DM-II Drying Monitor

What is the DM-II Drying Monitor?

The DM-II Drying Monitor is a patented instrument that is integrated into your dehumidifying drying system. The DM-II monitors the drying process as it occurs within the drying hopper. The DM-II can be programmed to alert the operator if the drying process deviates from a pre-determined and programmed range of drying parameters established by the operator.

Typical Applications

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

The DM-II will alert the operator, through a passive alarm shown on the control and on a light tower located on the top of the dryer, 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.

How the DM-II Works

Red - The dryer has stopped/shut down alarm on the dryer

Amber - possible trouble/ DM-II passive alarm

Green - running properly

The DM-II monitors the vertical temperature profile of the material in the drying hopper. The DM-II's six temperature sensors are located within the DM-II's temperature probe that has been / or will be installed in your drying hopper. If the temperature moves beyond the high or low setpoints, the DM-II alerts the operator through a passive alarm displayed on the control front and a light tower. The light tower lights green when everything is running properly, amber to indicate possible trouble, and red to alert the operator that the dryer has stopped. The DM-II will alert the operator if, after starting the dryer, the appropriate drying temperature has not be reached within four hours. **NOTE:** Four hours is the default time. The time can be changed with a supervisor password.

RTD Sensor Positions in the Hopper

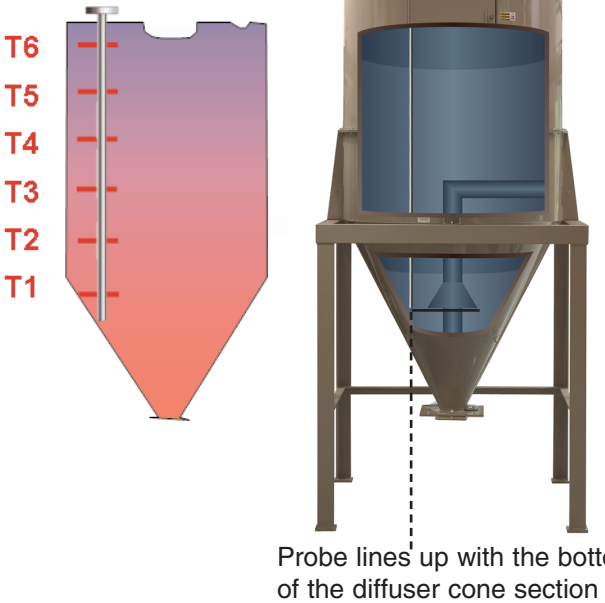
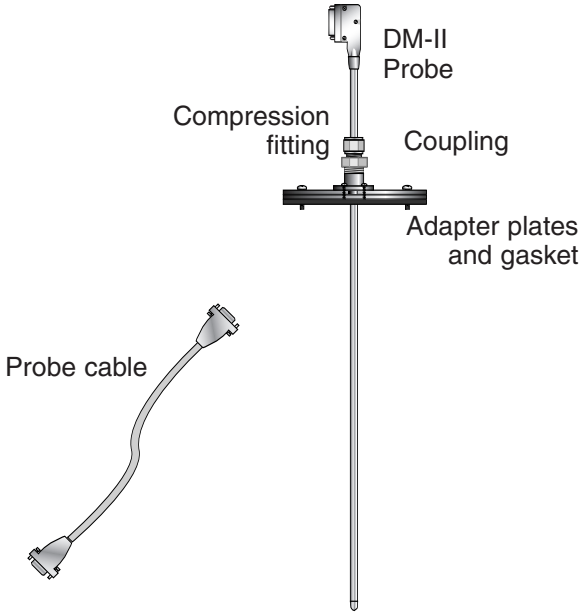


Figure 1

RTD's will be referred to in this Appendix and on your dryer as T1, T2, T3, T4, T5, and T6. T1 is the lower most temperature sensor within the DM-II temperature probe and is positioned at the bottom of the "funnel-shape" of the diffuser cone section. *See Figure 1.* T6 is the upper most temperature sensor in the DM-II 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.

Unpacking the Boxes

The DM-II comes in two or more shipping containers, depending on the options ordered. The containers should include:



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

2. **Remove all packing material, protective paper, tape, and plastic.** Do not discard installation notice tags. If you bought more than one DM-II, check each for a tag indicating which drying hopper it was factory-configured to monitor. *See the specifications on the next page to match the drying hopper model with the part number on the DM-II probe.*

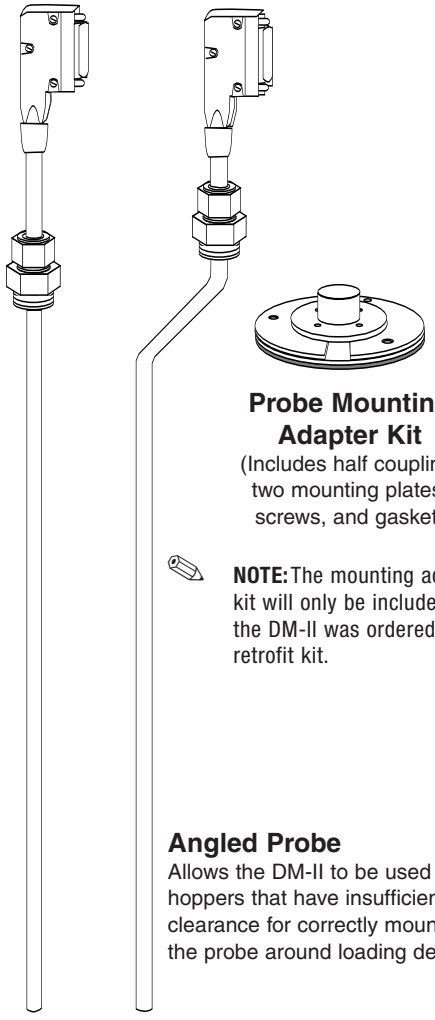
3. **Carefully inspect all components** to make sure no damage occurred during shipping, and that you have all the necessary hardware.

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

5. **You are now ready to begin installation.**

Specifications: DM-II Probe

Drying Hopper #	Conair Part #
CH/RW 10-1	18189901
CH/RW 10-1.5	18189902
CH/RW 14-2	18189903
CH/RW 14-3	18189904
CH/RW 14-4	18189905
CH 18-4	18189906
RW 18-5	18189907
CH/RW 18-6	18189908
CH 24-8	18189909
RW 24-9	18189910
CH/RW 24-12	18189911
CH/RW 24-15	18189912
CH/RW 24-18	18189913
CH/RW 33-21	18189914
CH/RW 33-28	18189915
CH/RW 39-35	18189916
CH/RW 39-42	18189917
CH/RW 44-58	18189918
CH 54-70	18189919
CH 54-85	18189920
CH 54-99	18189921
CH 54-114	18189922
CH 54-129	18189923
CH 64-158	18189924
CH 64-187	18189925
CH 64-215	18189926
CH 64-248	18189927
CH 74-245	18189928
CH 74-366	18189929
CH 74-487	18189930



Probe Mounting Adapter Kit
(Includes half coupling, two mounting plates, screws, and gasket)

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

Angled Probe
Allows the DM-II to be used on hoppers that have insufficient clearance for correctly mounting the probe around loading devices.

Installing the DM-II 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-II 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.

There are three mounting methods for the probe:

- **Select Mounting Method 1** if you purchased a new Conair 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

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

NOTE: If the angled probe is used, the bend in the probe must be oriented to the left of the probe connector. The male connector must face directly away from the center of the hopper.

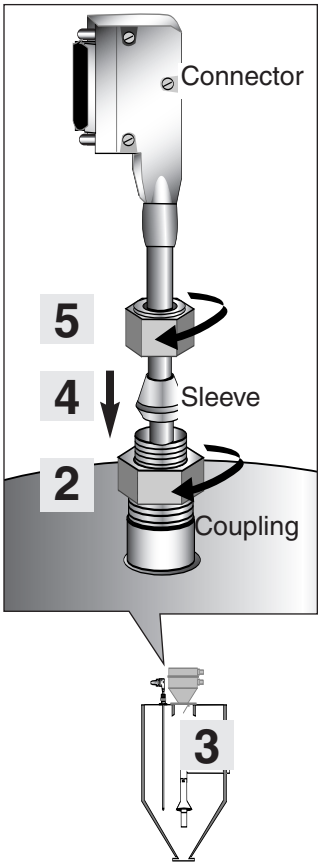
1 **Insert the probe through the coupling** in the top of the drying hopper.

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.



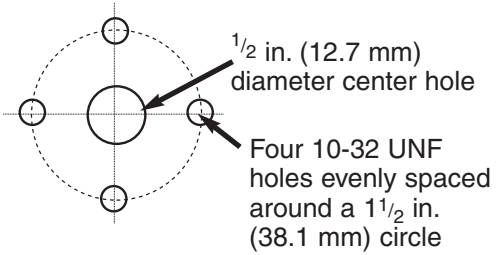
Tools for Installation:

- ❒ *3/4-in. wrench*
- ❒ *7/8-in. wrench*

Mounting Method 2

1 **Reference the drawings at the end of this Appendix** 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.



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

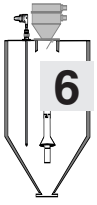
TIP: Stretch cloth or plastic across the inside of the hopper to catch metal shavings from the hole you will drill in the top of the hopper.

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.

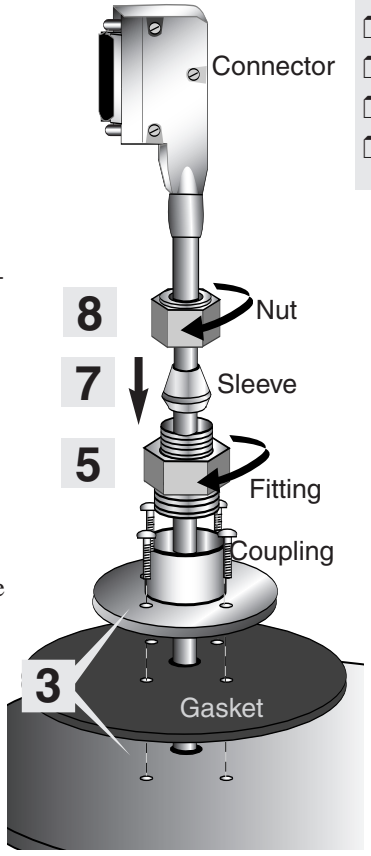
5 **Screw the fitting into the coupling.** Tighten with a wrench.

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.



Tools for Installation:

- ❒ *Drill and 10-32 tap*
- ❒ *Knife*
- ❒ *Flathead screwdriver*
- ❒ *3/4-in. wrench*
- ❒ *7/8-in. wrench*

NOTE: If the angled probe is used, the bend in the probe must be oriented to the left of the probe connector. The male connector must face directly away from the center of the hopper.

Mounting Method 3

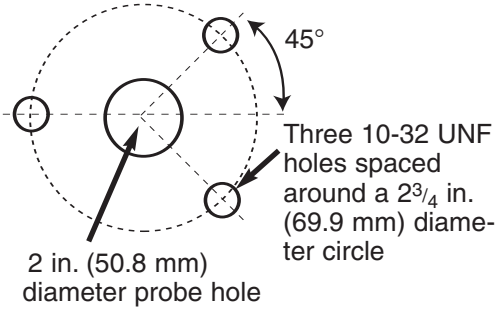
TIP: Stretch cloth or plastic across the inside of the hopper to catch metal shavings from the hole you will drill in the top of the hopper.

Tools for Installation:

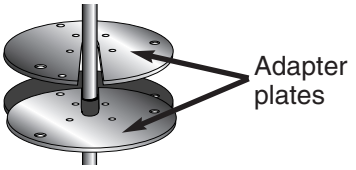
- ❒ *Drill and 10-32 tap*
- ❒ *Flathead screwdriver*
- ❒ *3/4-in. wrench*
- ❒ *7/8-in. wrench*
- ❒ *2-in. hole saw*

1 **Reference the drawings at the end of this Appendix** 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.



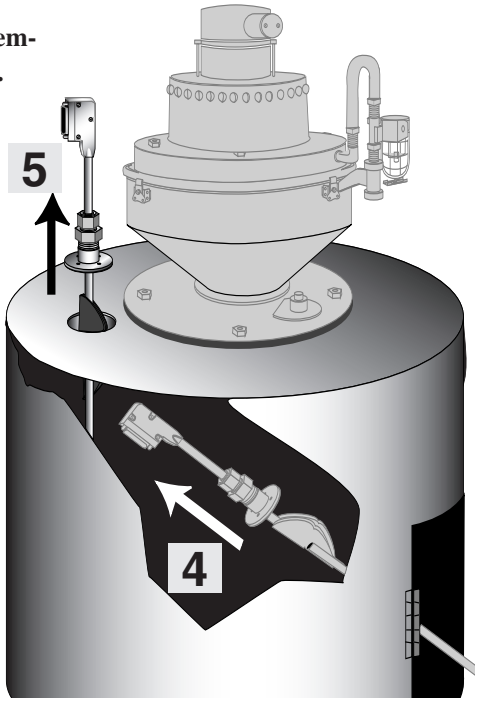
3 **Remove the two adapter plates from the probe mounting assembly.** Set the adapter plates aside for use in Step 7.



NOTE: If the angled probe is used, the bend in the probe must be oriented to the left of the probe connector. The male connector must face directly away from the center of the hopper.

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.



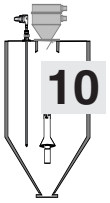
Mounting Method 3 (continued)

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.

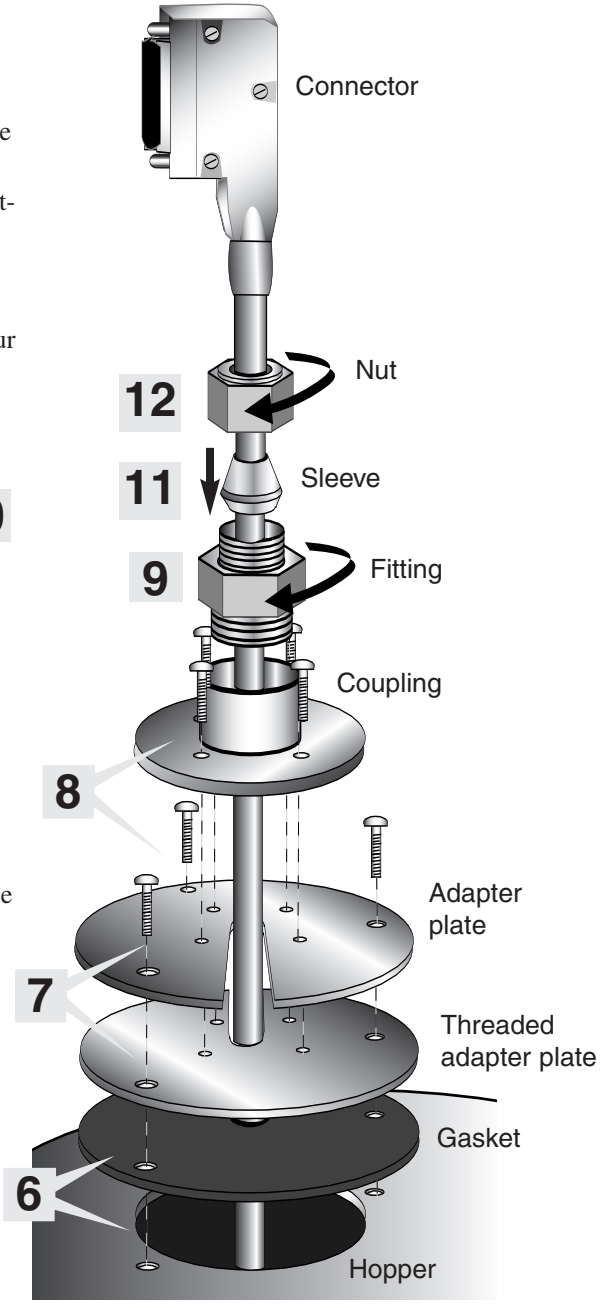
9 **Screw the fitting into the coupling.** Tighten with a wrench.



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.



Setting Up Your DM-II - The Basics

✎ **NOTE:** To understand the navigation of your control, *see the Control flow diagrams beginning on page AA-22 of this appendix.* There are also control flow diagrams in the operation section of your dryer manual.

The DC2 control on your dryer ships with the drying monitor software installed, but all of the functions are turned off by default to avoid nuisance errors due to improper set up. To enable the DM-II: set the dryer process air temperature, select an RTD for the alarm setpoint, and select the low temperature RTD sensor. (Instructions for setting each begin on the bottom of this page).

Selecting the low temperature RTD sensor will automatically engage the DM-II. Once the low temperature RTD is selected, the control will alert the operator if the appropriate drying temperature is not reached within four hours (default time).

Setting the Process Temperature Setpoint on a Non-Central Dryer
(dryer has a process heater)

The process temperature default screen shows the process air temperature setpoint and the actual temperature measured at the inlet to the drying hopper.

SCREEN 3 (DEFAULT SCREEN)

PROCESS TEMPERATURE	
ACT 325°F	SET 325°F

1 **Navigate to the process temperature screen on the dryer.** See the control function flow charts located in the Operations section of the dryer manual.

2 **Enter the dryer process setpoint temperature on the dryer.** The setpoint can be changed by pressing the Select Category button under the setpoint value. Once the button is pressed, the setpoint will begin to flash. The numeric keys can be used to enter a new setpoint or the +/- (Increment/ Decrement) buttons can be used to change the setpoint. Holding the +/- buttons will cause the number to ramp up or down faster the longer the button is held. The enter key must pressed to accept the new number.

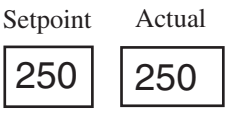
The display will return to the default screen from anyplace in the menu structure (with the exception of the AUTOTUNE screens) if nothing is done after ten minutes.

Pressing the MENU button from anyplace in the menu structure will also return to the default screen. *See the Control Functions Flow Charts located in the Operations section of the dryer manual.*

Setting the Process Temperature Setpoint on a Central Dryer

If you are using a central dryer, you will need to set the process temperature on the Hopper Temperature Controller (HTC) connected to your drying hopper. *See the Control Functions Flow Charts located in the Operations section of your HTC manual UGD031.*

SCREEN 4 (PROCESS TEMPERATURE SCREEN)

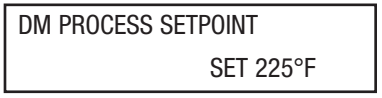


1 **Navigate to the process temperature** on the Hopper Temperature Controller (HTC). See the control function flow charts located in the Operations section of the HTC manual.

2 **Enter the process setpoint temperature on the Hopper Temperature Controller (HTC).** The process temperature is a setpoint and the actual temperature measured at the inlet to the drying hopper. The +/- buttons can be used to change the setpoint. Holding the +/- buttons will cause the number to ramp up or down faster the longer the button is held. The display will return to the default screen from any place in the menu structure if nothing is done for ten minutes.

3 **Enter the same process temperature setpoint on the dryer control so that the control knows the target temperature.** Once the process temperature is set at the HTC, you will need to enter this same temperature setpoint in the drying monitor control so that the control knows the target temperature. This is set on screen "M", *see the drying monitor control function flow charts and descriptions later in this appendix.*

SCREEN M (DM-II SETPOINT SCREEN)



Selecting the Low Temperature RTD

SCREEN B (DM-II LOW ALARM SELECT)

DM LOW ALARM SELECT	
T4	EDIT

TIP: Conair recommends controlling at an RTD in the middle of the material zone. For example a full hopper probably around RTD 3 or 4 - half-full hopper may be around the RTD 2 position.

This is the DM-II low alarm select screen. On this screen, you will need to select an RTD to measure the temperature for your low temperature alarm. The default for this screen is set to off. Some hoppers use level sensors to adjust material level in the hopper. If that is the case, you will want to make sure the sensor selected is in the material.

NOTE: If you choose an RTD that is too high in hopper, there is a chance that you will get a nuisance alarm when new "cold" material is loaded into the hopper. To avoid the nuisance alarms you can: adjust the alarm band (open up the tolerance); move the alarm setpoint or increase the temperature offset. You could also choose a different RTD located lower in the hopper.

Observing the temperatures of the RTD's at a steady operating state will help you to decide which RTD would be best to use to measure the setting for your low temperature RTD.

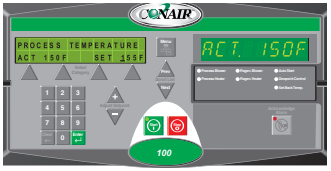
1. **Observe the RTD readings on the dryer control**. At a steady operating state scroll through the RTD readings to understand the temperature profile inside your drying hopper. *See page AA-23 "View/Monitor Screens"*, the flow chart located on that page will help you navigate to the area of the control where you can monitor the temperature at each of the RTD locations.

2. **Select the Low temperature RTD to use as a low temperature alarm.** Press the "Edit" key and the left side of the display will cycle through the RTD choices. Once the desired RTD is shown on the left side of the display, press the enter key to select the RTD.

Setting the Low Alarm Setpoint

SCREEN C (DM-II LOW ALARM SETPOINT)

DM LO ALARM SETPOINT SET 150°F



Numeric Keypad

Increment/Decrement Buttons

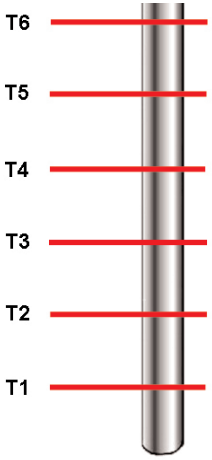
1 **This screen displays an automatically calculated value of the process temperature** minus the offset screen "D", *see the drying monitor control function flow charts and descriptions later in this manual*, minus ½ the band on screen "E", *see the drying monitor control function flow charts and descriptions later in this manual*. This alarm setpoint will move up or down based on your process setpoint temperature.

NOTE: You can choose to accept this value or change it (within the established band limits, *see page AA-27 later in this manual)* based on your processing needs. To change the value, push the select category button under the displayed value so that it begins flashing/blinking, then use either the numeric keys to enter a new value or the +/- (Increment/ Decrement) buttons can be used to change the value. Holding the +/- buttons will cause the number to ramp up or down faster the longer the button is held. Once the new value you have selected appears in the display push enter.

NOTE: If you choose an RTD that is too high in hopper, there is a chance that you will get a nuisance alarm when new "cold" material is loaded into the hopper. To avoid the nuisance alarm you can: choose a different RTD located lower in the hopper; adjust the alarm band (open up the tolerance); move the alarm setpoint or increase the temperature offset.

Getting the Most from Your DM-II

This simple overview provides an example of how the DM-II works.
Detailed instructions for installation and operation are also contained in this appendix.

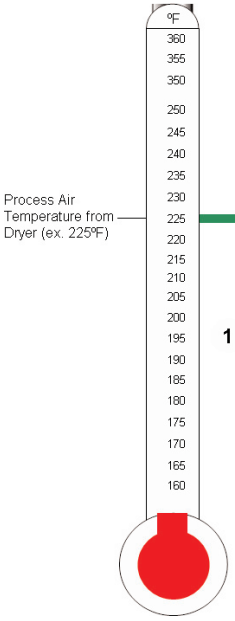


How to Use the DM-II

1 Set the dryer process air temperature

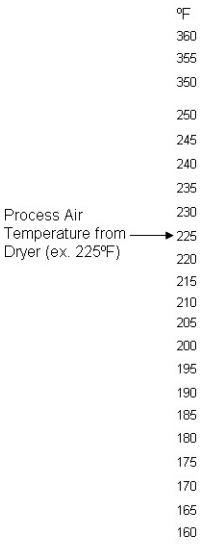
2 Select an RTD for the alarm setpoint

The DM-II will provide an alert in event of low hopper air temperature.

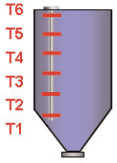


1 The operator sets the process air temperature on the dryer or on the HTC for Central dryer applications.

In this example, the operator is setting the process air temperature to 225°F.



2 Next, the operator selects one of the six **RTDs** as a monitoring position for the alarm setpoint.



IMPORTANT: Position T6 is always located in the air void above the bed of material and would not be a position the operator would choose as a monitoring position.

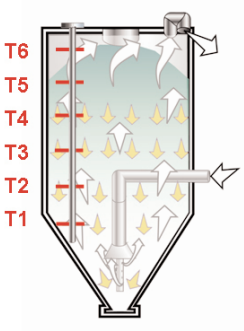
This selection activates the Drying Monitor

NOTE: There are two options for determining RTD selection. In this example, we'll refer to them as:

A Simple RTD selection

B Advanced RTD selection

RTD selection - *Simple*



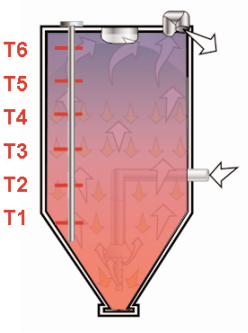
Understanding the temperature profile in the hopper.

Typically, the temperature profile in the lower 70%-80% portion of the hopper will come up to within 10°F of the process drying set point temperature.

The temperature above that level will begin to drop off quickly.

RTD selection - *Simple*

TIP: For more information on screen navigation refer to the control function flow charts located in this appendix.

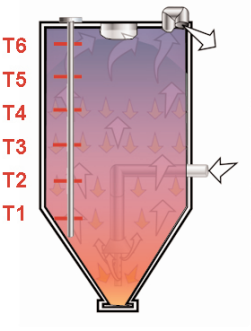


To select an RTD as a monitoring position for the alarm setpoint (using the simple method):

1. **In continuous process mode:** Make an initial run of the dryer and loaded hopper following the resin supplier's recommended temperature and time.
2. **When the material is sufficiently dry** for the process, scroll through the RTD readings in the control to review the hopper temperature profile.
3. **Select an RTD** below the point in the hopper where the temperature is expected to begin to drop (leave a margin for error).

NOTE: *See page AA-12 "Selecting the low temperature RTD"*

RTD selection- *Advanced*



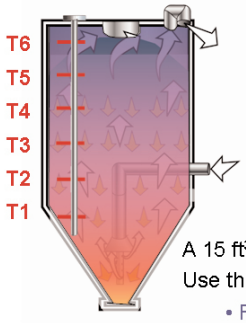
Why would an operator want to use the advanced method for selecting an RTD?

Advanced RTD 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

RTD selection- *Advanced*



EXAMPLE: Calculation

1. lbs per hour throughput? 100
2. drying time (residence time) 4 hrs
3. material's bulk density (lbs/ft³) 35 lbs/ft³
4. drying hopper capacity (ft³) 15 lbs/ft³

A 15 ft³ hopper holds 525 lbs of material @ 35 lbs/ft³ *(35 ft³ * 15)*.
Use the chart on page AA-36 of this appendix.

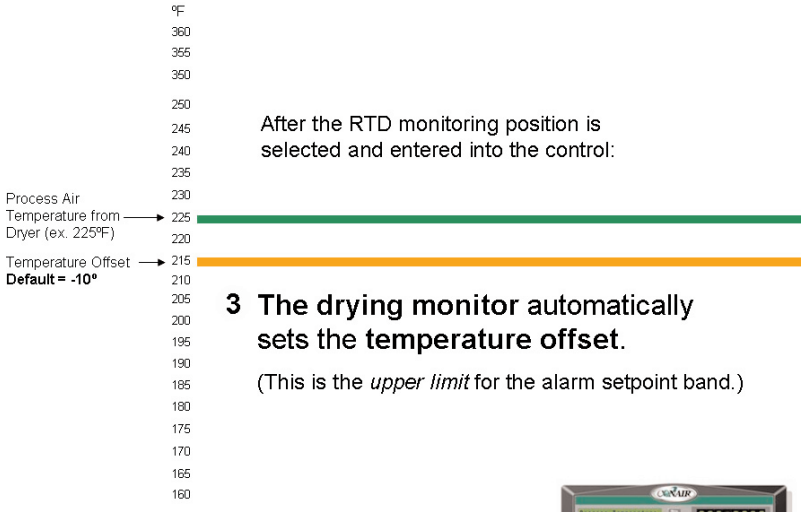
- RTD T5 is likely at a 440 lb fill level *(35 ft³ * 12.6)*.
- RTD T4 is at the 320 lbs level *(35 ft³ * 9.15)*.
  This position is at the ¾ point of the material load.

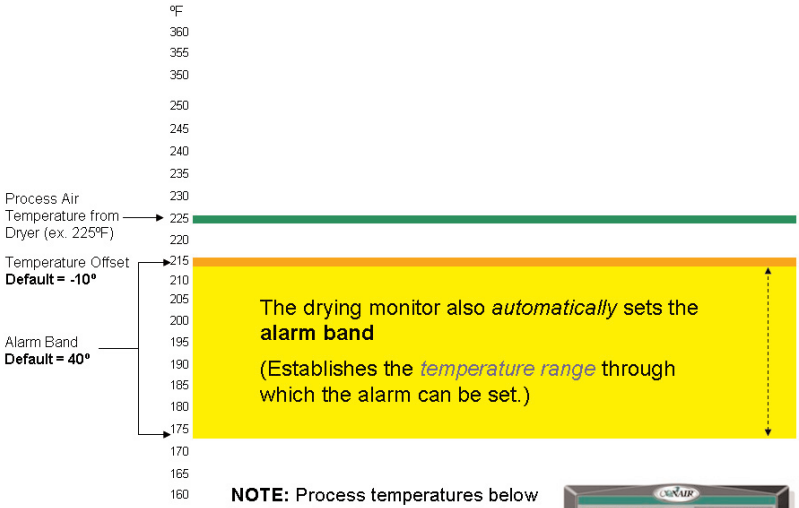
RTD T5 is closest to the desired monitoring point of 400 lbs (100 lbs/hr * 4 hrs).
Since RTD T5 is closest to the desired monitoring point, select T5.

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.

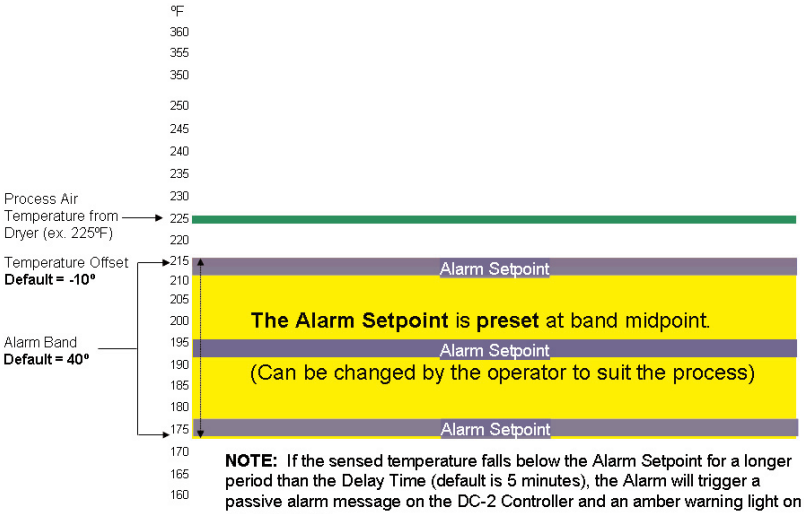
NOTE: You will need to know the bulk density of your material to calculate your drying hopper volume in cubic feet (ft³). *See page AA-40, "Understanding Bulk Density" and "How to Calculate Bulk Density".*

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.





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

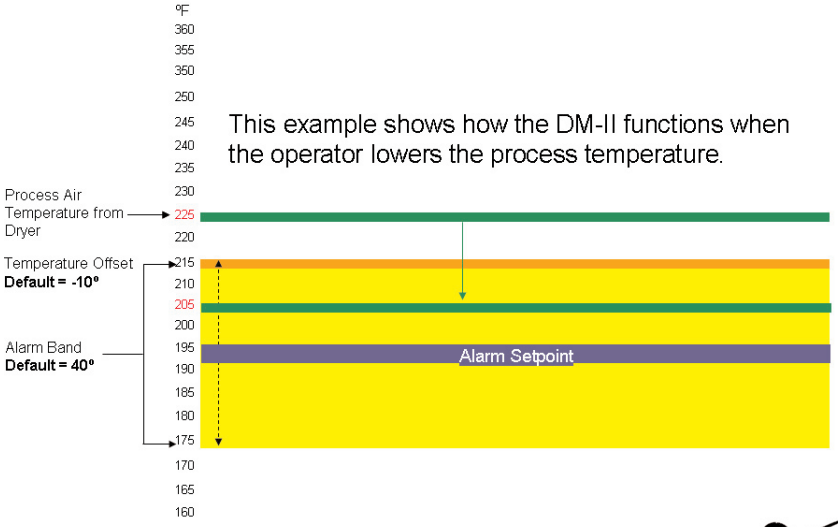


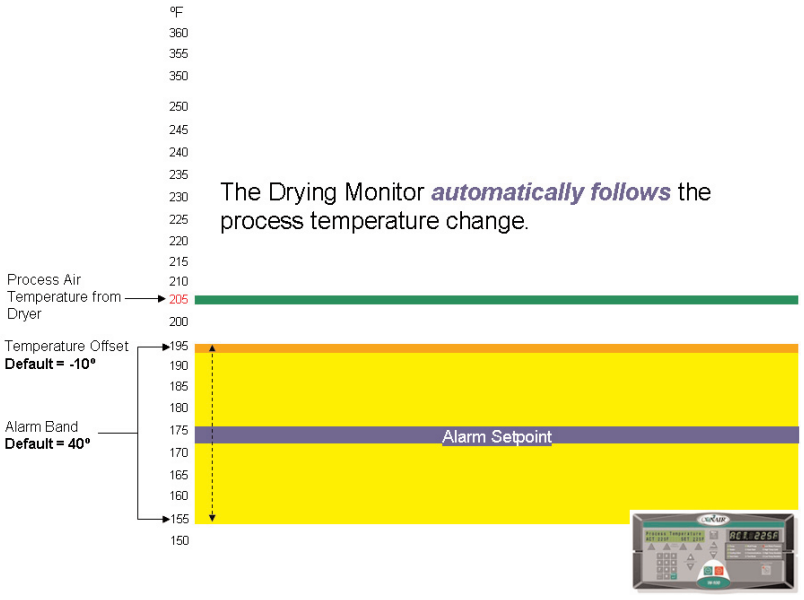
NOTE: If the sensed temperature falls below the Alarm Setpoint for a longer period than the Delay Time (default is 5 minutes), the Alarm will trigger a passive alarm message on the DC-2 Controller and an amber warning light on the light tower.

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-II triggers "Temperature Not Met".

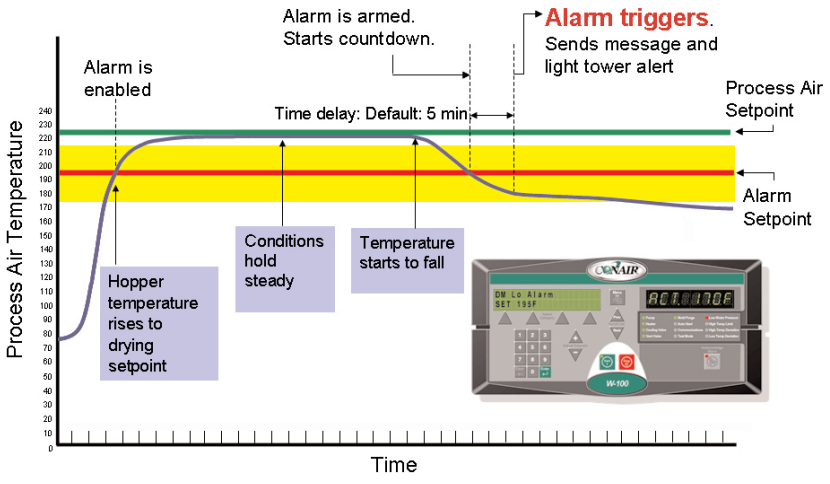
What happens when there is a drying hopper material change.

1. Operator lowers the Process Temperature to 205ºF from 225ºF. If the DM-II is being used on a central dryer with an HTC, screen M (see page AA-23) must be set to the new process temperature.
2. Drying Monitor *automatically follows* and adjusts:
   - Temperature Offset
   - Alarm Band
   - Alarm Setpoint
3. No further operator action is required unless material characteristics call for parameter adjustment





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



DM-II Series Control Functions

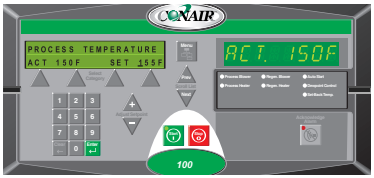
Drying monitor functions are values that you can set or monitor in the Screen Title and Status Display windows. Press the Menu button then select the category buttons, then the Scroll List ▲ or ▼ buttons (Next/Previous) until the function you want to set or monitor appears in the Screen Title window.

Control Function Flow Charts

The charts beginning on page AA-22 provide a quick summary of the control functions. For an explanation of each control function, *see "Control Function Descriptions" (page AA-26).*

To access parameters, push the **Menu** button until "Dryer Main Menu" screen is displayed. Use the **Select Category** buttons to access "Dryer Other Status," "Set up Process Other," "Dryer Setup Alarm," and "Dryer Setup Options" screens. Use the **Next/Previous** buttons to scroll through the parameters in each list.

To change a value, push the **Select Category** button under the value to be changed until it blinks, set to desired value, then push enter.

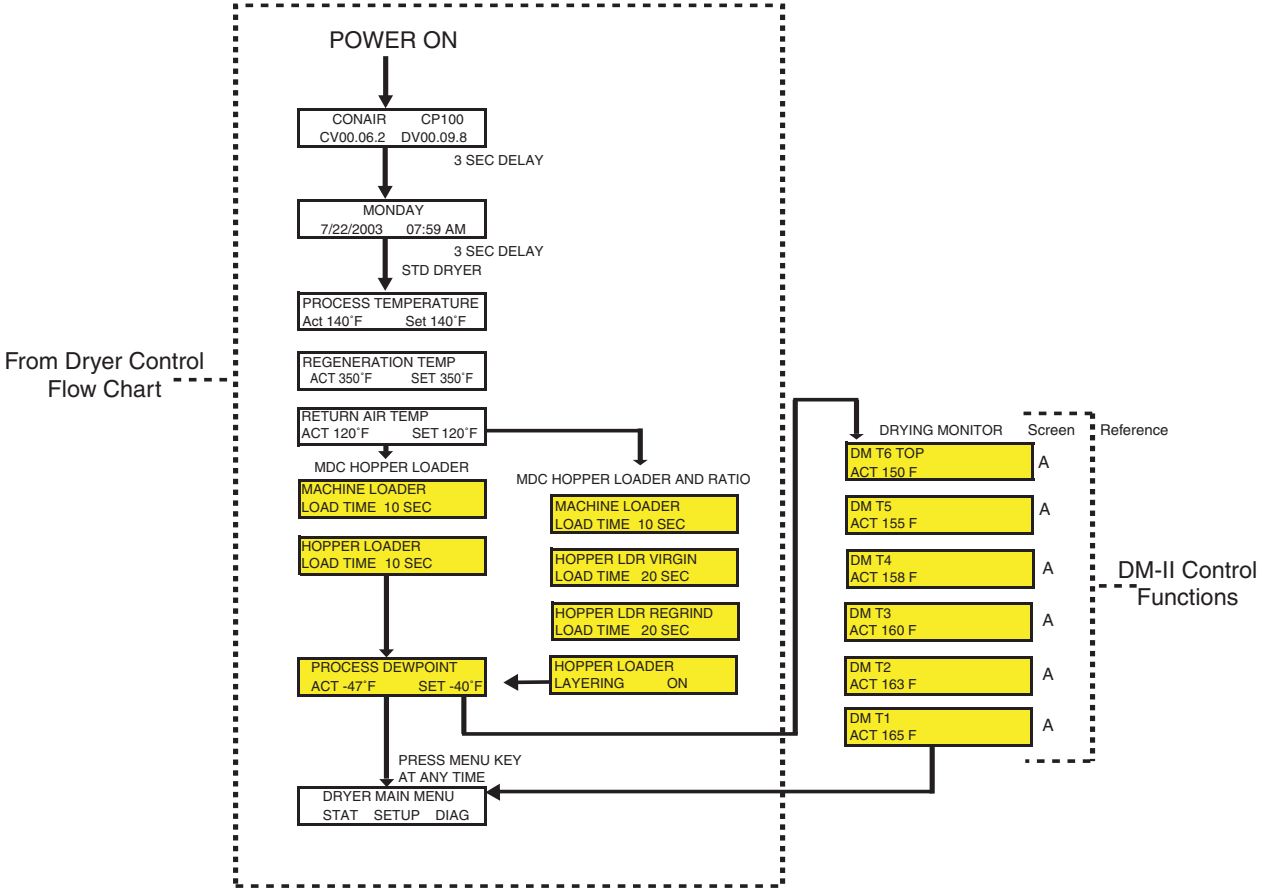


Menu Button

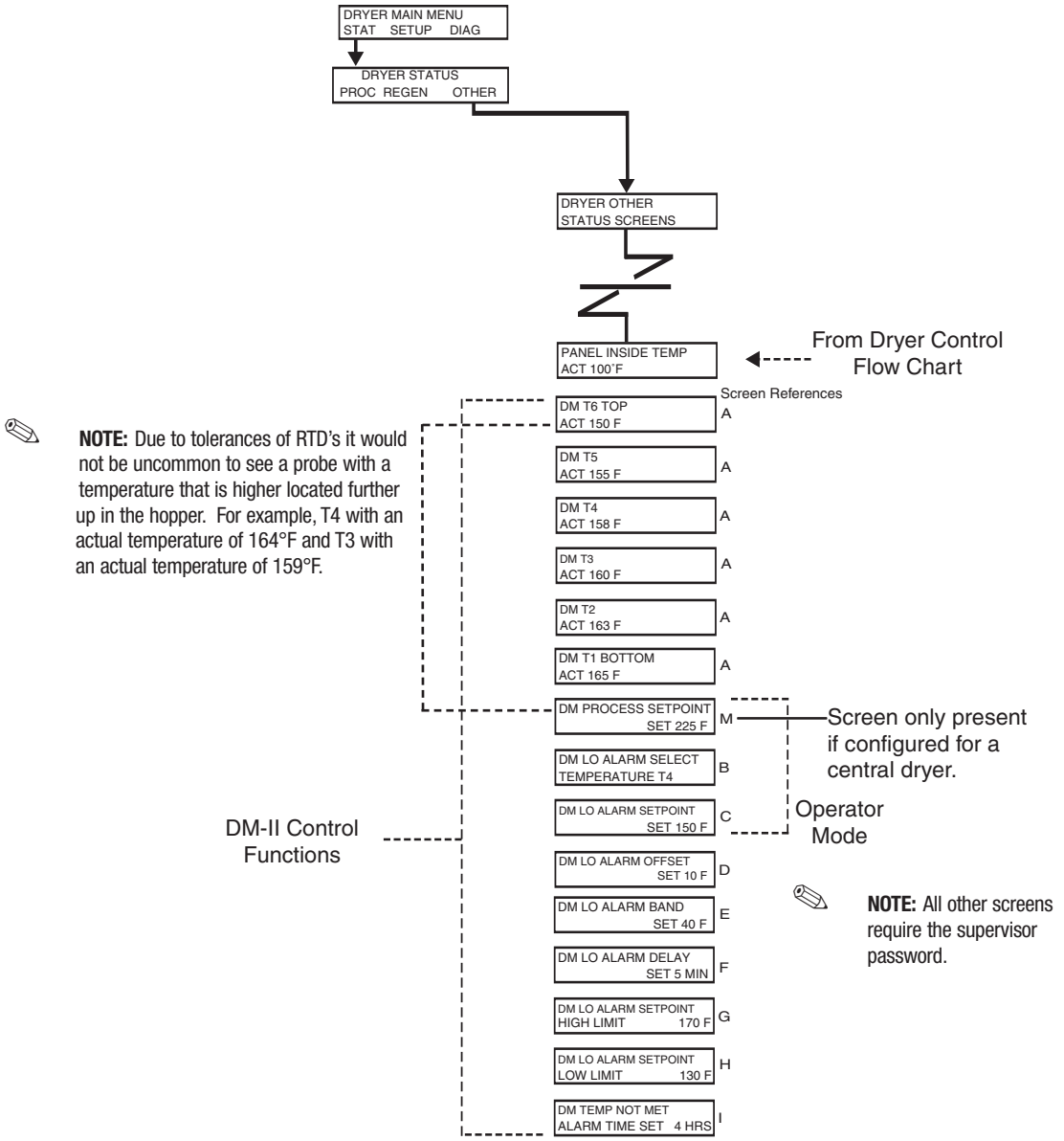
Select Category Buttons

Next/Previous Buttons

Main Menu/Display List

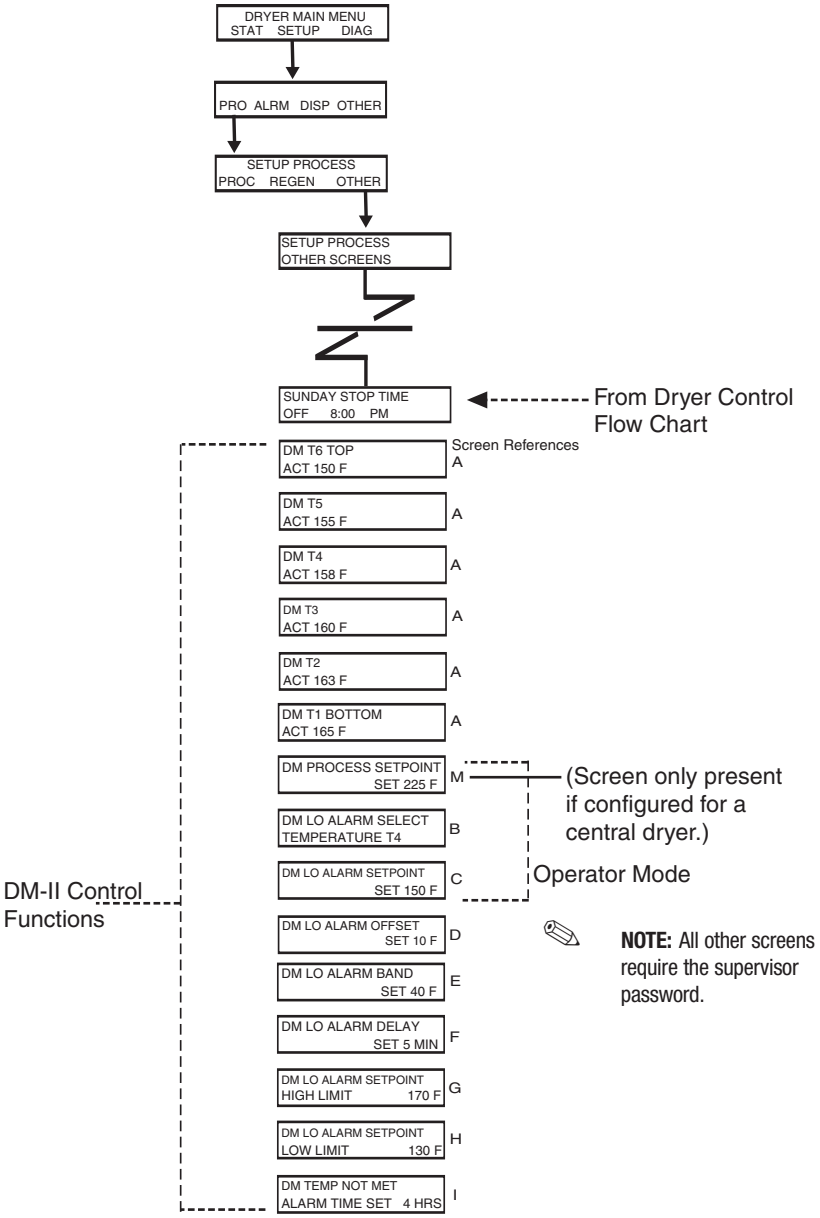


View/Monitor Only (Changes can not be made on these screens.)



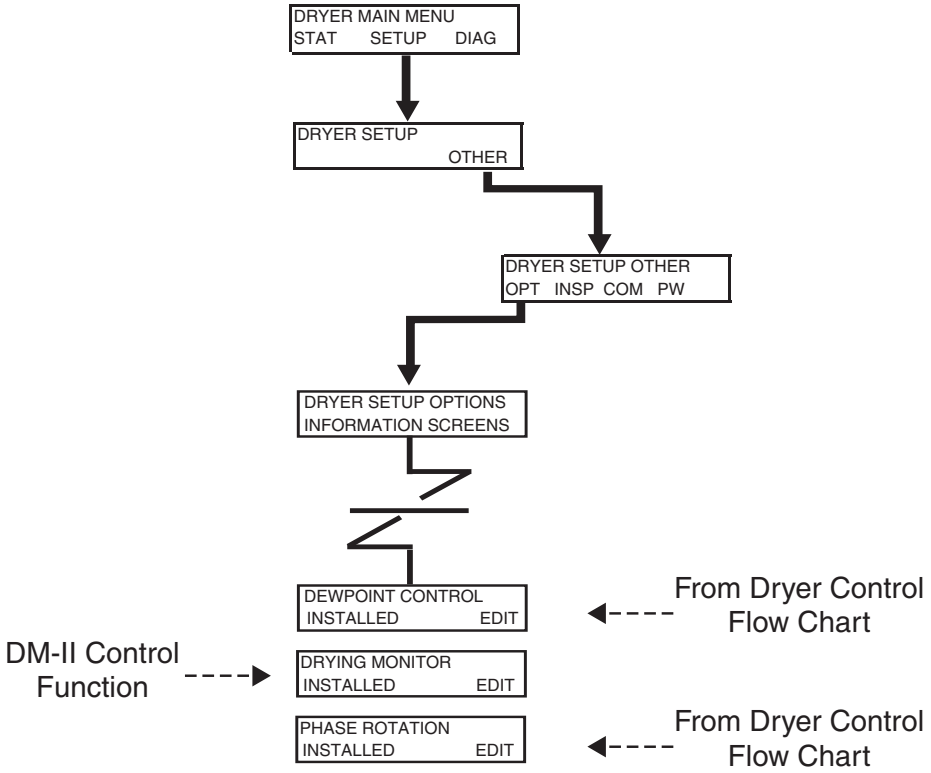
NOTE: Due to tolerances of RTD's it would not be uncommon to see a probe with a temperature that is higher located further up in the hopper. For example, T4 with an actual temperature of 164°F and T3 with an actual temperature of 159°F.

Set up Screen (Changes can be made to these settings.)



Installing the DM-II as a Field Retrofit.

NOTE: Installing the DM-II as a retrofit requires the service level password to set up the appropriate screens. Refer to the main portion of the dryer manual to access the password screen. Please contact Conair Service 1-800-458-1960 for the proper password.



Control Function Descriptions

Screen	Function
SCREEN A Dryer Status Screens DM T6 TOP ACT 150°F	The A screens display the actual temperature of the material in the drying hopper at a particular vertical position (T1 through T6) within the hopper. T6 is the top or upper most temperature sensor in the DM-II temperature probe. T6 is located in the air void above the material. T1 is the bottom or lower most temperature sensor in the DM-II temperature probe and will be located toward the bottom of the material hopper. NOTE: Changes must be made on the set-up screens, status screens are for viewing and monitoring only. *See pages AA-23 and AA-24 of this appendix for the path to access the screens.*
SCREEN B Low Alarm Select DM LO ALARM SELECT TEMPERATURE T4	Screen B allows the operator to select the temperature sensor (RTD) to be used to initiate the alarm function. The "Low Alarm Select" is factory set to the default position "Off." You must select a temperature sensor (RTD) that will be used to trigger the low temperature alarm.
SCREEN C Low Alarm Setpoint DM LO ALARM SETPOINT SET 150°F	This screen displays the low temperature alarm set-point temperature. The low temperature alarm set-point has been factory set to default to the middle of the low temperature alarm band. You may accept the factory default setpoint value or you may change it to a temperature setpoint of your choosing within the low temperature alarm band. *See screen E*

Control Function Descriptions (continued)

Screen	Function
SCREEN D Low Alarm Offset DM LO ALARM OFFSET SET 10 F	The Low Alarm Offset is the differential between the operator entered drying temperature setpoint and the upper value of the Low Temperature Alarm Band. The function of the Low Alarm "Offset" is to prevent nuisance alarms and allow the alarm band to change when the drying temperature setpoint is changed. The Offset is factory set to a default value of 10°F. The Supervisor Password is required to change the value from the default value to a user-preferred value.
SCREEN E Low Alarm Band DM LO ALARM BAND SET 40 F	The Low Temperature Alarm Band is the band of temperatures in which the Low Temperature Alarm Setpoint can be set. The width of the alarm band is factory set at 40°F. The alarm band is programmed to track any changes in the Dryer's drying temperature setpoint. The alarm band will move up and down with the Dryer's drying temperature setpoint, staying 10°F [Offset] below the drying set-point.
SCREEN F Low Alarm Delay DM LO ALARM DELAY SET 5 MIN	The Low Alarm Delay is a time delay to minimize nuisance alarms. If the drying temperature at the sensor selected for the low temperature alarm falls below the alarm limits the delay timer is activated. If the drying temperature at that particular sensor location comes back to within the alarm limits before the delay timer times out the delay timer is re-set. However, if the drying temperature at that sensor remains below the alarm limits until the delay timer times out the alarm is initiated. The Supervisor Password is required to change this value.

Screen	Function
SCREEN G Low Alarm Setpoint DM LO ALARM SETPOINT HIGH LIMIT 170 F	This is the upper end of the Low Temperature Alarm Band. The Supervisor Password is required to change the calculated value to a user-preferred value. This screen only displays the value. The Low Alarm offset and the Low Alarm Band should be modified in order to change this value.
SCREEN H Low Alarm Setpoint Low Limit DM LO ALARM SETPOINT LOW LIMIT 130 F	This is the Low end of the Low Temperature Alarm Band. The Supervisor Password is required to change the calculated value to a user-preferred value.
SCREEN I Temperature Not Met Alarm Time Set DM TEMP NOT MET ALARM TIME SET 4 HRS	This is the Temperature Not Met Alarm Time Delay, which occurs on every start-up. The temperature of the selected RTD must reach the setpoint within the time delay or the temperature not met alarm will be activated. The time delay is factory set for four hours, which is the typical drying time recommended for most moisture sensitive hygroscopic polymers. This time delay provides ample time for the material within the drying hopper to come up to the selected drying temperature. This helps to avoid nuisance alarms while the material in the hopper heats up. The Supervisor Password is required to change the default value to a user-preferred value.

Screen

SCREEN M
Process Setpoint

Function

Screen M is used to set the Process Temperature Setpoint to match the temperature set on the Hopper Temperature Controller (HTC). The temperature set on the DC screen on the HTC and this screen must match in order for the DM-II to function properly and to avoid nuisance alarms. This applies to all central dryers. (dryers without process heaters.)

Maintenance Checklist

The DM-II requires little maintenance. We recommend the following maintenance schedule and tasks.

• Whenever you change hoppers

❒ **Verify or change setpoint entries on the control.**
Verify that the temperature settings are correct for the application and material in this hopper.

• Whenever you change materials

❒ **Change the setpoint entries on the control.**
Verify that the temperature settings are correct for the new material.

❒ **Inspect the probe and mounting assembly.**
If the probe is damaged, replace it. If vibration has loosened the probe mounting hardware, tighten it.

• Monthly, or as often as needed

❒ **Inspect cables and cords for damage or wear.**
Replace any cable or power cord that is worn.

❒ **Inspect cable connections.**
Check for damage or loose connections. Tighten the connections or replace the damaged connectors.

Troubleshooting Alarms

All DM-II alarms are passive and will not cause the dryer to shutdown.
The amber light on the stack will be on.

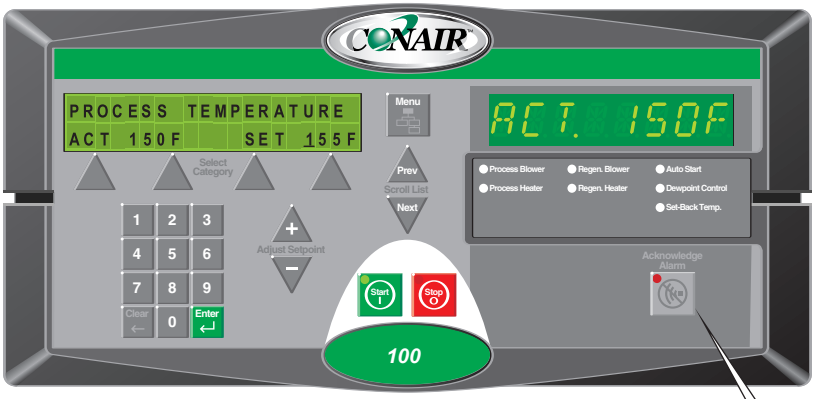
Red - The dryer has stopped/shut down alarm on the dryer

Amber - possible trouble/ DM-II passive alarm

Green - running properly

1 Press the Acknowledge Alarm button once to display the alarm message.
Pressing the Acknowledge Alarm button once also changes the alarm LED from blinking to solid.

NOTE: Pushing the Acknowledge Alarm button when there is no active alarm will take the user directly to the Alarm History list.



2 Find the error message in the diagnostics table of this troubleshooting section.

3 Note that pressing the Acknowledge Alarm button a second time will clear the alarm.

NOTE: If the condition still exists, or if a subsequent alarm has occurred as a result of the original alarm, the alarm will become active again.

Passive Alarms

If the amber Acknowledge Alarm LED is blinking, the alarm is a passive alarm. The dryer continues to operate, but this problem could prevent correct drying of your material. Note that once the Acknowledge Alarm button is pressed once, the blinking amber LED becomes solid.

Problem	Possible cause	Solution
Drying Monitor Temperature Not Met (DM Temp Not Met) - Upon start-up or a change in set-point, if the temperature at the RTD selected in Screen B does not reach or exceed the Low Temperature Alarm Setpoint in Screen C in the time value in the Drying Monitor Not Met Screen I, (Default 4 hours) this alarm will occur.	Selected the wrong RTD for the Low Alarm Select. It may be in the air and not in the material.	Reselect the RTD. *See "Selecting the Low Temperature RTD," in this appendix.*
	On central dryers with HTC, the process setpoint of the HTC control and drying setpoint of DM-II may not be the same.	Determine which setpoint is incorrect and adjust as needed. *See "Setting the Process Temperature on a Central Dryer," in this appendix*
	Material level in hopper is below the selected Low Temperature Alarm RTD.	Check your material supply system for loader problems, material availability, etc.
	Process air is not at the proper drying temperature.	On Central dryers with HTC, ensure the HTC control has been turned on. Check for process deviation or loop break alarms on the dryer or HTC control, and take the necessary steps to correct these alarms.
	Poor airflow to the hopper.	Clean or replace process filter, dust collector, etc. in the process airstream. Verify the blower is operating properly, including correct rotation. Straighten crimps or remove any objects that may restrict airflow through hoses and tubes. Connect any loose hoses. Replace any damaged hoses.

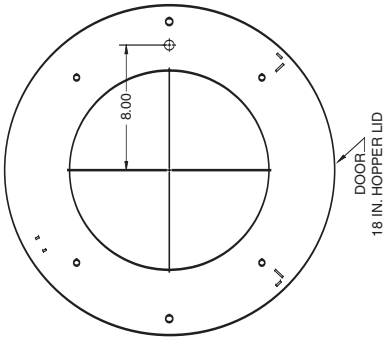
Passive Alarms (continued)

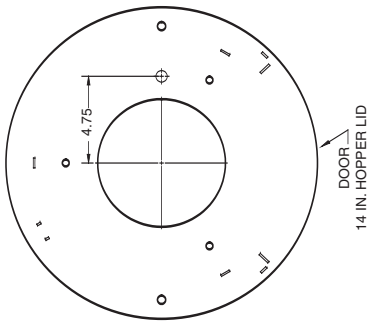
Problem	Possible cause	Solution
Drying Monitor Low Temperature Alarm (DM Low Temp) - Once the temperature at the RTD selected in Screen B has reached the Low Temperature Alarm Setpoint in Screen C, the alarm will become active if the temperature drops below the Low Temperature Setpoint for a length of time longer than the delay time in Screen F.	Material throughput too high.	Ensure the material usage is within the rated capacity of the dryer and hopper in use.
	Material level in the hopper is below the selected Low Temperature Alarm RTD.	Check your material supply system for loader problems, material availability, etc.
	Process air is not at the proper drying temperature.	On central dryers with HTC, ensure the HTC control has been turned on. Check for process deviation or loop break alarms on the dryer or HTC control. Take whatever steps are necessary to achieve the correct drying temperature.
	On central dryers with HTC, the process setpoint of the HTC control and drying setpoint of DM-II may not be the same.	Determine which setpoint is incorrect and adjust as needed.
	Poor airflow to the hopper.	Clean or replace process filter, dust collector, etc. in the process airstream. Verify the blower is operating properly, including correct rotation. Straighten crimps or remove any objects that may restrict airflow through hoses and tubes. Connect any loose hoses. Replace any damaged hoses.

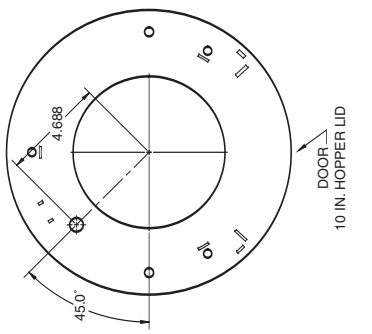
Passive Alarms

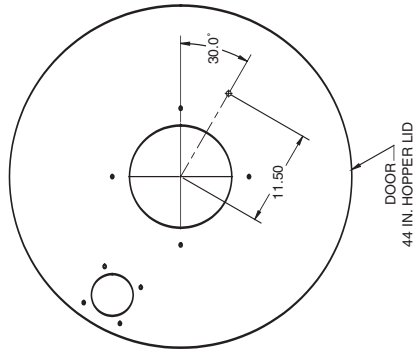
Problem	Possible cause	Solution
Drying Monitor RTD Integrity Alarm - This alarm indicates that one or more of the RTD sensors within the Drying Monitor probe have failed. The drying monitor will continue to function as long as the RTD that has failed is not the one selected for the Low Alarm or High Alarm RTD, but the alarm will be present until the cause of the alarm has been corrected.	The cable that runs between the Drying Monitor control and Drying Monitor probe is loose or damaged.	Verify the cable connections are secure. Repair or replace the damaged cable or connectors.
	The cable extending from the dryer control is damaged, or the wire connections from this cable to the analog option board are loose or broken.	Repair or replace the damaged cable or connectors, or tighten the wire connections at the analog option board.
	Damaged connector on the Drying Monitor probe.	Repair or replace the damaged connector.
	Defective RTD sensor in Drying Monitor probe.	Replace the probe.

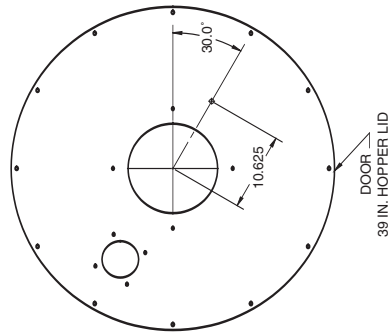
Templates

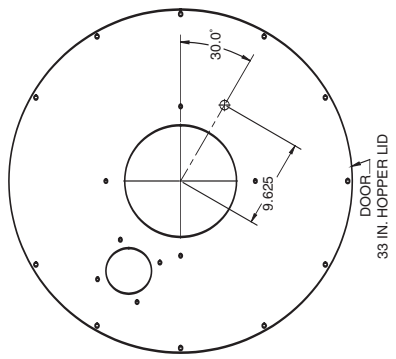

8.00
DOOR
18 IN. HOPPER LID

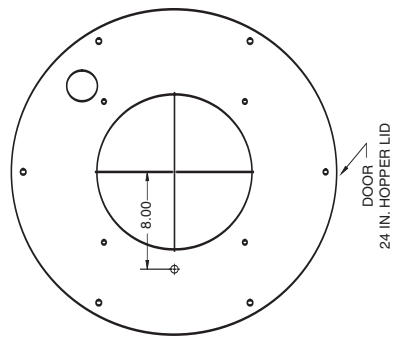

4.75
DOOR
14 IN. HOPPER LID


4.688
45.0°
DOOR
10 IN. HOPPER LID


30.0°
11.50
DOOR
44 IN. HOPPER LID


30.0°
10.625
DOOR
39 IN. HOPPER LID


30.0°
9.625
DOOR
33 IN. HOPPER LID


8.00
DOOR
24 IN. HOPPER LID

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

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 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

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 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

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

4. **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.

5. **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.