INSTRUCTION MANUAL

OptiFlex
OFX2 SERIES
Central Drying System Control

Document: OFX2 Manual 2024

NOVATEC™
Part of the MAGUIRE Family

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1 PURPOSE OF THIS MANUAL

This manual describes the installation and operation of Novatec's OFX2 Series Material Conveying System controller. Before installing this product, please read this guide and any additional guides associated with the system's auxiliary equipment.

1.1 Explanation of Symbols

This manual includes both general and task-specific safety precautions. These precautions are highlighted in the manual by the following categories:

WARNING: This symbol identifies situations that are potentially hazardous to personnel or equipment.

NOTE Highlights information provided in text or procedures. This information may or may not be related to safety.

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2 SAFETY PRECAUTIONS AND WARNINGS

These operating instructions must be read, understood, and implemented by all personnel responsible for this system.

- All mechanical and electrical work must be performed by qualified personnel only.
- Always disconnect power before servicing.
- Refer to the machine nameplate and drawings supplied with this system for actual power requirements.
- Be sure to install the equipment in the proper electrical area according to the NEMA rating specified. Care must be taken to adhere to all national and local regulations.
- Electric power supply should be through a separate disconnect switch with properly sized overload/fuse protection.
- Thread protectors and caps provided on solenoid valves, traps, pipe ends, etc. must be removed prior to start-up.
- The customer is required to operate the equipment with all safety features in proper working condition.
- Novatec shall provide no further guarantee for function and safety in the event of unauthorized modifications.

3 GENERAL DESCRIPTION

The Novatec OFX2 Opti-Flex™ Central Drying System control is a custom-programmed Siemens Programmable Logic Control (PLC) - based control system designed to manage all control aspects of multi-bin central drying systems produced by Novatec. Versions of this control are capable of controlling up to 32 drying bins. These systems are typically connected to up to 3 central dehumidifying dryers that act as a dry air source for the multi-bin drying system controlled by the OFX2.

The Opti-Flex OFX2 includes a 12" color, touch screen Human Machine Interface (HMI) that communicates with the OFX2's internal PLC. The PLC, in turn, communicates with all of the control components (heaters, sensors, switches, etc.) of the central drying system. Intuitive icons, that show functions, minimize the use of language specific text, reducing confusion by non-English speaking users and enhancing control understanding.

Active Drying, an exclusive Novatec drying feature, is included on all models. Active Drying prevents the overheating of dried materials by actively monitoring the temperature of each drying bin in the system and adjusting air inlet temperature, as required, to maintain the required temperature in the bin, yet prevent overheating. Overdry Protection also assures minimal energy consumption by automatically adjusting heat and air temperature through each bin to necessary levels, and no more.

Moisture Manager, another exclusive Novatec drying feature, is optional in the OFX2. Moisture Manager monitors the humidity profile of the drying bin, to prevent over drying. Moisture Manager includes valves at the drying bin to allow recirculation of the drying bin's air, essentially separating the bin from possible over drying. Note that systems equipped with Moisture Manager exclude the dewpoint monitoring feature shown in these instructions.

There is a piezo alarm horn on control face, plus a red alarm light on alarm silence pushbutton.

All OFX2 controls are equipped with Ethernet capability so they may be readily networked to PC(s) or Smart Devices anywhere. In addition, the OFX2 may be programmed to send alarm email messages to any SMTP server.

4 SPECIFICATIONS

Description:	OFX2 Central Drying System Control		
Model No	**OFX22-8-12C**	**OFX22-12-12C**	**OFX22-16-12C**
Performance Specifications			
Number of Drying Bins (CDA's)	8	12	16
Operator Interface	Siemens TP (12.1") Touchscreen		
Main PLC	Siemens IM151-8		
Output Voltage to Devices	24 VDC		
Input Voltage from Devices	24 VDC		
Input Voltage from TC	0-30 mVDC (analog)		
Input Current from Dewpoint Monitor	4-20 mA (analog)		
Dimensions (H x W x D) Inches			
Main Base Unit	24x30x8		
Remote I/O Base Unit	20x24x8		
Power Requirements			
Standard	115 / 1 PH / 60 HZ		
Optional	230 / 1 PH / 50 HZ		

Accessories				
FlexXpand Module	**OFXM22-4**	**OFXM22-8**		**OFXM2-16**
Number of CDA's that may be added per FlexXpand Module	Up to 4	Up to 8		Up to 16
Panel Mount Ethernet Repeater Switch Installed in OFX2 Panel. Required to extend single network greater than 100m	ETHS-5-24			
External Ethernet Repeater Switch Stand alone, NEMA 4 Panel (115/1/60 input power). Required to extend single network greater than 100m	SCR-CNTL-010			

5 PLC OVERVIEW

5.1 General

The OFX2 System Controller utilizes a centrally mounted PLC that monitors and controls interconnected functions of the central drying system. The central dryer(s) operate independently, but are monitored by the OFX2. The multiple Central Drying Assemblies (CDA's) are powered independently, but controlled entirely by the OFX2 control system.

5.2 Startup And Power Loss

When first starting up the OFX2, each hopper in the system must be configured with the proper temperature, alarm and energy saving set points and be enabled. Careful adherence to material drying parameters are extremely important at this phase of operation and are the sole responsibility of the user.

In addition, other components of the system including the central dryer(s) and conveying system(s) will require coordinated start-up for successful operation. Refer to their respective instructions accordingly.

When power is first applied to the PLC following a power loss, the system will automatically monitor all heat generating components for status. Components that can be re-energized safely will be restarted automatically if set to do so (see Auto Start function). This prevents the operator from having to restart each piece of equipment; however, depending upon the duration of the power loss, discharge devices may become temporarily locked out by pre-dry countdown timers to ensure material dryness.

6 OPERATING PRINCIPLES

A centralized, independently operating dehumidifying dryer source (up to 3 central dryers) provides dry air through manifold trunk lines to a series of Central Drying Assemblies (CDA's). The central dryer provides dry air for a number of drying bins, but heat for the drying process is provided by the CDA heater, individually set at the OFX2 for the required temperature of the material in each respective bin. The flow of heat into the CDA bin is ensured by its own blower, which draws dry air from the central dry air supply line, through the drying bin and then returns it to the return line to the central dryer.

6.1 The Central Dryer

The central dryer provides dry air for a number of CDA drying bins through process and return trunk lines, and is powered and controlled independently of the OFX2 system. The OFX2 control monitors an auxiliary contact in the central dryer's process blower starter to confirm proper operation and allow interconnected CDA's to function normally.

6.2 Receiver Station

Each CDA is equipped with a drying bin, an independently controlled heater for that bin, a blower sized for that bin, plus air manifolds with connecting couplers for ease of installation. Each CDA 'Active Dry' model also includes a control box specifically designed to be operated with the OFX2 control system. The central dryer provides dry air for a number of drying bins, but heat for the drying process is provided by the CDA heater, individually set at the OFX2 for the required temperature of the material in each respective bin. The flow of heat into the CDA bin is ensured by its own blower, which draws dry air from the central dry air supply line, through the drying bin and then returns it to the return line to the central dryer.

7 CONTROL EXPANSION

7.1 Opti-Flex OFX2 Main Panel and OFXM2 Module Addressing

The Expansion Modules are configurable with memory cards or with appropriate Siemens software, and each need the appropriate IP address uploaded to match the expansion module for the desired devices.

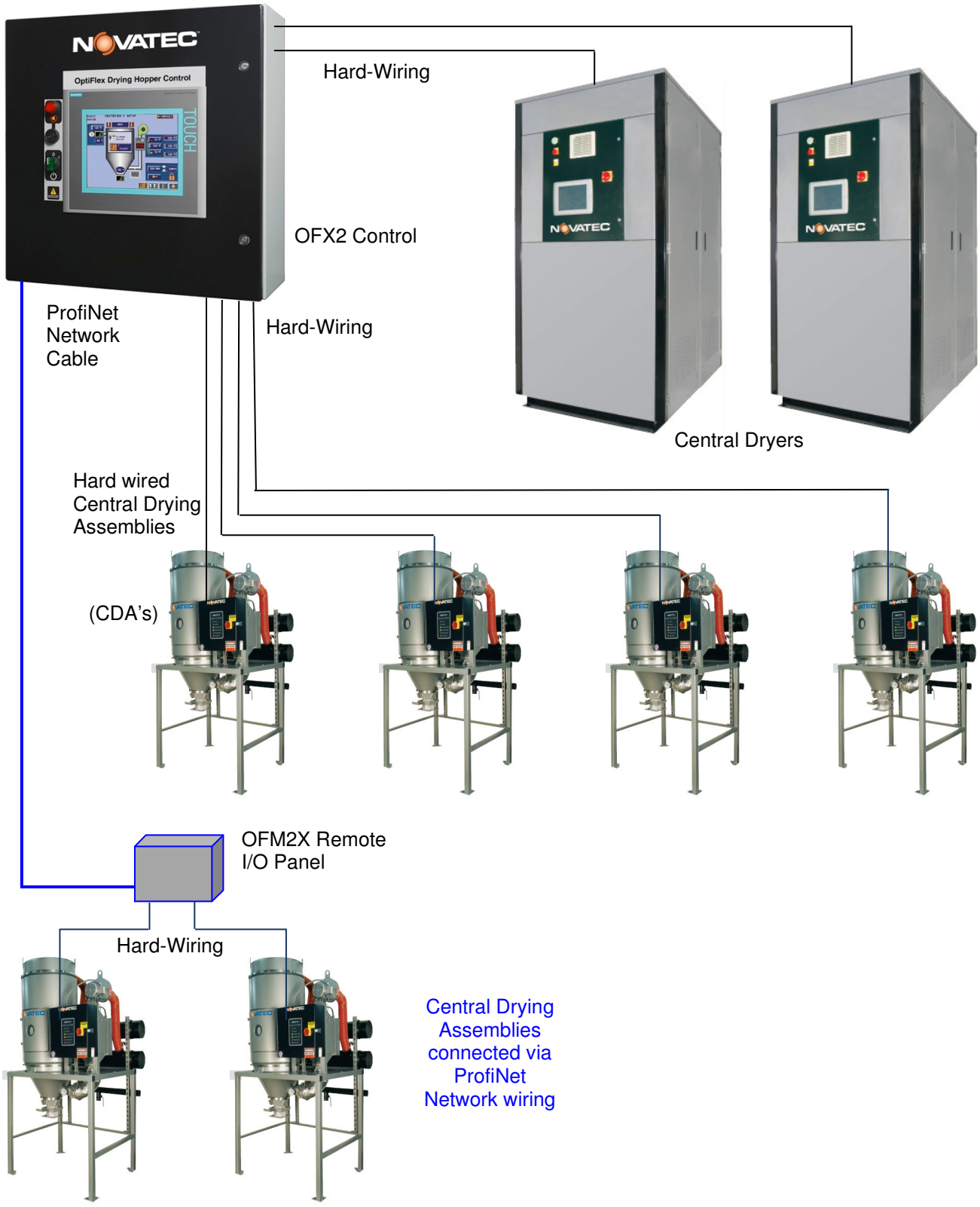
Station No	ProfiNet Station Name	IP Address	Panel Type
MAIN PANEL			
HMI		192.168.1.11	OFX2-8, -12, -16
Main	OFX2-MAIN 01-08	192.168.1.10	OFX2-8, -12, -16
EXPANSION PANELS			
1	OFXM2-4-CDA 13-16	192.168.1.200	OFXM2-8(-MM)
2	OFXM2-8-CDA 9-16	192.168.1.200	OFXM2-8(-MM)
3	OFXM2-16-CDA 17-32	192.168.1.200	OFXM2-8(-MM)

7.2 Opti-Flex & Remote HMI Addressing

The control system touchscreen interfaces (local HMI, remote RHI) are field configurable with appropriate Siemens software, and each needs the appropriate IP address uploaded to match the desired network map.

Station No	IP Address
HMI Main (10 inch)	192.168.1.11
RHI 1 (10 inch)	192.168.1.12
RHI 2 (10 inch)	192.168.1.13
RHI 3 (10 inch)	192.168.1.14
RHI 4 (10 inch)	192.168.1.15

7.3 Typical Wiring/Network Options



8 INSTALLATION

After unpacking and inspecting the Opti-FlexTouch OFX2 Controller, four basic activities will need to be performed. These activities are:

1. Completely install Central Drying Assemblies (CDA's), and other mechanical components. Run supply and return dry air trunk lines from the central dryer(s) and interconnect with each CDA, according to the system layout provided by Novatec. 3 phase power is required at each CDA. NOTE: A 3 phase disconnect switch is provided in the CDA control. 3 phase power is required for the CDA's heater box and blower operation.

2. Locate and mount the Opti-Flex electrical control in a convenient location near the group of CDA hoppers.

3. Wire the central dryer(s) and the CDA's to the OFX2 controller enclosure per their associated wiring diagrams. Standard drying bins (with Active Drying) require 9 conductors, and drying bins with Active Drying plus Moisture Manager require 10 conductors. These include common (neutral or 0 volts DC) and power (+24 VDC).

   There are two (2) type J thermocouples per hopper, requiring type "J" T/C wire. The wire should be continuous (contain no splices) from each CDA terminal block to the Main OFX2 Panel terminal point. As a guideline, under 100 feet with 20 AWG or thicker wire in an area free of electromagnetic interference usually is fine. (see appendix for additional T/C wiring notes)

   Moisture manager also requires an 18 AWG twisted, shielded pair for the analog signal back to the main panel (16 AWG for distances > 125 ft.)

4. Adjust each drying bin's set point values for the materials to be dried in each bin. Careful adherence to material drying parameters are extremely important at this phase of operation and are the sole responsibility of the user.

All national and local electrical, building, and safety codes need to be followed. Proper grounding of all equipment is important. Check the electrical wiring schematic for wiring numbers and details. The following paragraphs describe installation of typical system components. Some of them are optional and may not be required for your system.

CAUTION: Conveying lines must be grounded to prevent "shocks" from static electricity that are generated by some materials as they are conveyed. This is an extremely important step.

All electronics are susceptible (to varying degrees) to electrostatic damage and, although as much protection as possible has been designed into the system; this cannot completely eliminate upsets due to electrostatic voltage being accidentally introduced into the electronic circuitry.

Generally, grounding the case of the container from which the material is being conveyed (including the lines) to the same potential as the green wire ground of the conveying system eliminates most of this problem.

8.1 Central Drying Assembly Installation

See manual(s) accompanying the Central Drying Assemblies and layout drawing(s) supplied by Novatec for overall system layout and interconnection details. Wire central dryer process blower output in parallel to the appropriate OFX2 central dryer input.

9 CONTROLS EXPLANATION

9.1 Siemens HMI

The Siemens HMI is an operator interface with touch-screen entry. The color screens are graphical in nature and display information in text and/or color change. The screens permit data entry via touch. The HMI is equipped with Ethernet I/P communication. The HMI communicates with the Siemens PLC using a fast Ethernet link.

9.2 Startup

When power is first applied to the HMI the Main Menu screen is displayed.
Since no user is logged into the system at startup, DEFAULT is indicated in the user display.
Depending on system configuration, some buttons may not be visible on your screen.

10 OPERATOR SCREENS

10.1 Home Screen - Main Menu

The Main Menu screen has pushbuttons (PB) to navigate to other screens

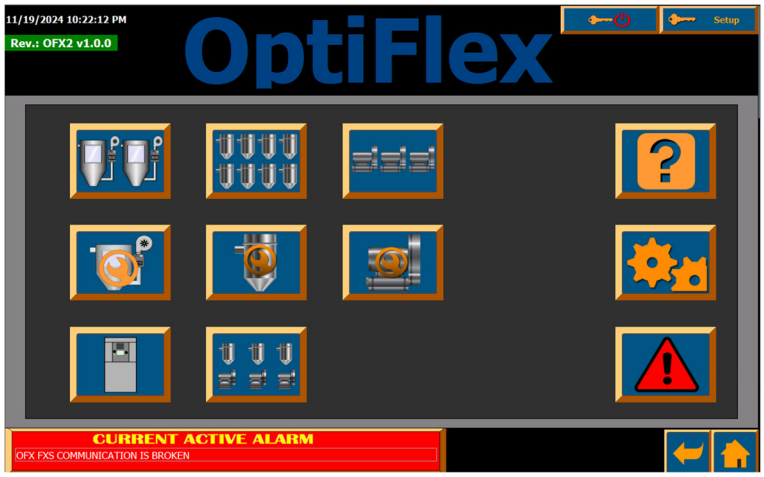


Figure 1: Default Main Menu

Displays the installed software revision in the OFX control.

CDA HOPPER STATUS - This button navigates to show up to 32 CDA drying hoppers and an overall indication of their status, including current drying temperature, high temperature alarm, low temperature alarm, and whether the material in the bin is dried and ready for processing.

CDA HOPPER SETUP – This button navigates to the screen for adjusting setup parameters of a CDA Hopper and aligning its function to the material being dried, temperature set point, active drying set point, alarm set points and the displayed name of the drying bin.

DRYER STATUS – This button will take the user to a screen to show the on/off status of the dry air supply dryers connected to the system. The same screen allows setting the minimum number of dryers needed for typical operation.

10.1 – HOME SCREEN – MAIN MENU (cont.'d)

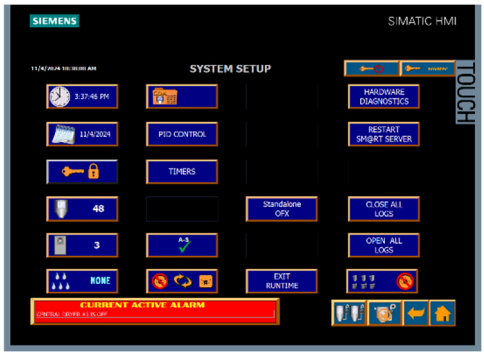
HELP - This button navigates to the Help pages. These pages explain the meaning of the different symbols used and how to set the different parameters of the central drying assembly's heater bins.

SYSTEM SETUP - This button navigates to the System Setup page. The System Setup page is primarily used for the initial setup of the system by the administrator.

ALARM HISTORY PAGE - This button navigates to the Alarm History Page. This page shows all logged alarms, when they happened and when they were acknowledged.

CONVEYING SYSTEM CONTROL – This button allows display of specially configured Novatec conveying system controls, so that the full system operation, including conveying, may be monitored and controlled from the OFX2 control panel. When pressed on systems that do not employ this feature, the button has no function.

10.2 System Setup



DATA ENTRY NOTE: After entering a value into a parameter field, hit the RETURN or ENTER key to retain the new value.

BUTTON BORDERS: An orange border indicates the button is enabled. A gray border indicates the button requires login at the appropriate user level for access.

Set Time of Day. Requires 'Level3' User Level access to make changes

Set Date. Requires 'Level3' User Level access to make changes

Sets the number of CDA Hoppers the panel will control. Requires 'Setup' User Level access to make changes.

Sets the number of Central Dryers the panel will monitor. Requires 'Setup' User Level access to make changes. The OFX2 monitors the auxiliary contact of the Central Dryer's process blower. When the blower is on, the contact closes and energizes the corresponding input. The OFX2 can monitor up to 3 Central Dryers. NOTE: A value of ZERO disables this feature.

Sets control to dry using one of two optional dewpoint monitoring functions: Moisture Manager  or Dewpoint Monitor  (see section 10.6 for more information)

Requires 'Setup' User Level access to make changes.

Navigates to the CDA Recipe Setup screen (see section 10.4 and 10.5 for more information). Requires 'Level3' User Level access to enable navigation to this screen.

Authorized Novatec service personnel only.

Navigates to Timers Setup screen for adjusting default timer values and setpoint ranges for control operation. Requires 'Setup' User Level access to make changes. Default values are recommended and should not be changed without contacting the Novatec Service department.

10.2.1 System Passwords

Password factory defaults:

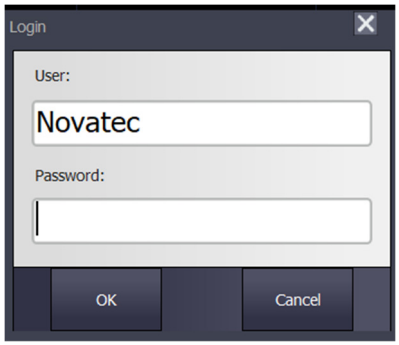
level1 : 1111 (Operator)
level2 : 2222 (Material Handler)
level3 : 3333 (Maintenance)
Setup : 4444 (Supervisor)

10.2 - SYSTEM SETUP (cont.'d)

Press for immediate LOGOUT from the current user level.

Displays current User Level status.

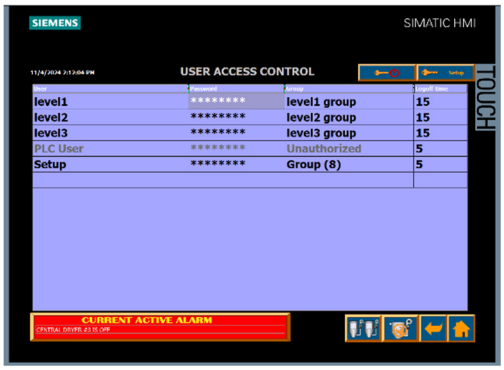
Press the LOGON button to open the **'Log on' Dialog Box**.



This box is also accessed when a parameter button is pressed and the current user level does not have permission to access that function.

Touch the User field, type in the desired User Name, and press 'enter'.
Touch the Password field, type in the correct password, and press 'enter'.
Click 'OK' to continue.

CHANGING USER LEVEL PASSWORDS.
Press this button to access the **Password Setup screen**.



Requires 'Setup' User Level access to make changes.

To SELECT A USER LEVEL, press on the desired User Level name on the left side of the screen.

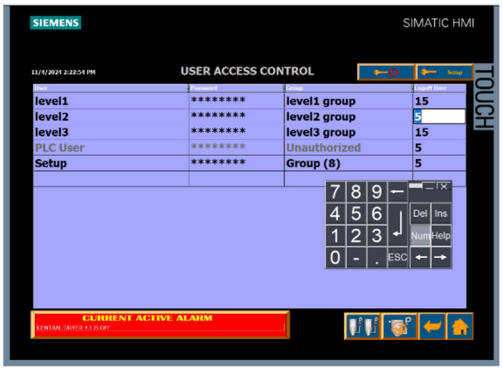
If 'level2' is pressed, the following screen and dialog box are displayed:

To ENTER A NEW PASSWORD, type in your desired password for 'level2' in the 'password' field and press 'enter'.

Passwords can be any combination letters and numbers up to 24 characters.

Passwords are case sensitive.

After entering your new password, press 'enter'. Click 'OK' to continue.



To CHANGE THE DEFAULT LOGOFF TIME for the selected user level, touch the adjacent data field, type in your desired time value, and press 'enter'.

Logoff Times are expressed in minutes, and can range from 1 – 60.

Default Logoff Time is 5 minutes.

This button navigates back to the previous page.

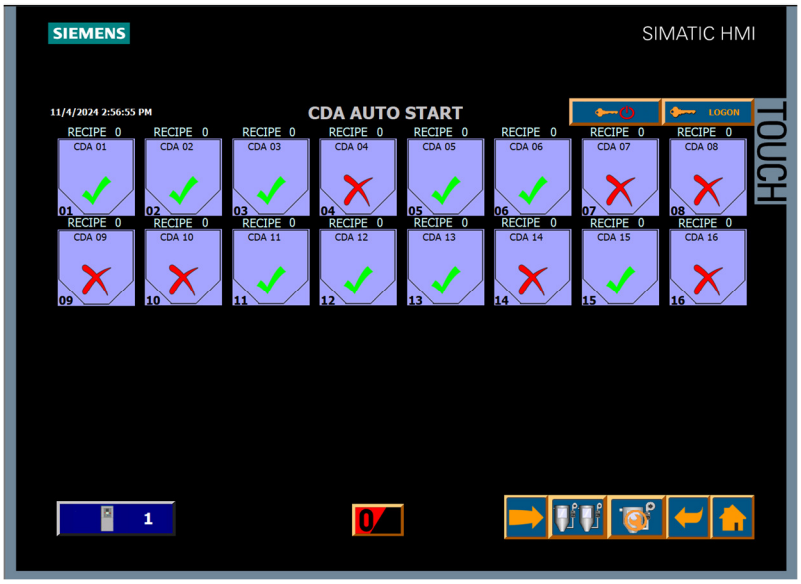
This button navigates to the CDA Status page.

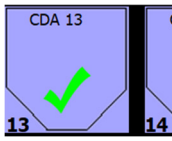
This button navigates back to the Main Menu page.

This button navigates to the CDA Setup screen.

10.2.2 CDA Auto Start

Navigates to the Auto Start Setup screen to designate CDA Drying Hoppers to automatically start when the Central Dryer(s) start, and to automatically shut down when Central Dryers shut down. Requires 'Level3' User Level access to enable navigation to this screen and make changes.





Auto Start status is identified by a Green Check Mark. Auto Start is disabled for a CDA Drying Hopper having a Red 'X'. Press an individual hopper icon to change status.

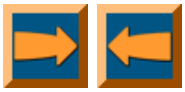
Auto Stop is a global setup parameter that applies to all CDA Drying Hoppers. The setpoint indicates the minimum number of Central Dryers that must be active for the CDA Drying Hoppers to operate.

CDA Drying Hoppers require airflow to operate safely and provide the necessary drying performance. Normally this setpoint equals the number of Central Dryers required to operate all CDA Drying Hoppers. When set to a lower value, some CDA Drying Hoppers must be disabled to ensure safe operation and acceptable drying performance. Contact the Novatec Service Department for assistance with system setup when operating with fewer partial Central Drying capacity.

A setpoint of ZERO disables this feature and allows CDA Drying Hoppers to operate independent of Central Dryer(s) status. CAUTION: Novatec is not responsible for damage to CDA Drying Hoppers or their contents resulting from operating with this feature disabled.

Pressing this button will toggle colors between Red and Green. Pressing when RED will disable Auto Start for all CDA Drying Hoppers. Pressing when GREEN will enable Auto Start for all CDA Drying Hoppers.

This button navigates back to the previous page.



Navigation Arrow buttons to show the status of the NEXT or PREVIOUS set of CDA Drying Hoppers.

This button navigates to the CDA Status page.

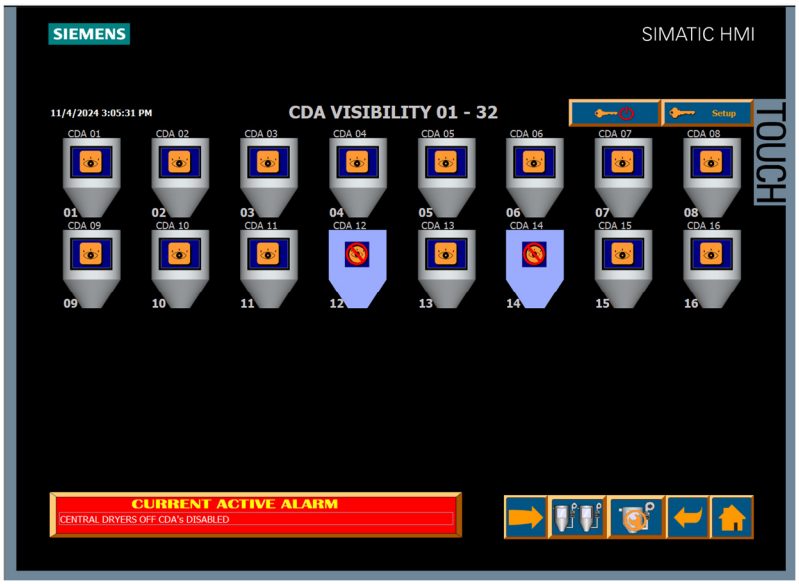
This button navigates to the CDA Setup screen.

This button navigates back to the Main Menu page.

CDA Hopper Visibility for Status Screen

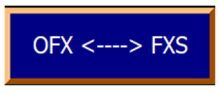
Navigates to the CDA Drying Hopper Visibility screen to select whether to make a particular CDA Drying Hopper VISIBLE or INVISIBLE on the CDA (Drying Hopper) Status screen by touching the icons. In the sample screen to the right, all CDA's are selected to be visible except #13 & #15. Requires 'Setup' User Level access to make changes.

NOTE: The sample visibility screen shows 16 CDA hoppers available. See page 15 for setting the number of CDA's in the system.



10.2.3 Other System Setup Screen Functions

Press to toggle FlexXpand (FXS) remote control access button located on Main Menu between visible or invisible.



Novatec setting only

Use to close logs before removing memory from HMI.

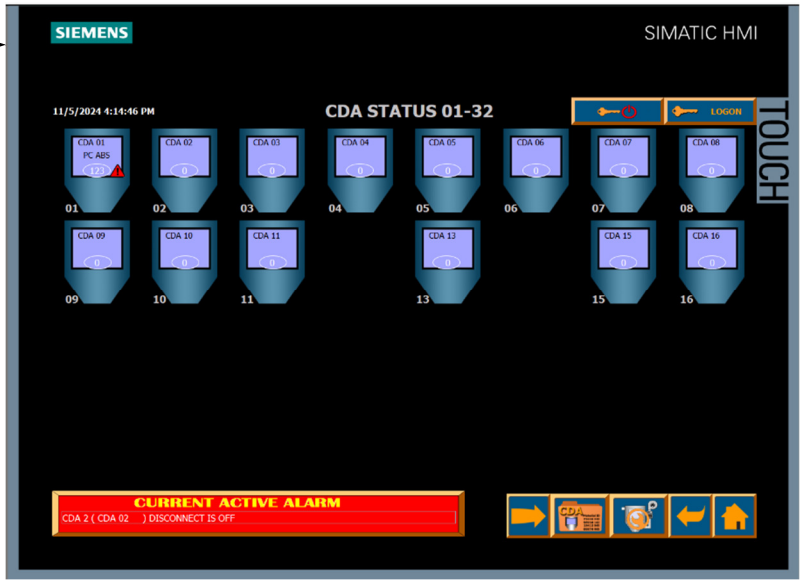
Use to open logs after installing a memory card.

Use to view the hardware status of networked components

Use to re-enable the HMI viewer to PCs using the SM@RT client.

10.3 CDA Status

Press the CDA STATUS button on the Home Screen (or most other screens) to access the CDA Status screen. This screen provides an overview of operating conditions for all CDA Drying Hoppers controlled by the OFX2 panel, up to 32 CDA's on a single screen.



You can also navigate to the CDA SETUP screen by pressing and releasing the desired CDA Hopper icon.

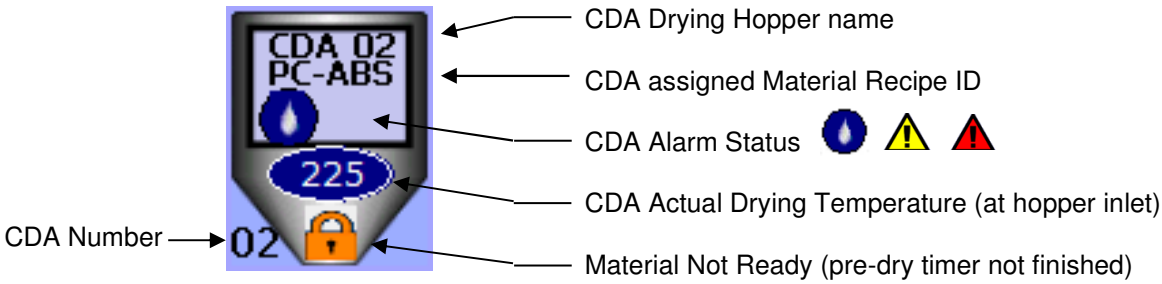
The CDA SETUP screen allows the user to enable and disable a CDA Hopper, and adjust features and parameters to meet a material's drying needs.

CDA Drying Hopper status indicators are:

DISABLED / OFF
– The CDA Drying Hopper is disabled – no material is being dried.

ENABLED / ON
– The CDA Drying Hopper is enabled – material is being dried.

Each enabled CDA Drying Hopper icon on this screen illustrates the following information:



Material Not Ready means that although the material in the bin has been drying, a period of time equal to or greater than the drying time set point defined in that bin's setup has not been satisfied.

The Heater Bin's current temperature is the temperature of the air blowing into the bottom of the bin.

10.3 – CDA STATUS (cont.'d)

LOW TEMPERATURE ALARM NOTE: The low temperature alarm (not the low temperature *deviation* alarm - Section 10.4) will shut off the heaters. This alarm is triggered if the temperature feedback is below the set point by 30 degrees F or more for longer than 5 minutes. This alarm is latched and must be reset with the red alarm reset pushbutton on the front of the cabinet. This alarm can mean the heater elements, fuses, solid state relays, or thermocouple input module have failed. In the worst case, the bin's thermocouple may have failed or been removed from the heater air stream. If removed from the air stream, the bin would be allowed to enter into a runaway heating state and could catch on fire.

HIGH TEMPERATURE ALARM NOTE: The high temperature alarm (not the high temperature *deviation* alarm - Section 10.4) will shut off the heaters and de-energize the main line safety contactor for that bin. This alarm is triggered if the temperature feedback is above the set point by 30 degrees F or more for longer than 30 seconds. This alarm is latched and must be reset with the red alarm reset pushbutton on the front of the cabinet. This alarm can mean the solid state relays have failed in the ON state or the thermocouple input module has failed.

HIGH DEWPOINT ALARM: The high dewpoint alarm is passive and will not shut off the heaters and stop CDA operation. This alarm is triggered if the dewpoint temperature feedback rises above the set point value. This is alarm is only active when the Dewpoint Monitor option is installed, and the option is active at the System Setup screen (see Section 10.3). This alarm can mean the air leaving the central dryer(s) is not dried properly, or a leak has developed between the central dryer(s) and the CDA air inlet.

Navigation Arrow buttons to show the status of the NEXT or PREVIOUS set of CDA Drying Hoppers.

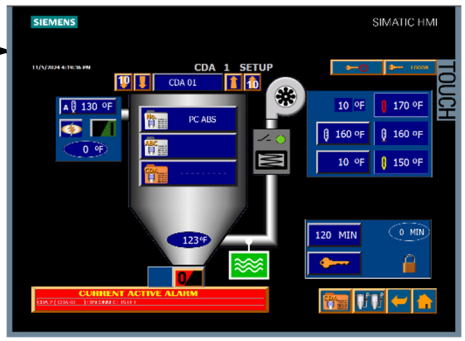
This button navigates to the CDA Recipe Setup screen.

This button navigates to the CDA Setup screen.

This button navigates back to the Home screen.

10.3 CDA Setup

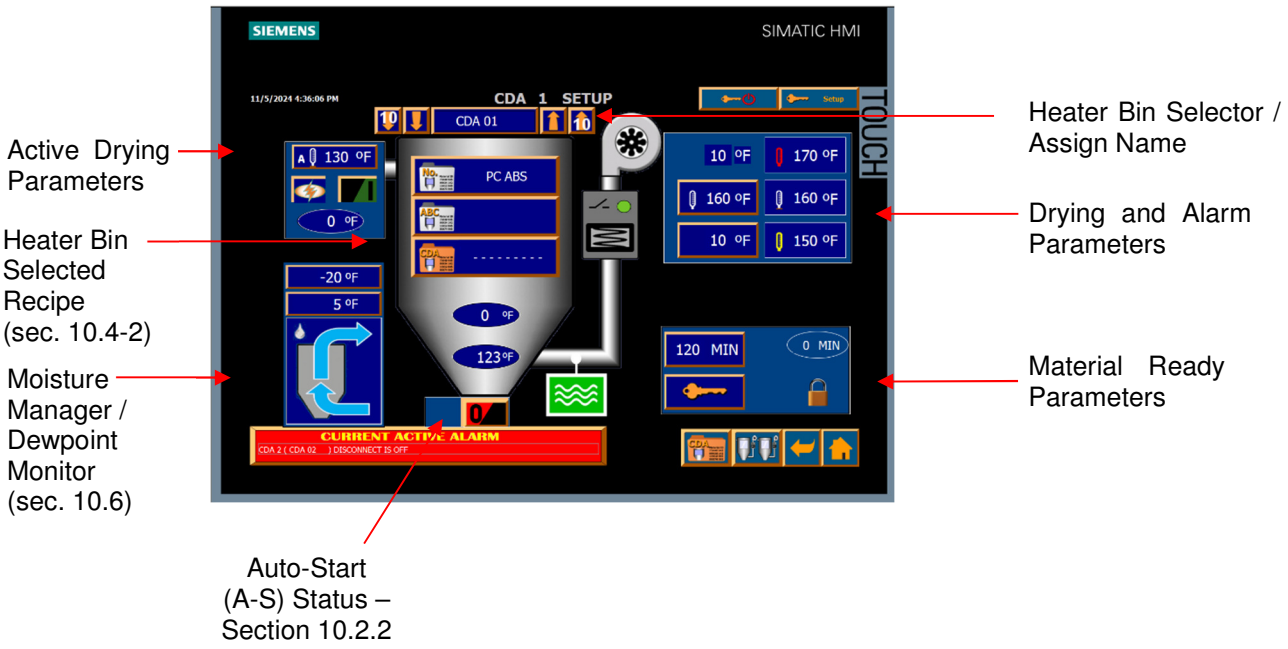
Press the CDA SETUP button on the Home Screen (or most other screens) to access the CDA Setup screen. This screen contains operating parameters for each individual CDA Drying Hopper.



You can also access CDA SETUP from the CDA Status screen by pressing and releasing a CDA Hopper icon, which will access the settings for that specific hopper.

For example, pressing the CDA 2 icon will navigate to CDA SETUP and display the CDA 2 parameters as shown.

Anyone can view a CDA's setup parameters, but login levels are needed to make changes to most parameters as described in the following summary.



10.3.1 Guidelines for changing a set point value

To change a set point value, the border of the button must be orange. This indicates that the proper password level has been entered correctly.

If the border of a set point button is gray, then the proper password level has not been entered correctly and that set point cannot be changed.

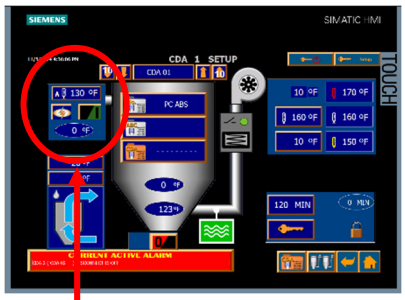
10.3.2 CDA Hopper Select and Name

This icon shows the name of heater bin currently in setup.
The increase and decrease buttons on either side of the bin name change which bin's setup parameters are being accessed.

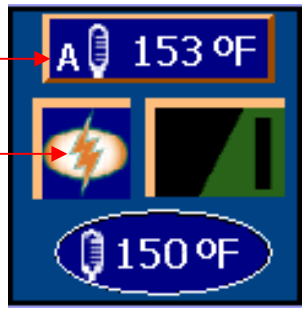
Down button – Go to the previous or next CDA Hopper's setup parameters.
Up button – Go to the next Heater Bin's setup parameters.

If the password level is "level 3" or higher, pressing the drying bin's title button itself will allow the name to be changed via keypad.

10.3.3 Drying (Overdry Protection)



CDA Hopper Setup Screen



Active Drying Setpoint
(When the CDA Hopper's Return Air Temperature exceeds this setpoint, Active Drying adjusts the CDA's material drying air temperature down to reduce excess heat entering the hopper.)

'Auto Mode' Indicator

'Auto Mode' On/Off button

ENABLE / DISABLE
This button toggles the Drying Bin's Active Drying function On and Off.

= OFF

= ON

Return Air temperature – the current temperature of the air exiting the top of the CDA Hopper.

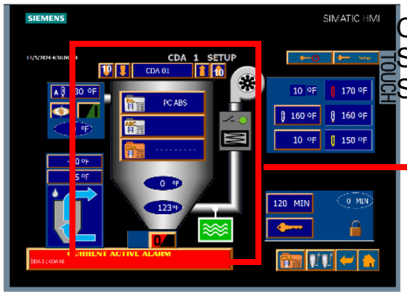
Active Drying is an energy saving feature that can also reduce overdrying effects during a temporary process interruption, and when your dried material demands fall below the CDA Hopper's drying capacity.

When enabled, Active Drying temperature adjustments begin when the CDA Hopper's Return Air Temperature rises above the Active Drying set point. Press  to ENABLE Active Drying.

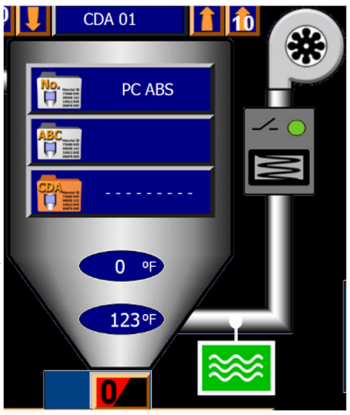
Active Drying Set point (*Range = 120 – 250 deg. F)*: In Auto Mode, the Active Drying setpoint is selected by the OFX2 control based on the CDA's drying temperature. The letter 'A'  beside the Active Dry Setpoint indicates Auto Mode is enabled. Enable or Disable Auto Mode by pressing the Power Guard  button. In Manual Mode (not recommended), the operator must enter the desired Active Drying Setpoint.

When the CDA Return Air Temperature exceeds the Active Drying Setpoint for 30 minutes, the material Drying Temperature Setpoint will be temporarily reduced by 5 degrees F. This process repeats every 30 minutes until the CDA Return Air Temperature falls below the Active Drying Setpoint. After 30 minutes in this condition, the material Drying Temperature is returned to its Setpoint value.

10.3.4 CDA Component Status



CDA Hopper Setup Screen



This group of icons and readouts graphically illustrate the status of the Drying Bin's input and output signals along with temperature and dew point feedback.

This button toggles the CDA On and Off.

= OFF

= ON

NOTES: Check the CDA disconnect and air flow switch status if the CDA fails to start. The CDA blower will continue to operate for a brief cool down cycle after the CDA is disabled. See Section 10.2.2 for Auto Start.

Local Heater Bin control panel circuit breaker status:

=OFF

=ON

NOTE: The local disconnect must be ON in order for the CDA to operate. If the disconnect is OFF, the CDA is disabled.

Status of the Drying Bin's Bin heater elements.

=OFF

=ON

Status of the Drying Bin's Blower.

=OFF

=ON

=COOL DOWN
When a CDA is disabled, the blower continues running until the cool down timer expires.

Status of the Drying Bin's air flow switch.

=OFF

Note: As a safety measure, the air flow switch must be ON (indicating proper air flow) before the bin heaters will energize.

Material ID – up to 8 characters may be programmed.

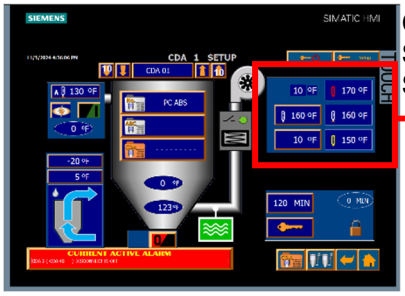
Material Name – up to 10 characters may be programmed.

Recipe Number – stores predetermined bin set points (sec. 10.4 and 10.5).

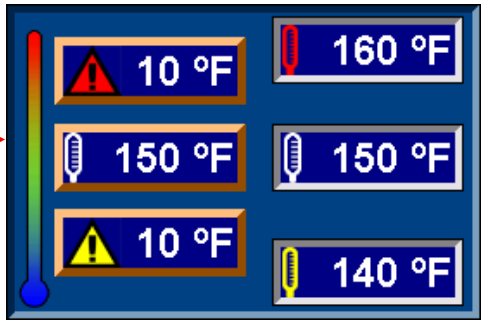
Readout of the dew point of air entering the drying bin (OPTIONAL FEATURE: Requires purchase of dewpoint monitoring components CDA Hoppers and OFX2 Panel. Not available on systems utilizing the Moisture Manager option).

Temperature of the air entering the drying bin.

10.3.5 CDA Drying and Alarm Parameters



CDA Hopper Setup Screen



Drying and Alarm Parameters – this group of icons shows the set points for the Heater Bin's drying temperature, and the high and low temperature deviation. Also shown in the right column are the trigger values affected by those set points

High Temperature Deviation: Temperature Set point plus this value equals trigger temperature above which causes a High Deviation Temperature alarm. Status elevates to High Temperature *Alarm* (shutdown) if deviation continues for 20 consecutive minutes.

Heater Bin Temperature set point, selected to dry the material.

Low temperature Deviation: Temperature Set point minus this value equals trigger temperature below which causes a Low Deviation Temperature alarm. Status elevates to Low Temperature *Alarm* (shutdown) if deviation continues for 20 consecutive minutes.

High Temperature Deviation Trigger: Temperature trigger point above which causes a High Deviation Temperature alarm.

Current Temperature Set point-No Active Drying: Heater Bin Temperature set point to dry the material with no adjustments from the Active Drying algorithm.

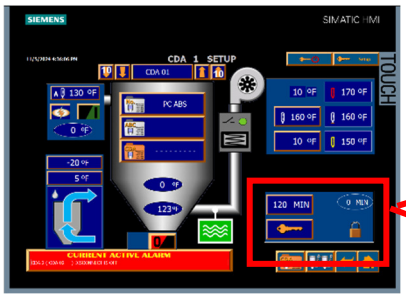
Current Temperature Set point-Active Drying Adjusted: Heater Bin Temperature set point to dry the material with the set point adjusted by the Active Drying algorithm.

Low Temperature Deviation trigger: Temperature trigger point below which causes a Low Deviation Temperature alarm.

DEVIATION ALARMS ARE DOUBLED DURING FIRST 10 MINUTES AFTER STARTUP

When the a CDA Drying Hopper is first enabled, the high and low deviation alarms will be doubled for the first 10 minutes of operation to allow the process temperature to reach the target setpoint and maintain steady state operation.

10.3.6 CDA Material Ready Parameters



CDA Hopper Setup Screen

Material Not Ready (Locked)

Material Ready (Unlocked)

The Material Ready Parameters indicate if the pre-drying period has been completed after initial CDA Hopper startup. This information allows the operator to ensure material has been pre-dried sufficiently to leave the CDA Hopper for processing. When a CDA Hopper is first enabled, the countdown begins. The countdown timer will pause if the CDA Hopper is disabled. The timer will reset after the CDA Hopper has been disabled for 20 minutes.

The Material Ready 'Locked' status will automatically prevent material from being conveyed from the CDA Hopper when used with a FlexXpand (FXS) Central Conveying Control, and a conveying purge valve is installed at the CDA Hopper discharge.

Drying Time Setpoint (for pre-drying): Enter the number of minutes the material in the CDA Hopper must be initially dried before it is ready for processing.

The actual countdown timer value. Represents the time remaining for pre-drying before the material is unlocked for processing.

Enable / Disable Material Lock: When the countdown timer is active, press this button to unlock the material. Press the button again to re-lock the material and continue the countdown. If the drying time has elapsed, this button has no function.

Locked: Material is NOT Dried/Ready: Locked icon showing that the material is NOT dried or ready for processing.

Unlocked: Material is Dried/Ready for production: Unlocked icon showing that the material is dried and ready for processing.

Countdown Timer Enabled: Hourglass full icon colored red indicates the countdown is enabled and active. WHEN FLASHING, the countdown timer has been paused by disabling the CDA Hopper. The timer will resume when the CDA is enabled. The Countdown Timer will reset after 20 minutes

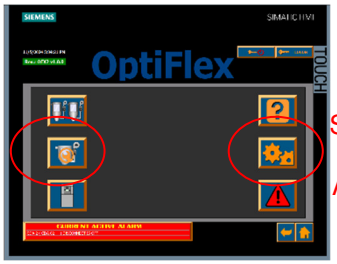
Countdown Timer Expired: Hourglass empty icon colored green indicates the timer has completed its countdown, or the Material Lock was disabled.

10.4 CDA Material Recipe Setup

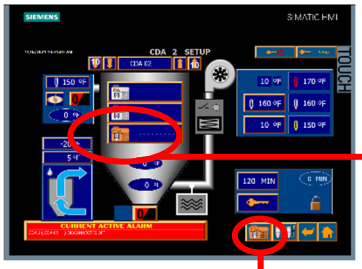
Drying Recipes may be created and stored to allow convenient heater bin set-up by simply choosing a recipe and assigning it to any specific heater bin(s). Recipes typically relate to the material being dried and may contain all temperature set points and temperature-related alarm parameters, as well as helpful descriptions of the material itself. The use of recipes is also a convenient way to easily program multiple heater bins with the same parameters once they've been saved to a recipe.

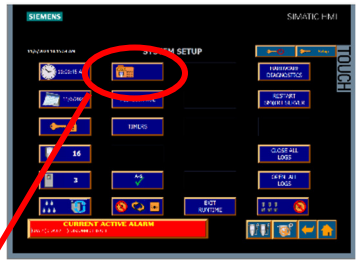
The set-up of recipes is accessed through the System Setup Screen by pressing the  button. Recipe Setup can also be accessed by pressing the  button on any CDA Setup Screen.

CDA Setup Access

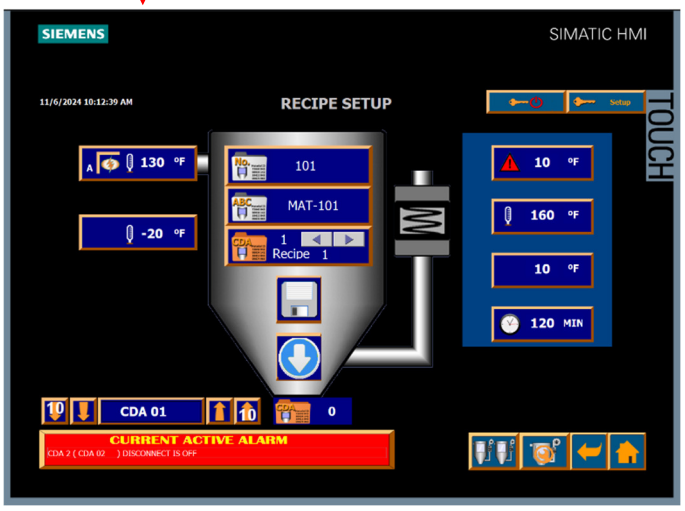


System Setup Access





Note that the Heater Bin Recipe Setup screen closely resembles the Heater Bin Setup Screen so that all available parameters may be readily viewed, considered and assigned to a recipe as desired. Detailed descriptions for each CDA setup parameter can be found throughout Section 10.3 of this manual.



-Material ID up to 8 characters

-The Recipe Name up to 10 characters

-Press the side arrows to view the previous or next recipe in the library. -Press folder icon to access a Recipe List with page scrolling (10 recipes visible at a time).

High Temperature Deviation Alarm

Drying Temperature Setpoint

Low Temperature Deviation

Material Ready Dry Time (Pre-dry Countdown)

Active Drying Setpoint (ref. Return Air Temperature) – Press the Power Guard Button  to toggle between Auto Mode  and Manual Mode. Auto Mode is recommended.


Download Recipe Button Active (recipe saved)


Download Recipe Button NOT Active (unsaved recipe settings)


Save Button NOT Active (no recipe settings have changed)


Save Button Active (recipe settings have changed)

CDA Hopper Selected

Recipe # Assigned

CDA Hopper Selected for Download and Current Recipe Assigned ('0' = no recipe assigned)

10.4.1 CREATING OR EDITING A RECIPE

Each setting may be accessed and changed by pressing the setpoint value. A keypad will appear. Make the desired changes on the keypad and press enter. When all recipe values are entered, you must SAVE THE RECIPE to store the new settings.


Save Button NOT Active (no recipe settings have changed)


Save Button Active (recipe settings have changed)

When a parameter is changed, the SAVE button changes color from gray to blue to indicate a new value is ready to be stored in the current recipe. When all recipe parameters are updated to the desired new values, press the Save Button to store these new values. CAUTION: Any values entered are lost when you navigate from the recipe screen without hitting the SAVE button first.

10.4.2 LOADING A RECIPE to a CDA Hopper

Once a recipe has been saved and is currently displayed, it may be assigned to any Heater Bin by selecting the desired bin number at the bottom left corner of the screen.

Arrows allow you to move up and down the list of Heater Bin one at a time, or 10 at a time.

The number to the right of the recipe folder icon indicates the recipe currently loaded. A value of '0' means no recipe is assigned.

When the desired Heater Bin is selected, press the Load Recipe button  at the bottom of the Heater Bin icon. The displayed recipe number will appear beside the recipe folder icon to confirm it has been successfully assigned to the Heater Bin.

10.5 Changing CDA Settings when a Recipe is Loaded

Before making changes to settings of a CDA Hopper operating with a recipe loaded, you should consider the following possibilities.

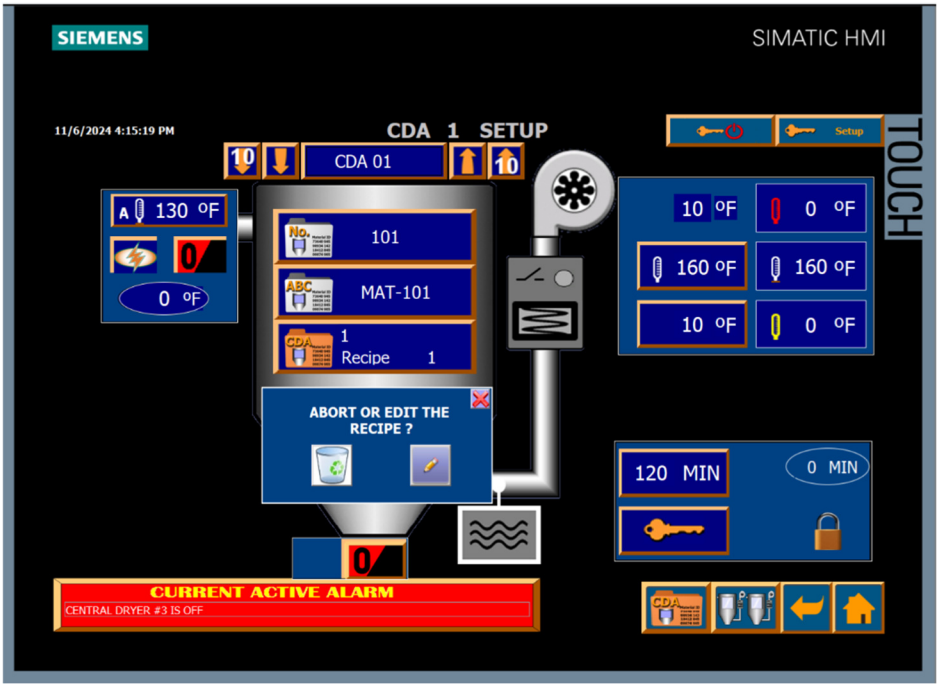
Do you wish to make changes to only this particular CDA Hopper? Or, do you want to make changes to the Stored Recipe that is currently guiding the operation of this CDA Hopper?

To assist making this decision properly, the OFX2 control provides this dialog box when attempting to edit a CDA Hopper setting that's part of an assigned recipe.

Press this button to close the recipe edit dialog box and keep the recipe loaded without changes.

Press this button to edit the loaded recipe for the displayed CDA. Navigation will be redirected to the recipe setup screen, where the recipe can be edited normally (see Section 10.5). CAUTION: Changes made to a recipe will be automatically loaded to ALL CDA Hoppers using that recipe.

Press this button to abort recipe usage for the displayed CDA Hopper. A message confirms this action. Press 'X' to close the message box. All settings remain the same except the recipe reference is removed. The setpoints can now be changed normally for this CDA Hopper (see Section 10.4).



CDA SETUP SCREEN with Recipe Edit Dialog Box active.

Select if you want to abort the recipe and change settings for the CDA Hopper, or if you want to edit and store new settings for the displayed recipe.

Editing the recipe will change settings for ALL CDA Hoppers using that recipe.

Changes can be made to a single CDA Hopper's settings without modifying the stored recipe in 2 ways.

1. Choose to abort the recipe as explained in this section.
2. Create a *new* recipe that includes the change(s) you wish to make, and download it to that CDA Hopper (see section 10.5).

10.6 Moisture Monitoring (optional)

CDA Hopper Setup Screen

The OFX2 control and CDA Hoppers can be equipped with Moisture Monitoring options to provide real time feedback of air moisture conditions entering, or inside, each CDA unit.

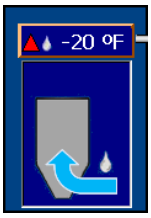
These options, if installed, can be activated through the System Setup Screen (see Section 10.2 on page 14).

When activated, they're visible on the CDA Setup Screen, accessed by pressing this button  (see Section 10.4).

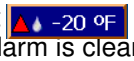
This icon displays the ***actual measured Dewpoint Temperature*** of the air.

- For Moisture Monitor, this value represents air entering the CDA Hopper.
- For Moisture Manager, this value represents air inside the CDA Hopper where material level equals ~ 2/3 the usable volume.

10.6.1 Moisture Monitor



This icon varies depending on the option installed, and mode of operation for that option.

Moisture Monitor creates this graphic when installed and activated. Moisture Monitor tracks the Dewpoint Temperature of the incoming dehumidified air. If the measured Dewpoint Temperature is greater than the Alarm Setpoint 

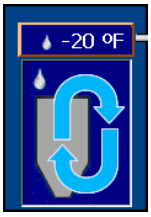
, a High Dewpoint Temperature alarm is generated for the CDA Hopper. The alarm is cleared when the measured Dewpoint Temperature returns to a level lower than the Alarm Setpoint.

10.6.2 Moisture Manager

Moisture Manager can reduce or eliminate the effects of overdried material in your process. Typical scenarios where Moisture Manager can help include temporary process shutdowns, or when dried material consumption decreases significantly below the CDA Hopper's drying capacity.

Moisture Manager creates one of two graphics that follow when installed and activated.

This graphic ***indicates the CDA is drying normally*** with dehumidified airflow from a remote source (Central Dryers).

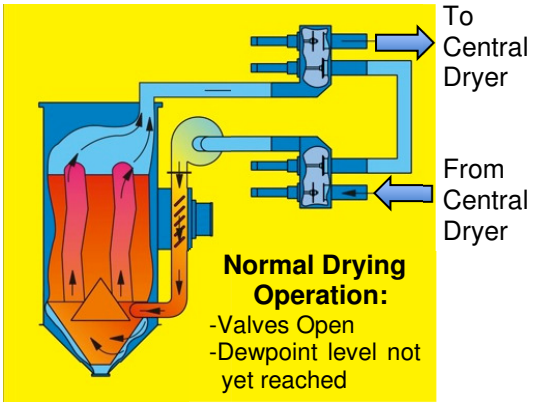


This graphic ***indicates Moisture Manager is active***, with recirculating airflow at the CDA. When recirculating, no additional moisture is removed from the material, yet the airflow maintains drying temperature. The CDA Hopper's dedicated blower makes this possible.

The **Moisture Manager Setpoint** -20 ºF creates a dryness limit inside the CDA hopper. The Dewpoint Temperature of the air is measured at ~2/3 usable material level. Moisture Manager activates when the measured Dewpoint Temperature is less than the Moisture Manager Setpoint value.

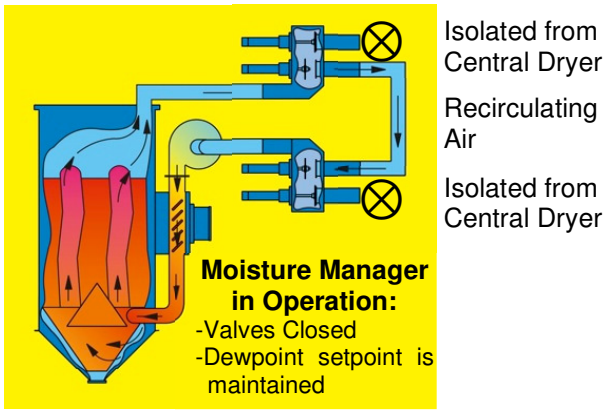
CDA Hoppers with the Moisture Manager option are equipped with air flow valves on their inlet and outlet. These valves open and close in response to the OFX2's Moisture Manager control signals, determining the path for airflow.

Normal Drying Operation: During start-up with moisture laden material, or anytime the CDA Hopper is drying material at a rate near its drying capacity, the Moisture Manager valves open and allow dehumidified air from the Central Dryer(s) into the CDA hopper.

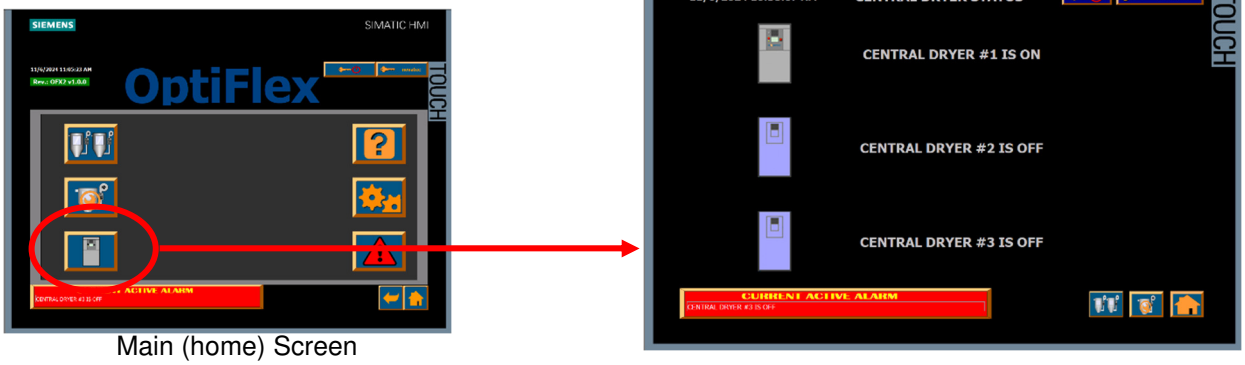


Moisture Manager Operation: When dried material consumption decreases substantially, the CDA Hopper dries material more quickly than it's taken away, which can lead to over-drying of materials like Nylon. Moisture Manager senses this condition and limits the overall dryness inside the CDA hopper by closing the valves leading to the dry air source, and recirculating the existing air inside the hopper.

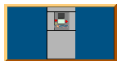
Over time, as dried material exits, the CDA Hopper is refilled with moisture laden material. Moisture Manager senses the increasing moisture content and automatically opens the valves to reintroduce dry air into the CDA Hopper.



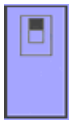
10.7 Dryer Status Screen



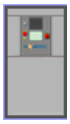
Main (home) Screen

Touching the CENTRAL DRYER STATUS button  on the main menu page will call up the screen to display the on/off status of the dryers connected to the system.

On the Drying Bin Status page, the Central Dryer Status buttons are coded to indicate operational status:



Wireframe icon: Central Dryer is OFF (aux contact for main blower starter is open)



Color Dryer Graphic: Central Dryer is ON (aux contact for main blower starter is closed)

Note that central dryers used with the OptiFlex have their own controls, located at the dryer itself, which govern their operation. The Dryer Status screen provides two functions:

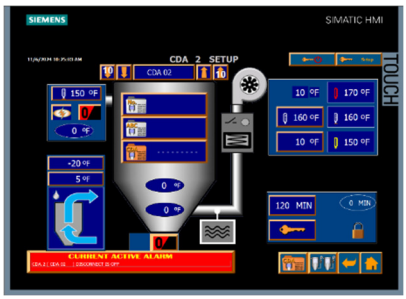
1. To allow viewing the on/off status of the dryer(s) providing dry air to the drying system.
2. To allow setting and viewing the minimum number of dryers providing dry air for proper system operation.

Set the number of Central Dryers installed on the System Setup Screen (Section 10.2).
Set the number of Central Dryers 'ON' to permit CDA Hopper operation (see Auto-Stop, Section 10.2.3).

10.8 Alarm Display

A new alarm will be displayed in a message banner that runs along the bottom left hand corner of any screen. The Alarm Banner will only be visible if alarms are present. Specific text detailing the Alarm will be displayed on the banner. Alarms that become cleared will disappear from the alarm banner when the alarm status returns to normal values.

By simply pressing the Current Active Alarm Banner, the Alarm History Screen will appear.

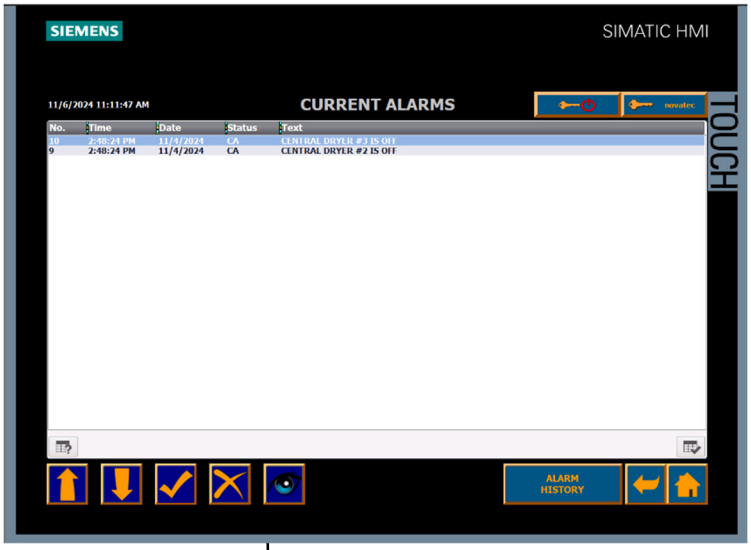


10.9 Alarm History

The ALARM HISTORY screen displays the last 150 alarm conditions.

The ALARM SILENCE pushbutton on the front of the control panel will silence the horn until another NEW alarm appears.

Acknowledging an alarm will log the time when the alarm was acknowledged. An acknowledged alarm will be deleted from the Alarm History when its alarm condition has been cleared.



 Page up (if you have a lot of alarms)

 Page down (if you have a lot of alarms)

 Acknowledge selected Current alarms

 Delete all alarms that are no longer active

 Go to the info page of that alarm

 Return to the previous page

 Return to Home (main) page

ALARM STATUS CODES:
C = Current Alarm
CA = Current Alarm Acknowledged
CD = Alarm Condition Cleared but Not Acknowledged

DELETING ALARMS:
Alarms are permanently deleted from the Alarm History when the alarm condition is no longer active (cleared), and the Alarm is Acknowledged.

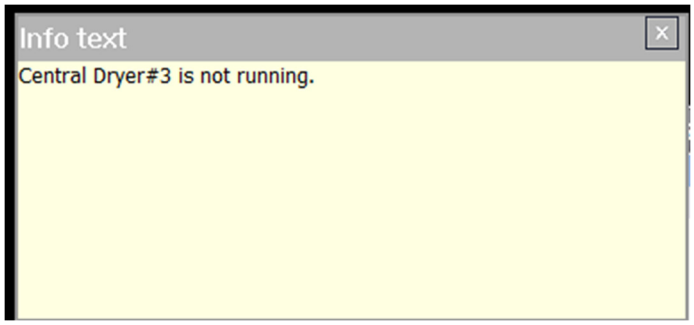
 There is an Alarm Silence Button located on the front of the control panel enclosure.

10.10 Help Pages

Assistance for understanding, monitoring, setting up and troubleshooting your OFX2 system are built into the OFX2 control and accessible from the main home page by pressing the  icon.

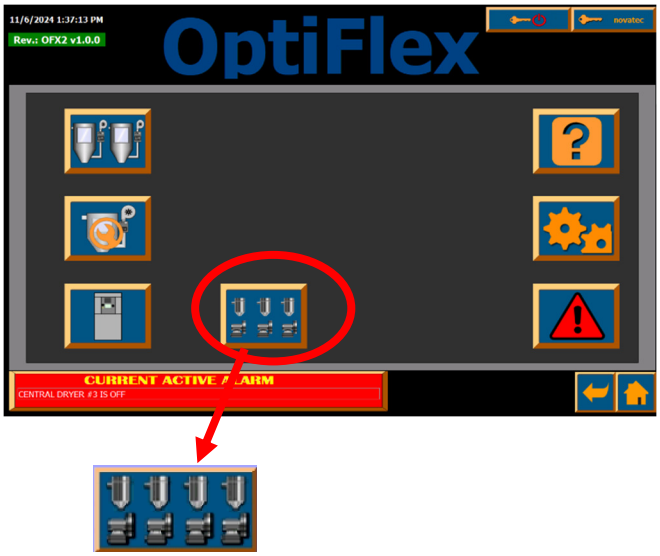
Help topics are identified at the top of each page and may be readily viewed and paged through as needed via the arrow buttons along the bottom.

Return to the Home screen by pressing the home button in the lower right of the screen.



10.11 Remote Access – OFX2 to FXS (FlexXpand) Central Drying Hopper Control

FXS CENTRAL CONVEYING REMOTE CONTROL ACCESS



(button located on the Home screen or Main Menu).

This button navigates to the IP Address of the Novatec FXS Central Drying Hopper Control to initiate remote control access. When accessing the FXS Control, the user assumes full control of the FXS HMI. A user at the FXS control will observe the remote user's actions on the screen. If local control is desired, the FXS user can simply touch the local screen twice to stop remote access and assume control.

This button can be made visible or invisible at the 'System Setup' screen (see Section 10.2)

10.12 Remote Access – FXS Screen Sharing

These four buttons open copies of the FXS screens allowing setup and monitoring of the Vacuum pumps and Stations. Unlike the full takeover method in 10.11, this method of shared control allows users at both panels to have control.

Further information on the Setup and monitoring indications of the Station and pumps can be found in the FX3 manual.

11 REMOTE CONTROL ACCESS, NETWORKING AND HMI SETUP

The OFX2 Control is able to communicate with a number of remote external devices. Accessing the OFX2 from 3rd party devices using an internet browser or remote desktop application provides remote monitoring and control capabilities. Access to other network installed Novatec central controls (see Section 10.12) has been preconfigured and programmed.

All communications are accomplished through a hard wired Ethernet cable network, utilizing ProfiNet and Industrial Ethernet protocols. Local wireless access can be created through customer installed wireless router near the OFX2 panel installation. Remote wireless access can be created through interface with customer corporate network.

11.1 CONNECTING OFX2 TO A CORPORATE NETWORK

11.1.1 Network Physical Layer

DO NOT utilize a corporate network as the physical layer (cables and routers) to connect a Novatec Control to its peripheral devices and remote I/O panels, or to connect it to other Novatec equipment and central controls. Corporate networks should access the Novatec control network via branch connection for communication purposes only.

WARNING: Failure to follow these instructions may prevent normal and safe operation of installed controls and their equipment.

11.1.2 Prior to Connecting

The customer should review and resolve all IP address conflicts PRIOR TO CONNECTING a corporate network to a Novatec control network. See Sections 11.1.3 and 11.1.4.

11.1.3 Network IP Addresses

Novatec utilizes fixed addressing scheme for its control networking topology.

IP Address: 192.168.1.xx
Subnet Mask: 255.255.255.0

A detailed list of OFX2 IP addresses is included in Section 7 of this instruction manual.

11.1.4 Network IP Address Conflicts

Novatec is not responsible for IP address conflicts that occur between its standard topology scheme and connected corporate networks.

WARNING: IP address conflicts may cause communication faults that prevent normal and safe operation of installed controls and their equipment.

If required, the HMI Subnet Mask pair stored in the OFX2-HMI Setup Utility can be modified to create compatibility with the customer network (see Section 11.3 for HMI Setup instructions).

- NOTE: A router (not included) may be required for the PLC and HMI on the Novatec control network (192.168.1.X) to be visible on the customer network, depending on the IP address and mask used on the customer system. Have your network administrator contact Novatec Service for additional assistance.

11.2 REMOTE ACCESS TO HMI VIA CORPORATE OR WIRELESS NETWORK

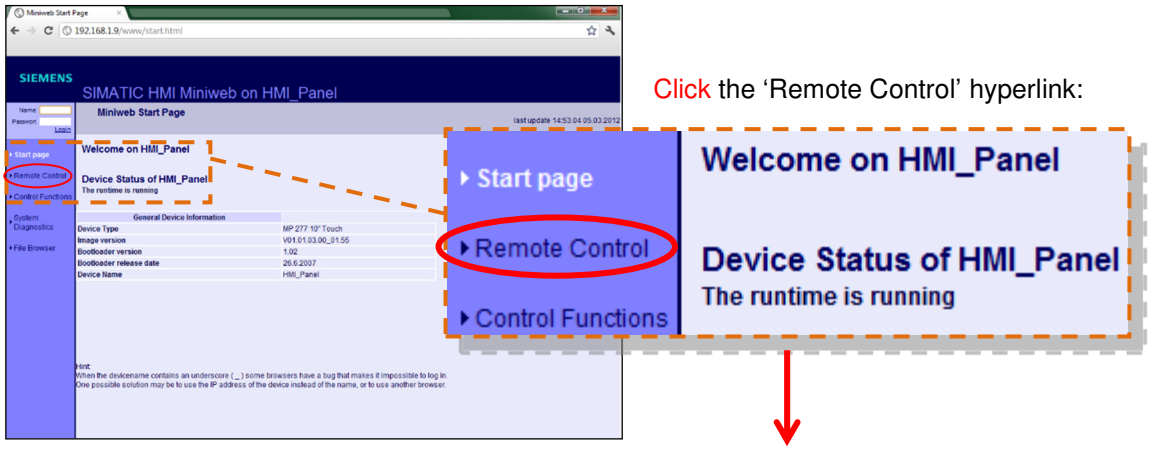
If permitted, a wireless router can be connected to the OFX2 control network to provide remote access. The OFX2 can also be connected to a corporate network as outlined in section 11.1. When the OFX2 has been successfully connected to an accessible network, a remote device may be used to remotely control the HMI as follows:

11.2.1 Connect wireless Smart Device to the OFX2 accessible network

Open PocketCloud App (or similar VNC App) on Smart Device and add a manual connection link. Use OFX2 IP Address 192.168.1.11 (10" HMI) to access the HMI remotely. Use '100' for password when prompted.

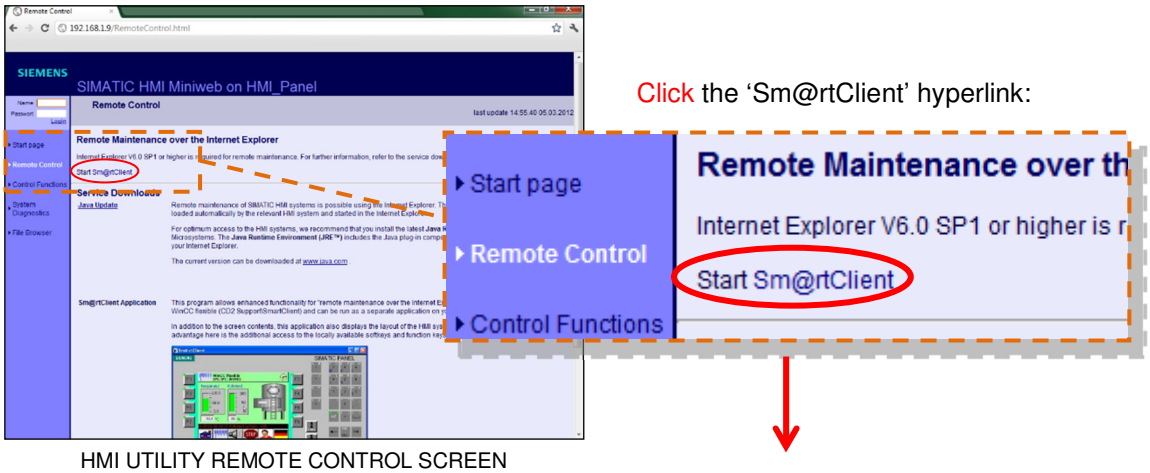
11.2.2 Connect PC to the OFX2 accessible network

Open Internet Explorer browser and enter OFX2 IP Address 192.168.1.11 (10" HMI) to access the HMI remotely. When connection to the HMI is established, the following utility screen will appear (note: a JAVA browser plug-in update or installation may be required during the connection process):



Click the 'Remote Control' hyperlink:

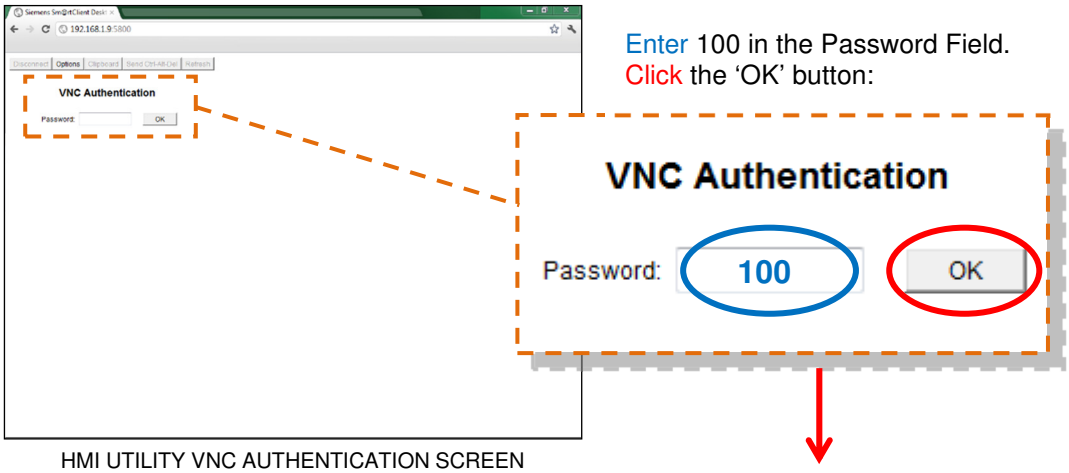
HMI UTILITY START SCREEN
IN BROWSER WINDOW



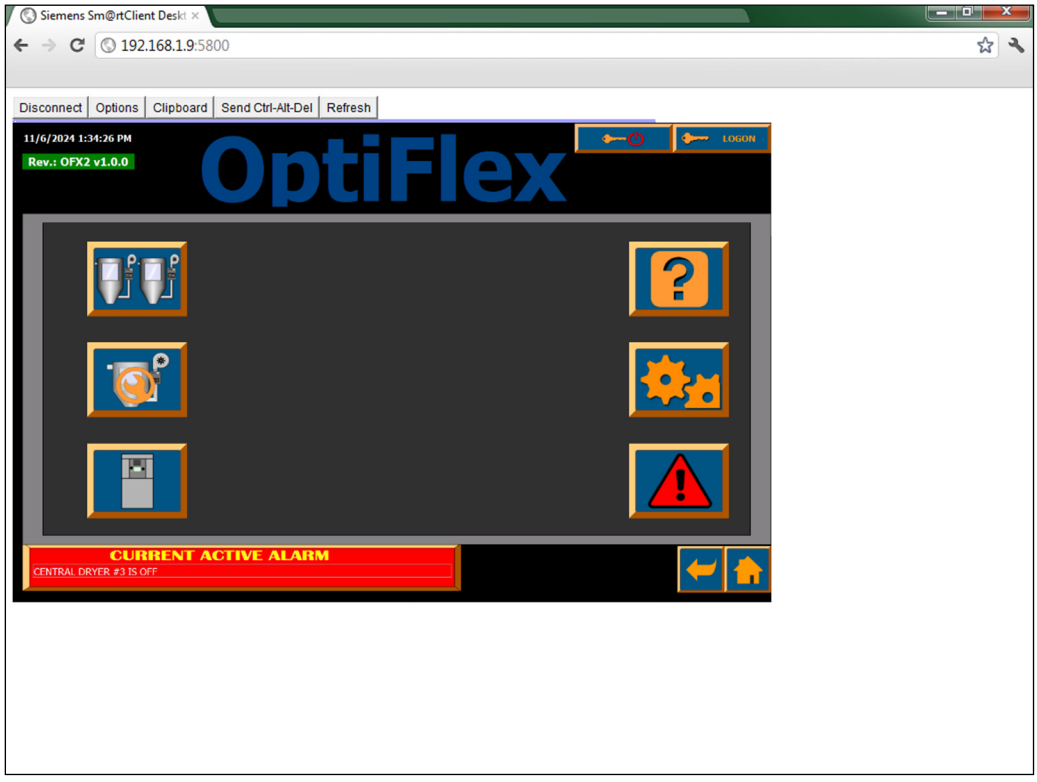
Click the 'Sm@rtClient' hyperlink:

HMI UTILITY REMOTE CONTROL SCREEN
IN BROWSER WINDOW

11.2.2 – 11.2.2 Connect PC to the OFX2 accessible network (cont.'d)



HMI UTILITY VNC AUTHENTICATION SCREEN
IN BROWSER WINDOW

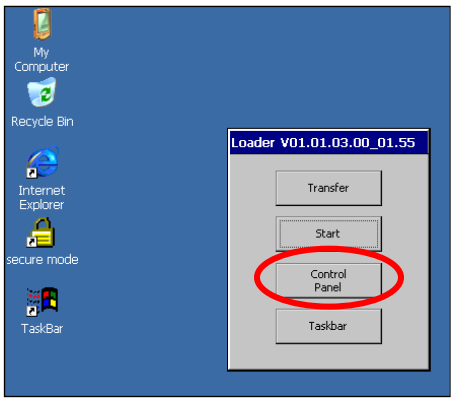


OFX HMI SCREEN IN BROWSER WINDOW

11.3 HMI SETUP FUNCTIONS

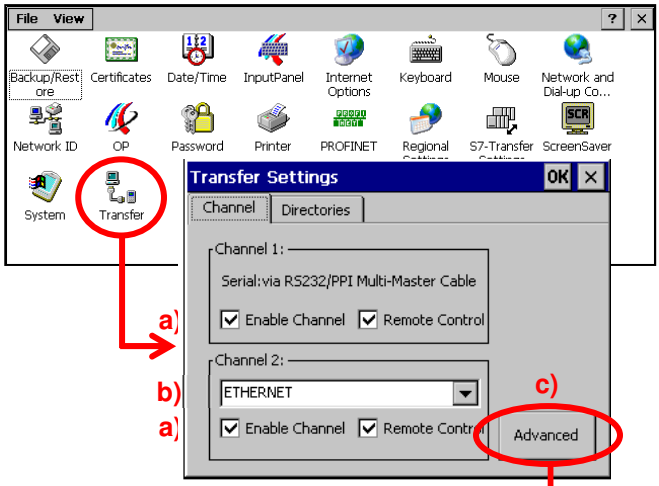
11.3.1 Accessing the HMI Operating System Utility

Power up the OFX2 control. During HMI boot sequence (approximately 20 – 40 seconds), the operating system 'desktop' screen appears for approximately 5 seconds. Press the CONTROL PANEL button.

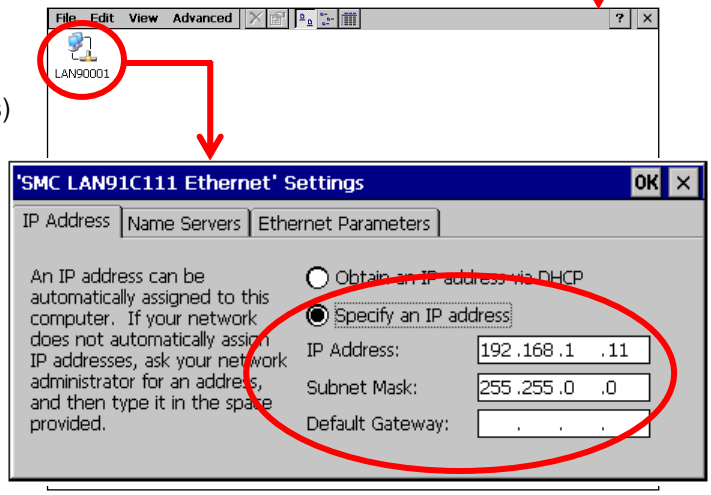


11.3.2 HMI Setup: Remote Access and Subnet Mask / IP Address

1. At the HMI Control Panel screen, double click (press) the TRANSFER button. In the Transfer Settings dialog box:
   a. Verify 'Enable Channel' and 'Remote Control' boxes are checked for Channel 2.
   b. Verify Channel 2 pull down selection is set to ETHERNET.
   c. Click (press) the 'ADVANCED' button.



2. At the Advanced Transfer Settings screen, double click (press) the LAN9001 button. In the Ethernet Settings dialog box, click (press) the 'Specify an IP address' radio button and set the Subnet Mask to permit access from your corporate network.



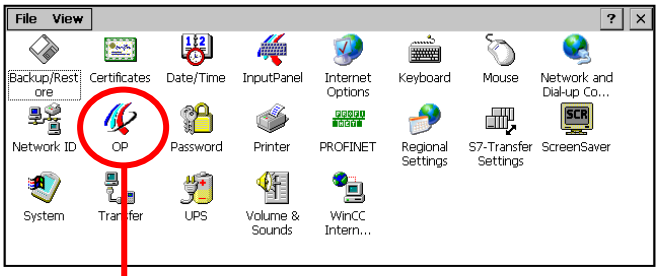
NOTES:

a) Do not change the HMI IP Address. Loss of communication with the PLC will result.

b) If IP Address conflicts exist between the Novatec Network and the corporate network, or the their IP address schemes do not permit direct communication, a managed router will be needed to bridge the networks.

11.3.3 HMI Setup: Brightness and Touch Calibration

At the HMI Control Panel screen, double click (press) the OP button. (see Section 11.3.1 for instructions to access the HMI Control Panel screen)

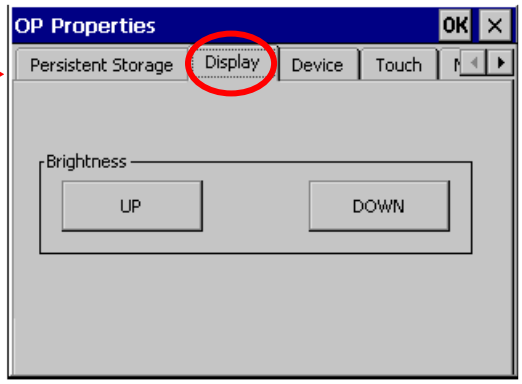


BRIGHTNESS

In the OP Properties dialog box, touch the 'Display' tab.

Press the Brightness UP and DOWN buttons to adjust display appearance for ambient lighting conditions.

Press the OK button to close the OP Properties dialog box.

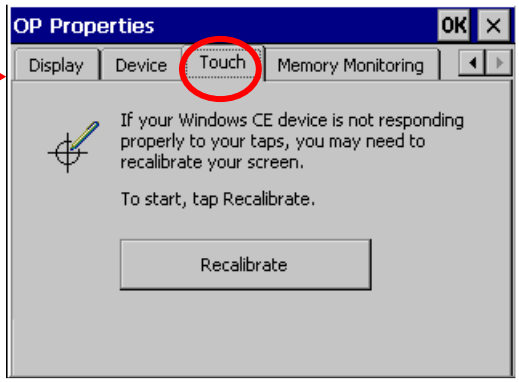


TOUCH CALIBRATION

In the OP Properties dialog box, touch the 'TOUCH' tab.

Press the RECALIBRATE button and follow the on-screen prompts to sync the screen reaction to user touch taps.

Press the OK button to close the OP Properties dialog box.



12 MAINTENANCE

It is recommended that maintenance and inspection be performed on a scheduled basis. Maintenance requirements may vary widely for each installation and specific operating conditions. It is suggested that a complete inspection be performed with necessary maintenance at the end of the first month, the first three months, and the first six months. These inspections will indicate how often future maintenance will be necessary.

- ❑ All electrical, mechanical repairs and tests are to be performed by qualified personnel only.
- ❑ Disconnect electric power from control box before opening panel for maintenance.
- ❑ Depressurize pneumatic system before performing maintenance or repairs on pressure containing components. Check all pressure gauges to ensure that depressurization has occurred.
- ❑ Uninsulated dryer, hopper, and heater surfaces may be in excess of 150°F during heating. Allow the system to cool completely before beginning repair work.
- ❑ Do not disable or bypass equipment safety features.
- ❑ Refer to system component manuals for additional information.
- ❑ To prevent equipment malfunction and improper material delivery, do not manually force actuated valves (i.e. Station Valves, Purge Valves, Proportioning Valves, etc.) to the open or closed position during system operation.

⚠ **WARNING: Before beginning repair work, disconnect all power sources and secure against inadvertent reconnection.**

⚠ **WARNING:** Auxiliary equipment may contain moving parts that may cut, crush, or otherwise injure personnel when safety/access covers are removed. Do not place hands or limbs in equipment during operation.

12.1 At Startup

- ❑ Verify CDA Hopper and System settings.
- ❑ Record equipment Serial Numbers and the OFX2 Controller program revision level.

12.2 Monthly

- ❑ Check system for air leaks or flow obstructions and correct as required.

12.3 Every 3 Months

- ❑ Check all electrical connections to make sure that they have not become loose, especially those connections at contactors, motor starters, and heater elements.

14 APPENDIX

14.1 T/C Wiring Notes

Description:Thermocouple extension wire, Type J, 20Ga, Stranded, Twisted Pair W/Shield. Red & White PVC conductors, Black PVC jacket.

As a guideline, under 100 feet with 20 AWG or thicker wire in an area free of electromagnetic interference usually is fine.

- Thermocouple grade wire is used to make the sensing probe of the thermocouple.
- Extension grade wire is used to extend a thermocouple signal from a probe to an instrument.
    - The extension grade wire typically will have a lower ambient temperature.
    - Thermocouple wire may be used as extension wire, but extension grade wire may not be used in the probe.
    - Part numbers for extension wire typically begin with an "EX" prefix.

Two of the main factors in determining useable thermocouple length are total loop resistance and preventing electrical noise getting into the signal. The resistance will vary based on the type of wire as well as the wire diameter and length. The allowable loop resistance is affected by the input resistance of the amplifier circuit to which it is attached. But as a guideline, typically the objective is to keep the total loop resistance under 100 ohms. Loop resistance is determined by multiplying the length in feet by the 'resistance per double feet' (remember 1 foot length of run includes 1 foot from each of the two t/c wires). For Type J 20Ga T/C wire, resistance is 0.349 ohms / ft at 68 deg. F. Remember in your calculations to include the probe (when used/applicable) in addition to the wire length. The second major factor in running a thermocouple wire is to keep it away from any electromagnetic fields. Thermocouple wire creates a low voltage signal and should not be run near power wires, motors, etc. To help minimize noise pickup, a metal over braid or twisted shielded wire is commonly used.