

VIPER (E) FLAVOR LOW OVERRUN

Service Manual



Release Date: May 10, 2016

Publication Number: 621360241LOEWSE

Revision Date: January 09,2017

Revision: B

Visit the Cornelius web site at www.cornelius.com for all your Literature needs.

The products, technical information, and instructions contained in this manual are subject to change without notice. These instructions are not intended to cover all details or variations of the equipment, nor to provide for every possible contingency in the installation, operation or maintenance of this equipment. This manual assumes that the person(s) working on the equipment have been trained and are skilled in working with electrical, plumbing, pneumatic, and mechanical equipment. It is assumed that appropriate safety precautions are taken and that all local safety and construction requirements are being met, in addition to the information contained in this manual.

This Product is warranted only as provided in Cornelius' Commercial Warranty applicable to this Product and is subject to all of the restrictions and limitations contained in the Commercial Warranty.

Cornelius will not be responsible for any repair, replacement or other service required by or loss or damage resulting from any of the following occurrences, including but not limited to, (1) other than normal and proper use and normal service conditions with respect to the Product, (2) improper voltage, (3) inadequate wiring, (4) abuse, (5) accident, (6) alteration, (7) misuse, (8) neglect, (9) unauthorized repair or the failure to utilize suitably qualified and trained persons to perform service and/or repair of the Product, (10) improper cleaning, (11) failure to follow installation, operating, cleaning or maintenance instructions, (12) use of "non-authorized" parts (i.e., parts that are not 100% compatible with the Product) which use voids the entire warranty, (13) Product parts in contact with water or the product dispensed which are adversely impacted by changes in liquid scale or chemical composition.

Contact Information:

To inquire about current revisions of this and other documentation or for assistance with any Cornelius product contact:

**www.cornelius.com
800-238-3600**

Trademarks and Copyrights:

This document contains proprietary information and it may not be reproduced in any way without permission from Cornelius.

This document contains the original instructions for the unit described.

CORNELIUS INC
101 Regency Drive
Glendale Heights, IL
Tel: + 1 800-238-3600

Printed in U.S.A.

TABLE OF CONTENTS

Safety Instructions	1
Read And Follow All Safety Instructions	1
Safety Overview	1
Recognition	1
Different Types of Alerts	1
Safety Tips	1
Qualified Service Personnel	2
Safety Precautions	2
Shipping And Storage	2
CO ₂ (Carbon Dioxide) Warning	2
Mounting in or on a Counter	3
Cart Information And Mounting	3
Introduction	4
Manual Overview	4
Dispensed Product Conditions	5
Overrun, As Applied To Carbonated Beverages	5
Overrun Definition	5
Overrun Is A Variable	5
Specific Product Ingredients Affect Overrun	5
BRIX Affects Overrun	5
Low Dispensing Volume Affects Overrun	5
Carbonation Level in Liquid Product Affects Overrun	5
Freezing Affects Overrun	5
System Overview	7
Introduction	7
Theory of Operation	7
CO ₂ System	12
Water System	16
Syrup System	16
Control Panel	16
Introduction	16
Control Panel Display	16
Control Panel Buttons	17
Control Panel Menu Descriptions	18
System Menus	18
Main Menu	19
Unit Data Menu	20
Error Status Menu	20
Error Log Menu	22

Setup Menu	23
Clock Setup Menu	23
Setting the Clock	24
Setting Daylight Savings Time	24
Events Setup Menu	25
Setting Events	26
Setting the Sleep and Wakeup Times	26
Setting Defrost Lockout	27
Viscosity Setup Menu	28
CO ₂ Setup Menu	28
Option Setup Menu	29
Setting the Temperature Format	29
Setting the Date Format	30
Setting the Time Format	30
Setting the POS Lighting	30
Setting the Type of Syrup	30
Barrel Maintenance	30
Maintenance Menu	30
Barrel Maintenance Menu	30
Purging a Barrel	31
Filling a Barrel	31
Run the Barrel Motor	32
Rinsing a Barrel	32
Manual Diagnostic Menu	32
Totals Menu	33
BRIX Setup Menu	34
Motor Setup Menu	37
Calibrating a Motor	38
System Menu	38
Security	39
Pressure Sensors	39
Operation	41
Maintaining Product Quality	41
Dispensed Product Throughput	41
Programmed Defrost Scheduling	41
Sleep Mode Recommendations	41
Viscosity Setting	42
CO ₂ Setting	42
Starting the Unit	42
Preventative Maintenance	43

Summary	43
Monthly Maintenance	43
Cleaning Air Filter	43
Semi-Annual Maintenance	44
Inspecting and Replacing Scraper Blades	44
Cleaning the Syrup Connections	45
Servicing Motorman Dispensing Valves	45
Sanitizing the System	46
Emptying a Barrel	47
Flushing the System of Syrup	47
Sanitizing the Barrel	48
Flushing the System	48
Component Replacement	50
Barrel Motor Seal Replacement	50
Removing the Existing Seal	50
Installing a New Seal	50
Motor Seal Leak Test	52
Barrel Motor Replacement	52
Motor Run Capacitor Replacement	53
Water Pump Replacement	54
CO ₂ Pulse Valve Replacement	54
Syrup and Water Shutoff Solenoid Replacement	55
Condenser Fan Motor Replacement	56
Compressor Replacement	57
Hot Gas Solenoid Replacement	58
Liquid Line Solenoid Replacement	58
Syrup Pressure Switch Replacement	59
Water Pressure Switch Replacement	59
Display Board Replacement	60
Control Board Replacement	61
Software Compatibility	61
Motor Board Replacement	61
Troubleshooting	63
Troubleshooting the System	63
Troubleshooting Product Not Cold	64



SAFETY INSTRUCTIONS

READ AND FOLLOW ALL SAFETY INSTRUCTIONS

Safety Overview

- Read and follow **ALL SAFETY INSTRUCTIONS** in this manual and any warning/caution labels on the unit (decals, labels or laminated cards).
- Read and understand **ALL** applicable **OSHA** (Occupational Safety and Health Administration) safety regulations before operating this unit.

Recognition



Different Types of Alerts

DANGER:

Indicates an immediate hazardous situation which if not avoided **WILL** result in serious injury, death or equipment damage.

WARNING:

Indicates a potentially hazardous situation which, if not avoided, **COULD** result in serious injury, death, or equipment damage.

CAUTION:

Indicates a potentially hazardous situation which, if not avoided, **MAY** result in minor or moderate injury or equipment damage.

SAFETY TIPS

- Carefully read and follow all safety messages in this manual and safety signs on the unit.
- Keep safety signs in good condition and replace missing or damaged items.
- Learn how to operate the unit and how to use the controls properly.
- **Do not** let anyone operate the unit without proper training. This appliance is **not** intended for use by very young children or infirm persons without supervision. Young children should be supervised to ensure that they do not play with the appliance.
- Keep your unit in proper working condition and do not allow unauthorized modifications to the unit.

NOTE: The dispenser is not designed for a wash-down environment and MUST NOT be placed in an area where water jet could be used.

QUALIFIED SERVICE PERSONNEL

WARNING:

Only trained and certified electrical, plumbing and refrigeration technicians should service this unit. **ALL WIRING AND PLUMBING MUST CONFORM TO NATIONAL AND LOCAL CODES. FAILURE TO COMPLY COULD RESULT IN SERIOUS INJURY, DEATH OR EQUIPMENT DAMAGE.**

IF THE SUPPLY CORD IS DAMAGED, IT MUST BE REPLACED BY THE MANUFACTURER, ITS SERVICE AGENT OR SIMILARLY QUALIFIED PERSONS IN ORDER TO AVOID A HAZARD.

SAFETY PRECAUTIONS

This unit has been specifically designed to provide protection against personal injury. To ensure continued protection observe the following:

WARNING:

Disconnect power to the unit before servicing following all lock out/tag out procedures established by the user. Verify all of the power is off to the unit before any work is performed. **FAILURE TO DISCONNECT THE POWER COULD RESULT IN SERIOUS INJURY, DEATH OR EQUIPMENT DAMAGE.**

CAUTION:

Always be sure to keep area around the unit clean and free of clutter. **FAILURE TO KEEP THIS AREA CLEAN MAY RESULT IN INJURY OR EQUIPMENT DAMAGE.**

SHIPPING AND STORAGE

WARNING:

Do not use dispense spigot to lift or move unit as this could result in personal injury.

CAUTION:

Before shipping, storing, or relocating the unit, the unit must be sanitized and all sanitizing solution must be drained from the system. A freezing ambient environment will cause residual sanitizing solution or water remaining inside the unit to freeze resulting in damage to internal components.

CO₂ (CARBON DIOXIDE) WARNING

DANGER:

CO₂ displaces oxygen. Strict attention **MUST** be observed in the prevention of CO₂ gas leaks in the entire CO₂ and soft drink system. If a CO₂ gas leak is suspected, particularly in a small area, **IMMEDIATELY** ventilate the contaminated area before attempting to repair the leak. Personnel exposed to high concentrations of CO₂ gas experience tremors which are followed rapidly by loss of consciousness and **DEATH**.

MOUNTING IN OR ON A COUNTER

WARNING:

When installing the unit in or on a counter top, the counter must be able to support a weight in excess of 450 lbs. to insure adequate support for the unit.

FAILURE TO COMPLY COULD RESULT IN SERIOUS INJURY, DEATH OR DAMAGE TO THE EQUIPMENT.

NOTE: Many units incorporate the use of additional equipment such as ice makers. When any additional equipment is used you must check with the equipment manufacturer to determine the additional weight the counter will need to support to ensure a safe installation.

THE APPLIANCE HAS TO BE PLACED ON A HORIZONTAL SURFACE.

CART INFORMATION AND MOUNTING

These carts are also designed with movable wheels (for 2-Barrel units) that act as outriggers to provide stability to the unit when it is being moved.

WARNING:

The above listed mounting bolts must be installed and the wheels extended and locked in the outboard position (for 2-Barrel units) prior to moving the unit.

FAILURE TO COMPLY COULD RESULT IN SERIOUS INJURY, DEATH OR EQUIPMENT DAMAGE.

INTRODUCTION

MANUAL OVERVIEW

The organization of this manual allows the user to scan quickly to the subject of interest along the left side of a page and to read the detail about the subject or procedure on the right side of the page. The manual provides the detail needed for newcomers to the industry while allowing experienced technicians to skip over the details and move quickly through the material.

This manual is designed as a guide to the technician in maintaining and servicing the Viper system. The Viper system is simple in design and has built-in features and diagnostic controls to help the service technician quickly and accurately service the machine.

The unit consists of multiple freeze barrels that each contain an internal beater driven by a rear mounted electric motor, a refrigeration system, timer-controlled, automatic hot gas defrost system and interconnecting tubing and controls required to dispense the product.

Some of the system features and functions are listed below:

- Simple User Interface LCD Display
- Real Time Clock
- Incoming Line Voltage Sensing
- Pressure Sensing of Incoming Water, Syrup and CO₂
- System Error Handling
- Error Log
- Viscosity Control

DISPENSED PRODUCT CONDITIONS

OVERRUN, AS APPLIED TO CARBONATED BEVERAGES

OVERRUN DEFINITION

Overrun is defined as product expansion that takes place in the frozen carbonated drink. It is caused primarily by CO₂ gas breakout and secondarily by freezing.

OVERRUN IS A VARIABLE

The percentage or degree of overrun depends on a number of factors. The specific syrup, BRIX, low dispensing volume, carbonation level in the liquid product and freezing of the product. These items all affect overrun. After these factors have been considered, desired viscosity (product consistency) adjustment may be made on the unit. The viscosity adjustment adjusts product texture from very wet to light.

SPECIFIC PRODUCT INGREDIENTS AFFECT OVERRUN

Each syrup has its own specific formulation of makeup. Fruit flavors contain citric acids that colas do not. Colas also differ in ingredients from one brand to another. Each product formulation has its own peculiarities regarding the way the product absorbs carbonation and the way it releases carbonation.

BRIX Affects Overrun

Sugar in carbonated drinks is like anti-freeze in water. The higher the BRIX, the greater the resistance of the product to freezing. Conversely, in products with lower BRIX, freezing takes place at higher temperatures than for high-BRIX products. Thus, BRIX affects overrun because the amount of sugar in a drink has a direct bearing on the product's freezing characteristics.



Figure 1.

Low Dispensing Volume Affects Overrun

When a unit sits idle for a period of time with no drinks being dispensed, CO₂ gas in the system takes a "set". When the first few drinks are drawn off after an idle period, CO₂ gas has less tendency to break out as the drink is dispensed. The result is that these first drinks have less overrun than drinks dispensed during peak-use periods.

Carbonation Level in Liquid Product Affects Overrun

The higher the specific carbonation level in a given product, the greater the potential for carbonation breakout in frozen carbonated form of that drink. For example, drinks with 3.0 volume of carbonation have more gas breakout in frozen carbonated form and more overrun than drinks that contain 2.0 volumes of CO₂ gas.

Freezing Affects Overrun

Freezing causes approximately a 5-7 percent expansion in dispensed frozen carbonated drinks. The degree of freezing is limited because the finished drink is intended to be sipped through a straw. This is not possible if the product is too "solid".

SYSTEM OVERVIEW

INTRODUCTION

The Viper unit consists of the following systems and hardware:

Multiple freeze barrels, each containing an internal scraper bar driven by an AC motor.

A refrigeration system and an intelligent, hot gas defrost system.

The components are enclosed in a powder-coated steel frame to prevent corrosion. It is covered with ventilated cladding panels and a lighted merchandiser. The cladding is easily removable to facilitate installation, service and maintenance.

Each barrel has a transparent faceplate, with an integral relief valve and a removable, self-closing dispensing valve mounted on the front. A removable drip tray, with cup rest, is located directly below the dispensing valves.

A programmable control system with a control panel that controls operational and diagnostic functions and settings is located behind the merchandiser.

THEORY OF OPERATION

The refrigeration system schematic is shown in Figure 2. for a 3-Barrel Viper unit, and Figure 3. for a 4-Barrel Viper unit. These show the basic configuration for the Viper refrigeration system for the 3-Barrel and 4-Barrel Viper units, respectively.

The wiring diagram of the 3-Barrel Viper unit is shown in Figure 4. This diagram shows the details of the electrical connections in the unit.

The wiring diagram of the 4-Barrel Viper unit is shown in Figure 5. This diagram shows the details of the electrical connections in the unit.

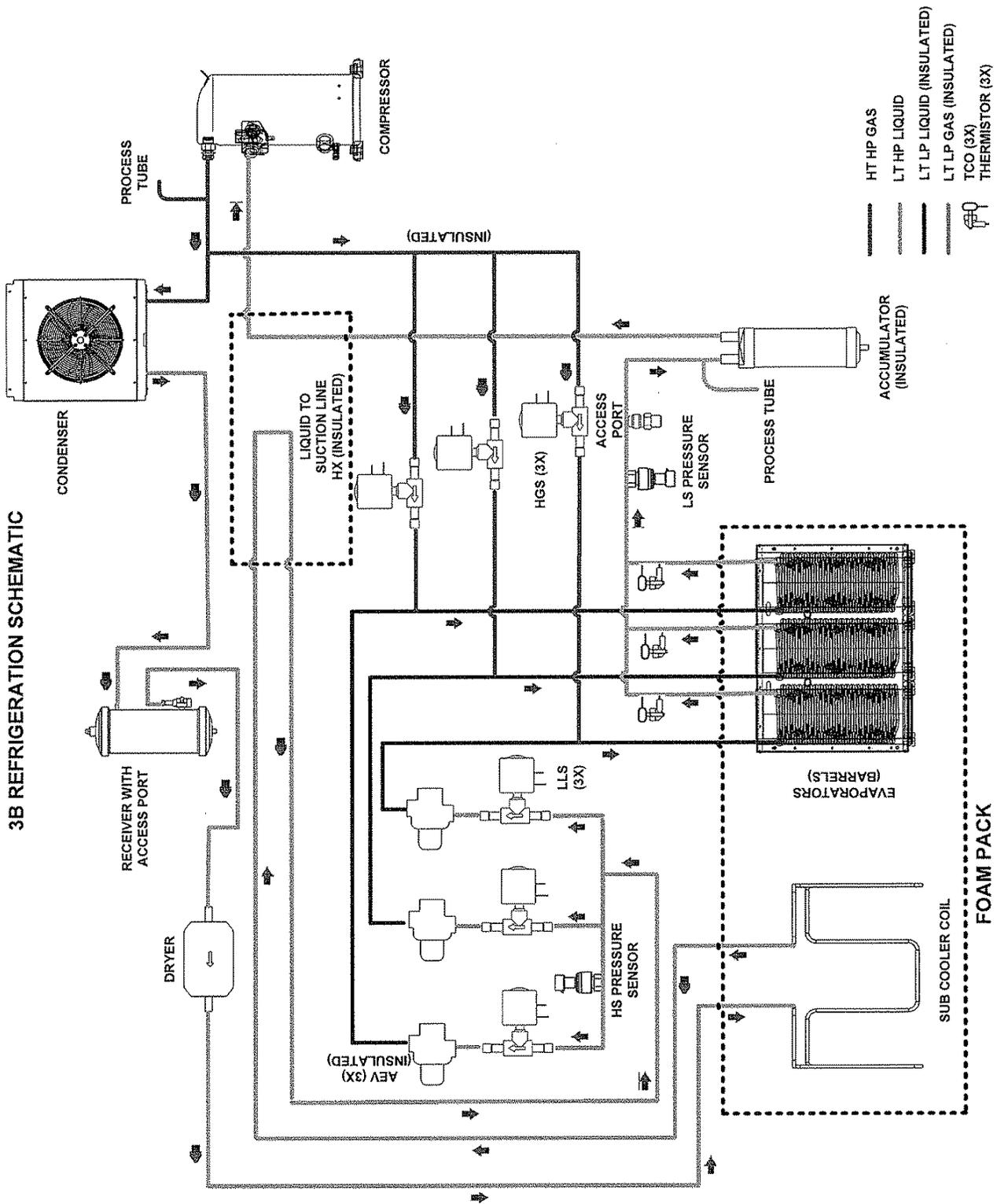


Figure 2. Low overrun Viper System 3-Barrel Refrigeration Schematic

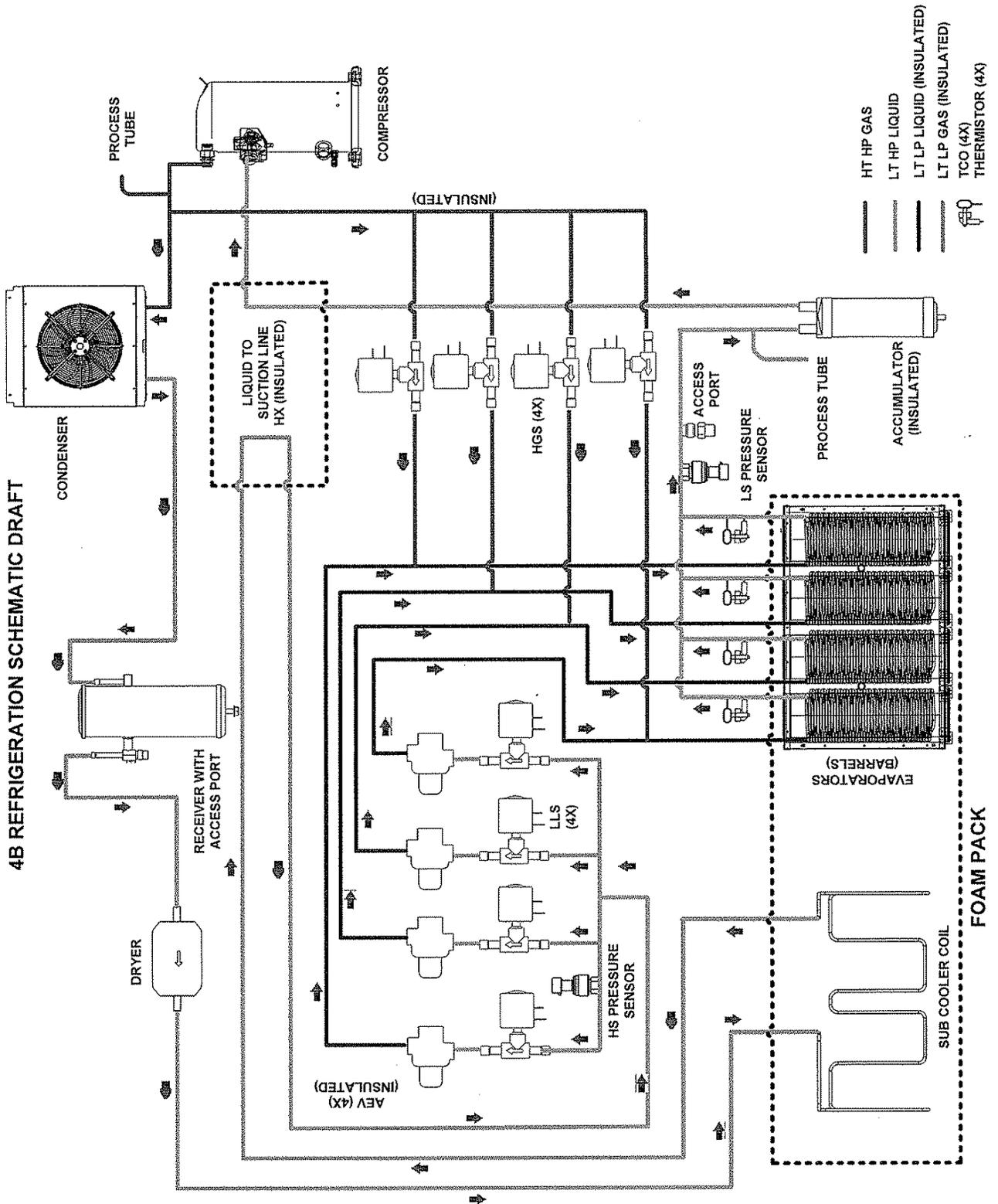


Figure 3. Low overrun Viper System 4-Barrel Refrigeration Schematic

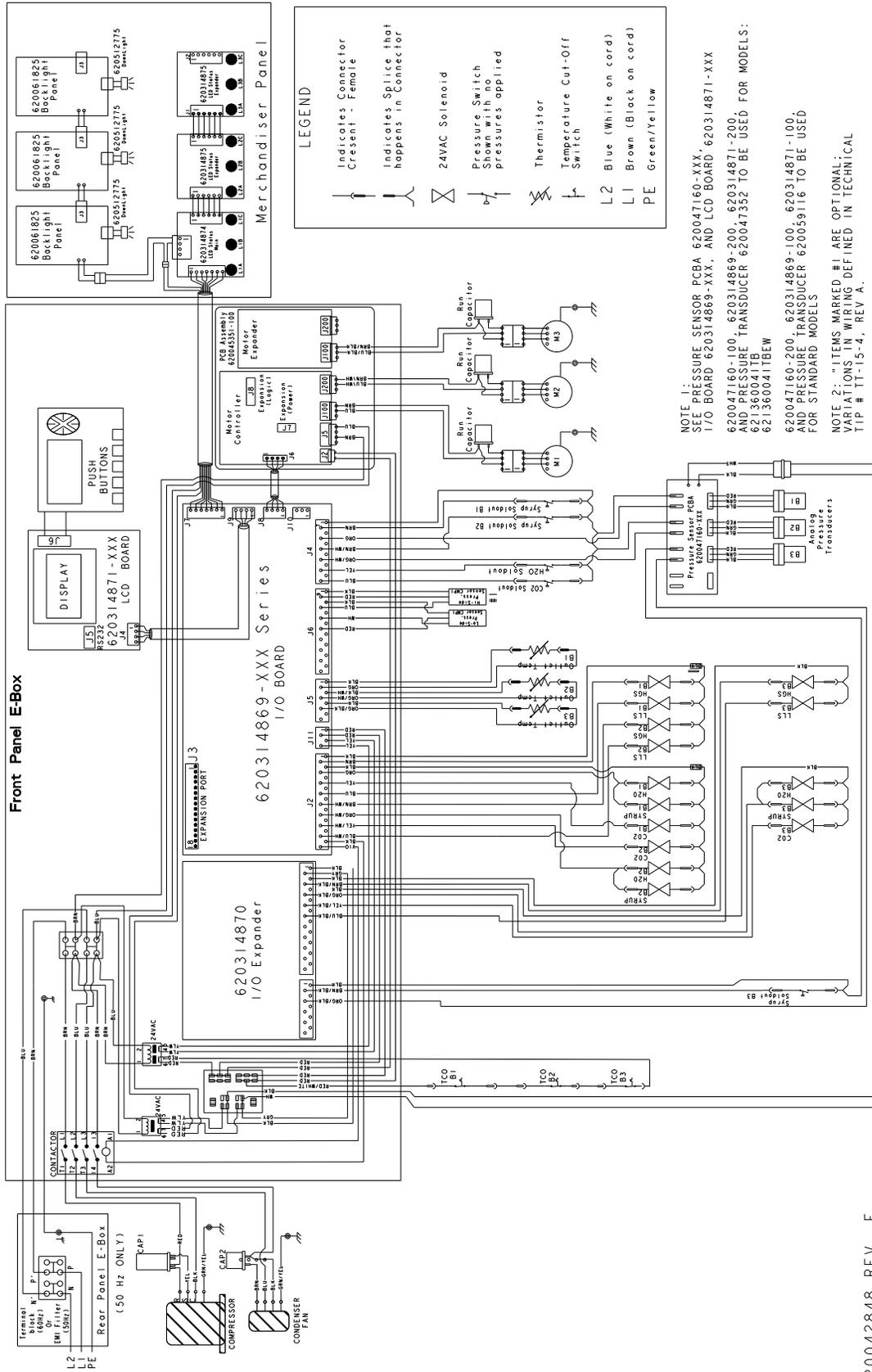


Figure 4. Low overrun Viper 3-Barrel Wiring Diagram

620042848 REV. F

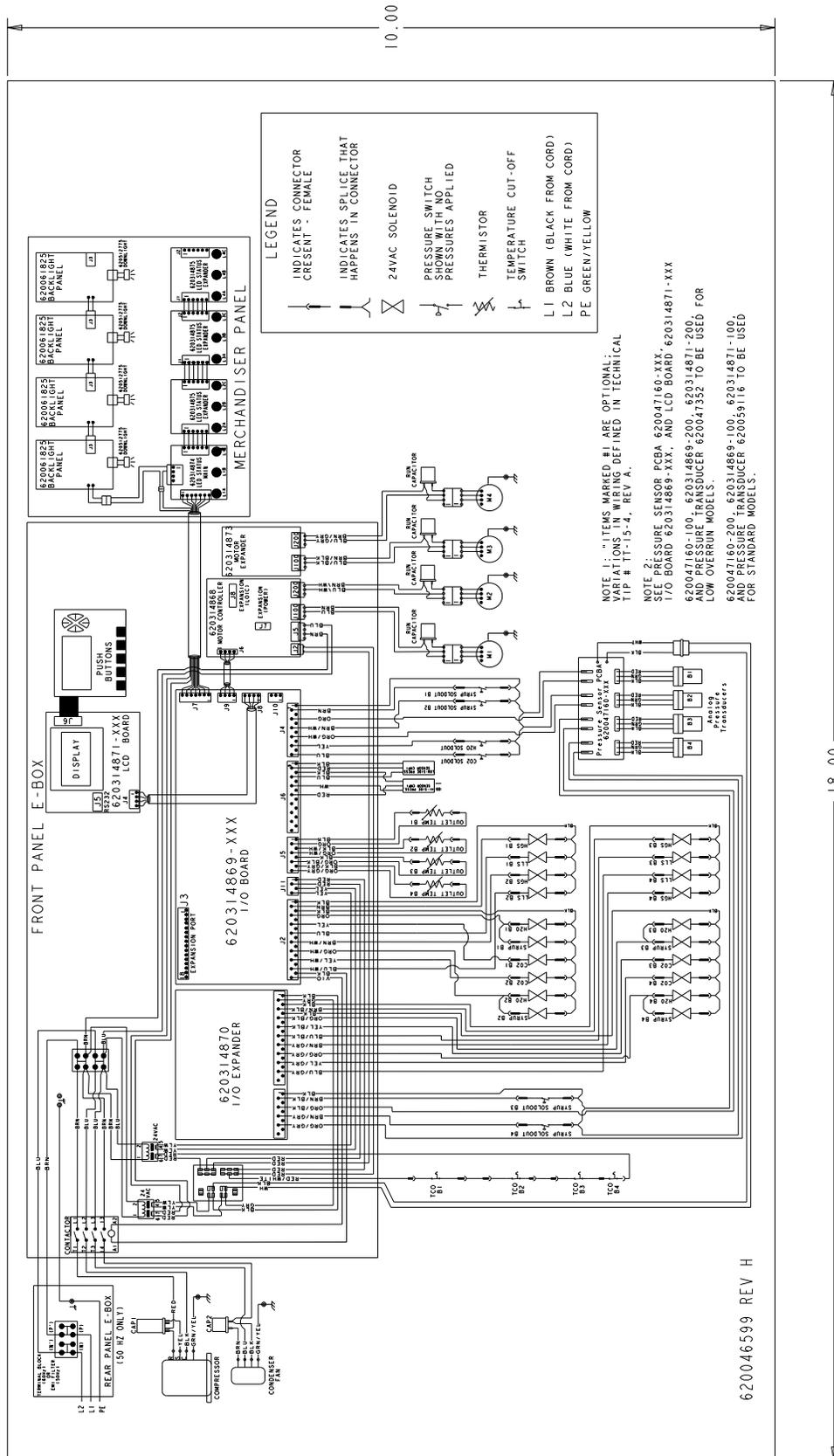


Figure 5. Low overrun Viper 4-Barrel Wiring Diagram

An overall schematic of the three delivery systems contained in the unit are shown in Figure 7. and Figure 8. The CO₂ system is on top, the water system is in the middle and the syrup system is at the bottom of the diagram. The CO₂ system interacts with both the water and syrup systems. It provides pressure and carbonation for the syrup/water product mix.

CO₂ System

A CO₂ tank or bulk CO₂ supply delivers carbon dioxide gas (CO₂) to an adjustable secondary CO₂ regulator assembly that is attached to the tank as shown in Figure 6. The CO₂ system also supplies CO₂ to the water boost pump, the expansion tank regulator and the secondary CO₂ tank regulators.

CO₂ enters the expansion tank regulator and is reduced to approximately 7 psig to feed holding pressure on the expansion tank. This provides a force to work against the barrel pressure when the product freezes and expands.

CO₂ also enters the secondary regulators. These regulators are used to adjust barrel overrun/expansion for various products. The pressure settings for various types of syrup are shown in Table 1. Overrun CO₂ pressure is applied to the CO₂ control solenoids through preset orifices and on to the in-line check valves.

From the in-line check valve, the CO₂ flows into the product line.

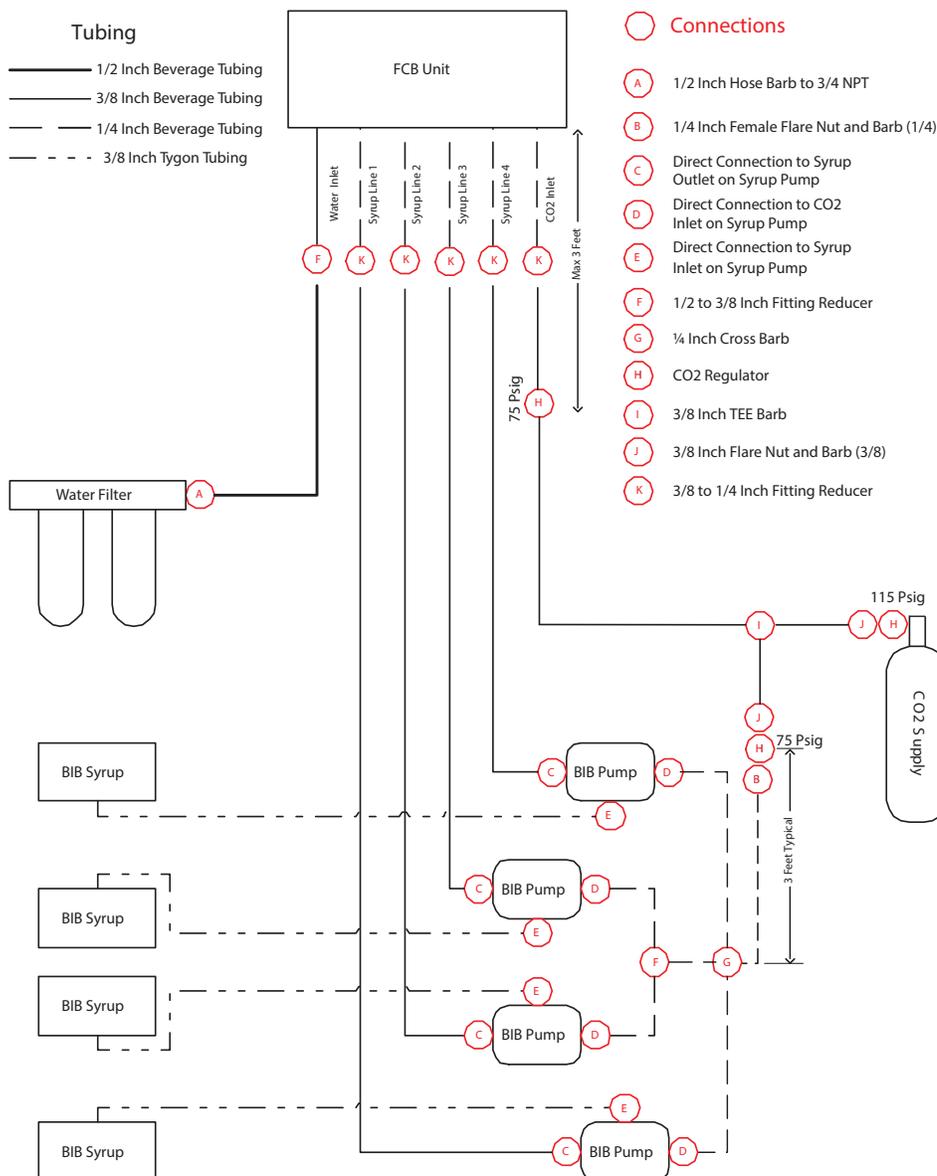


Figure 6. Cylinder CO₂ Connection

Table 1. provides guidelines for machine settings based on general syrup type. Several factors, including syrup formulation, level of citric acids, etc, will impact settings. These settings are to provide initial adjustments to achieve product overruns in the 5-40% range.

Table 1.

Settings	Syrup Type Set	Viscosity	CO2 Setting	Expansion
Nominal Settings	FCB	3	50%	7 PSIG

NOTE: For citric syrups, adjust the CO₂ pressures down by 5-10% PSIG from the above to compensate for the lower CO₂ adsorption.

VIPER PDEL 3 BARREL SCHEMATIC

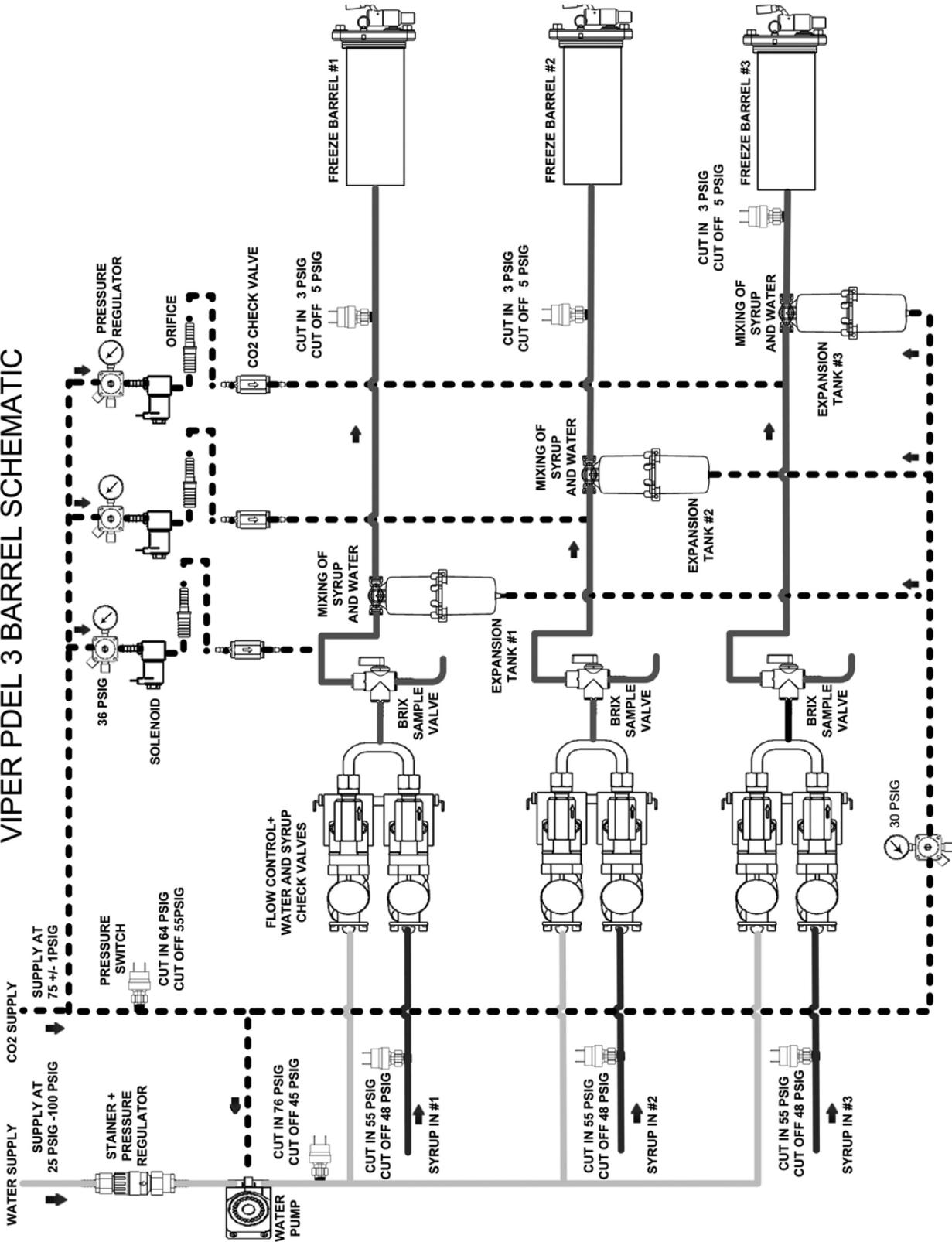


Figure 7. 3-Barrel System Schematic

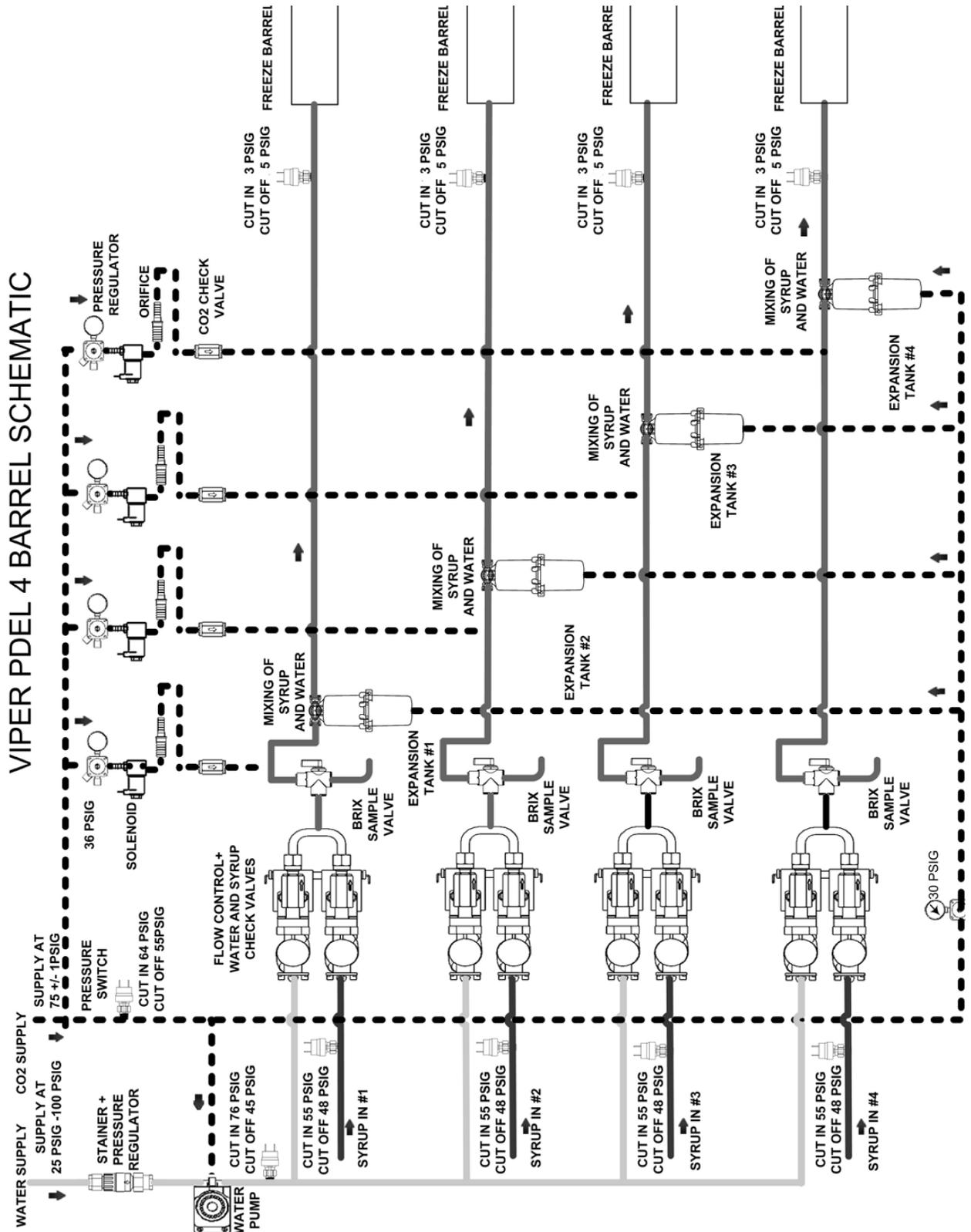


Figure 8. 4-Barrel System Schematic

Water System

Incoming water flows to a water pressure regulator that is preset to 30 psig. It flows through the water booster pump, to the regulator and through a sold-out switch.

Once through the boost pump, the water supply is split to each barrel and is fed to the water flow controls. From the flow rate control, the water passes through a single ball check valve and mixes with the syrup in a Wye fitting for injection into the freeze barrel.

Syrup System

Syrup enters the unit through a sold-out switch. It enters a similar flow control to the water system, passes through a single-ball check valve and into the Wye fitting where it meets the water for injection into the freeze barrel.

CONTROL PANEL

Introduction

The Viper unit uses a microprocessor based control system that monitors and controls all of the major systems and components of the machine. Temperatures and pressures are monitored, along with pumps, valves and the refrigeration system. They are managed by the control system to provide a consistently high quality product with optimal efficiency.

The control system is set up by the service provider to perform the tasks necessary to keep the Viper unit operating correctly. In addition to controlling the unit, the control system keeps track of the diagnostic information used when adjusting and/or repairing the machine.

The control system needs to be accessed in the following situations:

- Installing the Viper
- Modifying Operating Characteristics
- Checking Performance
- Servicing/Repairing the Machine
- Checking for Error Messages

The control system is accessed using the control panel located behind the lighted merchandiser. The control panel contains an LCD display and buttons shown in Figure 9.

There are 2 levels of access to the control panel: The first level can be accessed by the operator for normal operation and the second level is used by qualified service technicians for installation and service functions. The service functions can be secured (locked out) so that an operator does not have access to them. The control panel has a structured organization of menus. The outline of this structure is shown in Figure 10. The Maintenance sub-menu is not visible when the security feature is on.

The first menu that is displayed after the unit is powered up and stabilized is the BARREL STATUS or HOME menu, shown in Figure 9. This menu is displayed when the unit is running in normal operation.

Control Panel Display

The control panel display has two main areas. The first area is the menu display area. This area presents information about the status and settings of the machine. It also displays menus of actions that are taken to modify the functioning of the machine.

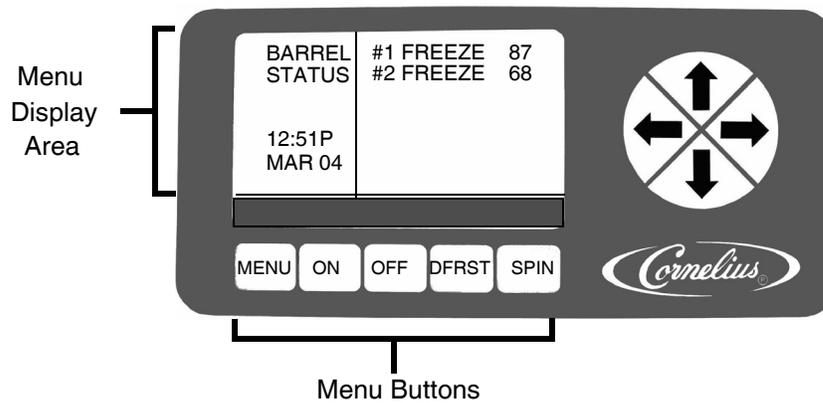


Figure 9. Control System Display

Control Panel Buttons

The second area are the buttons and arrows located across the bottom and on the right side of the control panel. There are up to five buttons and four directional arrows that may be used on a screen to activate and control various the functions of the system. Each button that is active for a given menu has a label directly above it. The label describes what that button controls. For example, from the Barrel Status menu, pressing button 1 (labeled MENU) displays the Select menu with more options — pressing button 3 (labeled OFF) turns off the highlighted barrel.

On each menu below the Select menu, there is a button (labeled BACK) to save any settings and return to the previous menu. There is another button (GO) to advance to the highlighted menu.

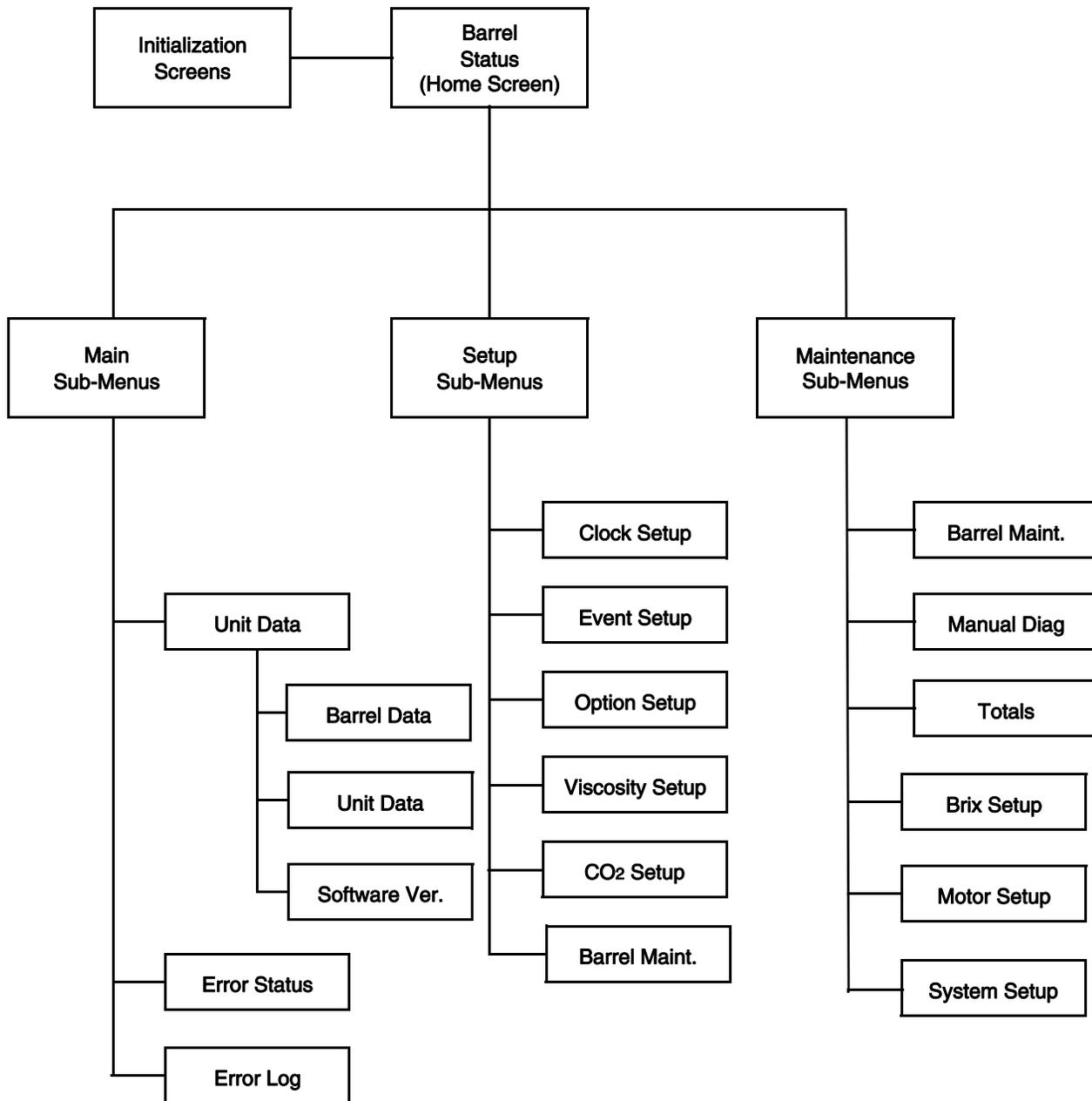


Figure 10. Software Structure

CONTROL PANEL MENU DESCRIPTIONS

The following section describes the information displayed on each control panel menu and the interactions and settings that are controlled by that menu.

System Menus

The system menu structure allows the user to control the unit through the control panel. Operational settings, optional parameters, troubleshooting and error information are controlled through this menu system.

The Barrel Status menu, shown in Figure 11. Is the home screen for the unit. During normal operation, this screen is displayed on the control panel. Refer to Table 2. for button functions.

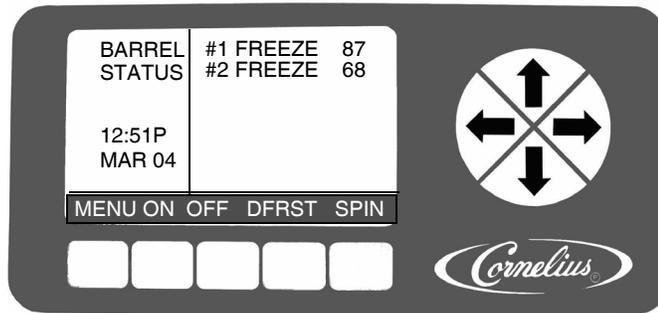


Figure 11. Main Screen

Table 2.

Button	Description
MENU	Displays the Main menu
ON	Turns on the highlighted barrel
OFF	Turns off the highlighted barrel
DFRST	Initiates a manual defrost on the highlighted barrel. Manual defrost is limited to a two minute cycle. If the barrel is off, this selection initiates a full defrost cycle.
SPIN	Turns off refrigeration, if on and mixes the product in the barrel.

Main Menu

To access the menus for the system from the Barrel Status menu, press the MENU button. This displays the Select menu, shown in Figure 12. The Setup and Maintenance menus are accessed through the buttons shown at the bottom of the display.

NOTE: If security is turned on, the MAINT button is not displayed.

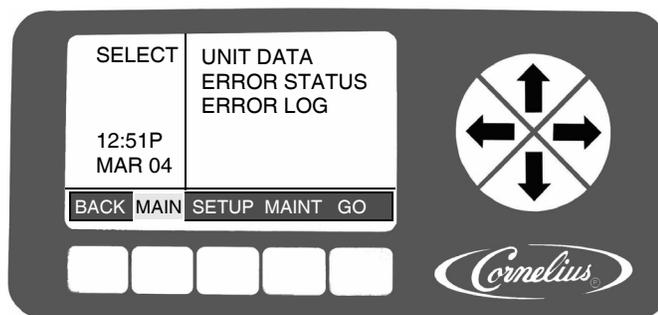


Figure 12. Select Screen

When the Select menu is displayed, the Unit Data is highlighted. To access the Unit Data menu, press the GO button. Refer to Table 3., the Select menu, for button functions.

Table 3.

Button	Description
BACK	Returns the display to the Barrel Status menu
MAIN	Highlighted to indicate current menu
SETUP	Opens the Setup menu
MAINT	Displays and opens Maintenance menu, if security is off or accessed

Table 3.

Button	Description
GO	Opens the highlighted selection on the current menu

Unit Data Menu

The Unit Data screen, shown in Figure 13., provides information about the individual barrels in the system. When DATA is highlighted and the GO button is pressed on the Select menu, the display shows the first barrel in the system and some of its parameters. To view the next barrel, press the Down arrow on the right side of the display. Continue pressing the down arrow to view the data on all barrels in the system. Refer to Table 4. for button functions.

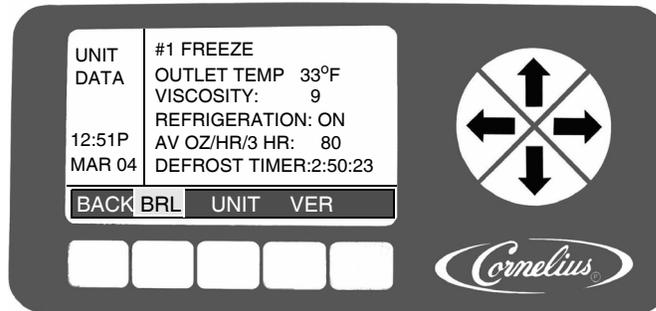


Figure 13. Unit Data Screen

Table 4.

Button	Description
BACK	Returns the display to the Select menu
BRL	Displays the data for a single barrel, including Outlet Temperature, Viscosity, if Refrigeration is On or Off, Average Ounces of product dispensed per hour for the last three hours and Defrost Lock Time until next defrost
UNIT	Displays the real time input voltage and frequency being supplied to the unit and the low, high or both refrigeration pressures for the unit, depending on the settings of the compressor sensors in the Unit Data screen, as shown in Figure 34.
VER	Displays the version number of the UI, I/O, Motor and Status boards installed in the unit

Error Status Menu

The Error Status menu, shown in Figure 14., displays any current errors contained in the Error Messages List.

There are three types of errors that can be generated by the system. These error types and a description of their meaning are listed in Table 5.

Table 5.

Error Type	Description
System	A System error displays the same information across all barrels in the unit.
Barrel	A Barrel error is limited to a specific barrel
Limp	A Limp error is an error that doesn't prevent the unit from operating, but limits functionality.

The possible messages from the control system and a description of the errors are shown in Table 6. The button functions are described in Table 7.

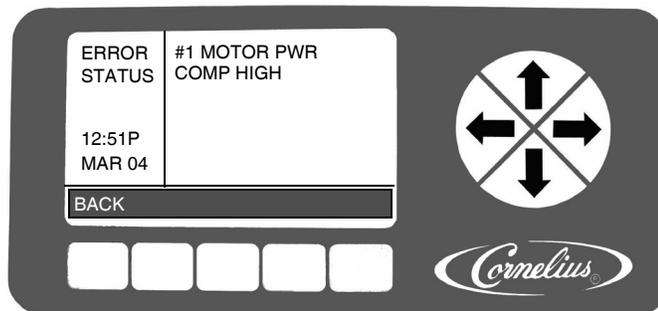


Figure 14. Error Status Screen

Table 6.

Displayed Message	Action	Type	Description
HOT GAS	Off	System	Occurs when the barrel outlet temperature exceeds 115 °F for more than one minute and the compressor is on.
HOT BARREL	Off	System	Occurs when the barrel outlet temperature exceeds 115 °F for more than one minute and the compressor is off.
MTR CTL FAIL		System	The motor controller reported a fault, triacs are shorted and there is a loss of motor on/off functionality.
TCO OPEN		System	TCO (Temperature Cut Off) has occurred on the refrigeration outlet of a barrel or the 24VAC power has failed.
COMM ERR IO		System	A communications error occurred between the IO board and the UI board.
COMM ERR MTR		System	UI board cannot communicate with the motor board.
BARREL REFRG		Barrel	Compressor has been on for more than 45 minutes and the viscosity of the barrel is not satisfied with no draws.
MTR CAL ERR		Barrel	Occurs if a calibration initiated from the Motor Setup menu fails. This indicates that the power draw of the motor is outside the allowable calibration range.
CMP HI-PRESS		System	This error is generated if the low side pressure is greater than 55 psi for greater than 30 sec. Only checked when barrels are in freeze mode and compressor is running more than two minutes.
BRL TEMP OUT		Barrel	Indicates thermistor reading is at min. or max. value for 30 sec. without changing.
MOTOR STALL		Barrel	Motor stalled. A two minute defrost and two retries are allowed, then the message is displayed,
METER FAIL		Barrel	Metering chip is non-responsive.
BRL RECOVER		Barrel	Barrel viscosity is too high. Motor cannot rotate. Automatic two minute defrost to thaw barrel.
COM ERR STAT		Limp	Communications error, the system continues to run.

Table 6.

Displayed Message	Action	Type	Description
HIGH VOLTAGE		System	The unit is experiencing voltage greater than 260VAC. System is enabled when line voltage drops below 260VAC for two minutes.
LOW VOLTAGE		System	The unit is experiencing voltage less than 200VAC. System is enabled when line voltage rises above 200VAC for two minutes.
NO MOTOR		Barrel	The motor is reporting no current draw when activated. Motor is unplugged or thermal cutoff has tripped.
FILL ERROR		Barrel	Barrel has not filled properly within 2 min.
H ₂ O OUT		System	Water pressure is too low for proper operation. This error occurs when the H ₂ O sensor reports no or low water pressure for more than one second. Error is cleared 10 sec. after restoration.
CO ₂ OUT		System	CO ₂ pressure is below required operating pressure. This error occurs when the CO ₂ sensor reports no or low CO ₂ pressure for more than one second. Error is cleared 10 sec. after restoration.
SYRUP OUT		Barrel	Syrup pressure is below required operating pressure. This error occurs when the syrup sensor reports no or low syrup pressure for more than one second. Error is cleared 10 sec. after restoration.
CLOCK		System	The real time system clock is not functioning.
MTR CTL EEPROM		System	Motor control EEPROM is bad or missing.

Table 7.

Button	Description
BACK	Returns the display to the Select menu
RESET	Allows the user to reset the highlighted error (This button only appears on certain manually resettable errors).

Error Log Menu

The Error Log screen displays information about any errors generated by the unit, as shown in Figure 15. If no errors have been detected, the right side of the display is blank. To view more than one error, press the Up or Down arrows on the right side of the display to scroll through the error log. Button functions are described in Table 8.

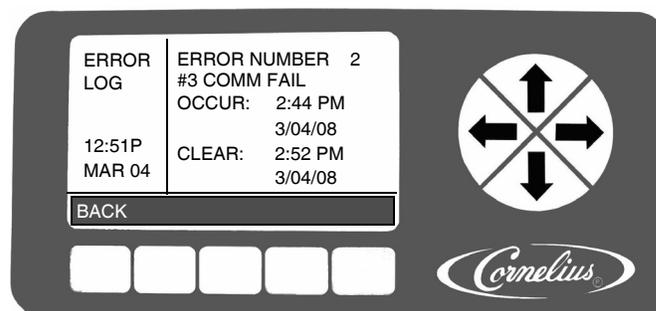


Figure 15. Error Log Screen

Table 8.

Button	Description
BACK	Returns the display to the Select menu

Setup Menu

The Setup menu provides the means to change various settings to local preferences, such as time, date and temperature formats. It also allows the user to adjust the unit for the type of syrup being served in each barrel.

To access the Setup menu from the Barrel Status menu, press the MENU button. This displays the Select menu, shown in Figure 12. Press the SETUP button to display the Setup menu, shown in Figure 16. To set up the unit options, use the Up and Down arrows on the right side of the control panel to highlight the choices on the display. When the desired option is highlighted, press the GO button to access that menu.

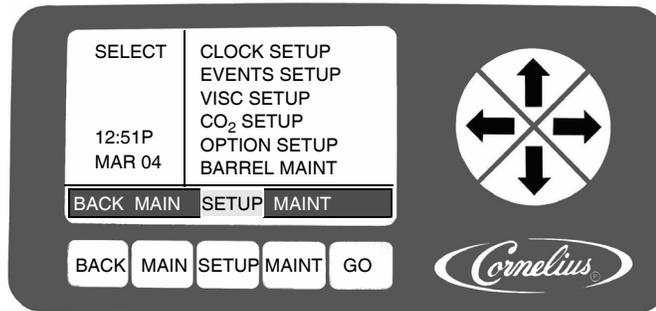


Figure 16. Setup Screen

Table 9.

Button	Description
BACK	Returns the display to the Select menu
MAIN	Opens the Main menu
SETUP	Highlighted to indicate that the Setup menu is displayed
MAINT	Displays button and opens Maintenance menu, if security is off or accessed
GO	Opens the highlighted selection on the current menu

Clock Setup Menu

Select the CLOCK SETUP menu from the Select menu, shown in Figure 16. This displays the Clock Setup menu, shown in Figure 17. Button functions are described in Table 10.

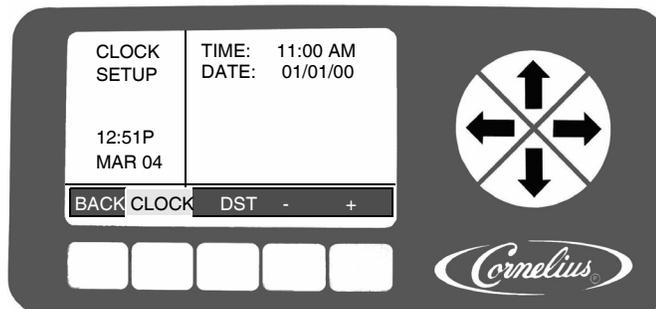


Figure 17. Clock Setup Screen

Table 10.

Button	Description
BACK	Returns the display to the Select menu
CLOCK	Highlighted to indicate that the Clock menu is displayed
DST	Opens the Daylight Savings Time menu
-	Decrements the highlighted field
+	Increments the highlighted field

Setting the Clock

Select the CLOCK SETUP menu from the Select menu, shown in Figure 16. This displays the Clock Setup menu, shown in Figure 17. To set the time, perform the procedure in Table 11.

Table 11.

Step	Action	Procedure
1	Set clock time	Use up and down arrows on the right side of the control panel to highlight TIME display on screen.
2	Select hour field	Use the left and right arrows to select hour field
3	Set correct hour	Use the + or - buttons at the bottom of the display to set the proper hour.
4	Select minute field	Use the left and right arrows to select minute field.
5	Set correct minute	Use the + or - buttons at the bottom of the display to set the proper minute.
6	Select AM/PM field	If the 12 hour clock option is selected, use the left and right arrows to select the AM/PM field.
7	Set AM/PM	Use the + button at the bottom of the display to set the AM/PM setting.

To set the date, perform the procedure in Table 12. and refer to Figure 17.

Table 12.

Step	Action	Procedure
1	Set date	Use up and down arrows on the right side of the control panel to highlight DATE display on screen.
2	Select month field	Use the left and right arrows to select month field
3	Set correct month	Use the + or - buttons at the bottom of the display to set the correct month.
4	Select day field	Use the left and right arrows to select day field.
5	Set correct day	Use the + or - buttons at the bottom of the display to set the correct day.
6	Select year field	Use the left and right arrows to select year field.
7	Set correct year	Use the + or - buttons at the bottom of the display to set the correct year.

Setting Daylight Savings Time

Once the date and time are set properly, daylight savings time settings can be done. The Daylight Savings Time menu is shown in Figure 18. If daylight savings time is off, press the + button to activate it. The button functions are described in Table 13. To set daylight savings time, perform the procedure in Table 14.

NOTE: Default daylight savings settings are for the U.S.

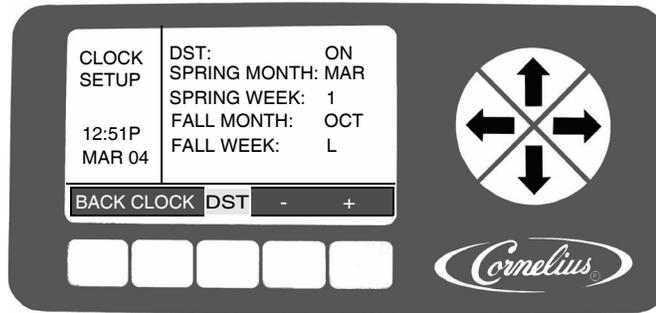


Figure 18. Daylight Savings Setup Screen

Table 13.

Button	Description
BACK	Returns the display to the Select menu
CLOCK	Opens the Clock menu
DST	Highlighted to indicate DST menu
-	Decrements the highlighted field by one increment
+	Increments the highlighted field by one increment

Table 14.

Step	Action	Procedure
1	Set daylight savings time	Press DST button at the bottom of display to open daylight savings time display, shown in Figure 18..
2	Select DST	Use the up and down arrows to select DST.
3	Set DST on	Use the + button to turn on daylight savings time.
4	Select SPRING MONTH	Use up and down arrows to select SPRING MONTH.
5	Set SPRING MONTH	Use the + or - buttons at the bottom of the display to set the correct month.
6	Select SPRING WEEK	Use up and down arrows to select SPRING WEEK.
7	Set SPRING WEEK	Use the + or - buttons at the bottom of the display to set the correct week. The choices are 1, 2, 3 or L.
8	Select FALL MONTH	Use the up and down arrows to select FALL MONTH.
9	Set FALL MONTH	Use the + or - buttons at the bottom of the display to set the correct month.
10	Select FALL WEEK	Use up and down arrows to select FALL WEEK.
11	Set FALL WEEK	Use the + or - buttons at the bottom of the display to set the correct week. The choices are 1, 2, 3 or L.

When the daylight savings settings are complete, press the BACK button to save the settings and return to the Select menu, shown in Figure 16.

Events Setup Menu

The Events Setup menu, shown in Figure 19., allows the user to set sleep periods for the unit and to lock out the defrost cycle during peak busy times. Sleep periods and defrost lockouts may be programmed for any day of the week or for all days of the week, depending on business requirements. Button functions are described in Table 15.

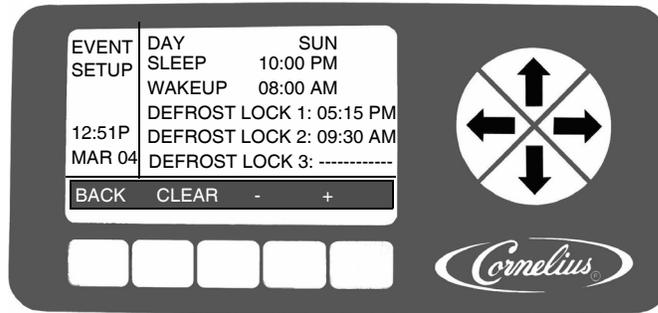


Figure 19. Event Setup Screen

Table 15.

Button	Description
BACK	Returns the display to the Select menu and saves current settings
CLEAR	Clears the highlighted field on the menu
-	Decrements the highlighted field
+	Increments the highlighted field

When the sleep and wakeup settings and the defrost lockout settings are complete, press the BACK button to save the settings and return to the Select menu, shown in Figure 16.

SETTING EVENTS

Events setup allows the user to set sleep periods for the unit and to lock out the defrost cycle during peak busy times. Sleep periods and defrost lockouts may be programmed for individual days of the week or for all days of the week, depending on location requirements.

Setting the Sleep and Wakeup Times

Sleep and wakeup times are set on the Event Setup menu shown in Figure 19. To set the sleep and wakeup times, perform the procedure in Table 16.

When the unit goes into a sleep period, the barrel automatically defrosts for four minutes. Also, if a barrel is off when the sleep cycle starts, the barrel continues to be in the off state when the sleep cycle ends. If a barrel is running when the sleep cycle starts, the barrel starts back up when the sleep cycle ends.

Wakeup should be scheduled for approximately one hour before product is required.

NOTE: Setting the sleep time after midnight requires you to set it during the next day (i.e. Saturday night at 1am must be set as 1am on Sunday, etc.). If this type of setting is required, you cannot set another sleep cycle during that following day, i.e. Sunday.

Table 16.

Step	Action	Procedure
1	Set sleep and wakeup times	Open the Events Setup menu, shown in Figure 19. by pressing the GO button.
2	Select DAY	The DAY field is highlighted.
3	Set DAY	Use the + or - buttons at the bottom of the display to set the desired day or all days.
4	Select SLEEP	Use the up and down arrows to highlight SLEEP.
5	Set hour field	Use the left and right arrows to select the hour field and press the + or - buttons to change the hour.
6	Set minute field	Use the left and right arrows to select the minute field and press the + or - buttons to change the minutes (15 min. increments)

Table 16.

Step	Action	Procedure
7	Select AM/PM field	If the 12 hour clock option is selected, use the left and right arrows to select the AM/PM field. Then press the + or - buttons to change between AM and PM.
8	Select DAY for Wakeup	Repeat Steps 2 and 3 as needed.
9	Select WAKEUP	Use the up and down arrows to highlight WAKEUP and repeat Steps 5 through 7 to set the WAKEUP times.

When the sleep and wakeup settings are complete, press the BACK button to save the settings and return to the Select menu, shown in Figure 16.

Setting Defrost Lockout

From the Barrel Status menu, shown in Figure 11., press the MENU button and then press the SETUP button to display the Setup menu. Use the up and down arrows on the right of the control to highlight the Events Setup menu, then press GO to enter the menu (Figure 19.).

The lockout can also be set day by day or for all days with up to three lockout periods of four hours each per day. These lockout periods may be overlapped to provide from four to 12 hours of defrost lockout, if desired. When the periods are overlapped, it is recommended that the defrost lockouts for sequential lockout periods be overlapped by 15 minutes. The defrost lockout affects all barrels in the unit. To set the defrost lockouts, perform the procedure in Table 17.

Table 17.

Step	Action	Procedure
1	Set defrost lockout	Open Events Setup menu, shown in Figure 19.
2	Select DAY	The DAY field is highlighted.
3	Set DAY	Use the + and - buttons at the bottom of the display to set the desired day or all days.
4	Select DEFROST LOCK 1	Use the up and down arrows to highlight DEFROST LOCK 1.
5	Set hour field	Use left and right arrows to select hour field
6		Use the + and - buttons at the bottom of the display to set the desired hour.
7	Set minute field	Use left and right arrows to select minute field
8		Use the + and - buttons at the bottom of the display to set the desired minute (in 15 min. increments).
9	Select AM/PM field	If the 12 hour clock option is selected, use the left and right arrows to select the AM/PM field.
10		Use the + button at the bottom of the display to set the AM/PM field.
11	Select DEFROST LOCK 2	Repeat Steps 2 through 10 for the DEFROST LOCK 2 time, if desired.
12	Select DEFROST LOCK 3	Repeat Steps 2 through 10 for the DEFROST LOCK 3 time, if desired.

When the defrost lockout settings are complete, press the BACK button to save the settings and return to the Select menu, shown in Figure 16.

Viscosity Setup Menu

The viscosity maintained in the freeze barrels depends on the type of product being served. Some products are served best at a higher viscosity, while others require a lower viscosity for best quality. The Viscosity menu, shown in Figure 20., allows the user to adjust the viscosity in each barrel to the optimum setting for each type of syrup.

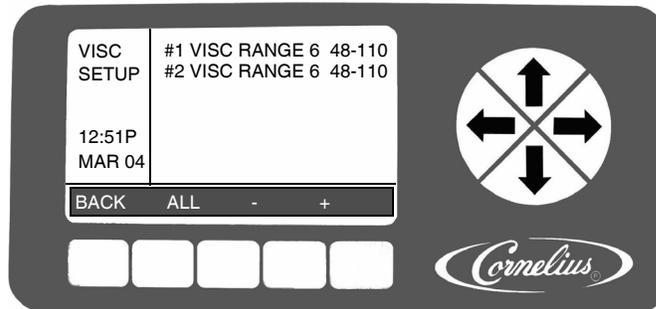


Figure 20. Viscosity Setup Screen

Refer to the Installation manual for the recommended settings based on syrup type.

Table 18.

Step	Action	Procedure
1	Set viscosity range	From the Setup screen (Figure 16.), open the Viscosity Setup screen, shown in Figure 20.
2	Select barrel	Use the Up and Down arrows to highlight the desired barrel.
3	Select range field	Use Left and Right arrows to select range field
4.	Set range	Use the + or - buttons at the bottom of the display to set the desired range.
5	Select barrel	Repeat Steps 2 through 4 for all barrels.

To set all barrels in the system to the same viscosity setting, perform Steps 1 through 4 in Table 18 and then press the ALL button at the bottom of the display while highlighting the viscosity setting you desire for all the barrels. When the viscosity settings are complete, press the BACK button to save the settings and return to the Select menu, shown in Figure 16.

CO₂ Setup Menu

The CO₂ Setup menu, shown in Figure 21., allows the user to adjust the percentage of time that the CO₂ pulse valves are open. This provides an adjustment of the overrun for the unit when using different syrups. The valves use a one second interval duration time. Setting a valve to 45 activates the valve for 450 msec. out of each second.

The CO₂ pulse valves may be set between 0 and 100%, in 5% increments. To change the settings of the CO₂ pulse valves, perform the procedure in Table 19.

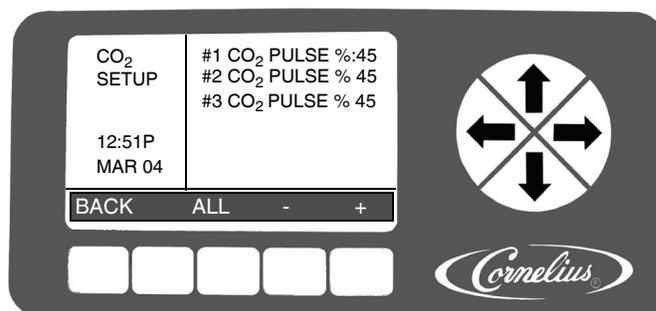


Figure 21. CO₂ Pulse Valve Setup Screen

Table 19.

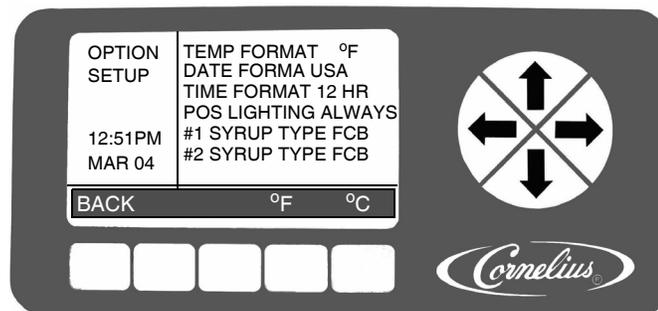
Step	Action	Procedure
1	Set CO ₂ Pulse valve duration	From the Setup screen (Figure 16.), select the CO ₂ Setup screen, shown in Figure 21.
2	Select barrel	Use the Up and Down arrows to highlight the desired barrel.
3	Select duration field	Use Left and Right arrows to select duration field
4	Set duration	Use the + or - buttons at the bottom of the display to set the desired duration.
5	Select barrel	Repeat Steps 2 through 4 for all barrels.

To set all barrels in the system to the same duration setting, perform Steps 1 through 4 in Table 19 and then press the ALL button at the bottom of the display while highlighting the duration setting you desire for all the barrels. When the duration settings are complete, press the BACK button to save the settings and return to the Select menu, shown in Figure 16.

Option Setup Menu

The Option Setup menu allows the user to set the various options available in the system. These options are listed in Table 20.. The Option Setup menu is shown in Figure 22..

The functions of the display buttons change, depending on the highlighted selection on the Option Setup screen. Refer to Table 20. for a listing of the button functions for the various field selections.


Figure 22. Option Setup Screen
Table 20.

Option	Button 2	Button 3	Button 4	Button 5
Temp Format			°F	°C
Date Format			USA	EURO
Time Format			12 HR	24 HR
POS Lighting		OFF	ALWAYS	SLEEP
#1 SYRUP TYPE	FCB	FCB-L	FUB	FUB-L
#X SYRUP TYPE	FCB	FCB-L	FUB	FUB-L

When all the options are set to the desired settings for the unit, press the BACK button to store these settings and return to the Select menu, shown in Figure 16.

Setting the Temperature Format

The temperature format displayed by the unit may be set to either Centigrade or Fahrenheit. Press the °F button to display readings in Fahrenheit and press the °C button to display readings in Centigrade.

Setting the Date Format

The date format can be displayed in either United States or European format. To display U.S. date format, press the USA button. This displays the date in mm/dd/yy format. Press the EURO button to display the date in dd/mm/yy format.

Setting the Time Format

Time format can be displayed in either 12 or 24 hour format. To display the clock settings in 12 hour format (1:08 P), press the 12 HR button. To display settings in 24 hour format (23:05), press the 24 HR button.

Setting the POS Lighting

POS Lighting is controlled by the POS LIGHTING field on the Option Setup menu (Figure 22.). To turn off the merchandiser lighting, press the OFF button while the POS LIGHTING field is highlighted. To turn on the merchandiser lighting permanently, press the ALWAYS button. To turn the merchandiser lighting on and off with the Sleep settings, press the SLEEP button.

Setting the Type of Syrup

Syrup type for each barrel may be selected by highlighting the desired barrel and pressing the appropriate button, FCB, FCB-L, FUB or FUB-L. FCB is for Frozen Carbonated Beverage, FCB-L is for Frozen Carbonated Beverages - Light (diet), FUB is for Frozen Un-carbonated Beverages and FUB-L is for Frozen Un-carbonated Beverages - Light (diet). Each of these settings provides the proper viscosity and temperature settings for the type of syrup being used.

Barrel Maintenance

Refer to the next section “Barrel Maintenance Menu” to perform barrel maintenance on the system.

MAINTENANCE MENU

The Maintenance menu, shown in Figure 23., is only available to service personnel or other authorized users, if security is enabled.

The Maintenance menu is used for barrel maintenance, diagnostics, BRIX setup and system information. It allows the technician access to the unit during periodic maintenance or troubleshooting problems. It sometimes overrides the normal inputs from the system in order to perform this task.

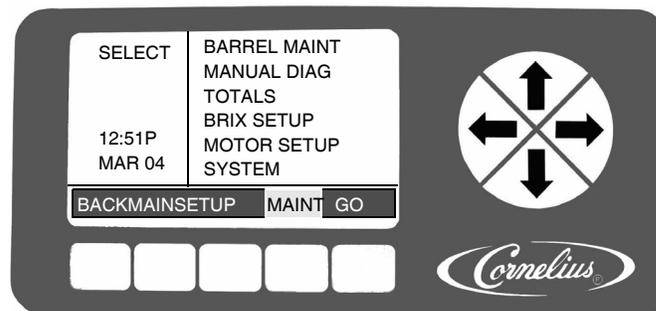


Figure 23. Select Screen

Barrel Maintenance Menu

The Barrel Maintenance menu, shown in Figure 24., allows the service technician to clean, rinse and sanitize the system on a barrel by barrel basis. The barrel must be OFF in order to perform the barrel maintenance functions. As a warning to the technician, the “Do Not Drink” status indicators are illuminated on the barrels when entering the Barrel Maintenance menu.

The procedure for purging a barrel is shown in Table 21. The procedure for filling a barrel is shown in Table 22. The procedure for running the scraper blade only on a barrel is shown in Table 23. and the procedure for waking up a barrel is shown in Table 25.

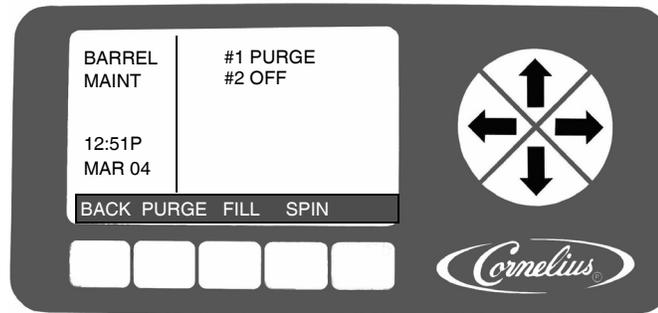


Figure 24. Barrel Maintenance Screen

Purging a Barrel

Table 21.

Step	Action	Procedure
1	Purge a barrel	From the Select menu (Figure 23.), open the Barrel Maintenance menu, shown in Figure 24..
2	Select the barrel	Use the Up and Down arrows to highlight the desired barrel
3	Select Purge function	Press the PURGE button at the bottom of the display to select purge for the highlighted barrel
4	Empty the barrel	Place a container under the barrel dispensing valve, open the dispensing valve and dispense all the product from the barrel. As the product level lowers in the barrel, partially close the valve to avoid spurting.
5	Complete the procedure	When the barrel is completely empty, close the dispensing valve and press the STOP button at the bottom of the display to turn off the purge. Press the BACK button to return to the Select menu.

NOTE: When the PURGE button is pressed, it changes to a STOP button.

Filling a Barrel

Table 22.

Step	Action	Procedure
1	Fill a barrel	From the Select menu (Figure 23.), open the Barrel Maintenance menu, shown in Figure 24.
2	Select the barrel	Use the Up and Down arrows to highlight the desired barrel
3	Select Fill function	Press the FILL button at the bottom of the display to fill the highlighted barrel
4	Finish filling the barrel	When the fill completes, intermittently open and close the relief valve to bleed CO ₂ from the barrel.
5	Complete the procedure	Press the STOP button at the bottom of the display to stop the fill. Press the BACK button to return to the Select menu.

NOTE: When FILL button is pressed, it changes to a STOP button.

Run the Barrel Motor

Table 23.

Step	Action	Procedure
1	Run a barrel	From the Setup menu (Figure 23.), open the Barrel Maintenance menu, shown in Figure 24.
2	Select the barrel	Use the Up and Down arrows to highlight the desired barrel
3	Select Run function	Press the SPIN button at the bottom of the display to start the motor in the highlighted barrel
4	Stop the procedure	Press the STOP button at the bottom of the display to stop the motor. Press the BACK button to return to the Select menu.

NOTE: When RUN button is pressed, it changes to a STOP button.

Rinsing a Barrel

When rinsing a barrel, the Barrel Maintenance menu cannot be used. The procedure must be done manually, as described in Table 24.

Table 24.

Step	Action	Procedure
1	Empty a barrel	If the barrel has liquid in it, use the Purge procedure in Table 21. to empty the barrel.
2	Rinse a barrel	Go to the Barrel Status menu (Figure 9.).
3	Select the barrel	Use the Up and Down arrows to highlight the desired barrel
4	Turn off the barrel	Press the OFF button at the bottom of the display to turn off the barrel.
5	Override Water Solenoid	Press the manual bypass on the water solenoid and fill the barrel with plain water. Use the relief valve on the faceplate of the barrel to relieve pressure and completely fill the barrel.
6	Run the barrel motor	Use the procedure in Table 23. to rinse the barrel.
7	Complete the procedure	Repeat the Purge procedure in Table 21. to empty the barrel.

Manual Diagnostic Menu

The Manual Diagnostic menu, shown in Figure 25., is used for troubleshooting and testing the system on a component basis. It allows the service technician to turn individual components of the system on and off for troubleshooting purposes. Pressing the BACK button returns the display to the Main menu and turns off all the active loads.

This screen should only be used by qualified technicians to troubleshoot the system.

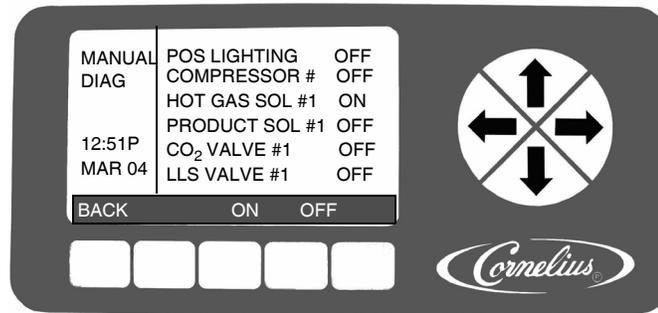


Figure 25. Manual Diagnostic Screen

The items shown in Table 25. are for the first barrel in the unit only. The list includes additional components with their related barrel number, i.e. Hot Gas Sol #2, etc.

⚠ CAUTION:

The compressor can suffer damage if it is allowed to run without either a hot gas defrost or liquid line solenoid open. The software is designed to turn on the hot gas solenoid for a barrel to prevent damage from occurring.

Table 25.

Display	Description
POS LIGHTING	This selection turns the Point-Of-Sale lighting on and off
COMPRESSOR #1	This selection turns the compressor on and off
HOT GAS SOL #1	This selection opens and closes the hot gas solenoid for barrel 1
PRODUCT SOL #1	This selection opens and closes the product solenoids and valves for barrel 1
CO ₂ VALVE #1	This selection opens and closes the CO ₂ solenoid and valve for barrel 1
LLS VALVE #1	This selection opens and closes the Liquid Line solenoid and valve for barrel 1
BRL MOTOR #1	This selection turns the barrel 1 motor on and off

To move between one set of barrel parameters to the next, press the Right or Left arrow keys. This moves the highlight to the first entry of the second barrel, etc.

Totals Menu

The Totals menu (Figure 26.) shows the cumulative run time of the system, a component of the system or an error. Some individual items may be reset, where available, by highlighting the item and pressing the RESET button. The RESET button is only displayed for items that may be reset, such as hours since the motor seal was changed or the number of compressor cycles. Pressing the BACK button returns to the Choose menu and saves the changes. The description of each item in the Totals list is shown in Table 26.

To move between one set of barrel parameters and the next, press the Right or Left arrow keys. This highlights the first entry of the second barrel, etc.

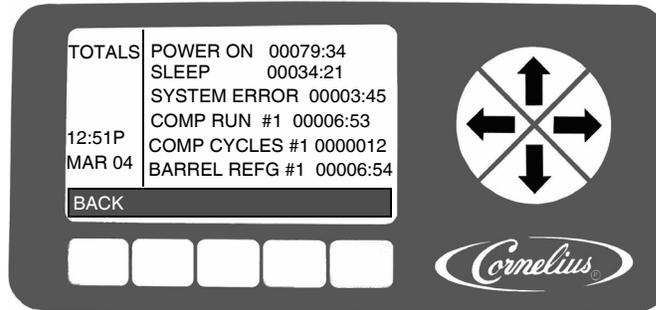


Figure 26. Totals Screen

Table 26.

Display	Value	Description
POWER ON	HHHHH:MM	Shows how long the machine has been powered up
SLEEP	HHHHH:MM	Shows how long the machine has been in sleep mode
SYSTEM ERROR	HHHHH:MM	Shows how long the machine has had a system error
COMP RUN #1	HHHHH:MM	Shows how long the compressor has been running since the last reset
COMP CYCLES #1	#####	Shows the number of compressor cycles since the last reset
BARREL REFG #1	HHHHH:MM	Shows how long the barrel has been in refrigeration mode
MOTOR ON #1	HHHHH:MM	Shows how long the motor has been running on a specific barrel
MOTOR SEAL #1	HHHHH:MM	Shows how long it has been since the motor seal was inserted on a specific barrel
DEFROST #1	HHHHH:MM	Shows how long the barrel has been in defrost mode
FILL CYCLES #1	#####	Shows the number of times the barrel has filled with product
SYRUP RUN #1	HH:MM:SS	Shows how long the syrup solenoid has been open
SYRUP OUT #1	HHHHH:MM	Shows how long the syrup has been out
ERROR #1	HHHHH:MM	Shows how long the barrel has had an error

BRIX Setup Menu

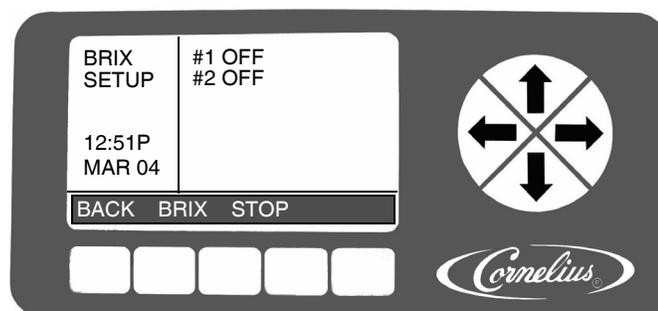
BRIX is important to the quality of the final product. The BRIX menu facilitates the extraction of a sample of product from the unit for BRIX measurement. There is an automatic three second dispense of product that produces a constant volume so that a BRIX comparison can be made between samples. To perform a BRIX test, perform the procedure in Table 27.

Table 27.

Step	Action	Procedure
1	Set status of barrels	Make sure the status of all barrels is OFF on the control display.
2	Remove drip tray/access panel	Remove the drip tray, loosen the two screws holding the access panel and remove it. (Figure 28.)

Table 27.

Step	Action	Procedure
3	Set product supply valve	Turn product supply valve to the 180 degree (BRIX) position for the barrel you are testing. (See Figure 29.)
4	Access BRIX menu	Press MENU. Then press the SETUP button.
5	Set barrel for BRIX	From the Setup screen (Figure 16.), open the BRIX Setup screen, shown in Figure 27.
		Use the Up and Down arrows to highlight BRIX SETUP. Press the GO button at the bottom of the display.
6	Select barrel	Use the Up and Down arrows to highlight the desired barrel for BRIXing.
7	Perform BRIX procedure	Locate the appropriate barrel sample tube and hold a cup under it.
8		Open the valve at the end of the sample tube. Press the BRIX button, and wait 3-5 seconds. The product pump pumps product for approximately 3 seconds. After the sample is dispensed Press BRIX twice more to dispense product two more times. Discard all three of these samples.
9		Press the BRIX button a fourth time. Collect this sample in a cup and close the valve at end of the sample tube.
10	Measure BRIX	Place adequate amount of the product on a refractometer and read the BRIX value. A target BRIX reading of 13.0 (+/- 1.0) is normally desired for sugar-based syrups. Lower values for some diet syrups can be specified. Check with the syrup manufacturer if you are not sure.
11	Adjust BRIX	If BRIX is not within the proper range, adjust the syrup/water mixture by opening or closing the syrup valve, shown in Figure 30., and then retest.
12	Clear hose	When BRIX measurement is complete, press the valve on the bottom of the appropriate water solenoid to flush out the hose before closing the valve at the end of the hose.
13	Set product supply valve	Turn product supply valve back to the (BARREL) position for the barrel you tested. (Figure 29.)
14	Replace access panel	Replace the hoses and the access panel. Secure the panel with the two screws removed in Step 2. This completes the procedure.


Figure 27. BRIX Setup Screen

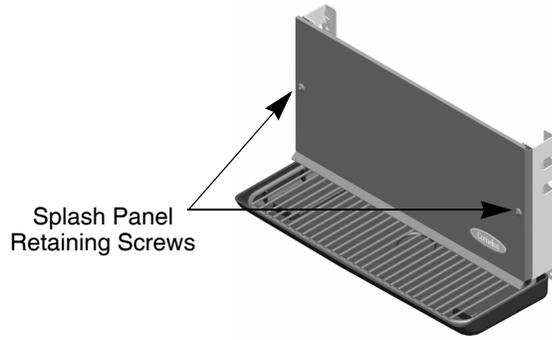


Figure 28. Splash Panel Mounting Screws



Product Supply Valve Barrel 1 Product Supply Valve Barrel 2 Flow Controls Barrel 1 Flow Controls Barrel 2 Flow Controls Barrel 3 Product Supply Valve Barrel 3

Valves shown in BARREL position w/ Splash Panel & Solenoid Covers Removed

Figure 29. Product Control Valves

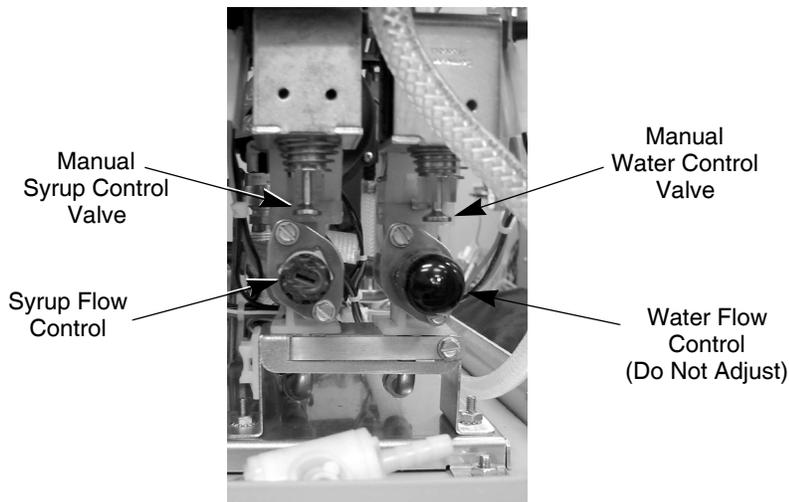


Figure 30. Flow Controls with Panel Removed

Motor Setup Menu

Motor setup is initially done at the factory and does not need to be changed unless a barrel motor or barrel components are replaced, adjusted or removed and reinstalled.

This menu allows you to select different motor types for each barrel in the unit and run the calibration procedure on that motor. This procedure correlates the actual viscosity of the barrel and its contents with the electrical characteristics of the motor. These characteristics are stored by the control system and are accessed at the time of calibration for each particular motor.

Because of the differences between motor characteristics from different motor suppliers, the Motor menu, shown in Figure 31., is used to adjust the unit settings to match the motor type being installed. It provides the correct table of electrical characteristics from embedded settings located in non-volatile memory. Perform the procedure described in Table 30. to change the motor type setting. Insure that the motor type matches the settings listed in Table 28. based on model.

NOTE: If the Motor Type shown is “DEFAULT”, it indicates that the EEPROM is not installed or is faulty.

Table 28.

Model	Motor Type
All 60 Hz	1
All 50 Hz	2

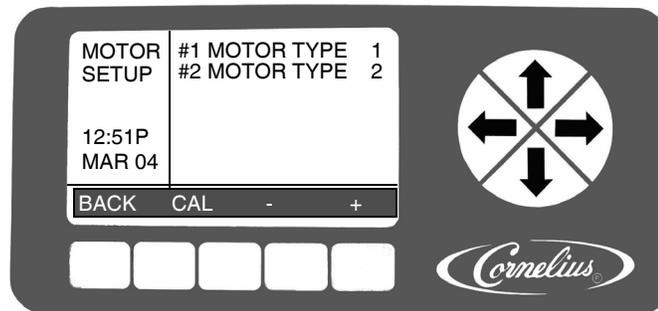


Figure 31. Motor Setup Screen

Table 29.

Button	Description
BACK	Returns the display to the Select menu
CAL	Verifies the motor settings of a new motor.
-	Decrements the highlighted field
+	Increments the highlighted field

Table 30.

Step	Action	Procedure
1	Set barrel for Motor Type	From the Maintenance menu (Figure 23.), open the Motor Setup menu, shown in Figure 31.
2	Select the barrel	Use the Up and Down arrows to highlight the desired barrel
3	Select the proper motor type	Press the + or - buttons at the bottom of the display to select the proper motor type
4	Complete the procedure	Press the BACK button at the bottom of the display to save the settings and return to the Setup menu.

Calibrating a Motor

Calibration of motors is typically required when a motor or any associated barrel components (i.e., scraper blades, seal, faceplate, etc.) is removed or replaced. Calibration establishes a new baseline for the motor assembly. This allows the system to determine proper viscosity settings for the new motor. When a new motor is installed in the unit or any of the barrel components are changed or adjusted, the motor should be calibrated by performing the procedure described in Table 31.

CAUTION:

Calibration must be performed when the product in the barrel is completely liquid. There must not be any ice on the scraper blade.

Table 31.

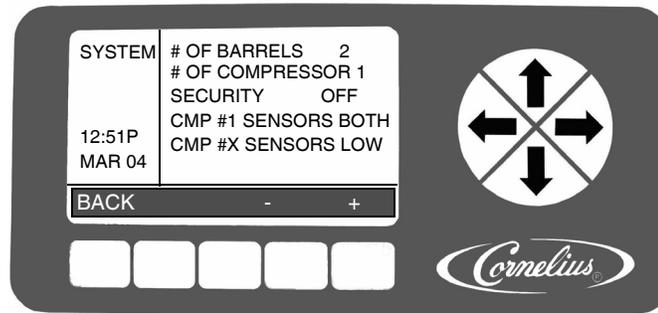
Step	Action	Procedure
1	Re-assemble barrel	It is VERY IMPROTANT that calibration be performed when the product in the barrel is in a 100% liquid state. There can be no ice in the barrel or on the beater bar.
2	Defrost the barrel	Select DFRST on the Barrel Status menu (Figure 11.). It is very important that calibration be performed on a fully defrosted barrel (outlet temperature must be 41°F or barrel must be purged and refilled with new product). Selecting DFRST while the barrel is off initiates a full defrost cycle.
3	Select Motor Setup	Use the Up and Down arrows to highlight MOTOR SETUP on the Maintenance menu.
4	Select the barrel	Use the Up and Down arrows to highlight the desired barrel
5	Start calibration	Press the CAL button at the bottom of the Motor Setup menu to start the calibration process.
6		The calibration cycle continues for five (5) minutes to allow the gearbox to stabilize at temperature and ensure correct calibration. At that time the motor stops and it is calibrated.
7	Complete the procedure	Press the BACK button at the bottom of the display to return to the Maintenance menu.

System Menu

The System menu is used during production to set up the unit. It also allows the technician to view and change the number of barrels, the number of compressors and the number of pressure sensors present in the system, as shown in Figure 32. The description of these items is shown in Table 32.

NOTE: Changing these values to a number that doesn't match the physical number of items in the system generates errors or turns off some of the equipment present in the system.

When the individual fields are highlighted, the display buttons change. Refer to Table 33. for a listing of the button functions for the various field selections.


Figure 32. System Screen
Table 32.

Display	Description
# OF BARRELS	This selection shows the number of barrels in the system and allows the user to change the quantity.
# OF COMPRESSORS	This selection shows the number of compressors in the system. Currently this number is fixed at one and cannot be changed.
SECURITY	This selection allows the user to turn security on or off.
CMP #X SENSORS	This selection allows the user to choose which pressure sensors are read for the compressor.

Table 33.

Option	Button 2	Button 3	Button 4	Button 5
# of Barrels			-	+
# of Compressors			-	+
Security			OFF	ON
Compressor Sensors	NONE	LOW	HIGH	BOTH

Security

System security is located on the System menu. It allows a supervisor or service technician to keep unauthorized personnel from accessing the Maintenance menu. This feature is activated on the System menu. When security is turned on, users can only access the Main and Setup menus.

Pressing the extreme Left and Right buttons (Buttons 1 and 5) on the bottom of the display simultaneously and holding them for approximately five (5) seconds unlocks the Security menu. If security is left ON on the System menu, when the system times out or when the user goes back to the Main menu, security is re-activated and the Maintenance menu is not accessible. To disable security, access the System menu, highlight Security and press the OFF button.

Pressure Sensors

Pressure sensors allow the technician to view the high and low-side pressures in the refrigeration system without having to connect external gauge to the system. To view this information, go to the Unit Data screen shown in Figure 13. and press the UNIT button. The System screen, shown in Figure 33., is displayed.

The number and type of sensors in the unit are typically set at the factory and should not be changed. Data is only available on the sensors installed. If a sensor that is not installed in the unit is activated, incorrect data is displayed. It is possible to install sensors in the field, but it is not recommended because system refrigerant charge may be lost.

The low side pressure sensor is used to monitor compressor reversal. If it is not installed on the unit, the unit may not operate properly.

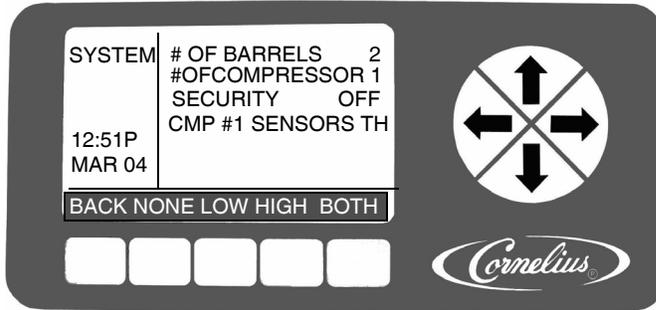


Figure 33. System Screen

When the pressure sensors selection is highlighted, pressing the NONE button removes the pressure readings from the Unit Data screen, shown in Figure 34. If LOW is selected, only the low pressure reading is displayed. If HIGH is selected, only the high pressure reading is displayed.

NOTE: If a pressure sensor is open, the pressure reading is 386 PSIG.

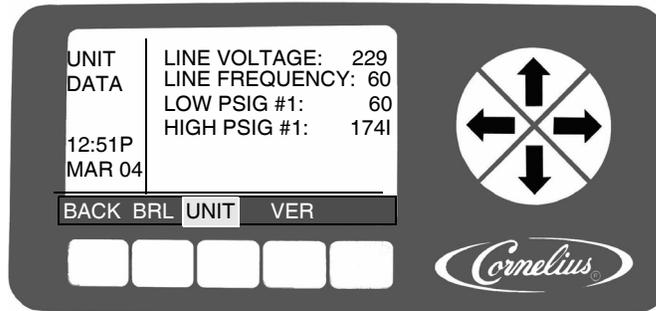


Figure 34. Unit Data Screen

OPERATION

MAINTAINING PRODUCT QUALITY

It has been determined that the following factors can affect the rate at which product quality diminishes (as indicated by a change in product appearance).

1. Dispensed Product Throughput
2. Programmed Defrost Scheduling
3. Viscosity Setting

Cornelius recommends the following instructions be read and followed relative to operating and establishing settings for the FCB equipment. Cornelius equipment service manuals contain instructions on how to program settings within the control system. Operators who have not been trained on servicing Cornelius FCB equipment should not attempt to modify equipment settings but should contact an accredited service provider.

Cornelius makes the following recommendations to help assure maximum product quality.

Dispensed Product Throughput

FCB equipment is designed to provide a high throughput of frozen carbonated product to meet peak draw demands. Where low product throughput is experienced, there is the potential for product quality to diminish. The information shown in Table 34. outlines the minimum throughput per barrel that must be dispensed on a 24 hour basis.

Table 34.

Viper	Viscosity ≤ 4	Viscosity > 4
Volume of dispensed product per barrel per 24 hours required to maintain product quality.	48 oz.	60 oz

NOTE: Cornelius recommends that, in conditions where the FCB machine is operational and the minimum throughput (as described in Table 34.) is not met on a per barrel basis, product should be dispensed and discarded to increase throughput and help assure that product quality is maintained.

NOTE: Data in Table 34. assumes equipment has been correctly installed, commissioned and calibrated as per directions contained in all technical literature published by Cornelius and the recommendations contained in this document have been followed.

Programmed Defrost Scheduling

The control system in the Viper system includes a function to automatically defrost product in the barrel at programmed intervals based on the viscosity of the product. Programmed defrosts are scheduled frequently to ensure that product quality within the barrel is maintained. Failure to defrost regularly during periods of low throughput allow increased ice crystal size, with a possible decrease in product quality. Regular throughput of dispensed product replenishes the barrel frequently with liquid and reduces the requirements for programmed defrosts. The unit automatically senses the lack of throughput and maintains the product quality by defrosting the barrels more frequently when throughput is slow.

Sleep Mode Recommendations

Cornelius recommends programming a sleep period for the machine during any amount of time over 3 hours that the unit is not used. This increases the life of the machine and reduces energy consumption.

A wake up time must be programmed after the sleep period to return the unit to normal operation. Cornelius recommends programming the wake up time for approximately 20 minutes before the product is needed. This is the time recommended if the ambient temperature is at 75° F. The times will vary depending on the ambient temperature (a higher ambient temperature requires more time for the product to cool).

Viscosity Setting

The control system includes a function to select the desired product viscosity. This function is referred to as “Viscosity Setting”. There are selectable viscosity ranges from 1-9. The higher the number selected, the more viscous the frozen product in the barrel becomes. This increased viscosity is achieved by freezing the product in the barrel to a lower temperature thereby increasing ice crystal size/growth. As the ice crystal size increases, however, there is potential for product quality to diminish.

Cornelius recommends that the viscosity settings be set at the lowest possible setting to achieve the desired drink quality. In most typical installations using a sugar-based syrup, acceptable drink quality can be achieved by programmed viscosity settings in the range of 3-5 for Viper.

Diet FCB syrups freeze much more readily than sugar based syrups, so the viscosity setting should be selected at the minimum value available (which is 1 or 2 for the Viper).

CO2 Setting

The control system includes a function to adjust the desired product overrun. This function is referred to as the “CO2 Setting”. This setting is adjustable from 0 to 100% in 5% increments.

STARTING THE UNIT

Table 11. describes the basic procedure for starting the Viper. Refer to the Operator’s Manual (P/N 621360041TBOPR) for details on operation of the Viper unit.

Table 35.

Step	Action	Procedure
1	Open the merchandiser	Open the merchandiser and expose the control panel.
2	Turn on the barrels	Turn all barrels on by pressing the buttons labeled ON to start the normal refrigeration process.
3	Close the merchandiser.	Close the merchandiser. In approximately 20 minutes, product is ready to serve.

PREVENTATIVE MAINTENANCE

SUMMARY

There are no daily maintenance procedures required on the Viper unit other than normal cleanup of spills or over-spray and emptying the drip tray. Normal equipment maintenance intervals are listed in Table 36. It is recommended that a preventative maintenance procedure be performed every six (6) months. This procedure should include all of the maintenance items described in Table 36. and the following sections.

Table 36.

Preventative Maintenance Summary	
Maintenance Procedure	Frequency of Maintenance
Clean Air Filter	Monthly or more often, as necessary (See "Cleaning Air Filter" on page 43.)
Check BRIX	Every six months or when changing syrup types (See "BRIX Setup Menu" on page 34.)
Seal Change	Every six months
Clean Condenser Coil	Every six months or as necessary
Sanitize Unit	Every six months or when changing syrup types
Change or Rotate Scraper Blades	Every six months
Check for Leaks	Every six months
Clean BIB Connectors & check operation of syrup sold out switches	Every six months or when changing syrup types.
Check Clock Setting	Every six months or when changing to or from daylight savings time
Change caged o-ring on models w/ Motorman Valves.	Every six months or when changing syrup types.

CAUTION:

Only trained and certified electrical, plumbing and refrigeration technicians should service this unit. All wiring and plumbing must conform to national and local codes.

MONTHLY MAINTENANCE

A general inspection of the machine for leaks and cleanliness should be done on a weekly basis. Any abnormal conditions should be reported and corrected when noticed.

Cleaning Air Filter

The air filter should be cleaned at least once a month (more often in harsh environments). Perform the procedure in Table 37. to clean the air cleaner.

Table 37.

Step	Action
1.	Open the merchandiser
2.	Remove the filter, shown in Figure 35., by grasping the two tabs and sliding it straight out the front of the unit.
3.	Wash the filter with clean water. Shake out the excess water.
4.	Reinstall the air filter.
5.	Close the merchandiser.

**Figure 35. Air Filter Location**

Semi-Annual Maintenance

There are several procedures that should be completed on a semi-annual basis. These procedures help to insure proper operation of the system on a long term basis. Refer to Table 36. for a listing of the semi-annual maintenance items.

Inspecting and Replacing Scraper Blades

Scraper blades should be inspected for wear during the semi-annual maintenance check. To inspect the blades, perform the procedure in Table 38.

Table 38.

Step	Action
1.	See "Purging a Barrel" on page 31.
2.	When purging is complete, remove power from the unit.
3.	Remove the four (4) 3/4 in. nuts from the faceplate and slowly remove the faceplate from the unit.
4.	Slowly pull the blade assembly out of the barrel.
5.	Rinse and inspect the blade assembly for signs of wear.
6.	If there is significant wear on the blades, Reverse or replace them, depending on the wear pattern.
7.	Replace the blade assembly and bushings (PN 2392) onto the motor shaft in the barrel.

Table 38.

Step	Action
8.	Re-install the faceplate and replace the four (4) mounting nuts. Hand tighten the nuts until the faceplate makes contact with the gasket, then use a wrench to tighten the nuts an additional 1/4 turn. Be careful not to over tighten the nuts or cracking of the faceplate may result.
9.	Refill the barrel with product. See "Filling a Barrel" on page 31.
10.	When barrel fill is complete, perform a motor calibration. See "Calibrating a Motor" on page 38.

Cleaning the Syrup Connections

Syrup connections should be cleaned at least every six months, or when syrup types are changed. Perform the procedure in Table 39. to clean the BIB connectors.

Table 39.

Step	Action
1.	Open the merchandiser and select OFF for the barrel to be cleaned.
2.	Remove the quick disconnect from the BIB container.
3.	Fill a suitable pail or bucket with soap solution.
4.	Submerge the disconnect in the soap solution and then clean it using a nylon bristle brush. (Do not use a wire brush). Rinse with clean water and dry.

Servicing Motorman Dispensing Valves

NOTE: Dispensing valves with caged o-rings should be serviced (lubricated) every six months and o-rings should be replaced once a year.

Refer to Figure 36. and perform the procedure in Table 40. to lubricate or change the caged o-rings in each dispensing valve on the unit.

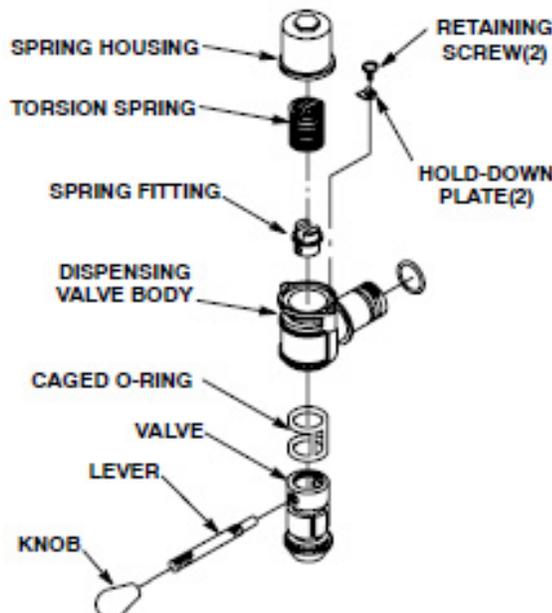


Figure 36. Self-Closing Dispensing Valve

Table 40.

Step	Action
1.	Defrost freeze cylinders, shut unit down, disconnect electrical power from Unit.
2.	Perform the procedure in Table 41. to empty the barrels.
3.	Remove the hex nuts and flat washers securing the faceplate to the freeze barrel, then remove the faceplate from the barrel.
4.	Carefully remove the large o-ring from the faceplate.
5.	Unscrew the relief valve from the faceplate.
6.	Disassemble the dispensing valve (see Figure 36.).
7.	Remove the two screws and hold-down plates securing the spring housing to the dispensing valve body, then remove the housing.
8.	Remove the torsion spring from the dispensing valve.
9.	Remove the knob, spring, sleeve, and lever from the dispensing valve.
10.	Remove spring fitting from dispensing valve.
11.	Press the valve with the caged O-ring, down and out of the dispensing valve body.
12.	Carefully remove the caged O-ring from the valve.
13.	Wash all the parts in warm water. Remove all traces of syrup and lubricant, especially from the faceplate, o-rings, and dispensing valve. If parts are excessively coated, wipe clean with a paper towel to remove excess syrup and lubricant, especially from caged o-ring and dispensing valve. Use a brush (provided with the unit) to clean the faceplate relief valve passages and the inside of the knob.
14.	Submerge all the parts in a 4-percent solution of approved sanitizing agent for the amount of time recommended by the sanitizer manufacturer.
15.	Remove the parts from the sanitizing solution and place them on clean paper towels.
16.	Assemble the dispensing valve.
17.	Lubricate the caged o-ring. Carefully install the caged o-ring onto the valve from the straight end (opposite tapered end). Lubricate the grooves that the o-ring rides to fill in all void areas around the o-ring.
18.	Carefully install the valve with the caged o-ring in the dispensing valve body.
19.	Install the spring fitting, knob and lever parts, torsion spring and spring housing assembly by reversing the removal procedure. Do not tighten down the hold-down plates securing the spring housing at this time.
20.	After re-installing the faceplate, turn the dispensing valve spring housing to the left (counterclockwise) to put tension on the tension spring. Apply just enough tension so that the dispense valve shaft returns to the closed position after release. Do not over tighten. Over-tightening results in a high activation force on the valve.

NOTE: Use Dow-Corning DC-111 (P/N 321471000) light grade silicone lubricant to lubricate the o-rings.

Sanitizing the System

The syrup systems should be sanitized every 180 days by a qualified service technician following the sanitizer manufacturer's recommendations or when changing syrup types.

The sanitizing process consists of emptying the barrel, washing the lines and barrel, cleaning the BIB connectors, rinsing and refilling the system.

Emptying a Barrel

To empty the barrel, perform the procedure in Table 41.

Table 41.

Step	Action
1.	From the Barrel Status menu, press the DFRST button.
2.	When the barrel is defrosted, go to the Maintenance menu. If the security feature is active, access the Maintenance menu by pressing and holding the far left and right buttons simultaneously for approximately five seconds.
3.	Remove the splash panel. See “BRIX Setup Menu” on page 34.
4.	Turn the Product/BRIX valve 90 degrees clockwise to shutoff product to the barrel.
5.	Place a large waste container under the dispense valve and drain as much product as possible from the barrel.
6.	When the pressure in the barrel drops, from the Barrel Maintenance menu, press the PURGE button to re-pressurize the barrel with CO ₂ . As product level lowers in the barrel, partially close the valve to avoid spurting.
7.	Disconnect the BIB from the unit.

NOTE: The unit should be sanitized every 180 days by a qualified service technician following the sanitizer manufacturer’s recommendations.

Flushing the System of Syrup

After emptying the barrel, the barrel should be flushed of product before proceeding with the sanitizing procedure. Perform the procedure in Table 42.

Table 42.

Step	Action
1.	Fill a clean 5-gallon pail with plain water.
2.	Connect a sanitizing fitting (p/n cc 28688) to the BIB connector. Put the connector in the bucket of water.
3.	Make sure the Product/BRIX valve is in the BRIX position.
4.	Hold a waste container under the brix tube to collect syrup from the syrup line and open the manual syrup flow valve (see Figure 30.) to start filling the syrup line with plain water. Continue to hold the manual syrup flow valve open until clean water starts coming out of the BRIX tube.
5.	Release the manual syrup flow valve and turn the Product/BRIX valve to the Product position.
6.	Open the manual water flow valve (see Figure 30.) to start filling the barrel with water. At the same time, open the faceplate relief valve until water comes out.
7.	When the barrel is full, press the SPIN button on the Barrel Status menu, while highlighting the appropriate barrel. This starts the scraper blade. Allow blade to operate for fifteen seconds.
8.	Turn barrel OFF by pressing the OFF button.
9.	Place a waste container under the barrel dispensing valve. Open the dispensing valve and dispense all wash water from the barrel. When the pressure in the barrel drops, from the Barrel Maintenance menu, press the PURGE button to re-pressurize the barrel with CO ₂ . As the wash water level lowers in the barrel, partially close the valve to avoid spurting.
10.	Perform rear barrel seal replacement. See “Barrel Motor Seal Replacement” on page 44.

Table 42.

Step	Action
11.	Perform inspection and replacement of scraper blades. See “Inspecting and Replacing Scraper Blades” on page 44.
12.	Perform a leak test on the barrel. See “Motor Seal Leak Test” on page 46.

Sanitizing the Barrel

Sanitize the syrup system and barrel by performing the procedure shown in Table 43.

Table 43.

Step	Action
1.	Use a clean 5-gallon pail filled with a sanitizing solution and water at a temperature of 90° F to 110° F (32° C to 43° C). The sanitizing solution must have 200-ppm available chlorine.
2.	Connect a sanitizing fitting (p/n cc 28688) to the BIB connector. Put the connector in the bucket of sanitizing solution.
3.	Make sure the Product/BRIX valve in the BRIX position.
4.	Hold waste container under the BRIX tube to collect flush water from the syrup line and open the manual syrup flow valve to start filling the syrup line with sanitizing solution. Continue to hold the syrup flow valve open until sanitizing solution starts coming out of the BRIX tube.
5.	Turn the Product/BRIX valve in the Product position.
6.	Manually override (open) the syrup flow valve to fill the barrel with sanitizing solution.
7.	Fill the barrel with sanitizing solution by opening the faceplate relief valve until sanitizing solution comes out of the relief port.
8.	Hold a 16 oz. cup under the dispense valve. Hold the dispense valve fully open until the cup is full.
9.	Use the brush provided with the unit to clean the relief port and clean the outlet of the dispense valve with sanitizing solution.
10.	From the Barrel Status menu, press the SPIN button while highlighting the appropriate barrel. This starts the scraper blade. Allow blade to operate for minimum of 10, but no more than 15 minutes. Turn the scraper blade off by pressing the OFF button.
11.	Place a large container under the dispense valve and drain as much sanitizing solution as possible from the barrel.
12.	When the pressure in the barrel drops, from the Barrel Maintenance menu, press the PURGE button to re-pressurize the barrel with CO ₂ . As sanitizing solution level lowers in the barrel, partially close the valve to avoid spurting.

Flushing the System

Flush the wash water from the system by performing the procedure in Table 44.

CAUTION:

Flush the system thoroughly, residual sanitizing solution left in the system may create a health hazard.

Table 44.

Step	Action
1.	Turn the Product/BRIX valve to the Product position.
2.	Manually open the manual water flow valve to start filling the barrel with wash water. At the same time, open the faceplate relief valve until water comes out.
3.	From the Barrel Status menu, press the SPIN button while highlighting the appropriate barrel. This starts the scraper blade. Allow the blade to operate for fifteen seconds, then turn barrel OFF by pressing the OFF button.
4.	To drain the water from the system, turn the barrel OFF.
5.	Place a container under the barrel dispensing valve. Open the dispensing valve and dispense all rinse water from the barrel. When the pressure in the barrel drops, from the Barrel Maintenance menu, press the PURGE button to re-pressurize the barrel with CO ₂ . As the wash water level lowers in the barrel, partially close the valve to avoid spurting.
6.	Remove the sanitizing fitting (p/n cc 28688) from the BIB connector and connect a BIB containing syrup to the syrup line.
7.	Rotate the Product/BRIX valve to the BRIX position and open the valve at the end of the tube.
8.	Hold a waste container under the BRIX tube to collect the sanitizing solution from the syrup line and open the manual syrup flow valve to start filling the syrup line with syrup. Continue to hold open the syrup flow valve until syrup starts coming out of the BRIX tube.
9.	Perform a BRIX setup. See “BRIX Setup Menu” on page 34.
10.	Fill the barrel with product as described in Table 22.
11.	Perform motor calibration. See “Calibrating a Motor” on page 38.

COMPONENT REPLACEMENT

The following are procedures for servicing the major components of the Viper system.

BARREL MOTOR SEAL REPLACEMENT

The barrel motor seal is typically replaced during the semi-annual preventative maintenance procedure. The seal location is shown in Figure 37.

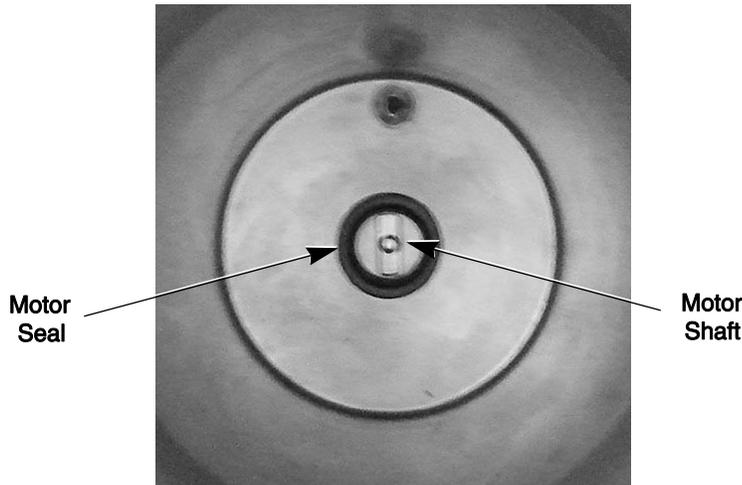


Figure 37. Front View Inside of Barrel w/ Faceplate Removed

REMOVING THE EXISTING SEAL

To remove the existing barrel seal, perform the procedure in Table 45.

Table 45.

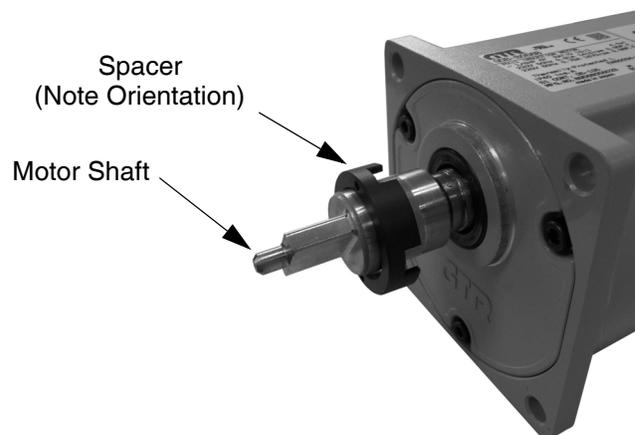
Step	Action
1.	Purge the barrel. See "Purging a Barrel" on page 31.
2	When purging is complete, disconnect power from the unit.
3	Open the relief valve on the front of the barrel to ensure that pressure is released. ⚠ CAUTION: Barrel pressure MUST be relieved before removing the faceplate!
4	Remove the four (4) 3/4 in. nuts from the faceplate and slowly remove the faceplate from the unit.
5	Carefully pull the blade assembly out of the barrel.
6	Remove any remaining product from the barrel.
7	Rinse and inspect the blade assembly and barrel for signs of wear (Replace if necessary).
8	Remove the seal and spacer from the rear of barrel.
9	When old seal and spacer are removed, use a clean soft cloth to clean between the motor shaft and the barrel to remove any remaining product.

INSTALLING A NEW SEAL

Perform the procedure in Table 46., Figure 38. and Figure 39. to replace the barrel seal with a new seal. When installing a new seal, **NEVER** use oil or silicon based lubricants. This can cause the new seal to rotate and **LEAK!**

Table 46.

Step	Action
1	Remove the old seal and the spacer (see Table 45.)
2	Remove the new seal from its packaging.
3	Clean the spacer.
4	Slide the spacer (with slots toward the motor housing) over the motor shaft.
5	Lubricate the inside of the seal using Dow Corning 111 Lubricant and Sealant. NOTE: Do not lubricate the static side (outer portion) of the seal. This could cause the seal to rotate in the bore and leak.
6	Carefully slide the seal over the motor shaft and press it firmly until it is fully seated against the spacer and the seal cannot be pushed any further.
7	Run your finger around the perimeter of the seal to insure it is flush against the back of the barrel.
8	Reinstall the blade assembly. Rotate the assembly while inserting it to insure that it is fully seated on the motor shaft. (Figure 38.)
9	Lubricate the faceplate o-ring.
10	Re-install the faceplate and replace the four (4) mounting nuts. Hand tighten the nuts until the faceplate makes contact with the gasket, then use a wrench to tighten the nuts an additional 1/4 turn. Be careful not to over-tighten the nuts or cracking of the faceplate may result.
11	Clean the drip tray and tube using warm water.
12	Perform the seal leak test in Table 47.


Figure 38. View of Motor Shaft with Spacer on Shaft

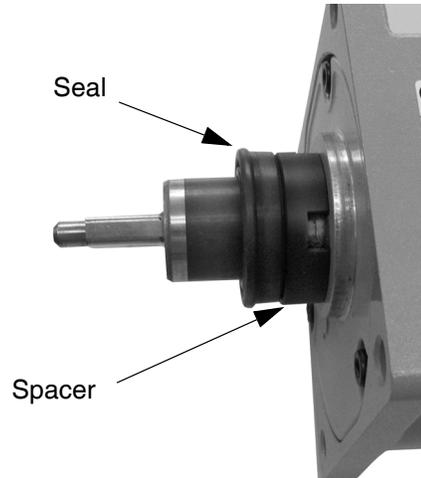


Figure 39. Side View of Seal and Spacer on Motor Shaft

MOTOR SEAL LEAK TEST

After replacing the motor seal, it is advisable to test the seal under pressure before refilling the barrel with product. Perform the procedure in Table 47. to verify that the seal is installed properly and not leaking. When the seal passes the leak test, perform the motor calibration routine on page 38.

Table 47.

Step	Action
1	Turn the 3-way Product Supply valve behind the splash panel (see Figure 29.) to the Off (horizontal) position.
2	From the Maintenance menu, press the FILL button for the barrel. This pressurizes the barrel with CO ₂ .
3	Observe the water and syrup fill solenoids.
4	If there are NO seal leaks, these solenoids cycle off within a minute and remain off.
5	If the solenoids cycle off and remain off, the barrel seal is not leaking and the barrel is ready to be filled with product.
6	If the solenoids do not cycle off, or cycle off and on, the seal is leaking and the seal installation process described in Table 45. and Table 46. must be repeated.
7	If there are no leaks, turn the 3-way Product Supply valve to the BRIX position.

BARREL MOTOR REPLACEMENT

The barrel motor does not require any special alignment when being replaced. It mounts on four (4) bolts. These bolts are screwed into threaded bosses in the foam pack barrel assembly, as shown in Figure 40. To replace a barrel motor, perform the procedure in Table 48.

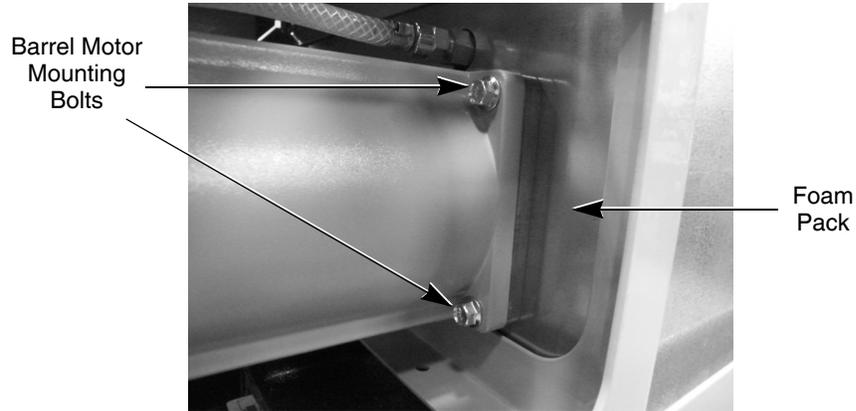


Figure 40. Side View of Motor Showing Two of the Four Mounting Bolts

Table 48.

Step	Action
1	Perform the procedure in Steps 1 through 8 of Table 45.
2	Disconnect the motor from the circuit by unplugging the connector.
3	Remove the motor by removing the four (4) bolts holding the motor to the barrel assembly.
4	Install the replacement motor and connect the connector.
5	Replace the motor seal, scraper blade assembly onto the motor shaft in the barrel, as described in Table 45.
6	Reconnect power to the unit.
7	Refill the barrel with product. See "Filling a Barrel" on page 31.
8	When barrel fill is complete, perform a motor calibration. See "Calibrating a Motor" on page 38.

MOTOR RUN CAPACITOR REPLACEMENT

The motor run capacitors, shown in Figure 41., are mounted at the rear of the unit between the barrel motors. To replace a run capacitor, perform the procedure in Table 49.

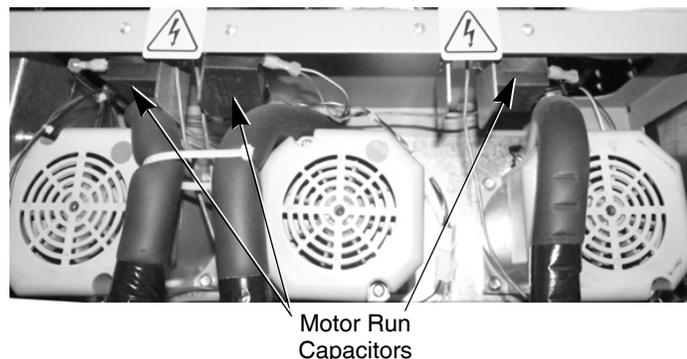


Figure 41. View of Motor Run Capacitors

Table 49.

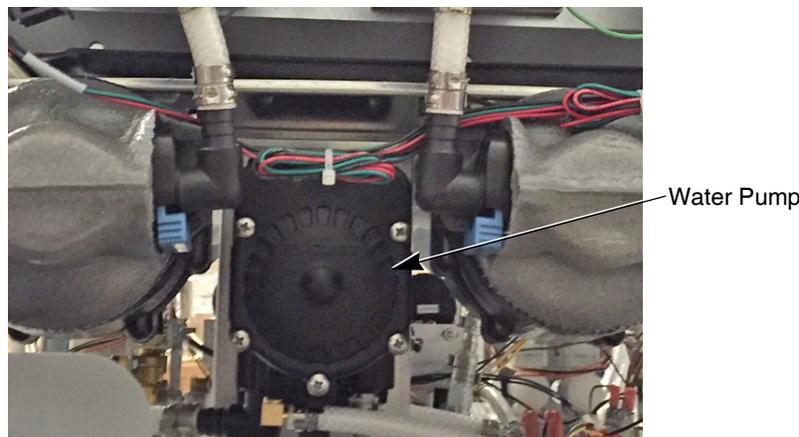
Step	Action
1	Disconnect power from the unit.
2	Remove the rear cover.
3	Disconnect the spade clips from the defective capacitor.

Table 49.

Step	Action
4	Remove the mounting screw from the base of the capacitor.
5	Replace the capacitor.
6	Reverse the procedure to install the new capacitor.
7	Reconnect power to the unit.
8	Refill the barrel with product. See "Filling a Barrel" on page 31.
9	When barrel fill is complete, perform a motor calibration. See "Calibrating a Motor" on page 38.

WATER PUMP REPLACEMENT

The water pump is located near the rear, center of the unit. It is mounted on a bracket facing the rear of the unit. To replace the pump, perform the procedure in Table 50.

**Figure 42. Rear View of Water Pump****Table 50.**

Step	Action
1	Disconnect power from the unit.
2	Remove the rear cover and the side panels.
3	Disconnect the CO2 supply from the unit.
4	Remove and drain the water supply from the unit.
5	Disconnect the quick disconnect input and output water lines from the bottom of the pump.
6	Disconnect quick disconnect CO2 input from the bottom of the pump.
7	Remove the four (4) screws and locknut holding the pump to the mounting bracket.
8	Replace the pump.
9	Reverse the procedure to install the new pump.

CO2 PULSE VALVE REPLACEMENT

The CO2 valves, shown in Figure 43., are located near the center of the unit and are mounted on a bracket to the bottom of the chassis. They control the injection of CO2 with the syrup/water combination to provide the final mixture for the product. There are one of these solenoids for each barrel in the system. When working in this area, care should be taken not to damage or mis-align the CO2 metering orifice. To replace one of these valves, perform the procedure in Table 51.

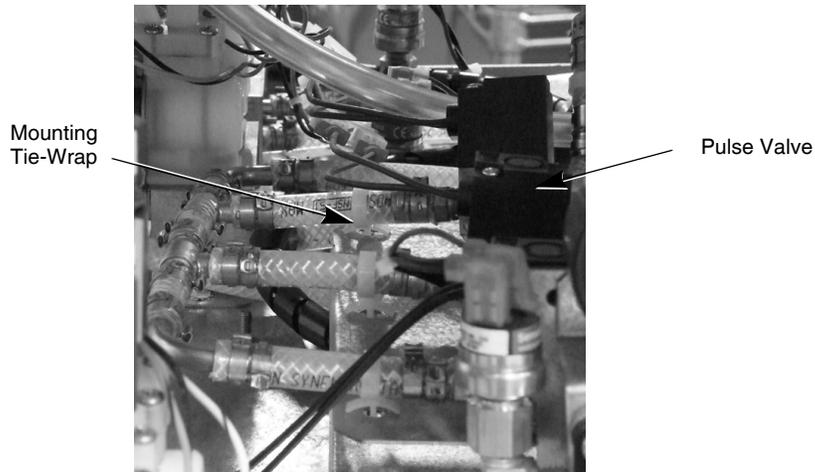


Figure 43. Side View of CO₂ Pulse Valves

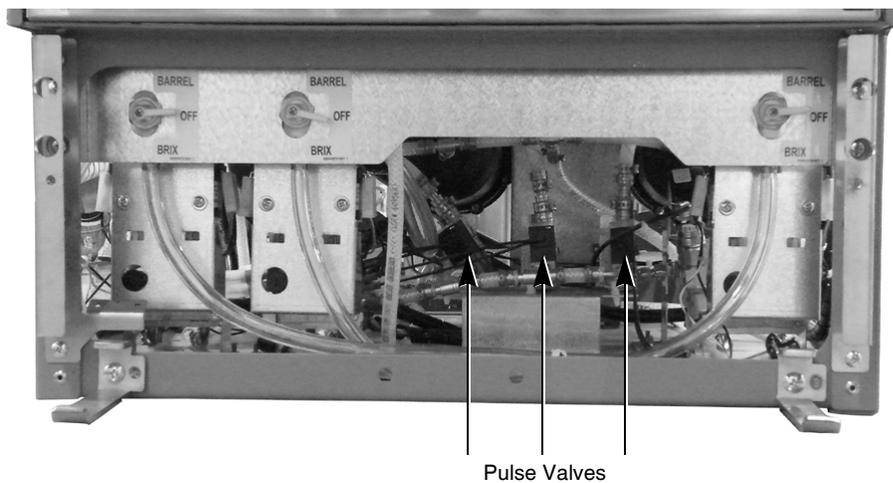


Figure 44. Front View of CO₂ Pulse Valves

Table 51.

Step	Action
1	Disconnect power from the unit.
2	Disconnect the CO ₂ supply from the unit.
3	Remove the rear cover and side panels.
4	Carefully remove the tubing from the rear of the valve.
5	Remove the mounting tie-wrap from the rear of the valve.
6	Replace the valve.
7	Reverse the procedure to reinstall the valve into the unit.
8	Test the unit for CO ₂ leaks.
9	Replace the rear and side panels.
10	Reconnect power to the unit.

SYRUP AND WATER SHUTOFF SOLENOID REPLACEMENT

The syrup and water shutoff valves and solenoids are mounted on a single bracket, as shown in Figure 45. Perform the procedure in Table 52. to replace the valves.

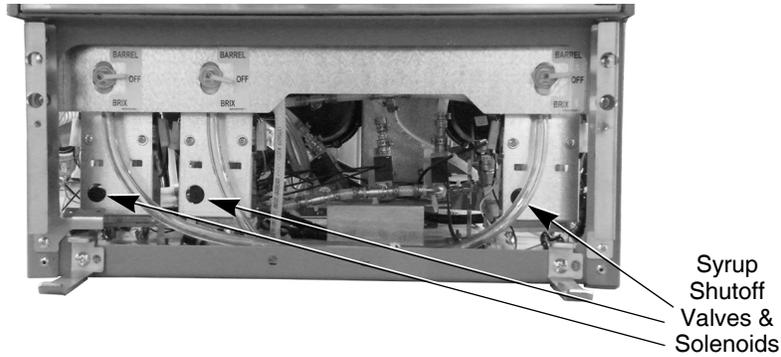


Figure 45. View of Shutoff Solenoids w/ Access Panel Removed

Table 52.

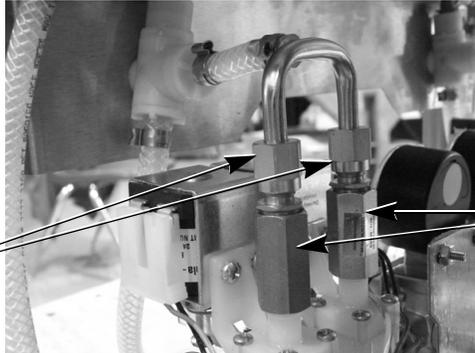
Step	Procedure
1	Disconnect power from the unit.
2	Disconnect and bleed the water and syrup lines to remove pressure from the system.
3	Remove the rear cover and side panels.
4	Remove the water and syrup lines from the input to the valves.
5	<p>Remove the Wye tube from the output (top) of the valves by loosening the nuts between the Wye and the check valves.</p> 
6	Remove the two (2) locknut's from the base of the assembly and remove it from the unit.
7	Remove the check valve from the valve being replaced.
8	Install the check valve on the new valve and solenoid.
9	Remove the valve and solenoid from the mounting bracket and replace it.
10	Reverse the procedure to reinstall the bracket into the unit.
11	Reconnect power to the unit and test the system.

Figure 46.

CONDENSER FAN MOTOR REPLACEMENT

The fan motor is located on the top of the unit, as shown in Figure 47. If the motor needs replacement, perform the procedure in Table 53. to remove and reinstall a motor.

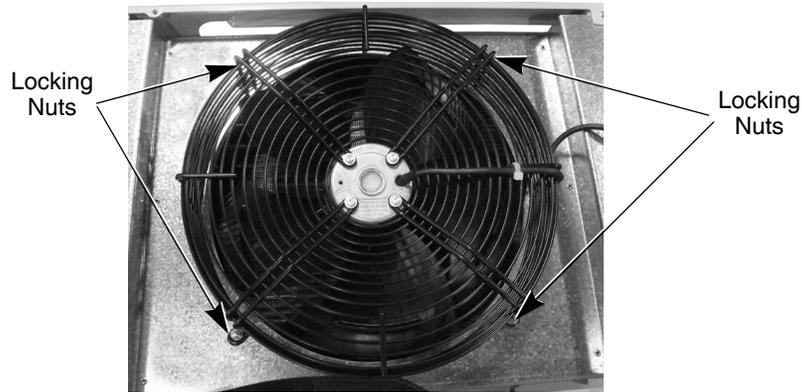


Figure 47. Condenser Fan Mounting Nuts

Table 53.

Step	Action
1	Disconnect power from the unit.
2	Disconnect the fan by unplugging the connector.
3	Remove the four locking nuts securing the fan to the top of the condenser.
4	Lift the fan and shroud off the unit.
5	Remove the four screws and washers securing the fan to the shroud.
6	Replace the fan.
7	Reverse the procedure to install the new fan.
8	Reconnect power to the unit.

COMPRESSOR REPLACEMENT

Caution should be used when working with refrigerants. To replace a compressor, perform the procedure in Table 54.

NOTE: Be sure to reclaim refrigerant when replacing compressor.

Table 54..

Step	Action
1	Disconnect power to the unit.
2	Remove the rear cover and side panels.
3	Label and disconnect all wires from the compressor.
4	Remove the four (4) mounting nuts from the base of the compressor.
5	Remove all insulation from around fittings.
6	Unsweet the suction line from the compressor.
7	Cut the discharge line on top of the compressor (Make sure line can be spliced back together).
8	Remove the compressor and Unsweat the discharge line.
9	Reverse the procedure to install the new compressor.
10	Replace the dryer.
11	Evacuate the system and recharge it according to the Cornelius nameplate on the unit.
12	Replace the side panels and rear cover.
13	Reconnect power to the unit and test the unit.

HOT GAS SOLENOID REPLACEMENT

The hot gas valves and solenoids, shown in Figure 48., are located near the center of the unit on the right and left sides. Whenever a hot gas valve and solenoid is replaced, the dryer should be replaced at the same time. Perform the procedure in Table 55. to replace the solenoid.

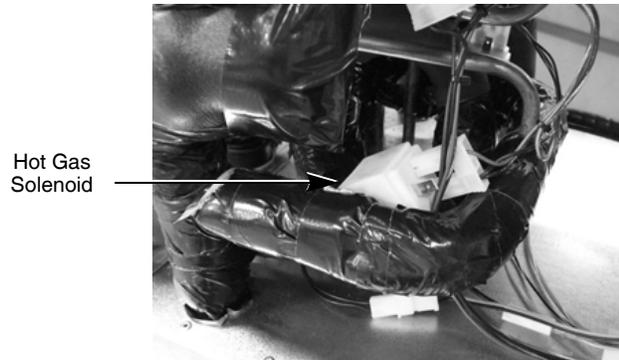


Figure 48. Hot Gas Solenoid (1 per barrel)

Table 55.

Step	Action
1	Disconnect power from the unit.
2	Remove the side panels.
3	Reclaim refrigerant from the system.
4	Carefully remove the insulation and remove the hot gas valve and solenoid.
5	Replace the hot gas valve and solenoid.
6	Replace the insulation around the valve and solenoid.
7	Replace the filter-dryer.
8	Evacuate the system.
9	Restore the proper refrigerant charge to the system and verify proper system operation.

LIQUID LINE SOLENOID REPLACEMENT

The liquid line valves and solenoids, shown in Figure 49., are located near the center of the unit on the right and left sides. Whenever a liquid line valve and solenoid is replaced, the dryer should be replaced at the same time. To replace the liquid line solenoid, perform the procedure in Table 56.



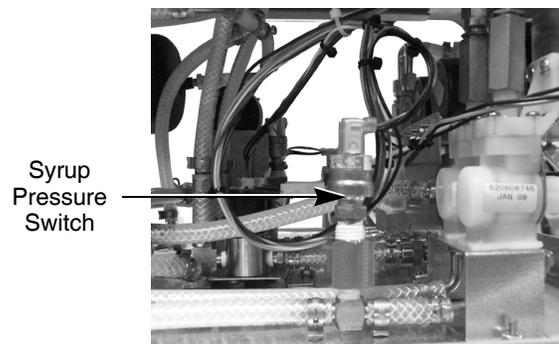
Figure 49. Liquid Line Solenoid (1 per barrel)

Table 56.

Step	Action
1	Disconnect power from the unit.
2	Remove the side panels.
3	Reclaim refrigerant from the system.
4	Carefully unwrap the foam insulation from around the valve and solenoid.
5	Remove the liquid line valve and solenoid.
6	Replace the liquid line valve and solenoid and insulation.
7	Replace the filter-dryer.
8	Evacuate the system.
9	Restore the proper refrigerant charge to the system and verify proper system operation.

SYRUP PRESSURE SWITCH REPLACEMENT

The syrup pressure switches (Sold Out Indicators) are located along the left and right sides of the unit near the front. There is one switch for each barrel in the system. Figure 50. shows the syrup pressure switch on the left side of the unit. To replace the syrup pressure switch, perform the procedure in Table 57.


Figure 50. View of Syrup Pressure Switch and Valve
Table 57.

Step	Action
1	Disconnect power to the unit
2	Remove the appropriate side panel.
3	Turn off the syrup supply to the unit.
4	Drain the syrup from the system.
5	Disconnect the wires on the pressure switch.
6	Remove the switch, using two wrenches.
7	Replace the switch with a new unit.
8	Reverse the procedure to install the new switch.
9	Restore the syrup supply and check for leaks.
10	Check switch operation.

WATER PRESSURE SWITCH REPLACEMENT

The water pressure switch, shown in Figure 51., can be viewed from the rear of the unit. Access to the switch is obtained by removing the left side panel of the unit, when viewed from the rear. To replace the water pressure switch, perform the procedure in Table 58.



Figure 51. View of Water Pressure Switch

Table 58.

Step	Action
1	Disconnect power from the unit.
2	Remove the side panel from the unit.
3	Turn off the water supply to the unit.
4	Drain the water from the system.
5	Disconnect the wires from the switch.
6	Remove the switch, using two wrenches.
7	Replace the switch with a new unit.
8	Reverse the procedure to install the new switch.
9	Restore the water supply and check for leaks.
10	Check to ensure that the new switch is working properly.

DISPLAY BOARD REPLACEMENT

When replacing or testing electronic components, be sure to wear a static strap that is connected to a chassis ground. This protects the electronic components from any static charge while working on the unit.

The display board is located on the back of the control panel display. It is mounted to the panel with four (4) Phillips head screws, shown in Figure 52. To replace the board, perform the procedure in Table 59.

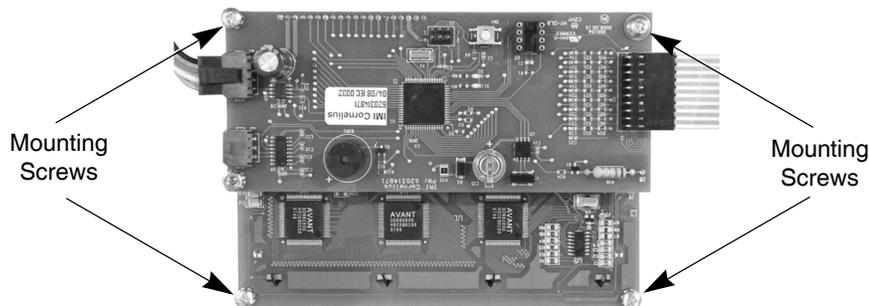


Figure 52. View of Display Board

Table 59.

Step	Action
1	Disconnect power from the unit.
2	Connect a static strap to your wrist and any convenient chassis ground on the unit.

Table 59.

Step	Action
3	Unplug the two (2) connectors from the display board.
4	Remove the four (4) screws from the corners of the board.
5	Replace the board with a new board.
6	Reverse the procedure to install the new board.

CONTROL BOARD REPLACEMENT

When replacing or testing electronic components, be sure to wear a static strap that is connected to a chassis ground. This protects the electronic components from any static charge while working on the unit.

The control board is located in the E-Box. It is mounted to the panel on four (4) plastic mounting studs, shown in Figure 53. To replace the control board, perform the procedure in Table 60.

Table 60..

Step	Action
1	Disconnect power from the unit.
2	Connect a static strap to your wrist and any convenient chassis ground on the unit.
3	Unplug the eight (8) connectors from the control board.
4	Squeeze each of the mounting studs at the corners of the board while carefully lifting the board.
5	Replace the board with a new board.
6	Reverse the procedure to install the new board.

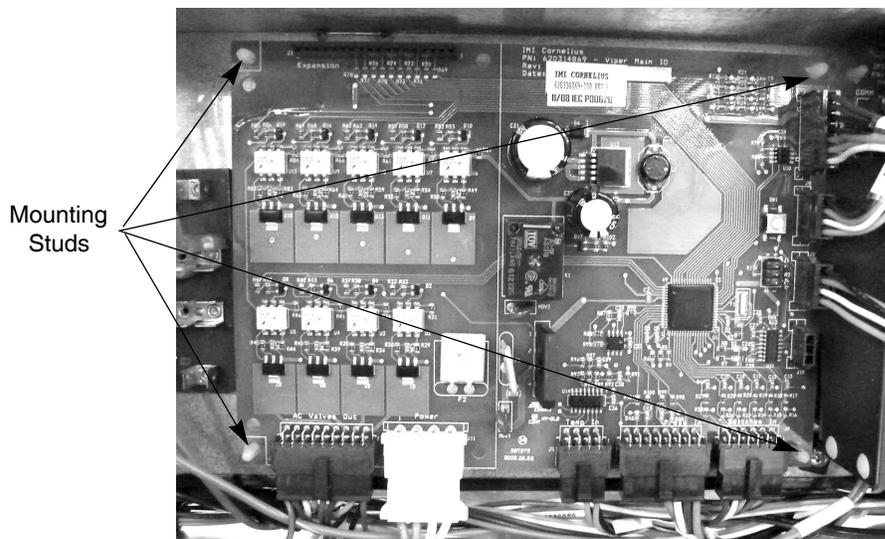


Figure 53. View of Control Board in E-Box

Software Compatibility

Low overrun software is not compatible with standard Viper software versions. When ordering replacement/service parts for any unit check the software version of the UI and IO boards and be sure to order the correct board.

MOTOR BOARD REPLACEMENT

When replacing or testing electronic components, be sure to wear a static strap that is connected to a chassis ground. This protects the electronic components from any static charge while working on the unit.

The motor board is located in the E-Box, to the right of the control board. It is mounted to the panel on three (3) plastic mounting studs and a threaded standoff, shown in Figure 54. To replace the motor board, perform the procedure in Table 61.

Table 61.

Step	Action
1	Disconnect power from the unit.
2	Connect a static strap to your wrist and any convenient chassis ground on the unit.
3	Unplug the eight (8) connectors from the control board.
4	Squeeze each of the mounting studs at the corners of the board while carefully lifting the board.
5	Replace the board with a new board.
6	Reverse the procedure to install the new board.

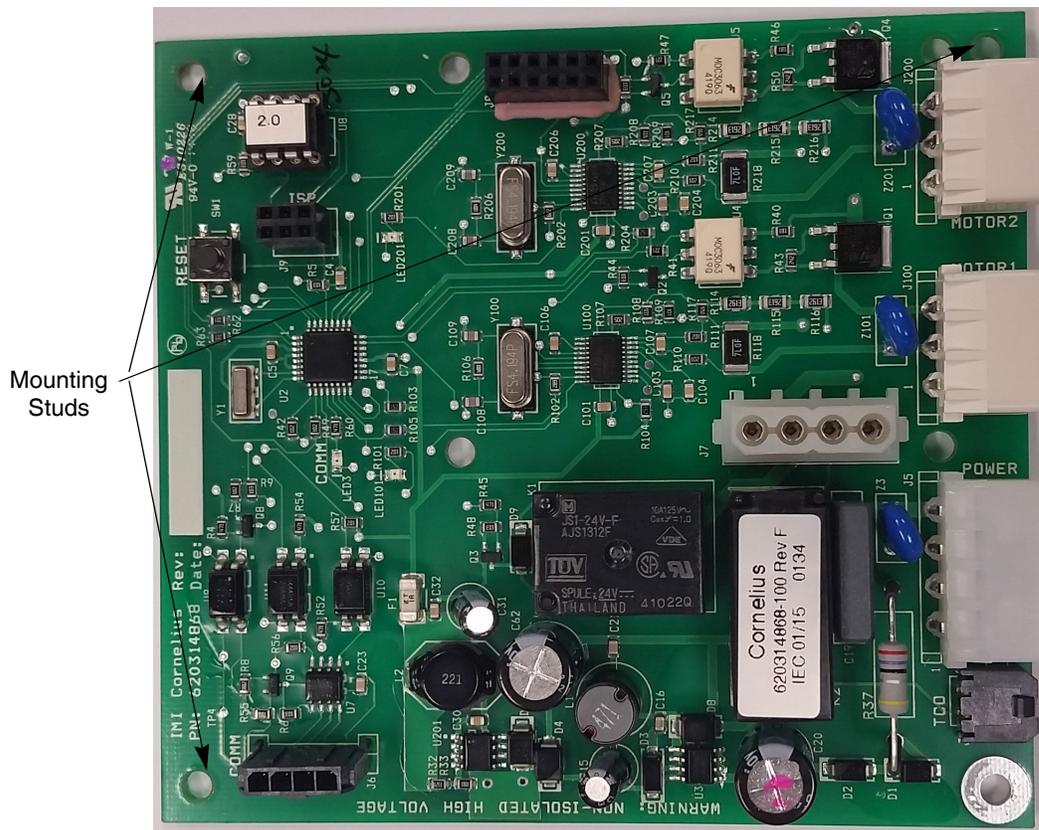


Figure 54. View of Motor Board in E-Box

TROUBLESHOOTING

TROUBLESHOOTING THE SYSTEM

Problem	Probable Cause	Remedy
Unit will not run.	A. Unit not plugged in. B. Circuit breaker. C. No power at L1 or L2 on contactor. D. Low voltage at T1 or T2.	A. Plug in unit. B. Reset/replace circuit breaker C. Check voltage at outlet. Check wiring to contactor. D. Replace the contactor.
“Sleep” display on barrel status menu.	A. Sleep time set. B. Clock incorrectly set. C. No wake time set.	A. Check sleep programming. B. Check sleep programming. C. Check sleep programming.
Barrel status OFF.	A. Not activated. B. Error has shut off motors. C. Unit in Diagnostics. D. Defective touch switch.	A. Turn to ON, DFRST or SPIN. B. Correct error & turn to ON, DFRST or SPIN. C. Exit diagnostics & turn to ON, DFRST or SPIN. D. Replace.
Low/High voltage ERROR.	A. Line Voltage out of SPEC (spec is 205-255 VAC for 60 Hz and 196-265 VAC for 50 Hz). B. Error range 180/260.	A. 1 - Check line voltage. 2 - Check T1/T2 with Compressor running. B. Correct line voltage.
Frozen Barrel	A. Low Brix B. Broken beater bar C. Broken drive coupler. D. No defrost. E. Are defrosts programmed all days?	A. Correct cause and reset Brix. B. Replace beater bar. C. Replace the drive coupler. D. Program defrosts in unit. E. Reprogram to all days.

TROUBLESHOOTING PRODUCT NOT COLD

Problem	Probable Cause	Remedy
Compressor not Running	<ul style="list-style-type: none"> A. Barrel not in ON mode. B. No voltage to compressor. C. Bad start components. D. Compressor's thermal overload protector "open". E. Open or shorted compressor windings. F. Bad control board. 	<ul style="list-style-type: none"> A. Turn barrel to ON. B. Check power at contactor L1, L2 - T1, T2. C. Check components and wiring. D. Check resistance of compressor windings and check incoming line voltage. E. Check resistance of compressor windings. F. Troubleshoot, replace if necessary.
Compressor Running but not Cooling	<ul style="list-style-type: none"> A. Low refrigerant. B. Restricted condenser/filter. C. Condenser fan motor/blade defective. D. Hot gas valve leaking or open. E. Defective compressor. 	<ul style="list-style-type: none"> A. Repair leak and weigh in new charge. B. Clean or repair. C. Repair or replace. D. Replace. E. Repair or replace.
Restricted Air Flow	<ul style="list-style-type: none"> A. Dirty filter. B. Dirty condenser. C. Damaged fins. D. Not enough "clearance" around unit. 	<ul style="list-style-type: none"> A. Clean filter. B. Clean condenser. C. Repair/replace if necessary. D. Ensure proper spacing around unit.
Fan Motor	<ul style="list-style-type: none"> A. Bad connection B. Bad motor C. Cracked or bent fan blade 	<ul style="list-style-type: none"> A. Check/connect B. Replace motor C. Replace fan blade
Hot Gas Valve	<ul style="list-style-type: none"> A. Miswired. B. Defective coil. C. Defective product delivery board. 	<ul style="list-style-type: none"> A. Correct wiring. B. Replace coil. C. Replace.
No/Low Refrigerant	<ul style="list-style-type: none"> A. Leak. 	<ul style="list-style-type: none"> A. Repair and weigh in new charge.
	<ul style="list-style-type: none"> A. Bad connection. B. Bad sensor. C. Sensor out of position. D. Defective product delivery board. 	<ul style="list-style-type: none"> A. Correct wiring. B. Replace sensor. C. Reposition sensor and clip. D. Replace.



Cornelius Inc.
www.cornelius.com