FlexXpand Siemens FX3 series Material Conveying System Controls FX3-516-16-7C, FX3-516-16-12C FX3-532-32-7C, FX3-516-32-12C Including NovaNet[®] Option



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instruction Manual: FX3 IM 26 JULY 2024

Model #:____

Serial #

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Contents

	1 PURPOSE OF THIS MANUAL	4
1.1	Explanation of Symbols	4
	2 SAFETY PRECAUTIONS AND WARNINGS	4
	3 GENERAL DESCRIPTION	5
		6
		0
	5 PLC OVERVIEW	8
5.1	General	8
	6 OPERATING PRINCIPLES	8
6.1	FlexXpand Conveying Controller	8
6.2	Vacuum Pump (VP)	8
6.3	Receiver Station	9
	6.3.1 Receiver Fill Cycle	9
	6.3.2 VF FIFU Queue	10 10
	6.3.4 Vacuum Pump Alarms	10
		44
	7 CONTROL EXPANSION	
7.1	FlexXpand FX3 Main Panel and FXM2 Module Addressing	11
7.2 7.2	FlexXpand HMI Interface Addressing	12
1.3	Typical wining / Network Topology and Options	13
	8 INSTALLATION	14
8.1	Mechanical Installation	15
	8.1.1 Material Conveying Lines	15
	8.1.2 Vacuum Pump	15
	8.1.3 Cyclone Filter	
	8.1.4 Station valves (Remote vacuum Sequencing)	
	8.1.6 Compressed-Air Blow Back	10 16
	8.1.7 Purge Valves	
	8.1.8 Proportioning Valves	17
8.2	Electrical Installation - General	18
8.3	Electrical Installation – Wires	18
	8.3.1 Wire Types	
	8.3.2 Standard Wires for Receivers	18
	8.3.4 Standard Wires for Vacuum Pumps	
	8.3.5 Optional Wires for Vacuum Pumps	20
8.4	Determining the Wire Needed	20
8.5	Wire Lead Installation Methods	20
8.6	Ethernet Cable and Connectors	20
	8.6.1 Wiring Ethernet Connectors	21
	9 CONTROLS EXPLANATION	22
9.1	Siemens HMI	22
9.2	Startup	22
	10 OPERATOR SCREENS	22
10 1	Home Screen - Main Menu	22
		<i>LL</i>

1



10.2 10.3 10.4 10.5 10.6 10.7 10.8 10.9	Receiver Station Status Screen Vacuum Pump Status Screen Help Screens Receiver Station Setup Screen System Setup Screen Auto ID Screen Vacuum Pump Setup Screen Alarm Page Screen	.25 .26 .26 .27 .27 .27 .28 .28
	11 SYSTEM SETUP PAGE 1 – BASIC FEATURES	.29
11.1 11.2 11.3 11.4 11.5	Date and Time User Levels and Passwords Changing User Level Passwords Defining the Installed Devices Options and Visibility	.29 .29 .30 .31 .31
11.6	Enable/Disable installed options.	.36
11.8	Saving Control Settings	.30
11.9 11.10	Enables Expansion Panels (Xpand Remote I/O panels) Defining Material Names	.38 .42
11.11	Defining Station Names	.42
11.12	Station On-Screen Assignments.	.43 .45
	12 STATION SETUP	.47
12.1	Station Timers	.48
12.2 12.3	Station Alarm Settings Priority Loading	.48 .48
12.4	Open / Closed Loop Convey	.49
12.5	Regrind Proportioning Blowback	.49 .49
12.7	Station Pump Assignment	.50
12.0	Material Source Selection (for a Station)	.50
12.10	Material ID Proofing status:	.51
12.12	Station Copy Settings	.52
12.13	Station BOP and Fill configurations:	.52
	13 VACUUM PUMP SET-UP	.54
13.1 13.2	Enable / Disable Priority Loading Setup (per pump)	.54 .55
13.3	Pump Operating Hours	.55
13.4	Backup Pump On / Off	.55 .56
	14 RECEIVER STATION STATUS	. 57
14.1	Receiver Status Graphics Guide	.57
14.2 14.3	Scrolling to Station Status Screens Station Status Screen Filter (by pump)	.59 .59
	15 VACUUM PUMP STATUS	. 59
15.1	Pump Status Graphics Guide	.60
	16 HELP INFORMATION SCREENS	.60
	17 ALARM BANNER	.61



17.1	Alarm History	62
18	8 ADVANCED SETUP FEATURES	62
18.1	Advanced System Setup (Page 1 and 2)	63
18.2	Source Sharing Bypass Limit	63
18.3	Auto-ID Source I/O Assignments (remapping)	63
18.4	Finding Duplicates (remapping I/O)	64
18.5	Auto-ID Station I/O Assignments (remapping outputs)	64
18.6	I/O Status (Troubleshooting)	64 67
18./	Auto-ID Station Exceptions	60
10.0	CDA Source Assignment	66
18.10	Auto-ID Source Confirmation (Ontion)	67
18 11	Silo Level Status	68
18	11.1 Silo Level Connections – Transducers to LU 10 (LU 02)	70
18	.11.2 Railcar Unloader (RCU) Status	71
18	.11.3 Silo Proofing (Truck Fill)	72
18.12	Configuring Remote Connections with Dryers	74
18.13	User Configurable HMI Remote Connections.	76
19	9 REMOTE CONTROL ACCESS, NETWORKING AND HMI SETUP	79
10 1	Connecting EX3 to a Corporate Network	79
19.1	1 1 Network Physical I aver	79
19	1.2 Prior to Connecting	79
19	.1.3 Network IP Addresses	79
19	.1.4 Network IP Address Conflicts	79
19.2	Remote Access to HMI via Corporate or Wireless Network	80
19	.2.1 Connect wireless Smart Device to the FX3 accessible network	80
19	2.2 Connect PC to the FX3 accessible network	80
19.3	HMI Setup Functions	82
19	.3.1 Accessing the HMI Operating System Utility	82
19	1.3.2 HMI Setup: Remote Access and Subnet Mask / IP Address	82
19	.3.3 HMI Setup: Brightness and Touch Calibration	83
20	D MAINTENANCE	84
20.1	At Startup	84
20.2	Monthly	84
20.3	Every 3 Months	84
21	1 WARRANTY	85
22	2 APPENDIX 1 – ULTRASONIC LEVEL INDICATOR CONTROL PANEL STARTUP	87
23	3 APPENDIX 2 – CONVEYING SYSTEM TROUBLESHOOTING	96
23.1	System Component Operation Details	96
23.2	System Control Operation – Station Conveying Timer Setup	98
23.3	Basic Startup / Troubleshooting Checklist - Receiver	98
23.4	Basic Startup / Troubleshooting Checklist - Vacuum Pump	98



1 PURPOSE OF THIS MANUAL

This manual describes the installation and operation of the Novatec FX3 Series Material Conveying System controller. Before installing this product, please read this guide and any additional guides associated with the system's auxiliary equipment.

1.1 **Explanation of Symbols**

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



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

NOTE

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

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.
- **D** The customer is required to operate the equipment with all safety features in proper working conditions.
- Novatec shall provide no further guarantee for function and safety in the event of unauthorized modifications.



3 GENERAL DESCRIPTION

The Novatec FX3 Series controller is a custom-programmed PLC-based control system designed to incorporate existing and future equipment.

The FlexXpand FX3 series is a PLC based, centrally installed touchscreen loading control featuring intuitive operation with the ability to expand using economical FlexXpand modules.

Low-cost installation is assured with the use of expansion modules that connect to the main control with a simple ProfiNet Communications Cable and Expansion Modules can be conveniently located to minimize wiring to system components. No extra programming is required as FlexXpand modules are enabled through the FX3 HMI interface.

A choice of two touch screen sizes and two different control capabilities are available. All models may be fully expanded with FlexXpand modules.

The FX3 allows easy expansion without the need for additional programming. Vivid icons show functions and enhance control understanding. Installation cost is minimized by the ability to place FlexXpand modules throughout the operation, minimizing cable runs.

Blow Back and Proportioning may be optioned in the main control and in FlexXpand modules.

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

All FX3 controls are equipped with Ethernet capability so they may be readily networked to PC(s) anywhere. In addition, the FX3 may be programmed to send alarm email messages to any SMTP server.



4 SPECIFICATIONS

System Component Capabilities

Component	Panel Input Voltage	Description	Pumps	Receivers	Purge Valves
FX3-516-16-7C	115/230 VAC	7" Diag. color touch screen PLC	5	16	16
FX3-516-16-12C	115/230 VAC	12" Diag. color touch screen PLC	5	16	16
FX3-516-16-15C	115/230 VAC	15" Diag. color touch screen PLC	5	16	16
FX3-532-32-7C	115/230 VAC	7" Diag. color touch screen PLC	5	32	32
FX3-532-32-12C	115/230 VAC	12" Diag. color touch screen PLC	5	32	32
FX3-532-32-15C	115/230 VAC	15" Diag. color touch screen PLC	5	32	32



Specifications:

Component		Dimensio	Amps F	Required		
Component	Description	in	mm	115V	230V	1/O voltage
FX3-516 <u>(</u> -120)	Central Control Panels	30 x 24 x 8	762 x 610 x 203	6	3	24 VDC or 115 <u>VAC</u>
FX3-532	Central Control Panels	30 x 24 x 8	762 x 610 x 203	6	3	24 VDC
FX3-532(-120)	Central Control Panels	36 x 36 x 8	914 x 914 x 203	6	N/A	115 <u>VAC</u>
FXM3- <u>STA(</u> -120)	Station Expansion	18 x 18 x 8	457 x 457 x 203	3	1.5	
FXM3- <u>PUMP(</u> -120)	Pump Expansion	18 x 18 x 8	457 x 457 x 203	3	1.5	24 VDC
FXM3- <u>MSV(</u> -120)	Purge Valves	18 x 18 x 8	457 x 457 x 203	3	1.5	(IIS VAC)
FXM3-AG16 or 32	Alarm Groups	18 x 18 x 8	457 x 457 x 203	3	1.5	24VDC or 115VAC
FXM3-ID/STA	ID Manifold	18 x 18 x 8	457 x 457 x 203	3	1.5	
FXM3-ID/MSV16	ID Manifold	18 x 18 x 8	457 x 457 x 203	3	1.5	24 VDC
FXM3-ID/MSV32	ID Manifold	18 x 18 x 8	457 x 457 x 203	3	1.5	Only
FXM3-SID-212 or 211-PS	Silo Proofing	24 x 20 x 8	600 x 500 x 210	3	1.5	

Note: add -120 to FX3 models and FXM3 modules for 115 VAC inputs/outputs (Where available) See FX3-NovaNet Control to include other system components <u>like</u>, dryers, blenders, silos, railcar unloaders, etc.

Options:

Blowback and proportioning output cards for

16 receivers: Up to 2 cards (1 each of proportioning and blowback) can be factory installed and wired into FX3 control. For 24 VDC or 115 VAC.

Ethernet Switch, 5-port, or 8-port: Adds networking ports to main panel, Xpand, and RHI'S.

230 VAC Panel Input Power: All models, 24 VDC I/O only.

Alarm strobe: (24 VDC) For 24 VDC or 115 VAC I/O.

Wireless Router: Seamlessly manage the FX3 from your tablet or mobile phone via wireless network.

Alarm Groups: Allows assignment of any station to a specific alarm group.

Accessories:

Receiver Xpand Module: Up to 8 modules can be added (16 stations per module). Add optional outputs for using blowback and/or proportioning with receivers.

Pump Xpand Module: Up to 7 modules can be added (5 pumps +2 backups per module). Add optional output for using automatic backup valves, air speed control, backup pump, <u>SmartPump</u>, and more.

Purge Valve Xpand Module: Up to 3 modules can be added (16 purge valves per module).

Auto ID-Source Xpand Module: Up to 4 modules can be added (16 or 32 sources per module).

Auto ID-Destination Xpand Module: Up to 5 modules can be added (32 destinations per module).

Station Alarm Groups: Easily manage and organize groups of machines for streamlined monitoring and quicker response time.

Silo Truck Fill Auto ID: Ensure precise material allocation from bulk trucks to silos, preventing misconnections and optimizing inventory management.

Remote Touch-Screen HMI: (7", 12" or 15") Extending Ethernet through an RHI panel requires (optional) Ethernet switch.



5 PLC OVERVIEW

5.1 General

The FlexXpand Series Material Conveying System Controller utilizes a centrally mounted PLC that sends commands to various conveying system components.

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.

The System Setup page has the button defining the power up mode:

6 OPERATING PRINCIPLES

6.1 FlexXpand Conveying Controller

The program controls the operation of loading the receivers from selected sources. The FlexXpand controls the operation of the Vacuum Pumps (VP), the station "Tee" valves and the Purge (Source) valves. The FlexXpand must be in SYSTEM RUNNING mode. for any conveying to take place. The FlexXpand will not default to STOPPED mode on power loss. Starting or stopping the FlexXpand will not reset the various station settings and controls.

(Green icon - see Setup Screen 2)



6.2 Vacuum Pump (VP)

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



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

A VP will start when an associated loading station calls for material. The VP 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 VP 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 display's Vacuum Pump Setup page and has a default value of 120 seconds.



6.3 Receiver Station

Each molding machine/press or drying bin hopper is equipped with a Vacuum Receiver complete with level switch. The FlexXpand control panel allows the user to view the status of the receiver, enable or disable it, and view or change any setup parameter. Enabling of a receiver permits it to be automatically serviced by the conveying panel. A receiver may be enabled or disabled at any time. If a receiver is in a fill cycle when it is disabled, the cycle will continue to completion. Receiver Station status indications are:

- □ OFF The Receiver is Disabled.
- **ENABLED** The Receiver enabled, not in the fill cycle and the level switch is satisfied.
- DEMAND The Receiver is not in the fill cycle and the level switch calls for material.
- □ REGRIND The Receiver is in the loading regrind material portion of the fill cycle. The station Tee valve is open, and the proportioning valve is energized to draw regrind material.
- VIRGIN The Receiver is in the loading virgin material portion of the fill cycle. The station Tee valve is open, and the material source valve is energized open permitting material to be conveyed to the vacuum chamber.
- PURGE The Receiver is in purge portion of the fill cycle. The station Tee valve is open, and the material source valve is closed allowing the conveying line to be purged free of any remaining material.
- DUMP The Receiver is in the dump portion of the fill cycle. The Station TEE valve closes, removing vacuum from the hopper. The material conveyed into the hopper gravity conveys (dumps) into the molding machine or drying bin.
- ALARM The receiver has gone through the fill cycle, without satisfying the material level prox sensor, a consecutive number of times equal to or greater than the no load alarm set point.

6.3.1 Receiver Fill Cycle

The Receiver Station number is moved into the appropriate Vacuum Pump FIFO queue when the receiver has material demand. The default VP assignment for all receiver stations is number 1. The fill cycle consists of three states, LOAD, PURGE and DUMP. When the receiver is ready to be serviced, the Vacuum Pump will start, if not already running, and the station Tee valve will open at the start of the fill cycle. The material source valve opens allowing pellets to be conveyed from the source to the vacuum chamber. The station Tee valve will remain open for the load and purge times.

When the load time expires, the material source valve closes, and the purge time begins. The purge time allows any pellets in the conveying line to be carried into the vacuum chamber. When the purge timer expires the station Tee valve is closed and the dump timer is started. The Vacuum Pump 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 material level switch is not satisfied at the end of the dump time, the receiver will be placed back at the end of its Vacuum Pump FIFO queue. The load, purge, and dump set points are changeable from the HMI and have default values of 10, 10, and 5 seconds, respectively.



6.3.2 VP FIFO Queue

Each Vacuum Pump has a First In/First Out (FIFO) queue. Any station Receiver may be assigned to any Vacuum Pump. The queue contains the receiver numbers (1 to 120) in the order the receivers became empty and needed material. The VP services each station in the order in which the demand was generated. A station is removed from the queue at the end of the purge cycle. At this time the VP 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.

6.3.3 Receiver Station Alarms

Each station receiver has a No-Load fault. If the receiver has gone through the fill cycle, without satisfying the material level prox sensor, a consecutive number of times equal to or greater than the no load alarm set point, 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 even if the alarm is on.

6.3.4 Vacuum Pump Alarms

The Vacuum Pumps have motor failure alarms. The motor failure alarm is set whenever the motor is called to run, but the motor auxiliary contact input is not made after 3 seconds. The alarm can only be cleared by pressing the "ALARM SILENCE" button on the front of the controller. 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 CONTROL EXPANSION

7.1 FlexXpand FX3 Main Panel and FXM2 Module Addressing

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



Station No	Profinet Station Name	IP Address	Remote IO Type
Main	FX3	192.168.1.8	-
1	o532oMachine	192.168.1.100	-
2	ExpandSta33-48	192.168.1.101	FXM3-STA
3	ExpandSta49-64	192.168.1.102	FXM3-STA
4	ExpandSta65-80	192.168.1.103	FXM3-STA
5	ExpandSta81-96	192.168.1.104	FXM3-STA
6	ExpandSta97-112	192.168.1.105	FXM3-STA
7	ExpandSta113-128	192.168.1.106	FXM3-STA
8	ExpandSta129-144	192.168.1.107	FXM3-STA
9	ExpandSta145-160	192.168.1.108	FXM3-STA
10	ExpandVacPump6-10	192.168.1.109	FXM3-PUMP
11	ExpandVacPump11-15	192.168.1.110	FXM3-PUMP
12	ExpandVacPump16-20	192.168.1.111	FXM3-PUMP
13	ExpandVacPump21-25	192.168.1.112	FXM3-PUMP
14	ExpandVacPump26-30	192.168.1.113	FXM3-PUMP
15	ExpandVacPump31-35	192.168.1.114	FXM3-PUMP
16	ExpandVacPump36-40	192.168.1.115	FXM3-PUMP
17	ExpandMatSV33-48	192.168.1.116	FXM3-MSV
18	ExpandMatSV49-64	192.168.1.117	FXM3-MSV
19	ExpandMatSV65-80	192.168.1.118	FXM3-MSV
20	ExpandIDOutSta1-32	192.168.1.119	FXM3-ID/STA
21	ExpandIDOutSta33-64	192.168.1.120	FXM3-ID/STA
22	ExpandIDOutSta65-96	192.168.1.121	FXM3-ID/STA
23	ExpandIDOutSta97-128	192.168.1.122	FXM3-ID/STA
24	ExpandIDOutSta129-160	192.168.1.123	FXM3-ID/STA

Table continued next page.



Table continued from last page.

Station No	Profinet Station Name	IP Address	Remote IO Type
25	ExpandIDInMat1-32	192.168.1.124	FXM3-ID/MAT
26	ExpandIDInMat33-48	192.168.1.125	FXM3-ID/MAT
27	ExpandIDInMat49-64	192.168.1.126	FXM3-ID/MAT
28	ExpandIDInMat65-80	192.168.1.127	FXM3-ID/MAT
29	StaAlarmGroups	192.168.1.128	FXM3-AG
30	StaAlarmGroups17-32	192.168.1.129	FXM3-AG
31	SiloProof	192.168.1.130	FXM3-SILO
32	LoadCellSilo1-6	192.168.1.131	Rice Lake i920
33	LoadCellSilo7-12	192.168.1.132	Rice Lake i920

7.2 FlexXpand HMI Interface Addressing

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

Station No	IP Address
HMI Main (7 inch)	192.168.1.7
HMI Main (12 inch)	192.168.1.9
RHI 1 (12 inch)	192.168.1.12
RHI 2 (12 inch)	192.168.1.13
RHI 3 (12 inch)	192.168.1.14
RHI 4 (12 inch)	192.168.1.15



7.3 Typical Wiring / Network Topology and Options

FlexXpand FX3 with FlexXpand FXM3 modules

The full-featured FlexXpand FX3 provides detailed control and monitoring of these conveying devices:



ID proofing for material source valves (MSV)

Purge Valves: Assign valves to any receiver and manifold sharing capability 2 (allows multiple pumps to work with

Material Sources and Destinations: Optional Auto-ID3

and Auto-ID+ material source to receiver destination

proofing prevents conveying through mismatched

See FX3-NovaNet control to include other system components like; dryers, blenders, silos, railcar unloaders, etc.

Receivers: Load time, discharge time, proportioning ¹ percentage, number of layers, blowback pulses, priority selection (standard and high), failed fill alarm. Receiver demands are serviced in the order they are received (FIFO = First In First Out) or priority. Purge time, open or closed loop conveying.

Pumps: Pump "ON" (starter), overload alarm, vacuum breaker valve function (NO or NC) and timer, dry air conveying closed loop valve, and run-time clock.

1 Blowback or proportioning can be added as an option to the main FX3 panel and the Xpand FX3-STA panels in groups of 16 consecutive stations. Blowback or proportioning can be added as a separate option in a similar manner. 2 Novatec's unique manifold sharing capability provides 'traffic control' of multiple pump systems calling upon the same shared material source. The FX3 assigns the source to one pump and allows waiting pump(s) to continue loading other receivers until the source is available. The FX3 remembers 'skipped' receivers and ensures a limited wait

common valves)

manifold connections.

³ Auto ID confirms the selected material source for each 'proofed' station matches the physical hose connection at the source selection manifold. If the correct connection is not confirmed through the (optional) manifold proofing connections, an alarm is <u>generated</u> and loading is not permitted.



8 INSTALLATION

After unpacking and inspecting the FlexXpand 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 remote FlexXpand node panels and run communication wiring. Wire the equipment to the node blocks per the wiring diagram.
- 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.



8.1 Mechanical Installation

8.1.1 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 so 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 hoses 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 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.

8.1.2 Vacuum Pump

Locate the vacuum pump 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. Control wiring for the starter coil and auxiliary feedback will need to be wired back to the control cabinet.

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 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 usually short or long period, check the programmed search timer value.





VRB



8.1.3 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.



8.1.4 Station Valves (Remote Vacuum Sequencing)

Station Valves are remotely installed vacuum sequencing valves. Check the receiver to confirm if a vacuum valve is included, or if a Station Valve is required. 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 back to the control cabinet. 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.



8.1.5 Vacuum Receivers

Secure the receiver (VR) 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 receiver body to the supply line, and lid to the vacuum line (or remote Station Valve if equipped). Wire the material level switch (and integral vacuum valve if equipped) back to the control cabinet. A machine mount receiver (MM) is used to dump material directly into the machine throat.



Vacuum Receiver (VR)



Machine Mount Receiver (VR-MM)



Vacuum Receiver with built-in sequencing valve (VRH)

8.1.6 Compressed-Air Blow Back

Some vacuum chambers (single and dual inlet) are provided with a compressed air Blow Back solenoid valve for cleaning the filter depending on the application. The pulse Blow Back solenoid valve is wired to the PLC I/O. 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 Blow Back solenoid valve that is supplied on small vacuum chambers.





8.1.7 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.

Two styles are offered by NOVATEC: A dual inlet/single outlet style (below left) designed to be installed within a tubing network. And a hopper-bottom model (below-right) designed to be installed below drying hoppers. A clean, dry supply of 80 - 100 PSIG compressed air is required for either model. The solenoid valve located on the body of the purge valve must be wired back to the control cabinet.





Takeoff Valve

External Purge Valve shown with filter screen installed

8.1.8 Proportioning Valves

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.



8.2 Electrical Installation - General

Always disconnect and lock out the main power supply before wiring power and communication cables between the FlexXpand controller and the network devices and control wiring to external devices. Refer to the wiring diagram and general arrangement drawings supplied with this system before making electrical connections.

- □ Use shielded cable for communications wiring.
- □ The maximum distance between any two network panels is 100 meters.
- Keep communication cables and control wiring as far as possible from high voltage equipment. Do not install panel beside power transformer.
- 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.

8.3 Electrical Installation – Wires

8.3.1 Wire Types

- Blue THHN 16 AWG (18AWG can be used for short distances, 250 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.

8.3.2 Standard Wires for Receivers

- <u>CONTROL POWER</u> (+24VDC) Supplied from a common terminal (set) at the main panel and shared by receivers grouped with the adjacent power module (see Electrical Schematic).
- <u>CONTROL NEUTRAL</u> (0VDC) Supplied from a common terminal (set) at the main panel and shared by receivers grouped with the adjacent power module (see Electrical Schematic).
- <u>VACUUM VALVE OUTPUT</u> (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.



8.3.2 - Standard Wires for Receivers (cont'd)

• <u>DEMAND INPUT</u> (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.



8.3.3 Optional Wires for Receivers

(may be required for receiver installed options)

- <u>BLOWBACK SOLENOID OUTPUT</u> Any receiver that includes the blowback option will also require the optional blowback output wire to operate the blowback solenoid valve.
- <u>PROPORTIONING VALVE SOLENOID OUTPUT</u> Any receiver that includes a proportioning (ratio) valve will also require the standard proportioning output wire to operate the proportioning valve solenoid.
- <u>PURGE VALVE OUTPUT</u> 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 wired to the 0VDC common the complete the power circuit when the output is energized.



8.3.4 Standard Wires for Vacuum Pumps

- <u>CONTROL POWER</u> (+24VDC) Supplied from a common terminal (set) at the main panel and shared by pumps grouped with the adjacent power module (see Electrical Schematic).
- <u>CONTROL NEUTRAL</u> (0VDC) Supplied from a common terminal (set) at the main panel and shared by pumps grouped with the adjacent power module (see Electrical Schematic).
- <u>AUX CONTACT</u> (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.
- <u>VACUUM PUMP MS OUTPUT</u> (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.
- <u>VACUUM BREAKER VALVE OUTPUT</u> (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.

8.3.5 Optional Wires for Vacuum Pumps

(may be required for pump installed options)

 <u>CLOSED LOOP VALVE OUTPUT</u> – 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 wired to the 0VDC common the complete the power circuit when the output is energized.

8.4 **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.

8.5 Wire Lead Installation Methods

- The wire leads can be installed in any of the following ways:
 - o Individual wires in conduit
 - o 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.

8.6 Ethernet Cable and Connectors

- Cable: part number caEN-01 (100 meters max between any two network panels) (Braided Shielded, CAT 5E, 350 MHZ, two twisted pairs)
- Connector: part number ehcETH-mfw (straight) <u>or</u> ehcETH-mfw90 (90 degree) (Fast Connect Field wireable RJ-45 Metal Connector Plug)
- Color and Pin Cod

Pin Number	Wire Color	
1	White	
2	Yellow	
3	Blue	





8.6.1 Wiring Ethernet Connectors

1. Remove Cable Jacket to expose 1" of Shielding and Ethernet Conductors.

2. Pull Shielding back and wrap around Jacket. DO NOT strip Conductors. Connector is Insulation Displacement type.

3. Align Conductor Colors and Connectors Colors. Slowly push Conductors into Connector Pockets until Conductors touch the end. Make sure Shielding is placed inside Twist Lock Connector.

4. Close Connector Cover. You may need to use Pliers to Close the Twist Lock Connector. Make sure the Shielding is captured in the twist lock. Remove any excess Shielding once assembled.











9 CONTROLS EXPLANATION

9.1 Siemens HMI

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

9.2 Startup

When power is first applied to the HMI the Main Menu screen is displayed. Since no user is logged into the system at startup, DEFAULT is indicated in the user display.

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

10 OPERATOR SCREENS

10.1 Home Screen - Main Menu

The Main Menu screen has touch buttons to navigate to other screens.



Figure 1: Default Main Menu



10.1 – HOME SCREEN – MAIN MENU (continued)



STATION STATUS – This 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 many stations on one page.

VACUUM PUMP - This button navigates to the Vacuum Pump status page. These pages show the status of the vacuum pumps running, loading, purging, and which station each pump is servicing. See section 11.2 for more detail.



HELP - This button navigates to the Help pages. These pages explain the meaning of the different symbols used and how to set the different parameters of the receiver stations.



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



VACUUM PUMP SETUP – This button will take the user to the parameter setup page for the vacuum pumps. The setup page allows the user to view and adjust (if logged in to the correct password level) a vacuum pump's seek time, vacuum breaker valve operation, current running hours and reset current running hours.



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



From the SYSTEM SETUP page, press this button to access the Advanced Setup page 2.



AUTO ID SETUP – This button takes the user to a page where material sources can be matched to specific vacuum receiver destinations.



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



HOME SCREEN – This button will take the user to the home, main menu page at any time. It is conveniently located in the same place on each page of the control and aids the user in navigation by allowing an easy return to the main menu (home) screen at any time.



BACK BUTTON – Pressing this button allows you to return to the previous page that was visited.



STATION STATUS BUTTON - Pressing this button on any screen will display the station status screen.



PUMP STATUS BUTTON - Pressing this button on any screen will display the pump status screen.



10.1 Home Screen – Main Menu (cont'd)





10.2 Receiver Station Status Screen

Section 14 describes The Load, Dump. Purge, and fault states of the Station.



10.3 Vacuum Pump Status Screen

Section 15 details the screen showing Vacuum Pump operational and alarm states.





10.4 Help Screens

Section 16 details the screens providing the user information on Alarms, icons and setup parameters.

3/23/2016 1:25 TEST MO	STATION NO LOAD ALARM HELP	\$ ~~©	} 1	OGON
	A station No load alarm occurs when a station continues to hav material demand for a consecutive number of fill cycles as define No load setpoint. This setpoint value can be different for each st and can be changed from the station setup page. Possible causes: 1) An empty obtain 2) Vacuum pump overload trip 3) Vacuum pump failure 4) Plug in material line 5) Material ID Mismatch	e ed by ation		
CU FXS com	IRRENT ACTIVE ALARM	j sj	-	

10.5 Receiver Station Setup Screen

Section 12 details the screen used to Setup the station such as loading purging, dumping. Also, the material source, and vacuum pump assignment can be changed, if user level permits.





10.6 System Setup Screen

Section 11 details the screens used to configure the conveying system, its options, and connections to other systems.



10.7 Auto ID Screen

Auto ID option used with the Quick Select Manifold (QSM) Option

The PLC sends a pulse to each of the stations flex pipes in sequence, the pipes connected to the manifold sources are also read by the PLC which looks at each of the source inputs for the pulse. This identifies which stations are connected to which sources.

An alarm is set when the found material source for the station differs from the assigned source. The alarm inhibits the receiver from loading until its corrected.

SIEMENS						S	IMATIC HM	11
7/29/2024 4:41:00	P	MAN	IIFOLD SC	CANNER		→ ()	LOGON	
22 4 8 13 15 25 10 11	1) 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1) • • • • • • • • • •	11 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	ii • • • • • • • • • •	ті • • • • • • • • • • • • • • • • • •	1 • • 7 • • • • • • • • • • • • • • • •		JUCH
					111	jeje		



10.8 Vacuum Pump Setup Screen

Section 13 details the configuration of the vacuum pumps. Permission is based on user level.



10.9 Alarm Page Screen

Section 17 details the screen showing current and past alarms.

7/19/2016 2:21:20 PM		ALARM PAGE						► O ► 100		
CURRENT	CONVEYING ALARMS	BLENDER ALARMS	DRYING ALARMS	CDA ALARMS	SYST MESS/	EM ALARM AGES HISTOR	4	ALL	ALARMS	V
No.	Time	Date	Status	Text						
18	2:21:05 PM	7/19/2016	c	FX2 Station 18	(Sta 18) Failed 1	fo Load				
10	2:20:53 PM	7/19/2016	¢.	FX2 Station 10	(Sta 10) Failed 1	to Load				
91	2:20:50 PM	2/19/2016	C	FX2 Station 91	(Sta 91) Failed 1	lo Load				
17	2:20:50 PM	7/19/2016	C	EX2 Station 17	(Sta 17) Failed 1	to Load				
553	2:18:29 PM	//19/2016	9	ICC2 PVN SITO 1	8 LOGO commu	nication fault			_	
550	2:18:25 PM	7/19/2016	Q	FX2 P/N Silo 1	8 LOGO commu	nication fault				
96	11:56:20 AM	7/19/2016	CD	FX2 Station 96	(Sta 90) Failed 1	lo Load				
86	11:55:51 AM	7/19/2016	CD	FX2 Station 86	(Sta 86) Failed 1	to Load				
3	11:52:03 AM	//19/2010	CD.	X2 Station 3(Sta 03) Fulled To	boad				
81	11:50:47 AM	7/19/2016	0	FX2-Station 81	(Sta 81) Failed 1	To Load				
6	11:50:01 AM	7/19/2016	0	1X2 Station 6(Sta 06) Fulled To	i Load				
117										E.
		1	$\mathbf{\times}$	1						
	CURREN	T ACTIV	EALAR	M			1111		4	
FX2 S	tation 18	3(Sta 18	3) Failed	То						



11 SYSTEM SETUP PAGE 1 – BASIC FEATURES

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

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



NOTE: All functions for this screen require 'Setup' Level password Access.

11.1 Date and Time



Pressing the Date and Time button opens a new pop-up window allowing the user to change the time and/or date (requires 'level3' authorization to make changes)...



Set Time & Date pop-up.

Press the 'Time' button to enter the time. Press the 'Date' button to enter the date. Press the SAVE button to save new time and date to PLC.

11.2 User Levels and Passwords



Press for immediate LOGOUT from the current user level. (top right of screen)



•	LOGON	Displays current User Level

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

Log on	×	etatue
		status.
User:	Setup	
Password:	****	
ОК	Cancel	

This box is also accessed when a

parameter button is pressed, and the current user level does not have permission to access that function.

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

Password factory defaults:

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

11.3 Changing User Level Passwords

Press this button **Press** to access the **Press** to access the **Password Setup screen**.

Requires 'Setup' User Level access to make changes.

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

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

7/26/2024 10:13:47 AM	PASSWORD SETUP		🕑 🔶 setup
User	Password	Group	Logoff time
level1		level1 group	0
level2	****	level2 group	5
level3	****	level3 group	5
PLC User	****		5
setup	*****	setup group	5
		UU 🗉	= + +

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

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

Passwords are case sensitive.

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

7/11/2016 11:41:21 AM TEST MODE	PASS	Change pareword			~ ⊕	eovatec
User	Password	New passwore:		Group	L	ogoff time
level1	*****	Confirmation:		users	0	
level2	****			level1 grou	лр 5-	
level3	******	_	_	level2 grou	лр 5-	
novatec	******	ок	Cancel	novatec gr	oup 5	
pass	******	*		pass group	5	
	******				ed 5	
setup	*****	ĸ		level3 grou	лр 5-	
				U U	J	-

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

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

The default Logoff Time is 5 minutes.

Press 'OK' to finish password setup for 'level2'.

7/11/2016 11:48:29 AM TEST MODE	PASSWORD SETUP	→ (b envates
User	Password	Group	Logoff time
level1	*****	users	0
level2	****	level1 group	5
level3	******	level2 group	5
novatec	*****	novatec group	5
pass	*****	pass group	5
PLC User	XXXXXXXXX		5
setup	*****	level3 group	5
		111 =	≓ ← 🔶

11.4 **Defining the Installed Devices**



Sets the number of Receiver Stations the panel will control. Requires 'Setup' User Level access to make changes. (1-160 depending on I/O)



Set the number of backup vacuum pumps. Requires 'Setup' user level to access make changes (0-16 depending on I/O).



Sets the number of Vacuum Pumps the panel will control. Requires 'Setup' User Level access to make changes. (1-20 depending on I/O)



0

Sets the number of Material Source Purge valves the panel will control. Requires 'Setup' User Level access to make changes. (1-73 depending on I/O)

Set the number of backup vacuum pumps. Requires 'Setup' user level to access make changes (0-16 depending on I/O).

11.5 **Options and Visibility**



Set number of connected Rail Car Unloaders. Requires 'Setup' authorization to make changes (0-2, default: 0).



Blender configurations (WSB) – see Blender Manual.



ID Proofing ON pulse duration (count of 20ms cycles). Requires 'Setup' authorization to make changes (1-9, default: 2).



ID Proofing OFF pulse duration (count of 20ms cycles). Requires 'Setup' authorization to make changes (1-9, default: 1).

Change runtime language. Requires 'Setup' authorization to make changes (English US, Spanish Mexico, default: English US).





Close runtime and open Control Panel. Requires 'Setup' authorization.



Restarts Sm@rtServer (VNC server for FX3 screen takeover by remote device). Requires 'level3' authorization.

VNC PASSWORD

Change VNC password for accessing remote HMIs (dryers, etc.). Requires 'Setup' authorization.





Set visibility for each station. Opens Station Visibility screen. Requires 'Setup' user authorization to make changes.







Set visibility for each silo. Opens Station Visibility screen. Requires 'Setup' user authorization to make changes.





Visibilities for the optional Station Setup screen items. Pressing the button will open popup window. Requires 'Setup' authorization.




Pressing any of the buttons in the pop-up will toggle visibility for related item on the Station Setup screen:





Duration of the blowback ON pulse. Requires 'Setup' user level to make changes (default 0.5 sec.).



Duration of the blowback OFF pulse. Requires 'Setup' user level to make changes (default 1 sec.).

MISSES 1

Sets the number of consecutive 'Misses' or skips a Receiver Station is permitted to experience if source conflict forces that station out of its pump queue without being filled. Requires 'Setup' authorization to make changes.

<u>Source conflicts</u> occur when a station tries to fill from an assigned material source, but the source is in use by another station assigned to another pump. When the conflict occurs, that station is removed from the pump queue without being filled, and its assigned pumps fulfills the next demand in its FIFO stack. The skipped station returns to the end of the pump FIFO stack and will wait for its turn to fill.

When the selected number of 'Misses' is reached, the station cannot be skipped if a conflict occurs. The station will instead wait at the top of the FIFO stack for the source to be released, while its



11.6 Enable/Disable installed options.

INSTALLED
OPTIONS

Pressing the button opens pop-up windows allowing user to toggle optional features of the FleXpand 3 system. Requires 'Setup' authorization.



NOTE: Displayed wording indicates current selection (e.g. AUTO ID OFF means ID proofing is disabled).

Auto ID – toggles material source proofing for the manifold (default: OFF).

SCADA INTERFACE – External system controls from third party system (default: DISABLED).

SOURCE THRUPUT – Source thruput calculations (default: DISABLED).

QSC MANIFOLD – Quick Connect Manifold system (for future use, default DISABLED).

SOURCE LOCK – Station lock when source not dry (only when system is working with configured Novatec dryers, default: OFF).

DEMAND SWITCH – reverse operation for station demand switches (default NORMALLY OPEN).

BACKUP PUMP VALVES - backup VP valves maula/automatic (default: manual)

PUMP-SENSE – Pump Sense monitoring system (when installed for enhanced ASC/SPD functionality and preventive maintenance, default: DISABLED)

11.7 Auto-ID Source-to-Station Proofing Option



Push to toggle AUTO ID function 'On' or 'Off' on System Setup (page 25). Auto ID 'ON' requires FXM2 expansion I/O panels to be installed and wired to a Quick Select Manifold (QSM) source-to-destination selection station equipped with Auto-ID wiring option (see Section 7). "Setup" level access is required to make changes.

When 'On,' this feature verifies a receiver station connection to its assigned material source. The verification is accomplished through control signals made possible by the correct physical connection between the receiver drop hose connection, and the source manifold connection at the QSM selection station.



The source valve is not permitted to energize when the Auto-ID connection is not correctly verified. This prevents the incorrect material from being transferred to a station.



Navigation Arrow buttons show the status of the NEXT or PREVIOUS screen set of station receivers.

11.8 Saving Control Settings



Press Press (all functions in this section require 'Setup' authorization).

SIEMENS		SIMA	TIC HMI
7/24/2024 7:39:20 AM	SYSTEM BACKUP / RESTORE	→ 0 →	- setup
Antipologie de l'an president and de deservoir de la construction de la construction de la construcción de la construcción de la construcción de la construcción de la construcción de la construcción de l		BACKUP/RESTOR PROCRESS	ABLED, ABLED, TO TO SD CARD SD CARD SD CARD SD CARD RECIPC
		IMPORT / EXPORT STATE BACKUP PROGRESS	+0

System and user settings can be backed up and then restored later when needed.

System Backup. Pressing the SYSTEM BACKUP button saves all parameters into the HMI recipes. It is not necessary but recommended to make a backup when all stations are disabled (otherwise whatever stations were enabled when backup was made, will be automatically enabled after the backup is restored). The process may take some time and it's indicated by the progress bar. The recipes are, however, stored only in the internal HMI memory. Once the settings are saved, the user may wish to export them to the SD card (installed in slot X51 of the HMI panel). Pressing the EXPORT TO SD CARD button, converts recipes to the CSV files and saves them to the SD card (a folder on the SD card is being created with the timestamp each time export is being done).

It is recommended to export recipes each time backup is done. This leaves backup files on the SD card which can be moved to the replacement HMI in case of the old device failure.

System Restore. To restore the settings backed up previously, first it is recommended to import recipe from the SD card. Pressing the IMPORT FROM SD CARD button opens the file browser pop-up



showing available (previously exported) backup files. Press on the desired backup (backup filename consist of 12 numbers divided with underscore describing date and time when the file was created) then press IMPORT button. Settings will be transferred from the selected backup file to the HMI recipe.

/24/2024 8:08 AM FILE MANAGER BackupState -10000	\mathbf{X}
(
Path: \Storade Card SD\FX3 Backup\	
Filter:	
C:\Storace Card SD\FX3 Backup\231018 003253	
C:\Storage Card SD\FX3 Backup\240724_075026	
Chistorade card 3D (1AS backub (240724 075055	
	OPT
State:	

After the backup is copied to the HMI recipes, press the SYSTEM RESTORE button to download settings to the PLC. All stations need to be stooped first otherwise SYSTEM RESTORE button remains disabled (indicated by grey background). Restore operation will take some time (progress bar is shown during the process).

Reset to factory defaults. This operation will reset all the system and user settings to the factory defaults. All stations need to be stooped first otherwise RESET TO FACTORY DEFAULTS button will stay disabled (indicated by the grey background). To reset the system to factory defaults, press the RESET TO FACTORY DEFAULTS button.

Recipe Viewer. Allows verification of parameters saved in the recipes (used mainly for system diagnostic and troubleshooting).

11.9 Enables Expansion Panels (Xpand Remote I/O panels)



This button opens pop-up window with Hardware Configuration options (requires 'Setup' authorization).

	HARDWARE CONFIGURATIO	DN .	
ACTIVATE AND DEACIVATE RIO		PLC & RIO RACK CONFIGURATIONS	

HARDWARE CONFIGURATION pop-up.

Pressing ACTIVATE AND DEACTIVATE RIO button will open screen where the user can toggle communication with remote IO boxes (FXM3 options).



To enable or disable remote IO box press the switch button for the desired FXM3 option (requires 'Level3' authorization).



ACTIVATE AND DEACTIVATE RIO screen.

FXM3 Remote IO description:

Sta:Station NodeVP:Vacuum Pump NodeMat SV:Material Source ValveID Out Sta:Auto ID for StationsID In Mat:Auto ID for Material SourcesStaAlarmGroups:Station alarm outputsLoadCell:Scale indicatorsSiloProof:Silo Proofing (Truck Fill)CNTL-SILO-CL:Continuous silo level monitoringCNTL-SILO-HL:Silo high- and low-level monitoring

To access and change PLC or FXM3 rack configurations press PLC & RACK CONFIGURATIONS button on the 'HARDWARE CONFIGURATION' pop-up (requires 'Setup' authorization).



7/22/2024 1:32:29 PM	PLC & R	IO RACK CONFIGU	IRATIONS 🛛 🛌	🕑 🔶 setup
PLC	o532oMachine	ExpandSta33-48	ExpandSta49-64	ExpandSta65-80
BAP+ASC/SPD5+2	ВАР	BASE	BASE	BASE
ExpandSta81-96	ExpandSta97-112	ExpandSta113-128	ExpandSta129-144	ExpandSta145-160
BASE	BASE	BASE	BASE	BASE
ExpandVacPump6-10	ExpandVacPump11-15	ExpandVacPump16-20	ExpandVacPump21-25	ExpandVacPump26-30
BASE	BASE	BASE	BASE	BASE
ExpandVacPump31-35	ExpandVacPump36-40			
BASE	BASE			
ExpandMatSV33-48	ExpandMatSV49-64	ExpandMatSV65-80		
BASE	BASE	BASE		
ExpandIDOutSta1-32	ExpandIDOutSta33-64	ExpandIDOutSta65-96	ExpandIDOutSta97-128	ExpandIDOutSta129-160
BASE	BASE	BASE	BASE	BASE
ExpandIDInMat1-32	ExpandIDInMat33-48	ExpandIDInMat49-64	ExpandIDInMat65-73	
MSV/ID-16	MSV/ID-16	MSV/ID-16	MSV/ID-16	
1-16	17-32	33-48	49-64	
StaAlarmGroups1-32	StaAlarmGroups17-32	SiloProof	WARNING !!! AFTER RACK CONFIGURATION F	
16 GROUPS	16 GROUPS	SID 6/5-PS	BEEN CHANGED, THE PLC MUST RESTARTED !	BE PLC
			₩₩≣	

PLC & RIO RACK CONFIGURATIONS screen.

The screen displays current PLC and Remote IO rack configurations. Pressing on PLC or any RIO will open pop-up screen for the selected rack allowing to make changes. This requires 'Setup' authorization. WARNING!!! The system is setup in the factory or during plant startup by authorized Novatec staff. It shouldn't be modified unless additional equipment or options are installed after the system was started up. Any change made from this screen requires restart of the PLC. This must be done with RESTART PLC button (can't be done just by cycling power to the PLC). It should be done by the authorized personnel only, as improper setup may leave PLC permanently stopped. If any new module (new options) needs to be added or removed from the central (PLC) rack, then best is to do proceed in the following order:

- 1. Put PLC in STOP mode using switch located on the S7-1512SP CPU module.
- 2. Change the PLC main rack configuration from the PLC & RIO RACK CONFIGURATION screen.
- 3. Press and hold for couple seconds RESTART PLC button (note: this action will not restart the PLC as it is still in STOP mode, it will set the flag for the CPU to load new configuration during next startup).
- 4. Power on the main PLC panel.
- 5. Install and wire new modules or remove old modules if necessary.
- 6. Power the main PLC panel on.
- 7. Put PLC mode switch to RUN position.

If everything is installed and wired correctly, the PLC will load new configuration and after minute or two the RUN led should change its state to solid green color. If PLC STOP led stays s solid amber, then PLC startup faulted. Troubleshooting is necessary.

Base steps for troubleshooting the CPU failure to start after hardware in the main PLC rack was modified:

- 1. Power system off.
- 2. Disconnect all I/O modules from the PLC (slide to the right, away from the CPU module).
- 3. Remove "server module", small end plate attached to the last module in the PLC rack.
- 4. Make sure PLC mode switch is in RUN position.
- 5. Power system on.
 - 5.1. If PLC starts up:



- 5.1.1.Power system off.
- 5.1.2. Remove server module from the CPU and install behind last IO module.
- 5.1.3. Attach all IO modules to the CPU (slide all to the left).
- 5.1.4.Next power system on.
- 5.1.5.If PLC stays stopped then navigate to the PLC & RIO RACK CONFIGURATION and try to start PLC by pressing RESTART PLC button.

If system still doesn't run, contact the Novatec service department.



11.10 Defining Material Names.



Press opens pop-up window where the user can enter custom material names, toggle closed loop controls and specify thruput (when Source Thruput enabled).



Material Names pop-up window.

11.11 Defining Station Names



Material source open (left) and closed (right) loop control icons.



Press opens pop-up windows where the user can enter custom station name and specify station material usage (when Source Thruput is enabled).



Station Names pop-up window.



11.12 ASC (air-speed control) Setup.



Press to access the ASC/SPD setup functions. 'Setup' authorization is required.



VP VELOCITY CONTROL SETUP screen.

The VP Velocity Control Setup screen is vertically split into two sections VP Assignment (left side of the screen) and Blower Type Editor (right side of the screen).

Before the ASC/SPD can be used, analog outputs for ASC vacuum pumps need to be enabled. This is done by pressing VP ASC OUTPUTS button and then toggling analog output for desired main and backup vacuum pumps.





VP VELOCITY CONTROL AO ENABLE/DISABLE screen.

VP Assignment section allows the user to assign specific blower type to the installed vacuum pump. The user can use up, down arrows or enter the VP number directly in the VP NO field to select vacuum pump. The system will update assigned blower type automatically each time pump number changes. New blower selection can be done from the dropdown list in the Pump Assignment section. Changes are taken over immediately - if vacuum pump was running when blower assignment was changed, then the vacuum pump will change its speed setpoint for all stations configured to be loaded by it.

All ASC/SPD speed setpoints the blower types are factory set by Novatec personnel. However, default setpoints can be modified if needed. This is done in the Blower Type Editor. The dropdown in the Type Editor section allows to select the desired blower type and display its speed setpoints for additive, low, normal, and high-speed operations saved in the PLC. Current setpoints for the selected blower type are shown in the fields with grey background on the left side of the Type Editor section.



button to copy current setpoints to editor setpoints (fields with white background), then modify

desired setpoints. When all edits are done, press the button to save new setpoints to the PLC (all values in white background fields will be written to the PLC for the selected Blower Type).



button to refresh setpoints from the PLC.



11.13 Station On-Screen Assignments.

The Station Status (station overview) screen displays status for 32 (15" and 12" HMI panels) or 16 (7" HMI panel) per page. By default, stations are being displayed in incremental order (for 12" HMI, page 1 displays stations 1-32, page 2 stations 33-64, etc.).

There is a possibility for the user to customize order in which stations will be displayed on each of the overview pages.



STATIONS ON SCREEN ASSIGNMENT screen (page 1 for stations 1-32).



Each section has information for the specific station displayed on the "Station Status" page. Press on the desired location to open the pop-up window and assign different station.







12 STATION SETUP

0 Press the STATION SETUP button on the HOME page to access the Station Setup screen. This screen contains operating parameters for each individual receiver station.

You can also access STATION SETUP from the Station Status screen by pressing a loading station icon for 3 seconds.



The station will be outlined in green. This will call up the parameters for that

Particular STATION SETUP and display the station parameters as shown. Anyone can view a station's setup parameters, but login levels are needed to make changes to most parameters as described in the following summary.

NOTE: STATION MUST BE DISABLED TO CHANGE OPERATING PARAMETERS!!!

Push the Receiver ICON to toggle the Receiver ON/OFF.



Changing currently displayed station:



STATION DISABLED – WAITING FOR FILL CYCLE TO COMPLETE. When a station is disabled during a fill or dump cycle, a red dot will appear to give the operator visual feedback that station has been toggled from ENABLED to DISABLED. When the current dump cycle is completed, the icon will change to OFF (see above).



Station numbers as needed. If the HMI is The Down Arrow toggles through to PREVIOUS currently showing parameters for Station 1 when this button is pressed, the controller will rollover to highest numbered station.



The Up Arrow toggles through to NEXT Station numbers as needed. If the HMI is currently showing parameters for the highest station number when this button is pressed, the controller will rollover to station 1.

Sta 01

Pressing the station name between the ARROW buttons will allow the station NAME to be changed. A typewriter keyboard for letter and number entry will appear. Up to 15 characters can be entered for a station name.



12.1 Station Timers

15.0 sec

Fill Time - 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 will also be open. This setting is proportional to the station capacity, material bulk density, and how well the material flows. Requires password "level1" to make changes.



Purge Time - 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 well the material flows. Requires password "level1" to make changes.



Dump Time - 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. Requires password "level1" to make changes.

12.2 Station Alarm Settings



No Load Alarm – CYCLES: Identifies the number of consecutive loading cycles that the station is filled without satisfying the 'Demand' condition, or 'No Load' requirement. Requires password "level1" to make changes.



No Load Alarm – SECONDS: Identifies the number of seconds the demand signal must remain 'open' during a Dump Cycle to validate material transferred during the Fill Cycle. If the Fill is validated, the No Load Alarm Cycles count does not increment and is reset to zero.

This function prevents nuisance alarms when filling large vessels.

The time value setting should be approx. 3 seconds less than the measured time for a full load of material to discharge from the station. Set SEC = 0 to ignore discharge time (i.e.: material demand must be satisfied in the selected CYCLES (use for JIT applications).

Requires password "level1" to make changes.



Alarm Group – Identifies the alarm group output assigned for the station. When system is equipped with FXM2-AGxx expansion panel, the assigned output will energize when the station No Load Alarm condition occurs.



Current source usage. If 'Material Thruput' option is enabled in the 'System Setting', then the FleXpand 3 controller will calculate material usage for all currently enabled stations with the same material source selected. If combined capacity of enabled stations exceeds programmed source thruput value, color of the actual value shown in the Current Source Usage field will change from white to red warning the user.

12.3 Priority Loading



This is used to designate the how the station will be serviced in its assigned pump queue. All 'Normal' Stations will enter their pump queue and be filled based on a FIFO basis (first in, first out). All 'Priority' stations enter a separate FIFO queue for their pump. The queues are satisfied according to the pump's PRIORITY RATIO to minimize wait time for high usage stations. Ratios should be assigned to distribute pump conveying time according to expected loading for priority and normal station groups. (See Pump Setup Section 10.4 for more information). Requires password "level3" to make changes.

Use CAUTION when assigning 'Priority' status to avoid starving 'Normal' stations.



12.4 Open / Closed Loop Convey



open- or closed-loop when station is conveying.



Closed Loop conveying guards against material moisture absorption by returning the pump exhaust air to the material source for conveying. A Closed Loop valve (CLV) is required between the pump exhaust and closed loop source to use this function.

12.5 Regrind Proportioning



Regrind Percent – Allows the user to select a proportion of regrind to be conveyed with Virgin pellets into the station. A Proportioning Valve is required at the inlet of the Station. This value is a percentage of the FILL time. For example, if the FILL 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 remaining 7 seconds. Requires password "level1" to make changes.



Regrind Layers – Allows the user to select the number of Regrind Layers created when using the Regrind % option. Multiple layers provide better mixing of Virgin and Regrind materials. MIN VALUE = 1 (default). MAX VALUE = 4.

Layer Guidelines:

- Layer FILL Times should be 2 seconds or longer for best results.
 - Calculating LAYER FILL TIMES for Virgin and for Regrind:
 - ➔ Divide FILL TIMES for Virgin and Regrind by the 'Regrind LAYERS' value (see Regrind % more about FILL TIMES).
- PROPORTIONING ERROR: Layer Time Too Short
 - Displayed when a Layer FILL Time < 2.
 - To clear the warning:
 - Decrease number of LAYERS.
 - Increase FILL time if receiver size permits (do not overfill).
 - PROPORTIONING ERROR: Single Layer for Purge
 - Displayed when PURGE>0 and LAYERS>1
 - To clear the warning:
 - Set PURGE = 0 or LAYERS = 1.





12.6 Blowback



Blow Back – OPTION. If the controller is equipped with Blow Back option, the user can define the number of filter cleaning compressed air pulses that will occur during the dump cycle. Also requires optional Station Blowback accumulator and solenoid valve. Requires password "level3" to make changes.



12.7 Station Pump Assignment



Vacuum Pump – Identifies the pump number that is physically piped to the station's vacuum valve. Requires password "level3" to make changes.

12.8 ASC Speed Setpoint selection



ASC Speed Setpoint selection. Only visible when assigned vacuum pump is with as ASC (ASC option hardware installed and configured, and blower type assigned to the vacuum pump). Requires password "Setup" to make changes. *Available Selections (when pressed):*



12.9 Material Source Selection (for a Station)



Selected Source – Press this button to access a menu to assign a material source to the displayed station. This material assignment serves two important functions:

- 1. Identifies the material purge valve to energize during the load cycle.
- 2. Identifies the material source for sharing across multiple pumps.

Requires password "level2" to make changes.

Press to open Material Selection pop-up. Displays name of the currently selected material)



To change material source for the selected station, the station needs to be disabled first and conveying cycle must be finished (if station was already queued when disabled). To change the material, press the Material Selection button (requires 'level2' authorization). Material Selection pop-up will open.





The user can select desired material (use up, down arrows to scroll through materials). Selected material (number and name) is shown in the middle of the pop-up. Pressing the checkmark button commits material selection and closes pop-up. Pressing the X button, discards material selection and closes pop-up. After user is done, the station can be enabled for loading.

12.10 Material ID Proofing status:

When material manifolds with ID Proofing option are installed and ID Proofing enabled in the 'System Settings', currently proofed material is shown below the current material selection for the selected station. If there is a material mismatch between selected material and material identified by the system, background color of the current material selection button will flash red and station conveying will be inhibited. The operations need to connect correct hose to the manifold or disable the station and change the material assignment.



NOTE: The station can be exempted from the ID proofing of any material (see 'Station Auto-ID Exemptions' in 'System Setup'). Also, no ID-proofing is done for material source 0 (typically used for undried materials without purge valves installed).



12.11 Material Lock indicator:

When FleXpand 3 is communicating with Novatec dryers and SOURCE LOCK option is set to ON ("OPTIONS' in the 'System Setup'), then the status of material assigned for selected station is indicated next to the material selection button with following icons:



It is possible to load not fully dried (locked) material to the receiver(s) if operations decide to that. In the 'SOURCE LOCK EXEPTIONS' ('System Setup' screen) the user can temporarily exempt any source he wishes.

12.12 Station Copy Settings



When visibility for the Copy & Paste item is set to visible in the 'System Settings', the user can copy settings (all but station name) from station currently displayed on the screen and then paste for another station. Requires 'level3' authorization.



12.13 Station BOP and Fill configurations:

To select blowback or proportioning function for the BOP outputs and enable or disable station fill



functionality for the selected station press the **selected** button (requires 'Setup' authorization). This will open STATION BOP AND FILL CONFIGURATION pop-up.





Blowback/Proportioning selection for the station's BOP output:

When the BOP (blowback or proportioning) option is installed, selection for the output needs to be done for each station equipped with BOP.



Changing BOP output functionality requires 'Setup' authorization.

Enable/Disable Station Fill:

When high-level switch is installed in the receiver and wired in series with demand switch, the user may enable Station Fill to automatically abort loading when the receiver is full.





Press to toggle between enabled). Requires 'Setup' authorization. (station fill disabled) and



13 VACUUM PUMP SET-UP



Touching the VACUUM PUMP SETUP

button on the HOME screen will call up the screen to view and change parameters for a particular vacuum pump. The VP runs intermittently depending on the loading cycle. If no station is calling for a load cycle, the VP will run for the seek time and then stop.





The Down Arrow toggles through to PREVIOUS vacuum pumps as needed. If the HMI is currently showing parameters for Vacuum Pump 1 when this button is pressed, the controller will rollover to highest numbered vacuum pump.



The Up Arrow toggles through to NEXT vacuum pumps as needed. If the HMI is currently showing parameters for the highest vacuum pump number when this button is pressed, the controller will rollover to Vacuum Pump 1.



This button allows the user to apply an 8-character name to the vacuum pump. VP 01 - VP 20 are the default names.



The center station receiver will display the station name the vacuum pump is currently servicing and its fill cycle status. The load and purge times are shown on the right as a vertical bar graph counting down the seconds remaining. On the left is shown the name of the next station in the vacuum pump's queue (if any) to be serviced. 1 indicates the PRIORITY station.

13.1 Enable / Disable



Indicates a DISABLED pump. Press it to toggle the vacuum pump to be ENABLED. When a vacuum pump is DISABLED, no new stations will be added to its FIFO queue to be serviced to receive material.



Indicates an ENABLED pump. Press it to toggle the vacuum pump to be DISABLED. Only an ENABLED Vacuum Pump will service stations to convey material. <u>Green circular arrows</u> indicate the vacuum pump is operating in normal CONVEY mode.



The <u>red dot</u> indicates that the vacuum pump is about to be DISABLED. Only after ALL the stations that it is currently servicing AND in its FIFO queue are done loading, will the vacuum pump go to seek and then to DISABLED.



Pump SEEK mode operation is indicated by <u>blue circular arrows</u>. This occurs when all material demands for assigned stations have been satisfied. The vacuum pump will stop when the seek timer counts down to zero or return to CONVEY mode if an assigned station demands material.



13.2 Priority Loading Setup (per pump)

Priority Loading

for

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This button sets the PRIORITY LOADING RATIO the pump will follow. indicates the PRIORITY station. The vacuum pump alternately loads both station types according to the Ratio you enter. The numbers identify the consecutive loads the station type if demands exist. Use this feature to minimize wait time for high usage stations. Default is 01 / 01. Customize if desired so that the ratio of loaded material is approximately the same as the ratio of consumed material.

Example:

- 3 priority stations: combined rate = 2000 pph; station size = 33 lb.
- 8 normal stations: combined rate = 500 pph; station size = 12 lb.
- Set the Priority Loading Ratio to 03 / 02 to ensure:
- Wait time for Priority Stations is limited to 5 load cycles or less.
- Priority stations load 3 out of 5 cycles if demands exist.

Ratio of loaded material matches ratio of usage: 99lb / 24lb. ~ 2000pph / 500pph ~ 4 / 1.
'Normal' Stations are guaranteed to be serviced.

13.3 **Pump Operating Hours**



This frame shows the number of hours the vacuum pump has been running since the last reset. Pressing the button will access the timer reset button.



Pressing Reset will clear the hour meter (i.e.: Hrs.=0). Pressing will close the Reset Box without resetting the running hours. Requires password "level3." to make changes.

13.4 Vacuum Breaker Valve and Seek Time



This button displays the Seek Time assigned to the vacuum pump. The Seek Time is the length of time, in seconds, that the vacuum pump will run after all its assigned stations have been filled, and no additional station demands exist. This feature requires a Vacuum Breaker Valve on the inlet of the vacuum pump (standard on Novatec units).

Using Seek Time prevents excessive starts of the vacuum pump to protect the pump unit, motor and motor starter against premature failure. The default value is 180 seconds. DISABLE Seek Time by entering a value of '0' seconds (for pumps not equipped with a vacuum breaker valve). Requires password "level3" to make changes.



This button toggles the operation of the Vacuum Breaker Valve (VBV) between energized to break vacuum or energized to pull vacuum and convey material. The VBV opens to pull ambient air at the vacuum pump during Seek Time, removing vacuum from the system when no station fill demand exist.



The blue arrows indicate the VBV is energized to break vacuum (Novatec standard). The green arrows indicate the VBV is energized to pull vacuum and convey material (some non-Novatec equipment). Requires password level "Setup" to make changes.



13.5 Backup Pump On / Off

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B/U VP OFF
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This button enables the backup pump to run in place of the current pump. The backup pump (if installed) will begin running immediately if any of the stations assigned to the current pump have a demand. Press button again to resume normal pump operation.

When the backup pump is active for the displayed pump, the button changes to orange and displays B/U VP ON'. A new panel appears above the button indicating the pump number using the backup pump.



B/U VP OFF

When the backup pump is active for another pump, the button changes to gray to indicate it is not available for use with the displayed pump.

The control can be equipped with optional outputs to operate automatic vacuum line switching valves (sold separately).

CAUTION: IF MANUAL VACUUM AIR CONNECTIONS ARE USED, THE VACUUM LINE FROM THE CURRENT PUMP MUST BE CONNECTED TO THE BACKUP PUMP PRIOR TO ENABLING THE BACKUP, OR DAMAGE MAY RESULT.



Typical Backup Pump Arrangement – Manual Air Connections (Butterfly Valves shown)



Typical Backup Pump Arrangement – Automatic Air Connections (EPV Valves shown)



14 RECEIVER STATION STATUS

Touching the STATION STATUS button on the main menu page or most other pages, will call up the screen to view the status of receiver stations. This screen permits the **Enable / Disable control** by momentarily touching the desired station icon. Enabling a receiver permits it to be automatically serviced by the conveying panel. A receiver may be enabled or disabled at any time. If a receiver is in a fill cycle when it is disabled, the cycle will continue to completion.





Access a Station Setup Screen by pressing and holding that station for approximately 3 seconds (background will

turn green). When released, the display navigates to the Station Setup Page.

14.1 Receiver Status Graphics Guide

DISABLED/OFF. The Receiver is disabled - no material will convey to it.

ENABLED. This icon indicates that the receiver is enabled – and material will be conveyed to it if the material level switch below it is not satisfied, its vacuum pump is enabled and not faulted.

-

ENABLED VIRGIN MATERIAL ONLY. The Receiver is ENABLED – material will be conveyed to it if the material level switch is not satisfied, and its vacuum pump is not faulted. This icon shows that the receiver station is not using regrind and it has no demand for material because it is full.

ENABLED VIRGIN WITH REGRIND MATERIAL. The receiver is ENABLED – material will be conveyed to it if the material level switch is not satisfied, and its vacuum pump is not faulted. This icon shows that the receiver station is using virgin and regrind, and it has no demand for material because it is full.



DEMAND. The Receiver is enabled, not in the fill cycle, and the level switch calls for material. The receiver will be placed in the FIFO and will fill when its vacuum pump becomes available.

VIRGIN (Virgin material only). The Receiver is in the loading virgin material portion of the fill cycle. The station Tee valve is open, and the material source valve is energized open permitting material to be conveyed to the vacuum chamber.





REGRIND. The Receiver is in the loading regrind material portion of the fill cycle. The station Tee valve is open, and the proportioning valve is energized to draw regrind material.



VIRGIN WITH REGRIND. The Receiver is in the loading virgin material portion of the fill cycle. Regrind material has already been loaded. The station Tee valve is open, and the material source valve is energized open permitting material to be conveyed to the vacuum chamber.



VIRGIN WITH REGRIND. The Receiver is in the loading virgin material portion of the fill cycle. Regrind material has already been loaded. The station Tee valve is open, and the material source valve is energized open permitting material to be conveyed to the vacuum chamber.



PURGE VIRGIN MATERIAL ONLY. The Receiver is in purge portion of the fill cycle. The station Tee valve is open, and the material source valve is closed allowing the conveying line to be purged free of any remaining material.



DUMP VIRGIN WITH REGRIND MATERIAL. The Receiver is in the dump cycle after the fill cycle. The Station TEE valve closes, removing vacuum from the hopper. The material conveyed into the hopper gravity conveys (dumps) into the molding machine or drying bin.



DUMP VIRGIN MATERIAL ONLY. The Receiver is in the dump cycle after the fill cycle. The Station TEE valve closes, removing vacuum from the hopper. The material conveyed into the hopper gravity conveys (dumps) into the molding machine or drying bin.



Indicates **BLOWBACK** output pulsing.



station is greater than zero).

Indicates **STATION FULL** (high level switch in the receiver activated during loading or purging cycle). Conveying is immediately stopped, and material is being immediately purged (if purge time for the

Indicates that station was **DISABLED** in the middle of a fill or dump cycle – The red dot will appear to give the operator visual feedback that station has been toggled from ENABLED to DISABLED. The fill and dump cycle icons will continue to show the status of the station receiver with the red dot present. When the dump cycle is complete, the icon will change to OFF (see above).

ALARM – The receiver has gone through the fill cycle, without satisfying the material level prox sensor, a consecutive number of times equal to or greater than the no load alarm set point. The red triangle will remain until either the material prox is covered with material or the station is DISABLED. The alarm is for indication only and does not prevent the station from attempting to load material.



14.2 Scrolling to Station Status Screens

Navigation Arrow buttons to show the status of the NEXT or PREVIOUS set of station receivers.

14.3 Station Status Screen Filter (by pump)

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The STATION VP ASSIGNMENT FILTER button allows the operator to see quickly which stations are assigned to a particular vacuum pump. When the button is pressed, a <u>pull-down menu</u> appears allowing the operator to select a vacuum pump.



Pressing the <u>checkmark button</u> applies the selected vacuum pump filter and returns to the Station Status screen.

When a pump is selected, the Status Screen view will be limited to only the stations assigned to the selected vacuum pump.



The Filter button displays the selected vacuum pump when active.

The filter is automatically removed after 30 seconds of inactivity while viewing the Station Status screen. VP 00' displays all stations for all pumps. This is the default view.

EXAMPLE: When "VP 01" is selected, all the stations assigned to vacuum pump 1 remain visible. Stations assigned to all other pumps will be invisible. All stations can be viewed again by selecting 'VP 00', or after 30 seconds of inactivity while viewing the Station Status screen.

15 VACUUM PUMP STATUS

This overview status screen displays the operation of the Vacuum Pump Units. Depending on model, up to 20 vacuum pumps can be monitored with up to 16 per page. The status of each Vacuum Pump is displayed; this includes the current station being serviced in a station icon that appears above the vacuum pump icon.

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





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If a vacuum pump is servicing a station receiver, then the icon of the station will appear above the vacuum pump icon. This station icon will display the station name and the proper icon for where the station is in the fill cycle. See section 15.1 for a list of status icons and their definitions.

The vacuum pump also has icons to show its status.

Indicates PRIORITY is assigned to the station.



15.1 Pump Status Graphics Guide



The vacuum pump is DISABLED. Press the vacuum pump icon to go to the Vacuum Pump Setup page to ENABLE the pump.

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	F 2

The vacuum pump is ENABLED and stopped. There are no system station demands for material, so the pump is off until a material demand enters its FIFO queue.



The vacuum pump is ENABLED and conveying material. There will be a station icon above it to indicate the station being loaded.



The vacuum pump is running in idle SEEK mode. It is not servicing any stations. It is waiting for the time period defined by the SEEK timer before turning off. The function of the seek time is to prevent excessive starts



The main vacuum pump is being replaced by the backup vacuum pump.



The backup vacuum pump replaces main vacuum pump.

16 HELP INFORMATION SCREENS

A series of screens are provided to assist the user in understanding some of the more commonly used icons and setup parameters.







Navigation Arrow buttons to go to the NEXT or PREVIOUS Help topic screen.



This button navigates to the Station Status page.



This button navigates to the Vacuum Pump Status page.



This button navigates back to the previous page.



This button navigates back to the Main Menu page.

17 ALARM BANNER

A new alarm will be displayed on a message banner that runs CURRENT ACTIVE ALARM FX2 Station 3(Sta 03) Failed To L...

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

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





17.1 Alarm History

The ALARM HISTORY screen displays the last 100 ALARM CONDITIONS. ALARM SILENCE on the front of the control panel will silence the horn until another NEW alarm appears.

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



<u>DELETING ALARMS:</u> Alarms are permanently deleted from the Alarm History when the alarm condition is no longer active (cleared), and the Alarm is Acknowledged. REQUIRES LEVEL3 ACCESS.



Page up (if you have a lot of alarms)



Page down (if you have a lot of alarms)



Acknowledge selected Current alarms



Delete all alarms that are no longer active



Go to the info page of that alarm



Return to the previous page



Return to Home (main) page



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

18 ADVANCED SETUP FEATURES

System Wide ON/OFF



Push to START or PAUSE System. Going from START to PAUSE will perform an orderly shutdown of the system. Any receiver stations that were in their vacuum pumps FIFO waiting to get material, will be serviced by the vacuum pump. However, no new stations will be added to the FIFO's even if material demand is present for receiver stations.





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, which is indicated by a green indicator button.

18.1 Advanced System Setup (Page 1 and 2)

Press on 1st System Setup page to access,

Advanced System Setup functions. The many functions that are accessible on this screen will be addressed on the next few pages.

2/7/2024 3:27:48 PM	SYSTEM	SETUP 2	()
2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	SYSTEM BACKUP / RESTORE L/O DIAGNOSTIC	RESTART SMORT SERVER QCC CONFIGURATION	UP HEADY SCARE ON 2 VICLES OF 1 VICL PASSWORD
			LastCyclaTime 0 ms LongestCyclaTime 0 ms ManLastCyclaTime 0 ms
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18.2 Source Sharing Bypass Limit

0 misses

Sets the number of consecutive 'Misses' or skips a Receiver Station is permitted to experience if source conflict forces that station out of its pump queue without being filled.

<u>Source conflicts</u> occur when a station tries to fill from an assigned material source, but the source is in use by another station assigned to another pump. When the conflict occurs, that station is removed from the pump queue without being filled, and its assigned pumps fulfills the next demand in its FIFO stack. The skipped station returns to the end of the pump FIFO stack and will wait for its turn to fill.

When the selected number of 'Misses' is reached, the station cannot be skipped if a conflict occurs. The station will instead wait at the top of the FIFO stack for the source to be released, while its assigned pump enters 'Seek' mode. The waiting station will begin filling when the source conflict cycle is completed.

'0' setting disables this function. A setting of '1 - 2' is recommended. A larger material reserve for system stations may allow for higher settings.

18.3 Auto-ID Source I/O Assignments (remapping)

AUTO-ID SOURCES I/O ASSIGNMENTS

Press to access a <u>configuration</u> <u>screen to remap the Auto-ID</u> <u>Material (source) inputs</u>.

See Section 10.2 AUTO ID ON/OFF for more details

The white box beside each Auto-ID station number identifies the assigned input. This is useful when the installed conveying tubes for destination stations do not match the default Auto-ID Material (source)

				AUT	יטו נ	5001	KUES	1/0	A53	SIGN	MEN	115		•	-0		<u> </u>	setup	
1 1	2	2	3	3 4	4	5	5	6	6	7	7	8	8	9	9	10	10		
11 11	12	12	13 1	13 14	14	15	15	16	16	17	17	18	18	19	19	20	20		
21 21	22	22	23	23 24	24	25	25	26	26	27	27	28	28	29	29	30	30		
31 31	32	32	33 3	33 34	34	35	35	36	36	37	37	38	38	39	39	40	40		
41 41	42	42	43 4	13 44	44	45	45	46	46	47	47	48	48	49	49	50	50		
51 51	52	52	53	53 54	54	55	55	56	56	57	57	58	58	59	59	60	60		
61 61	62	62	63 6	5 3 64	64	65	65	66	66	67	67	68	68	69	69	70	70		
71 71	n	72	73 7	73 74	74	75	75	76	76	n	77	78	78	79	79	80	80		
FIND DUPLICATES																			
												ŧ	j ti		d a		-		

program sequence. <u>For example</u>, Auto-ID materials 17-32 are sequenced together as Expansion Module 192.168.1.127. If the source materials piped to this Module include source materials 17-25, and 46-52, the Auto-ID inputs normally assigned to source materials 26-32 can be re-assigned to source materials 46-52. (NOTE: See next section FINDING DUPLICATES)



18.4 Finding Duplicates (remapping I/O)

FIND
DUPLICAT

Press

to verify all assigned outputs

(or Inputs for Auto Material ID) are unique after remapping is completed. If a duplicate is found, a message will identify the Auto-ID station (or material) number where the duplicate assignment was made. Reassign outputs (or inputs) to eliminate duplicates.



In the example screen above, Output 11 is assigned to Auto-ID Station 11 and Auto-ID Station 13.

ALWAYS FIND DUPLICATES after changing output (or input) assignments.

18.5 Auto-ID Station I/O Assignments (remapping outputs)

AUTO-ID STATIONS I/O ASSIGNMENTS		7/22/2	024 5:43:39	РМ	A	JTO ID S	STATIO	ONS I/	O ASS	IGNME	NTS		•(٩	setup
			1 1	2 2	3 3	4 4	5	5 6	6	7 7	8	8	9 9	9 10	10
Press to access a configuration	on 🔽 💷	1	11 11	12 12	13 13	14 14	15	15 16	16	17 17	18	18	19 1	.9 20	20
screen to remap the Auto-ID	See Section 10.2		21 21	22 22	23 23	24 24	25	25 26	26	27 27	28	28	29 2	.9 30	30
Station (destination) outputs.	for more details		31 31	32 32	33 33	34 34	35	35 36	36	37 37	38	38	39 3	.9 40	40
		1	41 41	42 42	43 43	44 44	45	45 46	46	47 47	48	48	49 4	.9 50	50
The white box beside each A	uto-ID station number		51 51	52 52	53 53	54 54	55	55 56	56	57 57	58	58	59 5	.9 60	60
identifies the assigned output	This is useful when		61 61	62 62	63 63	64 64	65	65 66	66	67 67	68	68	69 6	.9 70	70

Т ic the installed conveying tubes for destination stations do not match the default Auto-ID Station program sequence.

1 1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10	
11 11	12	12	13	13	14	14	15	15	16	16	17	17	18	18	19	19	20	20	
21 21	22	22	23	23	24	24	25	25	26	26	27	27	28	28	29	29	30	30	
31 31	32	32	33	33	34	34	35	35	36	36	37	37	38	38	39	39	40	40	
41 41	42	42	43	43	44	44	45	45	46	46	47	47	48	48	49	49	50	50	
51 51	52	52	53	53	54	54	55	55	56	56	57	57	58	58	59	59	60	60	
61 61	62	62	63	63	64	64	65	65	66	66	67	67	68	68	69	69	70	70	
71 71	72	72	73	73	74	74	75	75	76	76	77	77	78	78	79	79	80	80	
FIND DUPLICATES																			
													1	j ti	i I	d s		← 🛧	Ī

For example, Auto-ID stations 17-32 are sequenced together as Expansion Module 192.168.1.119. If the destination stations piped to this Module include stations 17-25, and 46-52, the Auto-ID outputs normally assigned to stations 26-32 can be re-assigned to stations 46-52.

(NOTE: See above section FINDING DUPLICATES)

18.6 I/O Status (Troubleshooting)



Press I/O STATUS button.

This button navigates to the I/O Status Page screen, where the user can navigate to summary screens that display the actual status of individual I/O points. This information can be used to troubleshoot wiring and hardware components during initial installation and startup, when expanding the system to add devices, or when existing devices do not operate as



expected. Screen header identifies the device range, and the associated IP Address for the connected communication module.



Requires 'Setup' User Level access.

Station Summary - organized by station number

- Green = Output or Input Energized
- Red = Output of Input Not Energized
- BB = Blowback
- Prop = Proportioning (Regrind Ratio)



Pump Summary - organized by I/O Slot

Aux_In = Pump Starter Auxiliary Contact Bck SV = Pump Backup Valve Solenoid Valve (opt.) Starter = Pump Starter Coil Vac_SV = Vacuum Breaker Valve Solenoid Valve Closed_Loop_SV = Discharge Selection Valve Solenoid Valve (opt.)

TEST MODE					I/O STATU	s v	[EW		→ -0	~~~	novate
		VAC	UUM PUN	4P 1	-5 & MATERIAL SOURCE	I-10 I/	O Statu	s (Base P	IC, 192.168.1.8)		
Alarm Reset		LED 1			Alarm Light	•	LED 1		VP 5 Closed Loop Sv	LED 1	
VP 1 Aux In	•	LED 5			Alarm Horn		LED 5		Backup VP Starter	LED 5	
VP 2 Aux In		LED 2			VP 1 Starter		LED 2		Backup VP Vacuum Sv	LED 2	
VP 3 Aux In		LED 6			VP 1 Vacuum Sv		LED 6		Backup VP Closed Loop Sv	LED 6	
VP 4 Aux In	•	LED 3			VP 1 Closed Loop Sv		LED 3		spare 🖉	LED 3	
VP 5 Aux In		LED 7			VP 2 Starter		LED 7		spare 🖉	LED 7	
Backup VP Aux In		LED 4	SLOT		VP 2 Vacuum Sv		LED 4	50T	Material Sv 1	LED 4	51.01
spare		LED 8	7		VP 2 Closed Loop Sv		LED 8	11	Material Sv 2	LED 8	13
VP 1 Backup Vv	•	LED 1			VP 3 Starter	•	LED 1		Material Sv 3	LED 1	
VP 2 Backup Vv		LED 5			VP 3 Vacuum Sv		LED 5		Material Sv 4	LED 5	
VP 3 Backup Vv	•	LED 2			VP 3 Closed Loop Sv		LED 2		Material Sv 5	LED 2	
VP 4 Backup Vv		LED 6			VP 4 Starter		LED 6		Material Sv 6	LED 6	
VP 5 Backup Vv		LED 3			VP 4 Vacuum Sv		LED 3		Material Sv 7	LED 3	
spare		LED 7			VP 4 Closed Loop Sv		LED 7		Material Sv 8	LED 7	
spare	•	LED 4	SLOT		VP 5 Starter		LED 4	SOT	Material Sv 9	LED 4	sto
maro		LED 8	16		VP 5 Vacuum Sv		LED 8	12	Material Sv 10	LED 8	14

18.7 **Auto-ID Station Exceptions**



confirming the correct physical connection between a station and its assigned source. This signal is generated through a QSM (Quick Select Manifold) assembly equipped with the Auto-ID option. The confirming signal permits the assigned source to open during the station's conveying cycle load time.

When the Auto-ID Station Exception is toggled ON, the Station will load material from the assigned source without having an Auto-ID signal confirmation.

This feature is typically used when a central selection area delivers material with Auto-ID confirmation to a press side blender or dryer, which then delivers material to the process.



18.8 Pre-Dry Source Lock Exceptions

material source not associated with an installed OFX



Central Drying Hopper Control Panel, cannot operate unless individually bypassed on this screen.

In this example, Material (source) #12 'OFX Source Lock Exception' is 'ON'. This means Material (source) #12 will operate normally without a 'ready' signal from the OFX control.

18.9 CDA Source Assignment

CDA SOURCE ASSIGNMENTS			to	to access CDA SOURCE ASSIGNMENT.												
7/22/2024 5:46:08 PM				(CDA SOURCE ASSIGNMENT							setup				
CDA 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	5000000 500000000000000000000000000000	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	CDA 17 13 19 20 21 22 23 24 25 25 27 28 29 30 31 31 32	22 23 24 25 26 27 28 30 31 32	2000 201 202 202 202 203 204 203 204 205 204 205 205 205 205 205 205 205 205 205 205	17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 31 32	CDA 33 34 35 36 37 38 39 40 41 42 43 44 45 45 45 45	33 34 35 36 37 38 39 40 41 41 42 43 44 45 46 47 48	33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48	33 34 35 36 37 38 39 40 41 41 42 43 44 45 46 47 48	CDA 49 50 51 52 53 54 55 55 55 53 60 61 62 63 64	49 50 51 52 53 54 55 55 56 57 58 59 60 61 62 63 64	3 SOUR SIGNM 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64	49 50 51 52 53 54 55 55 55 55 55 55 55 55 56 57 57 58 59 60 61 61 62 63 64	DUPLICATES: NOT FOUND DUPLICATES
													- 🕡 -	U.		

This serves as map for the CDAs connected to the up to 4 Novatec central dryers or CDS448 system. The #NWB specifies number of central dryers networked with FX3 controller. The value of 0 means that CDS448 is used. Each of the CDAs can have up to 3 source valves installed. The number in each box means FX3 logical source number (as wired purge valve 1-80) assignment to the remote CDA.



Source: Source 01

18.10 Auto-ID Source Confirmation (Option)

Source Connection ID

Displays the actual source connected to the station through the central QSM (Quick Select Manifold) equipped with the Auto-ID option. Visible when Auto-ID ON function status is selected (see Section 11.5), and appropriate Xpand Remote I/O Panels installed.

If Source ID does not match Source Selected, an Auto-ID Mismatch Alarm is generated, and the source will not open during the station's load time cycle.

2/7/2024 3:42:31 PM	STATION 1 SETUP	⊷ ©	togon	
15.0 sec	Sta 1	+ -₩	NORMAL	
10 sec			٦,	
10 sec		T	0 %	
3 cycles			1	
1 sec	1 🔹 🔹	Û	3 pulses	
	Material 02		1	
	Material 00		Ľ	
CURRENT ACTIVE AL FX3 Station 1 (Sta 1) Mat ID Mismat	ARM	1 II	← 🔒	



18.11 Silo Level Status

The FX3 system is capable of monitoring levels up to 12 silos. Depending on options used, the FX3 system can monitor weights (when loadcells and RiceLake i920 units installed), level (when Novatec CNTL-SILO-CL option installed with level transducers), high and low level (when Novatec CNTL-SILO-HL option installed with level switches).

The Silo Status screen allows the user to configure scaling factors (gain and offset) to convert level value from percent to weight individually for each silo. Also, when load cells or analog level transducers are used, the user can set low- and high-level warnings for each silo individually.

To access the Silo Status screen press **button** located on the "Home" screen (note: the button is only visible when the Number of Silos in the System Setup is set at least to 1). The background of the button will flash orange if one of the silos has reached level. All silo level alarms and warnings are logged by the HMI and can be seen from the "Alarm" screen.

The SILO STATUS screen shows only silos selected as visible in the System Setup.



SILO STATUS screen.

Silo names can be customized. Touch the Silo Name field to change (requires 'Setup' authorization). Custom names can be up to 15 characters long.

Silo Actual Level Bar level marker is shown only when loadcells or analog transducers are used. It represents range from 0-100%. The Actual Silo Level value is displayed in absolute units (lbs. or kg depending on RiceLake display setup) or percent (by default, when analog transducers level used).



Pressing the button (requires 'level3' authorization), shows and hides scaling parameters for each silo instance.





Depending on the options installed, scaling of the level bar or actual level display may be needed. When loadcells with RiceLake indicator are used, the value displayed on the HMI screen under the silo icon is in the same units as configured on the RiceLake display (pounds or kilograms). The level indicator always displays percent, but in this case needs to be scaled. This is done by setting GAIN parameter for the silo to be equal to maximum silo capacity (in the same units as used by RiceLake display). In case analog transducers are used for the silo level monitoring (CNTL-SILO-CL option), the silo level bar is always automatically configured to percent. By default, the actual level value displayed is in percent as well (GAIN = 1). It can be scaled to display weight (calculated in percent). The GAIN parameter needs to be set to be material weight (pounds or kilograms) when transducer reads 100%. If that value is unknown, the good starting point would be the silo capacity.

High- and Low-level alarm and warning indicators.



Silo high- and low-level alarm indicator.

High- and Low-level alarms are only shown when level switches are installed (CNTL-SIL-HL option).



Silo high- and low-level warning indicator.

High- and Low-level warnings are being only shown for silos being monitored with loadcells or analog transducers (RiceLake indicators or CNTL-SIL-CL options). The thresholds can be set individually for each silo to trigger high- or low-level warnings whenever actual level rises above or falls below them accordingly.

The actual silo levels values are logged by the HMI. To access silo level trend, press the silo icon.

4/29/2024 4:37:24 PM		SI	LO 1 LEVEL	HISTORY	ſ	stup			
			Silo 1	L .	î				

-									
-			+						
0.									
3	136:55 PM 3: /29/2024 4/ ℓ €€ → Q	29/2024	4:06:5 4/29/	5 PM 2024	4:	21:55 PM /29/2024	4:36:5 4/29/	S PM 2024 +	
Trend	Tag conn	ection		Value		Date/time			
Level SiloStatus_01.Weig		_01.Weight			0.00	0000 4/29/2024 4:0	5:58:659 PM		
					1	U sis	1		

SILO LEVEL HISTORY screen (trend).



18.11.1 Silo Level Connections – Transducers to LU 10 (LU 02)



To Transducers (10 max), RG62 A / U Coax, 365 m (1200 ft) / Transducer max.

Transducer cables must be run in a grounded metal conduit separate from other wiring (except TS-3 temperature sensor wiring, if applicable).



FXM2-SILO - Plug connections



<u>Profibus to ProfiNet Conversion</u> (included with FXM2-SILO1-4 and FXM2-SILO9-12)

- PBC-1-xx Profibus Cable (purple) to LU 10
- ePBPN Communication Converter (24 vdc input power)
- 13039 Ethernet Cable (gray) to FX3 / FXM2 (Comm Port. - ProfiNet)



LU-10 (or LU-02) - Wire terminations


18.11.2 Railcar Unloader (RCU) Status

If at least one RCU is configured from System Setup screen, the FX3 HMI will show rail-car status on the dedicated screen.

To access the RCU status press the



button located on the "Home" screen. If more than one RCU is configured, the user is presented with the pop-up window allowing him to select which RCU unit status should be displayed.

VACUUM

BLOWER

Status Indicator colors:



Gray = off or not present

On / Off status indicators:

- Vacuum and Pressure Blowers
- Feeder A and B (2nd feeder optional)

Level indicators:

Feeder Hopper A and B (high level pauses material feed from vacuum system)

90

Alarm Indicators:

High Pressure for pressure blower (causes system shutdown)

PRESSURE

BLOWER

High Pressure for vacuum blower (causes system shutdown with pressure side purge)



Load Silo Indicator displays silo selected for filling



Feeder A / B indicator displays airlock feeder selected for operation



RCU Vacuum / Pressure Unit



band

HIGH

HIGH



18.11.3 Silo Proofing (Truck Fill)



From the 'Home' screen, press to access Truck Fill Silo Proofing screen (the button is only visible when "SiloProof" remote IO box is enabled from the "Activate and Deactivate RIO" screen).



TRUCK FILL SILO PROOFING screen.

Silo Proofing screen shows silo enable buttons, proofing status, ready to fill and high-pressure lights. Proofing Status light states:

- Solid grey when silo is disabled
- Flashing green when silo is enabled but hose not connected yet
- o Solid green when silo is enabled, and hose is connected to the silo port

Ready to Fill light states:

- o Green blinking slow when
- o Green solid when silo enabled, hose connected and slide gate open
- Green blinking fast when silo enabled and slide gate moving (opening or closing)

High Pressure light states (applicable only when high pressure switches installed):

- Solid grey when high pressure
- Solid green when high pressure detected

To open the silo for loading, operator needs to enable it first. Press SILO ENABLE button for the selected silo. Next, the operator must connect hose to the silo port. Only when hose is connected to the correct silo, PROOFED light will turn green, and system will open the slide gate. Solid green READY TO FILL light indicates that slide gate is open, and the silo can be filled.

The slide gate will automatically close, and the silo will be disabled under one of the following conditions: • Hose is disconnected

- Silo is disabled from HMI by the operator (ENABLE SILO button pressed while silo was enabled)
- Slide gate is not open in specified time (open limit switch not made within debounce time)



TIMERS

Press the button to toggle the TIMERS pop-up (requires 'Level3' authorization). The supervision time for opening and closing slide gates, hose connections and slide gates open and close limit switches can be adjusted (all times are in seconds).



SOLENOID ENERGIZE TIME – specifies how long slide gate solenoids will stay energized after the limit switch is activated.

HOSE LS DEBOUNCE TIME – specifies time after hose proximity switch is activated before the system determines that hose is connected.

SLIDE GATE LS DEBOUNCE TIME – specifies time after slide gate limit switch is activated before the system determines that slide gate is open or closed.

The user can enable up to two silos for loading at the same time however, the first selected silo must be proofed first before the second silo can be selected for loading. If the user attempts to enable 2nd silo before 1st is proofed, the system will display warning following message:

OTHER SILO IS NOT PROOFED YET. CONNECT HOSE TO PREVIOUS SILO AND WAIT FOR IT TO OPEN OR DISABLE IT BEFORE ENABLING NEW SILO.

If two silos are proofed at the same time and the user tries to enable another silo, the HMI will display following message:



MAXIMUM NUMBER OF SILOS IS ENABLED. DISABLE ONE OF ENABLED SILOS FIRST.



18.12 Configuring Remote Connections with Dryers



Press **Control** button to access configuration screen for the connection with Novatec dryers and CDS448 system.

Dryer 1	7/22/2024 6:03:56 PM DRYER CONNECTIONS SETUP
custom name	DRYER #1 STSTEM NAME DRYER #4 SYSTEM NAME
	Dryer 1 0
Press to toggle communication	HMI IP ADDRESS SCREEN SIZE 192.168.1.41 7 inch
	DRYER # SYSTEM NAME Dryer 2
IP address of Dryer 1 HMI	HMI IP ADDRESS SCREEN SIZE 192.168.1.43 7 inch v
	DRYED #3 SYSTEM NAME
Dryer 1 HMI	
screen size	HMI IP ADDRESS SCREEN SIZE

The FleXpand 3 system HMI can display statuses and alarms of up to 4 connected Novatec dryers (including connected CDAs if central dryers installed).

To enable FX3 communication with the dryer, make sure the correct HMI IP address is entered in the HMI IP ADDRESS field, select correct HMI screen size using dropdown (7" is a standard screen size installed with a Novatec dryer), enter custom dryer name and then press toggle to enable communication. Dryer screens will be accessible from the HOME screen. Dryer alarms can be viewed from the Alarm screen.



From the FX3 Home screen press to access dryer screens and remotely takeover dryer HMI screen. The user will be presented with DRYERS pop-up window which will show 3 buttons for each configured dryer (dryer overview, material hopper or CDA overview, remote takeover).





Remote Takeover (requires 'level2' authorization) allows user to control directly functions of the remote dryer like from dryer's own display.



Remote session with dryer.



18.13 User Configurable HMI Remote Connections.

FleXpand 3 allows to configure up to 36 VNC connections (in 3 groups, up to 12 devices per group) to the machines capable of running VNC server on their screens (most of Novatec machinery equipped with HMS can).

To configure connections, first press

button located at 'System Setup 2' screen. The HMI will open REMOTE CONTROL CONFIGURATION screen ('Setup' authorization is needed to make changes to any item on this screen).



REMOTE CONTROL CONFIGURATION screen.

Use up and down arrows in the GROUP row to select desired group number. There are 3 groups capable of configuring up to 12 devices each. Each group has its own dedicated button on the 'Home' screen, which will display only buttons with access to the remote devices configured for that group.

Customize name for the selected group by pressing on the Remote Name field (make sure to hit Enter after name is entered).

Use up and down arrows in the DEVICE row to select desired device number for the selected group. Customize name for the selected device by pressing on the Remote Device field (make sure to hit Enter after name is entered).

Enter the IP address of the remote machine HMI screen in the REMOTE HMI CONFIGURATION, select the screen size using SIZE dropdown and then change TYPE to ENABLED. Press SAVE CONFIG button to save configuration for the device. Repeat steps for other machines and groups.

When other Novatec equipment is used with default IP addresses, all parameters for remote machine can be transferred by pressing DEFAULT IP ADDRESS LIST and selecting desired machine from the pop-up. Once the desired device is selected, pressing TRANSFER ADDRESS will transfer all settings for the selected machine. Press SAVE CONFIG to save the configuration for the current machine.



DEFAULT IP ADDRESSES

Select machine type from drop down list. Press TRANSFER ADDRESS button to load default PLC and HMI IP addresses or CANCEL to close this window. When addresses are transferred you still have to press SAVE CONFIG on NOVANET ALARM CONFIGURATION screen to activate new settings.

193	2.168.1.1	.1
192 1	68 1	10
	2000	
_		
RANSFER		
RANSFER		

Additionally, for certain Novatec equipment (dryer and FTS controllers) communication with remote device PLC can be configured. This allows FX3 users to see if remote machine has active alarm or fault (the background of the group button and title of the machine button in the pop-up will flash red, and the user can take over remote screen to see more detail about the alarm).

This function needs to be configured on both FX3 and remote device. Enter the IP address and communication port of the remote machine PLC and toggle ENABLE PLC COMM. to ON position. Press SAVE CONFIG to save parameters for the selected machine.

On the remote device make sure to enter same port number in its Common Alarm configuration.



HOME SCREEN with 3 remote groups.

Pressing the button for one of the device groups will open pop-up window where user can select which machine from that group he wants to control.

NOTE: if there is only one machine configured in the group, connection will be opened immediately (no pop-up will be shown).

Also, if 'Common Alarm' functionality is enabled and properly configured for one or more machines in the group, the background of the group selection button will flash red if any of the machines has alarm or fault present.





Machine group pop-up window.

Press the button for desired machine to open connection and takeover its HMI screen. **NOTE:** If configured machine in the group has 'Common Alarm' enabled, the machine name field will flash red whenever it has alarm or fault present.



19 REMOTE CONTROL ACCESS, NETWORKING AND HMI SETUP

The FX3 Control can communicate with several remote external devices. Accessing the FX3 from third party devices using an internet browser or remote desktop application provides remote monitoring and control capabilities. Access to other networks installed Novatec equipment and central controls (see Section 10.10 and 10.11) has been preconfigured and programmed.

All communications are accomplished through a hard-wired Ethernet cable network, utilizing ProfiNet and Industrial Ethernet protocols. Local wireless access can be created through customer installed wireless router near the FX3 panel installation. Remote wireless access can be created through interface with customer corporate network.

19.1 **Connecting FX3 to a Corporate Network**

19.1.1 Network Physical Layer

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

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

19.1.2 Prior to Connecting

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

19.1.3 Network IP Addresses

Novatec utilizes fixed addressing scheme for its control networking topology.

IP Address: 192.168.1.xx

Subnet Mask: 255.255.255.0

A detailed list of FX3 IP addresses is included in Section 7 of this instruction manual.

19.1.4 Network IP Address Conflicts

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

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

If required, the HMI Subnet Mask pair stored in the FX3-HMI Setup Utility can be modified to create compatibility with the customer network (see Section 11.3 for HMI Setup instructions).

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



19.2 Remote Access to HMI via Corporate or Wireless Network

If permitted, a wireless router can be connected to the FX3 control network to provide remote access. The FX3 can also be connected to a corporate network as outlined in section 11.1. When the FX3 has been successfully connected to an accessible network, a remote device may be used to remotely control the HMI as follows:

19.2.1 Connect wireless Smart Device to the FX3 accessible network

Open PocketCloud App (or similar VNC App) on Smart Device and add a manual connection link. Use FX3 IP Address 192.168.1.9 (10" HMI) or 192.168.1.7 (6" HMI) to access the HMI remotely. Use '100' for password when prompted.



19.2.2 Connect PC to the FX3 accessible network

Open Internet Explorer browser and enter FX3 IP Address 192.168.1.9 (10" HMI) or 192.168.1.7 (6" HMI) to access the HMI remotely. When connection to the HMI is established, the following utility screen will appear (note: a JAVA browser plug-in update or installation may be required during the connection process):





19.2.2 Connect PC to the FX3 accessible network (cont'd)



FX3 HMI SCREEN IN BROWSER WINDOW



19.3 HMI Setup Functions

19.3.1 Accessing the HMI Operating System Utility

Power up the FX3 control. During HMI boot sequence (approximately 20 – 40 seconds), the operating system 'desktop' screen appears for approximately 5 seconds. Press or click the CONTROL PANEL button.



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

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



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

NOTES:

- a) Do not change the HMI IP Address. Loss of communication with the PLC will result.
- b) If IP Address conflicts exist between the Novatec Network and the corporate network, or their IP address schemes do not permit direct communication, a managed router will be needed to bridge the networks.



19.3.3 HMI Setup: Brightness and Touch Calibration

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



OP Properties

Device

If your \

Display

Touch

recalibrate your screen.

To start, tap Recalibrate.

Recalibrate

properly to your taps, you may need to

BRIGHTNESS

In the OP Properties dialog box, click or press the 'Display' tab.

Click or press the Brightness UP and DOWN buttons to adjust display appearance for ambient lighting conditions.

Click or press the OK button to close the OP Properties dialog box.

TOUCH CALIBRATION

In the OP Properties dialog box, click or press the 'TOUCH' tab.

Click or press the RECALIBRATE button and follow the on-screen prompts to synchronize the screen reaction to user touch taps.

Click or press the OK button to close the OP Properties dialog box.

ок ×

Memory Monitoring

CE device is not responding



20 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 more than 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 protect 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.

20.1 At Startup

- □ Verify station and VP settings.
- □ Record equipment Serial Numbers and the MCS Controller program revision level.

20.2 Monthly

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

20.3 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.



21 WARRANTY

WARRANTY – NOVATEC INC – Effective Date 21 September, 2016

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 <u>"Warranty</u> <u>Periods".</u> 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 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: All warranty periods commence with the shipment of the equipment to the customer.

5-Year

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 *

Resin Blending and Feeding to Include

WSB Blenders, MaxiBatch & Feeders * Gaylord Sweeper Systems

Resin Conveying to Include

GSL Series ∀acuum Loaders Glass∀u Loaders, Receivers and Hoppers

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

2-Year

Central System Controls to Include

FlexTouch[™] Series Controls FlexXpand[™] Series Controls OptiFlex[™] Series Controls PLC Communications Modules Greenboard Communications Modules LOGOI Mini PLC

Moisture Measurement Equipment to Include

MoistureMaster®

PET Resin Crystallizers

Resin Conveying and Systems Components to Include

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

1-Year

Resin Conveying System Components to Include

VPD Vacuum Positive Displacement Pumps SVP Vacuum Pumps MVP Vacuum Pumps UltraVac Vacuum Pumps Vacuum Regenerative Blower Pumps Velocity Control Valves

Central System Controls to Include

MCS-600 Series Controls – (Distributed I/O) MCS-400 Series Controls

Infrared Dryers Custom Equipment of any kind unless otherwise specified Railcar Unloading Systems



Exclusions:

Routine maintenance/replacement parts are excluded from the warranty. These include, but are not limited to: hoses, desiccant, filters, filter elements, wiper seals, dew point sensors, infrared lamps, belts, rollers, bushings, knives, hoses, gaskets, seals, motors, internal solenoids, fuses, bearings 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 warranty is void if coalescing filters are not replaced on a yearly basis (per instruction manual) and/or membrane has been exposed to ozone.
- 2. Touch screen controls on NovaWheel dryers have a 2-year warranty. All other controls have a 1-year warranty.
- 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.
- 4. Load Cells on our WSB Blenders are covered by Novatec standard warranty as long as they have not been damaged from improper handling.
- 5. 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.
- 6. Warranty of Crystallizer Screen requires documented agitator shaft bearing maintenance and replacement on a yearly basis

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
- 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.



FX3 Addendum – LU 10 Ultrasonic Level Control Setup

(Note: Also, for LU 02 Silo Level Control)

22 APPENDIX 1 – ULTRASONIC LEVEL INDICATOR CONTROL PANEL STARTUP

In RUN MODE you can VIEW ANY PARAMETER as an auxiliary display by pressing in and entering the 3-digit parameter desired. This will be displayed as an auxiliary number below the main displayed parameter.

QUICK BUTTONS are available such as distance from the transducer face to the level of the material by pressing the ¹/₂ button.

LU 10 PROFIBUS COMMUNICATIONS SETUP

- 1. Clear LU 10 memory P999 with 00 for index, then press C and then enter (not simultaneously)
- 2. Set Comm parameters for Profibus.
 - a. P794 = 1
 - b. P795 = 0
- 3. Set address on Profibus (add-on) module dials to 59.



FX3 Addendum – LU 10 Ultrasonic Level Control Setup



LU 10 GENERAL STARTUP:

- 1. Hit the 12 block /keypad button. Screen should go blank except that icon.
- 2. Hit the circle arrow button. Screen should switch to programming mode (PXXX at the bottom)
- 3. P001- How the unit is measuring
 - a. 1= Level (reading from the bottom up)
 - b. 2 = Space (reading from the span set point down)
 - c. 3 = Distance (reading from the face of the transducer down)
- 4. P002 What is the unit measuring?
 - a. 1 = Liquid
 - b. 2 = Solid
- 5. P003 How fast the material will be changing
 - a. 1 = 1 Slow (.1 m/min)
 - b. 2 = Medium (1m/min)
 - c. 3 = 3 Fast (10 m/min)
- 6. P004 What transducer is attached
 - a. 100 = ST-H
 - b. 102 = XPS-10
 - c. 104 = XPS-15
 - d. 105 = XPS-30
 - e. 112 = XRS-5
- 7. P005 Units of measure
 - a. 4 = Feet

9. P007 – Span distance

- b. 5 = Inches
- 8. P006 Empty distance (From the face of the transducer down) Customer Silo Measurement: Enter here:

INSTRUCTION NOTE:

Yellow highlighted parameter values indicate typical settings. If you have questions regarding your parameter setup, please contact Novatec, Inc.



LEVELSETUP for P006 & P007:

Enter here:

Recommended:

P006 = distance to bottom of silo straight wall. Alternate Setup:

P006 = distance to silo discharge flange.

SEE VOLUME PARAMETERS P050 AND P052 FOR DETAILS.



FX3 Addendum – LU 10 Ultrasonic Level Control Setup

Volume Parameters (P050 to P055)

If Readings proportional to volume are desired, adjust the following parameters.

If Volume Conversion is not required, proceed to Reading Parameters.

P050 TANK SHAPE

Enter the Tank Shape option that matches the vessel monitored.

If the Tank Shape option selected requires additional vessel dimension entry, the **associated parameters** (as indicated below) may be scroll accessed.

When Operation is "level" (P001 = 1), material volume is calculated. Alternatively, when Operation is "space" (P001 = 2), remaining vessel capacity is calculated.

In the RUN mode, Readings are displayed in percent of (and mA outputs are proportional to) maximum volume. To convert Readings to volumetric units, see Max Volume (P051).

When monitoring solids, volume calculation accuracy may vary.

values: 0 = volume calculation not required (preset)



Enter the height of the tank bottom if P050 = 2,3,4, or 5, or the length of one end section of the tank if P050 = 7, in Units (P005).

values: 0.000 to 9999 Feet



FX3 Addendum – LU 10 Ultrasonic Level Control Setup

P051 MAX VOLUIVIE

Use this feature to display the Reading in volumetric units rather than percent.

Enter the vessel volume between Empty (P006) and Span (P007).

- e.g. 1 If the volume = 3650 m^3 , enter 3650.
- e.g. 2 If the volume = 267,500 U.S. gallons, enter 267.5 (1000's of gallons).

values: 0.000 to 9999



TRANSDUCER AIMING AND CONTROL SETUP:

While in program mode hit the circle arrow button. Whatever parameter you are looking

Best Practice:

Three steps are needed to ensure accurate readings based on setup.

- Full Silo
 - Aim Easy Aimer to receive the best signal through P805 and P806 on LU 10.
 - o Mark Easy Aimer
- 1/2 Empty Silo
 - Aim Easy Aimer to receive the best signal through P805 and P806 on LU 10.
 - Mark Easy Aimer
- Nearly Empty Silo
 - Aim Easy Aimer to receive the best signal through P805 and P806 on LU 10.
 - Mark Easy Aimer

Between the three marks on the easy aimer is the best range for the setup. Depending on what the customer would like to base their readings from, set Easy Aimer to that setting.

NOTE: During startup, Novatec aims to current level of material.

During the aiming process, you must check the following parameters to ensure valid aiming direction:

- {Short Echo: Long Echo}
- 1. <u>P805</u> Echo Confidence {# : #}
 - a. Access this Parameter in the run mode by pressing the button and entering 805. If

in the program mode you must press to activate an evaluation.

- b. Short Echo
 - i. Should be 0.
 - ii. If this is not 0 look at near blanking prior to calling Siemens.
- c. Long Echo
 - i. Should be as high as possible.
 - This parameter goes up to 99. However, you may find highest you can get is 10-15.
 - iii. If this number is lower than that, check P804 which is normally preset.1. Lower P804 upon discussion with Siemens
- 2. P806 -Echo Strength
 - a. Serves as directional feedback.
 - b. If P806 goes down as P805 goes up contact Siemens
- 3. <u>P807</u> Noise
 - a. Should be as low as possible
 - b. Should NOT change with aiming
 - c. Range -99 \rightarrow 99 with 0 being "low"
 - d. Left hand numbers should be below 20, negative numbers are okay.



FX3 Addendum – LU 10 Ultrasonic Level Control Setup

NOTE: If you have trouble obtaining acceptable values for P805, P806 or P807, the following parameters may be of assistance:

NOTE: If you have trouble obtaining acceptable values for P805, P806 or P807, the following parameters may be of assistance:

- 1. <u>P800</u> Near Blanking IF MATERIAL IS INSIDE BLANKING DISTANCE, ERRATIC READINGS WILL BE SEEN.
 - a. Use this feature if the material level is incorrectly reported to be near the transducer face
 - b. Ignores obstructions within a certain distance of Transducer
 - c. XPS 15&30 preset to ~2 ft

Extend Near Blanking to overcome measurement difficulties which cannot be corrected by transducer location mounting or aiming.

The causes of measurement difficulties which may be corrected include:

- A vessel obstruction partly blocking the transducer acoustic beam
- A transducer stand pipe mount that is too narrow for its length
- A transducer mounting which is resonant at the transducer frequency

2. <u>P801</u> – RANGE EXTENSION (values: 0.000 to 9999)

Use this feature if an incorrect level is reported (when material level is lower than Empty, P006).

Range Extension is the distance (in Units (P005) or % of Span (P007)) beyond 'Empty' which is still ultrasonically measurable.

If Empty is substantially higher than the actual vessel bottom, increase Range Extension such that Empty plus Range Extension is greater than the transducer to vessel bottom distance.

This value is automatically preset to 20% of Span (P007).



IMPORTANT PARAMETERS:

FX3 Addendum – LU 10 Ultrasonic Level Control Setup

	Silo	Silo	Silo	Silo	Silo	Silo	Silo	Silo	Silo	Silo	Silo	Silo	
	1	2	3	4	5	6	1	8	9	10	11	12	-
P001	1	1	1	1	1	1	1	1	1	1	1	1	Level
P002	2	2	2	2	2	2	2	2	2	2	2	2	Solid Material
P003	2	2	2	2	2	2	2	2	2	2	2	2	Medium Response
P004													XPS-15 = 104 XPS-30 = 105
P005	4	4	4	4	4	4	4	4	4	4	4	4	Unit of Meas. Feet
Empty P006	y												Dist.: Bottom of transducer to Empty Level
Span P007	l ,												Dist.: Empty Level to Full Level
P050													'0' OR '2' See p.36
P052													Based on P050 See p.36
P201	1	1	1	1	1	1	1	1	1	1	1	1	Automatically Set (P001 & P050)
P800													Near Blanking. Automatically Set for XPS15-30
P801													Range Extension. Default = 20% of Span.
P805													Record for reference
P806													Record for reference
P807													Record for reference

Novatec FX3 (Novatec access level)

Scaling Factor	(Gain)
Silo 1	
Silo 2	
Silo 3	
Silo 4	
Silo 5	
Silo 6	
Silo 7	
Silo 8	
Silo 9	
Silo 10	
Silo 11	
Silo 12	

Calculated by: If Gain = 1, Level = %; If Gain >1, Level = (Gain) x 9999

Fill out necessary parameters to provide an "At Start-up Reference" for customer and Novatec in the event parameters are inadvertently changed later. This will also help future troubleshooting.



Programming Chart FX3 Addendum – LU 10 Ultrasonic Level Control Setup

	PARAMETER	ALTERED VALUES FOR POINT #s											
#	NAME	1	2	3	4	5	6	7	8	9	10		
SECURI	ΓΥ												
P000	Lock (G)	T	<u> </u>										
QUICK S	TART	_	-						I				
P001	Operation	—											
P002	Material	+	 				<u>├</u>		<u> </u>	<u>├</u>			
P003	Measurement Response	+	 										
P004	Transducer	+											
P005	Units (G)												
P006	Empty	+											
P007	Span	+											
VOLUME									· · · ·				
P050	Tank Shape	Τ											
P051	Max Volume												
P052	Tank Dimension A												
P053	Tank Dimension L												
P054	Level Breakpoints			rec	ord val	ues on	a sep	arate s	heet				
P055	Breakpoint Volumes			rec	ord val	ues on	a sep	arate s	heet				
READIN	G VALUE												
P060	Decimal Position												
P061	Convert Reading												
P062	Offset Reading												
FAILSAF	E												
P070	Failsafe Timer	Т											
P071	Failsafe Material Level	1											
P072	Failsafe Level Advance												
RELAYS													
P100	Relay Set Up (G)	Τ											
P 101	Hi Alarm												
P102	Lo Alarm												
P103	Hi Hi Alarm												
P104	Lo Lo Alarm												
P110	Relay Allocation												
P111	Relay Function												
P112	Relay A Setpoint												
P113	Relay B Setpoint												
P116	Bound Alarm Hysterisis												
P 129	Relay Failsafe												



FX3 Addendum – LU 10 Ultrasonic Level Control Setup

PARAMETER			ALTERED VALUES FOR POINT #s										
#	NAME	1	2	3	4	5	6	7	8	9	10		

	MAME	1 .	2	3	4	9	•	-	ð	3	10
mA OU	TPUTS										
P200	mA Range										
P201	mA Function										
P202	mA Allocation										
P203	mA Value/Transducer (V)										
P210	0/4 mA Setpoint										
P211	20 mA Setpoint										
P212	mA Min Limit										
P213	mA Max Limit										
P214	4 mA Trim										
P215	20 mA Trim										
P219	mA Failsafe										

DATA LOGGING

P300	Temp, Transducer Max (V)					
P302	Temperature, Sensor Max(V)					
P330	Profile Record					
P331	Auto Record Enable (G)					
P332	Auto Record Transducer (G)					
P333	Auto Record Interval (G)					
P334	Auto Record A Setpoint (G)					
P335	Auto Record B Setpoint (G)					
P336	Auto Record Filling/Emptying(G)					
P337	Auto Record LOE Time					
P340	Date of Birth					
P341	Run Time					
P342	Start Ups					

RANGE CALIBRATION

P650	Offset Calibration					
P651	Sound Velocity Calibration					
P652	Offset Correction					
P653	Velocity					
P654	Velocity@20 °C					

TEMPERATURE COMPENSATION

P660	Temp Source					
P661	Temp Fixed					
P662	Temp Sensor Allocation					
P663	Temp Transducer Allocation					
P664	Temperature (V)					



23 APPENDIX 2 – CONVEYING SYSTEM TROUBLESHOOTING

23.1 System Component Operation Details

1. VACUUM T VALVE OPERATION

Each vacuum receiver in the conveying system is coupled to a vacuum "T" valve that isolates the vacuum conveying power of the pump to one receiver at a time for conveying. Each T valve in the system must close off air flow when it is NOT in operation, allowing other receivers to receive full vacuum. One 'stuck' valve can ruin the vacuum supply for the entire system. Check that each valve operates in response to its receiver's turn in the vacuum system. Each valve should open for loading and close when loading is complete. The extended shaft of the valve's cylinder is a good indication of valve operation.

<u>**Rule of thumb**</u>: If only one receiver in the system is conveying correctly, it is probably <u>that</u> receiver's T valve that is not closing properly.

2. RECEIVER DISCHARGE FLAPPER STUCK OPEN

The flapper valve at the base of the receiver provides three critical functions:

- Seal off the base of the receiver, creating a sealed vacuum chamber and allowing it to load,
- · Open reliably to allow material to empty out and
- Signal the conveying control system of the need for more material (when it swings shut, by its own weight).

If the flapper valve is stuck open or does not fully close, conveying cannot take place. A problem receiver can be easily checked for proper, free movement of its flapper valve:

- If conveying is not triggered when the flapped is closed, there is an issue with the electrical demand switch.
- If the flapper does not swing nearly shut by its own weight, there is a pivot point (hinge) or counterweight issue.
- If the flapper is 'stuck' in the open position, there is a material contamination issue with the pivot point (hinge) of the valve and it must be cleaned and examined for wear. Contamination of the hinge is typically caused by material finding its way into the pivot point, but in older receivers, may also be a metal burr that has formed from age.

3. RECEIVER INLET CHECK VALVE STUCK OPEN

Many receivers are equipped with swinging check valves on their material inlets. Check valves provide a variety of useful functions for system operation and are pushed open when material is conveyed into the receiver. But on systems that convey material from one source to multiple receivers, each check valve in the system must seal to allow the one receiver being loaded to receive the full vacuum force from the conveying pump. A check valve that is stuck open, either by hinge wear or a trapped pellet, will leak valuable vacuum air through that receiver while others try to fill. This decreases vacuum air at the source which can prevent conveying throughout the system. If the leakage is severe, material can even be pulled from the leaking receiver and delivered to another receiver.

<u>Rule of thumb:</u> On systems that convey material from one source to multiple receivers via a common material line; If only one receiver in the system conveys correctly, it is probable <u>that</u> receiver's check valve that is not closing properly.

4. CONVEYING CONTROLS NOT PROPERLY (RE) PROGRAMMED

Central material conveying systems that include a network of pumps, receivers and material sources provide high efficiency and a multitude of flexibility. But often, new requirements are not completely programmed after material or system configuration changes. Items to check:

• Is the new material source further away than the previous source? More conveying time and/or purge time might be required to accommodate this difference in distance.



- Is the new material as free flowing as the last material? Does the material tend to clog the conveying lines, or simply convey slower due to weight or shape? Changes to load/purge times as well as material pick-up tube changes may be required.
- Has the receiver been assigned to the proper vacuum pump? The proper material valve?
- Has system piping and or wiring been modified to accommodate this new configuration for conveying?

5. VACCUM PUMP - VACUUM BREAKER VALVE OPERATION

Located on the central vacuum pump of the system, the vacuum breaker valve allows ambient air to be drawn into the pump when the conveying system is NOT conveying. This function prevents rapid re-starts and stops of the pump during the "seek" time of the loading control, cools the pump, and prevents the overloads in the pump starter from overheating. But the pneumatically operated breaker valve must close and seal when the vacuum system is conveying material, directing all vacuum force to the job of conveying. Check the following:

- The valve is connected to a reliable source of clean compressed air, which is turned on. Air pressure should be 85-120 psi.
- The valve must not be leaking vacuum air. Often a sucking sound can be heard, indicating the valve is not sealing properly.
- View the level of vacuum created by the pump on its vacuum gage while attempting to convey material: Although the reading on this gauge will vary greatly depending upon your system configuration, it is a valuable tool for assessing system operation and discovering faults. Vacuum levels below 6" indicate a breaker valve fault or other problems in the vacuum system.

6. YOUR MATERIAL SOURCE

Common gaylord box issues are:

- Rat-holing: The feed tube has sucked up all the free-flowing material around its pick-up end and the material must now be stirred to allow material to flow into the feed tube again. A Gaylord tilter may be helpful in this situation.
- Bag liner line plugging: The feed tube has sucked in the thin film lining of the gaylord, blocking off material flow to the receiver.
- Feed tube fell out of the box: By weight of its own hose, or by vibration of the flex hose while conveying.
- Out of material: Time to move in a new gaylord.
- Common material selection issues:
 - Conveying line connected to the wrong source of material.
 - Wrong purge valve selected: If a purge valve is used at the material source, it must be programmed by the system control to operate in conjunction with a specific receiver. Material changes require making a new valve selection at the system control.
 - Purge valve is not operating: If a purge valve is used at the material source, it must be energized to allow material loading (and de-energized for purging). A fault at this valve, IE: lost compressed air connection, an open purge valve access door or a material jammed purge valve will prevent material movement.

7. FEED TUBE / TAKE-AWAY BOX AIR SETTINGS

The conveying of material by air cannot be accomplished without air movement. Regardless of the type of pickup device being used; purge valve, wand, take-off box, etc.... these devices must be adjusted to allow the introduction of material <u>and</u> air, in a mixture suitable for conveying the specific material the distance required. Typically, the probe should be at least 50% open to avoid plugging the material line.



23.2 System Control Operation – Station Conveying Timer Setup

Once the timers are set to give the maximum amount of material, per load, in the vacuum chamber without overfilling it, they should not be changed.

Exceptions: When going from a source farther from the point of usage to a source nearer the point of usage. (Or vice versa) Load time will be changed accordingly. For Purge systems, the Purge time will change but the Load time may not change.

(Increase or decrease accordingly)

23.3 Basic Startup / Troubleshooting Checklist - Receiver

- 1) Is the station turned on? Verify at the controller.
- 2) Is the Vacuum line physically attached to this station?
- 3) If using source valves, is the proper valve is assigned to this station? (Station Source Assignment)
- 4) Is the source valve opening and closing properly?
- 5) Check the air probe at the source is it at least 50% open. The system cannot move material without air mixed in with the material flow.
 - If the material line plugs when no leaks are present and the probe air adjustment is 100% open, partially close the hopper slide gate to limit material flow into the conveying line.
- 6) Are there holes or breaks in any material or vacuum hoses?
- 7) Is the material flowing freely from the source?
 - Is it clogged in the hopper or receiver discharge?
 - Is the material source empty or full?
 - Is material clogged in the line?
- 8) Is the receiver flapper sealing properly against the discharge tube? Is the gasket installed (5" dump throat only)?

23.4 Basic Startup / Troubleshooting Checklist - Vacuum Pump

- 1) Check direction of rotation of the pump motor.
- 2) Check amperage draws, check continuity of legs on the motor.
- 3) Check belts for wear and tear.
- 4) Check blower for wear and tear. Check for any bearing play.
- 5) Check the oil level in the blower. Replace if necessary per PM instructions.
- 6) To check vacuum in the system:
 - a) Remove vacuum line from inlet to the cyclone.
 - b) Cap off the cyclone inlet (use duct tape, or simply cover it with a rigid, flat object (wood, sheet metal, etc.).
 - c) Manually start the pump by pushing in the motor starter. The high vacuum relief should open. This will let you know the pump is sealed properly. The vacuum gauge should go to maximum inches HG for the pump (see pump instruction manual).
 - If the vacuum relief doesn't open, there is an air leak at the pump. Check the seal on the dump can on the cyclone, the filter housing lid seal at the pump, the vacuum breaker valve, (verify it has air 85 to 100 psi), and all piping connections.
 - d) If the relief valve opens, reconnect the vacuum line to the system and perform the same check. If the relief valve opens, the system is sealed, and all station vacuum valves are closed.
 - If the valve doesn't open, you have a vacuum leak and the system must be checked for any open lines, station valves open, or no air to the station vacuum valves.
- 7) Check the vacuum while the system is conveying material. The pump vacuum gauge should read between 4" Hg vacuum up 1" Hg less than the pump relief point. Typically, vacuum<4" Hg indicates a vacuum leak or no movement of material. Vacuum >relief point means the line is clogged:



- Too much material is in the conveying line without the proper air mixture.
- Stations are being overfilled.
- The filter on the vacuum chamber or at the pump may be clogged.
- The station vacuum valve may not be opening.