

MCS(C) Fixed I-O Series Material Conveying System

Part Number: MCS(C)-210-6-6C & -7C
MCS(C)-320-8-6C & -7C
MCS(C)-334-10-6C & -7C



222 E. Thomas Ave. Baltimore, MD 21225 USA

Phone 410-789-4811

Toll Free: 800-938-6682

Main Fax: 410-789-4638

Parts Email: parts@novatec.com

Service: service@novatec.com

Sales: sales@novatec.com



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1 PURPOSE OF THIS MANUAL

This manual describes the installation and operation of the NOVATEC MCS(C) Series Fixed I-O Material Conveying System controller. Before installing this product, please read in their entirety, 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.



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 MCS(C) Series controller is an Allen-Bradley PLC-based control system designed to incorporate existing and future equipment. The Material Conveying System (MCS(C)) will control up to 20 vacuum receivers and 3 Vacuum Pump Units (VPU), plus up to 8 material source valves.

A choice of two touch screen sizes and two different control capabilities are available.

The MCS(C) allows easy expansion from a small number of devices to maximum capacity without the need for additional programming. Vivid icons show functions and enhance control understanding.

Blow Back or Proportioning may be optioned in the main control.

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

4 SPECIFICATIONS

Description	Material Conveying System Controller		
Model No	MCS(C)-210-6-7C & 6C	MCS(C)-320-8-7C & 6C	MCS(C)-334-10-7C & 6C
Performance Specifications			
Max No. of Vacuum Power Units	2	3	3
Max No. of Vacuum Receivers	10	20	34
Max No. of Sources	6	8	10
Communications	Ethernet IP	Ethernet IP	Ethernet IP
Output Voltage to Devices	24 VDC	24 VDC	24 VDC
Input Voltage from Devices	24 VDC	24 VDC	24 VDC
Dimensions (H x W x D) Inches			
Main Base Unit	24 x 30 x 8		
Power Requirements			
Electrical Classification	NEMA 1	NEMA 1	NEMA 1
Base Unit	115 / 1 PH / 60 HZ	115 / 1 PH / 60 HZ	115 / 1 PH / 60 HZ

5 PLC OVERVIEW

5.1 General

The MCS(C) Series Material Conveying System Controller utilizes a centrally mounted PLC that is hardwired to the pumps, stations, and source valves.

The number of components the system supports depends on model. The maximum number is supported by the MCS(C)-334-10-7C & 6C units:

Loading Stations = 34

Vacuum Pumps = 3

Material Sources = 10

5.2 Startup and Power Loss

When power is first applied to the PLC following a power loss, the system will automatically start loading enabled stations that have material demand if the AUTO START ON POWER UP mode has been selected. If a Loading Station or Vacuum Pump is enabled, as indicated by ON, it will remain enabled. This prevents the operator from having to restart each piece of equipment. When first starting up, each station will have to be configured with the proper vacuum pump assignment, load, fill and dump times, no load alarm cycles, material number, and be enabled.

In the System Setup page is the button defining the power up mode:



AUTO START ON POWER UP

This button allows the user to select the start-up mode for the control panel: AUTO or MANUAL power up. In AUTO START ON POWER UP, the control panel will automatically start filling stations if they are enabled and demand material when power is applied to the panel. In MANUAL START ON POWER UP, the system is paused and the user must press the SYSTEM START button to begin loading stations.



**SYSTEM PAUSED
PRESS TO START**

When the system is paused, a large red indicator button will appear on top of all screens to indicate that the system is in PAUSED mode. Pressing the red button will enable the system and put it in SYSTEM RUNNING mode.

6 OPERATING PRINCIPLES

6.1 Material Conveying System (MCS(C))

The program controls the operation of loading material storage vessels or production points of use. The MCS(C) controls the operation of the Vacuum Pump Units (VPU), the station “Tee” valves and the Purge (Source) valves. The MCS(C) must be in RUNNING mode for any conveying to take place. The MCS(C) will default to STOPPED mode on power loss. Starting or stopping the MCS(C) will not reset the various station controls.

6.2 Vacuum Power Unit (VPU)

Each VPU is hard piped to multiple stations. Stations may be assigned to any VPU.



CAUTION: Care must be taken to verify that the mechanical connection of a station valve to a VPU matches the VPU assignment of that particular station

A VPU will start when an associated loading station calls for material. The VPU will run for the LOAD and PURGE portions of a fill cycle, plus a settable SEEK time. If no other station calls for material, the VPU will shut down after the seek time expires. A new station calling for material will reset the seek timer and begin a new fill cycle. The seek timer is accessible from the HMI and has a default value of 180 seconds.

6.3 Loader (Vacuum Receiver) Station (STA)

Each source hopper and machine/press is equipped with a Vacuum Loader Station complete with level switch.

The Loader Station control setup consists of an Enable/Disable maintained pushbutton, Station Status readout, Source okay/mismatch indication, and connected source readout. Enabling a Station permits it to be automatically serviced by the conveying subroutine. A Station may be Enabled or Disabled at any time. If a Station is in a fill cycle when it is disabled, the cycle will continue to completion. Station status indications are:

- OFF – The STATION is Disabled
- ENABLED – The STATION enabled, not in the fill cycle and the level switch is satisfied
- DEMAND – The STATION is not in the fill cycle and the level switch calls for material
- LOAD – The STATION is in the load portion of the fill cycle
- PURGE – The STATION is in purge portion of the cycle
- DUMP – The STATION is in the dump portion of the fill cycle
- ALARM – STATION has gone through the no load alarm setpoint of consecutive fill cycles without satisfying the level prox sensor.

The Station number is moved into the appropriate VPU FIFO queue if the Station is in demand. The default setting for Station VPU assignment is VPU1. The Station fill cycle consists of three states, LOAD,

PURGE and DUMP. When the Station is first in line, the VPU will start if not already running and the station T valve will open at the start of the fill cycle. Pellets will be conveyed from the source to the station. The T valve will remain open for the load and purge times.

When the load time expires the dryer source valve closes and the purge time begins. The purge time allows any pellets in the conveying line to be carried into the machine mounted Station. When the purge timer expires, the station T valve is closed and the dump timer started. The VPU FIFO stack advances to service the next station at the end of the purge time. Any pellets in the vacuum chamber will be gravity conveyed into the press hopper.

If the level switch is not satisfied at the end of the dump time, the Station will be placed back at the end of the VPU queue. The load, purge, and dump set points are changeable via the HMI and have default values of 15 seconds.

6.4 VPU FIFO Queue

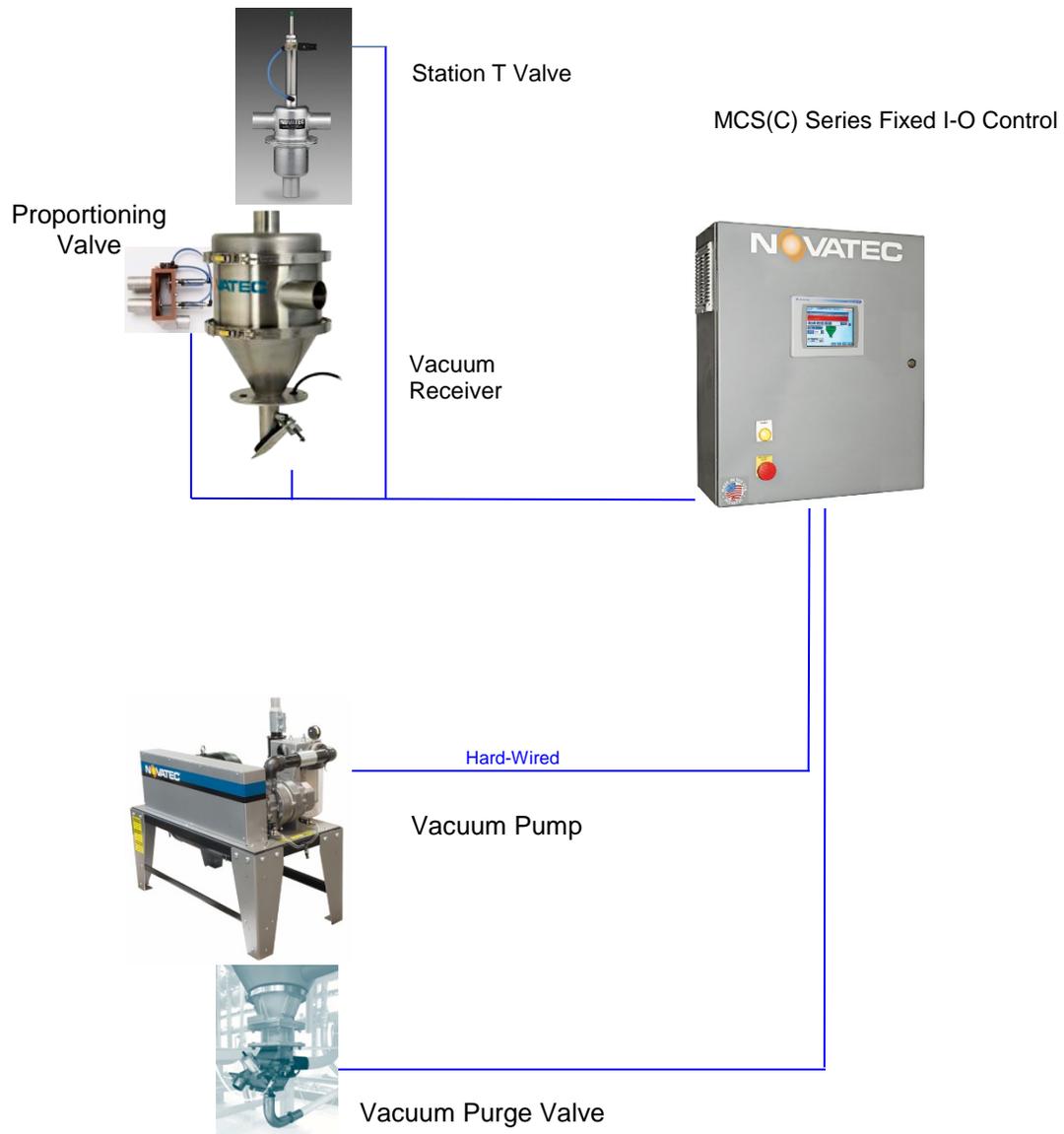
Each VPU has a First In/First Out (FIFO) queue. Any station may be assigned to any VPU. The queue contains the station number (1 to 20). The VPU services each station in the order in which the demand was entered. A station is removed from the queue at the end of the purge cycle. At this time the VPU begins to service the next station in the queue, if any. A station is still in demand at the end of the dump cycle will be re-entered into the queue. If there are no other stations in the queue, the fill cycle will repeat as soon as the dump cycle is complete.

6.5 Alarms

Each station has a No Load fault. If the station is serviced the setpoint number of times in succession without satisfying the level switch, the alarm flag is set. The alarm will be cleared when the demand is satisfied, or the station is disabled. The number of cycles is field changeable through the HMI, with the default value set at 3. Entering a value of zero (0) will disable the alarm. A station will continue to load if the alarm is on.

The VPUs have motor failure alarms. The motor failure alarm is set whenever the motor is called to run, but the motor aux contact input is not made after 3 seconds. The alarm is cleared only by pressing the "ALARM RESET" button on the alarm history or banner page or the vacuum pump status pages. Once a vacuum pump is in an alarm state, the controller will not allow that vacuum pump to attempt to convey until the alarm is cleared.

6.6 Typical System Wiring



7 INSTALLATION

After unpacking and inspecting the MCS(C) Controller, four basic activities will be performed. These activities are:

1. Completely install station receivers and station valves, pumps, and other mechanical components. Install material conveying and vacuum lines.
2. Locate and mount the MCS(C) control panel in a convenient location.
3. Wire all the equipment to the controller enclosure per the wiring diagrams.
4. Adjust each receiver station's set points at the control including: vacuum pump number, material number and load, purge, and dump times.

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.

CAUTION: The 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.

7.1 Mechanical Installation

7.1.1 Material Conveying Lines

The single most important activity performed to ensure satisfactory operation of a pneumatic conveying system is the actual installation of the equipment. All components should be located so that material lines and vacuum lines are as short as possible. Elbows or other changes in direction should be minimized. The material conveying line should be horizontal and/or vertical and as direct as possible with no slope. Care needs to be taken that all connectors are vacuum tight. All rigid conveying tubing should be properly supported by the customer to provide a safe and secure installation.

It is generally recommended to use flexible hose and clamps to connect material pick up lances, vacuum chambers, etc, to material or vacuum lines. The flexible hose should only be as long as needed since excess hose will reduce the efficiency of the system. The hose should not sag.

Rigid tubes and elbows should be connected together with bolted couplers. Each tube end should be square cut, round, and without burrs. The tube ends should butt together when installed, with the bolted coupler centered over the joint.

7.1.2 Vacuum Power Unit

Locate the vacuum pumps so that access to the secondary filter element mounted to the unit is accessible. Secure to the floor or platform as necessary. Connect 3 phase power (check nameplate) to the motor starter located in the motor starter junction box mounted on the vacuum pump unit FROM A FIELD-SUPPLIED DISCONNECT SWITCH (or to the optional combination starter with integral fused disconnect switch). An electrical ground wire is also required. Control wiring for the starter coil and auxiliary feedback will need be wired back to the control cabinet.



A clean, dry supply of 80 -100 PSIG compressed air must be connected to the pressure port of the pump's vacuum breaker valve solenoid.

When the vacuum breaker valve is energized, it allows ambient air to pass through the vacuum blower. This is done instead of shutting the pump down to prevent premature wearing of the pump and belt drive caused by constantly starting and stopping the pump. Eventually the pump will shut down completely (if not needed) when the seek timer expires. Note that the default time programmed into the seek timer of the system is 120 seconds when the system is first shipped to you. If the pump seems to be shutting down after an unusually short or long period, check the programmed seek timer value.

7.1.3 Cyclone Dust Collector

Locate the cyclone filter as close as possible to the vacuum power unit. Provide access for the material catch pan or fines drum as necessary. Secure the cyclone filter to the floor. Attach vacuum lines from the conveying system to the cyclone inlet (tangential inlet on the side of the cyclone body). Attach the cyclone outlet (top duct) to the vacuum breaker valve inlet on the vacuum power unit.



7.1.4 Station T Valves

Locate near each station's vacuum chamber. Typically, the station valve is rigidly attached with bolted couplers to the cyclone filter vacuum lines while running rigid tube or flex hose to the lid of the vacuum chamber. The station solenoid is wired to the main control box. Ground the system as necessary. A clean, dry supply of 80 - 120 PSIG compressed air is connected to the pressure on the station valve's solenoid valve.



valve
port

7.1.5 Vacuum Receiver (Vacuum Chamber)

Secure the loader station to the hopper or surge bin as required. Orient the material inlet line and vacuum outlet line as required. hose is normally used to connect the vacuum chamber to the supply line and station valve. Connect the material level switch to the main control box.



Flex
wires

3.1.1 Compressed-Air Blowback (option)

Some vacuum receivers are provided with a compressed air blowback solenoid valve for cleaning the filter depending on the application. The pulse blowback solenoid valve is wired back to the control cabinet. A clean, dry supply of 80 -100 PSIG compressed air is required. Connect it to either the compressed air accumulator tank supplied on large vacuum chambers or directly to the pulse blowback solenoid valve that is supplied on small vacuum chambers.



7.1.6 Purge Valves

Purge valves are typically installed at material sources, like silos, drying hoppers, blender bins, or anywhere conveying lines must be emptied between load cycles.



7.1.7 Proportioning Valves (option)

Proportional valves are typically installed directly on or very near individual receivers and allow the entry of locally generated regrind intermittently with virgin material during vacuum loading. A clean, dry supply of 80 - 100 PSIG compressed air is required. The solenoid valve located on the body of the purge valve must be wired back to the control cabinet.



NOTE: The control energizes the proportioning valve's solenoid to pull regrind into the receiver station. When installing, please configure the valve's air piping to ensure the top port is closed to regrind in the de-energized state, and opens in the energized state. **IMPORTANT:** Premature gasket wear and failure may occur if the proportioning valve operates with the Regrind Material Inlet on the lower inlet port.

7.2 Electrical Installation

Always disconnect and lock out the main power supply before wiring power and communication cables between the MCS(C) controller and the field devices. Refer to the wiring diagram and general arrangement drawings supplied with this system before making electrical connections.

- ❑ Use shielded cable for communications wiring.
- ❑ Keep communication cables as far as possible from high voltage equipment.
- ❑ Avoid running communication cable across power lines. If you must run cable across power lines, run the cable at right angles to the line.
- ❑ Ensure the equipment grounding is properly connected. Shielded cable should be grounded at one end only and is typically grounded in the main I/O enclosure.

WARNING: Do not install communication cable where it will come into contact with any buildup of electrical charge!



It may be tempting to run the wire next to the material conveying lines, but a substantial buildup of electrical charge can and will occur, especially with certain types of plastic resins and, if the conveying lines are not grounded, can arc to the cable disrupting communications and/or possibly causing damage.

7.3 Electrical Installation – Wires

7.3.1 Wire Types

- Blue THHN 16 AWG (18AWG can be used for short distances, 300 feet or less)
- US Electric Code indicates Blue for 24VDC. The gauge designation may be oversized for actual load, and there are percent reductions in AWG needed based on the number of conductors in the conduit; however, many electricians pull 16 AWG as a minimum. Consult with local electrical contractors to confirm local code requirements.

7.3.2 Standard Wires for Receivers

- CONTROL POWER (+24VDC) – Supplied from a common terminal (set) at the main panel and shared by receivers grouped with the adjacent power module (see Electrical Schematic).
- CONTROL NEUTRAL (0VDC) – Supplied from a common terminal (set) at the main panel and shared by receivers grouped with the adjacent power module (see Electrical Schematic).
- DEMAND INPUT (unique to each receiver) – The demand input wire for each station is connected to one side of the receiver’s demand switch. The +24VDC common wire is connected to the other side of the demand switch to provide the input signal voltage when the switch closes.
- VACUUM VALVE OUTPUT (unique to each receiver) – The vacuum valve output wire for each station is connected to one side of the receiver’s vacuum valve solenoid. This can be either a receiver mounted external fill valve (EFV) or remote mounted station tee valve (SV). The solenoid valve is also wired to the 0VDC common to complete the power circuit when the output is energized.

7.3.3 Optional Wires for Receivers

(may be required for receiver installed options)

- BLOWBACK SOLENOID OUTPUT – Any receiver that includes the blowback option will also require the optional blowback output wire to operate the blowback solenoid valve.
- PROPORTIONING VALVE SOLENOID OUTPUT – Any receiver that includes a proportioning (ratio) valve will also require the associated vacuum pump’s proportioning output wire to operate the proportioning valve solenoid. This output is daisy-chained to all stations assigned to a given pump.
- PURGE VALVE OUTPUT – Any receiver with a purge valve mounted below the hopper to which it supplies material can also provide the standard purge valve output wire to operate the purge valve solenoid.

- FOR ALL OF THESE OPTIONS, the solenoid is also wire to the 0VDC common the complete the power circuit when the output is energized.

7.3.4 Standard Wires for Vacuum Pumps

- CONTROL POWER (+24VDC) – Supplied from a common terminal (set) at the main panel and shared by pumps grouped with the adjacent power module (see Electrical Schematic).
- CONTROL NEUTRAL (0VDC) – Supplied from a common terminal (set) at the main panel and shared by pumps grouped with the adjacent power module (see Electrical Schematic).
- AUX CONTACT (unique to each pump) – The Aux Contact input wire for each pump is connected to one side of the pump starter auxiliary contact. The +24VDC common wire is connected to the other side of the auxiliary contact to provide the input signal voltage when the contact closes.
- VACUUM PUMP MS OUTPUT (unique to each pump) – The pump starter output wire for each pump is connected to one side of the pump's motor starter. The motor starter is also wired to the 0VDC common to complete the power circuit when the output is energized.
- VACUUM BREAKER VALVE OUTPUT (unique to each pump) – The vacuum valve output wire for each pump is connected to one side of the pump's vacuum breaker valve solenoid. The solenoid valve is also wired to the 0VDC common to complete the power circuit when the output is energized.
- VACUUM PUMP PROPORTIONING VALVE OUTPUT (unique to each pump) – see Section 7.3.3

7.3.5 Optional Wires for Vacuum Pumps

(may be required for pump installed options)

- CLOSED LOOP VALVE OUTPUT – Any receiver that includes the closed loop option will also require the optional closed loop output wire to operate the closed loop valve solenoid. The solenoid is also wire to the 0VDC common the complete the power circuit when the output is energized.

7.3.6 Determining the Wire Needed

- Add up the number of individual wires needed for a group of machines using the explanations given in throughout Section 8, and install the same number of wire leads from the panel to that area.

7.3.7 Wire Lead Installation Methods

- The wire leads can be installed in any of the following ways:
 - Individual wires in conduit
 - Decided multi-conductor shielded cable for each receiver in a cable tray
 - Shared multi-conductor shielded cable for a group of receivers in a cable tray

8 CONTROLS EXPLANATION

8.1 PanelView Plus 6, 700

The PanelView Plus 6, 700 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 PLC is equipped with Modbus, DeviceNet, and Ethernet I/P communications. The PanelView communicates with the Allen-Bradley 1769-L18ER PLC using Ethernet.

8.2 Startup

When power is first applied to the PanelView 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.

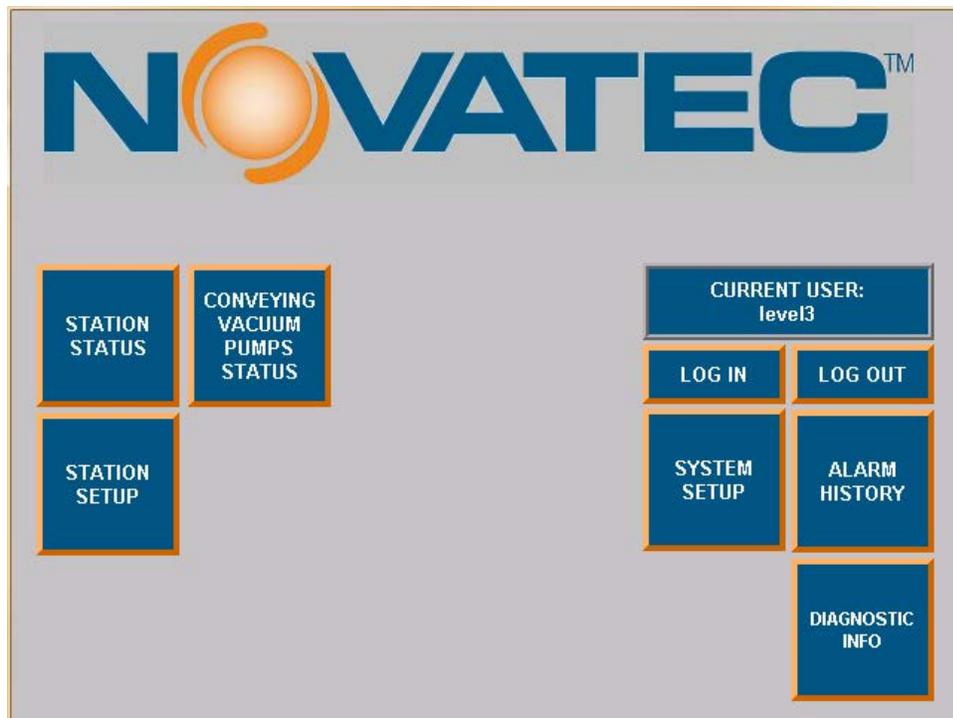


Figure 1: Default Menu

9 OPERATOR SCREENS

9.1 Main Menu

The Main Menu screen has pushbuttons (PB) to navigate to other screens. These screens include Station Overview, Station Setup, VPU (Vacuum Power Units) status, Novadrier Status, and Alarms. Log In and Log Out buttons are provided along with a display of the current user. The DEFAULT and OPERATOR users have access to operation screens. An administrator must be logged on to have access to the CONFIGURATION screens. The admin Log-On is usually reserved for level3 and NOVATEC.

When an administrator is logged on, additional pushbuttons become visible. These buttons allow access to maintenance and setup screens.

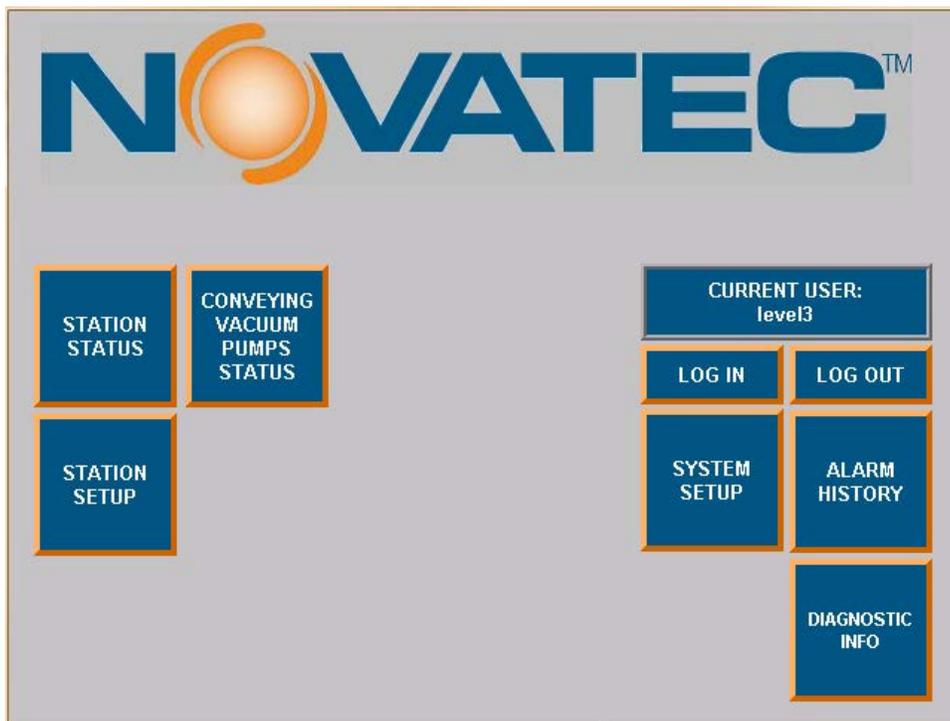


Figure 2: level3 Logon



These buttons allow the user to view, log in, and log out of the current user log in level. The log in levels and default passwords are listed below:

level1 : 1111
 level2 : 2222
 level3 : 3333

STATION
STATUS

The STATION STATUS button will take the user to the station overview status page. This page allows stations to be enabled ON and OFF as well as show the status of a large number of stations on one page.

STATION
SETUP

The STATION SETUP button will take the user to the parameter setup page for a station. The setup page allows the user to view and adjust (if logged in to the correct level) any stations parameters like: load time, purge time, dump time, material selection, and vacuum pump assignment.

CONVEYING
VACUUM
PUMPS
STATUS

This button navigates to the Vacuum Pump status page. These pages show the status of the vacuum pumps running, loading, purging, which station each pump is servicing with a countdown of the remaining load and purge times and seek times. See section 9.2 for more detail.

SYSTEM
SETUP

The SYSTEM SETUP page is primarily used for the initial setup of the system by the administrator.

ALARM
HISTORY

This button navigates to the Alarm History page. This page shows all logged alarms, when they occurred and when they were acknowledged.

DIAGNOSTIC
INFO

This button brings up a window showing all the communication and status messages generated by the Panelview.

9.2 Vacuum Pumps

This overview status screen displays the operation of the Vacuum Pump Units. Four vacuum pumps can be seen. The status of each VPU is displayed. This includes the current station being serviced in a station icon that appears above the vacuum pump icon.

- ❑ OFF – (gray) The VPU is Disabled
- ❑ ENABLED – (green) The VPU enabled, not running
- ❑ LOAD – (blue) The VPU is in the load portion of the fill cycle
- ❑ PURGE – (orange) The VPU is in purge portion of the fill cycle
- ❑ DUMP – (purple) The VPU is in the dump portion of the fill cycle or idle seek time
- ❑ ALARM – (red) VPU starter has a fault.

The VPU runs intermittently depending on the loading cycle. If no station is calling for a load cycle, the VPU will run for the seek time and then stop.

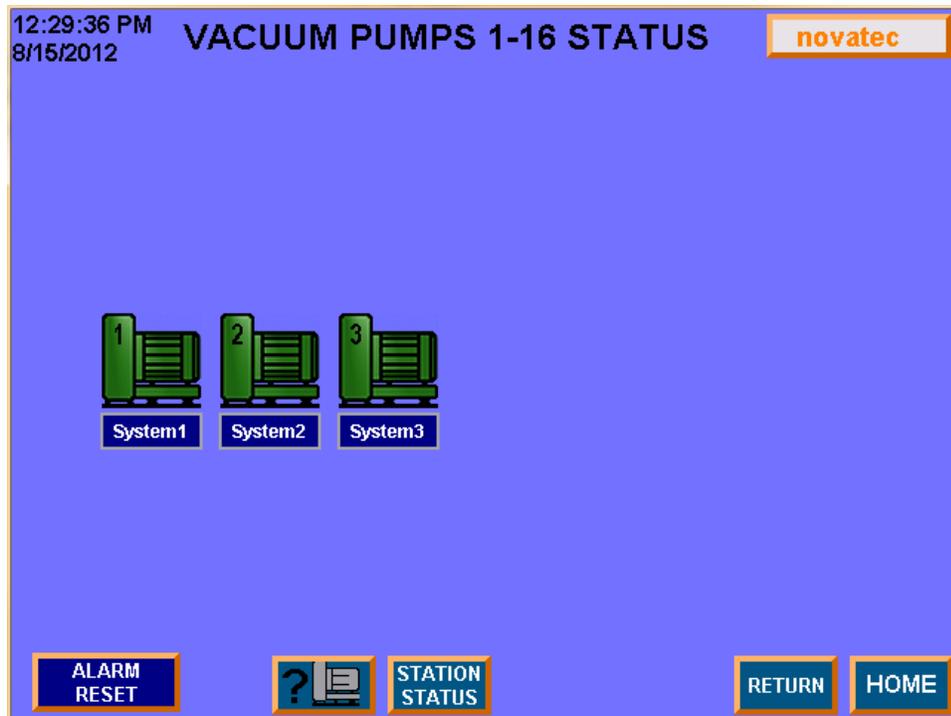


Figure 3: Vacuum Pump Screen



The STATION STATUS will navigate back to the Station 1-20 Status overview page – see 9.3



The PREV and NEXT buttons will scroll to other status screens as needed. You can only scroll to screens for vacuum pumps that the system can control. For example, if there were only 16 vacuum pumps in a panel, then the PREV and NEXT buttons would not be visible. If there were 20 vacuum pumps in a panel, the PREV and NEXT buttons would scroll between the 2 vacuum pump status screens.



The RETURN button will go back to the previous screen that was displayed.



The HOME button will go back to the main menu – see 9.1.



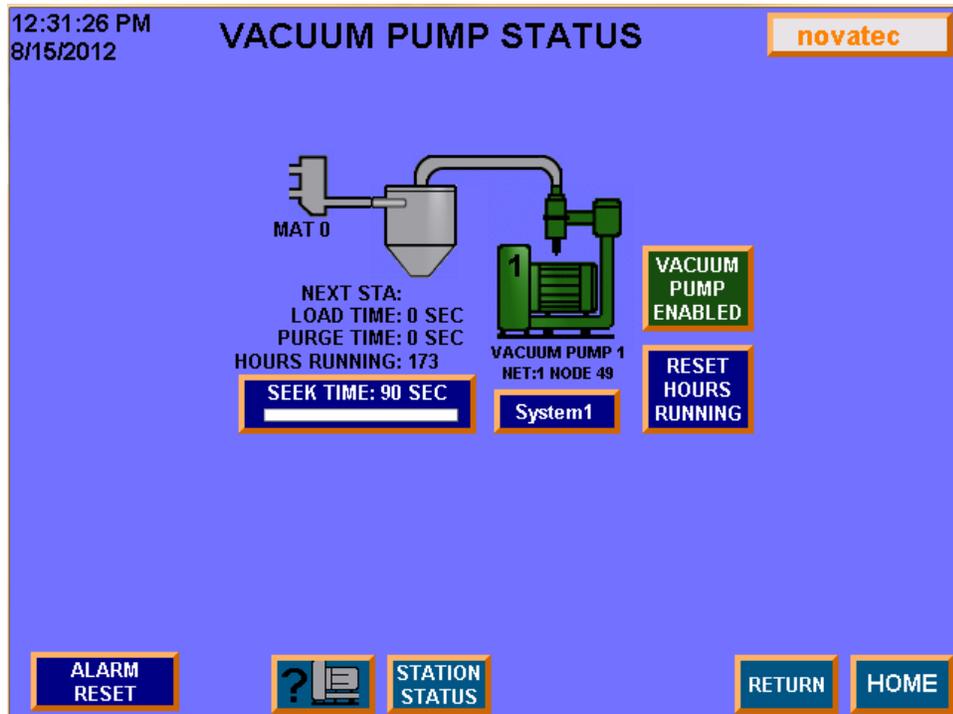
The ALARM RESET button resets the vacuum pump starter faults. If a vacuum pump start fault occurs because of a failed starter or tripped overload, the ALARM RESET button **MUST** be pressed to reset the alarm and return the pump to normal operation.



The Help button at the bottom displays another window that overlays the Vacuum Pump screens. The overlay is a color key for the status display of the vacuum pumps (as shown below).



Pressing the icon of any of the vacuum pumps will navigate to a more detailed screen of that particular vacuum pump.



The load and purge times are shown as a countdown in seconds remaining. The next station in the queue (if any) is also shown. A station and material purge valve icon show what station the vacuum pump is currently servicing and what material is being used. The icons will change color like on the station status page with blue for loading, orange for purging, green for on (idle) and grey for off. The VPU runs intermittently depending on the loading cycle. If no station is calling for a load cycle, the VPU will run for the seek time and then stop.

VACUUM PUMP ENABLED This button will ENABLE/DISABLE the vacuum pump. Once DISABLED, no more stations will be loaded into the FIFO queue. However, stations that are already in the FIFO will be loaded until the FIFO is cleared of all stations. Then, after the seek time has expired, the vacuum pump will shut off.

RESET HOURS RUNNING This button will reset the vacuum pump hours running counter.

VP2 This button allows the user to apply an 8 character name to the vacuum pump. VP1 – VP3 are the default names.

SEEK TIME: 120 SEC This button has two purposes. First it shows a bar graph of how much seek time is remaining until the pump shuts off. Second, touching the button will call up a keypad to allow the value to be changed. The seek time is a value in seconds that the VPU will run after it is no longer used in the Station Load Cycle. The function of the seek time is to prevent excessive starts of the VPU. A value is determined in the field for each system. The default value is 180 seconds.

9.3 MCS(C) Station Status

This screen permits the control and status display of up to 20 loading stations. Only a station that is “installed” is visible. The icon for each station is a PB that calls up the Setup Station screen. Anyone can view a station’s setup parameters, but level2 login is needed to make changes to most parameters. The assigned vacuum pump and number of Blow Back Cycles – if used, require level3 login. Each icon will change color to denote the status of the loading station.

If the station is ENABLED, the ON/OFF button above the station icon will change to green and display ON. The station icon will also change to green if the station has no demand and is not in the load cycle. DEMAND is defined as the Station is enabled and the low level switch calls for the station to be serviced. LOAD status occurs when the Station TEE valve is open and a Dryer source valve is open, permitting material to be conveyed to the vacuum chamber. The Station is in the PURGE portion of the cycle when the Dryer source valve closes and the Station TEE valve is open. This allows the conveying line to be purged free of any remaining material. The DUMP indication shows when the Station TEE valve closes, removing vacuum from the hopper. The material conveyed into the hopper gravity conveys (dumps) into the molding machine. The ALARM status denotes a “no fill” condition or a material mismatch is Auto ID Proofing is enabled. If the station goes through three (adjustable) consecutive fill cycles without satisfying the low level switch a no load alarm is set. Entering a number of zero (0) disables the alarm.

Each loading station can be identified by an 8 character text display. The defaults for the identifying text are STA 1 through STA 20. The text may be edited on the “Setup Station” screen with a level3 login.

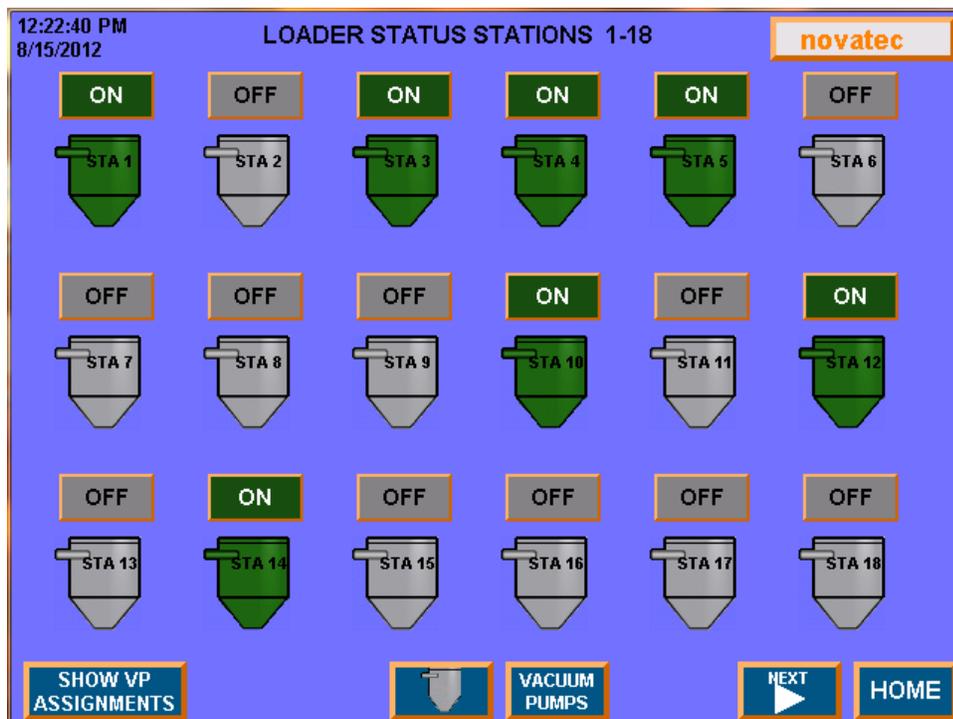


Figure 4: MCS(C) Station Status Screen

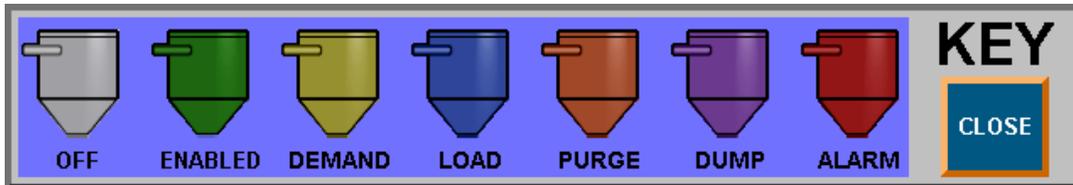


The SHOW VP ASSIGNMENTS button allows the operator to see quickly which stations are assigned to a particular vacuum pump. When the button is pressed, a pull-down menu appears allowing the operator to select which vacuum pump to view station assignments for. For example, when SHOW VP1 is selected, all the stations assigned to vacuum pump 1 remain visible. Stations assigned to all other pumps will go invisible until the SHOW ALL VP'S button is pressed.



The Help button at the bottom displays another window that overlays the MCS(C) screen. The overlay is a color key for the status display of a station.

Color Legend:



The VACUUM PUMPS button will go to the vacuum pump status screen #1 (Pumps 1-3). See 9.2 for a description of the vacuum pumps status page.



The PREV and NEXT buttons will scroll to other status screens as needed. You can only scroll to screens for stations that the system can control. For example, if there are 75 stations in a panel, then the PREV and NEXT buttons would scroll between the first 2 station status screens. If there were 96 stations in a panel, the PREV and NEXT buttons would scroll between all 3 station status screens.



The HOME button will go back to the main menu – see 9.1.



The ON/OFF button on top of each station icon can be used to easily enable or disable stations shown on the status page even if the user is not logged in. The orange border around the button indicates the button is active. A gray border around the button indicates the button is indication only. Pressing the actual station icon (the blue area shown on the left) will navigate to the Station Setup Page – 9.4.

9.4 Station Setup

The STATION SETUP screen is evoked when an operator either touches a loading station icon on the MCS(C) STATION STATUS screen or pressing the STATION SETUP button on the Main Menu screen. This screen displays the various parameters for each station and allows changes if the user login level is high enough. The loading station will change color to denote its status. The loading station may be enabled or turned off via a PB below it. The PB will be red with the text “OFF” when the station is disabled, and green (as shown) with the text “ON” when it is enabled.

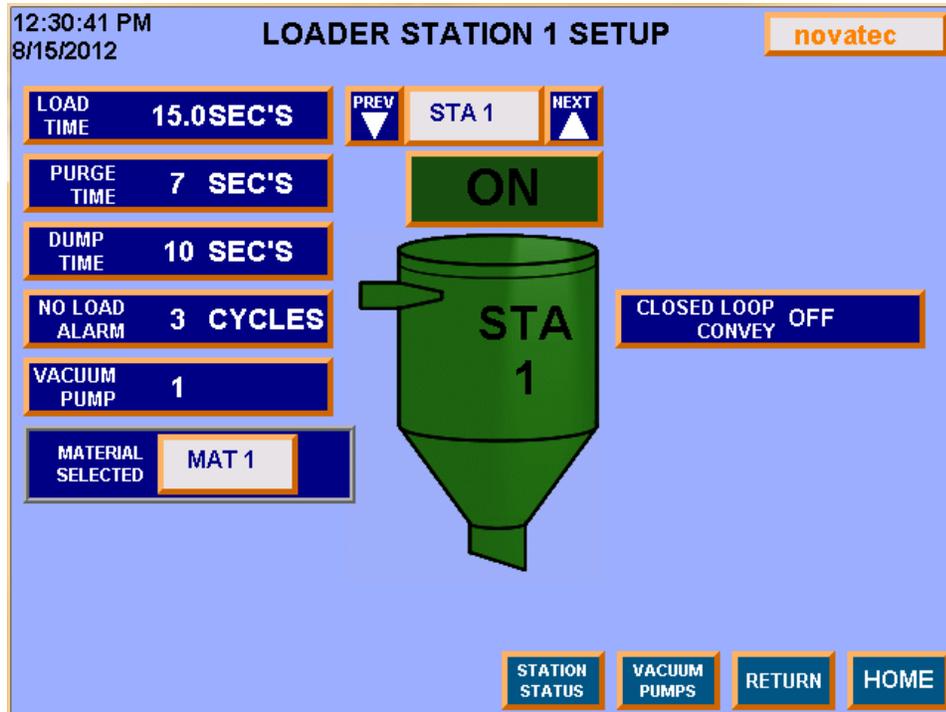


Figure 5: Station Setup Screen

Touching a given loading station icon or the STATION SETUP button on the main menu will call up the screen with the parameters for that particular loading station. Thus touching the STA 1 icon will display the station 1 parameters as shown.



Successive stations may be accessed by touching the NEXT or PREV above the station icon or pressing the station name between the NEXT and PREV buttons. This will display a pull-down menu to quickly access any station's setup parameters.

Touching a numerical entry button will call up a keypad for data entry for that parameter.



The time in seconds that material enters the convey air stream. It is the time the material purge valve is open. The station Tee valve is open. This setting is proportional to the size of the vacuum receiver and how difficult the material flows.



The time in seconds that the station Tee valve is still open but the material purge valve is closed. This time is proportional to the distance from the material purge valve and the station hopper and

how difficult the material flows.

DUMP TIME 8 SEC'S

This is the time that the material takes to fall from the receiver vessel into the drying hopper. This time is proportional to how difficult the material flows and the size of the vacuum receiver.

NO LOAD ALARM 3 CYCLES

This is the number of loading cycles that the station goes through without covering the material level sensor prox. For example, as shown at the left, after 3 load cycles, the "No Load" alarm will become active if no material is covering the material level sensor prox. A setting of zero will disable the No Load Alarm.

VACUUM PUMP 1

Vacuum Pump number that is hard piped to the station Tee valve.

MATERIAL SELECTED NONE

The Material Selected button brings up a pull down menu to select which material purge valve to energize during the load cycle.

REGRIND 0 %

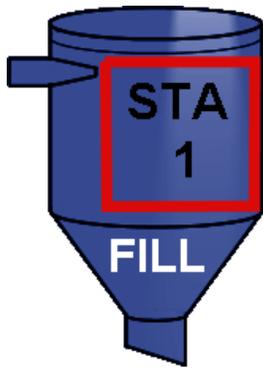
The Regrind Percent setting indicates what proportion of regrind will be injected into the receiver/ hopper. This value is a percentage of the LOAD time. For example, if the LOAD time is 10 seconds and the Regrind Percent is 30%, then the proportioning valve will energize for 3 seconds to fill regrind material and then virgin material will fill for the other 7 seconds.

LAYERS 1

The number of layers identifies how many virgin/regrind layers the control will create when loading regrind. A value of 1 will pull 1 layer of regrind, and 1 layer of virgin. The resulting load time for each regrind and virgin layer must be at least 2 seconds to convey material successfully and consistently.

CLOSED LOOP CONVEY OFF

Closed Loop Convey is used when material needs to be guarded against moisture absorption as much as possible. Provided the necessary hard pipe lines are run, material loading does not use ambient air but rather the dry air of a dryer. When the press pulls from a Drying Hopper source, Closed Loop Convey should be ON. When the press pulls from a Gaylord source, ambient conveying is used and Closed Loop Convey should be OFF.



Touching the station name in the center of the icon will show a typewriter keyboard for letter and number entry (provided that you are logged in at a sufficient level). Up to 8 characters can be entered for a station name.



The STATION STATUS will navigate back to the Station 1-20 Status overview page – see 9.3



The VACUUM PUMPS button will go to the vacuum pump status screen (Pumps 1-4). See 9.2 for a description of the vacuum pumps status page.



The RETURN button will go back to the previous screen that was displayed.



The HOME button will go back to the main menu – see 9.1.

9.5 Alarm Banner

A new alarm will be displayed in a message banner that runs along the top width of the screen. The Alarm Banner will be superimposed on the current screen. Text denoting the specific Alarm will be displayed on the banner. Alarms may be ACKNOWLEDGED or CLEARED as required. ALARM SILENCE will only turn off the horn. Acknowledging an alarm will log the time when the alarm was acknowledged. An acknowledged alarm will disappear from the alarm banner when the alarm status returns to normal values.



Figure 8: Alarm Banner Screen

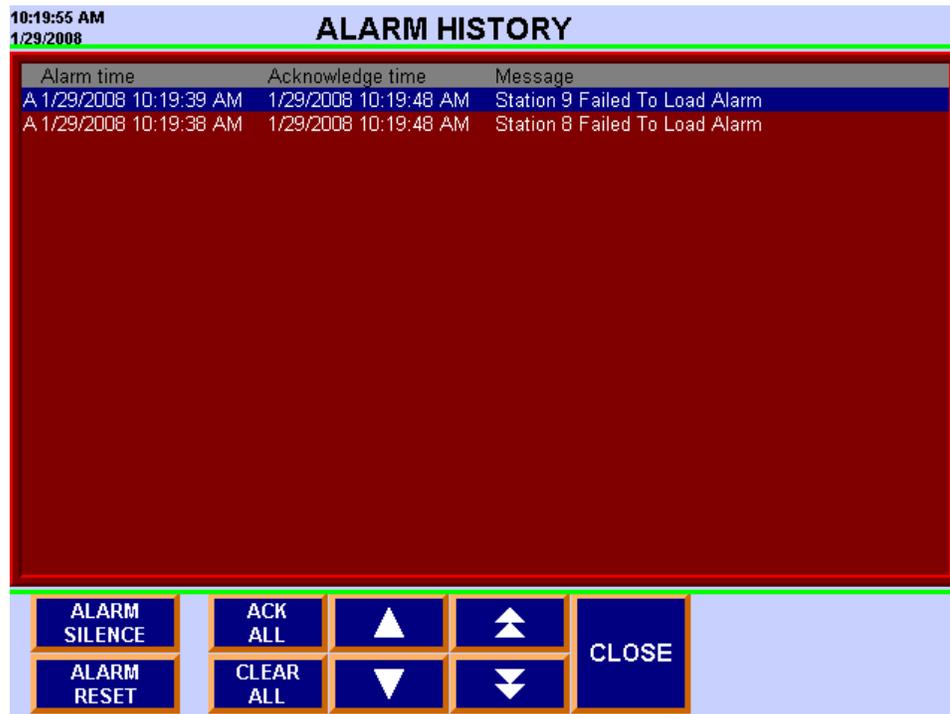


The ALARM RESET button resets the vacuum pump starter faults. If a vacuum pump start fault occurs because of a failed starter or tripped overload, the ALARM RESET button **MUST** be pressed to reset the alarm and return the pump to normal operation.

Table 0-1: Alarm Messages

Item	Alarm Message
1	Station XX No Load Alarm
2	Vacuum Pump Unit XX Motor Starter Fault
3	Low Battery Alarm

9.6 Alarm History



The ALARM HISTORY screen displays the last 100 alarm conditions.

Figure 9: Alarm History Screen



The ALARM RESET button resets the vacuum pump starter faults. If a vacuum pump start fault occurs because of a failed starter or tripped overload, the ALARM RESET button **MUST** be pressed to reset the alarm and return the pump to normal operation.

9.7 System Setup Screen

This administrator access screen allows the user to enable stations, set station priority, and perform simple I/O testing.

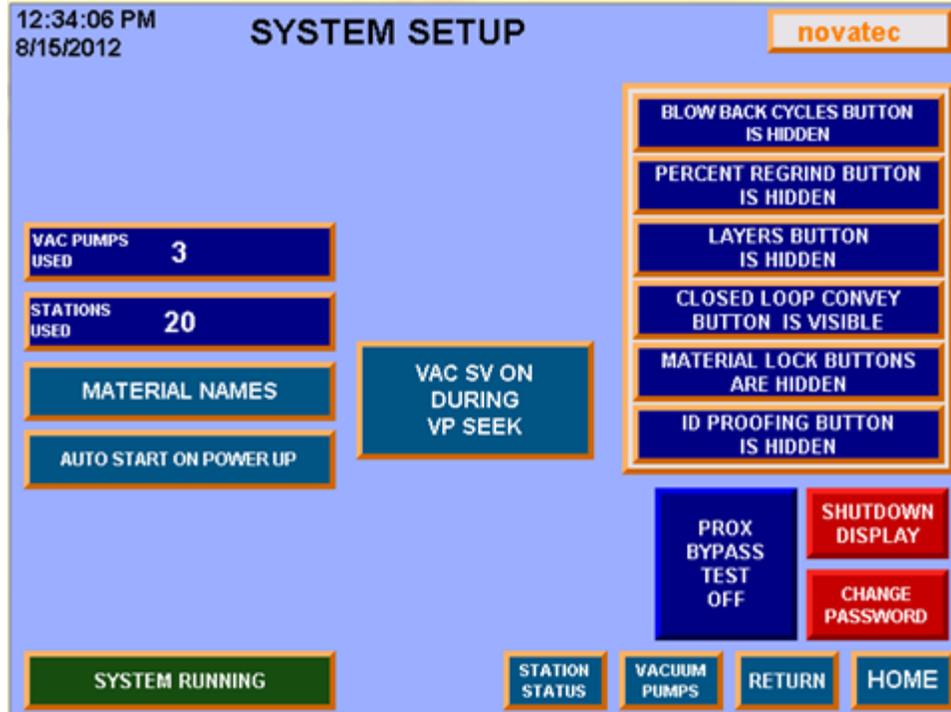


Figure 10: System Setup Screen

BLOW BACK CYCLES BUTTON IS VISIBLE

This button will toggle the HIDDEN or VISIBLE status of the Blow Back cycle button on the Station Setup page and the Blow Back ON Time and OFF Time on this page. Not used with your system. This should be hidden.

PERCENT REGRIND BUTTON IS VISIBLE

This button will toggle the HIDDEN or VISIBLE status of Regrind Percent button on the Station Setup page. Future option for your presses.

LAYERS BUTTON IS HIDDEN

This button will toggle the HIDDEN or VISIBLE status of the Layers button on the Station Setup page. This is used when proportioning Regrind. Not used with your system. This should be hidden.

CLOSED LOOP CONVEY BUTTON IS HIDDEN

This button will toggle the HIDDEN or VISIBLE status of the Closed Loop Convey button on the Station Setup page.

MATERIAL LOCK BUTTONS ARE HIDDEN

This button will toggle the HIDDEN or VISIBLE status of the Material Lock button on the Station Setup page. ***This button is not used with this control model (ie: status is HIDDEN).***

ID PROOFING BUTTON IS HIDDEN

This button will toggle the HIDDEN or VISIBLE status of the Auto ID Proofing button on the Station Setup page. ***This button is not used with this control model (ie: status is HIDDEN).***

**VAC SV ON
DURING
VP SEEK**

This button toggles the operation of the vacuum valve (on the inlet side of the blower). The default mode is to energize the vacuum valve at the end of a load cycle during the seek time (when there are no other stations needing servicing). The vacuum valve may be selected to energize during the load and purge cycle and de-energize during the dump and seek time. This may allow the control panel to work with non-NOVATEC equipment.

MATERIAL NAMES

This button navigates to a series of pages that allow the user to apply custom names for all materials. So rather than "1,2,3...", any 8 character alphanumeric name may be given to the materials.

**VAC PUMPS
USED 3**

This parameter limits the upper range for Vacuum Pump assignment on the Station Setup page. It also adjusts which icons and pages are visible for the vacuum pump status pages. This is currently set to 3.

**STATIONS
USED 20**

This parameter limits the upper range for NEXT and PREV station index on the Station Setup page. It also adjusts which icons and pages are visible for the MCS(C) Station status pages, it is currently set to 20.

AUTO START ON POWER UP

This button allows the user to select the start-up mode for the control panel: AUTO or MANUAL power up. In AUTO START ON POWER UP, the control panel will automatically start filling stations if they are enabled and demand material when power is applied to the panel. In MANUAL START ON POWER UP, the system is paused and the user must press the SYSTEM START button to begin loading stations.

SYSTEM RUNNING

The SYSTEM RUNNING/SYSTEM PAUSED button enables or disables the entire system. When the goes to SYSTEM PAUSED, the controller will no longer load stations in demand into the vacuum pumps' FIFO queue. Any stations that have already been loaded in to a vacuum pump's FIFO will be loaded in the order it was placed in the FIFO. However, no more stations will be loaded into the FIFOs until the controller returns to SYSTEM RUNNING.

**SYSTEM PAUSED
PRESS TO START**

When the system is paused, a large red indicator button will appear on top of all screens to indicate that the system is in PAUSED mode. Pressing the red button will enable the system and put it in SYSTEM RUNNING mode.

10 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.
- ❑ 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.

10.1 At Startup

- ❑ Verify station and VPU settings.
- ❑ Record equipment Serial Numbers and the MCS(C) Controller program revision level.

10.2 Monthly

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

10.3 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.



11 TROUBLESHOOTING

If you have questions concerning troubleshooting or equipment operation, contact NOVATEC and ask for the "Service Department". If you need to place an order for a part, contact NOVATEC and ask for the "Parts Department" or visit our web store.

NOVATEC, Inc.
222 E. Thomas Avenue
Baltimore, MD 21225 USA
Telephone: (410) 789-4811
Sales Fax: (410) 789-4638
Email: Service@NOVATEC.com or Parts@NOVATEC.com



12 WARRANTY

NOVATEC, INC. offers COMPREHENSIVE PRODUCT WARRANTIES on all of our plastics auxiliary equipment. We warrant each NOVATEC manufactured product to be free from defects in materials and workmanship, under normal use and service for the periods listed under "**Warranty Periods**". The obligation of Novatec, under this warranty, is limited to repairing or furnishing, without charge, a similar part to replace any part which fails under normal use due to a material or workmanship defect, within its respective warranty period. It is the purchaser's responsibility to provide Novatec with immediate written notice of any such suspected defect. Warranted replacement parts are billed and shipped freight pre-paid. The purchaser must return the suspect defective part, freight prepaid and with identifying documentation to receive full credit for the part returned. Novatec shall not be held liable for damages or delay caused by defects. No allowance will be made for repairs or alterations without the written consent or approval of Novatec.

The provisions in equipment specifications are descriptive, unless expressly stated as warranties. The liability of Novatec to the purchaser, except as to title, arising out of the supplying of the said equipment, or its use, whether based upon warranty, contract or negligence, shall not in any case exceed the cost of correcting defects in the equipment as herein provided. All such liability shall terminate upon the expiration of said warranty periods. Novatec shall not in any event be held liable for any special, indirect or consequential damages. Commodities not manufactured by Novatec are warranted and guaranteed to Novatec by the original manufacturer and then only to the extent that Novatec is able to enforce such warranty or guaranty. Novatec, Inc. has not authorized anyone to make any warranty or representation other than the warranty contained here. Non-payment of invoice beyond 90 days will invalidate the warranty. A renewed warranty can be purchased directly from Novatec.

Please note that we always strive to satisfy our customers in whatever manner is deemed most expedient to overcome any issues in connection with our equipment.

Warranty Periods:

Note: All warranty periods commence with the shipment of the equipment to the customer.

5-Year (Except 1-Year on Non-Novatec Buy-Out Items)

Resin Drying to Include

NovaWheel™ Dryers *
Dual Bed Dryers
NovaDrier *
NDM-5 Membrane Dryer
Gas-Fired Process Heaters
Gas-Fired Regeneration Heaters
Drying Hoppers
Central Drying Hopper Assemblies
Heater/Blower Units and Hot-Air Dryer
Silo Dehumidifiers
NovaVac Dryers *
Nitrogen NovaDriers (Nitro)
DryTemp Plus

Central System Controls to Include

FlexTouch™ Series Controls
FlexXpand™ Series Controls
OptiFlex™ Series Controls
PLC Communications Modules
Greenboard Communications Modules
LOGO! Mini PLC
MCS-600 Series Controls – (Distributed I/O)
MCS-400 Series Controls
CL Silo Manager

Moisture Measurement Equipment to Include

MoistureMaster®

PET Resin Crystallizers

Resin Blending and Feeding to Include

WSB Blenders, MaxiBatch & Feeders *
Gaylord Sweeper Systems

Downstream Extrusion Equipment to Include

C and NC Bessemer Series Cutters
NPS Bessemer Series Pullers
NPC Mini Puller/Cutter
All NS Series Servo Saws
All Cooling and Vacuum Tanks Manufactured

Resin Conveying and Systems Components to Include

GSL Series Vacuum Loaders
GlassVu Loaders, Receivers and Hoppers
VL/VLP Series Loaders
VRH, VR, VR-FL & VRP Series Receivers
Compressed Air Loaders
AL-B Barrel Loader
Cyclone Dust Collectors
Conveying System Accessories
Surge Bins
Valves and Accessories
Electronic Metal Separators
Quick Select Manifolds
Tilt Tables
Filter Dust Collectors
Drawer Magnets
Velocity Control Valves

3-Year

Resin Conveying System Components to Include

** VPDB Vacuum Positive Displacement Pumps
** SVP Vacuum Pumps

** MVP Vacuum Pumps
** Railcar Unloading Systems

****5-Year Extended Warranty** - When a MachineSense® data plan is activated for products with **, Novatec automatically extends the warranty to 5 years. The data plan must be activated within 60 days after product shipment, and remain active through the warranty period to maintain extended warranty eligibility. The first 6-months of data plan usage is free from Novatec.

1-Year

Infrared Dryers
UltraVac Vacuum Pumps

Vacuum Regenerative Blower Pumps
Custom Equipment of any kind unless otherwise specified



Exclusions:

Routine maintenance/replacement parts are excluded from the warranty. These include, but are not limited to: hoses, desiccant, filters, filter elements, wiper seals, gaskets, dew point sensors, infrared lamps, motors, internal solenoids, fuses and motor brushes. Use with abrasive materials will void the warranty of any standard product. Wear resistant options may be available to extend usable service life with abrasive materials. Novatec reserves the right to limit the warranty if the customer installs replacement parts that do not meet the specifications of the original parts supplied by Novatec.

***Specific Exclusions:**

1. NovaDrier and NovaDrier-Nitro warranty is void if coalescing filters are not replaced on a 6-month or yearly basis (per instruction manual) and/or membrane has been exposed to ozone.
2. NovaVac Dryer -The ability of the canisters to hold vacuum will be compromised if the vacuum seal edge is damaged from mishandling. We do not warranty canisters damaged from improper handling. We do, however, warranty the seals.
3. LOAD CELLS on our WSB's are covered by Novatec standard warranty as long as they have not been damaged from improper handling.
4. Desiccant Wheel Warranty will be void if the wheel has been exposed to plasticizer, dust or other contaminants as a result of negligence on the part of the processor.

This warranty shall not apply to equipment:

1. Repaired or altered without written approval of NOVATEC unless such repair or alteration was, in our judgment, not responsible for the failure
2. Which has been subject to misuse, negligence, accident or incorrect wiring by others
3. Warranty is void if processing rates exceed manufacturer-recommended levels or if damage is caused by ineffective power isolation and/or power spikes/sags or incorrect installation.

NOTE: All conditions and content of this warranty are subject to changes without notice.