

TFC-1230 ROLLER COMPACTOR

OPERATION INSTRUCTIONS



YOUR GLOBAL EQUIPMENT AND PROCESSING SOLUTION

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INTRODUCTION

The Vector Roller Compactor is a compacting machine designed to produce a dry compacted granulation. Powder is charged into a hopper where a screw feeder pre-compacts, de-aerates and feeds the powder into a gap between two cantilevered compacting rolls. The compacting rolls process the powder into a compacted sheet that is then fed into the granulator.

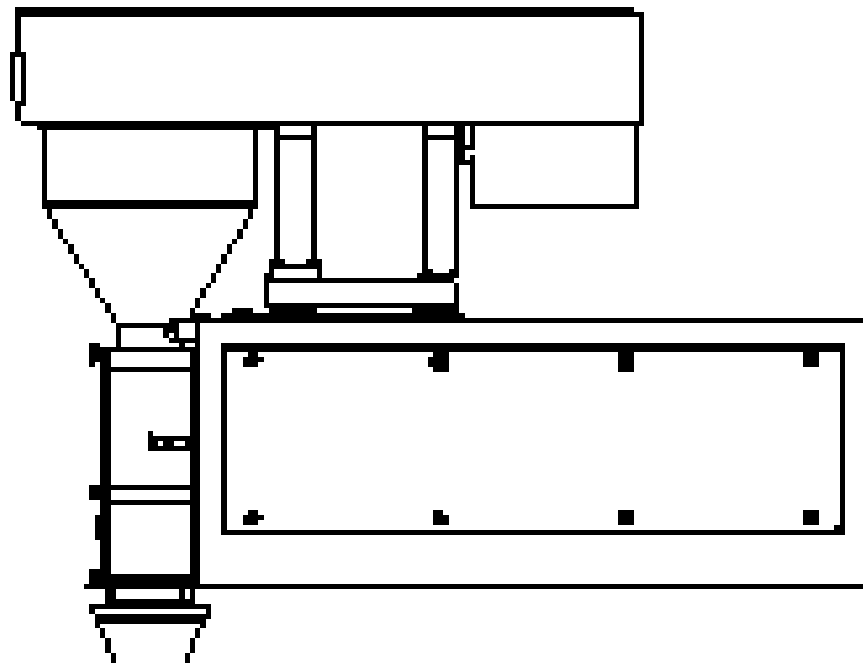


Figure 1. TFC-1230 Roller Compactor

GENERAL INFORMATION

To assure successful operation of this machine, the material presented in this publication must be thoroughly read and understood BEFORE proceeding.

Our goal is to provide you with the most complete and accurate information as possible to help you operate and maintain your machine. The examples and diagrams are included solely for illustrative purposes. Should you find any errors, please be sure to contact us so we may continue to improve the quality of our publications.

Throughout this manual, you will find warnings, cautions and notes. These items are to make you aware of safety considerations.



Warnings - Indicate a potentially hazardous situation with specific procedures or policies that should be followed to avoid serious injury or death.



Cautions - Indicate a potentially hazardous situation with specific procedures or policies that should be followed to avoid minor or moderate injury to personnel OR damage to equipment.



Notes - Indicate specific information that will benefit the reader in the use and care of the machine.

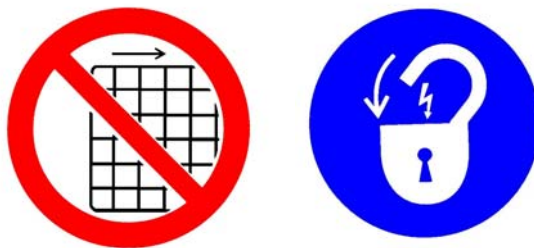
GENERAL INFORMATION

WARNING LABELS

Following is a listing of the various labels used on the TFC-1230. Please become familiar with each label and its meaning.

DO NOT OPERATE WITH GUARDS OR COVERS REMOVED

LOCK OUT ELECTRICAL POWER



This combination of labels will be found on all the removable covers on the machine.

The first label informs the operator and service personnel that the covers or guards are NOT to be removed during operation of the equipment.

The second label tells personnel that when the guards or covers are removed for servicing, that electrical power should be locked out to avoid injury.

ELECTRICAL SHOCK HAZARD



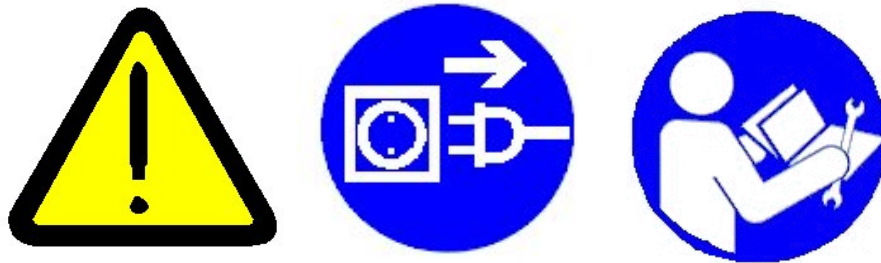
This label cautions the operator to be aware of the hazard of electric shock. The hazard exists when the guards or covers are removed from the machine or the doors to electrical panels are opened. The operator should take extreme care to avoid the hazard of electric shock, usually by removing the power supply from the area or taking extra precautions for safety.

GENERAL INFORMATION

LABELS (Continued)

DISCONNECT POWER SUPPLY

BEFORE SERVICING CONSULT SERVICE MANUAL



The first label cautions the operator to pay attention.

The second label tells the operator to disconnect the power supply.

The third label tells the operator to consult the service manual before performing any service or maintenance on this machine.

CRUSH HAZARD



This label warns the operator of the Crush Hazard that exists when the Upper Cover Assembly is lowered into processing position. The operator **MUST** keep hands clear of the area between the Lower and Upper Cover Assemblies. When servicing the unit, Lock Out/Tag Out procedures should be initiated to keep the operator or serviceman from injury.

GENERAL INFORMATION

LABELS (Continued)

ROLL HAZARD



This label will be found on the compacting roll cover assembly. Although a safety cover is provided for the compacting rolls, this cover may be removed by the operator.

This label cautions the operator to be aware of the hazard of entanglement between the compacting rolls. Keep hands, fingers, tools and ALL objects away from the compacting rolls during operation.

As always, Vector recommends shutting down the power supply before removing the guards and performing service on the machine.

GENERAL INFORMATION

LABELS (Continued)

FEED SCREW HAZARD



This label warns the operator of the Crush Hazard that exists when the Upper Cover Assembly is lowered into processing position. The operator **MUST** keep hands clear of the area between the Lower and Upper Cover Assemblies. When servicing the unit, Lock Out/Tag Out procedures should be initiated to keep the operator or serviceman from injury.

FEED SCREW CRUSH HAZARD



This label warns the operator of the feed screw hazard that exists inside the funnel where the feed screw is located. **DO NOT** stick hands or objects inside the funnel at any time. Keep clear of the area during processing. If servicing is required, all electrical power to the machine should be shut down.

ELECTRICAL CONTROL PANEL

CONTROLS DESCRIPTION AND FUNCTION



WARNING!

Electrical installation of this equipment must be in accordance with all state and local electrical codes as well as in compliance with the National Electric Code (NEC™). Failure to install this equipment properly could result in damage to equipment, property and loss of life.

OPERATOR DISCONNECT HANDLE

This circuit breaker mechanism is located on the right flange of the Electrical Control panel. The disconnect handle is used to control the ON/OFF power to the panel. When the handle is in the ON (UP) position, electricity is supplied to the panel. In the OFF (DOWN) position, power is interrupted and the panel shuts down.

CONTROL SYSTEM

A PLC-based Touch Screen Control System is used to configure, control and monitor the compacting process. Various sensors mounted at critical points in the system provide the data required to monitor and control the process.

OPERATOR INTERFACE PANEL

The Operator Interface Panel includes the Touch Screen Control System and the emergency stop button. The operator uses the panel to interface with the Roller Compactor and control the process.

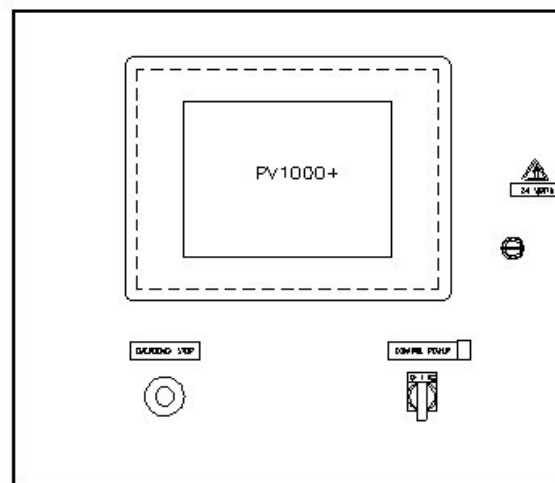


Figure 2. Operator Interface Panel

CONTROL SYSTEM

CONTROLS

EMERGENCY STOP

This push button, when pressed, will interrupt all control power to the system, disabling all functions. Main power to the machine is NOT interrupted, only the control power.

To restore control power, the emergency stop should be pulled back out and the control power switch toggled to the reset position.

CONTROL POWER ON/OFF

This selector switch activates power to the operator interface panel. When the switch is turned to the ON position, power is supplied to the operator interface panel, although outputs cannot be activated. To allow outputs to be activated turn the switch to the RESET position. Turn the switch to the OFF position to turn off power to the operator interface panel.

CONTROL SYSTEM

TOUCH SCREEN MONITOR

The touch screen monitor allows the operator to communicate with the programmable logic controller in the power panel. Each mode of operation requires operator input or response. The monitor displays equipment status throughout the process. The functional touch pads allow the operator to interface with the Roller Compactor. The monitor also displays system faults.

When applying power to the machine, an initialization screen appears on the touch screen monitor. After a few moments the Main Menu Screen (Figure 3) appears:

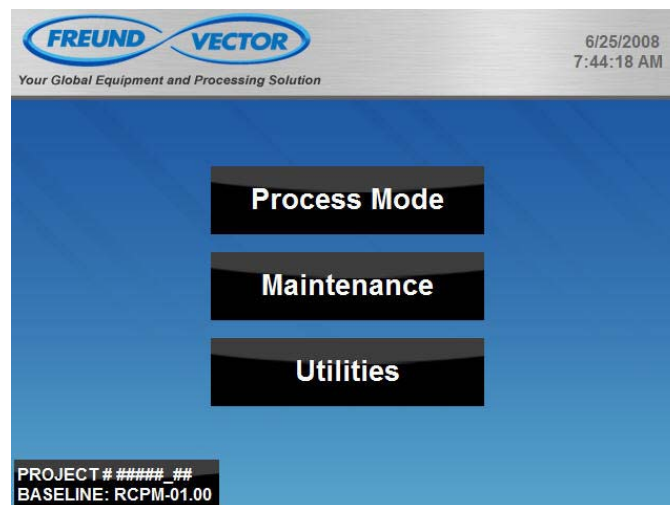


Figure 3. Main Menu Screen

The Main Menu function keys are displayed at the right side of the screen. The operator uses these function keys to access the different modes of operation.

This screen also displays the project number and the software version.

CONTROL SYSTEM**SECURITY ACCESS**

When selecting any function from the Main Menu, a Security Verification Screen (Figure 4) is displayed. This screen prompts the operator for a login password to prevent unauthorized personnel from accessing any function. Passwords are assigned in the Utility Mode.

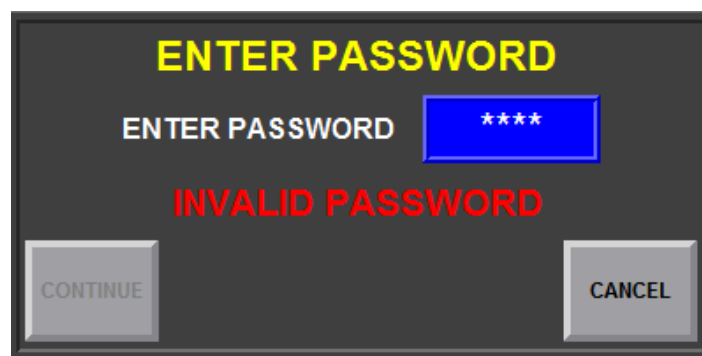


Figure 4. Security Verification Screen

To enter a password, the operator touches the block. Pressing this block will display a data entry block overlay (Figure 5). This overlay allows the operator to enter the appropriate numerical value. The value is displayed at the top of the data block.

To enter a password, the operator touches the block. Pressing this block will display a data entry block overlay (Figure 5). This overlay allows the operator to enter the appropriate numerical value. The value is displayed at the top of the data block.

Press ENTER to close the overlay.



Figure 5. Data Entry Block

CONTROL SYSTEM

SECURITY ACCESS (Continued)

FUNCTION KEYS

CONTINUE

Pressing the CONTINUE function key will close the security screen and open the selected process screen.

CANCEL

Pressing the CANCEL function key will close the Security Verification Screen.

CONTROL SYSTEM**PROCESS MODE**

When the operator selects the Process Mode function key from the Main Menu, the Process Display Screen (Figure 6) is displayed. This screen provides the function keys needed to control the process. This screen also displays the actual process variable values of the current process.

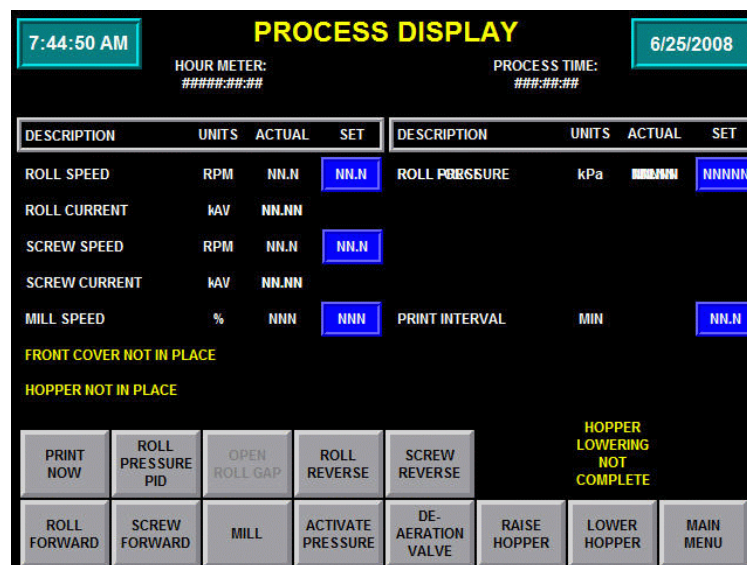


Figure 6. Process Display Screen

FUNCTION KEYS**PRINT NOW**

Pressing this function key will print one line of data of the current process variables.

ROLL PRESSURE PID

Pressing this function key will display the Roll Pressure PID Screen via the Security Screen.

OPEN ROLL GAP

Pressing this function key will open the gap between the pressure rolls.

CONTROL SYSTEM

PROCESS MODE (Continued)

FUNCTION KEYS (Continued)

ROLL REVERSE

This function key controls the ON/OFF operation of the rolls reverse movement. Pressing this function key runs the rolls in reverse at the roll speed setpoint defined on the Process Display Screen. Pressing again stops the rolls.

SCREW REVERSE

This function key controls the ON/OFF operation of the screw reverse movement. Pressing this function key runs the screw in reverse at the screw speed setpoint defined on the Process Display Screen. Pressing again stops the screw.

ROLL FORWARD

This function key controls the ON/OFF operation of the pressure rolls forward movement. Pressing this function key will move the pressure rolls forward at the roll speed setpoint defined on the Process Display Screen. Pressing again stops the rolls.

SCREW FORWARD

This function key controls the ON/OFF operation of the feeder screw. Pressing this function key will rotate the feeder screw at the screw speed setpoint defined on the Process Display Screen. Pressing again stops the feeder screw.

CONTROL SYSTEM

PROCESS MODE (Continued)

FUNCTION KEYS (Continued)

MILL

This function key controls the ON/OFF operation of the mill. Pressing this function key will run the mill at the mill speed setpoint defined on the Process Display Screen. Pressing again stops the mill.

ACTIVATE PRESSURE

Pressing this function key will activate the pressure on the pressure rolls. As the pressure increases the value on the display screen will increase. Roll pressure can be displayed in lb., Ton or kPa units. Actual roll pressure is displayed on the screen. Press the function key again to deactivate roll pressure.

DE-AERATION VALVE

The de-aeration function is optional for the roller compactor units. It is used to take excess air out of the powder to be compacted, improving flowability of the product into the compaction zone. An eductor is mounted on the frame of the unit, with a fine mesh screen mounted on the top seal. As product passes the seal, the air is removed. This function key, pressed once, opens the de-aeration valve. Press the function key again to close the valve.

LOWER HOPPER

This function key will be enabled only if the Roll Motor and Screw Motor are OFF and the hopper is in the up position. Pressing this function key will lower the hopper.

CONTROL SYSTEM

PROCESS MODE (Continued)

FUNCTION KEYS (Continued)

RAISE HOPPER

This function key will be enabled only if the Roll Motor and Screw Motor are OFF and the hopper is in the down position. Pressing this function key will display the Hopper Warning Screen (Figure 7). The purpose of this warning screen is to remind the operator to remove the bolts from the Screw Hopper before raising it.

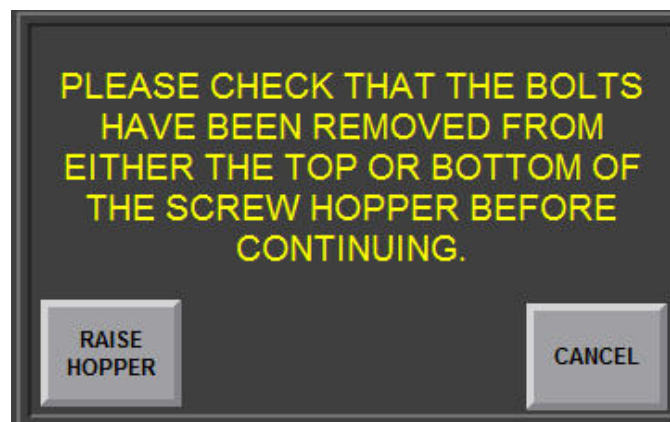


Figure 7. Hopper Warning Screen

Pressing RAISE HOPPER will raise the hopper. Pressing CANCEL will close the Hopper Warning Screen.

CONTROL SYSTEM

PROCESS MODE (Continued)

FUNCTION KEYS (Continued)

MAIN MENU

Selecting the Main Menu function key will return the system screens to the Main Menu via a Warning Screen (Figure 8).



Figure 8. Warning Pop-Up Screen

Pressing the MAIN MENU function key will terminate the manual process.
Pressing the CANCEL function key will close the Warning Pop-Up Screen.

CONTROL SYSTEM**PROCESS MODE (Continued)****STATUS INDICATORS**

The status indicators on this screen are representative of the actual value and the setpoint value for each listed variable. The actual value will change dependent on process occurrences. The setpoints will change only when the operator enters new values. The following variables are displayed on the screen:

Roll Speed	Setpoint Range is 1.6 - 16.0 RPM
Screw Speed	Setpoint Range is 4.7 - 47.6 RPM
Mill Speed	Setpoint Range is 0 - 100%
Roll Force/Pressure	Setpoint Range is 0 - 64000 lb 0.00 - 32.00 Ton 0 - 20684 kPa
Roll Power/Current (kW or A)	Actual Value Displayed
Screw Power/Current (kW or A)	Actual Value Displayed
Print Interval	Setpoint Range is 0.0. 0.2 - 99.9 Min
Screw Hopper Status	IN PLACE/NOT IN PLACE
Front Cover Status	IN PLACE/NOT IN PLACE

CONTROL SYSTEM**ROLL PRESSURE PID SCREEN**

Pressing the Roll Pressure PID function key at the Process Display Screen, will display the Roll Pressure PID Screen (Figure 9) via the Security Verification Screen. This screen displays process information and allows the operator to modify setpoints associated with the Roll Pressure PID Loop.

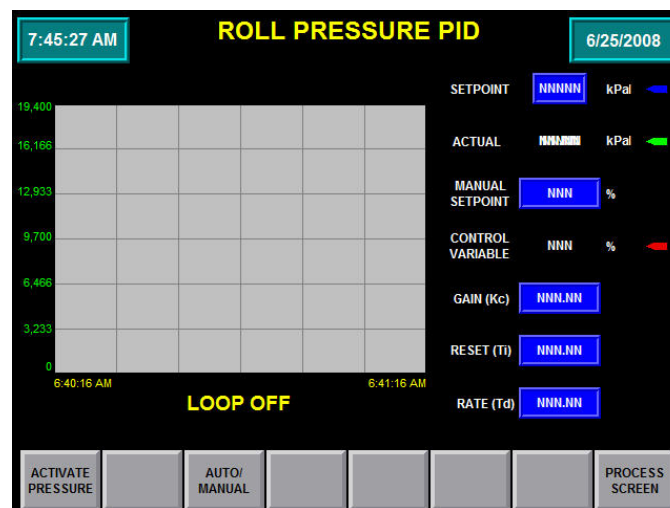


Figure 9. Roll Pressure PID Screen

FUNCTION KEYS**ACTIVATE PRESSURE**

Pressing this function key will activate the pressure on the pressure rolls. As the pressure increases the value on the display screen will increase. Roll pressure can be displayed in lb., Ton or kPa units. Actual roll pressure is displayed on the screen. Press the function key again to deactivate roll pressure.

CONTROL SYSTEM**ROLL PRESSURE PID SCREEN (Continued)****FUNCTION KEYS (Continued)****AUTO/MANUAL**

Pressing this toggle function key allows the operator to place the PID loop in the manual mode. This function key remains disabled until the PID Loop is turned ON. In the manual mode, control is accomplished by entering output value settings with constant monitoring from the operator. Clicking on or pressing the function key again places the PID Loop in automatic mode. In the automatic mode, setpoints are entered and the precalibrated PID Loop automatically maintains the setpoint.

PROCESS SCREEN

Pressing this function key will return the operator to the Process Display Screen.

SETPOINTS

The following process variables are displayed on the Pressure PID Screen:

Process Variable Setpoint	0 - 64000 lbs. 0.00 - 32.00 tons 0 - 20684 kPA
Process Variable	Actual Value Displayed
Manual Setpoint	0 - 100% Roll Pressure
Proportional	0.01 - 327.67
Integral	0.00 - 327.67
Derivative	0.00 - 327.67

CONTROL SYSTEM

MAINTENANCE MODE

Pressing the Maintenance function key on the Main Menu screen will open the default Maintenance Screen (Figure 10). The maintenance screens can be used by maintenance and service personnel to test system components.

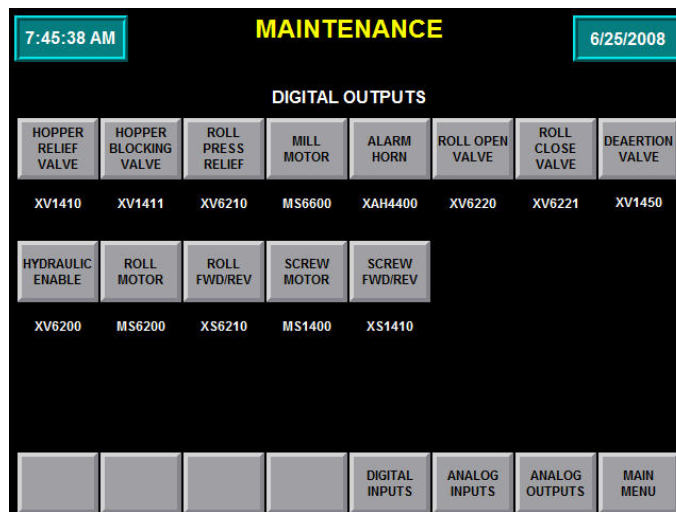


Figure 10. Maintenance Screen - Digital Outputs

FUNCTION KEYS

There are four types of maintenance screens: Digital Input, Digital Output, Analog Input and Analog Output screens. Each screen has a function key that, when pressed, will access the other maintenance screens.

DIGITAL OUTPUT

The Digital Output Screen (Figure 9) is the default maintenance screen and will automatically be displayed when the Maintenance function key is selected at the Main Menu. This screen allows the operator to force system components ON to verify working order. All safety interlocks still apply during the maintenance mode. To force an output, touch the selected data field and toggle the function key. OFF is displayed without color and ON is displayed with a filled button.

CONTROL SYSTEM**MAINTENANCE MODE (Continued)****FUNCTION KEYS (Continued)****DIGITAL INPUTS**

The Digital Input Screen (Figure 11) monitors the status of system component digital inputs. Since this screen represents machine input, operator entry is not possible. This screen displays values only.

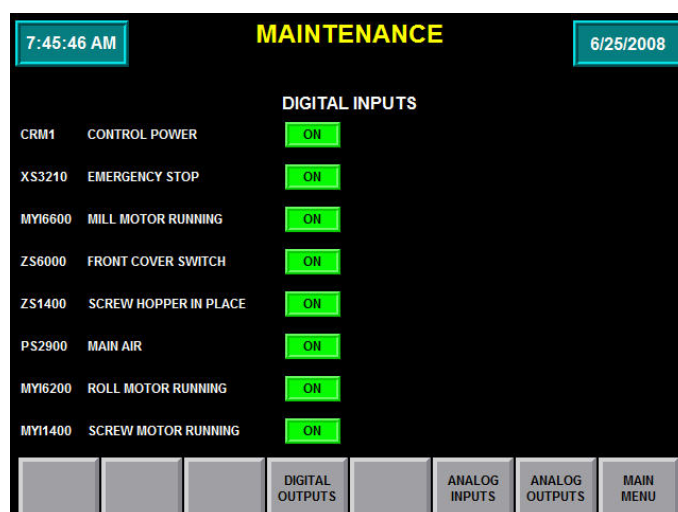


Figure 11. Maintenance Screen - Digital Inputs

CONTROL SYSTEM**MAINTENANCE MODE (Continued)****FUNCTION KEYS (Continued)****ANALOG IN/OUT**

When this function key is pressed, the Analog Input Screen will be displayed. The Analog Input Screen (Figure 12) monitors the status of system component analog inputs. Since this screen represents machine input, operator entry is not possible. This screen displays values only.

ANALOG INPUTS				
TAG NAME	DESCRIPTION	RANGE	STATUS	UNITS
PT6200	ROLL PRESSURE	0 - 3000	NNNN	PSI
JT6200	ROLL POWER	0.00 - 15.00	NN.NN	kW
JT1400	SCREW POWER	0.00 - 4.40	N.NN	kW
IT6200	ROLL CURRENT	0.00 - 34.00	NN.NN	A
IT1400	SCREW CURRENT	0.00 - 12.00	NN.NN	A
SI6200	ROLL MOTOR SPEED ACTUAL	0.0 - 20.0	NN.N	RPM
SI1400	SCREW MOTOR SPEED ACTUAL	0.0 - 70.0	NN.N	RPM

Figure 12. Maintenance Screen - Analog Inputs

CONTROL SYSTEM**MAINTENANCE MODE (Continued)****FUNCTION KEYS (Continued)****ANALOG OUTPUTS**

The Analog Output Screen (Figure 13) allows the operator to place output values on system component tags to verify working order.

ANALOG OUTPUTS				
TAG NAME	DESCRIPTION	RANGE	SET	UNITS
ST6200	ROLL MOTOR SPEED	0 - 100	NNN	%
ST1400	SCREW MOTOR SPEED	0 - 100	NNN	%
ST6600	MILL MOTOR SPEED	0 - 100	NNN	%
IPT6200	ROLL PRESSURE VALVE	0 - 100	NNN	%

Figure 13. Maintenance Screen - Analog Outputs

MAIN MENU

Selecting the Main Menu function key will return the system screens to the Main Menu via the Warning Screen.

CONTROL SYSTEM**ALARM SUMMARY SCREEN**

During processing, fault conditions can occur that will cause a function key labeled CHECK ALARM to appear at the top of the current screen. When this function key is displayed, the operator should press it to advance to the Alarm Summary Screen (Figure 14) to view the fault condition and take necessary corrective action.

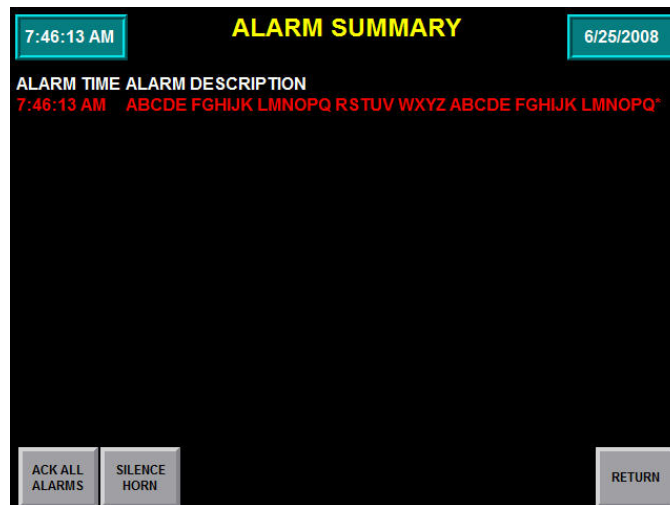


Figure 14. Alarm Summary Screen

FUNCTION KEYS**ACK ALARMS**

Pressing this function key will acknowledge the alarm conditions on the screen. If the alarm condition goes away after the alarm has been acknowledged, the fault message will be deleted from the screen.

SILENCE HORN

Pressing this function key will silence the alarm horn. Faults are not corrected or reset, the horn is simply silenced.

RETURN

Pressing this function key will close the Alarm Summary Screen.

CONTROL SYSTEM

UTILITY SCREEN

The Utility Screen (Figure 15) displays information about the system setup.

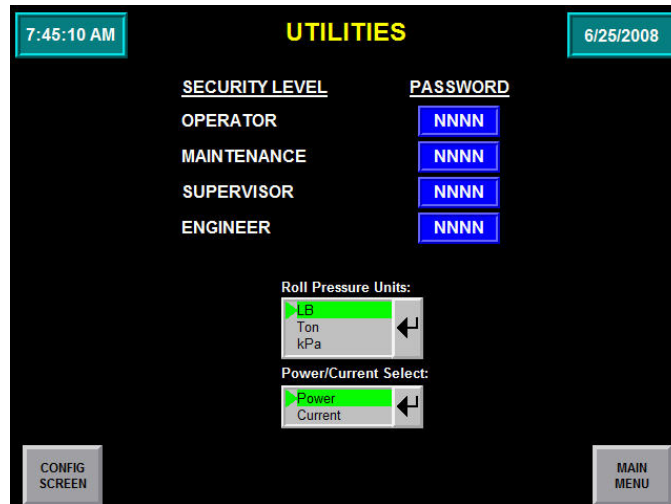


Figure 15. Utilities Screen

The operator can select the unit to be displayed on the various screens for Roll Pressure and Power/Current. To change the unit, simply press the arrow on the process variable to be changed. The arrow acts as a toggle: press once and the next unit measurement is selected, press again and the next unit measurement is selected. Continue to press the arrow until the desired measurement is highlighted.

FUNCTION KEYS

MAIN MENU

Pressing this function key will return the operator to the Main Menu Screen.

CONTROL SYSTEM**UTILITY SCREEN (Continued)****FUNCTION KEYS (Continued)****CONFIG SCREEN**

Pressing this function key will display a Configuration Screen Warning (Figure 16). The operator must be sure that exiting the system is needed.



Figure 16. Configuration Screen Warning

Pressing CANCEL will return the operator to the Utility Screen.

Pressing CONFIG SCREEN will display the Configuration Mode Screen (Figure 17). The Configuration Screen is built into the PanelView Plus firmware. This screen allows supervisory personnel to modify system setup details, ie. terminal language, date and time, screen adjustments etc. For detailed information on this screen, read the Allen-Bradley PanelView™ Plus Operator Terminal User Manual included in this manual.

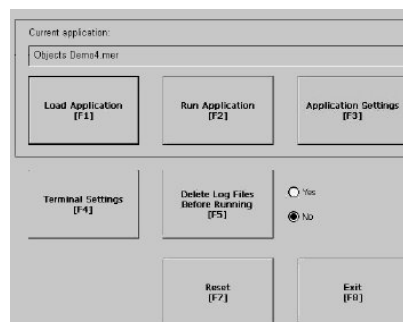


Figure 17. Configuration Mode Menu Screen

FAULTS AND ALARMS

The following pages will describe the various types of faults that can trigger an alarm during processing. When a fault has occurred an alarm message is displayed in the Alarm section of the software and an audio alarm is sounded.

There are two (2) different types of faults:

 Main/Critical Faults

 Analog/Digital Input Faults

MAIN/CRITICAL FAULTS

Main/Critical faults affect the entire system, causing all outputs to be disabled.

Although the process is aborted and put on HOLD, product batches are not necessarily jeopardized. It is dependent on what stage in the process the main/critical fault occurred and the length of time needed to correct the fault and resume the process. Testing for signs of the Main/Critical faults and keeping equipment in good working order can reduce the occurrences of these faults.

The fault must be corrected and the alarm acknowledged before the system function keys are enabled and the process can be resumed.

Main/Critical faults for the Roller Compactor system are as follows:

■ Main Air Fault

This fault indicates that main air pressure is not being detected at the main air pressure switch. Maintenance checks on the main air source is advised. Possible failure of the pressure switch. Repair, turn control power back on and acknowledge the alarm on the screen.

FAULTS AND ALARMS

MAIN/CRITICAL FAULTS (Continued)

■ Emergency Stop Fault

This fault occurs when an emergency stop button on the system has been pressed. The operator should find out why the emergency stop button was pressed and take care of or remove any hazardous situations. The emergency stop should then be pulled out, control power turned back on and the alarm acknowledged on the screen.

■ Control Power Input Fault

The control power is automatically turned off whenever a main/critical fault has occurred. Correct the fault that caused this, turn the control power back on via the control power switch on the front of the operator interface panel and acknowledge the alarm at the screen.

PLC Communications Fault

This fault indicates that the communication link between the Panelview and PLC has been severed. The operator should re-establish communication and acknowledge the alarm on the screen.

DIGITAL INPUT FAULTS

The Digital Input faults indicate the system components are not responding to PLC commands. This could be a result of component malfunction. If the fault occurs during a process, the component is shut down.

The following faults occur when communication is lost between the frequency drive and the PLC.

- Roll Drive Comm Fault
- Screw Drive Comm Fault

FAULTS AND ALARMS

DIGITAL INPUT FAULTS (Continued)

The following faults occur when the inputs have been deactivated and are not responding to the PLC commands. Check the appropriate device and acknowledge the alarm on the screen.

- Roll Motor Running Fault
- Screw Motor Running Fault
- Mill Motor Running Fault
- Screw Hopper in Place Fault
- Front Cover Switch Fault

SEQUENCE OF OPERATION

START-UP PROCEDURES

1. Check to make sure that the machine is assembled properly.
2. Check to be sure that all service connections have been made; ie. Main air, electricity, etc.
3. Make sure all equipment covers and guards are in position.
4. Prepare powder for processing.
5. Plug the process variable printer into the data port at the rear of the Operator Interface Panel (OIP).
6. On the OIP turn control power to ON. When the system has completed initialization, the Main Menu Screen will be displayed.
7. At the Main Menu Screen, select the Process Mode function key.
8. At the Process Display Screen enter setpoints for:
 - Roll Speed
 - Screw Speed
 - Mill Speed
 - Roll Force/Pressure
 - Printing Interval
9. Begin the process by turning the pressure rolls on. Adjust the roll speed as needed.
10. Add product to the supply hopper.
11. Turn on screw feeder. Adjust screw speed as needed.

The operator continues to monitor and control the compacting process through the Process Display Screen. Setpoint values can be changed during system operation in accordance with actual results.

Throughout the compacting process, be sure to note setpoints and screen display values for future reference. Printed reports are valuable for this.

SEQUENCE OF OPERATION

SHUT-DOWN PROCEDURES

1. Turn the rolls OFF.
2. Deactivate roll pressure

The routine start-up and shut-down of the roller compactor previously described must be followed in the correct sequence. Altering the sequence may create a circumstance of overloading and obstructing the normal passage of material through the machine. Unnecessary wear and possible breakage of parts can occur through machine abuse.

All motors must be turned ON before processing can begin. If any motor is OFF, operation cannot be executed properly and blockage and/or damage to unit can occur.