Instruction Manual

MCS-648 & -696 SERIES
Conveying Control
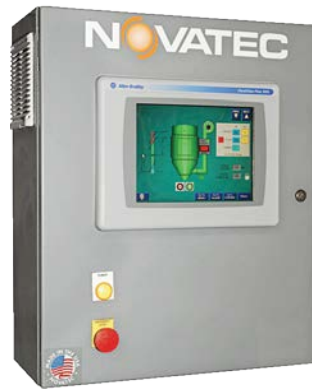
NOVATEC™

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

TABLE OF CONTENTS

1   PURPOSE OF THIS MANUAL

This manual describes the installation and operation of Novatec's MCS-600 Series 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-600 Series controller is a custom-programmed Allen-Bradley PLC-based control system designed to incorporate existing and future equipment. The Material Conveying System (MCS) will control up to120 JIT chambers and 20 Vacuum Pump Units (VPU).

Future loading stations are made available to operations on a password protected screen. Assignments for current and future VPUs and Stations may be changed via a password-protected screen on the HMI.
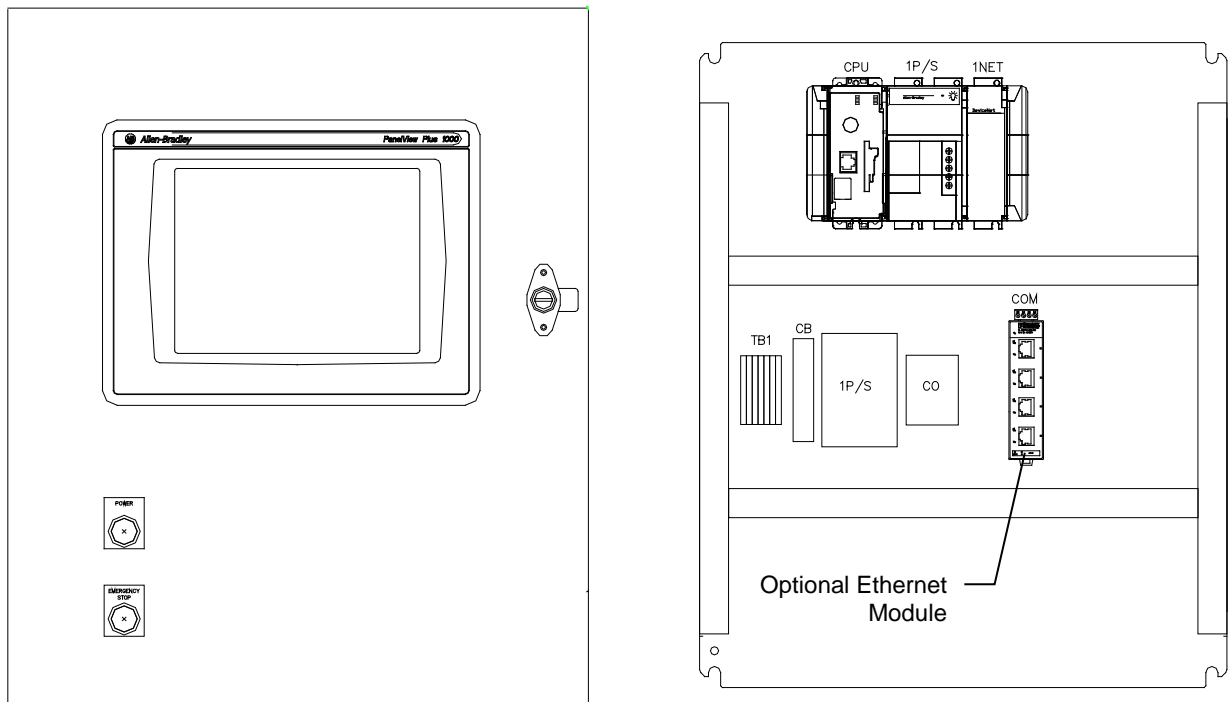
Figure 1: MCS-600 Series Enclosure and Back-Panel.

4 SPECIFICATIONS

Description	Material Conveying System Controller	
Model No	MCS-648	MCS-696
Performance Specifications		
Max No. of Dryers	4	8
Max No. of Vacuum Power Units	8	16
Max No. of Vacuum Receivers	48	96
Main PLC	Allen-Bradley CompactLogix L32E	
Base Operator Interface	Allen-Bradley PanelView Plus 1000	
Remote Operator Interface	N/A	
Communications	DeviceNet, Ethernet	
Output Voltage to Devices	24 VDC	
Input Voltage from Devices	24 VDC	
Dimensions (H x W x D) Inches		
Main Base Unit	24 x 20 x 8	
Remote I/O Base Unit	N/A	
Power Requirements		
Electrical Classification	NEMA 4 / 12	
Base Unit	115 / 1 PH / 60 HZ	
DeviceNet I/O Power Supply	90 - 264 VAC, 50 - 60 HZ or 110 - 375 VDC, 2-4 Amps	
Program Information		
Operator Interface	-	
PLC	-	

5 PLC OVERVIEW

5.1 General

The MCS-600 Series Material Conveying System Controller utilizes a centrally mounted PLC that sends commands over the DeviceNet network to various conveying system components. A remote I/O block controls each pump, station, loader, etc. The physical device and its associated electronics form a 'node'. Refer to the specifications page for the maximum number of Loading Station and Vacuum Pump nodes supported by this system.

This type of control system requires much less wiring in order to install and maintain the material conveying system.

The MCS's programming allows for additional equipment to be installed at a later date without re-programming.

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)

The program controls the operation of loading the Dryers from the Gaylords to filling the JIT chambers on the Molding Machines from the Dryers. The MCS controls the operation of the Vacuum Pump Units (VPU), the station "Tee" valves and the Purge (Source) valves. The MCS must be in RUNNING mode for any conveying to take place. The MCS will default to STOPPED mode on power loss. Starting or stopping the MCS 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 120 seconds.

6.3 Molding Machine (MMS)

Each molding machine/press is equipped with a JIT Chamber complete with level switch.

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

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

The MMS number is moved into the appropriate VPU FIFO queue if the MMS is in demand. The default setting for MMS VPU assignment is VPU1. The MMS fill cycle consists of three states, LOAD, PURGE and DUMP. When the MMS 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 vacuum chamber. 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 JIT chamber. 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 MMS will be placed back at the end of the VPU queue. The load, purge, and dump setpoints 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 MMS number (1 to 120). 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 reentered 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 MMS 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.

7   ADDING NODES (DEVICENET PLUG & PLAY)

Each network device is assigned its own DeviceNet Node by installing a remote *busstop®* station at the device. Refer to the wiring diagrams included with this manual for additional information.

7.1   DeviceNet Remote I/O

The DeviceNet *busstop* station has four inputs and four outputs. The input and output circuits are combined in one connector.
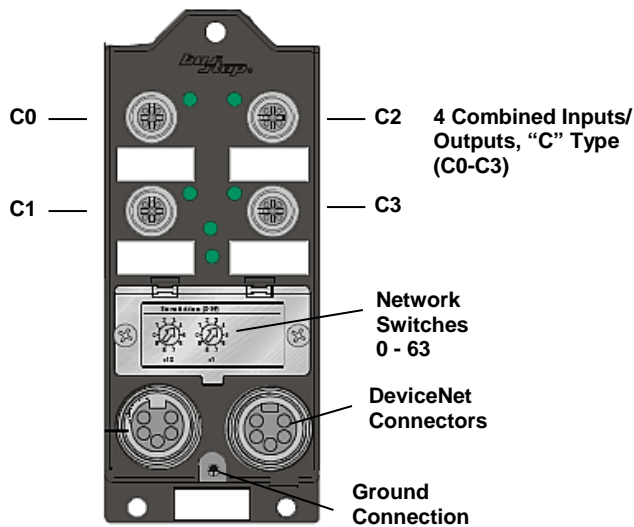
Each connector has both an input LED and an output LED associated with it. The LED turns green if the I/O point is on. Inputs are monitored for short-circuit protection as a group. Outputs are monitored for short-circuit protection as a group.

The node address can be set using the rotary switches located under the device cover or through software node commissioning. The unit can automatically detect the network communication rate.

The *busstop* station supports explicit messaging, poll, change of state, and cyclic I/O messages. These connections are established through UCMM or predefined master/slave connection set.

7.2   DeviceNet I/O Data Map

Func	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
In	0	IGS	OGS			I-3	I-2	I-1	I-0
Out	0	-	-	-	-	O-3	O-2	O-1	O-0

Abbreviations
I = Input Data (0=OFF, 1=ON)   O = Output Data (0=OFF, 1=ON)
OGS = Output Group Status (0=Working, 1=Fault)   IGS = Input Group Status (0=Working, 1=Fault)

7.3   Status Lights

Each DeviceNet station contains network and module status indicator lights. Refer to the Troubleshooting section for details.

7.4   Network Switches

Set the network switches to the unique address assigned to the equipment as described in Section 8.

7.5   Connector Pin-Outs

DeviceNet Connector	Through Bus
Connector: 5-Pin *minifast* 1 = Shield 2 = V + 3 = V - 4 = CAN_H 5 = CAN_L	

Combined I/O Connectors	Single Sensor	Part Verification Array
Connector: 5-Pin *eurofast* Type "C" 1 = V + 2 = Output Signal 3 = GND 4 = Input Signal 5 = PE		
	Single Output	**Push Button**

7.6   Typical Field Wiring

Typical field wiring terminations for the *busstop* block are listed below. This arrangement may vary depending on system requirements and complexity. C2 and C3 can be field configured for a Material Purge Valve, Vacuum Receiver Blowback, or Vacuum Receiver Proportioning Valve.
The "Devicenet I/I Mapping" button will appear on the main menu when the password level is "level3" or higher.

The defaults are:

Connector	Connected Device
C0	Input – Material Low Level Limit Switch

C1	Output – Station Valve
C2	Output – Vacuum Receiver Proportioning Valve
C3	Output – Vacuum Receiver Blowback

8   NODE ADDRESSES

Refer to the table below for a complete list of addressable nodes.

8.1   Loading Station Nodes

Each loading station has its own DeviceNet Node. The node number must match the default station number. Station 1 is node 1 and station 17 is node 17, for example. The program is written as if all loading stations are installed. To add a node after the original installation and start-up, set the node number equal to the station number and connect the node to the DeviceNet trunk. The I/O devices connected to each node are connected to the same point on every node. Thus the I/O and programming for each loading station and node match up.

> **NOTE**   Node and station numbers are not required to be sequential.

8.2   VPU Nodes

Each VPU has its own DeviceNet Node. The I/O devices connected to each node are connected to the same point on every node. Thus the I/O and programming for each node and VPU match up.

8.3   Unused Nodes

Each DeviceNet scanner Module is limited to a total of sixty-three (63) nodes. An additional DeviceNet module may be installed to add more nodes to the system.

Table 8-1: Node Addresses

DeviceNet Scanner Module 1 Installed in MCS-648 / 696		DeviceNet Scanner Module 2 Installed in MCS-696 only	
Node Address	**Device**	**Node Address**	**Device**
0	PLC	0	PLC
1 - 48	Loading Stations 1 - 48	1 - 48	Loading Stations 49 - 96
49 - 56	Vacuum Power Units 1 - 8	49 - 56	Vacuum Power Units 9 - 16
57 - 58	Purge (for gaylords, etc.)	57 - 58	Purge (for gaylords, etc.)
59	Proofing (Sources)*	59	Proofing (Sources)**
60	Proofing (not used)*	60	Proofing (Destinations)**
61	Spare/Alarm	61	Spare
62	Hand-held scanner	62	Hand-held scanner
63	Programmer's Laptop	63	Programmer's Laptop

AutoID Proofing Standard Device Mapping
* Module 1 (NODE 59) – Sources 1 through 16 mapped to Network 1 Nodes 1 – 16.
* Module 1 (NODE 60) – Not used.

**Module 2 (NODE 59) – Sources 17 through 32 mapped to Network 1 Nodes 17 – 32.
**Module 2 (NODE 60) – Destinations mapped to Network 2 Nodes 1 – 48.

9   INSTALLATION

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

1. Completely install stations and station valves, pumps, and other mechanical components. Run material conveying lines.

2. Locate and mount the electrical controls for the main base unit, pumps, dryers, etc.

3. Install the node DeviceNet blocks and run communication wiring. Wire the equipment to the node blocks per the wiring diagram. Install DeviceNet power supplies.

4. Assign addresses to pumps and stations.

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: 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.

9.1   Mechanical Installation

9.1.1   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.

9.1.2   Vacuum Power Unit

Locate the vacuum power unit so that access to the secondary filter element mounted to the unit is available. Secure to the floor or platform as necessary. Attach high voltage (check nameplate) to the motor starter located in the motor starter junction box mounted to the vacuum power 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. Attach DeviceNet cables as shown in the wiring diagrams supplied with this manual.

A clean, dry supply of 80 -120 PSIG compressed air must be connected to the pressure port on the vacuum breaker valve solenoid valve. 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 search timer expires. Note that the default time programmed into the search 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 usually short or long period, check the programmed search timer value.

9.1.3 Cyclone Filter

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.

9.1.4 Station 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 valve solenoid is wired to the DeviceNet network. Ground the system as necessary. A clean, dry supply of 80 - 120 PSIG compressed air is connected to the pressure port on the station valve's solenoid valve.

9.1.5 Single Inlet Vacuum Chamber

Secure the chamber to the hopper or surge bin as required. Orient the material inlet line and vacuum outlet line as required. Flex hose is normally used to connect the vacuum chamber to the supply line and station valve. Connect the material level switch wires to the DeviceNet network.

9.1.6 Compressed-Air Blowback

Some vacuum chambers (single and dual inlet) are provided with a compressed air blowback solenoid valve for cleaning the filter depending on the application. The pulse blowback solenoid valve is wired to the DeviceNet network. A clean, dry supply of 80 - 120 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.

9.1.7 Purge Valves

Purge valves are typically installed at the silo, hopper, blender, or other material outlets where conveying lines must be emptied between load cycles. A clean, dry supply of 80 - 120 PSIG compressed air is required. The solenoid valve located on the body of the purge valve must be wired to the DeviceNet network as shown in the wiring diagrams

9.2   Electrical Installation

Always disconnect and lock out the main power supply before wiring power and communication cables between the MCS controller and the network 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.

10 CONTROLS EXPLANATION

10.1 PanelView Plus 1000

The PanelView Plus 1000 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 PanelView is equipped with DeviceNet and Ethernet I/P communication. The PanelView communicates with the Allen-Bradley CompactLogix L32E PLC using Ethernet.

10.2 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.

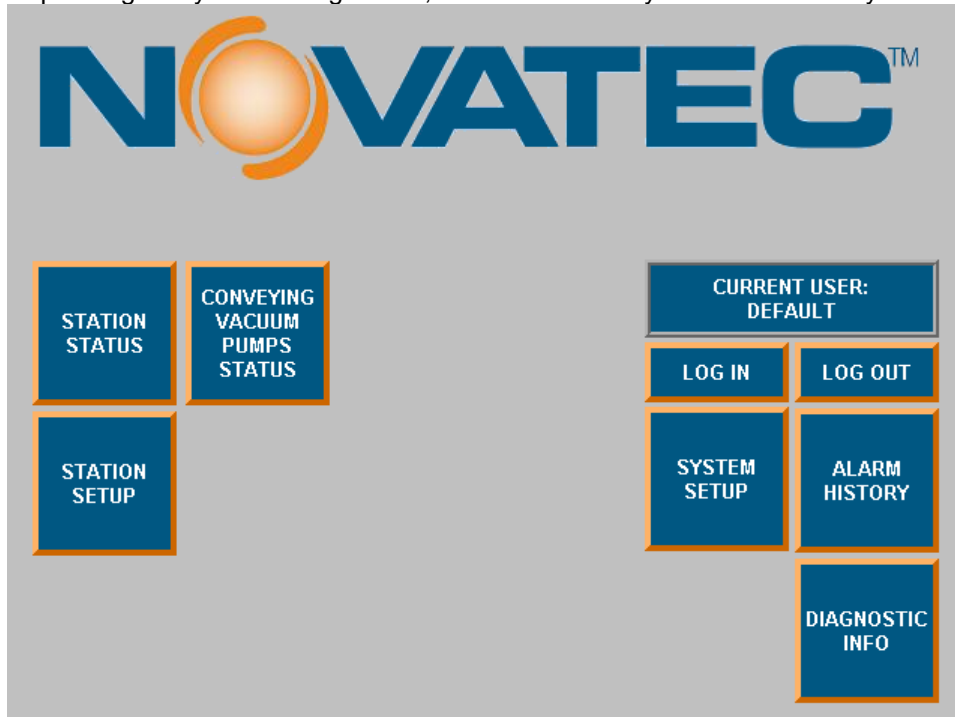Depending on system configuration, some buttons may not be visible on your screen.

Figure 2: Default Menu

11 OPERATOR SCREENS

11.1 Main Menu

The Main Menu screen has pushbuttons (PB) to navigate to other screens. The screens include the MCS (Main Conveying System), VPU (Vacuum Pump Units), 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 only admin Log-On is level3.

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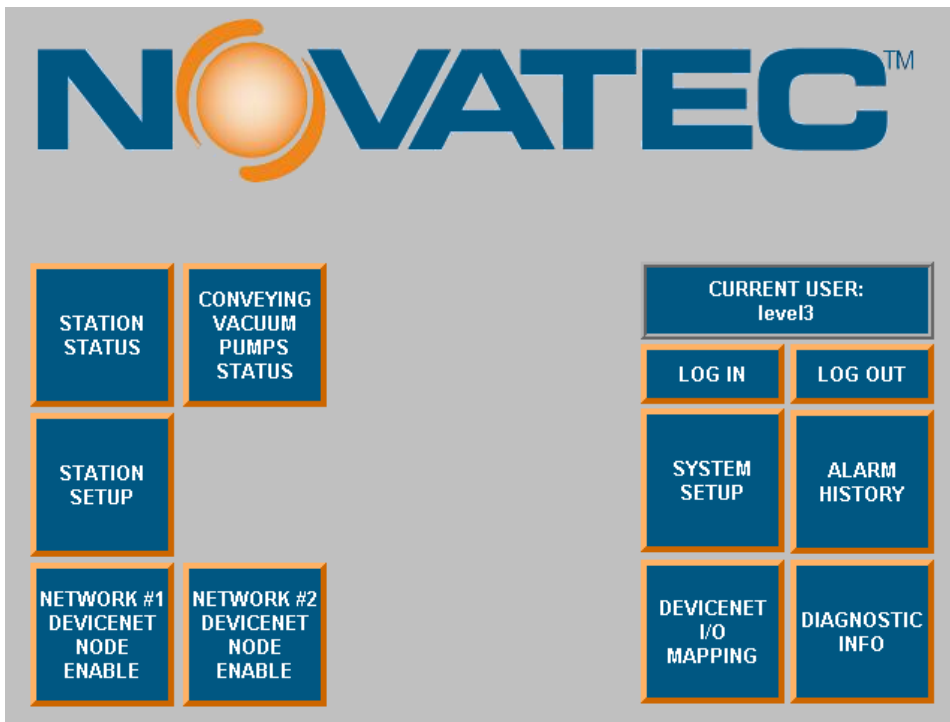

Figure 3: Novatec Logon

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 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 blower 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 count down of the remaining load and purge times and seek times. See section 11.2 for more detail.

NETWORK #1 DEVICENET NODE ENABLE

This button and the NETWORK #2 DEVICENET NODE ENABLE button take the user to a level3 or higher protected screen. Here, the user defines which devicenet node are going to be used. Nodes 1-48 also control if a station icon on the STATION STATUS page is visible by being enabled. Also, only enabled nodes are checked for being present on the network and work properly.

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 happened and when they were acknowledged.

DIAGNOSTIC INFO

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

DEVICENET I/O MAPPING

This button enters into the Devicenet I/O mapping screens. These screens allow the administrator to field assign how Devicenet I/O is configured. Outputs 2 and 3 of nodes 1-48 on both Devicenet gateways can be assigned in any fashion to station Blow Back valves, station proportioning valves, or material purge valves

11.2 Vacuum Pumps

This overview status screen displays the operation of the Vacuum Pump Units. Sixteen 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 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.
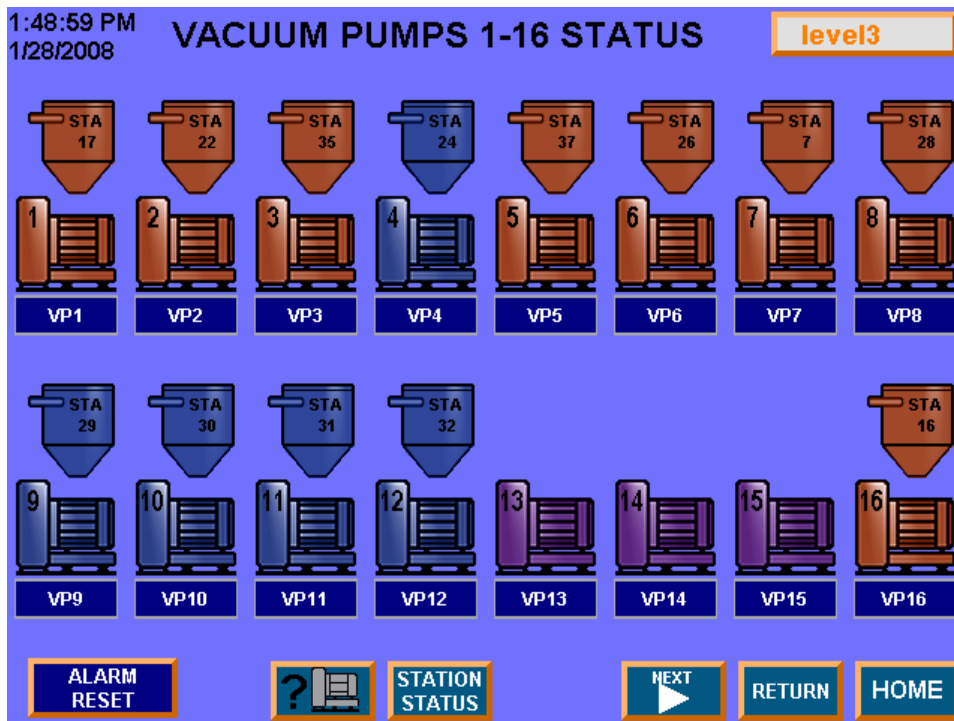

Figure 4: Vacuum Pump Screen

STATION STATUS — The STATION STATUS will navigate back to the Station 1-40 Status overview page – see 11.3

PREV **NEXT** — 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.

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

HOME — The HOME button will go back to the main menu – see 11.1.

ALARM RESET — 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).

1 — Pressing the icon of any of the vacuum pumps will navigate to a more detailed screen of that particular vacuum pump.
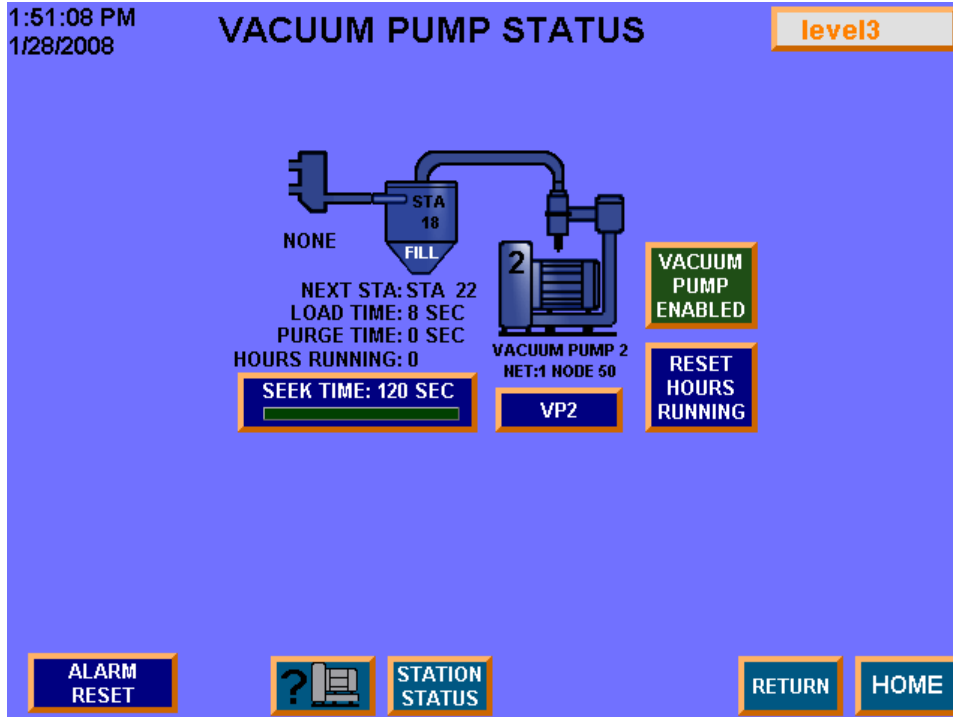
The load and purge times are shown as a countdown in seconds remaining. The next station in the queue (if any) is also shown. A station and material purge valve icon show what station the vacuum pump is currently servicing and what material is being used. The icons will change color like on the station 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.

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.

This button will reset the vacuum pump hours running counter.

This button allows the user to apply an 8 character name to the vacuum pump. VP1 – VP20 are the default names.

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 120 seconds.

11.3   MCS Station Status

This screen permits the control and status display of up to 96 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 96. The text may be edited on the "Setup Station" screen with a level3 login.
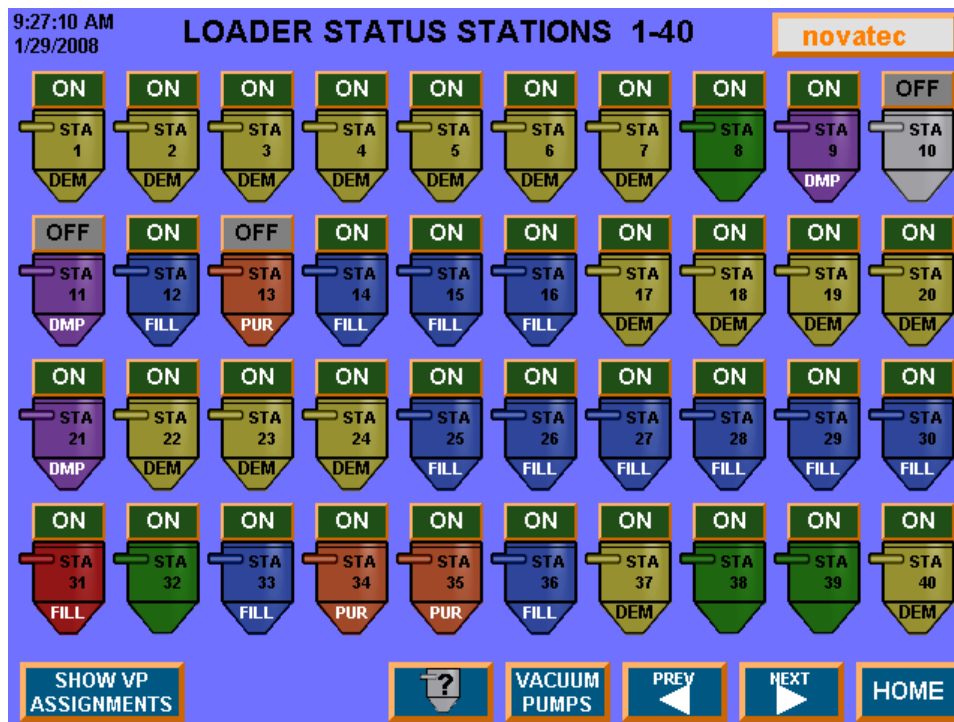

Figure 5: MCS Station Status Screen

SHOW VP ASSIGNMENTS

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 screen. The overlay is a color key for the status display of a station.

.
Color Legend:
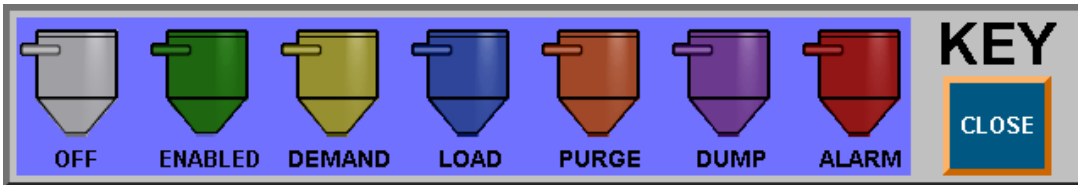
VACUUM PUMPS

The VACUUM PUMPS button will goto the vacuum pump status screen #1 (Pumps 1-4). See 11.2 for a description of the vacuum pumps status page.

PREV   NEXT

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 were only 40 stations in a panel, then the PREV and NEXT buttons would not be visible. If there were 48 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.

HOME

The HOME button will go back to the main menu – see 11.1.

ON STA 14 FILL

The ON/OFF button on top of each station icon can be used to easily enable or disable stations shown on the status page if the user is logged in with the proper password level. 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 – 11.4.

11.4   Station Setup

The STATION SETUP screen is evoked when an operator either touches a loading station icon on the MCS 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 log in 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 "STATION OFF PUSH TO START" when it is off, and green (as shown) with the text "STATION ON PUSH TO STOP" when it is enabled.
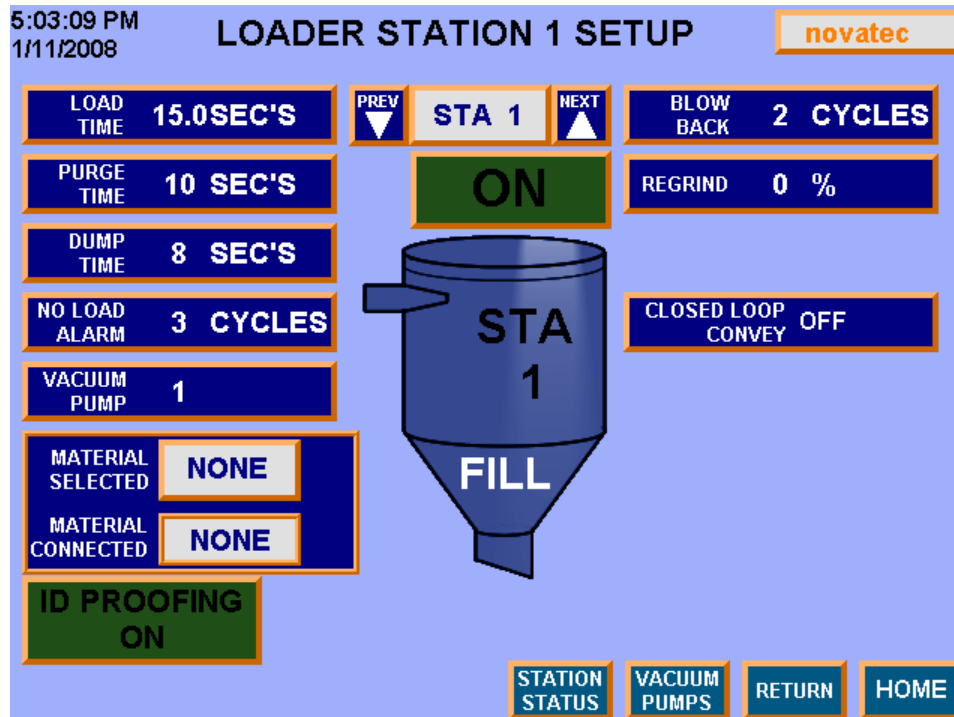

Figure 6: View Station Setup Screen

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.

Screen navigation PBs are at the bottom of the screen.

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

LOAD TIME 15.0SEC'S — 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 station hopper and how difficult the material flows.

PURGE TIME 10 SEC'S — 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.

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 / MATERIAL CONNECTED NONE / ID PROOFING ON — The Material Selected button brings up a pull down menu to selected what material purge valve to energized during the load cycle. If Auto ID Proofing is enabled (as on the left) the Material Connected window will become visible. With ID Proofing enabled ON , the Material Selected value and Material Connected value should be the same. If they are not, material for that station will not be allowed to be conveyed.

BLOW BACK 2 CYCLES — If a station is equipped with Blow Back, then the user can define the number of pulses of Blow Back that will occur during the dump cycle.

REGRIND   0   %

The Regrind Percent setting tell what proportion of regrind will be injected into the hopper. This value is a percentage of the LOAD time. For example, if the LOAD time was 10 seconds and the Regrind Percent was 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.

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 return air of the dryer.

STA 1
FILL
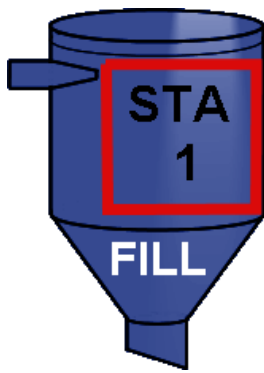
Touching the station name in the center of the icon will show a typewriter keyboard for letter and number entry. Up to 8 characters can be entered for a station name.

STATION STATUS

The STATION STATUS will navigate back to the Station 1-40 Status overview page – see 11.3

VACUUM PUMPS

The VACUUM PUMPS button will goto the vacuum pump status screen #1 (Pumps 1-4). See 11.2 for a description of the vacuum pumps status page.

RETURN

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

HOME

The HOME button will go back to the main menu – see 11.1.

11.5   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.
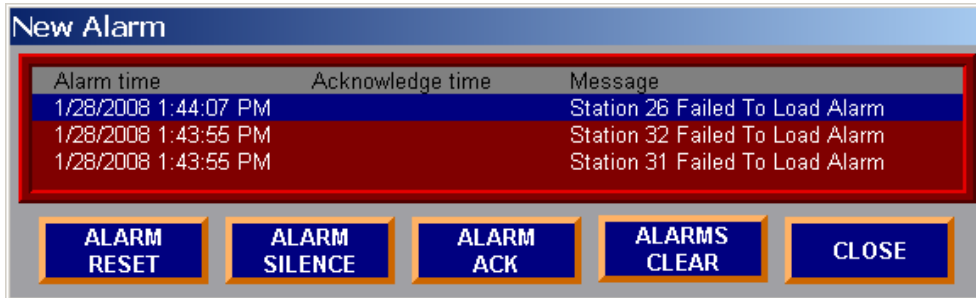

Figure 7: Alarm Banner Screen

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 11-1: Alarm Messages

Item	Alarm Message
1	Station *XX* No Load Alarm
2	Scanner 1 Node *XX* Fault
3	Scanner 2 Node *XX* Fault
4	Vacuum Pump Unit *XX* Motor Starter Fault
5	Low Battery Alarm

11.6   Alarm History

The ALARM HISTORY screen displays the last 150 alarm conditions.

Figure 8: 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.

11.7   System Setup Screen

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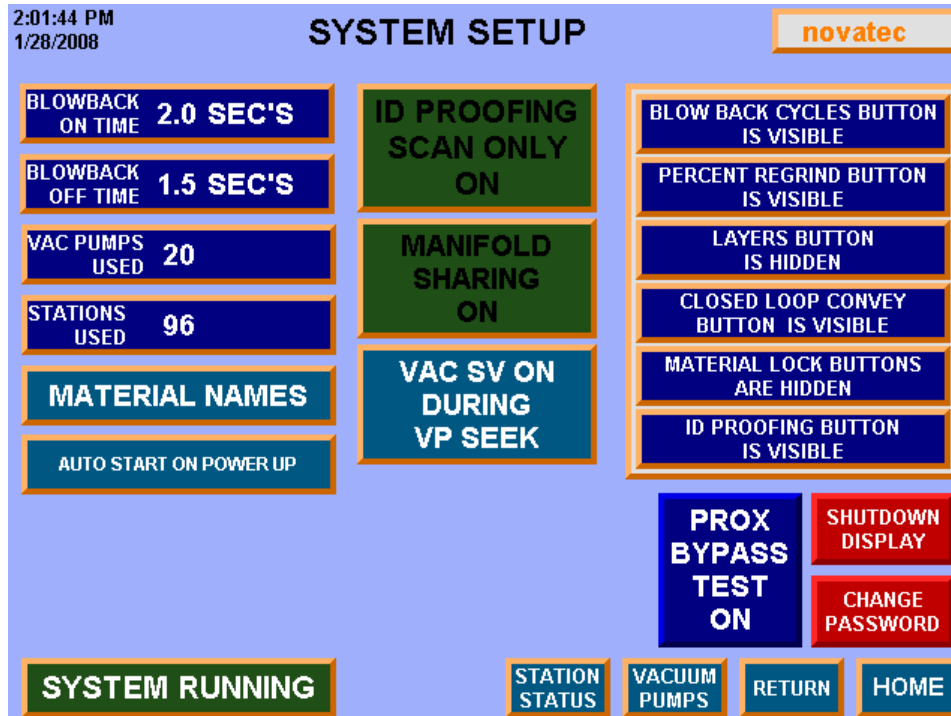

Figure 9: Maintenance Screen

 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.

 This button will toggle the HIDDEN or VISIBLE status of Regrind Percent button on the Station Setup page.

 This button will toggle the HIDDEN or VISIBLE status of the Layers button on the Station Setup page.

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

 This button will toggle the HIDDEN or VISIBLE status of the Material Lock button on the Station Setup page. This button is only used when the convey panel communicates to the HB control panel.

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.

ID PROOFING SCAN ONLY OFF

This button will toggle ON/OFF the Auto ID Proofing to scan only. The material setpoint and feedback values will be displayed on the Station Setup page but a mismatch in values will not inhibit the conveying of material. This is useful for initial startup and troubleshooting. Auto ID Proofing must be OFF before this test mode can be enabled.

MANIFOLD SHARING ON

This button will toggle ON/OFF Manifold sharing. With manifold sharing on, if 2 stations on 2 different vacuum pumps try to use the same material at the same time, the system will prevent it. One station will get to use the material while the other station will have to wait. (The waiting vacuum pump does not idly wait for the material to become available – it will service the next station in the FIFO and then go back to service the waiting station.)

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 selected to energize during the load and purge cycle and de-energize during the dump and seek time. This allows the control panel to work with competitor's 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.

BLOWBACK ON TIME 2.0 SEC'S

BLOWBACK OFF TIME 1.5 SEC'S

The time for the Blow Back pulse on time and off time can be adjusted here. These values apply to all stations with Blow Back.

VAC PUMPS USED ??

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.

STATIONS USED 96

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 Station status pages

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 pump's FIFO queue. Any stations that already loaded in the vacuum pump FIFO's will be loaded in the order if the FIFO. However, no more stations will be loaded into the FIFO's until the controller goes 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.

11.8   Install Stations

This administrator access screen allows for the installation of additional loading stations.   A station that is "future" or not currently installed is not shown until an administrator enables operator access to that station by touching the INSTALL pushbutton.   An operational station is green while an uninstalled station is red.
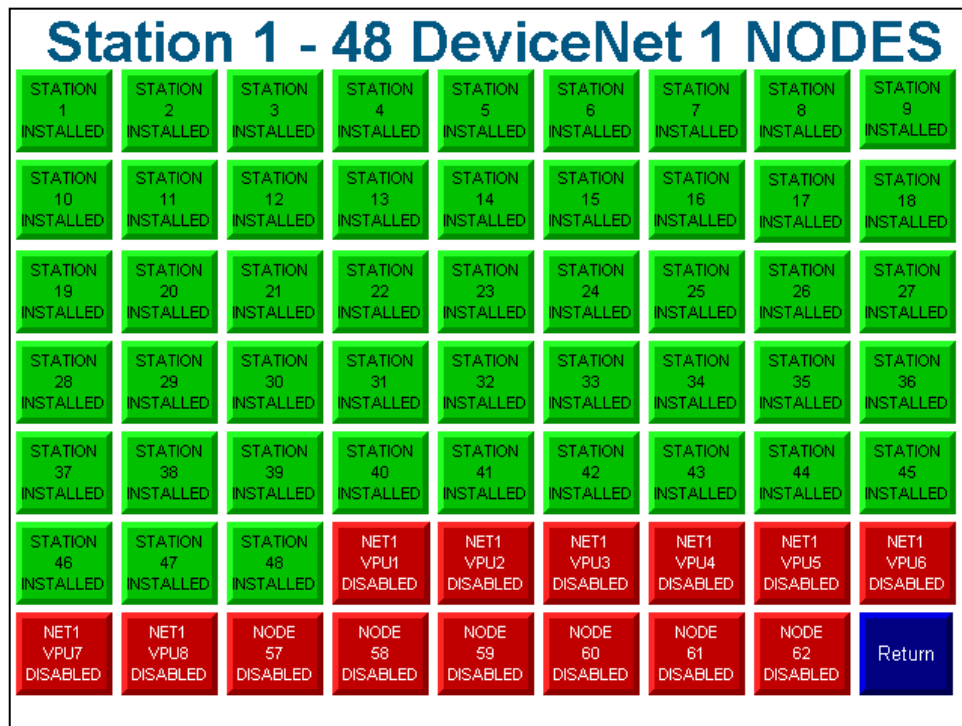

Figure 10: Install Stations Screen

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 station and VPU settings.

❑ Record equipment Serial Numbers and the MCS 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.

13 TROUBLESHOOTING

13.1 DeviceNet Network

Table 13-1: Indicator Lights

Indicator	Color/Status	Indicates	Recommended Action
I/O Status – Remote I/O	Off	Input or Output is OFF	Verify cables between I/O block and equipment are properly seated and wired if status light fails to indicate proper state.
	Green	Input or Output is ON	None
Module Status – Remote I/O	Off	No module power	Check wiring and power supply connections.
	Green	Working properly	None
	Flashing Green	Detecting AutoBaud Rate	Verify network status.
	Flashing Red	I/O Short-Circuit	Check wiring between I/O block and equipment. Verify all connectors are properly seated.
Network Status – Remote I/O	Green	Established Connection	None
	Flashing Green	Ready for Connection	Connect I/O block to equipment.
	Flashing Red	Connection Time-Out	Verify DeviceNet network is setup properly and all wiring is connected.
	Red	Connection not Possible	Verify scanner module has power and

If you have questions concerning troubleshooting or the dryers 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
Toll Free: 1-800-237-8378
Sales Fax: (410) 789-4638
Email: Service@novatec.com or Parts@novatec.com

WARRANTY – EFFECTIVE 7 FEB 2018

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 DehumidifiersNovaVac 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 by Novatec

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.