364	Uint			Spare maintenance alert 14 actual minutes
	[15]	300365	Uint			Spare maintenance alert 15 actual minutes

Modbus Parameter / TAG List (Continued)

Tag Name		Modbus	Type	E/U	Access	Notes	
	[16]	300366	Uint			Spare maintenance alert 16 actual minutes	
		300367 to 300400 Reserved					
Gn_User_RhsHtrSz_Act		300495	Dint	N/A	RO	Remote heat source electric heater size, 1 - 9 = 4kW - 270kW 1 = 4kW 2 = 10kW 3 = 15kW 4 = 30kW 5 = 60kW 6 = 90kW 7 = 120kW 8 = 180kW 9 = 270kW	
Gn_User_RhsCgtSz_Act		300497	Dint	N/A	RO	Remote heat source conair gastrac size, 1 - 5 1 = CGT150 2 = CGT250 3 = CGT350 4 = CGT500 5 = CGT700	
Gi_User_RhsPkg_Act		300499	Int	N/A	RO	Remote heat source feature package, 1-4 1 = Base 2 = Setback 3 = Drying monitor 4 = ES1 Dryer	
Gi_User_RhsType_Act		300500	Int	N/A	RO	Remote heat source type actual, 1 - 5 1 = HTC (electric) 2 = ResinWorks (electric) 3 = HAD (electric) 4 = CGT (natural gas) 5 = MRC (micro resin cart)	
Gi_User_PlcSwRev_Act		300501	Int	N/A	RO	PLC software revision, 100 = 1.00	
Gi_User_RhsState_Act		300502	Int	NA	RO	Remote heat source state actual, 0 - 9 0=Powering up 1=Standby 2=Waiting 3=Starting 4=Stopping 5=Running 6= Passive Alarm 7=Shutdown Alarm 8=Comms Loss 9=Test mode 10=Tuning	
Gu_User_BurnerSeqState		300503	Uint	NA	RO	Burner control sequence state, See table 20 of Honeywell manual	(Gas heat)
Gu_User_BurnerFaultCode		300504	Uint	NA	RO	Burner control fault code, See table 22 of Honeywell manual	(Gas heat)
Gu_User_BurnerPurgeTime		300505	Uint	NA	RO	Burner control purge time in seconds	(Gas heat)
Gr_User_DelAirTempSP_Act		300506	Real	°F-°C	RO	Delivery air temperature set point actual	
Gr_User_DelAirTemp_Act		300508	Real	°F-°C	RO	Delivery air temperature actual	
Gr_User_SetBkActvtnTempSP_Act		300510	Real	°F-°C	RO	Setback activation temperature set point actual	(Optional)
Gr_User_HprOutletTemp_Act		300512	Real	°F-°C	RO	Hopper outlet temperature actual	(Optional)
Gr_User_SetBkToTempSP_Act		300514	Real	°F-°C	RO	Setback to temperature set point actual	(Optional)
Gr_User_SetBkRstTempSP_Act		300516	Real	°F-°C	RO	Setback reset at temperature set point actual	(Optional)
Gr_User_ProcessOnTime_Act		300518	Real	%	RO	Delivery air heater on-time actual, 0-100%	

Modbus Parameter / TAG List (Continued)

Tag Name	Modbus	Type	E/U	Access	Notes	
Gr_User_EnergyHours_Act	300520	Real	Hrs	RO	Energy measurement total hours	
Gr_User_EnergyLastHour_Act	300522	Real	kWh	RO	Energer used in the last hour	
Gr_User_EnergyTotalKWHr_Act	300524	Real	kWh	RO	Total energy used	
Gr_User_TotalRunHrs_Act	300526	Real	Hrs	RO	Hopper temperature control total running hours actual	
Gr_User_DryingMonT1_Act	300528	Real	°F-°C	RO	Drying monitor, position T1 temperature actual	(Optional)
Gr_User_DryingMonT2_Act	300530	Real	°F-°C	RO	Drying monitor, position T2 temperature actual	(Optional)
Gr_User_DryingMonT3_Act	300532	Real	°F-°C	RO	Drying monitor, position T3 temperature actual	(Optional)
Gr_User_DryingMonT4_Act	300534	Real	°F-°C	RO	Drying monitor, position T4 temperature actual	(Optional)
Gr_User_DryingMonT5_Act	300536	Real	°F-°C	RO	Drying monitor, position T5 temperature actual	(Optional)
Gr_User_DryingMonT6_Act	300538	Real	°F-°C	RO	Drying monitor, position T6 temperature actual	(Optional)
Gr_User_DelAirDewpoint_Act	300540	Real	°F-°C	RO	Delivery air dew point actual, -76 to +40F	(Optional)
Gr_User_DelAirFlow_Act	300542	Real	Hz	RO	Delivery air flow VFD %speed actual, 0-100%	(Optional)
Gr_User_Throughput_Act	300544	Real	lb/hr-kg/hr	RO	Material troughput of the hopper	(Optional)
Gr_User_BulkDensity_Act	300546	Real	lb/f³-kg/M³	RO	Bulk density of the material in the hopper	(Optional)
Gr_User_RsdncTime_Act	300548	Real	Hrs	RO	Hopper residence time actual	(Optional)
Gr_User_BurnerFlameSig	300550	Real	Volts	RO	Burner control flame signal volts, 0.0-25.5 volts	(Gas heat)
Gr_User_HprLevelAct	300552	Real	%	RO	Hopper level actual, 0.0-100.0%	(Optional)
Gr_User_MatlExtTempAct	300554	Real	F/C	RO	Material exit temperature actual	(Optional)
Gr_User_DelAirVelAct	300556	Real	fpm	RO	Delivery air velocity actual	(Optional)
	0X			**RW**	**Modbus 0X coils**	
Gx_User_Control.	0X	Bool Structure	NA	RW	Modbus 000001 - 000032	
Start	000001	Bool			Start command True=start, resets to false	
Stop	000002	Bool			Stop command True=stop, resets to false	
EngUnit	000003	Bool			Engineering units (False=english, True=Metric)	
AckAlarm	000004	Bool			Acknowledge alarm PB	
EnergyMeterEn	000005	Bool			Energy meter enable PB	
AutoStartEn	000006	Bool			Main auto start enable PB	
AutoStopEn	000007	Bool			Main auto stop enable PB	
SetBkCtrlEn	000008	Bool			Setback temperature control enable PB	
SetBkMode	000009	Bool			Setback setpoints mode (False=Man, True=Auto)	
RemCommsEn	000010	Bool			Drying monitor, remote exp. I/O communications enable	
VfdCommsEn	000011	Bool			Delivery/Combustion air VFD communications enable	
Spare_Bit_12	000012	Bool			Place holder for the protocol	
TrueRateCommsEn	000013	Bool			TrueRate throughput, communications enable	
BurnerCommsEn	000014	Bool			Burner control, communications enable	
TestOutput	000015	Bool			Test mode, test PLC output PB	
TestRemOutput	000016	Bool			Test mode, test remote output PB	
SaveDelAirDflt	000017	Bool			Save delivery air PID gains as default	
LoadDfltDelAir	000018	Bool			Load the default delivery air PID gains	
NetChgEn	000019	Bool			Network communications change enable, true = apply	
Spare_Bit_20	000020	Bool			Place holder for the protocol	
Spare_Bit_21	000021	Bool			Place holder for the protocol	
Spare_Bit_22	000022	Bool			Place holder for the protocol	
Spare_Bit_23	000023	Bool			Place holder for the protocol	
Spare_Bit_24	000024	Bool			Place holder for the protocol	
Spare_Bit_25	000025	Bool			Place holder for the protocol	
Spare_Bit_26	000026	Bool			Place holder for the protocol	
Spare_Bit_27	000027	Bool			Place holder for the protocol	
Spare_Bit_28	000028	Bool			Place holder for the protocol	
Spare_Bit_29	000029	Bool			Place holder for the protocol	
Spare_Bit_30	000030	Bool			Place holder for the protocol	
Spare_Bit_31	000031	Bool			Place holder for the protocol	
Spare_Bit_32	000032	Bool			Place holder for the protocol	
Gb_User_AutoStartEn[1..3]	0X	Bool Array	NA	RW	Three auto start events, Modbus 000065 - 000067	
[1]	000065	Bool			Event #1 start enable, true=enable	
[2]	000066	Bool			Event #2 start enable, true=enable	
[3]	000067	Bool			Event #3 start enable, true=enable	

Modbus Parameter / TAG List (Continued)

Tag Name		Modbus	Type	E/U	Access	Notes
Gb_User_AutoStopEn[1..3]		0X	Bool Array	NA	RW	Three auto stop events, Modbus 000068 - 000070
	[1]	000068	Bool			Event #1 stop enable, true=enable
	[2]	000069	Bool			Event #2 stop enable, true=enable
	[3]	000070	Bool			Event #3 stop enable, true=enable
Gx_MaintAlert[1..16].Enable		0X	Bool Array	NA	RW	Enable maintenance alerts from the HMI or Remote
	[1]	000301	Bool			Maintenane alert 1 enable
	[2]	000302	Bool			Maintenane alert 2 enable
	[3]	000303	Bool			Maintenane alert 3 enable
	[4]	000304	Bool			Maintenane alert 4 enable
	[5]	000305	Bool			Maintenane alert 5 enable
	[6]	000306	Bool			Maintenane alert 6 enable
	[7]	000307	Bool			Maintenane alert 7 enable
	[8]	000308	Bool			Spare maintenane alert 8 enable
	[9]	000309	Bool			Spare maintenane alert 9 enable
	[10]	000310	Bool			Spare maintenane alert 10 enable
	[11]	000311	Bool			Spare maintenane alert 11 enable
	[12]	000312	Bool			Spare maintenane alert 12 enable
	[13]	000313	Bool			Spare maintenane alert 13 enable
	[14]	000314	Bool			Spare maintenane alert 14 enable
	[15]	000315	Bool			Spare maintenane alert 15 enable
	[16]	000316	Bool			Spare maintenane alert 16 enable
		000317 to 000350 Reserved				
Gx_MaintAlert[1..16].Reset		0X	Bool Array	NA	RW	Reset maintenance alert time or count from the HMI or Remote
	[1]	000351	Bool			Maintenane alert 1 reset
	[2]	000352	Bool			Maintenane alert 2 reset
	[3]	000353	Bool			Maintenane alert 3 reset
	[4]	000354	Bool			Maintenane alert 4 reset
	[5]	000355	Bool			Maintenane alert 5 reset
	[6]	000356	Bool			Maintenane alert 6 reset
	[7]	000357	Bool			Maintenane alert 7 reset
	[8]	000358	Bool			Spare maintenane alert 8 reset
	[9]	000359	Bool			Spare maintenane alert 9 reset
	[10]	000360	Bool			Spare maintenane alert 10 reset
	[11]	000361	Bool			Spare maintenane alert 11 reset
	[12]	000362	Bool			Spare maintenane alert 12 reset
	[13]	000363	Bool			Spare maintenane alert 13 reset
	[14]	000364	Bool			Spare maintenane alert 14 reset
	[15]	000365	Bool			Spare maintenane alert 15 reset
	[16]	000366	Bool			Spare maintenane alert 16 reset
		000367 to 000400 Resurved				
		4X			**RW**	**Modbus 4X holding registers**
Gx_MaintAlert[1..16].TimeSetPoint		4X	Uint Array	Hrs	RW	Maintenance alert time set points from the HMI or Remote
	[1]	400301	Uint			Maintenane alert 1 "Check process heater" time (Range 720 - 8640hrs)
	[2]	400302	Uint			Maintenane alert 2 "Check combustion burner" time (Range 720 - 8640hrs)
	[3]	400303	Uint			Maintenane alert 3 "Check inlet/outlet hoses" time (Range 168 - 4320hrs)
	[4]	400304	Uint			Maintenane alert 4 "Check or replace blower filter" time (Range 8 - 720hrs)
	[5]	400305	Uint			Maintenane alert 5 "Check or replace combustion air filter" time (Range 8 - 720hrs)
	[6]	400306	Uint			Maintenane alert 6 "Clean flame detector lens" time (Range 4320 - 12960hrs)
	[7]	400307	Uint			Maintenane alert 7 "Clean or replace spark igniter" time (Range 4320 - 12960hrs)
	[8]	400308	Uint			Spare maintenane alert 8 time (Hours)
	[9]	400309	Uint			Spare maintenane alert 9 time (Hours)
	[10]	400310	Uint			Spare maintenane alert 10 time (Hours)
	[11]	400311	Uint			Spare maintenane alert 11 time (Hours)
	[12]	400312	Uint			Spare maintenane alert 12 time (Hours)

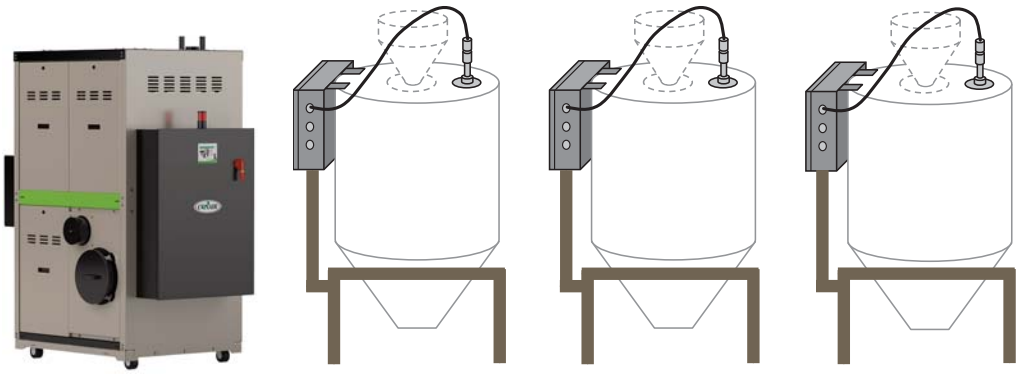
Modbus Parameter / TAG List (Continued)

Tag Name	Modbus	Type	E/U	Access	Notes
[13]	400313	Uint			Spare maintenane alert 13 time (Hours)
[14]	400314	Uint			Spare maintenane alert 14 time (Hours)
[15]	400315	Uint			Spare maintenane alert 15 time (Hours)
[16]	400316	Uint			Spare maintenane alert 16 time (Hours)
400317 to 400350 Resurved					
Gr_User_DelAirTemp_SP	400530	Real	°F-°C	RW	Delivery air temperature set point, min to max
Gr_User_SetBkToTempSP	400532	Real	°F-°C	RW	Setback function, setback to temperature set point (ProcMin-ProcSp)
Gr_User_SetBkActvtnTempSP	400534	Real	°F-°C	RW	Setback function, activation hopper outlet temperature set point (ProcMin-ProcSp)
Gr_User_SetBkRstTempSP	400536	Real	°F-°C	RW	Setback function, reset at temperature set point (ProcMin-SetBkToSp)
Gr_User_DelAirDewpoint_SP	400538	Real	°F-°C	RW	Delivery air dew point set point
Gr_User_DelAirTempSP_Max	400540	Real	°F-°C	RW	Delivery air temperature set point max limit, min to 375F
Gr_User_DelAirTempSP_Min	400542	Real	°F-°C	RW	Delivery air temperature set point min limit, 100F to max
Gr_User_HprLevel_SP	400544	Real	%	RW	Hopper level set point (60.0-100.0%)
Gu_User_AirLossAlarm_SP	400546	Uint	Sec	RW	Air loss alarm set point, 3-15 seconds
Gr_User_DewpointHighAlarm_SP	400547	Real	°F-°C	RW	High dew point alarm set point
Gu_User_DryingMonHiAlmPos_SP	400549	Uint	N/A	RW	Drying monitor high temperature alarm position set point, 0-3 0 = T2 1 = T3 2 = T4 3 = T5 (default)
Gr_User_DryingMonHighAlarm_SP	400550	Real	°F-°C	RW	Drying monitor high temperature alarm set point
Gu_User_DryingMonLoAlmPos_SP	400552	Uint	N/A	RW	Drying monitor low temperature alarm position set point, 0-3 0 = T2 (default) 1 = T3 2 = T4 3 = T5
Gr_User_DryingMonLowAlarm_SP	400553	Real	°F-°C	RW	Drying monitor low temperature alarm set point
Gr_User_DelAirFlow_SP	400555	Real	%	RW	Delivery air flow set point, 60.0-100.0%
Gr_User_RsdncTime_SP	400557	Real	Hrs	RW	Material residence time, 1-10 hrs
Gr_User_HprLowLevelAlarm_SP	400559	Real	%	RW	Drying hopper low level alarm set point, 0.0-Level set point
Gx_User_AutoStart_SP[1..3]	4X	Structured Array		RW	Auto start event setpoint ellements
[1].Weekday	400601	Uint	Hr	RW	Auto start event #1 weekday set point, range 1 to 8, Mon to Sun and Daily
[1].Hour	400602	Uint	Hr	RW	Auto start event #1 hour of the day, range 0-23
[1].Minute	400603	Uint	Min	RW	Auto start event #1 minute of the hour, range 0-59
[2].Weekday	400604	Uint	Hr	RW	Auto start event #2 weekday set point, range 1 to 8, Mon to Sun and Daily
[2].Hour	400605	Uint	Min	RW	Auto start event #2 hour of the day, range 0-23
[2].Minute	400606	Uint	Hr	RW	Auto start event #2 minute of the hour, range 0-59
[3].Weekday	400607	Uint	Min	RW	Auto start event #3 weekday set point, range 1 to 8, Mon to Sun and Daily
[3].Hour	400608	Uint	Hr	RW	Auto start event #3 hour of the day, range 0-23
[3].Minute	400609	Uint	Min	RW	Auto start event #3 minute of the hour, range 0-59
Gx_User_AutoStop_SP[1..3]	4X	Structured Array		RW	Auto stop event setpoint ellements
[1].Weekday	400610	Uint	Hr	RW	Auto stop event #1 weekday set point, range 1 to 8, Mon to Sun and Daily
[1].Hour	400611	Uint	Min	RW	Auto stop event #1 hour of the day, range 0-23
[1].Minute	400612	Uint	Hr	RW	Auto stop event #1 minute of the hour, range 0-59
[2].Weekday	400613	Uint	Min	RW	Auto stop event #2 weekday set point, range 1 to 8, Mon to Sun and Daily
[2].Hour	400614	Uint	Hr	RW	Auto stop event #2 hour of the day, range 0-23
[2].Minute	400615	Uint	Min	RW	Auto stop event #2 minute of the hour, range 0-59
[3].Weekday	400616	Uint	Hr	RW	Auto stop vent #3 weekday set point, range 1 to 8, Mon to Sun and Daily
[3].Hour	400617	Uint	Min	RW	Auto stop event #3 hour of the day, range 0-23
[3].Minute	400618	Uint	Hr	RW	Auto stop event #3 minute of the hour, range 0-59

Appendix

Drying Monitor DM-4

For use with D Series Dryers with DC-C Control



Zero Mechanical State (ZMS)

⚠ **CAUTION:** Before performing maintenance or repairs on this product, you should disconnect and lockout electrical power sources to prevent injury from unexpected energizing or start-up.

During maintenance, it is essential that the system be put into a state which eliminates the possibility of components making an unexpected and dangerous movement. This procedure is typically referred to as lockout. After all energy sources have been neutralized, the system is in the zero mechanical state (ZMS). This provides maximum protection against unexpected mechanical movement.

The lockout procedure must include all energy sources:

- Electrical power supply
- Compressed air supply
- Hydraulic fluids under pressure
- Potential energy from suspended parts
- Energy in springs
- Any other source that might cause unexpected mechanical movement

The following is a recommended Zero Mechanical State procedure which must be followed prior to any inspection, or maintenance of the Dryer Monitor hopper probe(s).

1 **Turn off the loading device installed to the top of the drying hopper to assure that it does not attempt to load the hopper with material.**

2 **Perform the proper shutdown sequence to the connected dryer or drying system and allow all hopper components (internally and externally) to adequately cool.**

3 **Disconnect and lock out the primary electrical supply feeding the dryer.**

4 **Drain the drying hopper, at least to a level that fully exposes the probe; typically just below the air spreader cone in the hopper, as observed through a sight glass or viewing window.**

5 **Carefully open the drying hopper door and clarify that material level is below the probe and that the temperature of all hopper surfaces and the probe are adequately reduced to make touching and handling safe.**

6 **Use caution working in elevated areas and use approved fall prevention measures and carefully disconnect the drying monitor probe from its junction box on the top of the hopper.**

7 **The probe is now accessible for maintenance, replacement, adjustment or repairs.**

⚠ **WARNING:** Before removing lockout devices and returning switches to the ON position, make sure that all personnel are clear of the machine, tools have been removed, and all safety guards reinstalled.

What is the Drying Monitor™?

The Drying Monitor is the latest generation of technology created for analyzing drying performance from a multi-zone, resistance temperature detector (RTD) probe installed in the drying hopper. Embedded into the DC-C dryer control software, the Drying Monitor is designed to provide early detection of poor drying conditions and provide alarms for correcting problems. Up to 16 hoppers can be monitored.

Drying Monitor probes are supplied for any size or brand of drying hopper and are installed through the lid of the hopper (or from the bottom of the hopper up) and extend to the base of the air diffuser. Probe signals are then continuously fed back to the control where each hopper's temperature profile can be viewed, trended and used to determine if proper drying is taking place according to required drying parameters.

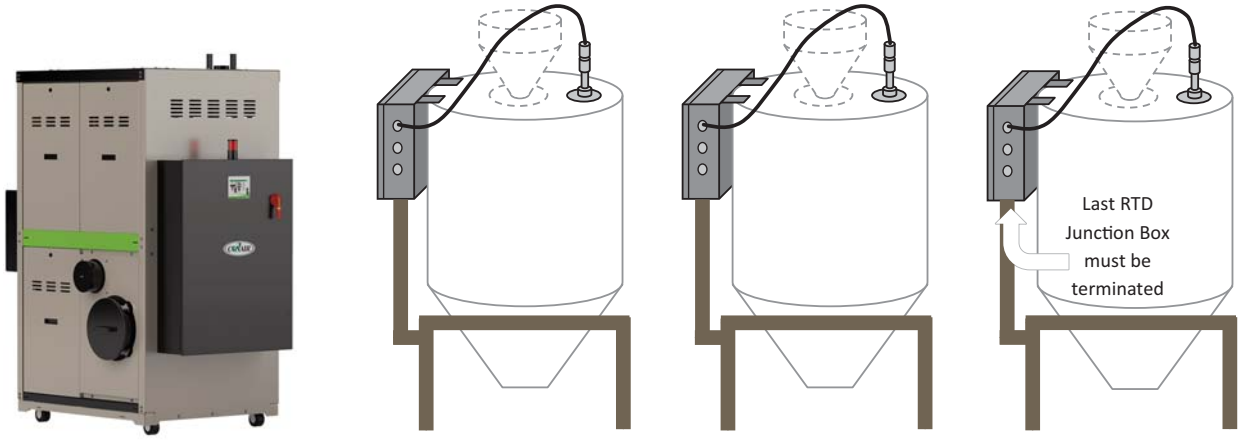
Typical Applications

The Drying Monitor is ideal for applications that require strict monitoring of the drying process to meet product quality specifications. The DM can also aid in the prevention of product rejects through early identification of potential drying problems.

The DM will alert the operator, through a passive alarm shown on the local hopper control monitor that one of these common drying problems may exist:

- A change in the temperature profile within the drying hopper.
- Loss of air flow through the drying hopper.
- A reduction or loss of drying time at the selected and programmed drying temperature.

Note: Drying Monitor is also provided as an independent control and probe set for dryers not equipped with DC-C. This independent version is called the DM4-i. On the DM4-i version of Drying Monitor, an independent TouchView control provides the operator interface. For more information on the DM4-i version of the Drying Monitor, contact Conair.



Multi-hopper Drying Monitor

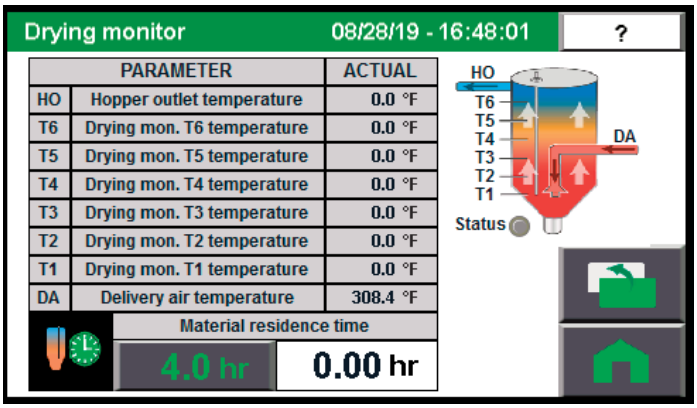
How the Drying Monitor Works

The Drying Monitor consists of stainless steel, 6-zone, temperature probes installed in drying hoppers that sense the specific temperature profile of the hoppers and compares their profiles to the requirements needed for proper drying in a specific hopper for a specific material.

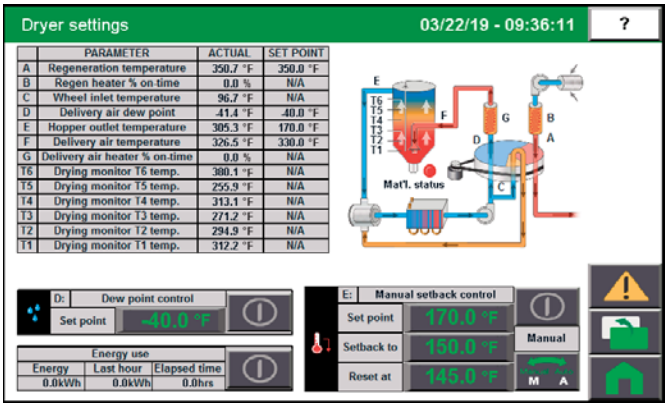
Interpretation of that temperature profile by the DM leads directly to predicting under or over dried material, inadequate air flow, clogged filters, heater failure, excess throughput for that hopper size, unresponsive loading, over capacity drying and many other conditions that are likely to produce scrap and waste time, energy and material.

The DM will store all temperature readings and organize the data into logical groups for review or downloading to a spreadsheet program for analysis. The DM has memory capacity to store seven days of data for each hopper in the system.

Alarms are displayed on the local hopper control and also stored for future reference. Pressing the Alarms button will take you to the alarm list.



Example of a remote heat source



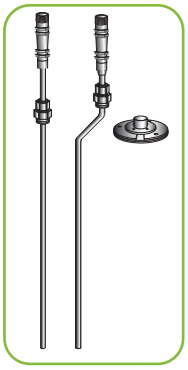
Example of a stand alone standard dryer

Drying Monitor System Components

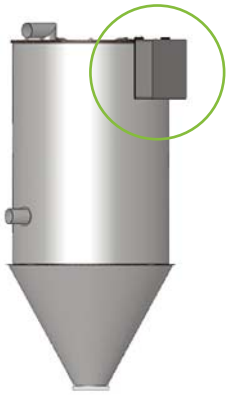
The Drying Monitor system consists of:

A Conair Carousel Plus dryer with DC-C control that connects to up to 16 probes via RTD junction boxes at each hopper.

Stainless steel, 6-zone, temperature probes are installed in each of the drying hoppers. These probes are sized specifically for the hoppers they will be installed into and hang from the lid of the hopper approximately halfway between the centerline and the inside wall of the hopper. Some hoppers (especially those fitted with loading equipment) often require probes with an offset to allow location in one position on the lid and another vertical position in the hopper. Conair hoppers are typically outfitted to readily receive a DM probe. Non-Conair or older Conair hoppers will require adaptation for probe installation according to instructions supplied in this manual.



RTD junction boxes link the cable from the hopper probe into the ModBus communications interface, and back to the local heat control (HTC, ResinWorks, Gastrac or standalone dryer). All remote heat controls are daisy chained back to the dryer.



Cable sets are custom ordered in lengths of 5 feet {1.5 meters}, 10 feet {3.0 meters}, 15 feet {4.6 meters}, 20 feet {6.1 meters}, 50 feet {15.2 meters, 75 feet {22.9 meters} and 100 feet {30.5 meters} long.

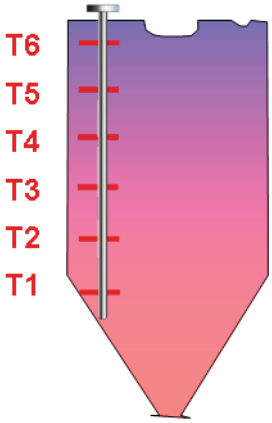
To order a cable set:

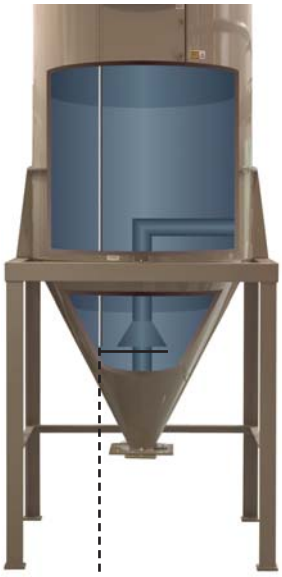
Contact Conair Parts
1 800 458 1960
From outside of the United States, call:
814 437 6861

5 ft {1.5 m}- 1886780405
10 ft {3.0 m}- 18886780410
15 ft {4.6 m}- 18886780415
20 ft {6.1 m}- 18886780420
50 ft {15.2 m}- 18886780450
75 ft {22.9 m}- 18886780475
100 ft {30.5 m}- 188867804100

✎ **Note**: Cables can be shortened in the field by a qualified technician. It is better to order a cable length that is too long and shorten it in the field than to have a cable that is too short.

RTD Sensor Positions in the Hopper



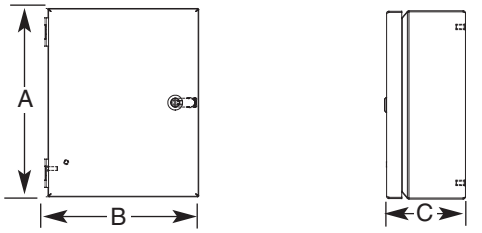


Probe lines up with the bottom of the diffuser cone section

RTD's will be referred to in this user guide and on your DM display as T1, T2, T3, T4, T5, and T6. T1 is the lower most temperature sensor within the DM temperature probe and is positioned at the bottom of the diffuser cone section. T6 is the upper most temperature sensor in the DM temperature probe and is located near the top of the hopper when installed. Position T6 is always located in the air void above the bed of material in the hopper.

Specifications

Probe junction box



Front view **Side view**

MODEL	DM
Control box type	**DM probe junction box**
Dimensions inches {mm}	
A- Height	10.0 {254}
B- Width	8.0 {203}
C- Depth	4.0 {101}
Weight lb {kg}	
Installed	29 {13}
Shipping	36 {16}

SPECIFICATION NOTES

Specifications may change without notice. Check with a Conair representative for the most current information.

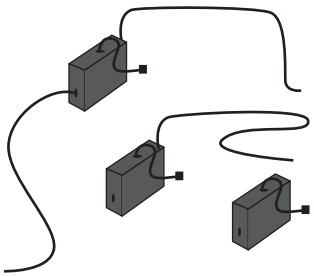
The DM is also available as a independent option, with its own TouchView control panel, to monitor up to 30 hoppers. Contact Conair for more information on the DM4-i.

Unpacking the Boxes

The DM software is included as part of your DC-C control. The necessary hardware (not included as part of the dryer - must be ordered separately) comes in two or more shipping containers, depending on the options ordered.

The DM consists of:

- One or more stainless steel probes
- An RTD junction box for each probe, including associated mounting hardware
- ModBus connecting cables and
- If ordered, installation hardware for each probe.



Packaging for the DM system can be varied depending upon what has been ordered, so carefully inventory all items.

NOTE: You must have local hopper control (HMI) to use DM4-i as part of a central drying system.

To order a hopper mount adapter kit, part #18169902:

Contact Conair Parts
1 800 458 1960
From outside of the United States, call:
814 437 6861

1 **Carefully remove all components** from their shipping containers.

2 **Remove all packing material, protective paper, tape, and plastic.** Do not discard installation notice tags.

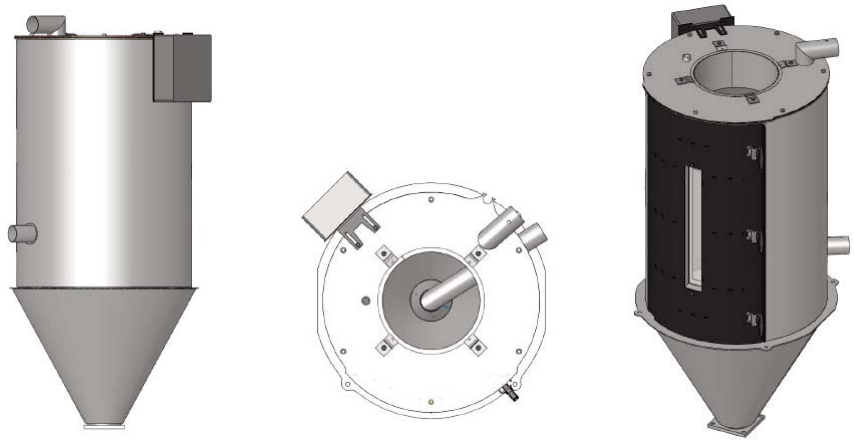
3 **Carefully inspect all components** to make sure no damage occurred during shipping, and that you have all the necessary hardware.

TIP: Inspect all of the equipment in the presence of the fright carrier's representative for damage during shipment. Note any damage on the delivery receipt before signing it. If damage is evident, file a claim immediately against the carrier as it is their responsibility to pay for any damage incurred during shipping. Make sure to include a detailed report of the damage along with photos. Note that RTD probes are delicate and may not operate properly if bent or otherwise damaged.

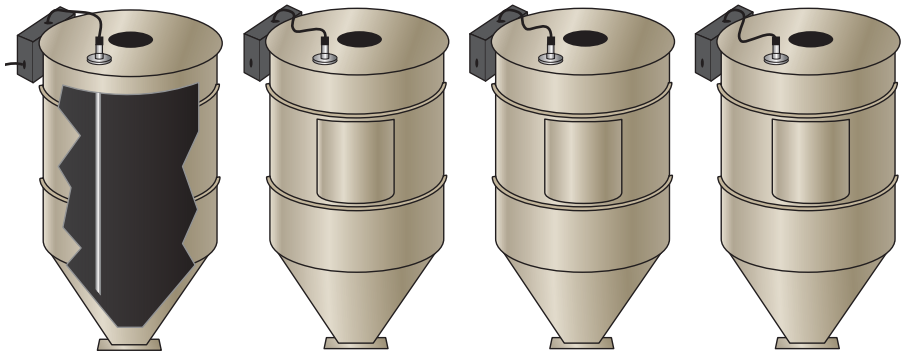
4 **Take a moment to record serial numbers.** Also record the drying hopper's model number and specifications. This information will be helpful if you ever need service or parts.

Preparing for Installation

In addition to mounting the probe into the hopper, each hopper will be equipped with an RTD Junction Box. This box provides the link from the probe to the ModBus interconnection cables that will connect each hopper to the heater control panel.



The RTD Junction Box should be mounted in a safe location, at the top of the hopper as near as possible to the hopper probe and if possible, not directly above the hopper, to minimize transmitted heat from the hopper to the junction box. Stay clear of loading equipment that may require service access and be sure to mount the box so that it is not likely to be used as step or hand-hold during service procedures.



⚠ **IMPORTANT:** The DC-C controlled dryer, and any junction boxes should not be installed in extreme temperature locations. Ambient air temperatures below 41°F {5°C} and above 104°F {40°C} should be avoided.

Installing the Probe

CAUTION: Hopper surfaces may be hot. Make sure the drying hopper is empty and has cooled to room temperature before installing the probe assembly. Failure to do so can lead to serious injury.

The DM probe is inserted through a hole in the top of the drying hopper and secured to a threaded coupling with a compression fitting. Mounting adapter plates may be necessary.

CAUTION: Always disconnect and lock out the main power supply before beginning the installation process.

There are three mounting methods for the probe:

- **Select Mounting Method 1** if you purchased a new Conair CH series drying hopper equipped with a factory-installed coupling for the probe.
- **Select Mounting Method 2** if you are installing the probe and coupling in a drying hopper that has enough overhead clearance to insert the probe from the top of the hopper.
- **Select Mounting Method 3** if you are installing the probe and adapter kit on a drying hopper that does not have enough overhead clearance to insert the probe from the top.

Mounting Method 1
(New Conair hopper with Factory Installed coupling)

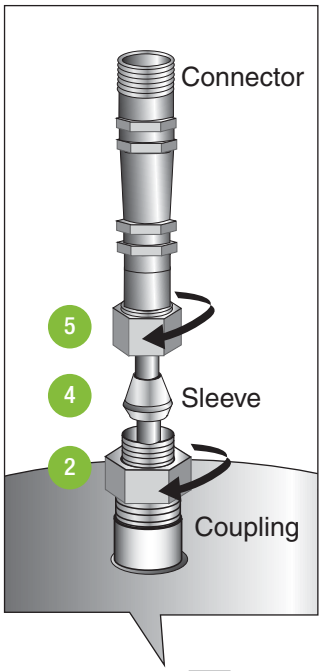
1 **Insert the probe through the coupling** in the top of the drying hopper.

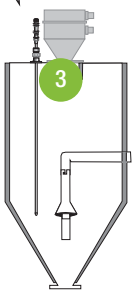
2 **Screw the fitting into the coupling.** Tighten with a wrench.

3 **Make sure the probe is the correct size.** The probe should extend from just above the top of the hopper into the hopper, with the tip approximately in-line with the bottom edge of the diffuser cone.

4 **Push the compression sleeve into the fitting.**

5 **Tighten the nut over the sleeve.** The compression sleeve will crimp the tube to hold the probe in place. Be sure to position the connector in such a way as to avoid interference of the cable with the loader, etc. Use a wrench to tighten the nut so that it covers the threads.





NOTE: The mounting adapter kit will only be included if the DM was ordered as a retrofit kit.

NOTE: If the angled probe is used, the bend (dog leg) in the probe must be oriented so that it is angled in toward the center of the hopper.

CAUTION: Always disconnect and lock out the main power supply before beginning the installation process.

CAUTION: Hopper surfaces may be hot. Make sure the drying hopper is empty and has cooled to room temperature before installing the probe assembly. Failure to do so can lead to serious injury.

Tools for Installation:

❒ 7/8-in. wrench

CAUTION: Always disconnect and lock out the main power supply before beginning the installation process.

CAUTION: Hopper surfaces may be hot. Make sure the drying hopper is empty and has cooled to room temperature before installing the probe assembly. Failure to do so can lead to serious injury.

IMPORTANT: Stretch cloth or plastic across the inside of the hopper to catch metal shavings from the hole you will drill in the top of the hopper.

NOTE: The mounting adapter kit will only be included if the DM was ordered as a retrofit kit. Remove the mounting adapter plates from the probe assembly, you will not need them. You will need the gasket.

Tools for Installation:

- ❒ Drill and 10-32 tap
- ❒ Knife
- ❒ Flathead screwdriver
- ❒ 7/8-in. wrench

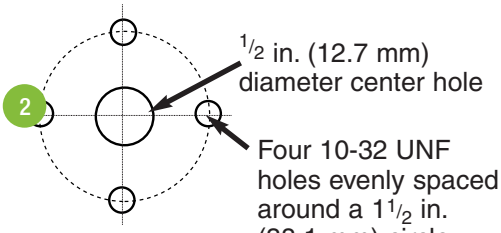
NOTE: If the angled probe is used, the bend (dog leg) in the probe must be oriented so that it is angled in toward the center of the hopper.

Mounting Method 2

(Drying hopper with enough overhead clearance to insert probe from the top of the hopper)

1 **Reference the drawings at the end of this user guide** and select the drawing that reflects your installation. Drill the appropriate hole in the top of the hopper.

2 **Drill and tap four 10-32 UNF holes** to match the hole pattern in the coupling.

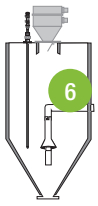


3 **Secure the gasket and coupling to the hopper** with the four 10-32 screws. Remove any excess gasket with a knife.

4 **Insert the probe through the coupling** in the top of the hopper.

5 **Screw the fitting into the coupling.** Tighten with a wrench.

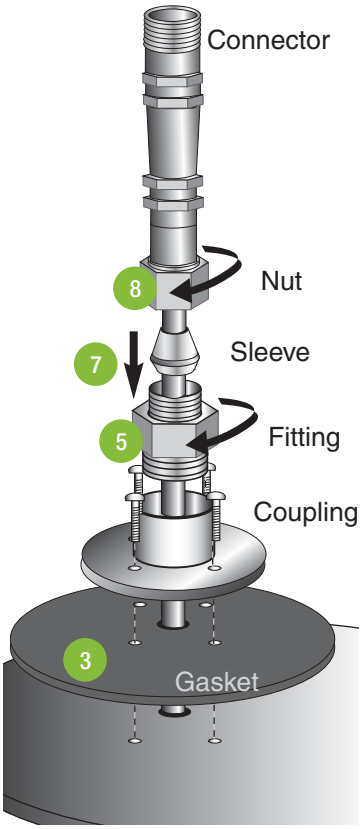
6 **Make sure the probe is the correct size.** The probe should extend from just above the top of the hopper into the hopper, with the tip approximately in-line with the bottom edge of the diffuser cone.



7 **Push the compression sleeve into the fitting.**

8 **Tighten the nut over the sleeve.** The compression sleeve will crimp the tube to hold the probe in place. Be sure to position the connector in such a way as to avoid interference of the cable with the loader, etc. Use a wrench to tighten the nut so that it covers the threads.

9 **Thoroughly clean the inside of the hopper** to remove any debris left from installation of the probe.

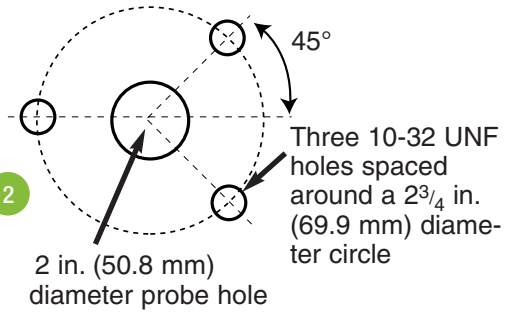


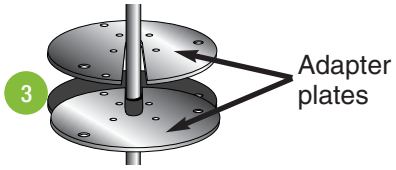
Mounting Method 3

(Not enough overhead clearance to insert the probe from the top of the hopper)

1 **Reference the drawings at the end of this user guide** and select the drawing that reflects your installation. Drill the appropriate hole in the top of the hopper.

2 **Drill and tap three 10-32 UNF holes** to match the screw pattern in the adapter plates and gasket. You can use the template in the appendix.

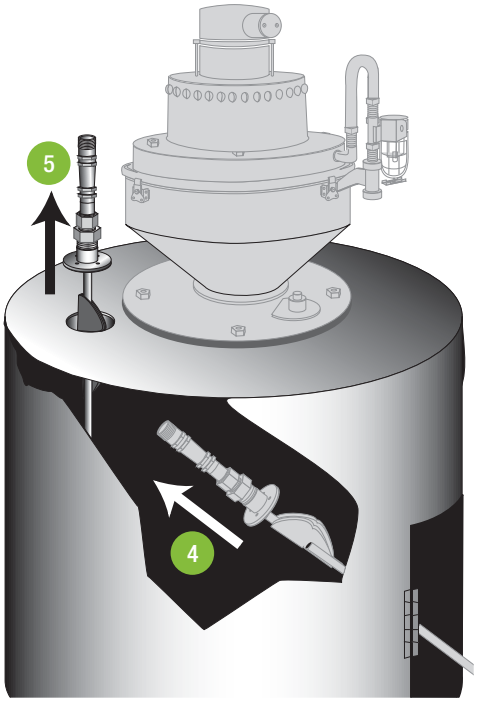




3 **Remove the two adapter plates from the probe mounting assembly.** Set the adapter plates aside for use in Step 7.

4 **Insert the probe and mounting assembly through the door of the hopper.**

5 **Pull the probe and mounting assembly through the hole in the top of the hopper.** Fold the gasket around the probe so that it will fit through the hole.



Tools for Installation:

- ❒ Drill and 10-32 tap
- ❒ Flathead screwdriver
- ❒ 7/8-in. wrench
- ❒ 2-in. hole saw

CAUTION: Always disconnect and lock out the main power supply before beginning the installation process.

CAUTION: Hopper surfaces may be hot. Make sure the drying hopper is empty and has cooled to room temperature before installing the probe assembly. Failure to do so can lead to serious injury.

IMPORTANT: Stretch cloth or plastic across the inside of the hopper to catch metal shavings from the hole you will drill in the top of the hopper.

NOTE: If the angled probe is used, the bend (dog leg) in the probe must be oriented so that it is angled in toward the center of the hopper.

(continued)

Mounting Method 3 (continued)

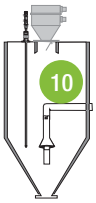
6 **Place the gasket over the probe hole.**

7 **Place the adapter plates over the gasket and secure** them to the hopper with three 10-32 UNF screws. Make sure the adapter plate with the threaded holes is on the bottom, and that the slots in the adapter plates are oriented in the opposite direction as shown. *See drawing to right, #7.*

8 **Secure the coupling to the adapter plates** with the four 10-32 UNF screws.

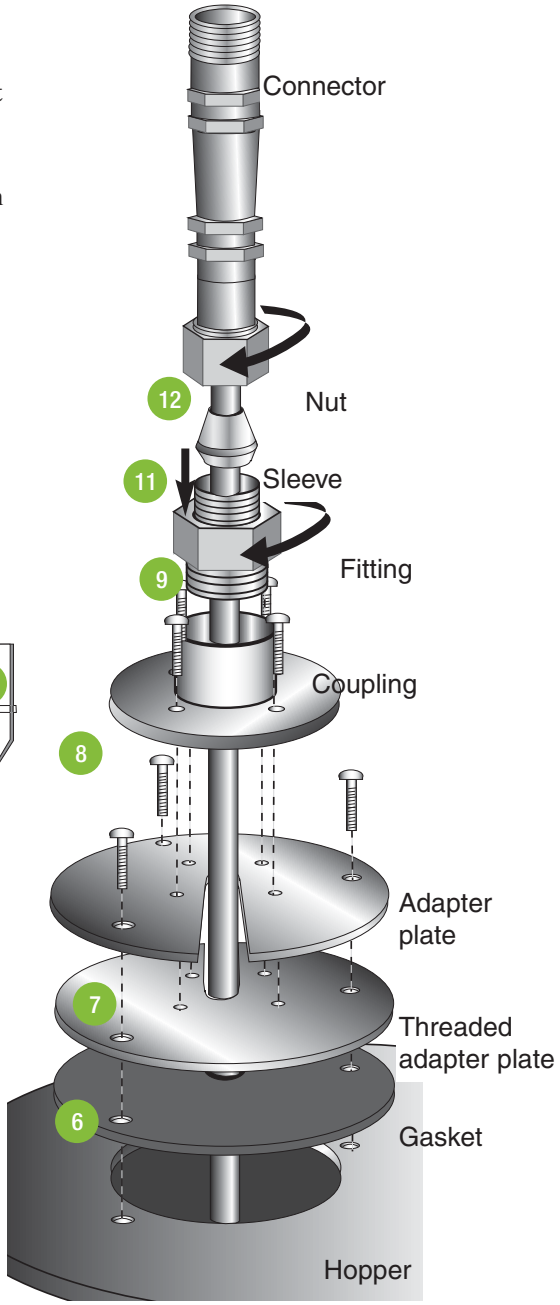
9 **Screw the fitting into the coupling.** Tighten with a wrench.

10 **Make sure the probe is the correct size.** The probe should extend from just above the top of the hopper into the hopper, with the tip approximately in-line with the bottom edge of the diffuser cone.



11 **Push the compression sleeve into the fitting.**

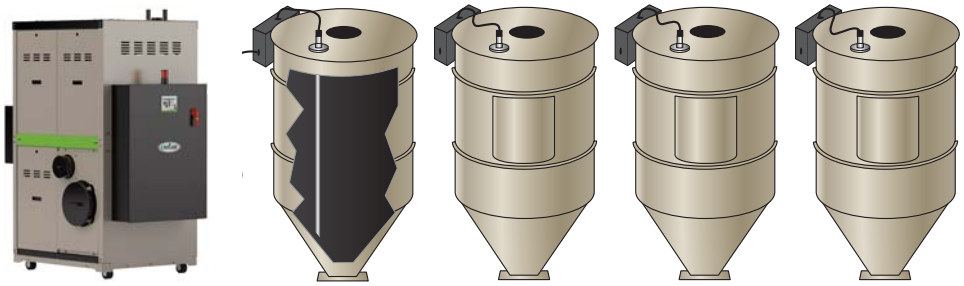
12 **Tighten the nut over the sleeve.** The compression sleeve will crimp the tube to hold the probe in place. Be sure to position the connector in such a way as to avoid interference of the cable with the loader, etc. Use a wrench to tighten the nut so that it covers the threads.



13 **Thoroughly clean the inside of the hopper** to remove any debris left from installation of the probe.

Preparing for Electrical Installation

1 Using the ModBus cables provided, connect the RTD box to the heat source being used (HTC, ResinWorks, Gastrac or standalone dryer) for each hopper. Repeat this for each hopper and heat source of the ModBus. Avoid parallel runs with your factory's power cables, and material conveying lines.



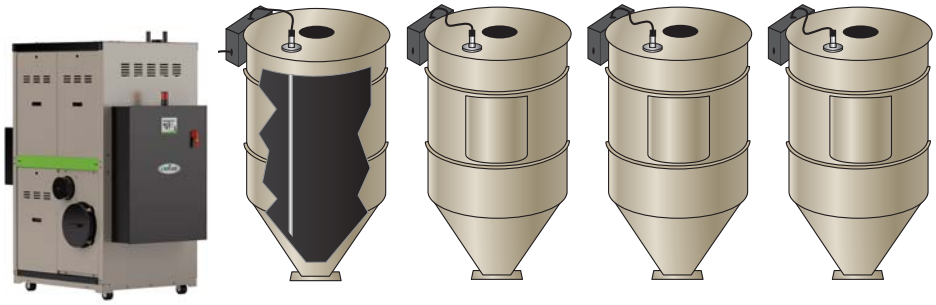
NOTE: RTD junction boxes connect via Modbus to the heater control and multiple heater controls are daisy chain wired Modbus connection back to the dryer control.

CAUTION: Always disconnect and lock out the main power supply before making electrical connections. Electrical connections should be made only by qualified personnel.

IMPORTANT: Always refer to the wiring diagrams that came with your dryer to locate specific electrical components. Illustrations in the User Guide are intended to be representative only.

Installing ModBus Cable Sets

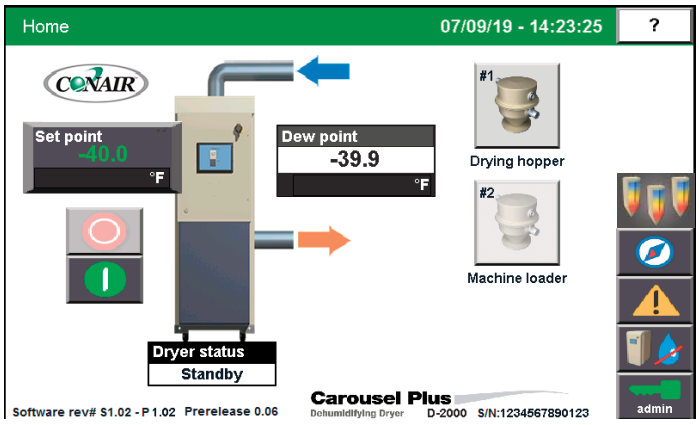
Cables are available in a wide variety of lengths and a cable assembly should be supplied with each probe/junction box set in the system. Plan your installation appropriately, determining which cable length has been selected for each hopper/junction box with consideration to neat cable routing. Cables should be routed away from heated surfaces, material conveying lines, or moving equipment and not run in parallel to three-phase power lines. Support each cable as needed to prevent strain on the connectors.



Carefully install each cable set from the remote heat source control to the hopper, firmly screwing the connectors into place on each panel.

Navigating the DC-C with Drying Monitor Enabled (ResinWorks Configuration)

The System Home screen on the dryer.



Navigation buttons for all DC-C functions are located on the right side of the screen and will appear in this location on all screens. The selection of buttons will change based on the specific screen. From the Overview page the buttons include:

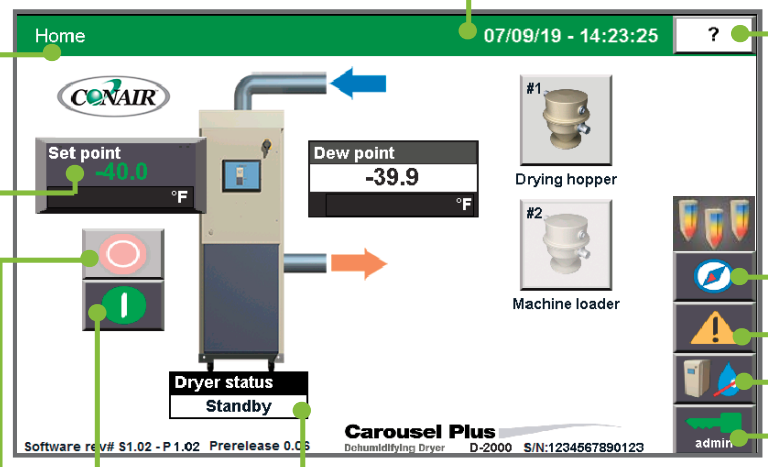
A **Hopper Selector Button** for viewing of all hoppers included in the system (up to 15).

An **Alarm Log Button** for viewing of not only active alarms, but also alarms that have appeared in the past.

A **Trend Selection Button** for viewing hoppers to show trends for each hopper.

The Home Button
On pages other than the Home page, a “Home” button will appear in the lower right corner, allowing the user to return to the home screen at any time.

The Drying Monitor Screens of the DC-C (RW Configuration)



Date and Time
This area displays the current date and time.

Screen name
Indicates what screen you are currently looking at.

Displayed data
Displays the current live data for the piece of equipment. If this data displays as all dashes or blanks, there is a communication error.

Help button
Help for the current screen.

Navigation button
Go to the Navigation screen

Alarms button
Go to the Alarms area.

Dryer Settings button
Go to the Dryer Settings Selection screen.

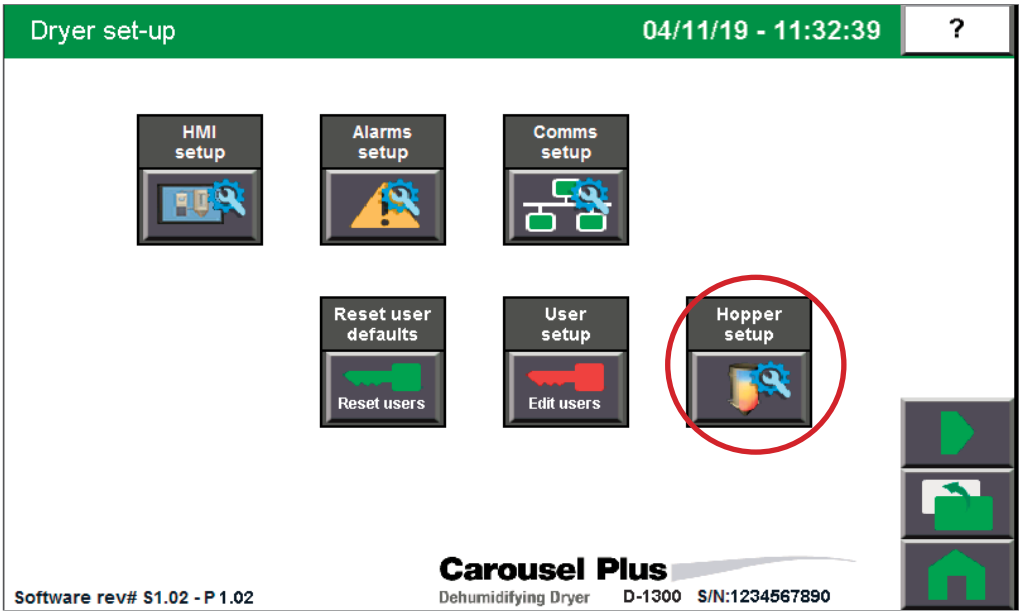
Login/Logout button
This button is used to log in or log out as a user.

Stop Button

Start Button

System status
This area displays messages to let you know the current status of the dryer.

Configuring the DC-C for DM Operation

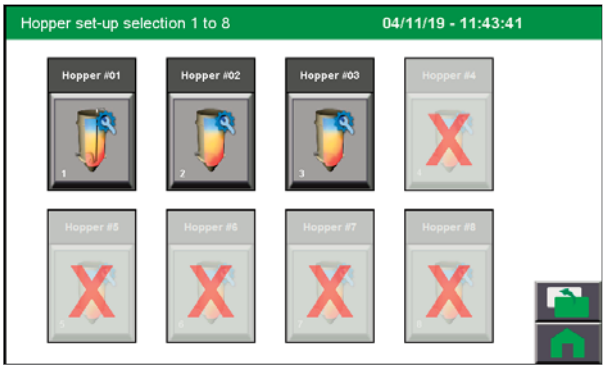


Before using the DM functionality of your DC-C dryer control, the DC-C must be set to communicate to your installed Drying Monitor hardware.

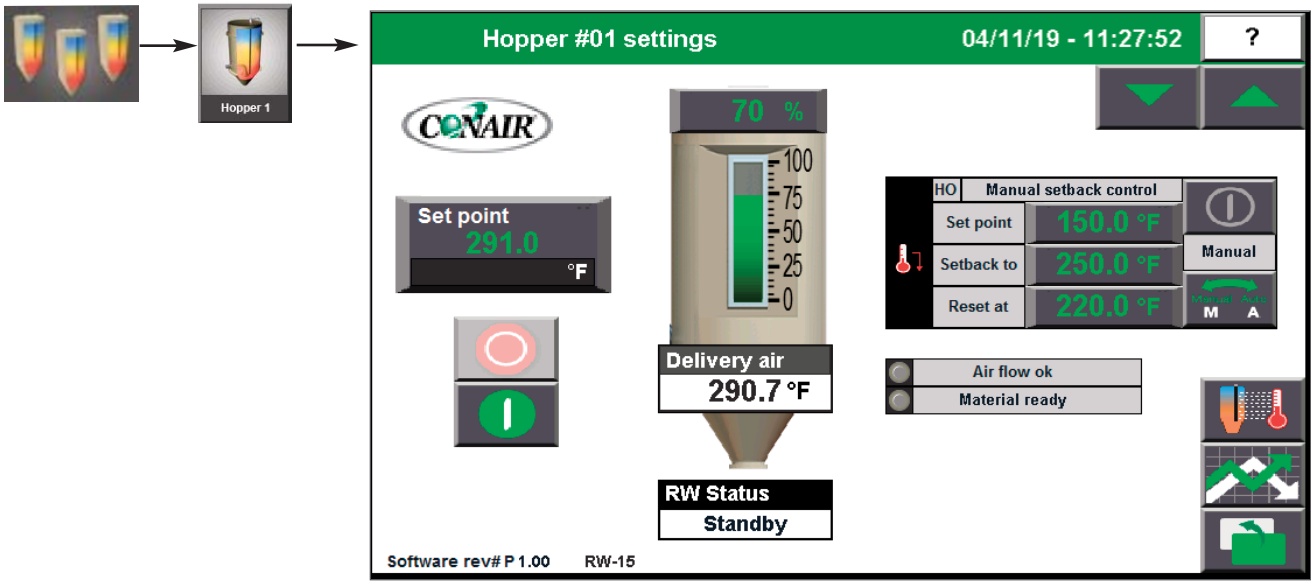
To set up the DC-C to use the DM:

1 Press the Dryer Seup button. The System Settings screen will open.

2 Press the Hopper Setup button. The Hopper Setup screen will open.



Navigating the DM Individual Hopper Screens



Detailed Hopper View

From the **Hopper Selection** screen, any hopper can be spotlighted by pressing its icon and a detailed view of that hopper will appear and its name will be shown in the green stripe.

From the detailed hopper view, you will see all the information about that hopper.

NOTE: Each hopper in your system will be displayed individually.

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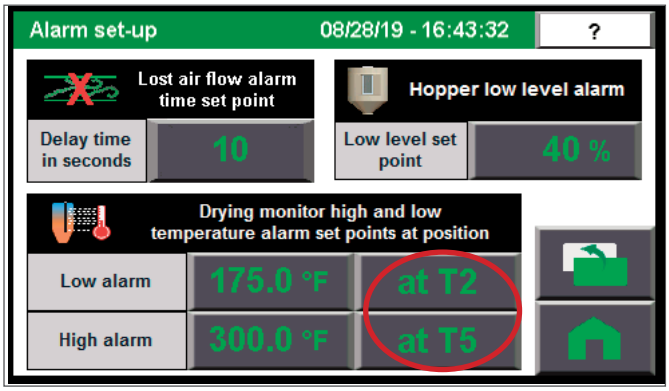
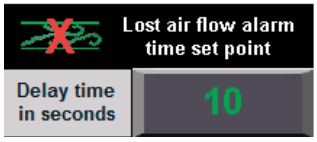
Navigating the DM Screens from the Hopper Temperature Control (GasTrac, ResinWorks, or HTC)

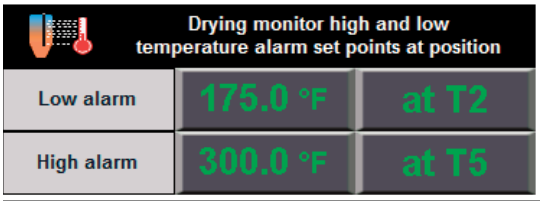


DM Settings



Alarm Time: Select to enter the amount of time in seconds that the system waits while running, before shutting down on a loss of air flow. Range 5-15 seconds.

✎ **NOTE:** Only visible when drying mnitor is installed.

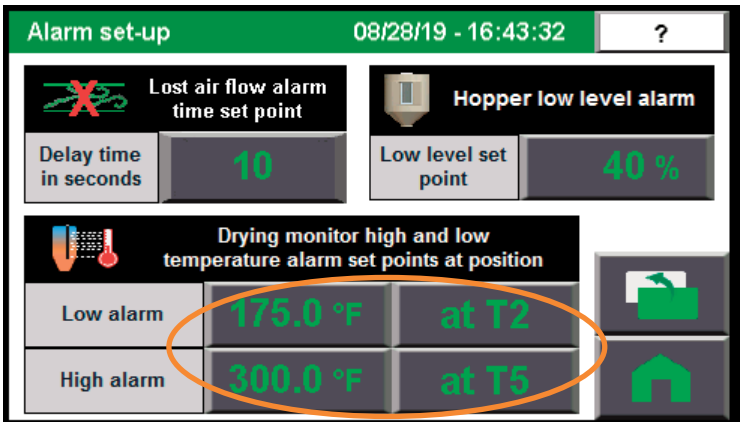


✎ **NOTE:** The Alarm Location can be set to T2, T3, T4, or T5.

Alarm Setpoint and Location: Low and high temperature alarms can be set at the same or different points in the drying hopper. Selecting the "at T" pushbutton changes the locatin the drying hopper each time it is released. The available positions are T2 lowest, through T5 the highest position in the hopper. The alarms are passive.

Setting Up Your DM: The Basics- Alarm Location (Simple)

The **Alarm Location** establishes the location in the drying hopper where the actual drying temperature is within a certain range of the process temperature. The user sets the point on the RTD probe to assure good drying with proper temperature delivery.



In drying, the material must be exposed to the process temperature for a set period of time (refer to your dryer manual for more information) to assure good drying. The DM's multiple temperature sensors allow you to select the specific point where the material will see that process temperature for 4 hours, or the remainder of its travel through the hopper on its way to processing. The 'drying zone" is between sensor T1 (the bottom sensor, located at the hot air entry point of the hopper)and the selected "Alarm Location" sensor T4.

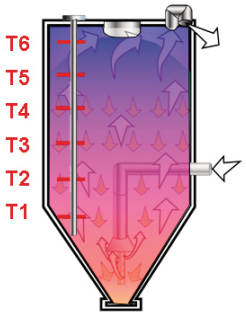
This critical position in the hopper, called the "Alarm Location" will monitor the temperature reading to assure that material will be within a certain range of the process temperature for the determined time, assuring good drying. Default value of the temperature range is within 10°F of the process temperature. This default value can be changed on the set-up screen in case tighter or looser tolerances are required by your application.

Setting Up Your DM: The Basics- Alarm Location (Advanced)

NOTE: You will need to know the bulk density of your material to calculate your drying hopper volume in cubic feet (ft^3). See *Operation: Understanding Bulk Density.*

NOTE: Nuisance alarms may trigger if the selected RTD position is too close to the alarm set point. In this case, the operator would either simply select a lower RTD or adjust the alarm set point lower within the alarm band.

Why would an operator want to use the Advanced method for selecting an RTD to use as the **Alarm Location**? The advanced Alarm Location selection may be desirable for processes where the operator wants to pick an RTD at a specific material residence time level at a given throughput. To select an RTD as a monitoring position for the alarm setpoint (advanced) the operator will need to consider the following drying parameters:



- hopper capacity (ft^3)
- throughput rate
- bulk density
- drying (residence) time

EXAMPLE calculation

1. lbs per hour throughput	**100**
2. drying time (residence time)	**4 hours**
3. material's bulk density (lbs/ft^3)	**35 lbs/ft^3**
4. drying hopper capacity (ft^3)	**15 lbs/ft^3**

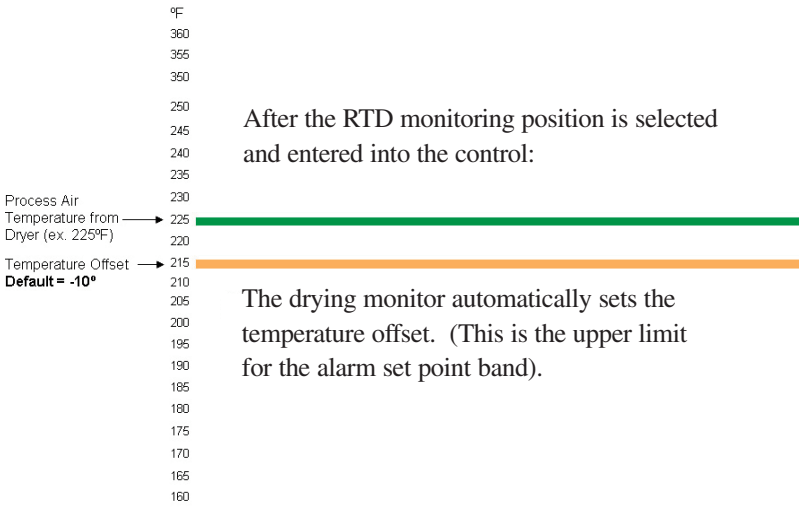
A 15 ft^3 hopper holds 525 lbs of material at 35 lbs/ft^3 (35 ft^3 x 15).
Use the chart in *Operation: Drying Hopper Volume by Model Number.*

- RTD T5 is likely at a 440 lb fill level (35 ft^3 x 12.6).
- RTD T4 is at the 320 lbs level (35 ft^3 x 9.15)

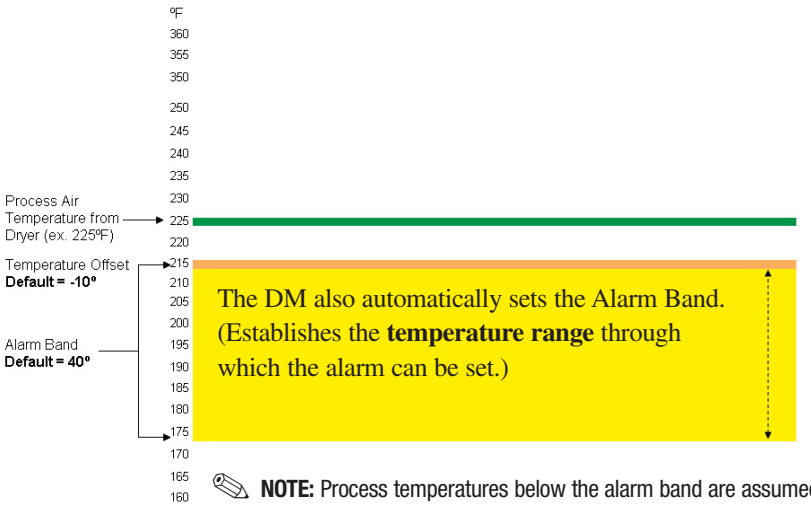
This position is at the 3/4 point of the material load.

RTD T5 is closest to the desired monitoring point of 400 lbs (100 lbs/hr x 4 hrs). Since T5 is closest to the desired monitoring point, select T5.

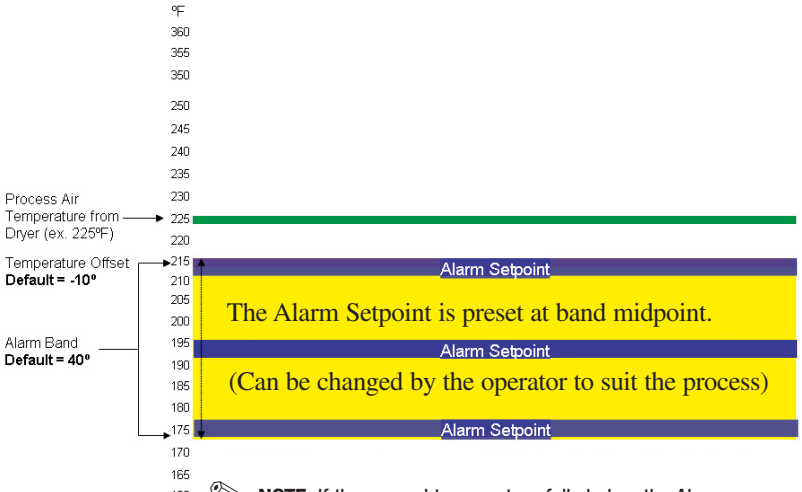
Check the temperature reading at T5 to confirm that the temperature is not at or below the alarm set point (default is 30 deg. below process). If necessary, adjust the alarm set point.



Setting Up Your DM: The Basics- Alarm Location (Advanced) (continued)



NOTE: Process temperatures below the alarm band are assumed to be insufficient to dry the material.



NOTE: If the sensed temperature falls below the Alarm Setpoint for a longer period than the Delay Time (default is five minutes), the alarm will trigger an alarm message on the control.

NOTE: From a cold start: If, after a preset time period, the temperature read at the selected alarm RTD does not reach the Alarm Setpoint, DM triggers “Temperature Not Met” alarm.

(continued)

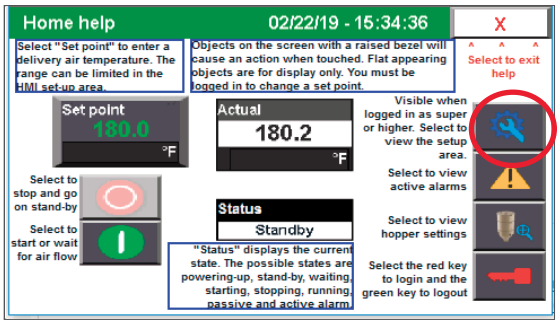
Setting Up Your DM: The Basics- Alarm Setpoint

Alarm Setpoint

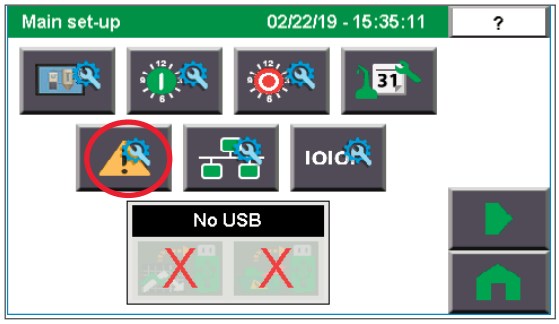
The alarm setpoint is automatically established on the "Hopper Settings" screen but can be adjusted on the set-up screen. This value acts as a default level of temperature performance. If the temperature reported on the alarm location falls below this level for longer than an adjustable time range (default, 5 minutes), the DM will alarm that the material is not being properly dried. The alarm setpoint relationship with the process setpoint (referred to as "band") as well as the time range before alarm notification can be adjusted on the Set up screen.

Remote Heat Source Procedure

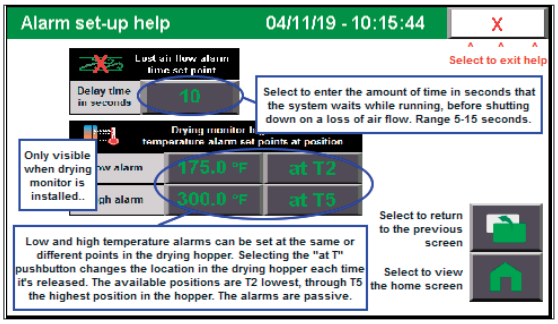
1 Press setup button from the home screen (logged in at appropriate level to see setup button),



2 Press Alarm setup button (triangle with wrench) from setup screen .



3 Set settings for probe postition temperatures that you would like to activate the alarm notifications from Alarm setup screen,



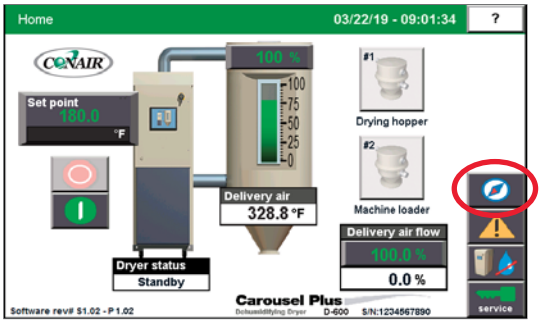
Once the process temperature and alarm location are established for the first hopper, the remaining hoppers in the system may be set up in an identical fashion.

Once hopper settings are made, only setting the Process Temp is required to align the DM functions with a particular drying application. But if necessary, further fine tuning of the process conditions can be made on the DM Set-up screen.

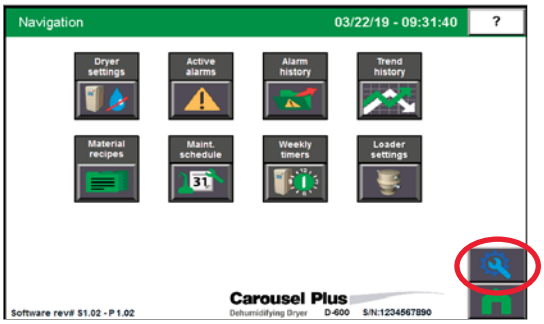
Setting Up Your DM: The Basics- Alarm Setpoint (continued)

From Stand Alone Dryer Screen Procedure

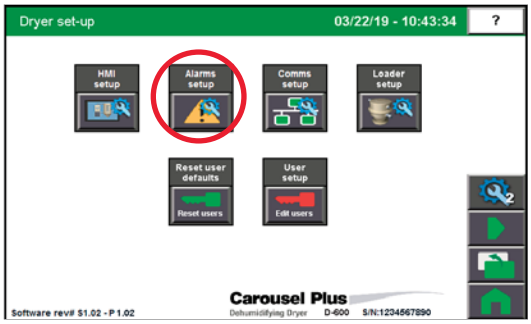
1 **Press the Navigation button.**



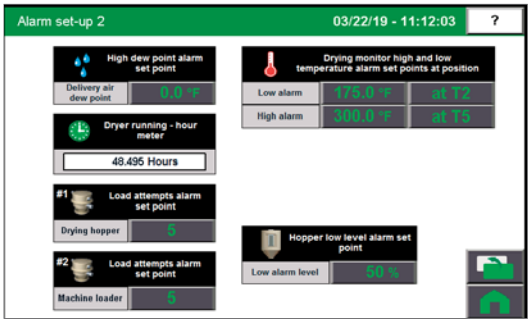
2 **Press the setup button (wrench).**



3 **Press the alarm setup button.**



4 **Set Drying Monitor high and low set points and positons.**



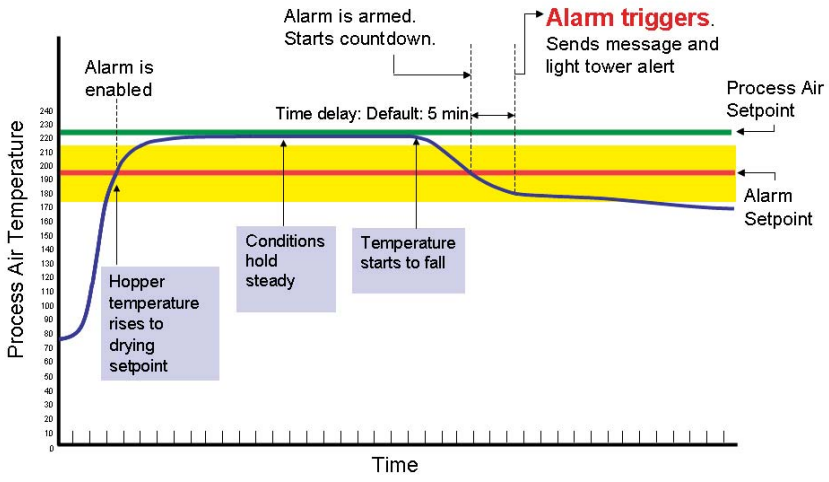
Drying Hopper Material Change

What happens when there is a drying hopper material change?

1 Change the process temperature. For example, let's say the process temperature is changed to 205°F from 225°F. If the DM is being used on a central drying with an HTC or Heater Pack, the process temperature on that hopper must be changed.

2 If material characteristics require a parameter adjustment, adjust that now. Otherwise, no further operator action is required.

This graph shows the time sequence of a DM alarm indicating low hopper air temperature, that could result in improperly dried material.



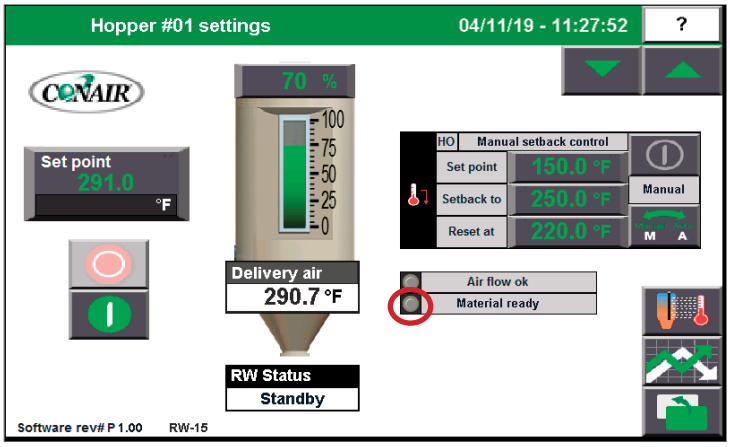
Material Ready Interlock Feature

The Drying Monitor option on your Carousel Plus dryer allows you to utilize Conair's Material Ready feature. This feature ensures that material is not conveyed to the machine until it has been dried at the proper temperature for the proper amount of time.

How does it work?

When T1, T2, or T3 locations of the Drying Monitor probe reach 95% of the setpoint for a user specified residence time, the interlock activates to allow material to convey to the molding machine or extruder. Until the material has dried for the proper amount of time at the proper temperature, the interlock will not allow material to be moved from the drying hopper. A material ready indicator is shown on the dryer control or the local hopper control (HTC, ResinWorks, or GasTrac control) indicating that material is ready.

If the temperature drops below 95% of setpoint, the residence timer stops until it returns to the setpoint range. It then continues counting up toward the desired residence time. For example - You have the residence time set at 4 hours. Your material reaches 95% of setpoint and dries for 2 hours within that range, but then drops to below 95% of setpoint for 10 minutes. After 10 minutes, your temperature returns to 95% of setpoint. The timer begins counting at 2 hours and continues until you reach the residence time of 4 hours. That 10 minutes did not count toward the residence time. But the time at temperature that was achieved was banked until the material reached the setpoint temperature again. (It did not restart the timer at 0 minutes - you got credit for time the material had already dried.)



This feature is designed to eliminate undried material making it to the molding machine, therefore eliminating the production of parts that are inferior due to moisture in the material.

Drying Hopper Volume by Model Number

Drying Hopper	Hopper Diameter	Volume (ft.³)	RTD Position	RTD Distance from the top	Volume up to RTD position (ft.³)
CH/RW 10-1	10	1	5	8.38	0.85
		1	4	12.88	0.65
		1	3	17.38	0.45
		1	2	21.88	0.28
		1	1	26.612	0.09
CH/RW 10-1.5	10	1.5	5	8.88	1.37
		1.5	4	16.13	1.04
		1.5	3	23.38	0.72
		1.5	2	30.63	0.46
		1.5	1	37.88	0.15
CH/RW 14-2	14	2	5	8.75221183	1.62
		2	4	13.75221183	1.18
		2	3	18.75221183	0.78
		2	2	23.75221183	0.35
		2	1	28.75221183	0.14
CH/RW 14-3	14	3	5	9.25	2.87
		3	4	17.25	2.17
		3	3	25.25	1.47
		3	2	33.25	0.80
		3	1	41.25	0.16
CH/RW 14-4	14	4	5	8.87	3.62
		4	4	19.12	2.72
		4	3	29.37	1.82
		4	2	39.62	0.95
		4	1	49.87	0.14
CH18-4	18	4	5	12.725	3.19
		4	4	18.225	2.38
		4	3	23.725	1.64
		4	2	29.225	0.84
		4	1	34.725	0.25
RW 18-5	18	5	5	10.41	4.36
		5	4	18.66	3.17
		5	3	26.91	1.97
		5	2	35.16	0.85
		5	1	43.41	0.25
CH/RW 18-6	18	6	5	10.12	5.87
		6	4	20.66	4.39
		6	3	30.91	2.92
		6	2	41.16	1.52
		6	1	51.41	0.25

(continued)

Drying Hopper Volume by Model Number

(continued)

Drying Hopper	Hopper Diameter	Volume (ft.³)	RTD Position	RTD Distance from the top	Volume up to RTD position (ft.³)
CH 24-8	24	8	5	13.23	7.38
		8	4	20.73	5.50
		8	3	28.23	3.56
		8	2	35.73	1.58
		8	1	43.23	0.39
RW 24-9	24	9	5	10.79	8.73
		9	4	19.54	6.48
		9	3	28.35	4.22
		9	2	37.04	2.09
		9	1	45.79	0.47
CH/RW 24-12	24	12	5	53.33	10.89
		12	4	42.58	8.14
		12	3	31.83	5.39
		12	2	21.08	2.72
		12	1	10.33	0.52
CH/RW 24-15	24	15	5	11.13	12.60
		15	4	24.63	9.14
		15	3	38.13	5.69
		15	2	51.63	2.32
		15	1	65.13	0.57
CH/RW 24-18	24	18	5	10.88	15.56
		18	4	27.38	11.35
		18	3	43.88	7.15
		18	2	60.38	2.94
		18	1	76.88	0.55
CH/RW 33-21	33	21	5	18.30	19.66
		21	4	29.80	13.96
		21	3	41.30	8.27
		21	2	52.80	2.95
		21	1	64.05	1.63
CH/RW 33-28	33	28	5	20.30	25.68
		28	4	34.80	18.52
		28	3	49.30	11.36
		28	2	63.80	4.19
		28	1	78.30	1.68
CH/RW 39-35	39	35	5	25.25	35.32
		35	4	38.75	25.98
		35	3	52.25	16.65
		35	2	65.75	7.83
		35	1	79.25	1.83

(continued)

Drying Hopper Volume by Model Number

(continued)

Drying Hopper	Hopper Diameter	Volume (ft.³)	RTD Position	RTD Distance from the top	Volume up to RTD position (ft.³)
CH/RW 39-42	39	42	5	25.25	42.38
		42	4	41.25	31.32
		42	3	57.25	20.26
		42	2	73.25	9.72
		42	1	89.25	1.90
CH/RW 44-58	44	58	5	27.00	59.24
		58	4	44.50	43.84
		58	3	62.00	28.45
		58	2	79.50	13.55
		58	1	97.00	2.73
CH 54-70	54	70	5	22.98	66.76
		70	4	33.48	52.85
		70	3	43.98	38.93
		70	2	54.48	25.01
		70	1	64.98	15.68
CH 54-85	54	85	5	23.98	80.12
		85	4	36.98	62.89
		85	3	49.98	45.67
		85	2	62.98	28.52
		85	1	75.98	15.17
CH 54-99	54	99	5	26.98	92.93
		99	4	42.73	73.05
		99	3	56.98	53.17
		99	2	71.98	33.40
		99	1	86.98	15.61
CH54-114	54	114	5	28.98	92.36
		114	4	47.23	69.17
		114	3	63.98	45.98
		114	2	81.48	22.78
		114	1	98.98	16.15
CH 54-129	54	129	5	29.98	116.87
		129	4	49.98	90.36
		129	3	69.98	63.85
		129	2	89.98	37.36
		129	1	109.98	16.15
CH 64-158	64	158	5	28.98	145.06
		158	4	46.98	111.55
		158	3	64.98	78.04
		158	2	82.98	44.98
		158	1	100.98	20.21

(continued)

Drying Hopper Volume by Model Number

(continued)

Drying Hopper	Hopper Diameter	Volume ($ft.^3$)	RTD Position	RTD Distance from the top	Volume up to RTD position ($ft.^3$)
CH 64-187	64	187	5	30.98	176.67
		187	4	52.23	137.11
		187	3	73.48	97.55
		187	2	94.73	58.15
		187	1	115.98	20.73
CH 64-215	64	215	5	33.98	198.55
		215	4	58.23	153.40
		215	3	82.48	108.25
		215	2	106.73	63.16
		215	1	130.98	20.73
CH 64-248	64	248	5	34.48	229.24
		248	4	62.48	177.12
		248	3	90.48	124.99
		248	2	118.48	72.86
		248	1	146.48	23.49
CH 74-245	74	245	5	30.98	180.95
		245	4	50.48	132.42
		245	3	69.98	40.15
		245	2	89.48	22.59
		245	1	108.98	5.62
CH 74-366	74	366	5	38.98	304.39
		366	4	68.48	230.97
		366	3	97.98	157.55
		366	2	127.48	29.68
		366	1	156.98	5.90
CH 74-487	74	487	5	47.98	369.86
		487	4	86.98	272.79
		487	3	125.98	175.72
		487	2	164.98	42.10
		487	1	203.98	6.78

Understanding Bulk Density

Bulk density is the weight of material in pellet form, where the material has a lot of free space between pellets. It is not a specification that material suppliers typically provide. You may need to calculate the bulk density. It is important not to confuse bulk density with material density, which is the weight of the plastic in solid form without any air gaps between pellets.

How to calculate the bulk density-

1. **You will need a container or bucket that you know the volume of to calculate the bulk density of your material.**

2. **Weigh the empty container and record the weight.**

3. **Fill the container with your material, level it off at the top with a straight edge.**

4. **Weigh the container with material in it.** Record this weight.

5. **Subtract the weight of the empty container from the weight of the container** with the material present. The result will be the weight of the material for the volume of the container.

6. **Convert the number you calculated in step 4, to lbs. per cubic foot. (lbs/ft^3)** For example, if your container had a volume of 0.5 ft^3 and the material weight was 20 lbs., divide 20 lbs by 0.5 ft^3. The result: The bulk density of the material is 40 lbs/ft^3.

Interpreting Drying Monitor Trend Curves

⚠ **IMPORTANT:** The descriptions and curve examples shown in this user guide are for general reference only and may not relate to the characteristics of your specific drying process. These guidelines are intended to make the user aware of common temperature patterns of common drying applications to allow correct identification of proper or improper drying through observation of the temperature patterns within the drying hopper as displayed by the DM.

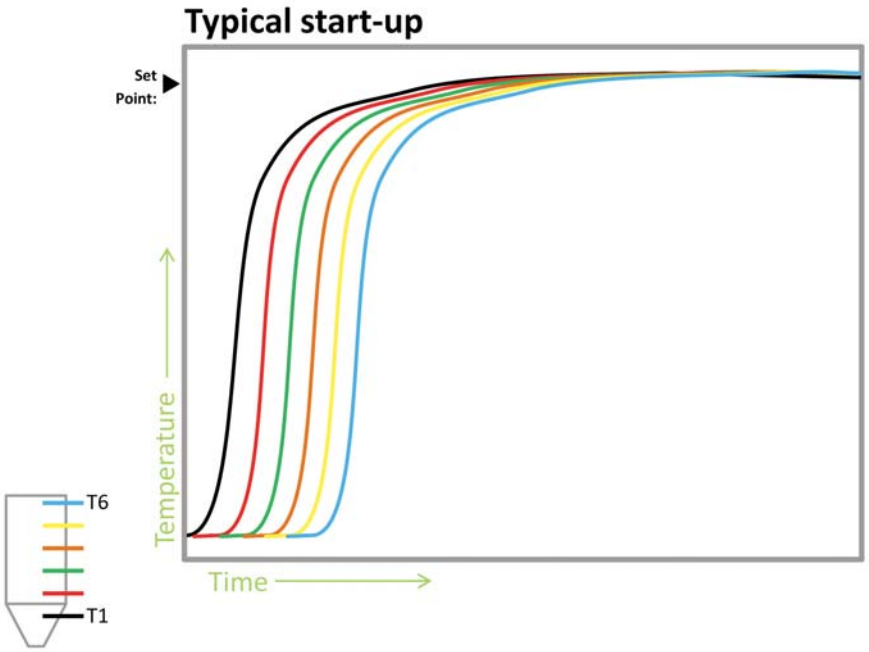
Any of these variables can effect how your drying system's particular trending curves and data will be displayed:

- hopper size and length/diameter relationship
- drying system and heat/air delivery capability
- bulk density of material being dried
- drying temperature
- condition of the drying equipment's heaters, filters and blowers and heat/air delivery system
- proper installation, condition and connection of the DM hopper probe
- type and regularity of the automated loading system being employed
- level of the material in the hopper
- temperature of incoming, new material
- specific location of probe sensors, once installed

✎ **NOTE:** Conair recommends that users familiarize themselves with these guidelines to develop an understanding of typical drying parameters and then apply those principles to monitor their own particular drying system.

Interpreting DM Trend Curves-
Typical Startup

Upon start-up with a full hopper of material, temperatures read by all DM probes will rise towards the drying set point temperature, starting with T1. If processing does not start (no material taken away from the hopper) eventually all the probes (with the possible exception of T6 if it is above the material level) will come very close to the process temperature.



All probes align with set point temperature: All temperature zones will align with the inlet temperature. The material is not yet moving, so temperatures become uniform.

Interpreting Drying Monitor Trend Curves- Normal Operation

NOTE: If the alarm location sensor never reaches the drying temperature setpoint, there is a problem with the drying system and it should be examined for proper operation. Refer to the user guide for your dryer.

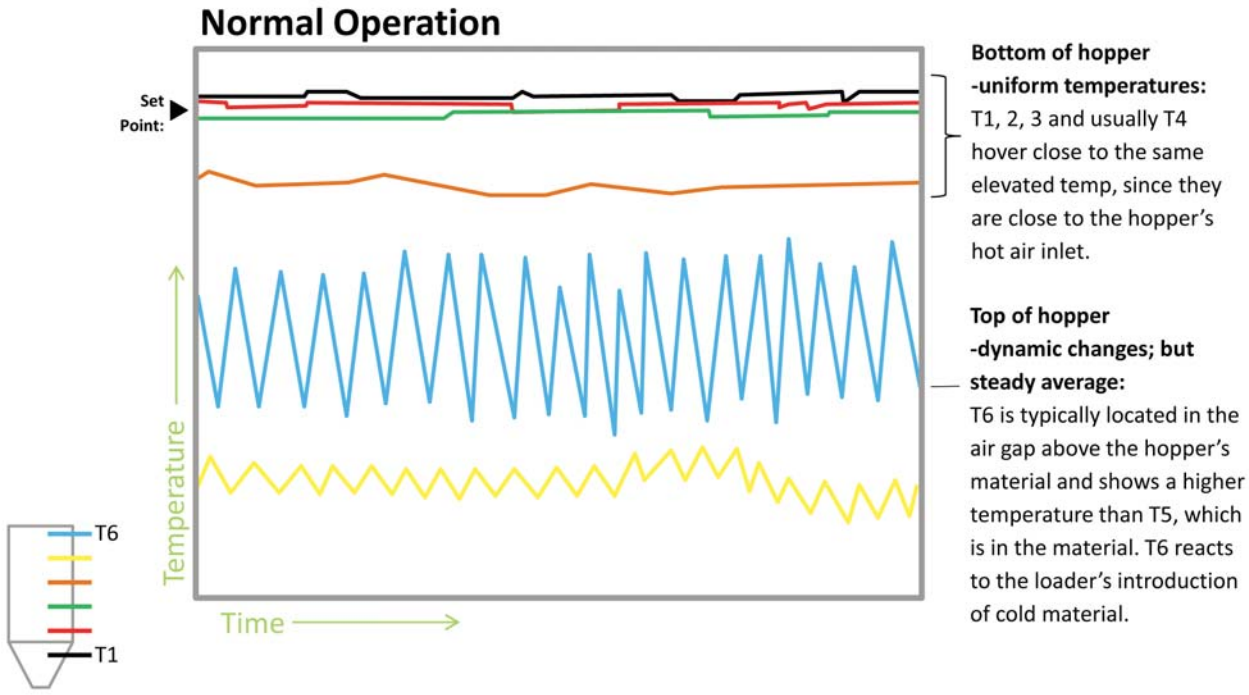
NOTE: If equipped with material ready introduce drying temp must be at 95°F at setpoint for use selected residence time.

The DM can be used to determine when successful drying is underway and processing of material can begin, using the following guidelines:

- *See Operation:Setting Up Your DM: The Basics-Alarm Location* for establishing the "alarm location" sensor for your drying system (this is typically T3 or T4).
- The alarm location sensor can be used to determine when the hopper's material has been sufficiently exposed to proper drying temperature for the proper length of time (residence time) and processing of the material in the hopper can begin.
- Processing can begin when the alarm location sensor (typically T3 or T4) has stabilized at the drying temperature setpoint for approximately 50% of the required residence time.

  Example: If the material drying temperature is 250°F and the required residence time is 4 hours, once the alarm location sensor has displayed 250°F for 2 hours (50% of 4 hours), processing can begin.

In normal operation, T1 will read closest to the process air temperature.



(continued)

Interpreting Drying Monitor Trend Curves- Normal Operation (continued)

In normal operation with material flowing through to the process, readings from T1, T2 and T3 will typically be very close to the process air temperature. T4 and T5 (and T6 if it is located in material) will display temperatures descending in value from the process temperature.

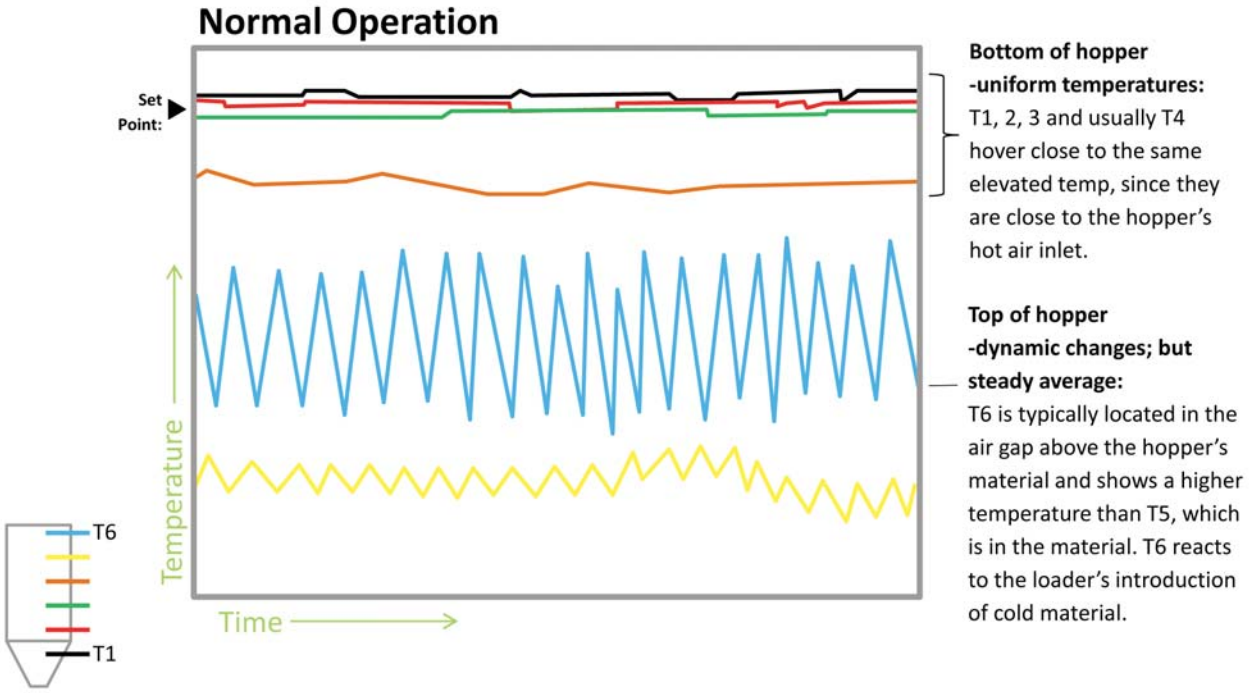
In normal operation with material flowing through to the process, if T6 is located in the air space at the top of the hopper (where there is no material), it will display a higher temperature than T5, which is typically located within the material. This is because a sensor in the open air is not in contact with heat-consuming resin. This is especially true at higher (275+°F) drying temperatures.

The hopper design, and how the material comes to rest in the hopper (the "angle of repose") and the loading system being used typically dictate the size of the "no-material" area at the top of the hopper depending upon:

- where the demand switch for loading more material is located
- how far into the hopper the discharge of the loader/receiver extends

The DM can show a reaction to successful automated material loading as a drop in the T5 temperature (from the loading of new, cold material), alternating with a rise of T5 (as the new material absorbs drying heat). This reaction can be seen as a saw-tooth up/down temperature pattern.

NOTE: Hoppers being used at less than full capacity (hoppers using demand sensors on their viewing windows for loading, small drying jobs, hoppers that are larger than necessary for the drying task, etc) are likely to have more than one sensor exposed to air and not material, and this should be taken into consideration when analyzing DM data. This consideration is also important when selecting the " alarm location" sensor. *(See Operation: Setting Up Your DM: The Basics-Alarm Location.)*



Interpreting Drying Monitor Trend Curves- Material Flow problems

If material flow through the drying hopper is slowed down (a decrease in material throughput), the difference in temperature readings between T1 and T5 will steadily decrease. T4 and T5 will gradually align towards the T1 temperature since the slower moving material will absorb more of the drying heat.

If material flow is stopped (no material is leaving the hopper) and prior to any energy saving functions in the dryer being engaged, the temperature readings from T4, T5 and T6 will begin to increase and align with the process temperature. The stopped material now has time to more fully absorb drying heat.

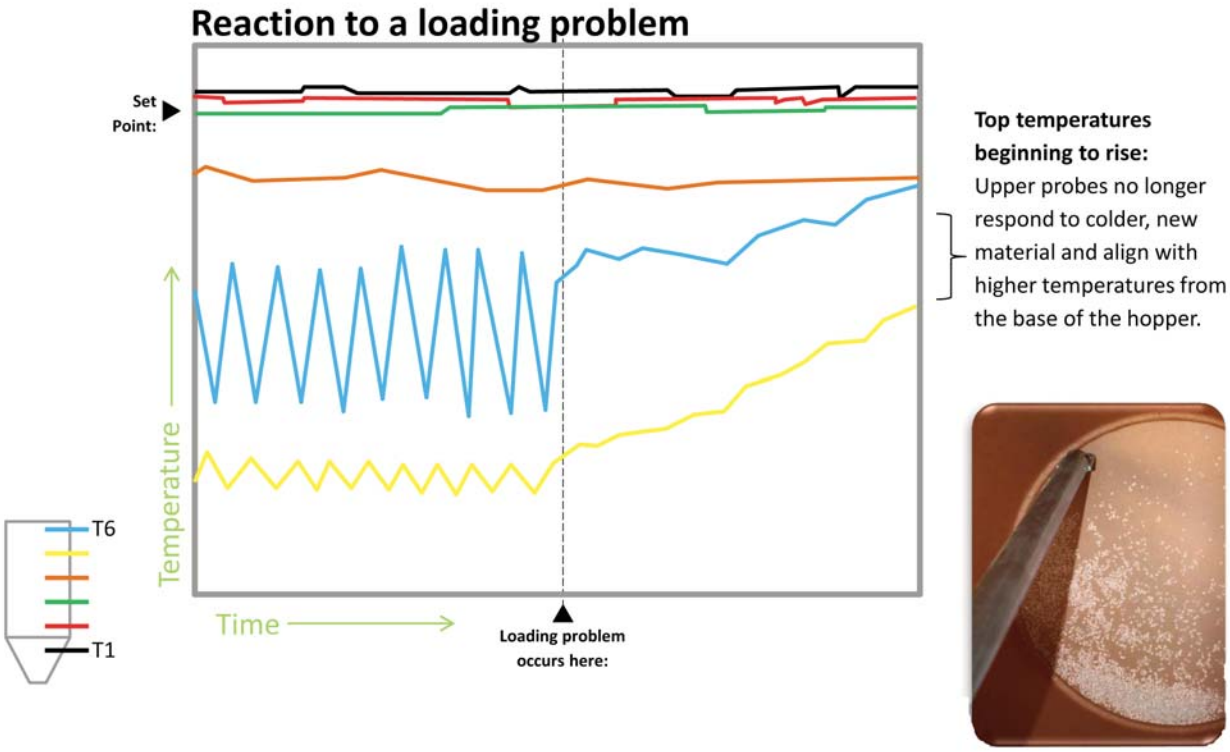
If material flow increases (an increase in throughput), the difference in temperature readings between T1 through T5 will steadily increase. The faster moving material now spends less time being heated so the difference in temperatures read at the bottom of the hopper compared to the top, will display a greater spread.

✎ **NOTE:** An increase in the difference between T1 through T5 (as described above) can also be the result of an increase in the quantity of reground material being dried in the hopper. Increasing the quantity of regrind decreases the bulk density of the material being dried and increases the flow of material.

Interpreting Drying Monitor Trend Curves- Loading problems

If the loading function stops (no new material being supplied to the hopper) while normal operation is underway, T5 and T6 will increase in temperature as the heat-consuming material level in the hopper decreases. T4 will eventually follow, especially if it also becomes exposed to air and not material.

✎ **NOTE:** Successful drying is in jeopardy if the material supply to the hopper is interrupted. Even if the problem is corrected and the hopper is refilled, the incoming material will not be exposed to the proper length of residence time for successful drying.

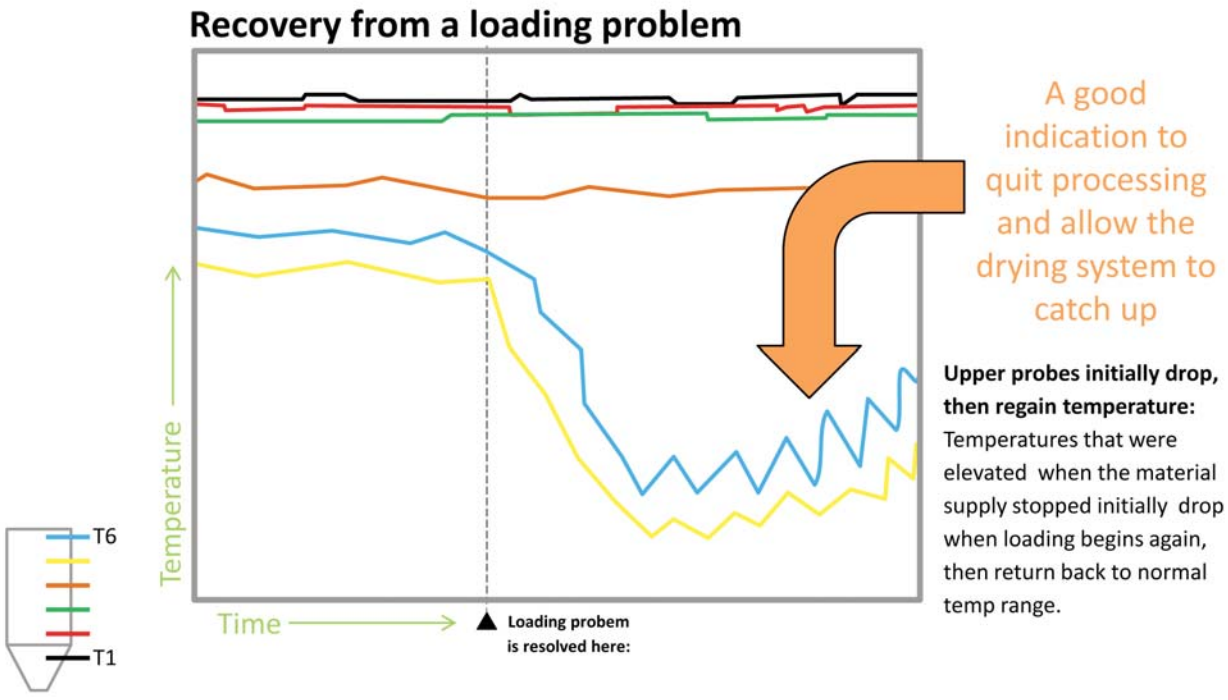


(continued)

Interpreting Drying Monitor Trend Curves- Loading problems (continued)

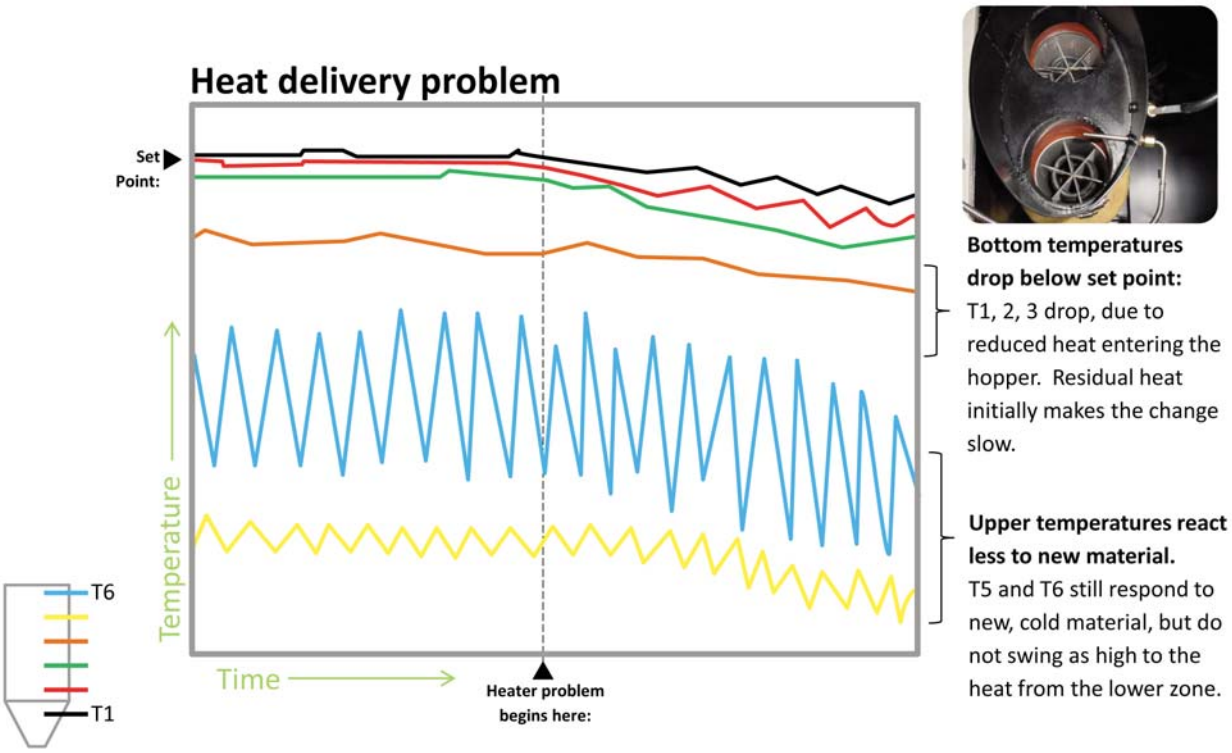
When automatic loading is restored, (new material is once again supplied to the hopper), T3 through T5 will initially drop in temperature from exposure to the new, colder material coming into the hopper, and then begin to rise and realign into a normal temperature profile for the hopper.

✎ **NOTE:** The drop in temperature displayed by T3 through T5 is a reaction to a quantity of cold material being introduced into the hopper following a lapse of automatic loading. This drop can be compared to a 'cold front' of material moving down through the hopper that has not been exposed to drying in the hopper for a long enough residence time. Temporary halting of the process should be considered to allow the drying system to catch up and deliver proper residence time to this new material, to prevent production of insufficiently dried product. If the process is not stopped, this 'cold front' will eventually be seen to a lesser degree, on T2, then T1.



Interpreting Drying Monitor Trend Curves- Problems with Heat Supply

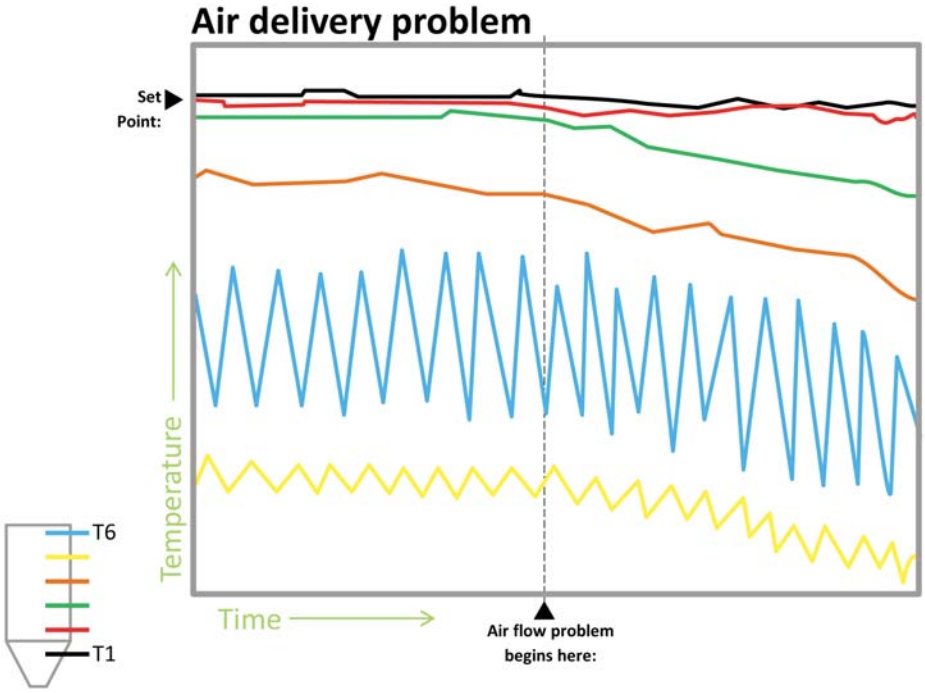
Problems with the heat supply (reduced temperature) to the drying hopper initially show up as a reduction in T1 and T2 temperature readings. Frequently, this reduction does not display immediately due to the residual heat of the material. The remaining probes will also sequentially decrease in temperature as the problem continues.



Interpreting Drying Monitor Trend Curves- Air Supply Problems

Problems with the air supply to the drying hopper (I.E: clogged filters or blocked drying air supply line) initially show up as a reduction in the T5, T4, and eventually T3 temperature readings since the air flow is no longer strong enough to carry the drying heat up through the hopper. The remaining probes will also decrease in temperature as the problem continues, even though T1 and T2 continue to display levels close to the process temperature. This can be a very gradual reaction to filters gradually becoming clogged.

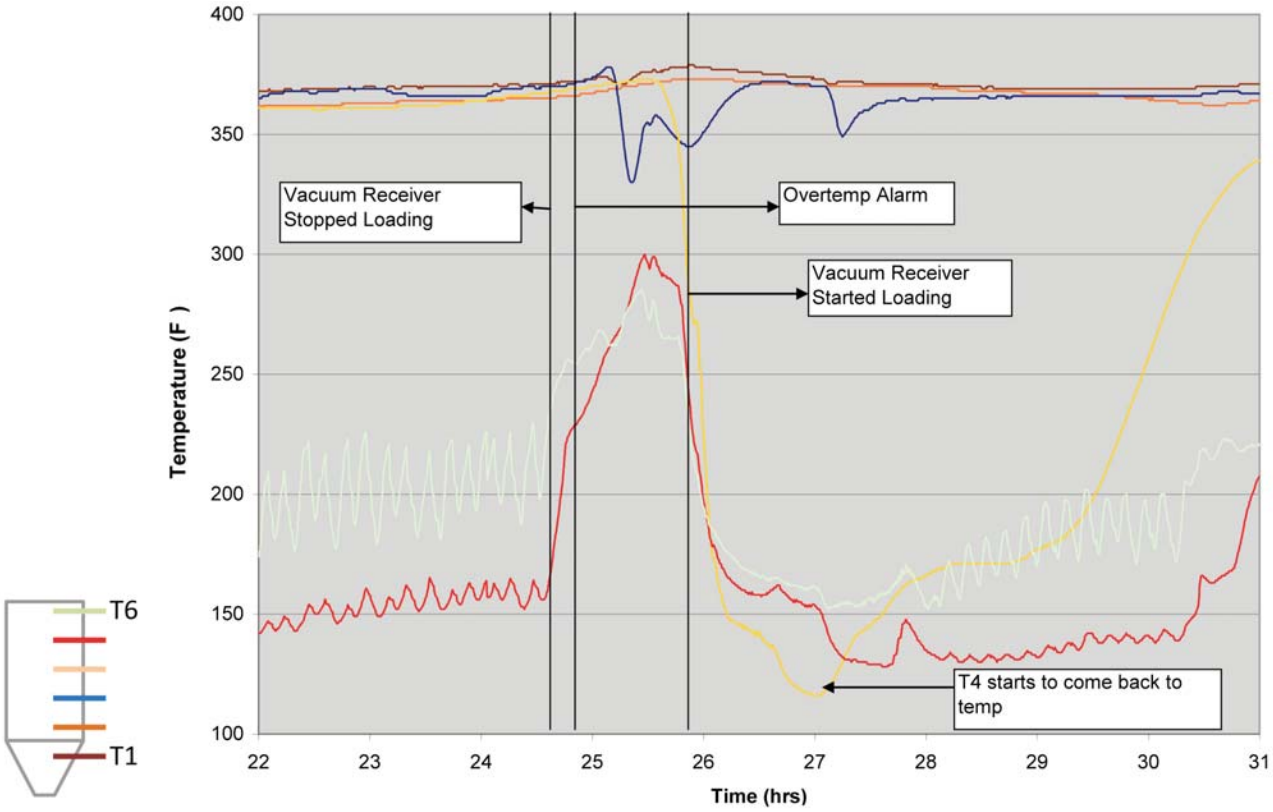
✎ **NOTE:** A decrease of T3 (as described above) can also be the result of an increase in throughput or an increase in the quantity of reground material being dried in the hopper. Increasing the quantity of regrind decreases the bulk density of the material being dried.



Mid temperatures react to reduced air flow.
T4 and T5 begin to drop since air flow is not strong enough to drive heat to them. T3 will eventually follow. But T1 and T2 often stay strong since they are still receiving the proper heat, in spite of reduced air flow.

Interpreting Drying Monitor Trend Curves- Actual DM Trend Analysis

Below is an actual trend analysis used by a PET bottle processor to find the cause of overnight process variations.



Preventative maintenance schedule

No specific maintenance schedule is required for the Drying Monitor since there are no moving parts. All components of the system are electrical in nature, but like any component in a factory, can be prone to unforeseen breakage.

In the event of breakage, replace the component(s). Do not attempt repair.

- **When material is changed.** Since a key component of the DM is the temperature probe(s) and they are exposed to your material and elevated temperatures, they should be checked whenever their host drying hopper is drained, cleaned, etc. No specific preventative maintenance is required beyond wiping down and examining for damage whenever the hopper is empty, cool and available for inspection. In the event of visible damage or non-operation, replace the probe. Do not attempt repair.

In addition, the coupling assembly that holds the probe in place should be closely examined from the top of the hopper and inside the hopper to be sure it is intact and has not been damaged or become loose as a result of use in the hopper.

- **Monthly, or as often as needed**
  - ❒ **Check that the cables and junction boxes associated with the DM.** Make sure all cables are intact, undamaged, out of harm's way, etc.
  - ❒ **Correct the mounting integrity of junction boxes as required and re-route the ModBus cables to avoid high amperage electrical lines and/or moving, hot or sharp objects.**

What the Drying Monitor Can Tell You

The DM monitors the temperature profile of the material in the hopper using six Resistance Temperature Device (RTD) sensors. These RTD sensors are located at evenly spaced positions in the drying hopper. Monitoring the six sensors creates an accurate profile of the hopper's temperature gradient. This simple gradient measuring system informs the user that major characteristics of good drying are present (or not).

Heat: Each probe precisely measures the heat being created by the dryers heating system and more importantly, the changes that heat goes through as it is combined with the flow of material through the hopper. Heated air is going up in the hopper and is constantly facing a refreshed supply of material while that material is flowing down and into the process, which creates a predictable heat profile for good drying inside the hopper. The DM keeps precise track of that profile and alerts you if something is not as it should be for good drying.

Air flow: Air is the medium that carries heat to the drying hopper and carries moisture away from the material. By keeping track of different heat zones in the drying hopper, the DM is also passively keeping track of the air flow through the hopper.

Time: The DM interprets the temperature findings from the drying hopper and knows how long material needs to be kept at the correct temperature for good drying. Once again, by measuring each of the six zones the DM can tell you if you are getting good drying performance or if something is not correct for success.

Understanding Alarms

The DM monitors each hopper and will give you an alarm if the temperature falls below your established alarm setpoint. See *Operation: Setting Up Your DM: The Basics- Alarm Setpoint* for more information about setting the alarm setpoint.

The DM uses the DC-C's alarm system to alert the user to an alarm condition. Refer to the User Guide that came with your dryer for more information on understanding alarms.

The information in the alarm notification box on your DC-C screen tells you which hopper has triggered the alarm, and at what time the alarm delay was met. For example, after being at temperature, Hopper 1 fell below the alarm setpoint for a period of time longer than the alarm delay. The DM triggered an alarm so that you can determine the problem and avoid downtime due to material not being properly dried.

Drying Monitor Problems

Symptom	Possible cause	Solution
Hopper data does not display	**Connection to RTD(s) in hopper(s) is incorrect or disconnected.**	❒ Check integrity of cable connections from drying monitor panel to RTD junction boxes to RTD.
	The last hopper in the ModBus string is not terminated.	❒ See section **Terminating the final RTD Junction Box** for properly terminating the last hopper
	Loose or damaged connectors in the ModBus cables.	❒ Check all connections and replace cable set(s) that are damaged
	Damaged connectors on the hopper probe.	❒ Replace the hopper probe.
	Defective temp sensor(s) within the probe.	❒ Replace the hopper probe.
Hopper alarm message appears on touch screen.	**A low temperature condition has been sensed by the drying monitor in the hopper listed in the alarm message**	❒ Press trend button on Drying Monitor, and select the alarm hopper to view the specific time the temperature dropped, to pinpoint possible problem. ❒ Review settings in the hopper set-up screen to assure the drying monitor settings are correct for the current drying task. ❒ Check drying system for insufficient air flow caused by blower malfunction or damaged or plugged air connection to hopper from dryer. ❒ Check if drying system material throughput has elevated due to process change or sharing of material with another process, beyond the capabilities of the drying system.