Vission 20/20™ Micro-controller

Operation and Service Manual • Version 3.1

VILTER™

COPELAND

Standard VILTER™ Warranty Statement

What is covered & how long it is covered: Subject to the other terms of this Warranty Statement, Seller warrants to its direct purchasers (and to no others) that the Products it manufactures will be free from defects in material and workmanship under normal use, regular service and maintenance. This warranty only applies when such defect appears in the Products within 12 months ("m") from the date such Products are placed in service and when such Products are returned to and received by Seller within 18m from the date of manufacture by Seller ("12m/18m"), except that defects in the following Products different than 12m/18m are covered by the number of months indicated below if returned to Seller within the following number of months ("m Ship") from shipment by Seller—

<table>
<tr><th rowspan="2">Product</th><th colspan="3">Compressor Type</th></tr>
<tr><th>Reciprocating Compressors</th><th>VSS / VSM Refrigeration Compressors</th><th>VSG / VSSG Gas Compressors</th></tr>
<tr><td>New Unit</td><td>24m Ship</td><td>24m Ship</td><td>12m/18m</td></tr>
<tr><td>Compressor (New Unit Only)</td><td>24m Ship</td><td>60m Ship</td><td>12m/18m</td></tr>
<tr><td>New Bareshaft Compressor</td><td>24m Ship</td><td>24m Ship</td><td>12m/18m</td></tr>
<tr><td>Remanufactured Compressor</td><td>12m/18m</td><td>12m/18m</td><td>12m/18m</td></tr>
<tr><td colspan="4">Any Engineered to Order (ETO) packaged system (including Heat Pumps and Process Chillers) not described above carry the 12m/18m warranty.</td></tr>
<tr><td colspan="4">VSS / VSM single screw compressors installed and shipped on New Units carry an internal Product component warranty of 5 years from shipment date and a warranty of 15 years from shipment date for compressor bearings only. Does not include actuator motors and shaft seals.</td></tr>
<tr><td colspan="4">Vilter™ Genuine OEM Parts, retrofit Vission 20/20 panels, retrofit PLC panels and any other supplied equipment not described above carry a 12m warranty from shipment date.</td></tr>
<tr><td colspan="4">New Vapor Recovery Units ("VRU Units") and its Compressors carry the standard 12m/18m warranty—all other VRU parts carry a 6 m warranty from shipment date.</td></tr>
</table>

What is not covered: This warranty does not extend to any losses or damages due to misuse; corrosion; accident; abuse; neglect; normal wear and tear; negligence (other than Seller's); unauthorized alteration; use beyond rated capacity; acts of God; war or terrorism; unsuitable power sources or environmental conditions; operation with refrigeration or lubricants which are not suitable for use with the Product; improper installation, repair, handling, maintenance or application; substitution of parts not approved by Seller; or any other cause not the fault of Seller. This warranty is only applicable to Products properly maintained and used according to Seller's instructions, the use of genuine Vilter™ replacement parts and recommended oil in all repairs, and when Buyer has demonstrated adherence to a scheduled maintenance program as detailed in the applicable operating manual. The Buyer must use Vilter approved oil only and provide oil analysis results to Vilter. To the extent the Buyer has supplied specifications, information, representation of operating conditions or other data to Seller in the selection or design of the Products and the preparation of Seller's quotation, and in the event that actual operating conditions or other conditions differ from those represented by Buyer, any warranties or other provisions contained herein which are affected by such conditions will be null and void. Seller does not warrant that the Products comply with any particular law or regulation not explicitly provided in the Product specifications, and Buyer is responsible for ensuring that the Products contain all features necessary to safely perform in Buyer's and its customers' plants and operations. If the Products are for a gas compression application, this warranty does not apply if the Products are operated in conjunction with a gas with an H_2S level above 100 PPM.

Third Party Motors & Starters: Motors and starters or Motor & Starter Parts purchased by Seller from a third party for resale to Buyer or for incorporation into Seller's Product will carry only the warranty extended by the original manufacturer ("OEM"). Motor manufacturer warranties cover only the repair or replacement of the motor, and do not cover removal and installation charges, incidental charges associated with the removal and installation process, loss of product, or shipping to and from the manufacturer or approved shop. The individual motor manufacturer warranty terms can be found on the manufacturer's associated websites.

Other limitations: Seller will not be liable under the above warranty if Buyer is in default of its payment obligations to Seller under any purchase order or credit agreement. Except with Seller's written permission given after receipt of Buyer's request within 60 days of an event, Seller will not be responsible for costs of dismantling, lost refrigerant, re-assembling, repair labor and expenses, travel cost or transporting the Product. Products repaired or replaced under this warranty will be warranted for the unexpired portion of the warranty applying to the original Products. Buyer agrees that all instructions and warnings supplied by Seller will be passed on to those persons who use the Products. Products are to be used in their recommended applications and all warning labels adhered to the Products by Seller must be left intact. Any technical advice furnished by Seller before or after delivery in regard to the use, application or suitability of the Products may not be construed as an express warranty unless confirmed by Seller in writing, and Seller assumes no obligation or liability for the advice given or results obtained—all advice given and accepted at Buyer's sole risk.

Exclusive Remedy: Within (10) ten days after Buyer's discovery of any warranty defects within the warranty period, Buyer will notify Seller of such defect in writing. Seller will, at its option and as Buyer's exclusive remedy, repair, correct, or replace F.O.B. point of manufacture, or issue credit or refund the purchase price for, that portion of the Products found by Seller to be defective. Failure by Buyer to give such written notice within the applicable time period will be deemed an absolute and unconditional waiver of Buyer's claim for such defects. Buyer assumes all other responsibility for any loss, damage, or injury to persons or property arising out of, connected with, or resulting from the use of the Products, either alone or in combination with other products/components. If so required, Products or parts for which a warranty claim is made are to be returned transportation prepaid to Seller's factory. **THE FOREGOING CONSTITUTES THE SOLE AND EXCLUSIVE REMEDY FOR BREACH OF ANY WARRANTY HEREUNDER.**

SOLE WARRANTY: THE WARRANTIES ABOVE CONSTITUTE SELLER'S SOLE AND EXCLUSIVE WARRANTIES WITH RESPECT TO THE PRODUCTS AND ARE IN LIEU OF AND EXCLUDE ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, ARISING BY OPERATION OF LAW OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE WHETHER OR NOT THE PURPOSE OR USE HAS BEEN DISCLOSED TO SELLER IN SPECIFICATIONS, DRAWINGS OR OTHERWISE, AND WHETHER OR NOT SELLER'S PRODUCTS ARE SPECIFICALLY DESIGNED AND/OR MANUFACTURED BY SELLER FOR BUYER'S USE OR PURPOSE.

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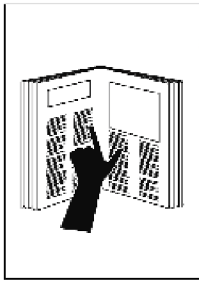
Important Message



⚠ WARNING

Read and understand operator´s manuals before using this machine.

Failure to follow operating instructions could result in serious injury.

READ CAREFULLY BEFORE OPERATING YOUR COMPRESSOR.

The following instructions have been prepared to assist in operation of Vilter™ Vission 20/20 micro-controllers.

The entire manual should be reviewed before attempting to operate.

Only qualified personnel shall operate, install and maintain the equipment.

Qualified personnel shall be accredited by a local regulatory agency, which requires that they are continually scrutinized by an organization whose sole mission is to establish, maintain and assure that the highest industry standards are set and met in a continuous and ongoing basis. The credentials shall address topics ranging from plant safety, operating concepts and principles and operations through the basics of refrigeration compliance and PSM (Process Safety Management) requirements.

Follow local workplace occupational safety and health regulations.

Vilter™ micro-controllers are thoroughly inspected at the factory. However, damage can occur in shipment. For this reason, the equipment should be thoroughly inspected upon arrival. Any damage noted should be reported immediately to the Transportation Company. This way, an authorized agent can examine the unit, determine the extent of damage and take necessary steps to rectify the claim with no serious or costly delays. At the same time, the local Vilter™ representative or the home office should be notified of any claim made.

All inquires should include the Vilter™ sales order number, compressor serial and model number. These can be found on the compressor nameplate on the compressor.

All requests for information, services or parts should be directed to:

Vilter™ Manufacturing LLC
Customer Service Department
5555 South Packard Ave
Cudahy, WI 53110 USA
Telephone: 1-414-744-0111, Fax:1-414-744-3483
E-mail: info.vilter@copeland.com, Website: www.Vilter.com

Equipment Identification Numbers:

Vilter Order Number: ________________________Software Version: __________________
Vilter Order Number: ________________________Software Version: __________________

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How To Use This Manual

NOTE

Manual revision should match software version.

This manual contains instructions for the Vission 20/20 Operation & Service Manual. It has been divided into 32 sections.

Section 1: Operational Flow Charts

Section 2: Installation Recommendations

Section 3: Hardware Architecture

Section 4: Main Screen

Section 5: Menu Screen

Section 6: Compressor Control

Section 7: Alarms & Trips

Section 8: Timers

Section 9: Compressor Scheduling

Section 10: Compressor Sequencing

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Section 20: Data Backup

Section 21: Maintenance

Section 22: User Access

Section 23: Help Screen

Section 24: Twin Screw Control

Section 25: Cool Compression Control

Section 26: Remote Oil Cooler

Section 27: Parts

Appendix A: Vission 20/20 Troubleshooting Guide

Appendix B: Application Procedures

Appendix C: Remote Control

Appendix D: Vission 20/20 Communications

Appendix E: Abbreviations Used on the Vission 20/20 Panel Screen

It is highly recommended that the manual be reviewed prior to servicing the Vission 20/20 system parts.

Figures and tables are included to illustrate key concepts.

Safety precautions are shown throughout the manual. They are defined as the following:

WARNING - Warning statements are shown when there are hazardous situations, if not avoided, will result in serious injury or death.

CAUTION - Caution statements are shown when there are potentially hazardous situations, if not avoided, will result in damage to equipment.

NOTE - Notes are shown when there are additional information pertaining to the instructions explained.

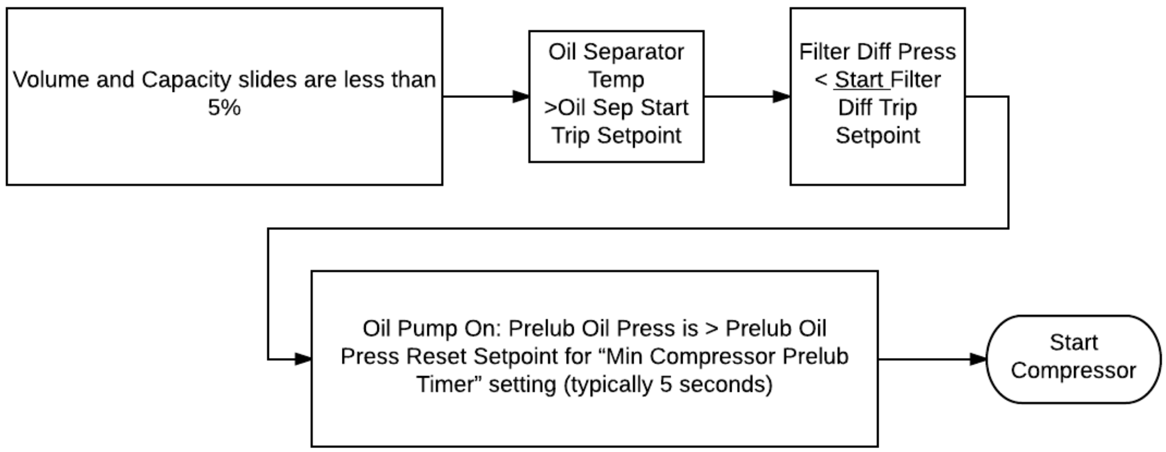
NOTICE - Notices are shown when there are important information that can help avoid system failure.

ADDITIONAL IMPORTANT NOTES

- Due to continuing changes and unit updates, always refer to the www.Vilter.com to make sure you have the latest manual.
- Any suggestions for manual improvements can be made to Vilter™ Manufacturing at the contact information on page iii.
- For additional video information pertaining to the Vission 20/20, refer to the Vilter™ video playlist at www.YouTube.com/EmersonClimateTech

Requirements to Start Compressor

Requirements to Start Compressor



Critical Compressor Run Logic at Compressor Start

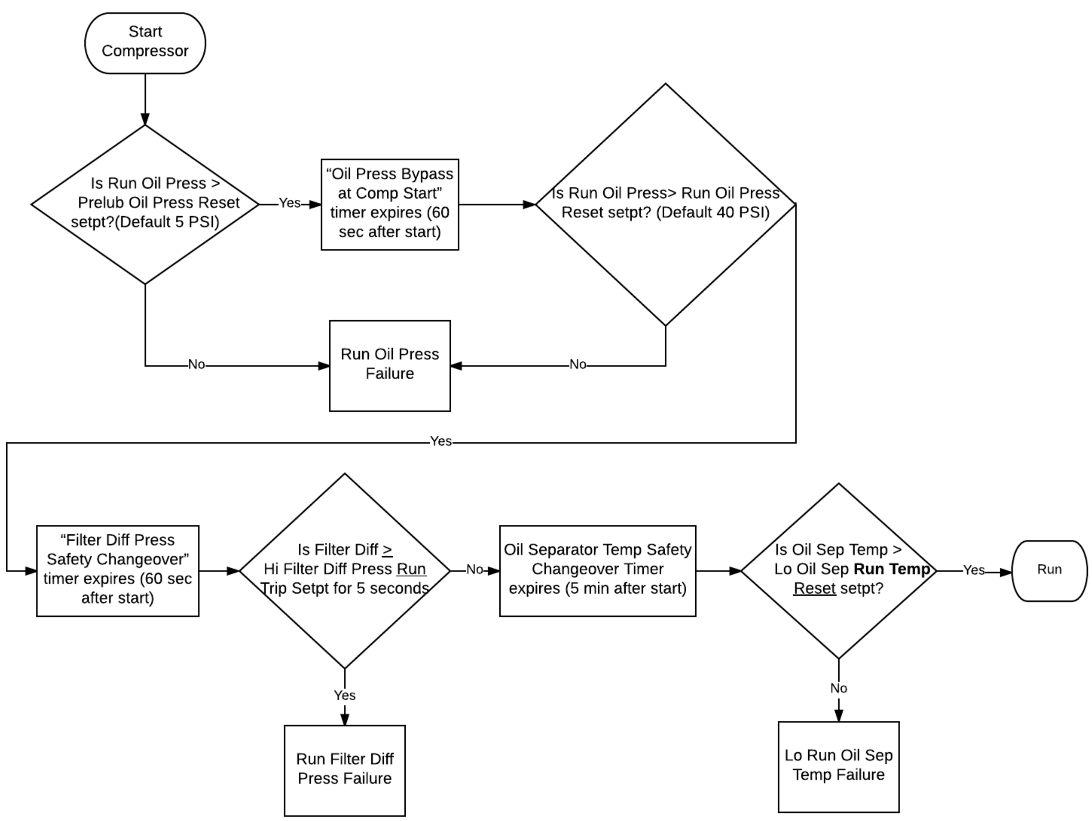
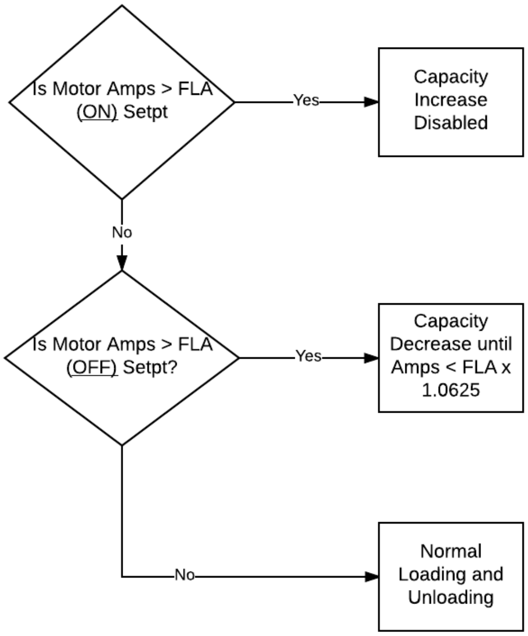
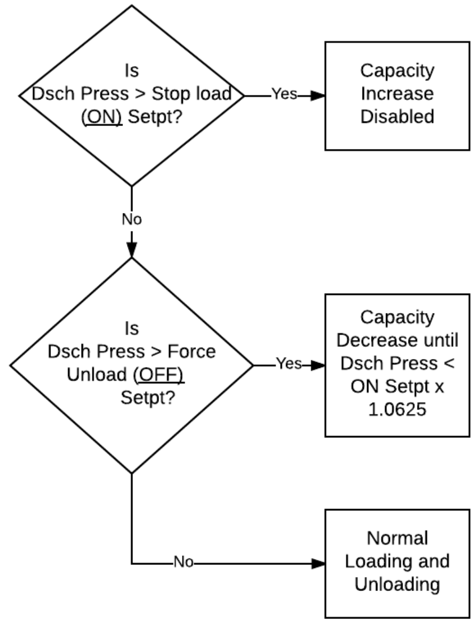


Figure 1-1. Operational Flow Charts (1 of 2)

Compressor Amperage Load Limiting



High Discharge Pressure Load Limiting



Suction Pressure Override Load Limit During Temperature Control

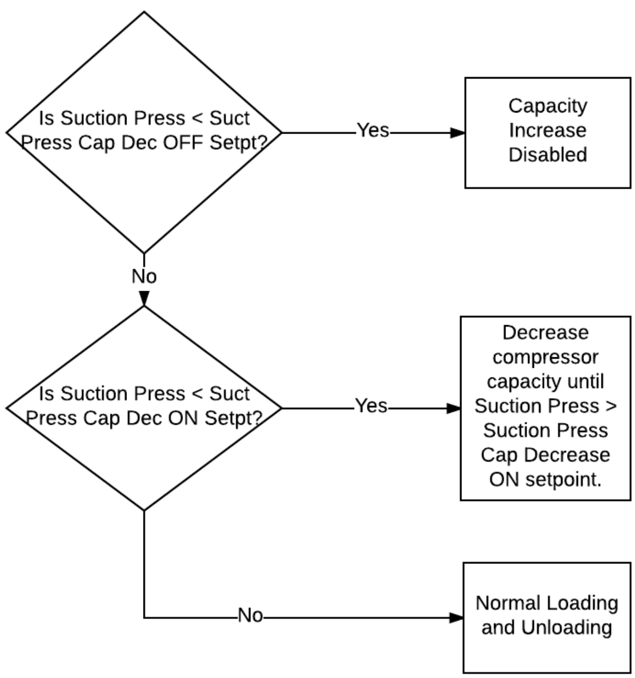


Figure 1-1. Operational Flow Charts (2 of 2)

Proper Wiring Sizing

- Always size wire gauges as specified by the National Electrical Code (NEC) for electronic control devices.
- For improved noise immunity, install one size larger wire gauge than the NEC requirement to assure ample current-carrying capability.
- Never under size wire gauges.

Voltage Source

- Transformers block a large percentage of Electromagnetic Interference (EMI). The Vilter Vission 20/20 should be isolated with its own control transformer for the most reliable operation, see Figure 2-1.
- Connecting the Vilter Vission 20/20 to breaker panels and central control transformers exposes the Vission 20/20 to large amounts of EMI emitted from the other devices connected to the secondary terminals of the transformer. This practice should be avoided if possible, see Figure 2-2.

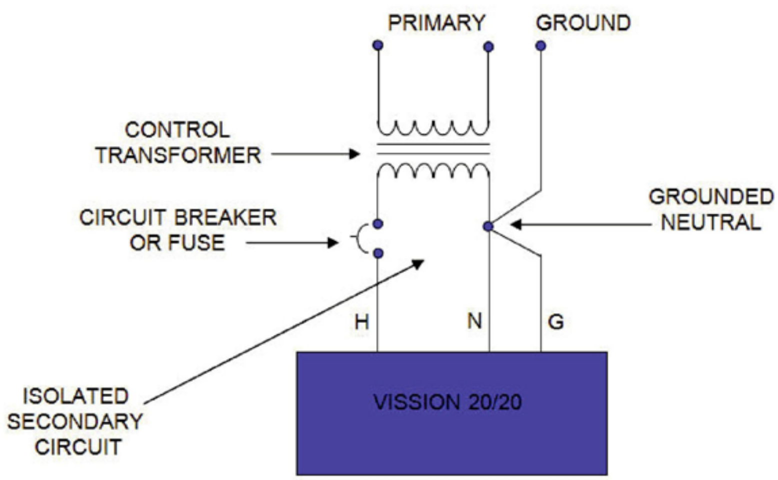


Figure 2-1. Vission 20/20 with Individual Transformer

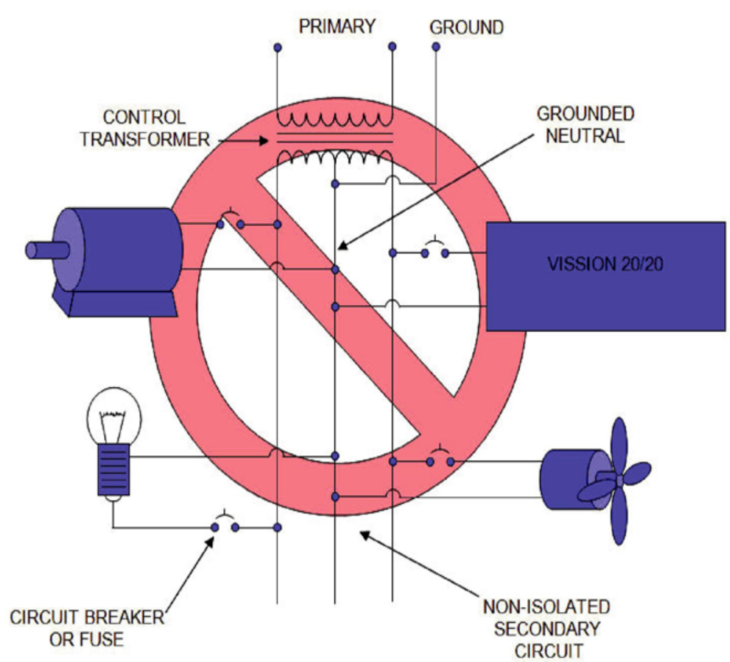


Figure 2-2. EMI and Vission 20/20

Grounding

- Continuous grounds must be run from the utility ground to the Vission 20/20, see Figure 2-3. Grounding.
- Grounds must be copper or aluminum wire.
- Never use conduit grounds.

Mixing Voltages

- Separate different voltages from each other and separate AC from DC, see Figure 2-4.
- Each voltage level must be run in separate conduit:
  - 460 VAC
  - 120 VAC
  - DC Signals
  - 230 VAC
  - 24 VAC
- If your installation site has wireways or conduit trays, dividers must be installed between the different voltages.

DC signals

- If your installation site has wire-ways or conduit trays, dividers must be installed between the different voltages.

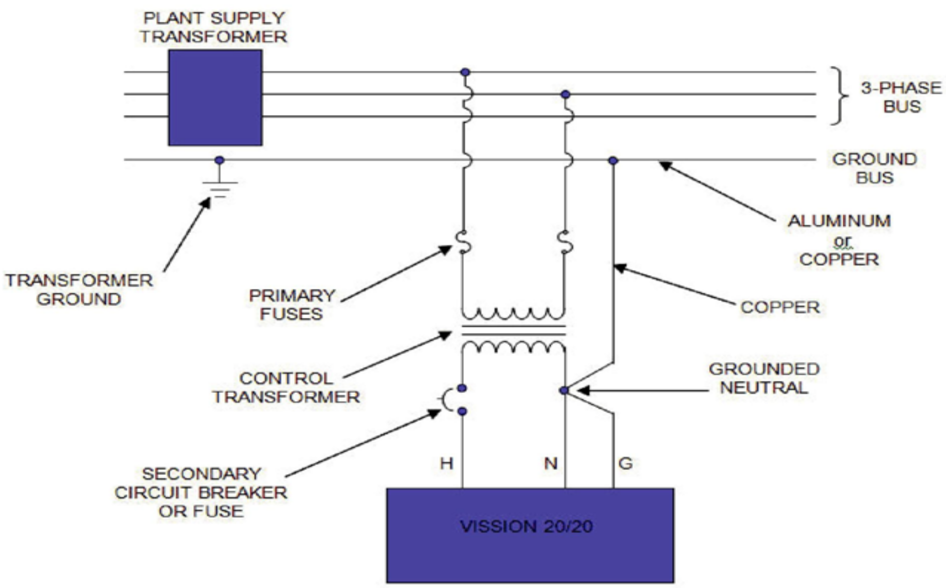


Figure 2-3. Ground Wiring

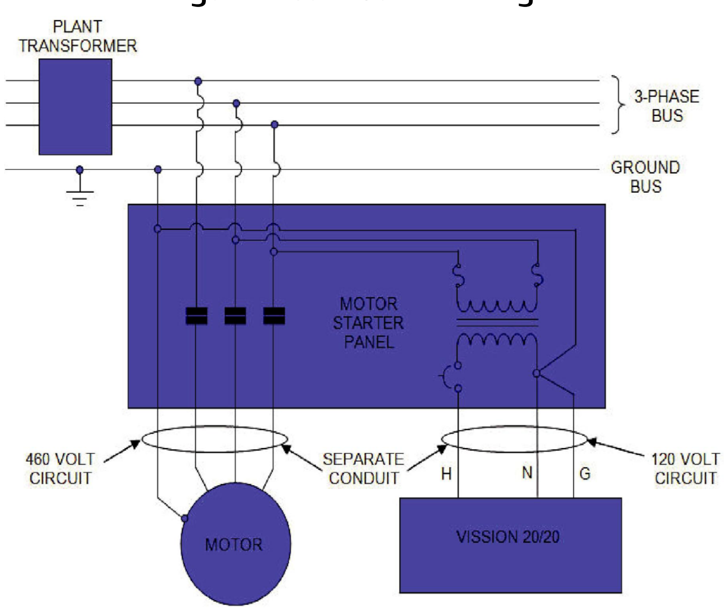


Figure 2-4. Mixed Voltage Wiring

Wiring Methods

- Each Vission 20/20 panel should have its own individual control transformer, see Figure 2-5 and Figure 2-6.

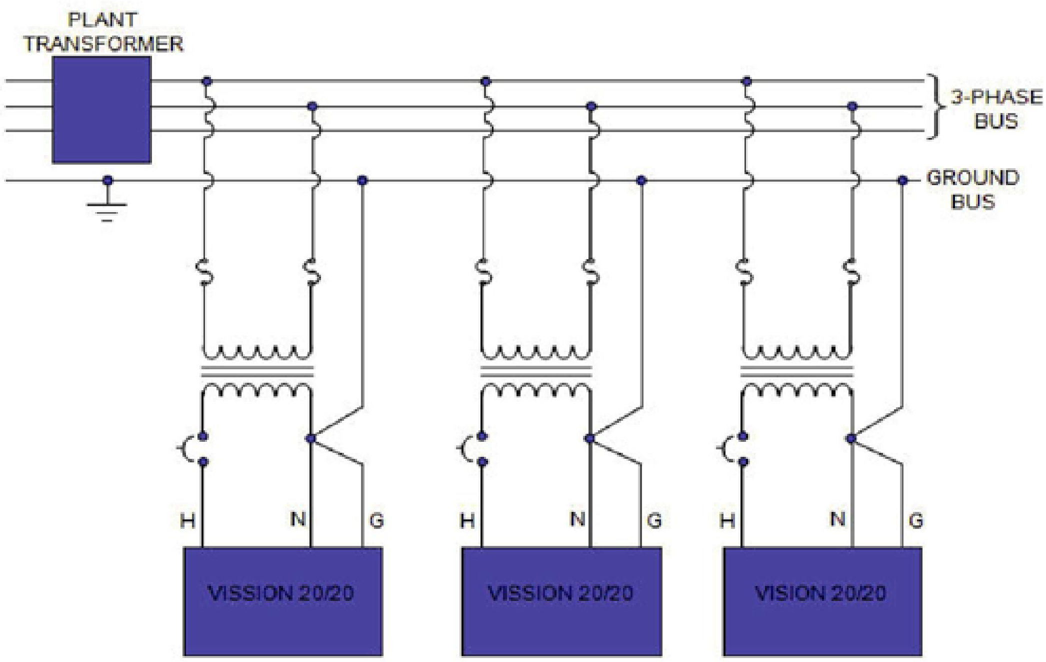


Figure 2-5. Correct Transformer Wiring Method

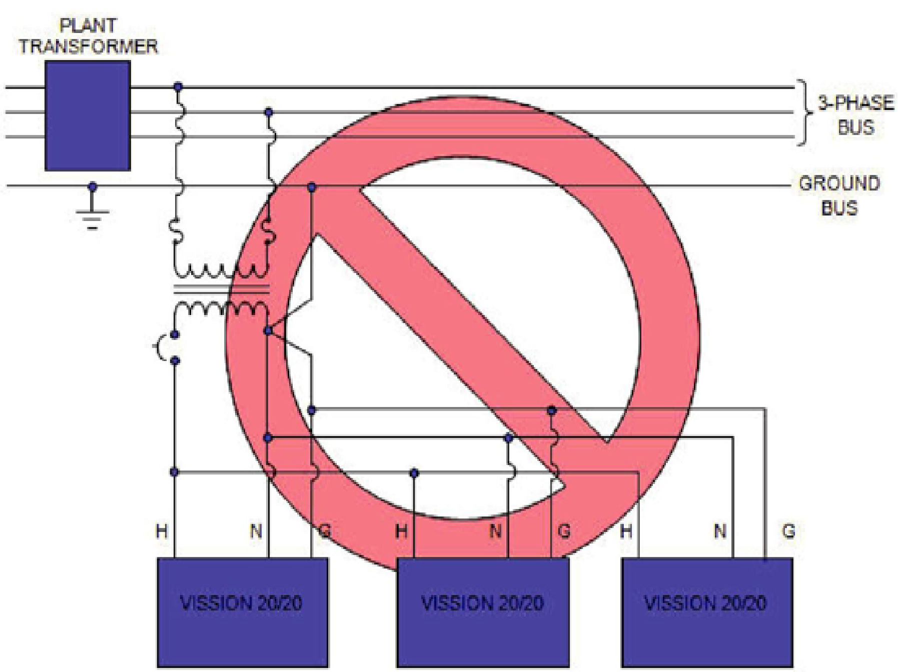


Figure 2-6. Incorrect Transformer Wiring Method

Best Practices

- Do:
  - Keep AC wires away from circuit boards.
  - Always run conduit into the bottom or sides of an enclosure.
  - Use a water-tight conduit fitting to keep water from entering the enclosure, IF the conduit MUST be placed in the top of an enclosure.
  - The Vission 20/20 is supplied with pre-punched conduit holes. Use them!

- Don't:
  - Don't run wires through the Vission 20/20 enclosure that are not related to the compressor control.
  - Don't add relays, timers, transformers, etc. In the Vission 20/20 enclosure without first checking with Vilter™.
  - Don't run conduit into the top of an enclosure.
  - Don't run refrigerant tubing inside the enclosure.
  - Don't drill metal enclosures without taking proper precautions to protect circuit boards from damage.

Transformer, Fusing and UPS Sizing

The following information can be used to help determine the power requirements for a Vission 20/20 panel. This can be helpful for sizing transformers or UPS devices that will power the Vission 20/20 panel.

- The Vission 20/20 panel contains two power supplies – Total power supply load = 90 watts.
  1. (1) 24VDC @ 2.2 A (53 watts)
  2. (1) dual output 12V @1 amp + 5V @ 4A = (35 watts)
- The DC loads that are attached to the power supplies breakdown like this:
  1. Each actuator = +24VDC @ 20mA ea (x2) = 40 mA
  2. Each press transducer = +24VDC @ 30 mA ea (x4) = 120 mA
  3. Each RTD (negligible) (the hardware applies a 25 ma pulsed signal not constant).

For estimating purposes, assume: A total sum constant draw for total RTDs used 50 mA

4. Each 4-20mA transmitter for an RTD = 10 mA
5. Danfoss positioning valves:
   - ICAD 600 = 1.2 A
   - ICAD 900 = 2.0 A
6. Howden 4-20mA LPI = 50 mA

- So for 120V fusing – consider 90 watts for the power supplies, PLUS add any additional 120V loads that are connected to the digital outputs + relays added to the panel.

  1. Each actuator motor = 0.6 amps AC load
  2. Each small solenoid = 50 watts (estimate – read the nameplate for exact load rating)
  3. Large solenoids (water, hot gas) = 100 watts (estimate – read nameplate for exact load rating)
  4. Each small pilot relay = 25 watts (estimate – read the nameplate for exact load rating)
  5. Add load values for panel heaters if used, and heat trace tape if used

Overview

The Vission 20/20 control panel utilizes X-86 PC technology with a Linux operating system. For hardware architecture, see Figure 3-1.

The Vission 20/20 has the following attributes:

- Low power, Industrial rated X-86 CPU.
- 15" XGA, high resolution LCD display. (Outdoor viewable LCD optional).
- 8-wire touch screen operator interface.
- Flexible and expandable I/O.
- NEMA-4 enclosure (NEMA-4X optional).
- Industrial temperature range design.

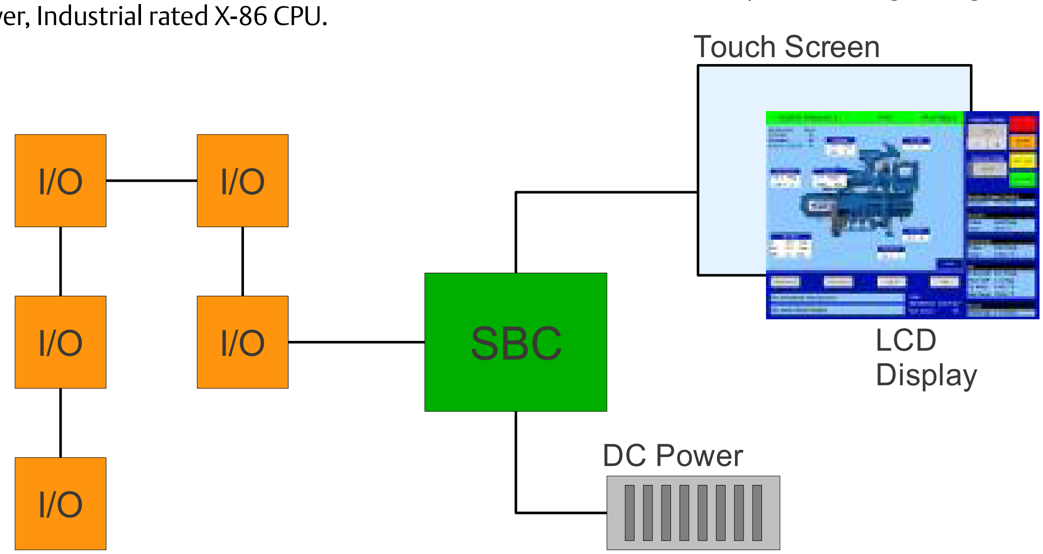


Figure 3-1. Hardware Architecture Overview

Digital Input/Output (I/O)

Refer to Table 3-1.

Compressor Start Output:

- When the Vission 20/20 signals the compressor to start, this output is energized. When the Vission 20/20 signals the compressor to stop, this output is de-energized.

Oil Pump Start Output:

- When the Vission 20/20 signals the oil pump to start, this output is energized. When the Vission 20/20 signals the oil pump to stop, this output is de-energized.

Capacity Increase Output[1]:

- This output is only active when the compressor is running. When the Vission 20/20 determines that the compressor should increase capacity by moving the slide valve to a higher percentage, this output is energized. Once the slide valve reaches 100%, this output will not energize.

1 The Capacity Increase Output won´t be available or operational when working without slides (VFD only).

Capacity Decrease Output[2]:

- This output is only active when the compressor is running. When the Vission 20/20 determines that the compressor should decrease capacity by moving the slide valve to a lower percentage, this output is energized. Once the slide valve reaches 0%, this output will not energize.

Volume Increase Output[3]:

- This output is only active when the compressor is running. When the Vission 20/20 determines that the compressor should increase Volume Index (VI) by moving the volume slide to a higher percentage, this output is energized. Once the volume slide reaches 100%, this output will not energize.

Volume Decrease Output[3]:

- This output is only active when the compressor is running. When the Vission 20/20 determines that the compressor should decrease Volume Index (VI) by moving the volume slide to a lower percentage, this output is energized. Once the volume slide reaches 0%, this output will not energize.

2 The Capacity Decrease Output won´t be available or operational when working without slides (VFD only).

3 Similarly, Volume Increase and Volume Decrease Outputs will not be available or operational when working without slides (VFD only).

Oil Separator Heater Output:

- This output is active and energized when the oil separator temperature is lower than the oil separator temperature setpoint. It is de-energized when the oil separator temperature is higher than the oil separator temperature setpoint.

Trip Output:

- This output is energized when the system has no Trips. If a trip is issued, the output de-energizes and stays de-energized until the trip condition is cleared.

Slide Valve Setpoint #1 Output (Economizer Port #1):

- Normally used for an economizer solenoid, but could be used for other devices. When the compressor slide valve percentage is equal to or greater than “slide valve Setpoint #1”, the output is energized. When the compressor slide valve percentage is less than “slide valve Setpoint #1”, the output is de-energized.

Slide Valve Setpoint #2 Output (Hot Gas Bypass):

- Normally used for a hot gas solenoid, but could be used for other devices. When the compressor slide valve percentage is equal to or greater than “slide valve Setpoint #2”, the output is energized. When the compressor slide valve percentage is less than “slide valve Setpoint #2”, the output is de-energized.

Alarm Output:

- This output is energized when the system has no alarms. If an alarm is issued, the output de-energizes and stays de-energized until the alarm condition is cleared.

Economizer Port #2 Output:

- This output is energized when the compressor slide valve percentage is equal to or greater than slide valve Setpoint for economizer port 2. It is de-energized when the compressor slide valve percentage is less than slide valve Setpoint for economizer port 2.

Liquid Injection #1 Output (see Figure 3-2):

- The function of this output will differ depending on what type liquid injection is selected. If the liquid injection solenoid only is chosen, then the output will energize when discharge temperature is above liquid injection setpoint #1 and the oil separator temperature is above the oil separator temperature override Setpoint. The output is de-energized when any one of the above condition is not met.
- If the compressor has liquid injection with motorized valve oil cooling, then this output is energized when the compressor is running and the discharge temperature is above the oil separator temperature override Setpoint and the oil separator temperature is above the override setpoint. The output is de-energized when the discharge temperature falls below the “on” setpoint minus the solenoid differential or when oil separator temperature is below the oil separator temperature override Setpoint.

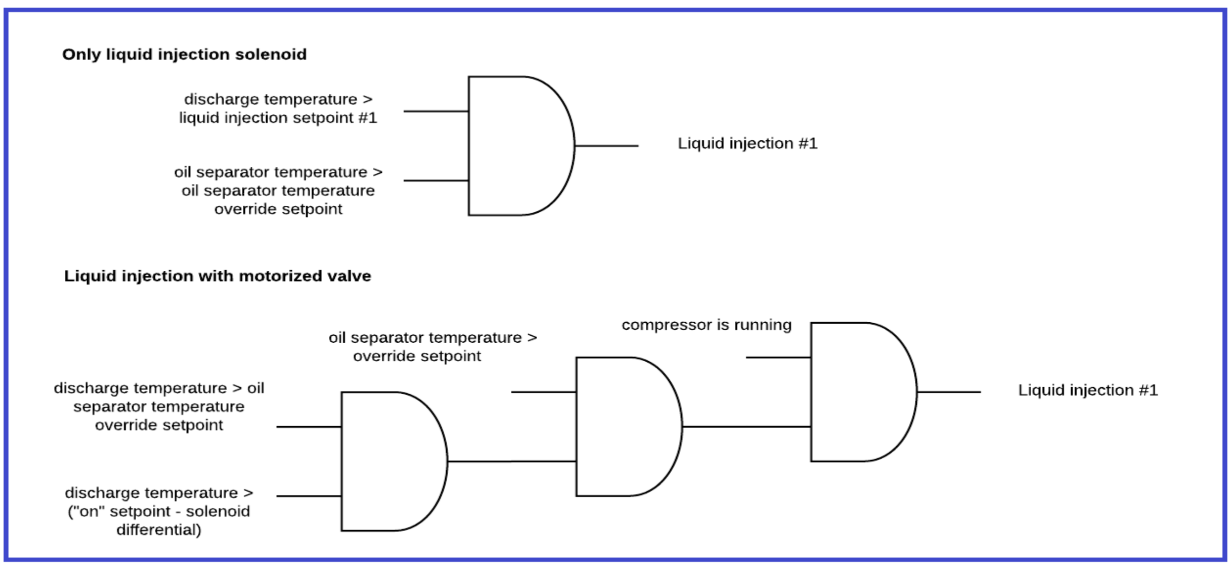


Figure 3-2. Liquid Injection #1 Logic

Table 3-1. Digital I/O (1 of 2)

Board	I/O #	Description	Type
1	1	Compressor Start	OUTPUT
1	2	Oil Pump Start	OUTPUT
1	3	Capacity Increase	OUTPUT
1	4	Capacity Decrease	OUTPUT
1	5	Volume Increase	OUTPUT
1	6	Volume Decrease	OUTPUT
1	7	Oil Separator Heater	OUTPUT
1	8	Trip indicator (ON=Normal)	OUTPUT
2	9	Slide Valve Set point #1 (Economizer Port #1)	OUTPUT
2	10	Slide Valve Set point #2 (Hot Gas Bypass)	OUTPUT
2	11	Alarm (ON=Normal)	OUTPUT
2	12	Economizer Port #2	OUTPUT
2	13	Liquid Injection #1	OUTPUT
2	14	Liquid Injection #2	OUTPUT
2	15	Remote Enabled	OUTPUT
2	16	Shunt Trip	OUTPUT
3	17	Comp Motor Starter Auxiliary Contact	INPUT
3	18	High Level Shutdown	INPUT
3	19	Oil Level Float Switch #1	INPUT
3	20	Oil Level Float Switch #2	INPUT
3	21	Remote Setpoint #1/#2 Selection	INPUT
3	22	Remote Start/Stop	INPUT
3	23	Remote Capacity Increase	INPUT
3	24	Remote Capacity Decrease	INPUT
4	25	Condenser / Remote Oil Cooler Step #1	OUTPUT
4	26	Condenser / Remote Oil Cooler Step #2	OUTPUT
4	27	Condenser / Remote Oil Cooler Step #3	OUTPUT
4	28	Condenser / Remote Oil Cooler Step #4	OUTPUT
4	29	Auxiliary Input #1	INPUT
4	30	Auxiliary Input #2	INPUT
4	31	Auxiliary Input #3	INPUT
4	32	Auxiliary Input #4	INPUT

Liquid Injection #2 Output (see Figure 3-3):

- Used with the Dual Liquid Injection option, its availability depends on compressor type and model. The Liquid Injection # 2 digital output is controlled depending on Liquid Pressure and Slide % value.

Remote Enabled Output:

- This output is energized when the Vission 20/20 panel is enabled for Direct I/O control. If there is a warning/trip/inhibit condition present in the compressor, if there´s still Anti-Recycle Time present, or if the compressor is placed in the manual stop position, this output is de-energized.

Shunt Trip:

- This output is designed to be connected to a master power breaker with a shunt trip input. If the Vission 20/20 detects the compressor motor is running when it's not suppose to be, then this output can be energized to trip the breaker supplying power to a starter.

Comp Motor Starter Auxiliary Contact:

- This input looks for a feedback signal from the compressor starter, confirming that the compressor starter is energized.

High Level Shutdown Input:

- This input must be energized in order for the compressor to operate. If de-energized, the compressor will shut down and issue a high level trip.

Oil Level Float Switch #1 Input:

- This input must be energized in order for the compressor to operate. If de-energized, the compressor will shut down and issue a oil level #1 trip.

Oil Level Float Switch #2 Input:

- This input must be energized in order for the compressor to operate. If de-energized, the compressor will shut down and issue a oil level #2 trip.

Remote Setpoint #1/#2 Selection Input:

- This input is monitored when I/O based setpoint control is enabled from Compressor Control screen. When this input is De-Energized, Setpoint 1 will be used as Control Setpoint for modulating the compressor capacity. When this input is Energized, Setpoint 2 will be used as Control Setpoint for modulating the compressor capacity. For using Setpoint 2, the operator should make sure that No. of Controllers is set to 2 in Configuration screen.

Remote Start/Stop Input:

- If the compressor is enabled for remote I/O control, this input is enabled. Energizing this input will issue a start for the compressor as long as it is available to run. De-energizing this input stops the compressor.

NOTE

The scan interval on the remote increase and decrease inputs is approximately ONE SECOND. Please take that into account when developing a control scheme using the remote increase and remote decrease inputs for compressor control.

Remote Capacity Increase Input:

- If the compressor is enabled for remote I/O control, this input is enabled. Operational only when the compressor is running. Energizing this input will increase the slide valve position or VFD speed if Compressor VFD is Enabled.
- The slide valve/VFD speed will continuously increase as long as this input is energized. The slide valve/VFD speed will not increase when this input is de-energized.

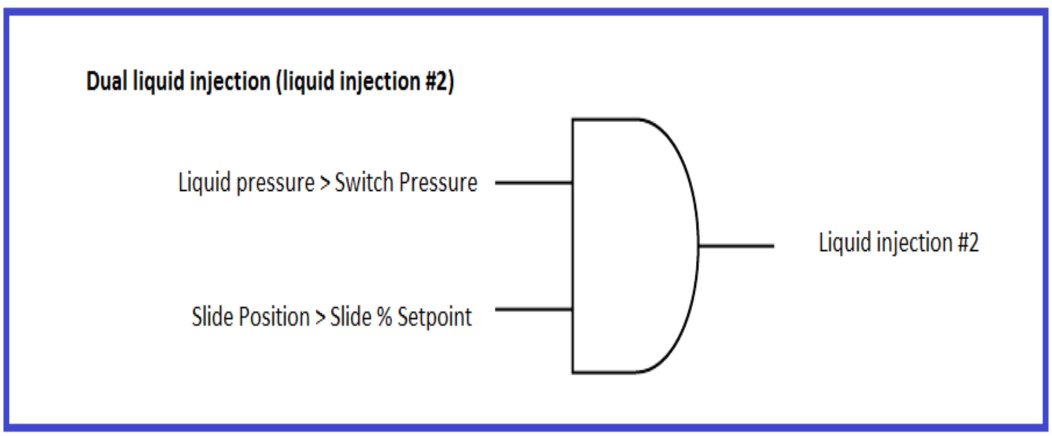


Figure 3-3. Liquid Injection #2 Logic

Table 3-1. Digital I/O (2 of 2)

Board	I/O #	Description	Type
5	33	Auxiliary Output #1	OUTPUT
5	34	Auxiliary Output #2	OUTPUT
5	35	Auxiliary Output #3	OUTPUT
5	36	Auxiliary Output #4	OUTPUT
5	37	Auxiliary Input #5	INPUT
5	38	Auxiliary Input #6	INPUT
5	39	Auxiliary Input #7	INPUT
5	40	Auxiliary Input #8	INPUT

Table 3-2. Analog Inputs (1 of 2)

Board	I/O #	Description	Type
6	1	Motor Current	4-20 mA, 0-5A
6	2	Suction Pressure	0-5V, 1-5 V, 0-10V, 4-20 mA
6	3	Discharge Pressure	0-5V, 1-5 V, 0-10V, 4-20 mA
6	4	Oil Filter Inlet Pressure	0-5V, 1-5 V, 0-10V, 4-20 mA
6	5	Oil Manifold Pressure	0-5V, 1-5 V, 0-10V, 4-20 mA
6	6	Economizer Pressure	0-5V, 1-5 V, 0-10V, 4-20 mA
6	7	% Slide Valve Position	0-5V, 4-20 mA, Potentiometer
6	8	% Volume Position	0-5V, 4-20 mA, Potentiometer
7	9	Suction Temperature	4-20 mA, RTD, ICTD
7	10	Discharge Temperature	4-20 mA, RTD, ICTD
7	11	Oil Separator Temperature	4-20 mA, RTD, ICTD
7	12	Oil Manifold Temperature	4-20 mA, RTD, ICTD
7	13	Process Temperature	4-20 mA, RTD, ICTD
7	14	Chiller Inlet Temperature	4-20 mA, RTD, ICTD
7	15	Condenser Pressure	0-5V, 1-5 V, 0-10V, 4-20 mA, RTD, ICTD
7	16	Remote Caphold Setpoint	0-5V, 4-20 mA, RTD, ICTD
8	17	Auxiliary #1	0-5V, 1-5 V, 0-10V, 4-20 mA, RTD, ICTD
8	18	Auxiliary #2	0-5V, 1-5 V, 0-10V, 4-20 mA, RTD, ICTD
8	19	Auxiliary #3	0-5V, 1-5 V, 0-10V, 4-20 mA, RTD, ICTD
8	20	Auxiliary #4	0-5V, 1-5 V, 0-10V, 4-20 mA, RTD, ICTD
8	21	Auxiliary #5	0-5V, 1-5 V, 0-10V, 4-20 mA, RTD, ICTD
8	22	Auxiliary #6	0-5V, 1-5 V, 0-10V, 4-20 mA, RTD, ICTD
8	23	Auxiliary #7	0-5V, 1-5 V, 0-10V, 4-20 mA, RTD, ICTD
8	24	Auxiliary #8	0-5V, 1-5 V, 0-10V, 4-20 mA, RTD, ICTD
9	25	Auxiliary #9	0-5V, 1-5 V, 0-10V, 4-20 mA, RTD, ICTD
9	26	Auxiliary #10	0-5V, 1-5 V, 0-10V, 4-20 mA, RTD, ICTD
9	27	Auxiliary #11	0-5V, 1-5 V, 0-10V, 4-20 mA, RTD, ICTD

Remote Capacity Decrease Input:

- Operational only when the compressor is running. This input is enabled if the compressor is enabled for remote I/O control. Energizing this input will decrease the slide valve position or VFD speed if Compressor VFD is Enabled.
- The slide valve/VFD speed will continuously decrease as long as this input is energized. The slide valve/VFD speed will not decrease when this input is de-energized.

Condenser / Remote Oil Cooler Step #1 Output:

- This output is enabled when condenser control or Remote Oil Cooler option is selected. A condenser / Remote Oil Cooler fan or pump will be turned on or off by this output.

Condenser / Remote Oil Cooler Step #2 Output:

- This output is enabled when condenser control or Remote Oil Cooler option is selected. A condenser / Remote Oil Cooler fan or pump will be turned on or off by this output.

Condenser / Remote Oil Cooler Step #3 Output:

- This output is enabled when condenser or Remote Oil Cooler control option is selected. A condenser / Remote Oil Cooler fan or pump will be turned on or off by this output.

Condenser / Remote Oil Cooler Step #4 Output:

- This output is enabled when condenser or Remote Oil Cooler control option is selected. A condenser / Remote Oil Cooler fan or pump will be turned on or off by this output.

Auxiliary Inputs #1 - #8:

- Optional inputs that can be configured as an alarm or trip. Typically connected to external switched devices.

Auxiliary Outputs #1 - #4:

- Optional inputs that can be configured as an alarm or trip. Typically connected to external switched devices.

Analog Inputs

Refer to Table 3-2.

Motor Current:

- Default is a 0-5 Amp current transformer (CT). Current transformer ratio is set in the calibration screen.

Suction Pressure:

- Default signal is 4-20mA. Suction pressure transducer range and calibration is set in the calibration screen.

Discharge Pressure

- Default signal is 4-20mA. Discharge pressure transducer range and calibration are set in the calibration screen.

Oil Filter Inlet Pressure:

- Default signal is 4-20mA. Oil filter pressure transducer range and calibration are set in the calibration screen.

Oil Manifold Pressure:

- Default signal is 4-20mA. Oil manifold pressure transducer range and calibration are set in the calibration screen.

Economizer Pressure:

- Default signal is 4-20mA. Economizer pressure transducer range and calibration are set in the calibration screen.

Slide Valve Position[4]:

- Reads the 0-5 volt signal back from the slide position motor actuator to indicate current slide valve position.

Volume Position[5]:

- Reads the 0-5 volt signal back from the slide volume motor actuator to indicate current volume position.

Suction Temperature:

- Default signal is RTD. Suction temperature calibration is set in the calibration screen.

Discharge Temperature:

- Default signal is RTD. Discharge temperature calibration is set in the calibration screen.

Oil Separator Temperature:

- Default signal is RTD. Oil separator temperature calibration is set in the calibration screen.

4 The Slide Valve Position Input won´t be available or operational when working without slides (VFD only).

5 The Volume Position input won't be available or operational when working without slides (VFD only).

Oil Manifold Temperature:

- Default signal is RTD. Oil manifold temperature calibration is set in the calibration screen.

Process Temperature:

- Default signal is 4-20mA. Process temperature calibration and range are set in the calibration screen.

Chiller Inlet Temperature:

- Default signal is 4-20mA. Measures separator level. Chiller Inlet Temperature calibration and range are set in the calibration screen.

Condenser Pressure:

- Default signal is 4-20mA. Condenser pressure transducer range and calibration are set in the calibration screen.

Remote Caphold:

- Default signal is 4-20mA. Active in "Direct I/O" mode. Adjusts the capacity of the compressor from 0-100%, proportional to the 4-20mA signal.

Auxiliary #1 - #16:

- Flexible analog inputs that can be configured to control, alarm or trip.

Analog Outputs

Refer to Table 3-3.

Compressor VFD:

- 4-20mA output to control compressor motor speed with a Variable Frequency Drive (VFD).

Condenser / Remote Oil Cooler VFD:

- 4-20mA output to control one condenser / remote oil cooler fan which is interleaved between the remaining condenser / remote oil cooler steps for smoother control.

% Slide Valve Position[6]:

- 4-20mA signal that transmits the slide valve position for remote monitoring.

Motorized Valve (V+):

- For a cool compression compressor, this 4-20mA signal controls a motorized valve to regulate the liquid refrigerant level in the oil separator. For a liquid injection application on a standard single screw, this 4-20mA signal controls a motorized valve to regulate the liquid refrigerant injected into the compressor for oil cooling purposes.

Auxiliary Outputs #1 - #4:

- Optional outputs that can be configured in user defined manner.
- When Oil Flow Control option is selected from configuration screen, Auxiliary Output #1 which is 4-20mA signal is used to control the opening percentage of Danfoss valve.

6 The % Slide Valve Position output won't be operational when working without slides (VFD only).

Table 3-2. Analog Inputs (2 of 2)

Board	I/O #	Description	Type
9	28	Auxiliary #12	0-5V, 1-5 V, 0-10V, 4-20 mA, RTD, ICTD
9	29	Auxiliary #13	0-5V, 1-5 V, 0-10V, 4-20 mA, RTD, ICTD
9	30	Auxiliary #14	0-5V, 1-5 V, 0-10V, 4-20 mA, RTD, ICTD
9	31	Auxiliary #15	0-5V, 1-5 V, 0-10V, 4-20 mA, RTD, ICTD
9	32	Auxiliary #16	0-5V, 1-5 V, 0-10V, 4-20 mA, RTD, ICTD

Table 3-3. Analog Outputs

Board	I/O #	Description	Type
10	1	Compressor VFD	4-20 mA
10	2	Condenser / Remote Oil Cooler VFD	4-20 mA
10	3	% Slide Valve Position	4-20 mA
10	4	Motorized Valve (Cool Compression or Liquid Injection), V+	4-20 mA
10	5	Auxiliary Output #1	4-20 mA
10	6	Auxiliary Output #2	4-20 mA
10	7	Auxiliary Output #3	4-20 mA
10	8	Auxiliary Output #4	4-20 mA

Digital & Analog I/O Boards Layout

It is important to install the boards in the proper layout. For the correct digital and analog input/output (I/O) board layout, see Figure 3-4.

Dipswitches

- Each board has a dipswitch which sets its communications address so that it can communicate with the CPU board. The dipswitch settings must be correct or the I/O will not function.

Jumpers

- Jumpers are required on the analog boards to configure them for the type of sensors used. The jumper table for the analog board shows the optional jumper configurations for sensors other than the default Vilter standard. If a different sensor is to be used, the jumpers on the analog board need to be changed. In addition, the configuration for this sensor must be changed in the Instrument Calibration screen. The following illustrations show the Vilter default configurations for the Vission 20/20.

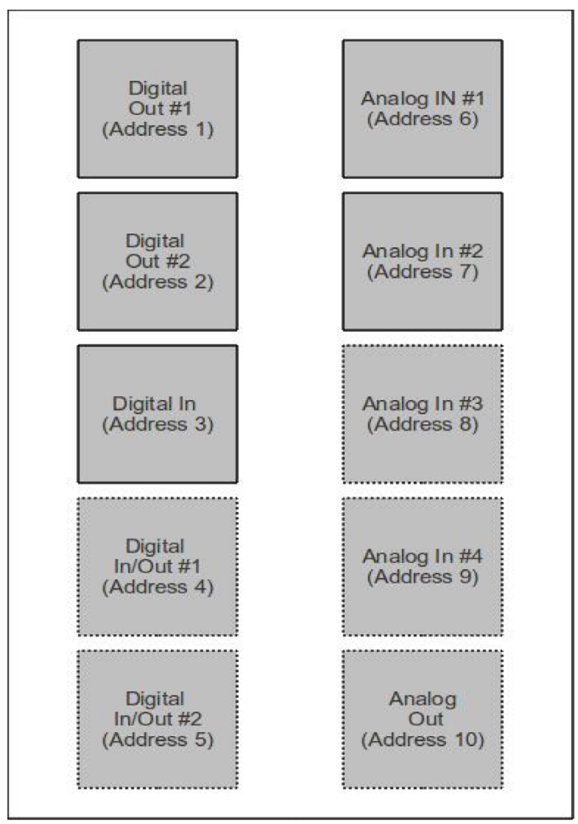


Figure 3-4. Digital I/O Board Layout

Digital Output Boards

The digital output board converts signals generated by the Vission 20/20 program into 120VAC signals that can energize or signal other devices. All the signals are digital in that the only two states available are either on or off. See board layout, Figure 3-5.

Signal LEDs:

- Marked in the diagram below in Blue. These LEDs indicate when a 120VAC output is being produced.

Voltage LEDs:

- Marked in the diagram below in Orange. These LEDs indicate the correct voltage of both the 5V DC and 24V DC power sources.

Communication LEDs:

- Marked in the diagram below in Green. These LEDs show the active communications between the digital output board and the Vission 20/20 CPU board.

Address Dipswitches:

- Marked in the diagram below in Red. These dipswitches are used to assign each board its address position. The addresses are binary and therefore the address of a digital output board will either be address 1 (0001) or 2 (0010).

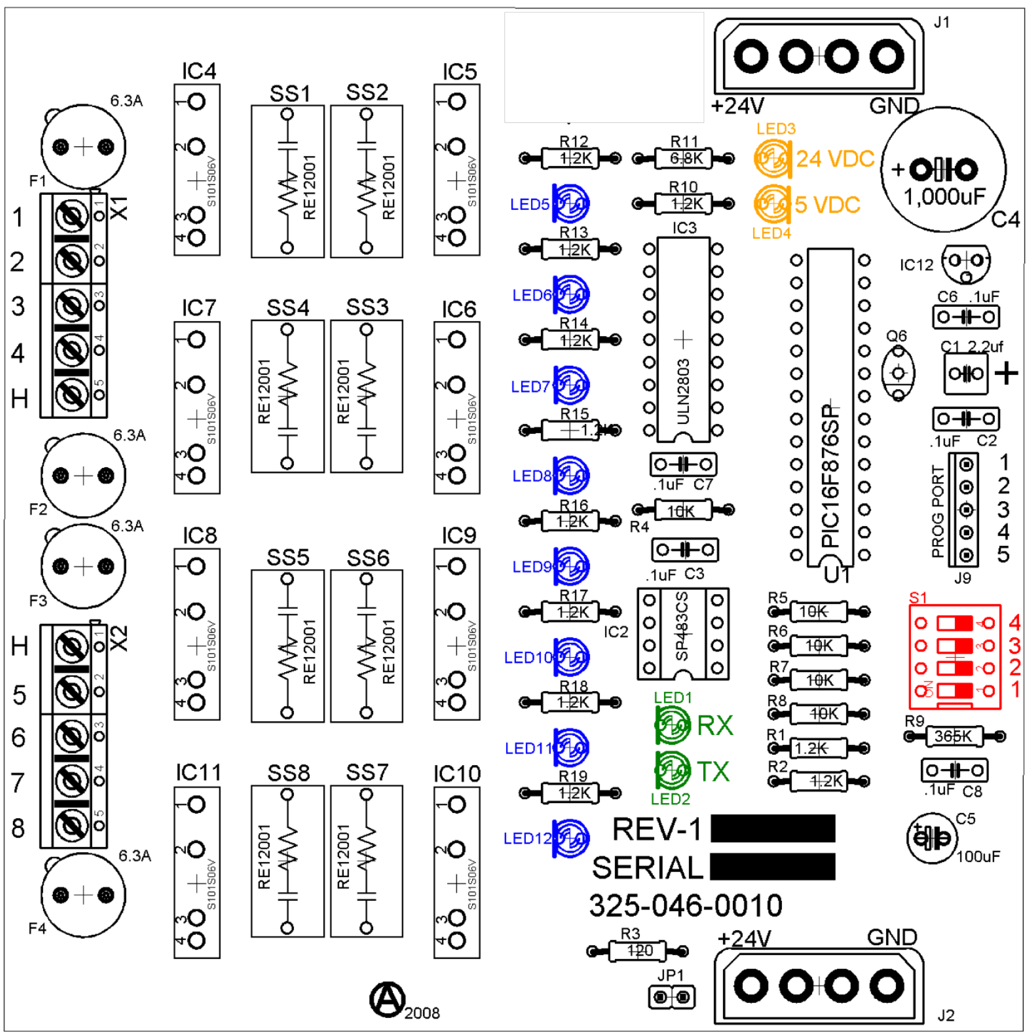


Figure 3-5. Digital Output Board Layout

Digital Input Boards

The digital input board converts 120V DC signals from external devices to signals for the Vission 20/20 program. All the signals are digital in that the only two states available are either on or off. See board layout, Figure 3-6.

Signal LEDs:

- Marked in the diagram below in light Blue. These LEDs indicate when a 120VAC input is detected.

Voltage LEDs:

- Marked in the diagram below in Orange. These LEDs indicate the correct voltage of both the 5V DC and 24V DC power sources.

Communication LEDs:

- Marked in the diagram below in Green. These LEDs show the active communications between the digital input board and the Vission 20/20 CPU board.

Address Dipswitches:

- Marked in the diagram below in Red. These dipswitches are used to assign each board its address position. The addresses are binary and therefore the address of a digital input board can only be addressed as 3 (0011).

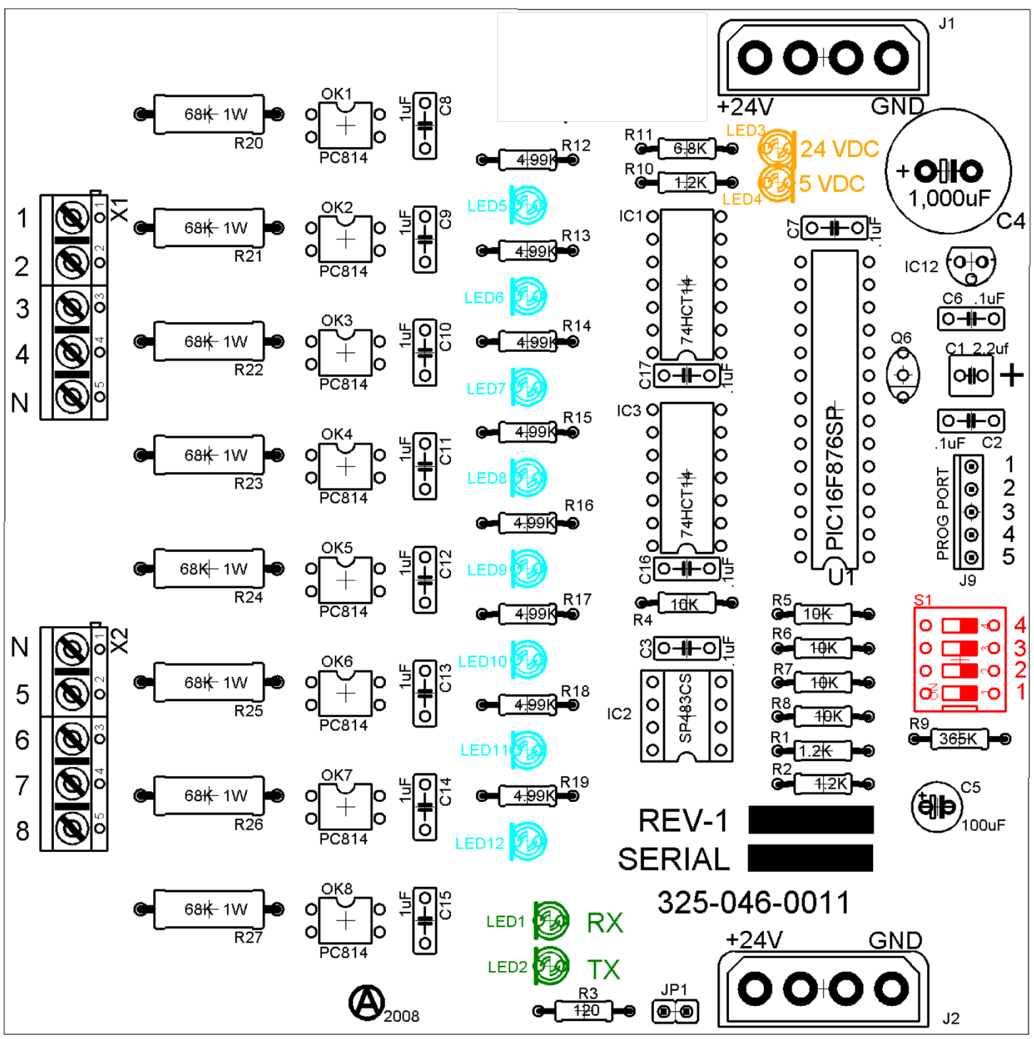


Figure 3-6. Digital Input Board Layout

Digital In-Out Boards

The digital input - output board converts signals generated by the Vission 20/20 program into 120VAC signals as well as detect external 120VAC inputs to signal the Vission 20/20 program.

All the signals are digital in that the only two states available are either on or off. See board layout, Figure 3-7.

Signal LEDs:

- Marked in the diagram below in Blue or outputs and light blue for inputs. These LEDs indicate when a 120VAC output is being produced or a 120VAC signal is detected.

Voltage LEDs:

- Marked in the diagram below in Orange. These LEDs indicate the correct voltage of both the 5V DC and 24V DC power sources.

Communication LEDs:

- Marked in the diagram below in Green. These LEDs show the active communications between the digital in-out board and the Vission 20/20 CPU board.

Address Dipswitches:

- Marked in the diagram below in Red. These dipswitches are used to assign each board its address position. The addresses are binary and therefore the address of a digital output board will either be address 4 (0100) or 5 (0101).

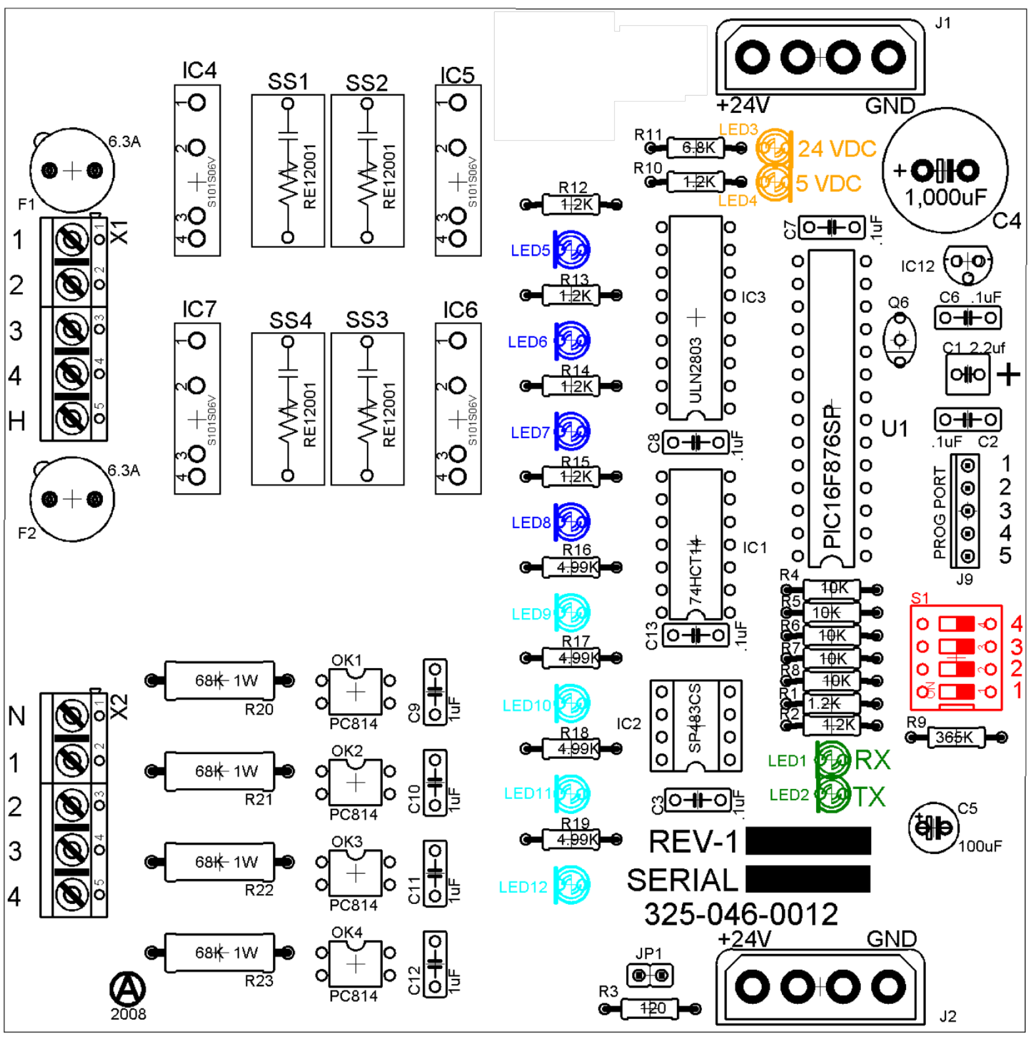


Figure 3-7. Digital Input-Output Board Layout

Analog Input Boards

The analog input board converts varying DC signals into a signal that can interpreted by the Vission 20/20 program. The signals are considered analog because the input DC signal can vary from the minimum value to the maximum value. See board layout, Figure 3-8.

Configuration Jumpers:

- Marked in the diagram below in Purple. The jumpers allow the operator to configure the signal type and range for incoming analog signals. For the correct jumper setting for a giving application, see Table 3-4. Analog Input Jumper Tables.

Voltage LEDs:

- Marked in the diagram below in Orange. These LEDs indicate the correct voltage of both the 5V DC and 24V DC power sources.

Communication LEDs:

- Marked in the diagram below in Green. These LEDs show the active communications between the analog input board and the Vission 20/20 CPU board.

Address Dipswitches:

- Marked in the diagram below in Red. These dipswitches are used to assign each board its address position. The addresses are binary and therefore the address of a digital output board will be address 6 (0110), 7 (0111), 8 (1000) or 9 (1001).

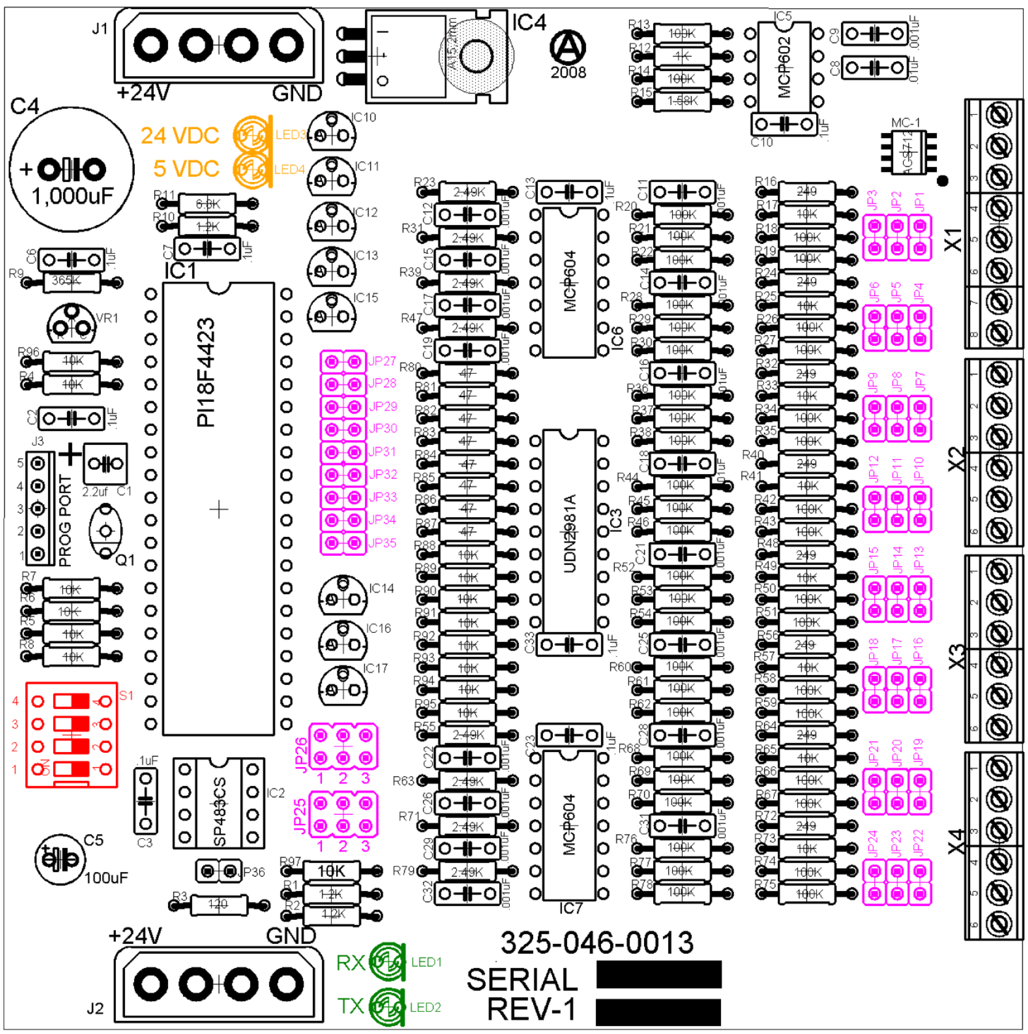


Figure 3-8. Analog Input Board Layout

Analog Input Jumper Tables

The following tables are used to configure each channel of the analog input board signal type and range desired by the operator, see Table 3-4.

Table 3-4. Analog Input Jumper Tables

CHANNEL 1	SIGNAL	JP-1	JP-2	JP-3	JP-27	JP-35
Analog Input 1-A* Analog input 1-B**	0-5 AMP	OUT	OUT	OUT	OUT	IN
	0-5 VOLT	OUT	OUT	OUT	OUT	OUT
	1-5 VOLT	OUT	OUT	OUT	OUT	OUT
	0-10 VOLT	OUT	OUT	IN	OUT	OUT
	4-20 mA	IN	OUT	OUT	OUT	OUT
	ICTD	OUT	IN	OUT	OUT	OUT
	RTD	OUT	OUT	OUT	IN	OUT

*Use Analog Input 1-A when 0-5 AMP secondary current transformers are installed in the motor starter.

**Use Analog Input 1-B when current transformers are installed in the motor starter.

CHANNEL 2	SIGNAL	JP-4	JP-5	JP-6	JP-28
Analog Input 2	0-5 VOLT	OUT	OUT	OUT	OUT
	1-5 VOLT	OUT	OUT	OUT	OUT
	0-10 VOLT	OUT	OUT	IN	OUT
	4-20 mA	IN	OUT	OUT	OUT
	ICTD	OUT	IN	OUT	OUT
	RTD	OUT	OUT	OUT	IN

CHANNEL 3	SIGNAL	JP-7	JP-8	JP-9	JP-29
Analog Input 3	0-5 VOLT	OUT	OUT	OUT	OUT
	1-5 VOLT	OUT	OUT	OUT	OUT
	0-10 VOLT	OUT	OUT	IN	OUT
	4-20 mA	IN	OUT	OUT	OUT
	ICTD	OUT	IN	OUT	OUT
	RTD	OUT	OUT	OUT	IN

CHANNEL 4	SIGNAL	JP-10	JP-11	JP-12	JP-30
Analog Input 4	0-5 VOLT	OUT	OUT	OUT	OUT
	1-5 VOLT	OUT	OUT	OUT	OUT
	0-10 VOLT	OUT	OUT	IN	OUT
	4-20 mA	IN	OUT	OUT	OUT
	ICTD	OUT	IN	OUT	OUT
	RTD	OUT	OUT	OUT	IN

Table 3-4. Analog Input Jumper Tables (Continued)

CHANNEL 5	SIGNAL	JP-13	JP-14	JP-15	JP-31
Analog Input 5	0-5 VOLT	OUT	OUT	OUT	OUT
	1-5 VOLT	OUT	OUT	OUT	OUT
	0-10 VOLT	OUT	OUT	IN	OUT
	4-20 mA	IN	OUT	OUT	OUT
	ICTD	OUT	IN	OUT	OUT
	RTD	OUT	OUT	OUT	IN

CHANNEL 6	SIGNAL	JP-16	JP-17	JP-18	JP-32
Analog Input 6	0-5 VOLT	OUT	OUT	OUT	OUT
	1-5 VOLT	OUT	OUT	OUT	OUT
	0-10 VOLT	OUT	OUT	IN	OUT
	4-20 mA	IN	OUT	OUT	OUT
	ICTD	OUT	IN	OUT	OUT
	RTD	OUT	OUT	OUT	IN

CHANNEL 7	SIGNAL	JP-19	JP-20	JP-21	JP-33	JP-25*
Analog input 7	0-5 VOLT	OUT	OUT	OUT	OUT	2
	1-5 VOLT	OUT	OUT	OUT	OUT	2
	0-10 VOLT	OUT	OUT	IN	OUT	2
	4-20 mA	IN	OUT	OUT	OUT	2
	ICTD	OUT	IN	OUT	OUT	2
	RTD	OUT	OUT	OUT	IN	2
	ACTUATOR	OUT	OUT	OUT	OUT	1
	POTENTIOMETER	OUT	OUT	OUT	OUT	3
	LPI	IN	OUT	OUT	OUT	1

*JP-25
Position 1 = sends +24VDC (unregulated) to “supply” terminal (2.2A limit)
Position 2 = sends +24VDC (regulated) to “supply” terminal (25mA limit)
Position 3 = sends +5VDC (regulated) to “supply” terminal

CHANNEL 8	SIGNAL	JP-22	JP-23	JP-24	JP-34	JP-26
Analog Input 8	0-5 VOLT	OUT	OUT	OUT	OUT	2
	1-5 VOLT	OUT	OUT	OUT	OUT	2
	0-10 VOLT	OUT	OUT	IN	OUT	2
	4-20 mA	IN	OUT	OUT	OUT	2
	ICTD	OUT	IN	OUT	OUT	2
	RTD	OUT	OUT	OUT	IN	2
	ACTUATOR	OUT	OUT	OUT	OUT	1
	POTENTIOMETER	OUT	OUT	OUT	OUT	3

2-wire Versus 3-wire RTD Connection

Figure 3-9 shows the different wiring for RTDs with 2 or 3 wires.

RTD Type	+24	SIGNAL	COM (GROUND)
2-wire	R1	jumper to R1	W1
3-wire	R2	W2	W2

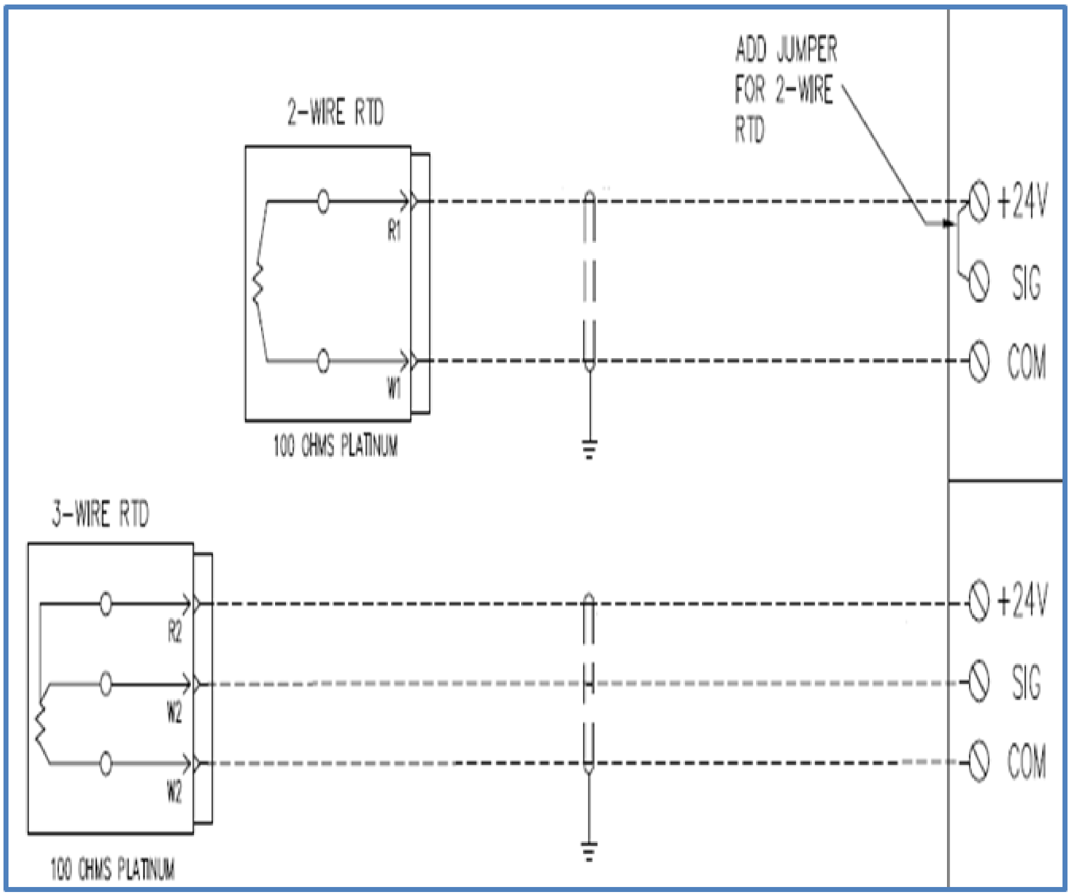


Figure 3-9. 2-Wire and 3-Wire RTD Connection Diagram

Analog Output Boards

The Analog Output board converts signals from the Vission 20/20 program into a current ranging from 4mA to 20mA, see Figure 3-10.

Voltage LEDs:

- Marked in the diagram below in Orange. These LEDs indicate the correct voltage of both the 5V DC and 24V DC power sources.

Communication LEDs:

- Marked in the diagram below in Green. These LEDs show the active communications between the analog output board and the Vission 20/20 CPU board.

Address Dipswitches:

- Marked in the diagram below in Red. These dipswitches are used to assign each board its address position. The addresses are binary and therefore the address of a digital output board will only be addressed as 10 (1010).

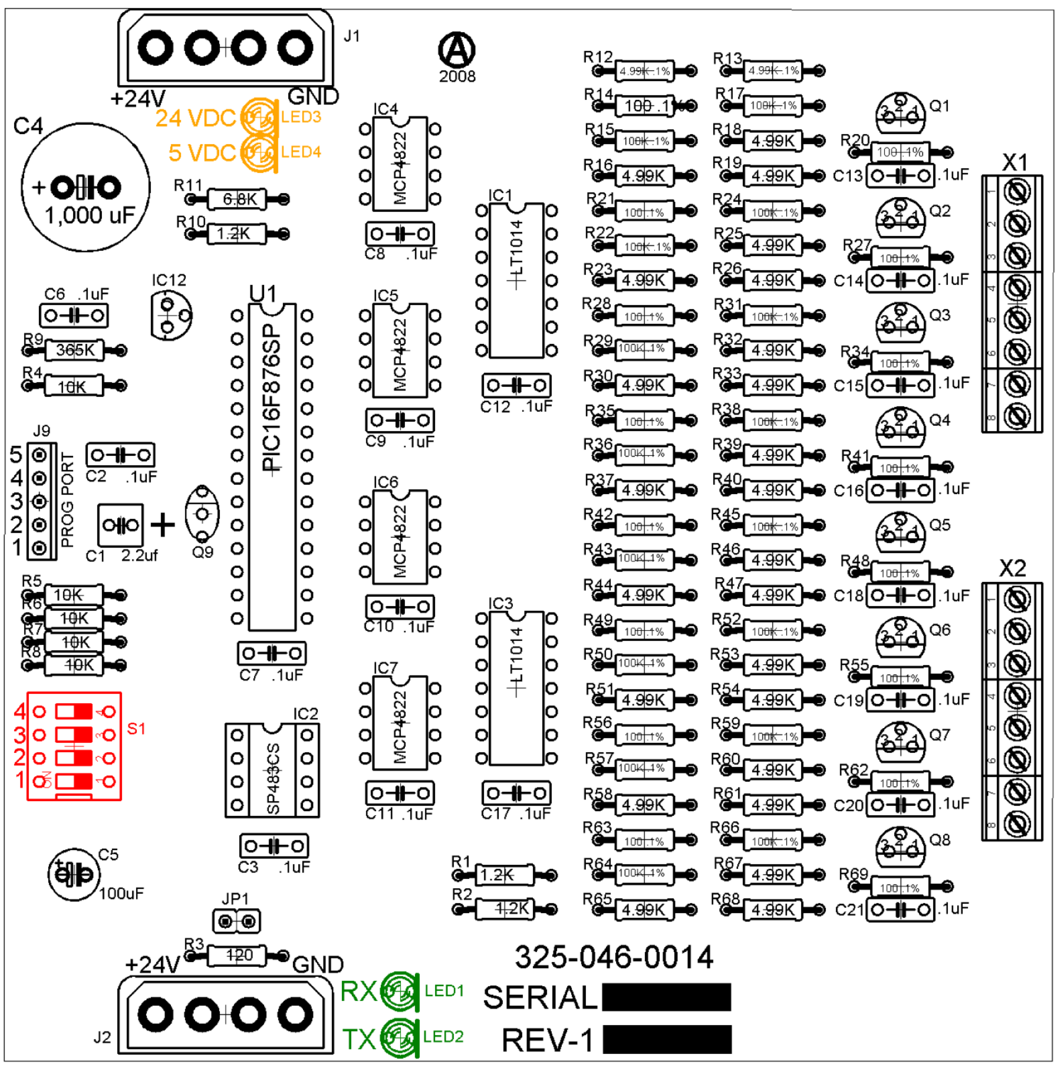


Figure 3-10. Analog Output Board Layout

Overview

The Main Screen is the first screen encountered when powering up the Vission 20/20 Panel, see Figure 4-1. This screen is designed as the starting point for all succeeding screens and provides as much information as possible at a glance. The Main Screen is divided into four sections. Three of the sections are static: Top Status Bar, Bottom Status Bar and Parameters Bar. These three sections of the main screen will remain visible while navigating through other screens and provide a constant view of critical information. The splash screen is the only dynamic section. All navigation to any other screens will be performed through the Main Screen.

NOTE

Because of space constrains, the full text of some labels, messages, etc., cannot be fitted on the screen of the panel with the rest of the information. If you want to read the complete string, you can click on it, and it will appear superposed on the screen.

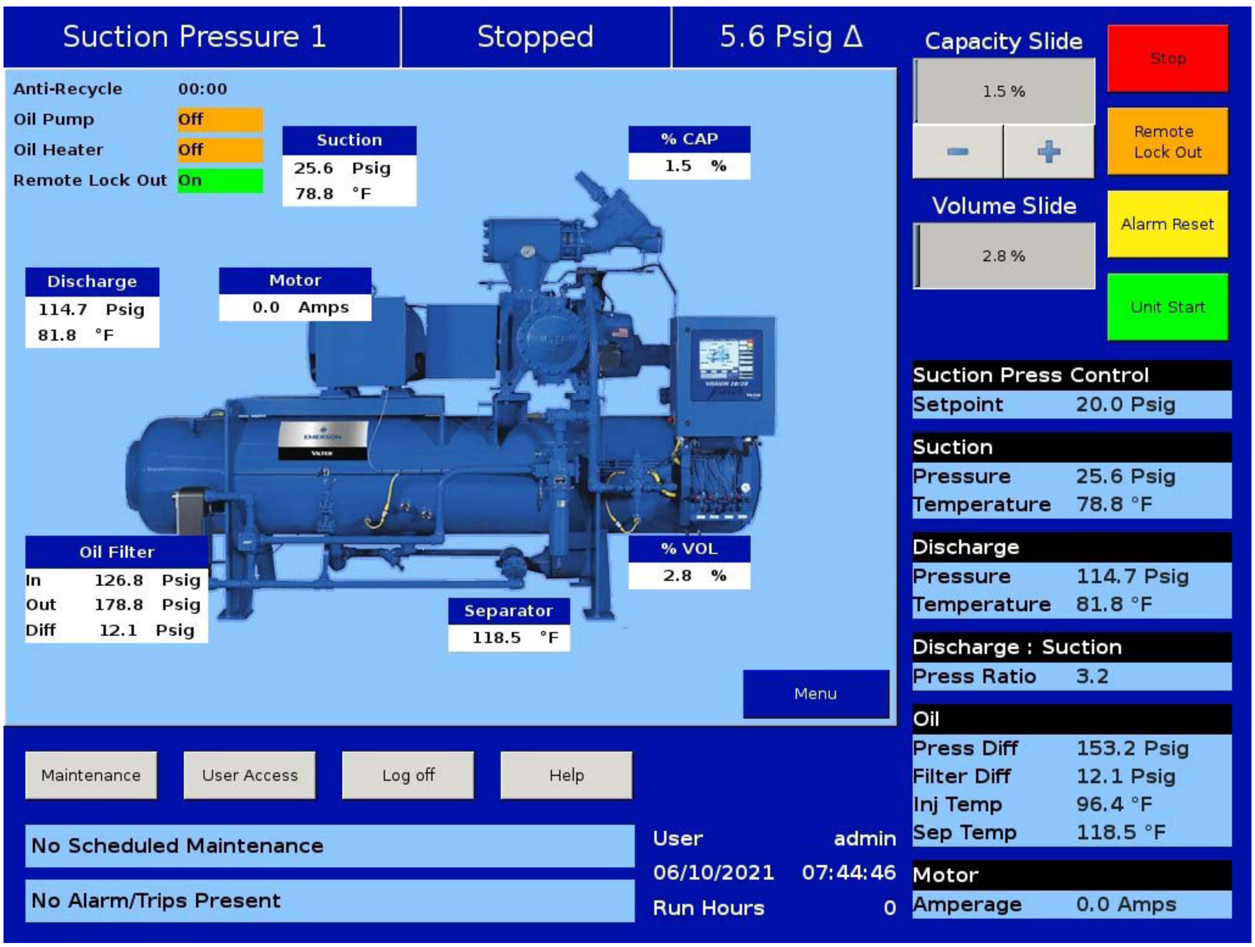


Figure 4-1. Main Screen

Top Status Bar

The standard view of the status bar shows three pieces of information. From left to right, the bar shows the control method, the current run mode, and the difference between the desired control setpoint and the actual value of the processes control value, see Figure 4-2.

The status bar also has an alternate function where it displays to the user any information that requires the user's attention or intervention. It accomplishes this by changing the status bar's color and/or flashing additional information bars over the standard status bar view.

Standard Bar – blue:

- Indicates a condition where the compressor motor is not running.

Standard Bar – green:

- Informs the operator that the compressor motor is currently running.

Information Bars will flash their information over the top of the status bar. The operator will see the status bar and then one or more information bars in a repetitive sequence.

Information Bar – blue:

- Shows various operational modes that are different than normal running condition. An example of this would be a load limit condition. The compressor is not able to completely load due to some parameter like high motor current and therefore the operator is notified via this type of information bar.

Information bar – yellow:

- This typically indicates an Alarm condition. Alarm conditions do not stop the compressor but are meant to alert the operator of conditions such that, if no corrective action is taken, can result in a compressor trip.

Information bar – red:

- Informs the operator that the compressor's motor was stopped due the condition listed in the information bar. Compressor trips are designed to protect the equipment and any personnel operating the equipment.

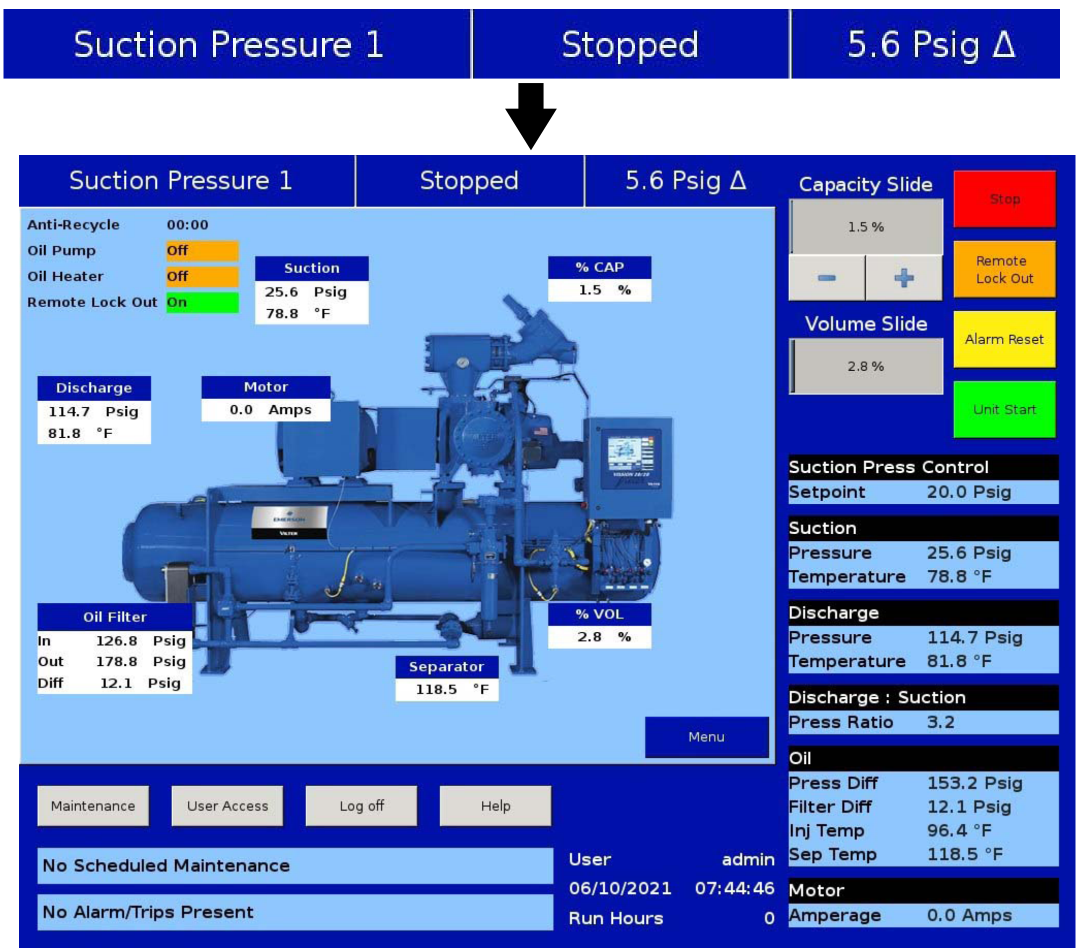


Figure 4-2. Top Status Bar

Parameter Bar

The main purpose of the Parameter Bar is to display the common operational parameters that the operator would be most concerned with. It also gives the operator access to critical buttons such as the "Stop" and "Start" buttons, see Figure 4-3.

Capacity Slide Indicator:

- Shows the position of the capacity slide from 0% to 100% via a horizontal gray bar. The buttons below the indicator are used in manual capacity control. The "-" button will decrease the capacity position and the "+" button will increase the position.

Volume Slide Indicator:

- Shows the position of the volume slide from 0% to 100% via a horizontal gray bar. The increase and decrease buttons will appear below the volume indicator only if the operator who is logged on has sufficient privileges (security level 4). If available, the buttons work to increase and decrease the volume slide position in the same manner as the capacity slide.

VFD Speed indicator (No Slide Operation):

- Shows the speed of the VFD controlling the compressor's capacity from 0% to 100% via a horizontal gray bar. The buttons below the indicator are used in manual capacity control. The "-" button will decrease the capacity position and the "+" button will increase the position.

Stop Button:

- When pressed, stops the compressor in all cases.

Remote Lock Out Button:

- When pressed, activates the remote lock out option. This is a safety feature that prevents any external devices from assuming control and starting the compressor. To release the remote lock out, the operator must press the "Unit Start" button and then the "Remote" button when the start dialog box appears.

Alarm Reset Button:

- When pressed, clears any current alarms, trips or status messages that may be displayed on the information bar. Note that, if the condition that created the alarm, trip or status message still exits, the message will reappear.

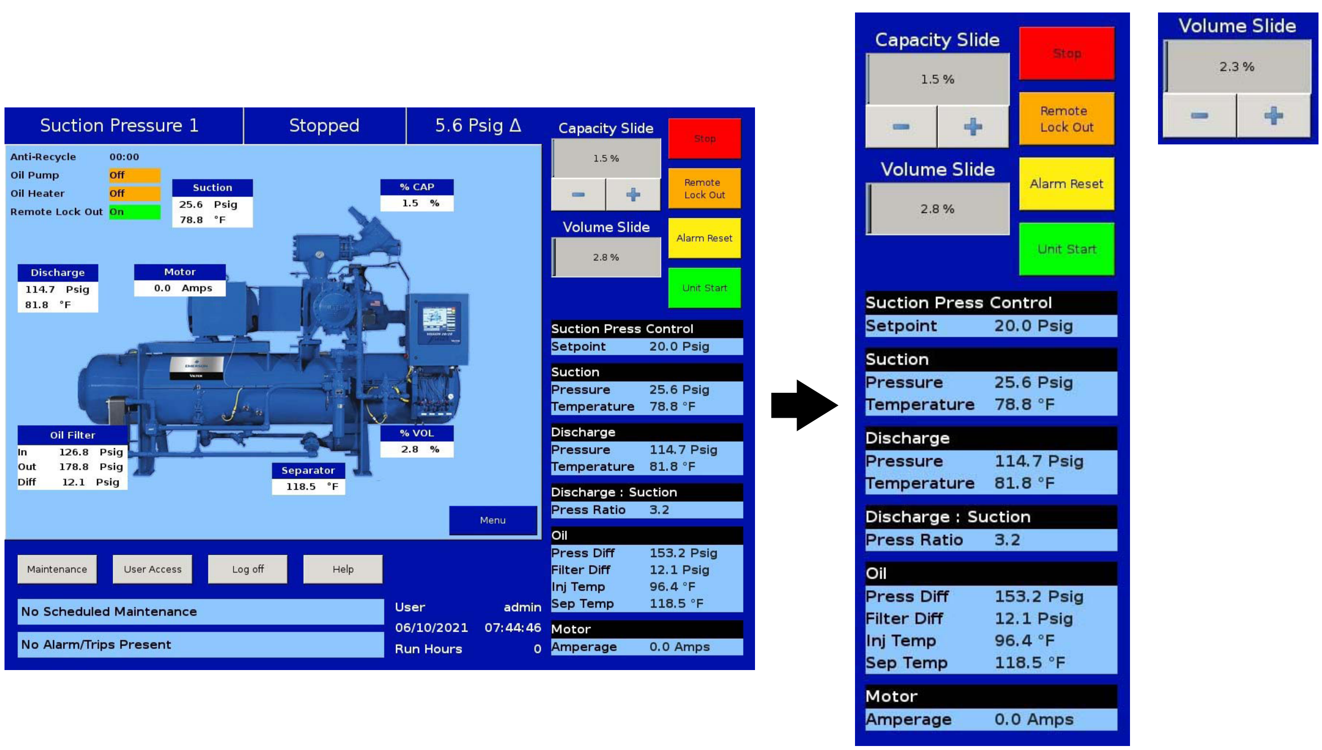


Figure 4-3. Parameter Bar

Unit Start Button:

- When pressed, a start dialog box that gives the operator several run options will appear: Auto, Manual, Remote, Auto Seq or Cancel, see Figure 4-4.

Control Parameter Boxes:

- The parameter boxes provide updated data on several key control parameters.
  - The top box indicates the desired control setpoint that is set in the Compressor Control Screen. In the case that the Run mode is in remote capacity control, this box will show the desired capacity position.
  - The suction box shows the current suction pressure and suction temperature.
  - The discharge box shows the current discharge pressure and discharge temperature.
  - The oil box shows the pressure differential which is calculated as oil filter out pressure minus suction pressure. Filter differential is calculated as per Filter Input 1 & Filter Input 2 settings in Configuration screen. “Inj Temp” is the temperature of the oil at the oil injection port and “Sep Temp” is the temperature of the oil in the separator.
  - The Discharge: Suction box shows the ratio of gage discharge pressure to gage suction pressure.
  - The motor box shows the motor current.

NOTE

The “Auto Seq“option in the “Unit Start“ pop-up will only appear when sequencing compressors.

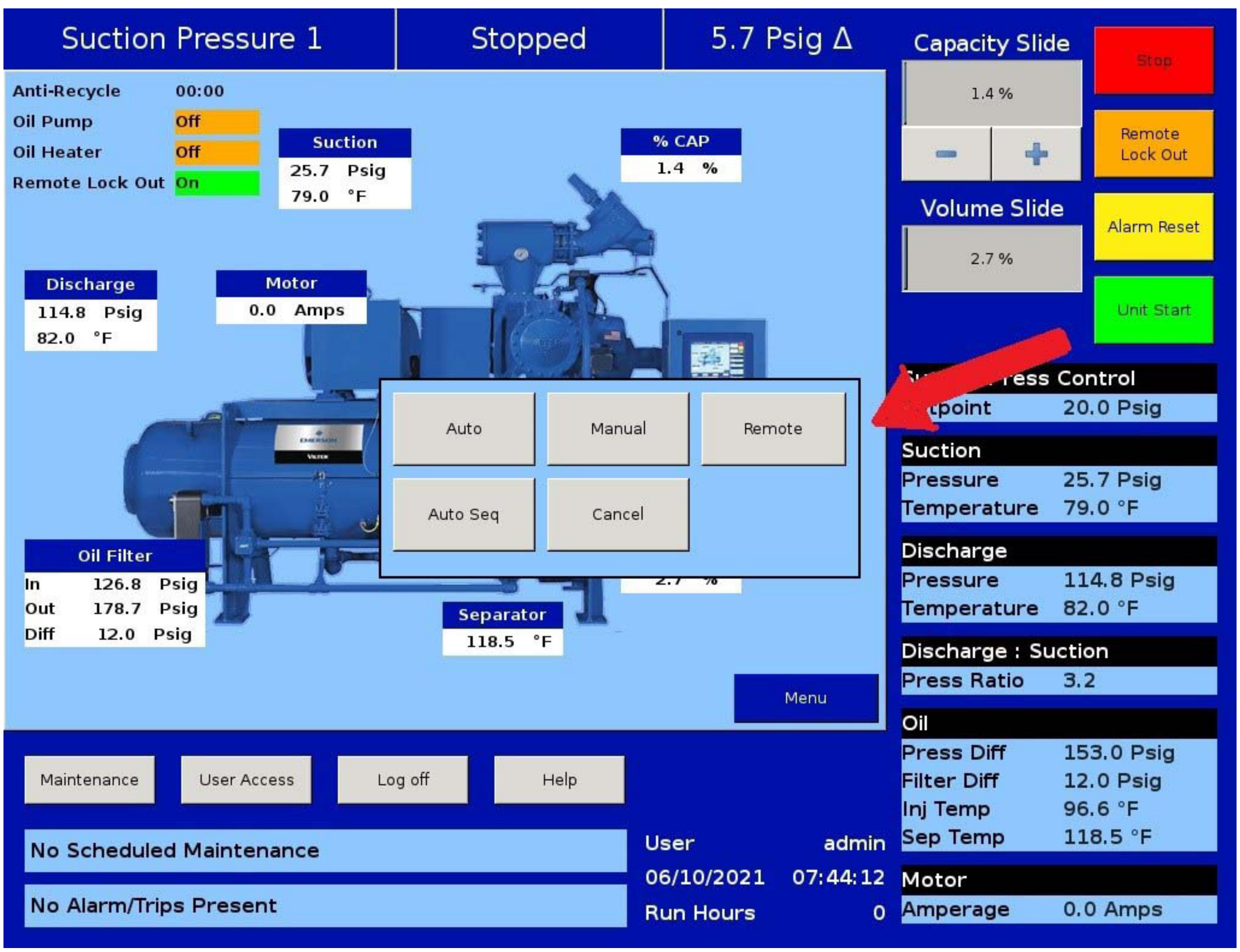


Figure 4-4. Unit Start Pop-Up Window

Bottom Status Bar

The bottom status bar gives the operator easy access to some basic functions and information. The functions are available via the four buttons, see Figure 4-5.

Maintenance Button:

- Pressing the maintenance button will give the operator access to the maintenance charts and sign off tables.

User Access Button:

- This button takes the operator to the login screen to create additional users or log in.

Log off Button:

- Pressing the log off button logs off the current user if any are logged in.

Help Button:

- Pressing the help button takes the operator to the help screen where the operation and service manual can be read, and where there's access to program information as well.

Status Bars:

- The information available is provided by two status bars, one for maintenance activities and the other for any alarms or trips that might be active. To the right of the status bars there is a space to display the current user (if any are logged in), the date and time, and the total run hours of the compressor.

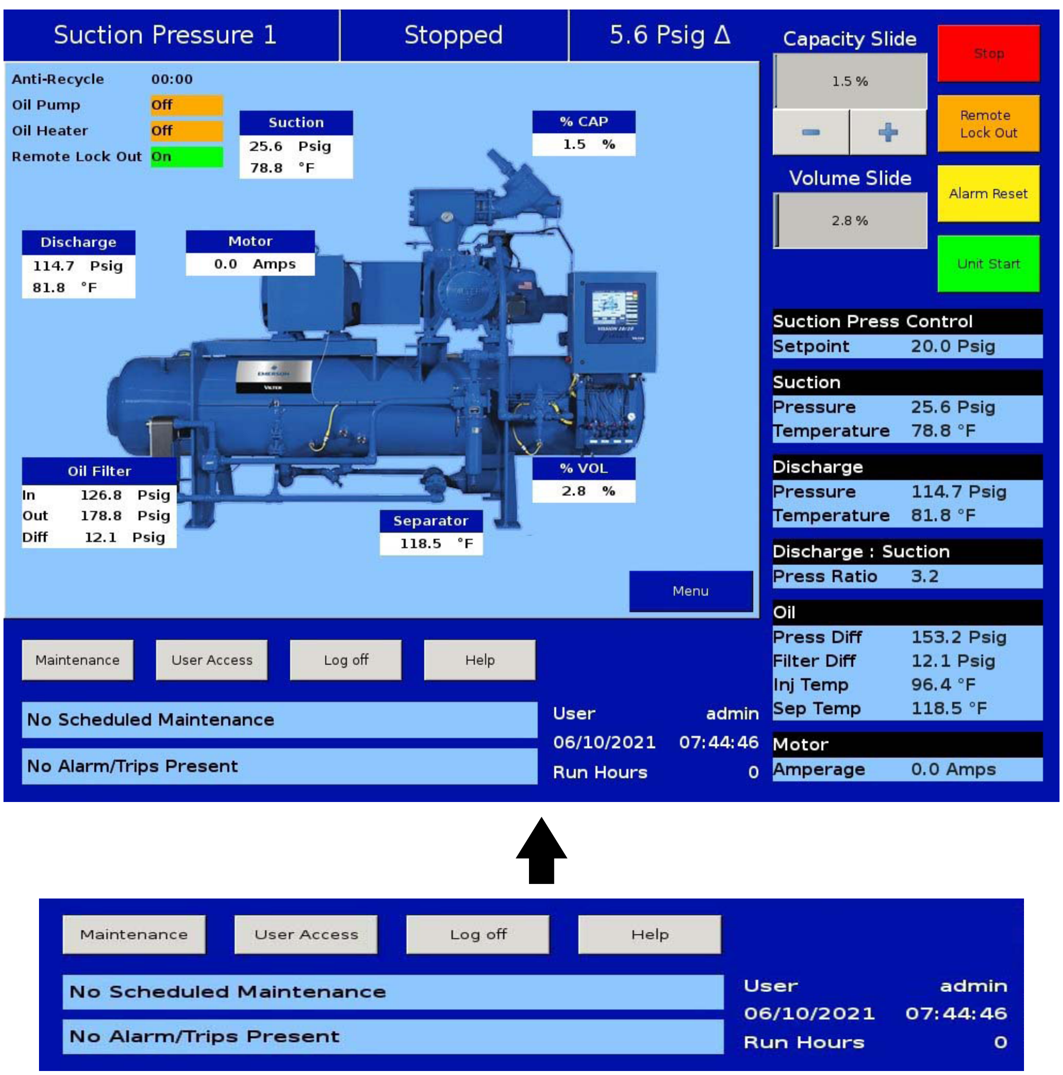


Figure 4-5. Bottom Status Bar

Splash Screen

The splash screen is the dynamic portion of the screen that will change as the operator navigates through the Vission 20/20 panel screen, see Figure 4-6. The main screen shows a graphic of a Vilter™ compressor with several data boxes spread across the screen. Also on the top left are several indicators.

Discharge:

- Displays the discharge pressure and temperature.

Oil Filter:

- Displays the oil filter inlet pressure, oil filter outlet pressure, and oil differential pressure across the oil filter.

Suction:

- Displays the suction pressure and temperature.

Motor:

- Displays the motor current. When the motor VFD is enabled, this box will also display the motor RPM.

Separator:

- Displays the temperature of the oil in the separator.

% Cap:

- Displays the position of the capacity slide from 0% to 100%.

Process:

- When the Process control is selected as the control mode, this box will appear and display either of the process temperature or process pressure depending on process control mode selection.

% Vol:

- Displays the position of the volume slide from 0% to 100% .

Anti-Recycle:

- Displays the anti-recycle time, if applicable.

Oil Pump:

- The oil pump on a Vilter™ compressor often cycles on and off depending on differential pressure. This indicator informs the operator when the oil pump is running.

Oil Heater:

- The oil heater often cycles on and off depending on the separator oil temperature. This indicator informs the operator when the oil heater is on.

Remote Lock Out:

- Displays the current status of the remote lock out. While on, no system controller can remotely assume control of the Vission 20/20 panel and start the compressor.

Menu Button:

- When pressed, navigates the operator to the menu screen.

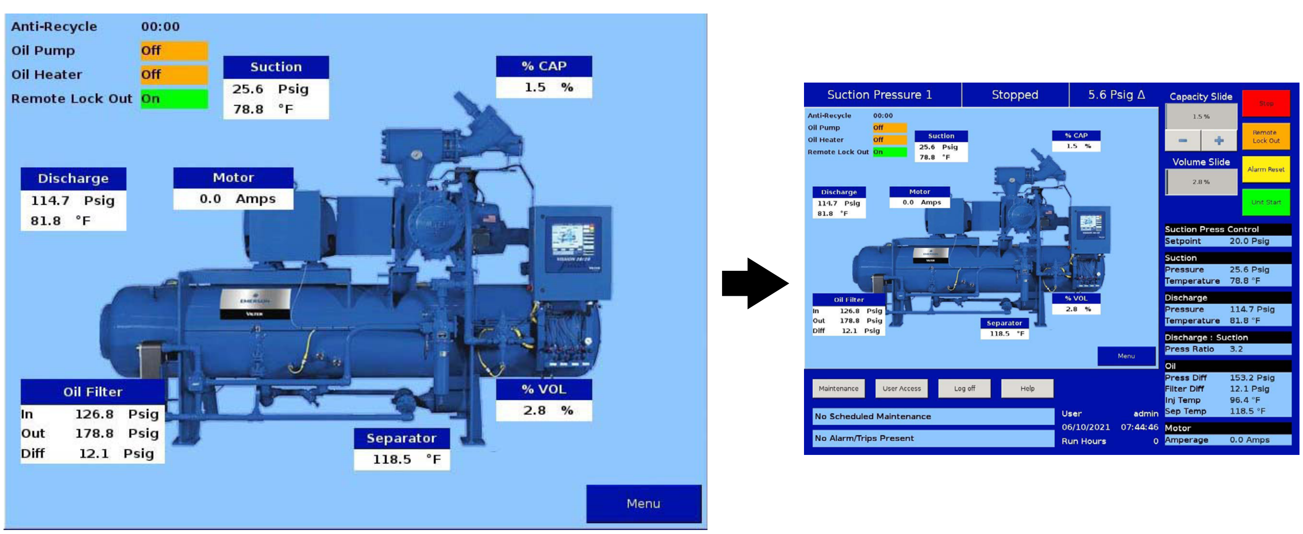


Figure 4-6. Splash Screen

Step VI Screen

This will be displayed only when the VI control method is set as Step VI.

Refer to Section 6, Compressor Control, for more on Step VI.

Low VI:

- Displays the current status of Low VI Digital Output
- This will be displayed only when the VI control method is set as Step VI.

High VI:

- Displays the current status of High VI Digital Output
- This will be displayed only when the VI control method is set as Step VI.

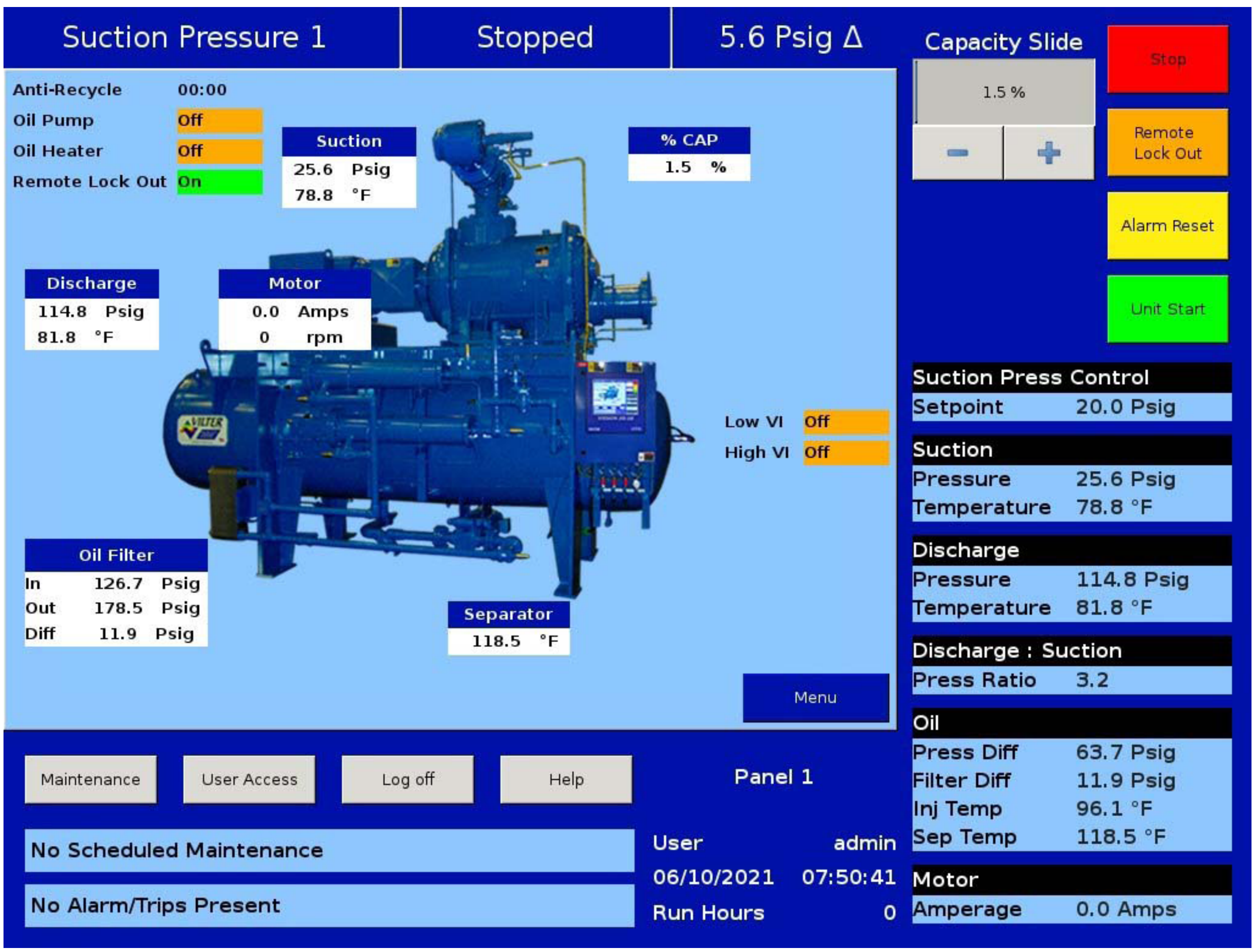


Figure 4-7. Step VI Screen

SOI Solenoid Screen

Refer to Section 6, Compressor Control, for more on SOI Solenoid.

SOI Solenoid:

- Displays the current status of SOI Solenoid Digital Output.
- This will be displayed instead of Oil Pump when the SOI Solenoid Feature is enabled from Configuration Screen.

NOTE

The ‘On’ state for digital outputs on the main screen will be displayed with a Green Background while the ‘Off’ state for digital outputs will be displayed with an Orange Background.

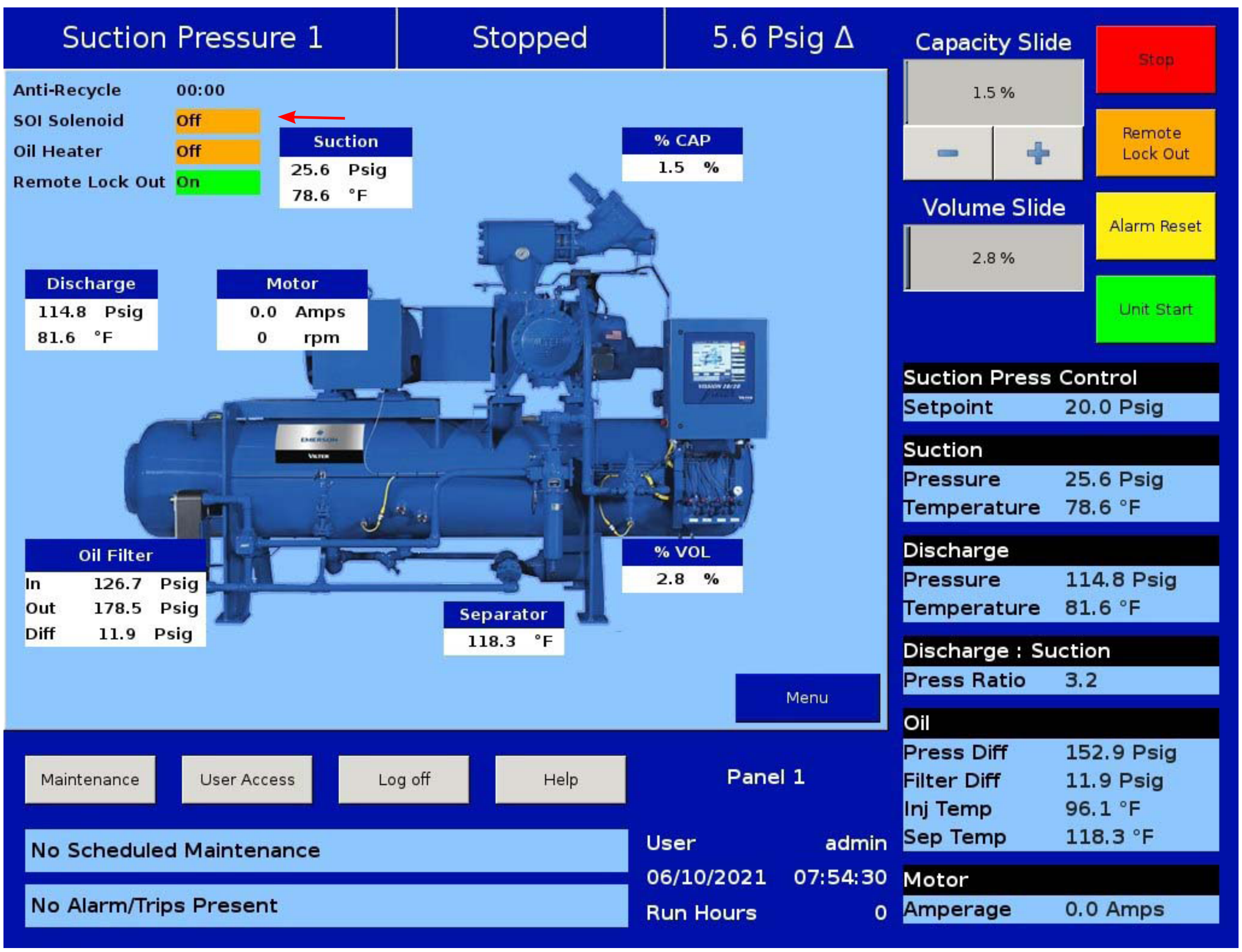


Figure 4-8. SOI Solenoid Screen

Configurable Main Screen

To use the Configurable Main Screen, the “Display Background Image” box in Configuration Page 2 (Touchscreen section) must be unchecked (default state is Enabled). If the checkbox is enabled, only the background image of the compressor will be displayed.

The Configurable Main Screen has four tables. The top left corner table will display values such as Anti-Recycle Time & State for the Oil Pump, Oil Heater, SOI Solenoid, Separator Level, Low VI, High VI & Remote Lock Out Digital Outputs. Please see Figures 4-9,4-10,4-11,4-12, 4-12(a).

The other 3 Tables are user-configured and will display values as per the settings in pages 3 & 4 of the configuration screen. Please see Figure 4-9.

No values will be displayed in these tables if “None” is selected on the Configuration Screen (see Figure 19-6). Please see Figure 4-13 for the default view.

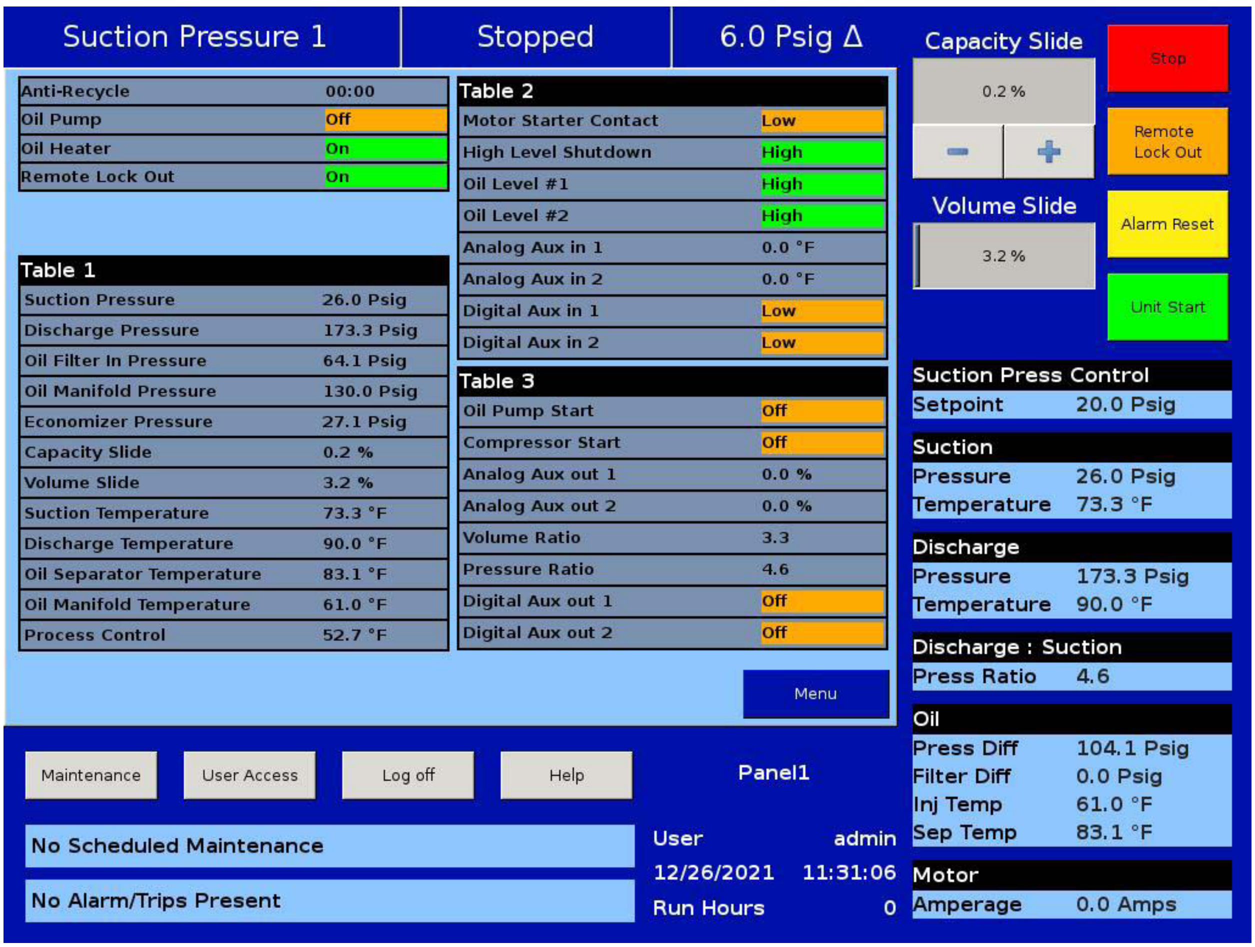


Figure 4-9. Configurable Main Screen with Oil Pump and Oil Heater

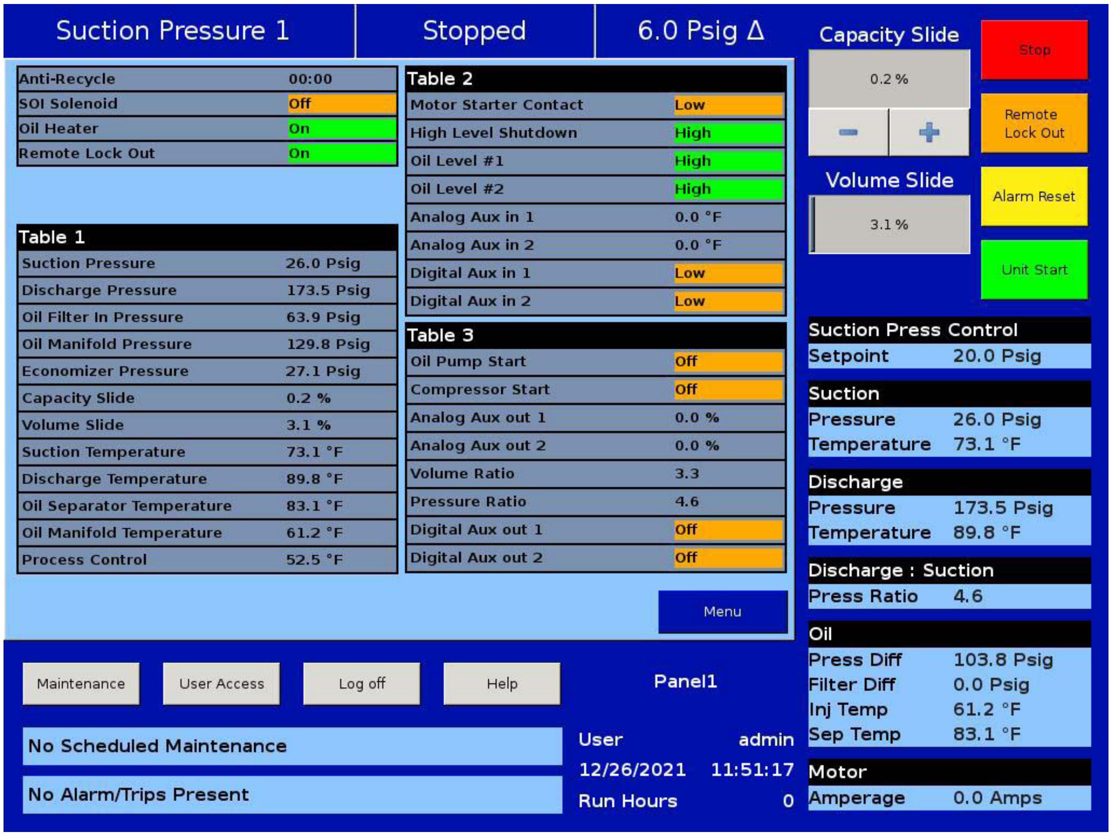


Figure 4-10. Configurable Main Screen with SOI Solenoid and Oil Heater

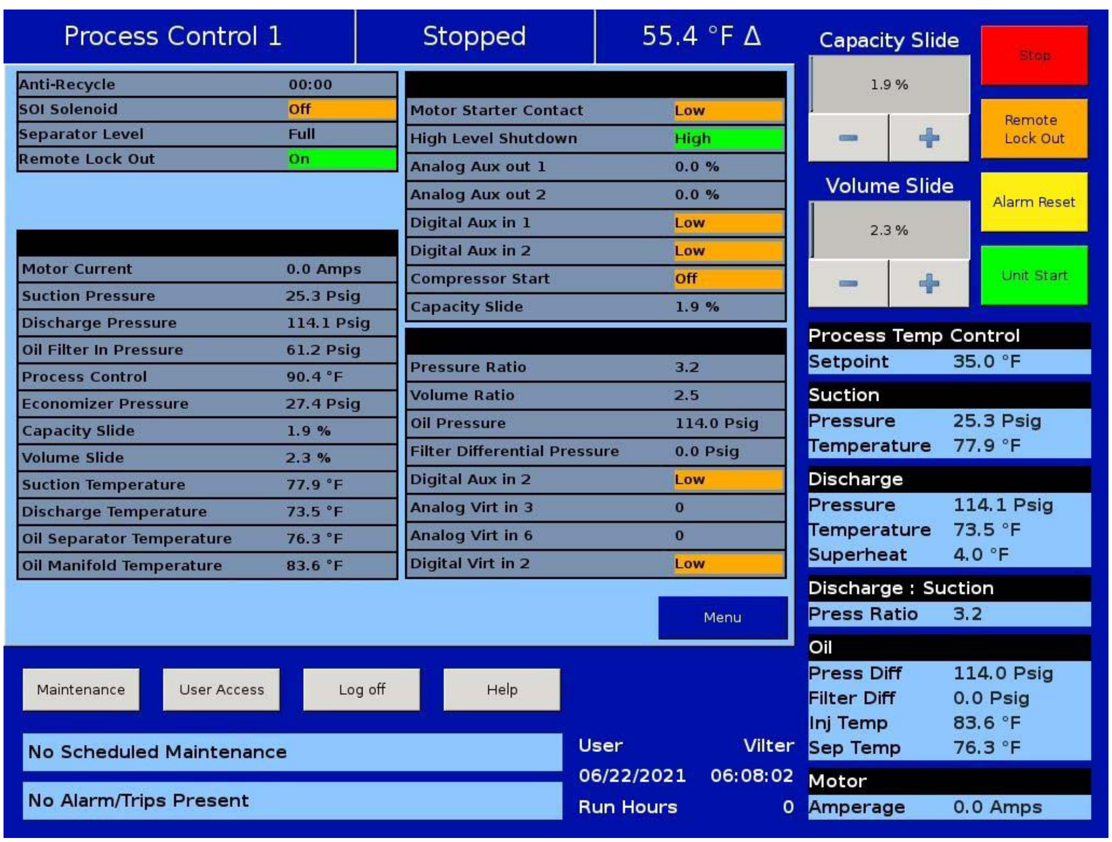


Figure 4-11. Configurable Main Screen with SOI Solenoid and Separator Level

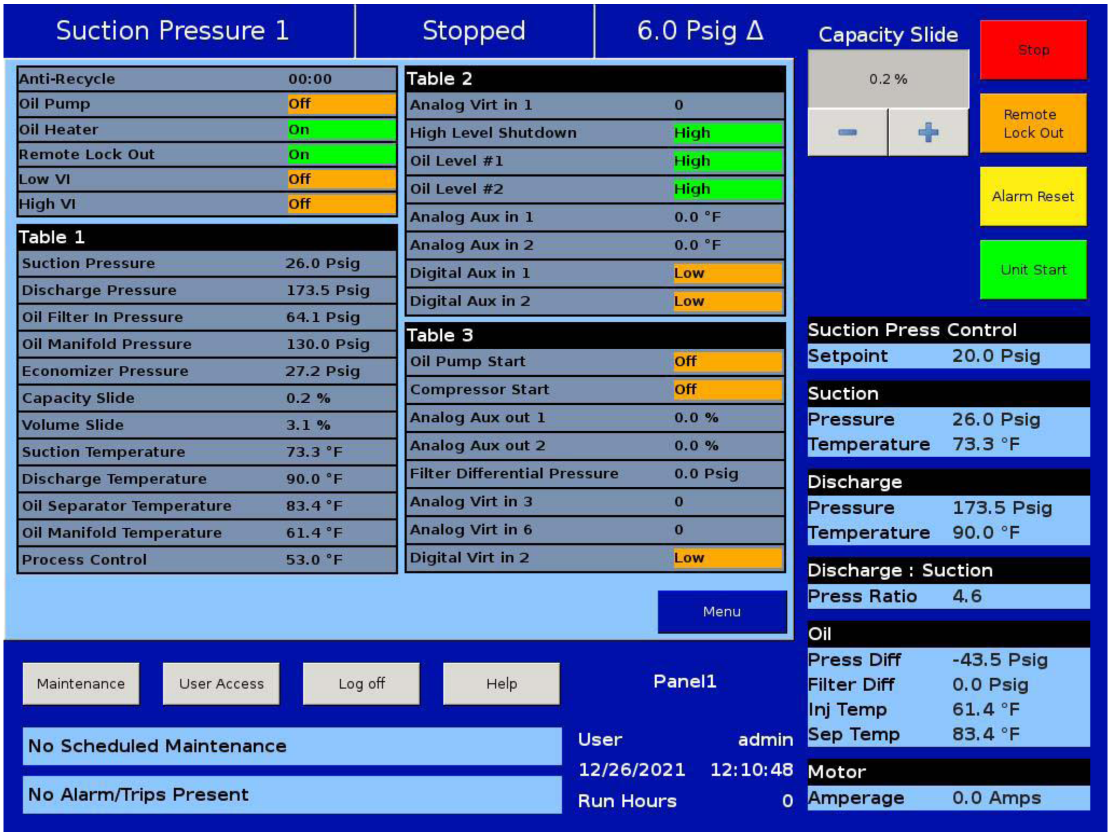


Figure 4-12. Configurable Main Screen with Step VI

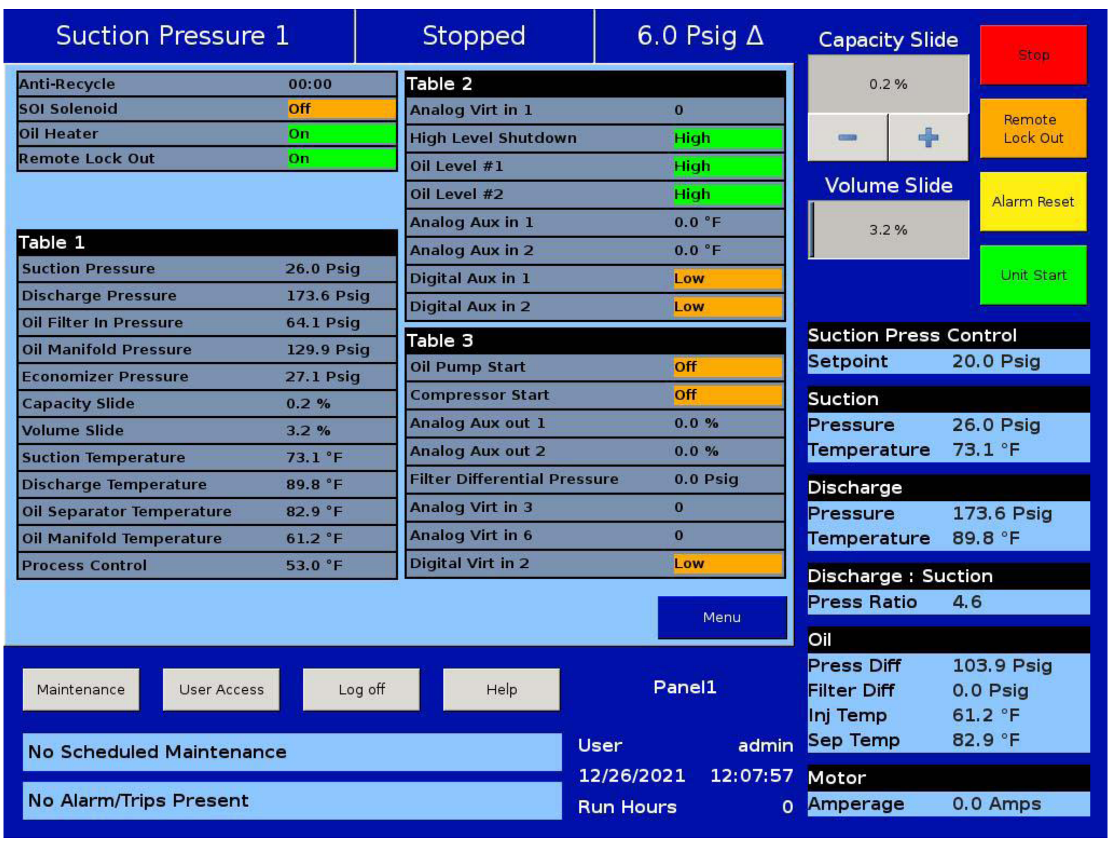


Figure 4-12(a). Configurable Main Screen with Virtual Inputs

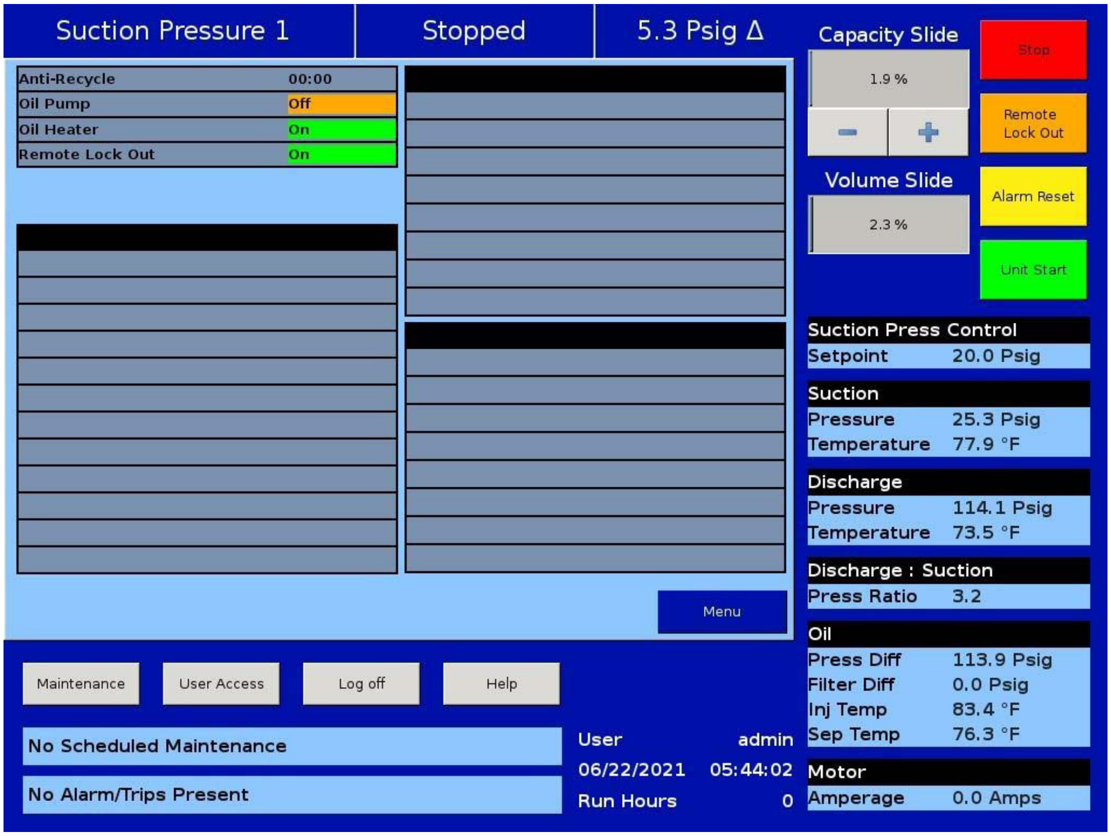


Figure 4-13. Configurable Main Screen Default View

Status Icons on Main Screen

Main Screen Display's status Icons for Feature like Pumpdown, Pulldown, Compressor Sequencing and Condenser Control.

If the Pumpdown Function is running when "Run" button is pressed in Compressor Control Screen, Main Screen will display the corresponding Icon and Control Setpoint for Pumpdown Feature. See Figure 4-14.

If the Pulldown Function is running, Main Screen will display the corresponding Icon and Control Setpoint for Pulldown Feature. See Figure 4-15.

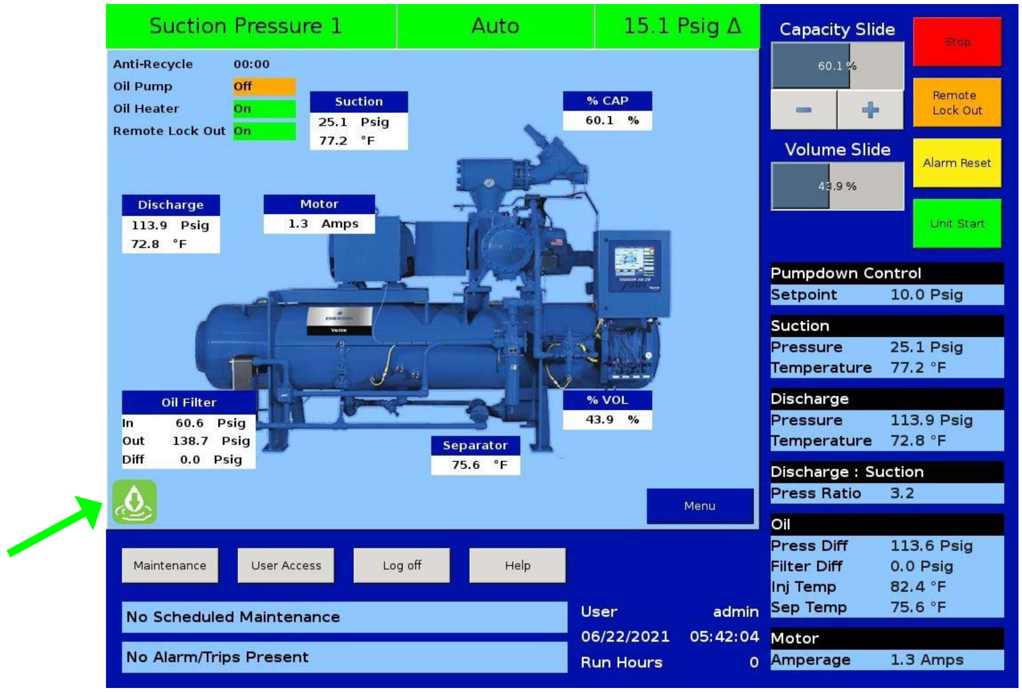


Figure 4-14. Pumpdown Status Icon

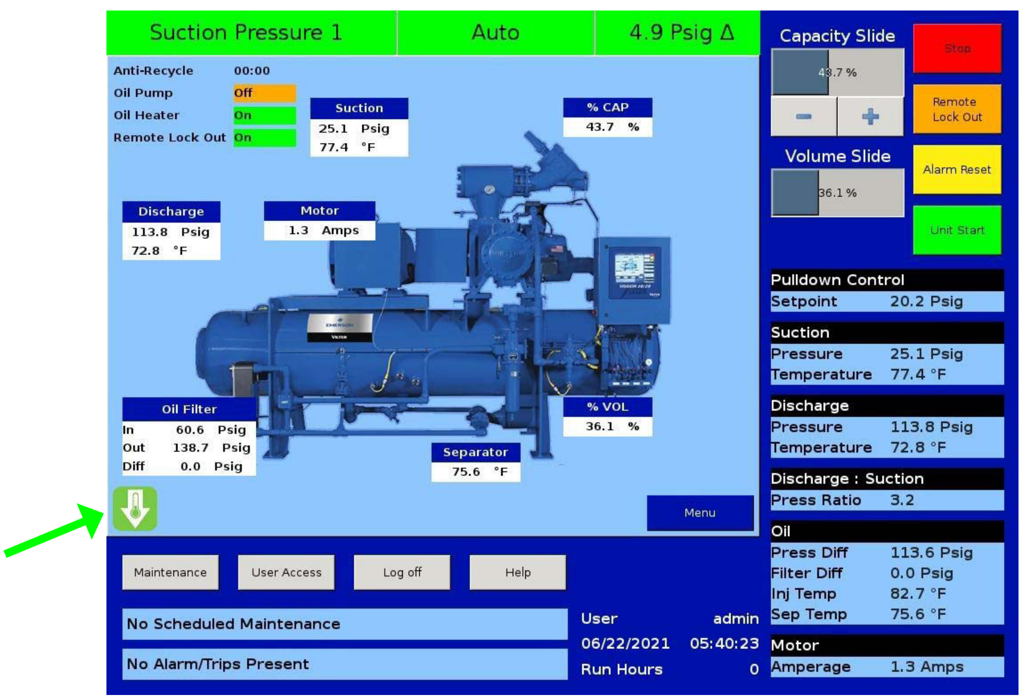


Figure 4-15. Pulldown Status Icon

When Compressor is Running in Auto Sequencing Run Mode, That Means Compressor is in Sequencing. Main Screen will display Icon for Auto Sequencing. See Figure 4-16.

When Condenser Control Algorithm is running, Main Screen will display Icon for Condenser Control Feature. See Figure 4-17.

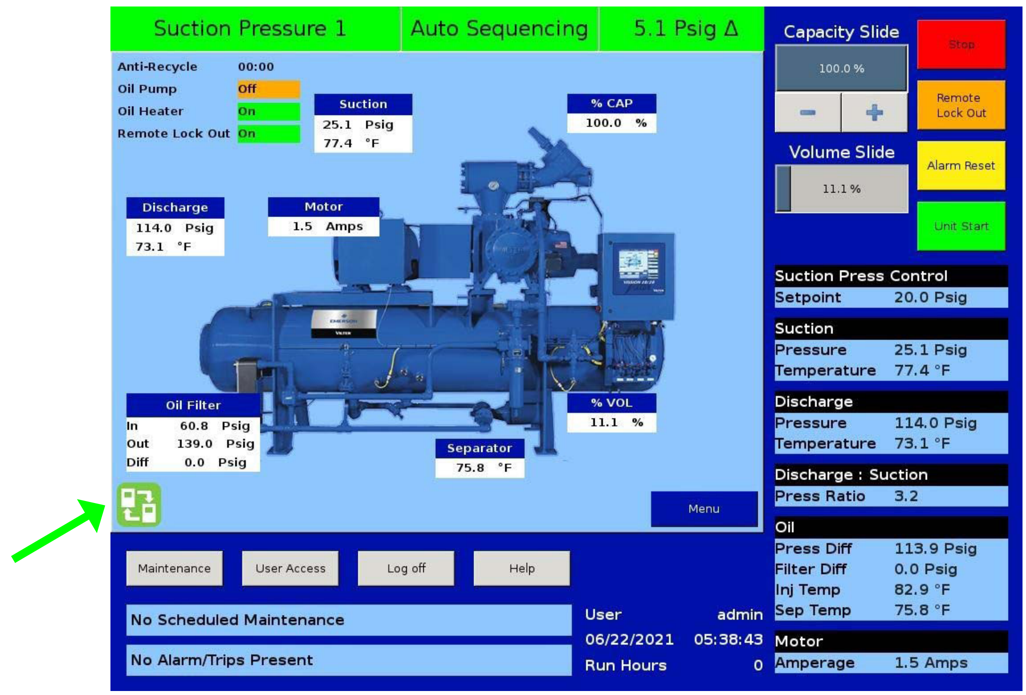


Figure 4-16. Compressor Sequencing Status Icon

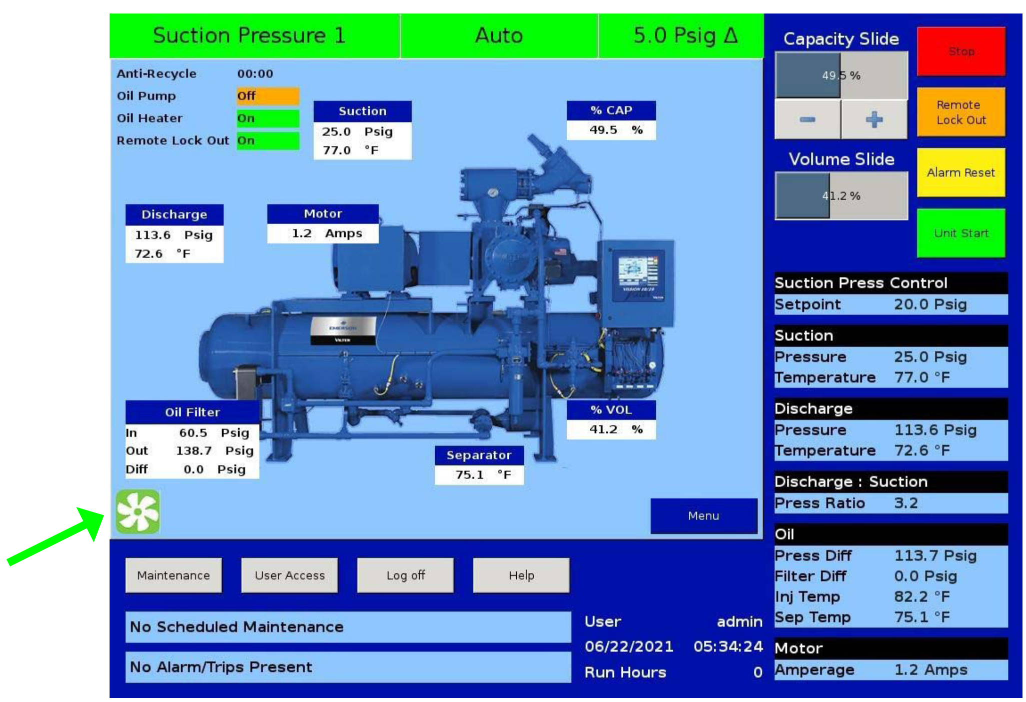


Figure 4-17. Condenser Control Status Icon

Overview

The menu screen is the launching point to every other section of the Vission 20/20 panel software. Every screen navigated to from this screen will return to the menu screen upon exiting, see Figure 5-1.

Navigation Buttons

Compressor Control:

- Navigates to the compressor control screen where the operator can set the various compressor control parameters.

Alarms and Trips:

- Navigates to the alarms and trips screen where the operator can set the various alarm and trip parameters.

Timers:

- Navigates to the timer screen where the operator can set the various time related parameters.

Compressor Scheduling:

- Navigates to the compressor scheduling screen where the operator can set the scheduler to change the control method at settable dates and times.

Compressor Sequencing:

- Navigates to the compressor sequencing screen where the operator can set-up compressor to sequence up to nine other compressors. This is also sometimes known as lead-lag control. Note, as well, that Compressor Sequencing will only be available when it has been enabled from Configuration Page 1, and the selected compressor is the master.

Condenser Control:

- Navigates to the condenser control screen where the operator can set up local condenser control parameter.

Vilter™ VFD:

- Not currently available.

Service Options:

- Navigates to the service options screen where the operator can manually turn on/off digital and analog outputs for maintenance and diagnostics purposes.

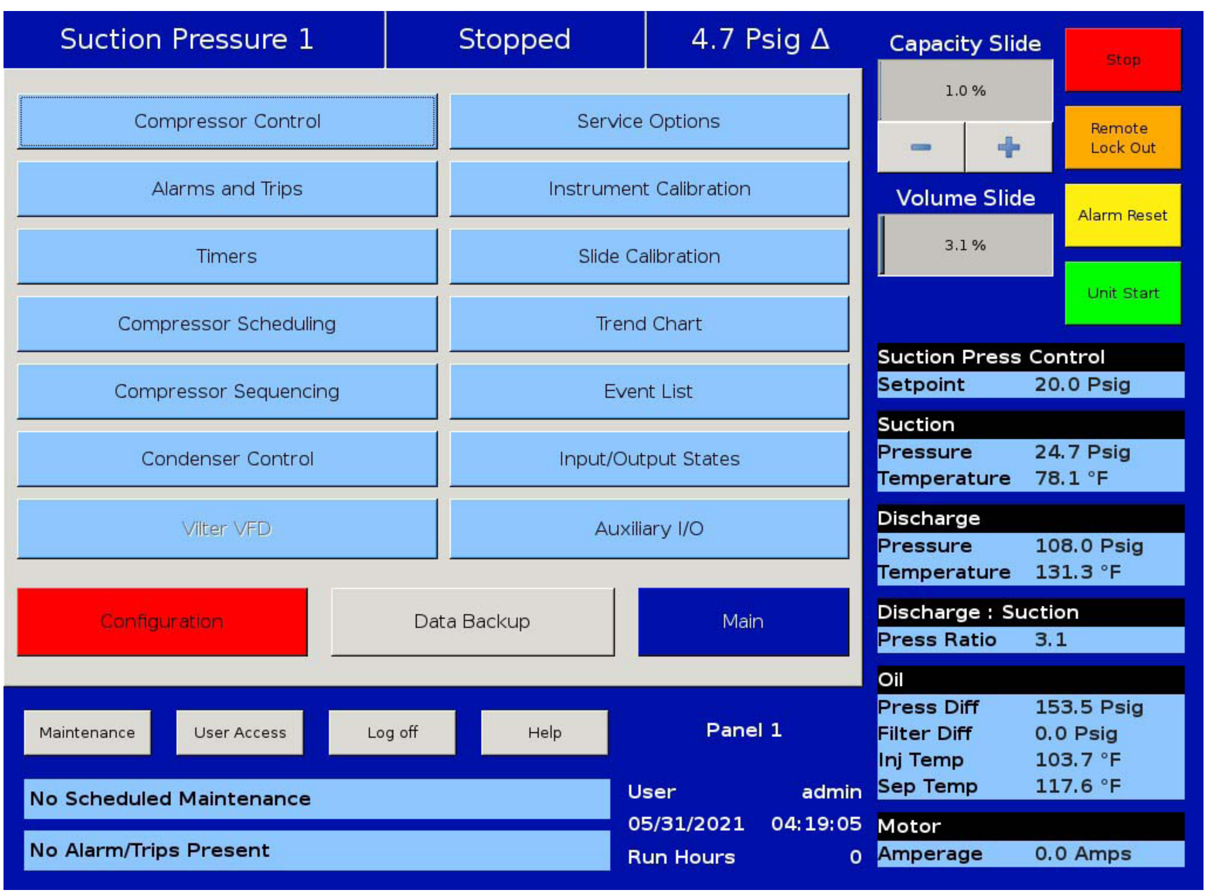


Figure 5-1. Menu Screen

Instrument Calibration:

- Navigates to the instrument calibration screen where the operator can calibrate all of the system sensors.

Slide Calibration:

- Navigates to the slide calibration screen where the operator can calibrate the capacity and volume slide actuators.

Trend Chart:

- Navigates to the trend chart screen where the operator can select up to four parameters for graphical historical data trending.

Event List:

- Navigates to the event list screen where the operator can view the systems events such as trips or alarms in descending chronological order.

Input/Output States:

- Allows viewing of the live data of all analog and digital input and outputs. Also allows viewing of a "snap shot" of all analog and digital input and outputs at the time of the last compressor fault event.

Auxiliary I/O

- Navigates to the auxiliary I/O screen where an operator can configure any auxiliary instruments or devices.

Configuration:

- Navigates to configuration screens where the initial system parameters are configured.

Data Backup:

- Allows the operator to backup setpoints, configuration parameters, and calibration settings to a USB memory device. In addition, this allows the restoration of previously saved database files.

Main:

- Navigates back to the main screen.

Remote Oil Cooler:

- Navigates to the Remote Oil Cooler screen where the operator can set up local Remote Oil Cooler control parameter. Menu screen will show this option in place of condenser control option when enabled, see Figure 5-2.

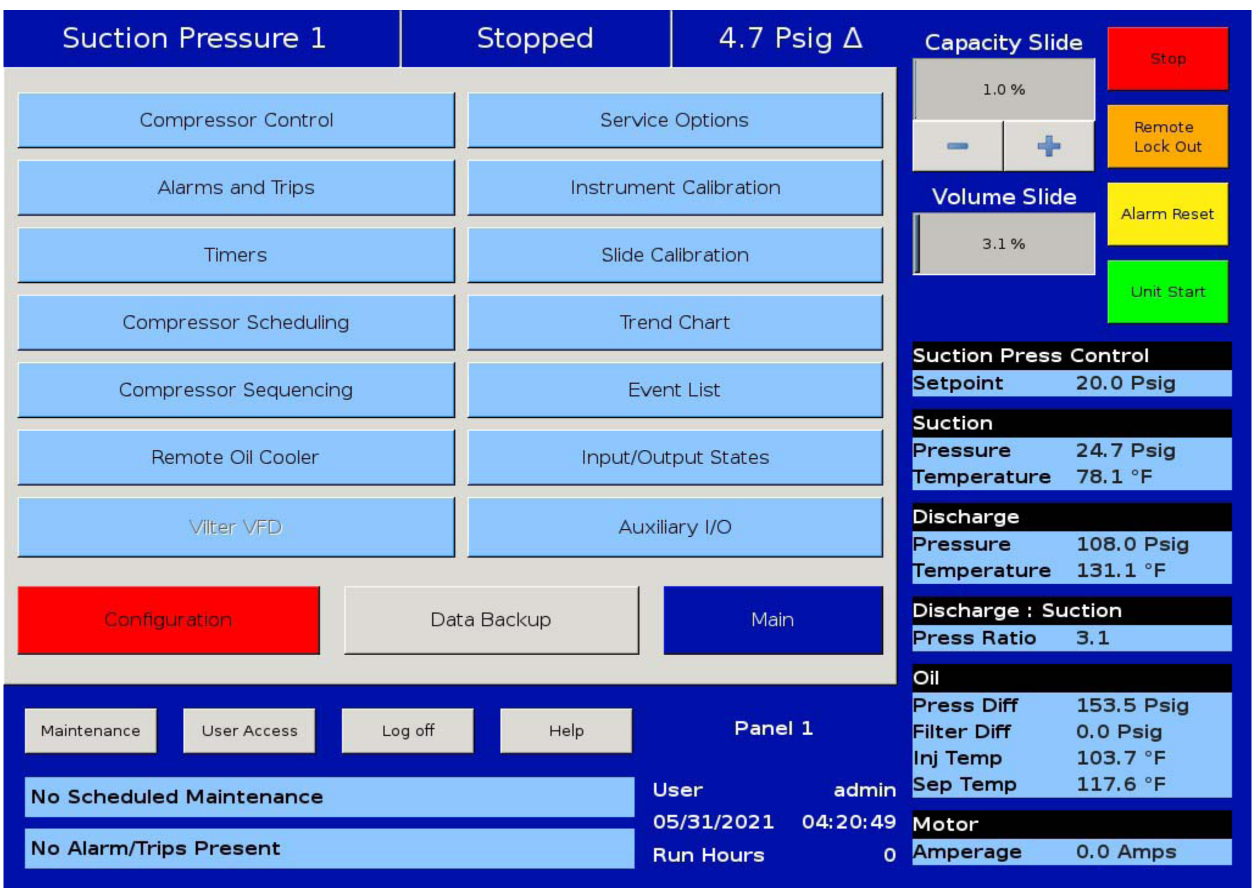


Figure 5-2. Menu Screen with Remote Oil Cooler Enabled

Overview

The compressor control screen is where an operator can set the majority of the compressor settings. These settings define how the compressor will operate and respond to changing loads. The compressor control screen consists of several screens, but in order not to overwhelm the operator with options, many of the screens may not be visible.

NOTE

How the compressor is set up in the configuration screen (Section 19) will determine what compressor control pages are displayed. Additional setup information can be found in Appendix B.

It is important to note that there isn't one correct way to set these parameters. Every application is different and requires the operator to tune these settings to achieve the best operation.

Suction Pressure Control, Process Temperature Cooling Control, Process Pressure Cooling Control, Discharge Pressure Control, Process Temperature Heating Control, Process Pressure Heating Control

The Vission 20/20 uses a pulse proportional control method to control the compressor capacity slide valve in order to maintain the control setpoint. The control setpoint can either be the suction pressure control setpoint, process temperature cooling control setpoint, process pressure cooling control setpoint, discharge pressure control setpoint, process temperature heating control setpoint and process pressure heating control setpoint depending on what the operator has selected as the control mode. For screens, see Figure 6-1, Figure 6-2, Figure 6-3, Figure 6-5, Figure 6-6, and Figure 6-7.

The proportional control uses the Interval Time Setpoint to define the time that the algorithm waits to read the current setpoint and calculate the error from the process control setpoint.

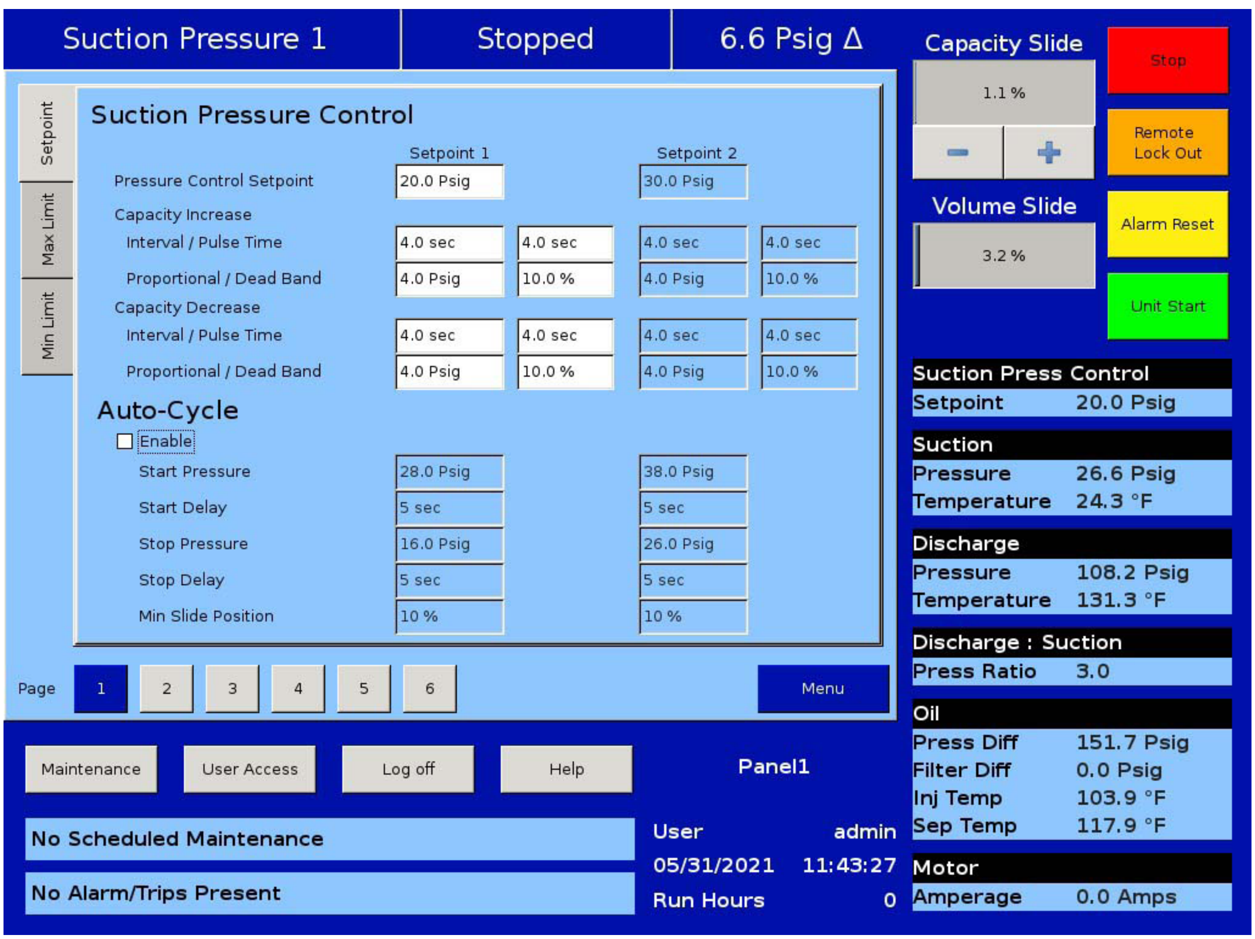


Figure 6-1. Compressor Control Screen - Suction Pressure Control

Based on the error from setpoint, the algorithm calculates a pulse time in which the capacity slide is moved in the direction of the error, or the VFD speed is corrected, if compressor VFD is enabled.

The further away the process variable is from the control setpoint, the larger the corrective pulse will be. The duration of the pulse is limited by the Pulse Time Setpoint[1]. By default the maximum pulse time is the same as the interval time.

This means that the pulse time can be 100% of the interval time given a near continuous movement of the capacity slide or adjustment of the VFD speed, if Compressor VFD is Enabled.

Adjusting these setpoints can be useful in slowing down the reaction time of the compressor if large thermal time contents are present in the refrigeration cycle. As mentioned in the above paragraph, the distance of the process variable from the control setpoint determines the size of the pulse used to make adjustments. This is called the proportional band and is set by the Proportional Setpoint. When the process variable is outside the proportional band, the slide/VFD speed will move in the direction of the error continuously. Increasing the size of the proportional band can help slow the compressors reaction by varying loads if desired, see Figure 6-4.

The Deadband Setpoint defines the area around the control setpoint where the algorithm stops making adjustments. This area is a percentage of the proportional band. By default the proportional band is set to 4 Psig and the deadband is set to 10% of 4 Psig. Making the deadband +/- 0.4 Psig of the control setpoint. Once the process variable is within the deadband, the algorithm considers the compressor to be on setpoint.

If the operator wishes the compressor to operate closer, the setpoint can be set to a smaller percentage. However this will result in the capacity slide excessively moving to maintain the setpoint and could over heat the actuator or shorten the actuator's operational life.

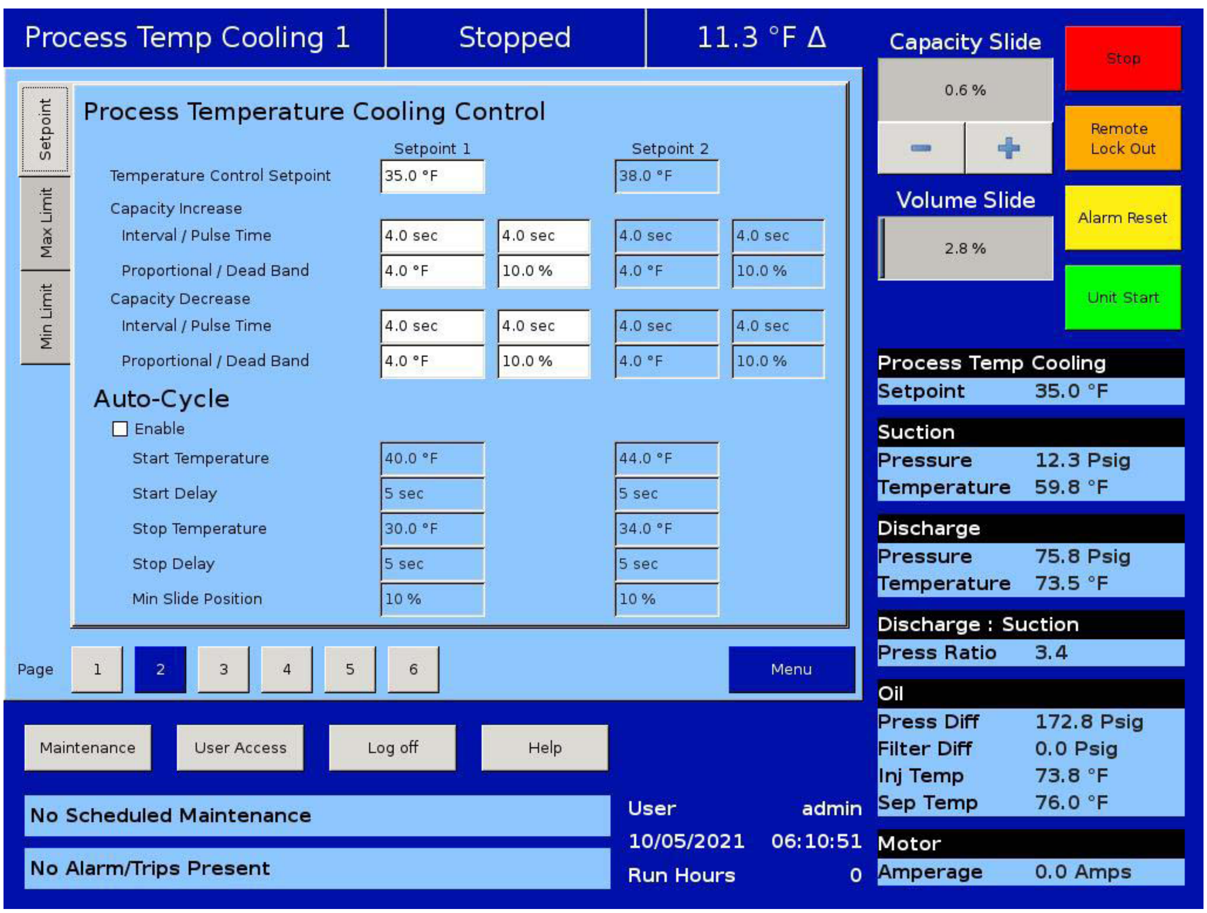


Figure 6-2. Compressor Control Screen - Process Temperature Cooling Control

1 Pulse Time and Dead Band setpoints will be grayed out for the No Slide Operation feature.

Auto-Cycle

The auto-cycle setpoints define the control points in which the compressor will automatically cycle on and off when placed into “Auto” run mode. These setpoints can be “enabled” or “disabled” using the check box. A delay can be entered to momentarily delay the start or stop from immediately occurring when the setpoint is met. If a compressor shutdown is desired on a suction pressure drop and a manual reset is required, set the OFF value below the Low Suction Pressure safety trip value. This will shut down the compressor and a Reset will be required to restart it.

The auto-cycle function will operate only in local “Auto” mode and Direct I/O “Remote Auto” mode. If the auto-cycle feature is enabled while running in any other remote mode, the function will simply be ignored. However, the Minimum slide position will continue to be respected in “Remote “Auto” mode. If the compressor changes from a remote mode back to Local “Auto” mode, the auto-cycle feature will operate normally.

NOTE

When the Pumpdown feature is enabled, the Auto-cycle setpoints are automatically disabled. Pumpdown mode will cause the compressor to cycle off via the Pumpdown Stop Pressure setpoint, and will not allow the compressor to start again.

Enable:

- Enables the Auto-cycle control. Uncheck the box to disable the Auto-cycle setpoints.

Start Pressure:

- When the suction pressure meets or exceeds this setpoint, the compressor will start.

Start Delay:

- Delays the compressor from starting when the suction pressure meets or exceeds this setpoint.

Stop Pressure:

- When the suction pressure meets or falls below this setpoint, the compressor will stop.

Stop Delay:

- Delays the compressor from stopping when the suction pressure meets or exceeds this setpoint.

Minimum Slide Position:

- The minimum capacity slide position that the compressor is allowed to run at.
- This setpoint also controls minimum VFD speed when operating without slides.
- This setpoint will be ignored if Max Slide Position % setpoint in Slide Valve Control section is set below this setpoint.

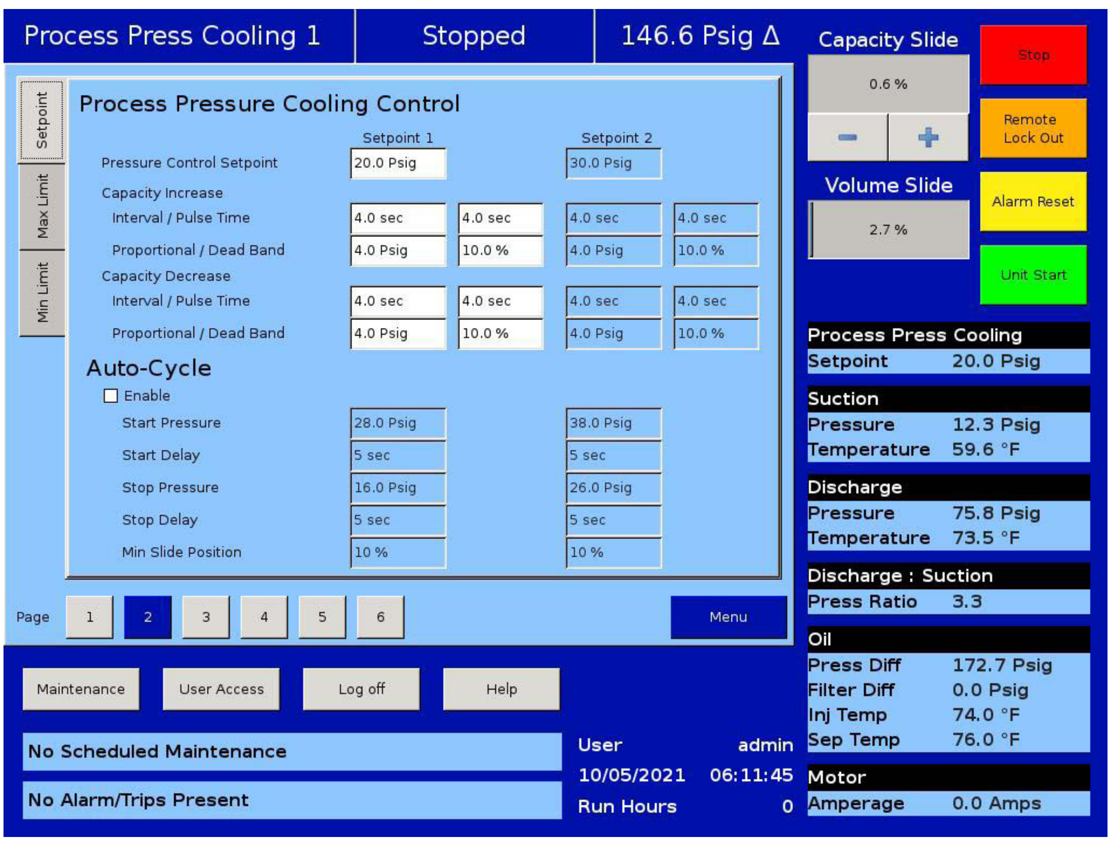


Figure 6-3. Compressor Control Screen - Process Pressure Cooling Control

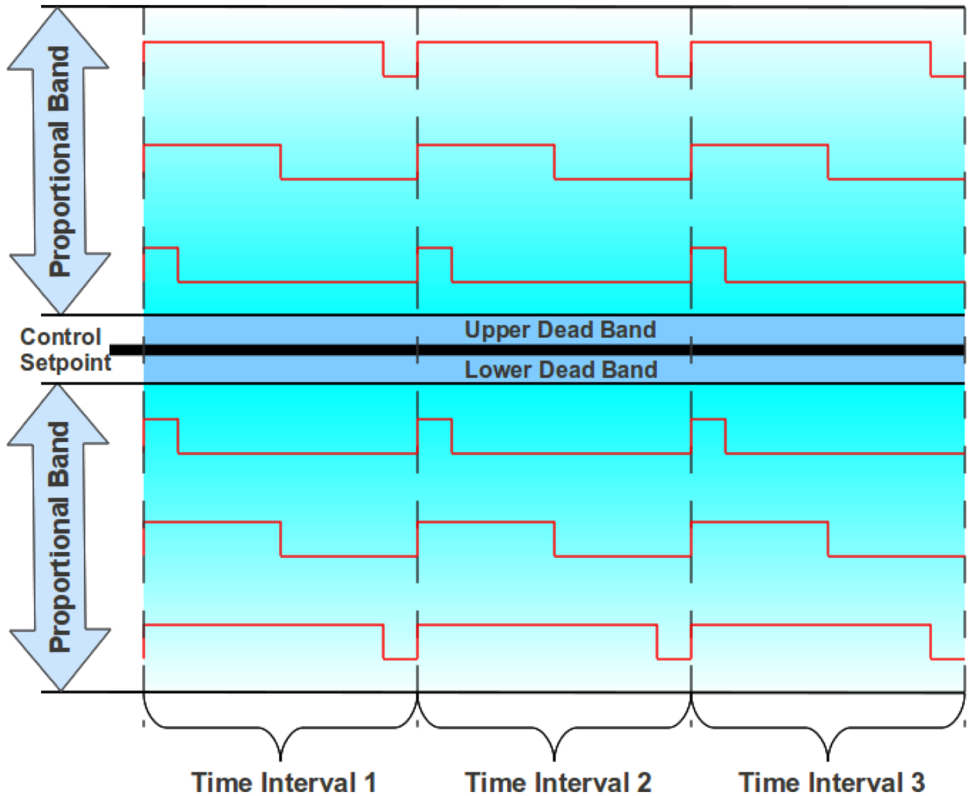


Figure 6-4. Proportional Band & Setpoint

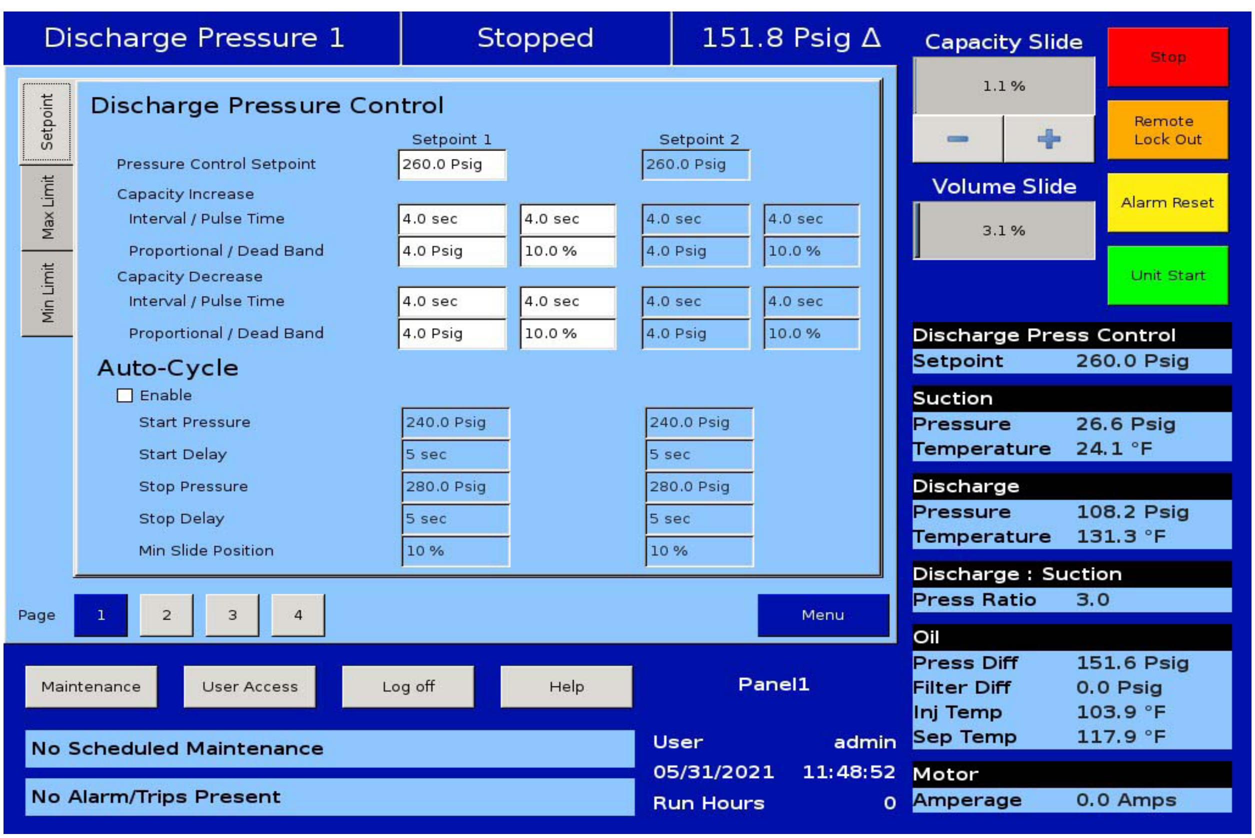


Figure 6-5. Compressor Control Screen - Discharge Pressure Control

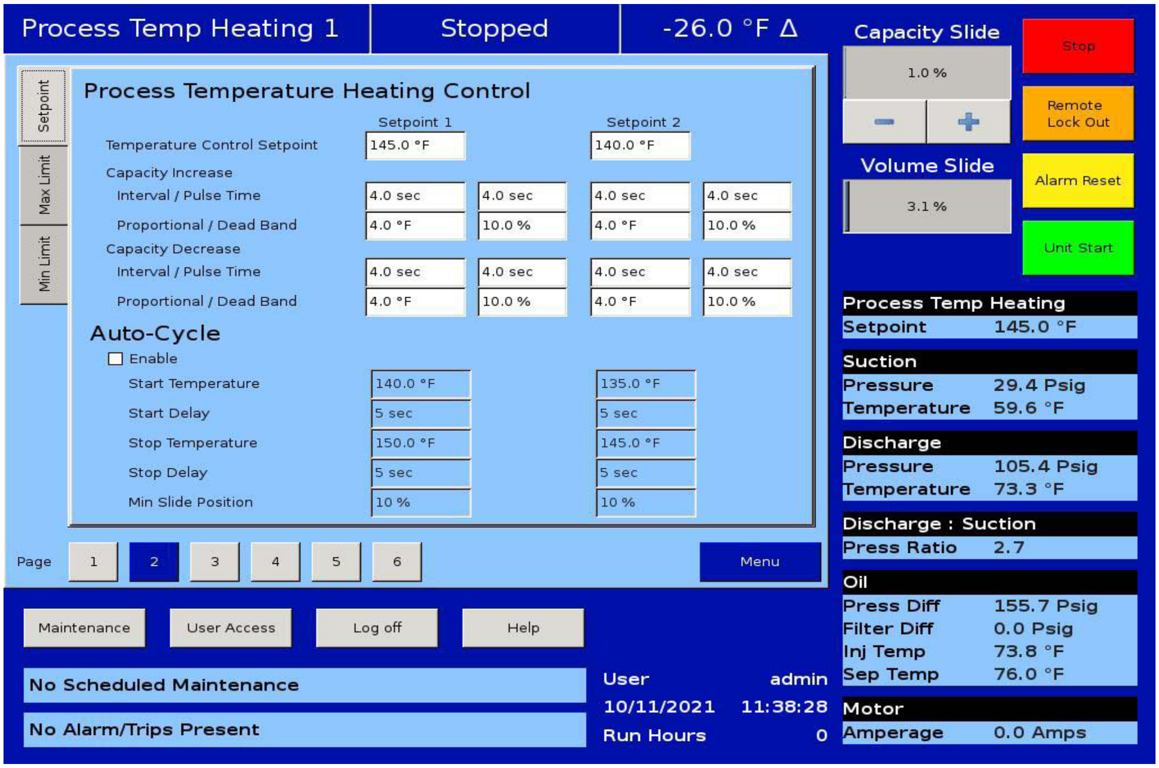


Figure 6-6. Compressor Control Screen - Process Temperature Heating Control

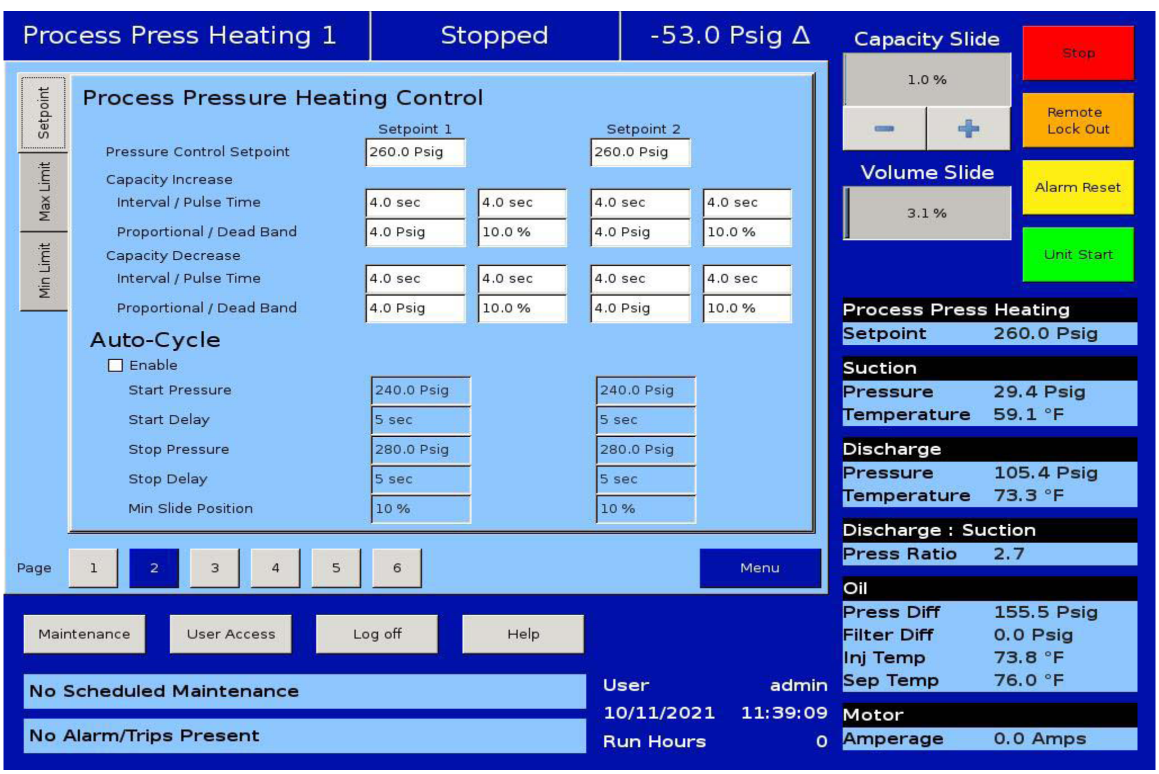


Figure 6-7. Compressor Control Screen - Process Pressure Heating Control

Variable Frequency Drive (VFD) Settings Control

The VFD page is where the operator can tune the motor VFD for desired operation, see Figure 6-8. Compressor Control Screen - VFD Settings Control. A Vilter™ compressor uses the variable speed of a VFD controlled motor to vary the amount of work or capacity of the compressor. The basic one step VFD control will use the capacity slide to control the first half of the total available capacity and the motor speed to control the second half of the total available capacity, see Figure 6-10, VFD One-Step Control Method. For example, if the compressor needs to load to 100% of its capacity, the control algorithm will first move the capacity slide to its maximum position, and then the motor speed will ramp up to its maximum speed. In the unloading direction, the motor speed will ramp down to its minimum speed, and then the capacity slide will move to its minimum position.

The two-step control method works much like the one-step method but divides the control into four sections, see Figure 6-11. While loading the compressor will first move the capacity slide to the maximum set for step one, then speed up the motor to its maximum speed for the same step. Once step one has completed, the control algorithm will again move the capacity slide to the maximum position and the maximum motor speed of step two. At this point the compressor would be fully loaded. Unloading occurs in the reverse direction. The two-step control method is not typical for most installations and is normally used when a Vilter™ engineer recommends it.

When operating with no slides, the Capacity Slide Position Minimum & Maximum boxes will be grayed out, and the only VFD option available will be the 1 step one, see Figure 6-9.

NOTE

VFD installation is not covered in this manual. A VFD that is not properly installed and configured has the potential of causing intermittent and dangerous problems. Please consult your VFD manual.

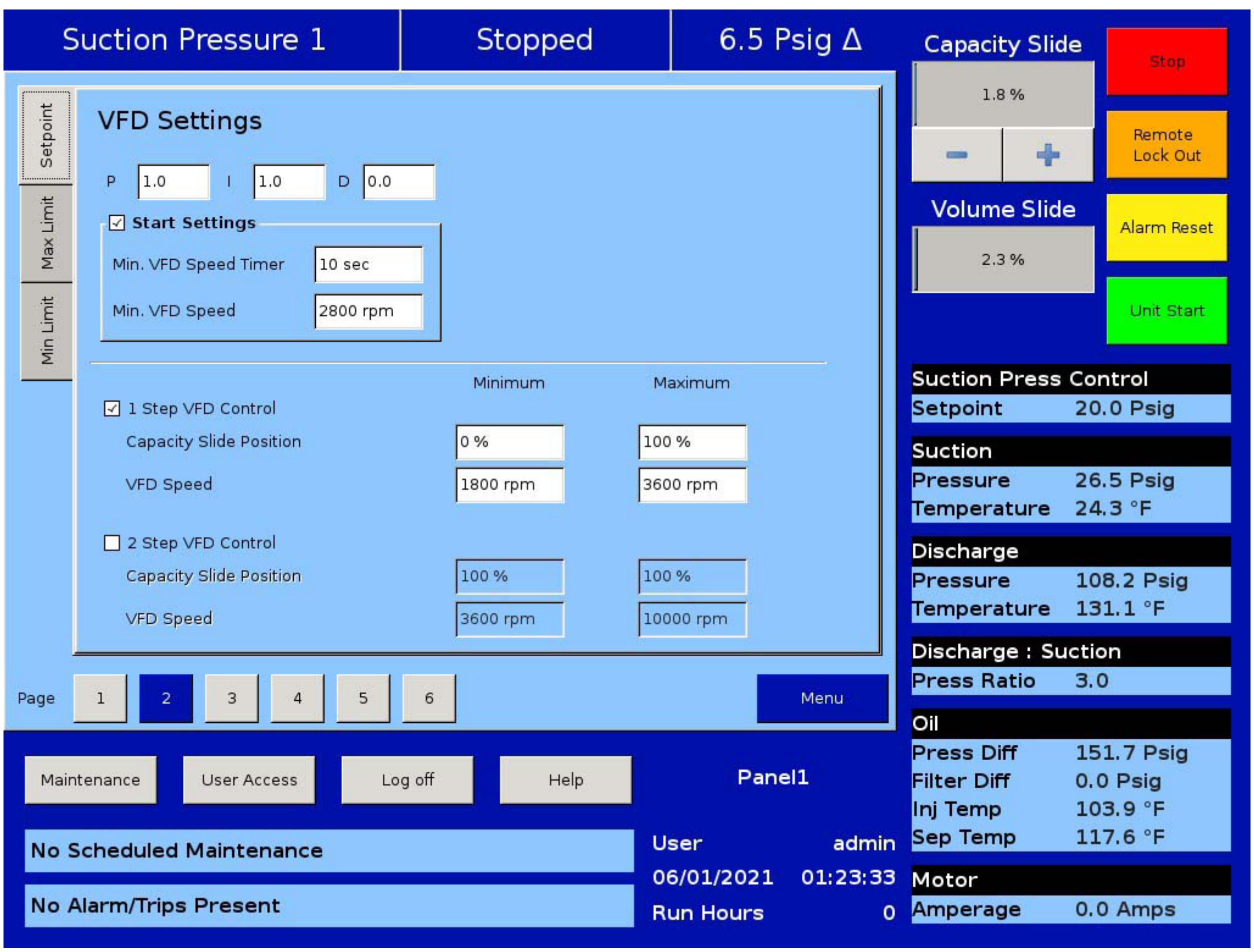


Figure 6-8. Compressor Control Screen - VFD Settings Control

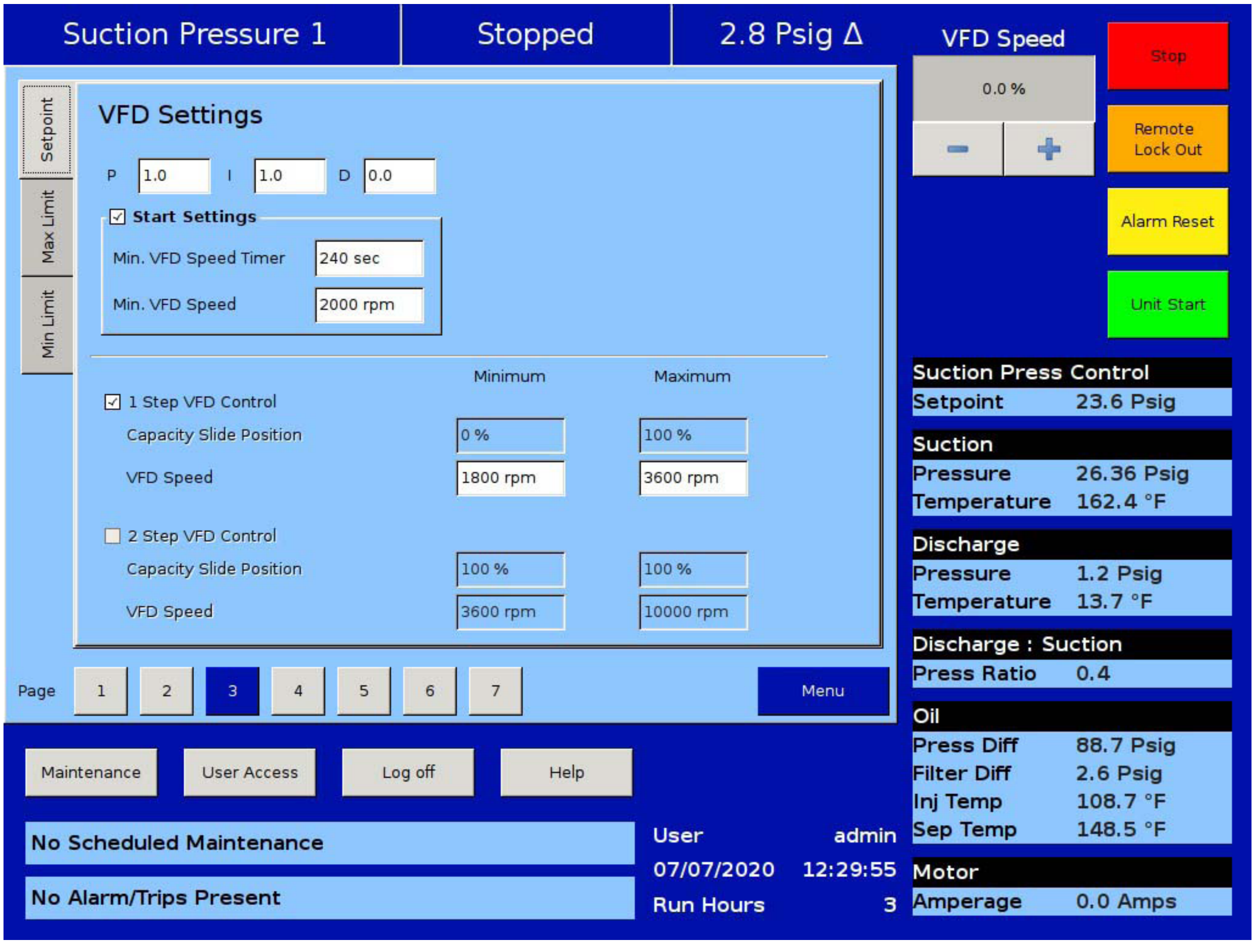


Figure 6-9. Compressor Control Screen - VFD Settings Control without Slides

Start Settings:

- Enables the Start Settings Function for VFD control algorithm. This option allows the operator to run Compressor Motor at defined Minimum Speed when Compressor is Started.

Min VFD Speed Timer:

- Defines the Start Settings period for the Compressor. This timer gets activated after every compressor start and remains active for the defined time. During this period, the motor speed is not allowed to drop below defined Min VFD Speed.

Min VFD speed:

- Defines the minimum speed for the motor for period as defined by Min VFD Speed Timer.

1 Step VFD Control:

- Enables the first step in the VFD control algorithm. This check box cannot be unselected by the operator.

Capacity Slide Position:

- Defines the minimum and maximum positions for the capacity slide. While in 1 step control these values should be 0% for minimum and 100% for maximum.

VFD Speed:

- Defines the minimum and maximum speed for the motor. While in 1 step control these values should reflect the full range of the VFD.

2 Step VFD Control:

- Enables the second step in the VFD control algorithm.

Capacity Slide Position:

- Defines the minimum and maximum position of the capacity slide in the 2 step VFD control.

VFD Speed:

- Defines the minimum and maximum speed for the motor in the 2 step VFD control.

P = Proportional (gain) setpoint:

- Used to adjust the motor speed action in direct proportion to the difference between the control setpoint and the process variable (SP - PV error). This is a unitless quantity and is used for coarse adjustment. This setpoint should be set to the lowest value that gives adequate control system response. Increasing the proportional setting increases the control system's sensitivity to small process fluctuations and the tendency to hunt.

I = Integral (reset) setpoint:

- Used to adjust the capacity control action, integrating the error over time, to account for a small error that has persisted for a long time. This quantity is used for fine adjustment. This setpoint is used to smooth out process variations. This setpoint should be set high enough to prevent hunting but low enough to prevent control system overshoot.

D = Derivative (rate) setpoint:

- Used to adjust the capacity control action, accounting for how fast the error is changing, positively or negatively. A standard PID loop variable, it is not used for our applications.

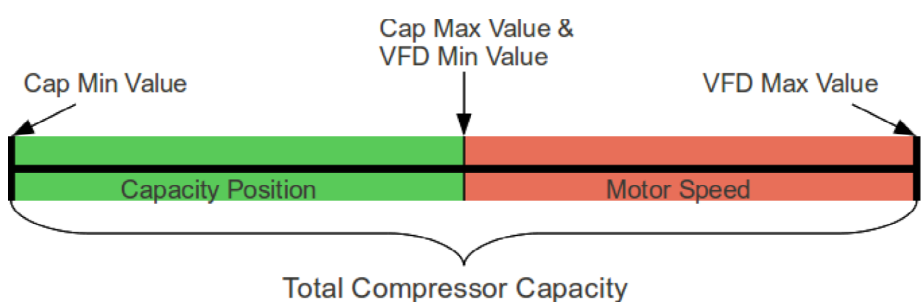


Figure 6-10. VFD One-Step Control Method

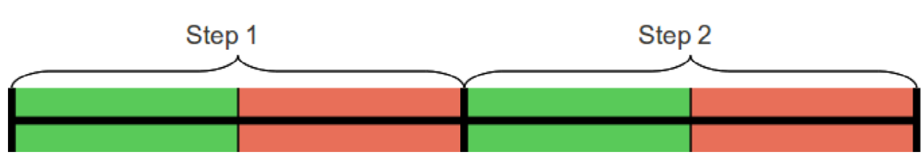


Figure 6-11. VFD Two-Step Control Method

Oil Restriction Solenoid

The Oil Restriction Solenoid feature controls the Oil Restriction Solenoid Digital Output, see Figure 6-12. The Oil Restriction Feature will control the Digital Output according to VFD RPM Speed. This function can be selected along with Compressor VFD / Rapid Cycling VFD.

VFD Speed Range:

- Defines the Minimum and Maximum speed for the motor. These values should reflect the full range of the VFD.

Warm up Timer:

- Defines the Warm up period for the Compressor. This timer gets activated after every compressor start and remains active for the defined time. During this period, the Oil Pump is turned ON and the motor speed is varied from 1200 RPM to 3600 RPM.

Oil Restriction Setpoint:

- This is Compressor VFD RPM setpoint used for turning ON/OFF the Oil Solenoid Digital Output. Oil Solenoid Digital Output is turned ON when Compressor is Running and Compressor VFD RPM goes below this setpoint.

Oil Restriction Differential:

- This is the differential around Oil Restriction Setpoint.

State Below Setpoint:

- This is the Oil Restriction Solenoid State selection Setpoint. The user can select the Oil Restriction Solenoid Digital Output State as “N/O” or “N/C”. Oil Restriction Solenoid Digital Output will be controlled according to state selection. For example, if Oil Restriction Setpoint is set to 1800 RPM, Oil Restriction Offset is set to 5 RPM and State Below Setpoint as “N/O”, then as Compressor VFD RPM decreases to 1795 RPM, then Oil Solenoid Digital Output will be turned OFF. If Compressor VFD RPM increases to 1805 RPM, then Oil Solenoid Digital Output will be turned ON.

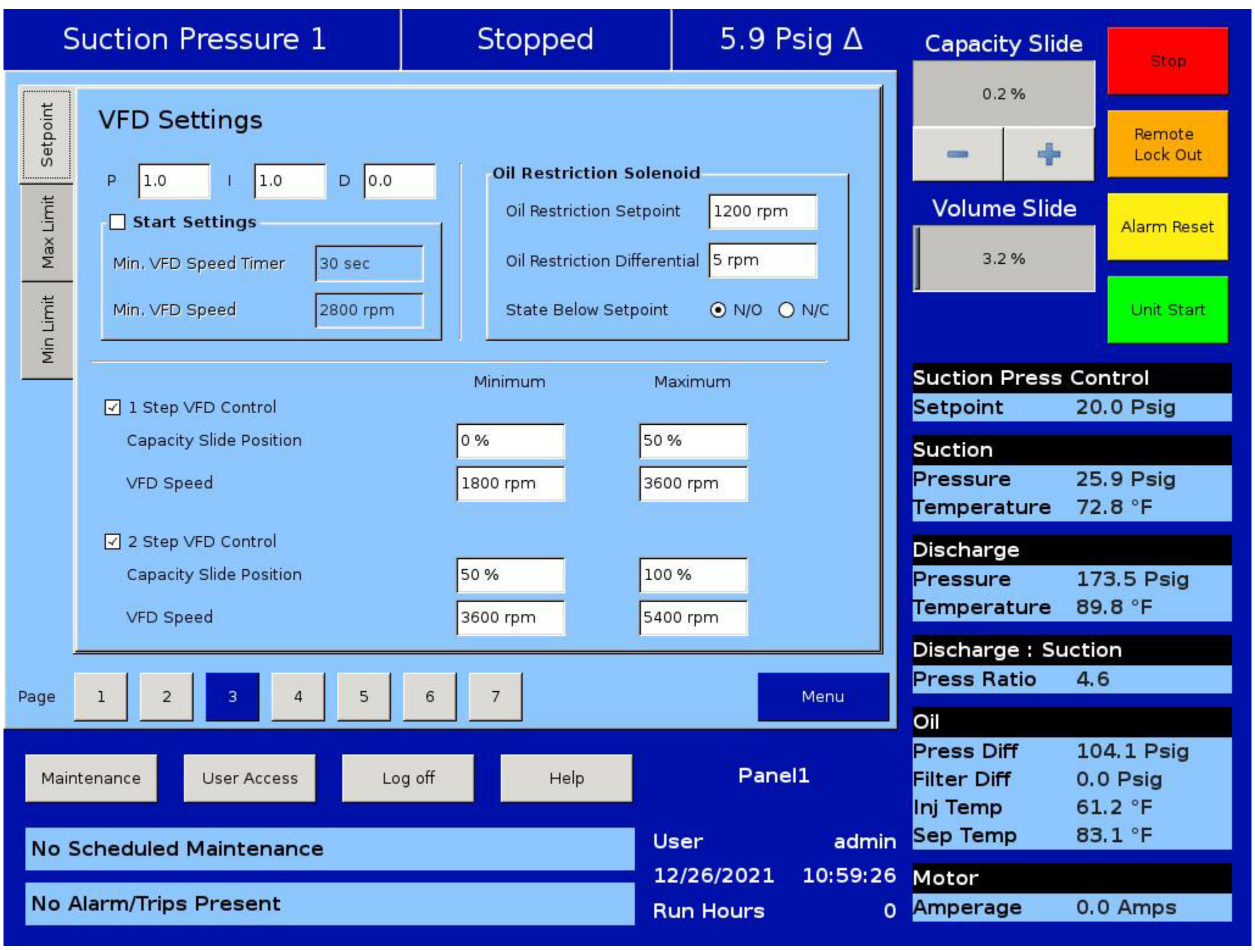


Figure 6-12. Compressor Control Screen - Oil Restriction Solenoid

Rapid Cycling VFD Control[2]

Operation at variable speed provides constant load-matching capacity and energy saving by eliminating over-capacity running.

However, refrigeration compressors that use speed control are operated outside the normal area of operation defined and specified by the manufacturer. It is therefore very important to take into consideration certain electrical and refrigeration technology restraints.

That is why this is a Special Compressor Setting that only a Vilter™ user can activate, with knowledge of installation data, to make sure the equipment you have is compatible with the set up, and that you have available all hardware (such as Digital Input/Output Card #5, that will allow you to control the Oil Restriction Solenoid), so that the Rapid Cycling VFD Control can work fluidly in your application.

If at any point changes are made to your application, configuration or equipment, you will need to consult a Vilter™ engineer on how to apply those changes to the use of the Rapid Cycling VFD Control feature.

The VFD page is where the operator can tune the motor VFD for desired rapid cycling VFD operation, see Figure 6-13. A Vilter™ compressor uses the variable speed of a VFD controlled motor to vary the amount of work or capacity of the compressor. The rapid Cycling VFD control will keep the capacity slide loaded to maximum and vary the motor speed to achieve the required work or capacity.

For example, if the compressor needs to load to 100% of its capacity, the control algorithm will keep the capacity slide loaded to its maximum position and ramp up the motor speed up to its maximum speed. In the unloading direction, the motor speed will ramp down to its minimum speed, keeping capacity slide loaded to maximum.

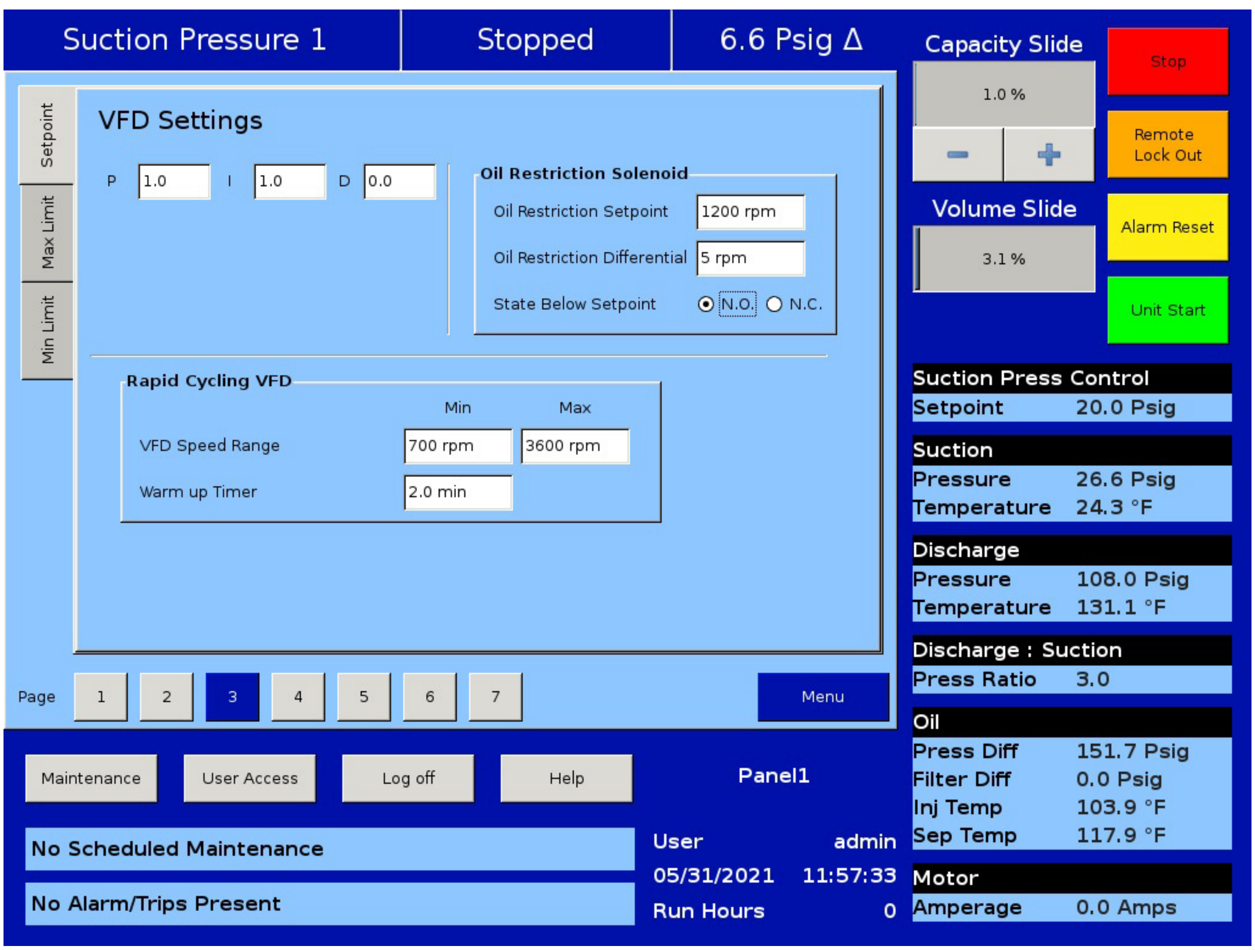


Figure 6-13. Compressor Control Screen - Rapid Cycling VFD Control

2 Rapid Cycling VFD Control is not available when working with the No Slides feature.

In this manner, capacity load is handled by varying motor speed only. Oil Restriction Solenoid Function will be automatically enabled when Rapid Cycling VFD is selected in Configuration Screen. Refer to the Oil Restriction Solenoid Section for Oil Restriction Setpoint details.

Oil Restriction Setpoint:

- This is the compressor VFD RPM setpoint used for turning ON/OFF the Oil Solenoid Digital Output. Oil Solenoid Digital Output is turned ON when the compressor is Running, Warm up Timer is Lapsed and Compressor VFD RPM goes below this setpoint.

Oil Restriction Differential:

- This is the differential around Oil Restriction Setpoint.

Oil Restriction Offset:

- This is the differential offset around Oil Restriction Setpoint. For example, if Oil Restriction Setpoint is set to 1800 RPM and Oil Restriction Offset is set to 5 RPM, then as Compressor VFD RPM decreases to 1795 RPM, then Oil Solenoid Digital Output will be turned ON. If Compressor VFD RPM increases to 1805 RPM, then Oil Solenoid Digital Output will be turned OFF.

NOTE

For use of compressor control screen - page 4, see Cool Compression Control in Section 25.

Pumpdown Control

The Pumpdown Control defines a method of "pumping" down a chiller, which is to draw off refrigerant from it. This feature can be enabled or disabled from this page, see Figure 6-14. If Pumpdown is enabled, this feature will only function when the compressor is running in local Auto Mode and Control Mode Configured is Suction Pressure.

When Pumpdown Control is running, a status icon will appear on the bottom left corner of the main screen to make the user aware of it.

If the Pumpdown Operation is running, then;

- The Auto-cycle functionality is ignored. Pumpdown mode will cause the compressor to cycle off via the Pumpdown Stop Pressure setpoint. Normally, the Pumpdown Stop Pressure setpoint will be set lower than the Auto-cycle Stop setpoint. Therefore, as the suction pressure is pulled down, the compressor is prevented from shutting down prematurely via the Auto-cycle Stop setpoint by automatically ignoring the Auto-cycle feature.
- Compressor's capacity will be modulated as per Pumpdown Stop Pressure Setpoint. i.e. Pumpdown Stop Pressure setpoint will act as Control setpoint instead of Suction Pressure Control Setpoint.
- The compressor will be placed into "Stop" mode after the suction pressure is equal to, or goes below the Pumpdown Stop Pressure.
- If Control Mode is changed from suction pressure to process pressure/temperature , then Pumdowm operation will be paused. Pumpdown operation will be resumed once control mode is changed back to suction pressure from process pressure/temperature.

Pumpdown:

- This checkbox enables the Pumpdown feature. If this box is unchecked, the Pumpdown setpoints are ignored and the user is not allowed to edit them.

Stop Pressure:

- This setpoint defines the suction pressure value at which the compressor will cycle off. Normally, this setpoint is set below the Suction Pressure Auto-cycle Stop Pressure setpoint.

Stop Delay:

- This setpoint delays the compressor from stopping when the suction pressure is equal to or less than the Stop Pressure.

Min Slide Position:

- The minimum capacity slide is the setpoint that the compressor is allowed to run at. By forcing the compressor capacity to operate at a value above minimum, we insure that the suction pressure will be pulled down to the Stop Pressure setpoint.
- This setpoint controls minimum VFD speed in No Slide Operation feature.
- This setpoint will be ignored if Max Slide Position % setpoint in Slide Valve Control section is set below this setpoint.

Pumpdown Operation (Run/Stop):

- This button starts/stops the Pumpdown operation. This button is active only when compressor is in local Auto mode and the Control Mode configured is Suction Pressure. This button will display "Run" when Pumpdown operation has not started or stopped, while button will display "Stop" when Pumpdown operation is running.

Pumpdown operation can be aborted through –

1. Switching Run Mode to Manual / Remote from Auto run Modes.
2. When Compressor is Stopped due to Trip or on press of 'Stop' button.

When the Pumpdown feature is enabled, the Pulldown checkbox is automatically grayed out. Similarly when Pulldown feature is enabled, the Pumpdown checkbox is automatically grayed out and hence, the user will not be able to operate the Pumpdown feature. This is done to keep the Pumpdown and Pulldown features mutually exclusive.

Pulldown Control

The Pulldown Control defines a method of slowly pulling the Suction pressure/Process Pressure/ Process Temperature down from a high value to operating conditions. The pulldown method decreases pressure /temperature value in steps over a defined time interval. This is sometimes required on systems that have liquid recirculation systems or on new building to prevent structural damage by limiting the rate at which the building should be cooled.

This feature can be enabled or disabled from this page, see Figure 6-14. If Pulldown is enabled, this feature will only function when the compressor is running in local Auto / Auto Sequencing / Direct I/O Auto mode and when the Control mode is set as Suction Pressure 1 / Process Press Cooling 1 / Process Temp Cooling

1. If compressor is not started with Control mode as Suction Pressure 1 / Process Press Cooling 1 / Process Temp Cooling 1, then Pulldown operation will not run until compressor is stopped and restarted with control mode set as Suction Pressure 1/ Process Press Cooling 1 / Process Temp Cooling 1. If Control mode is changed during pulldown operation, then Pulldown operation will be aborted.

If Suction Pressure/ Process Pressure / Process Temperature is already below Pulldown Stop value Setpoint during Compressor Start, Pulldown Operation will not start.

When Pulldown operation is running,

- Compressor's capacity will be modulated as per Pulldown Control Setpoint. i.e. Pulldown Control Setpoint will act as Control setpoint instead of Suction Pressure / Process Press Cooling / Process Temp Cooling Control Setpoint.
- Auto-Cycle Start Suction Pressure Setpoint 1 & Stop Pressure Suction Setpoint 1 as set in Suction Pressure Control Page will get ignored. Instead Start Pressure & Stop Pressure as displayed in Pulldown Column will be used by Auto-Cycle Feature to Start & Stop Compressor Stop Compressor respectively. Refer Figure 6-14(a).

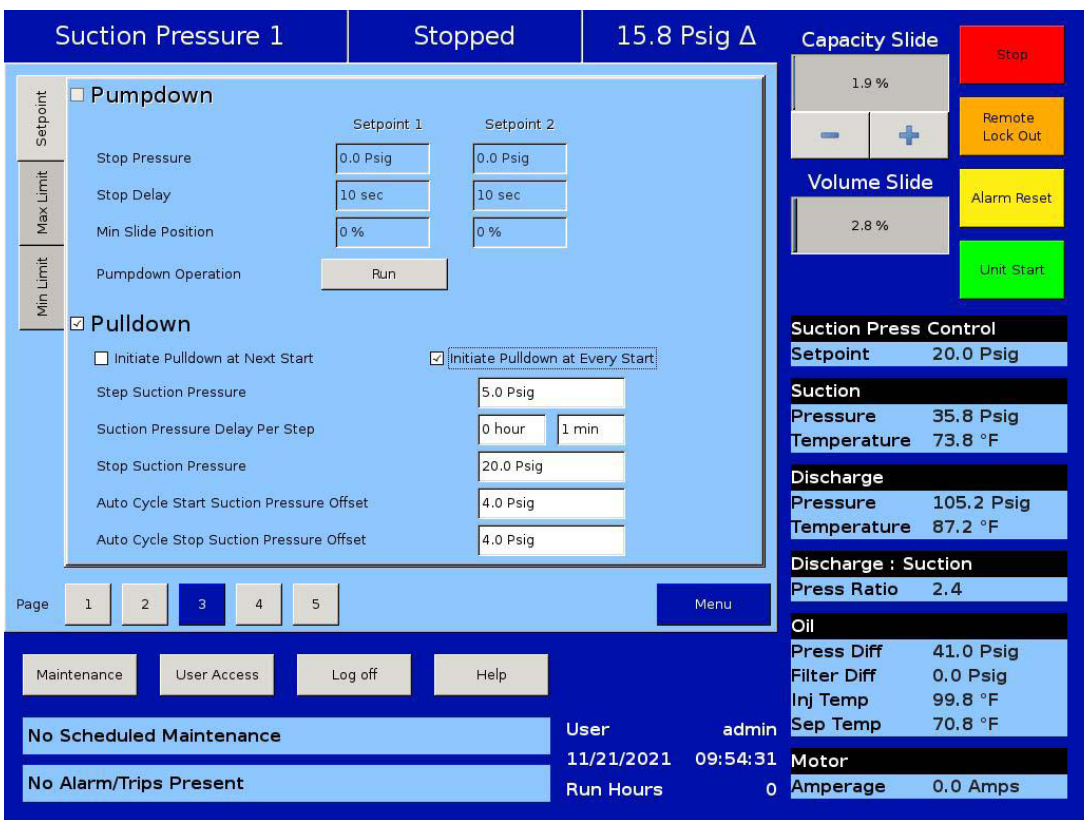


Figure 6-14. Compressor Control Screen - Pumpdown/Pulldown Control

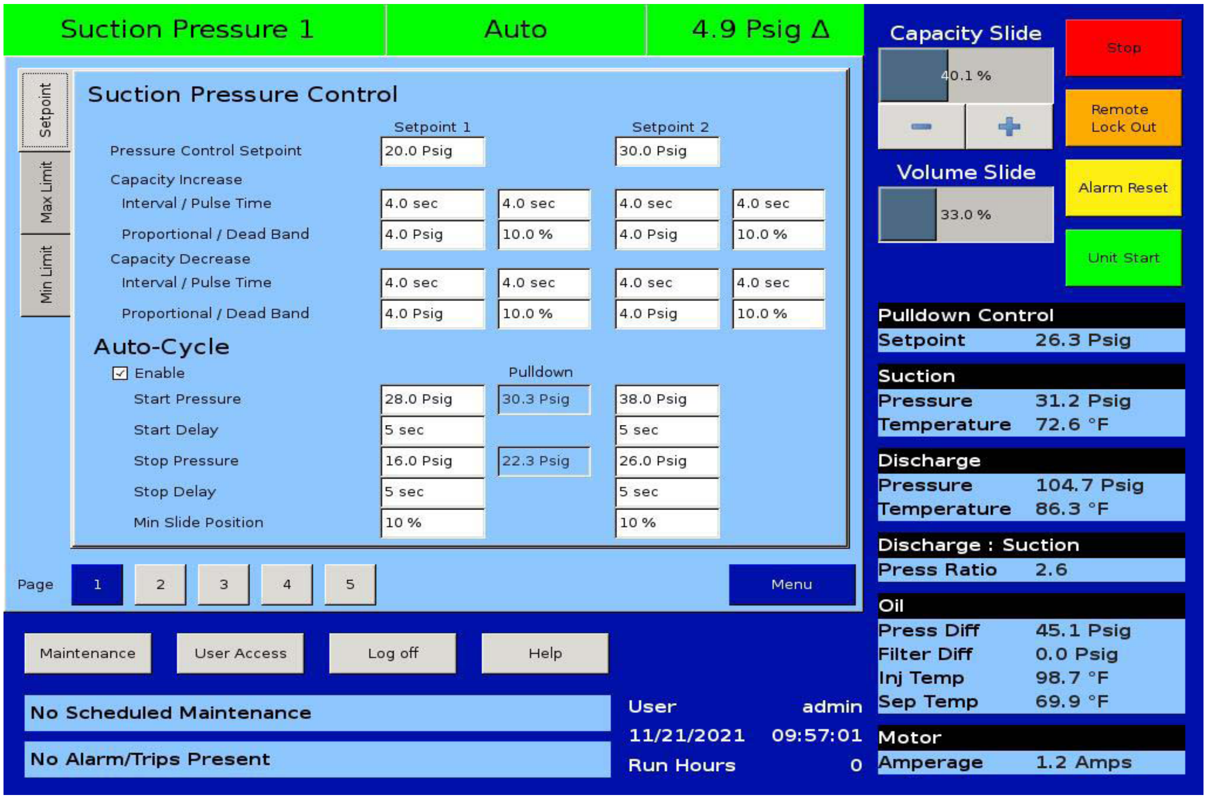


Figure 6-14(a). Pulldown Control – Auto-Cycle Start / Stop Suction Pressure

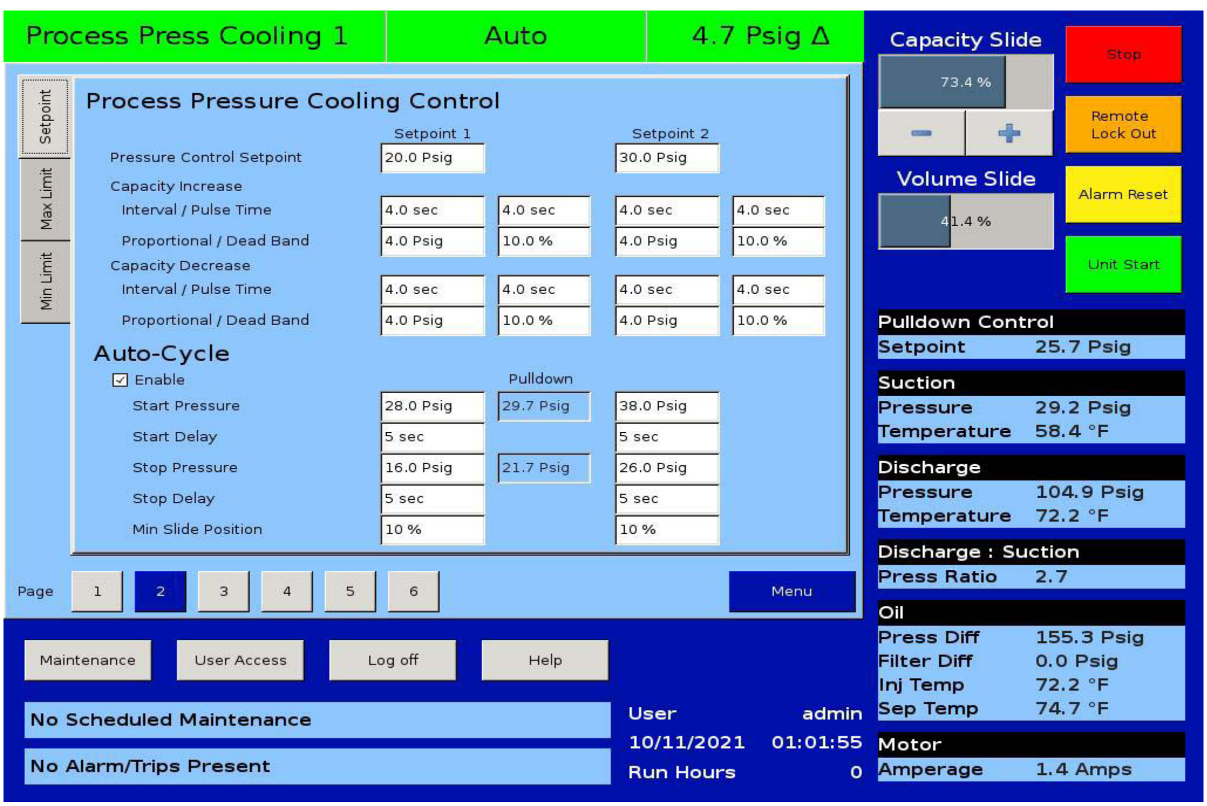


Figure 6-14(b). Pulldown Control - Auto-Cycle Start / Stop Process Pressure Cooling

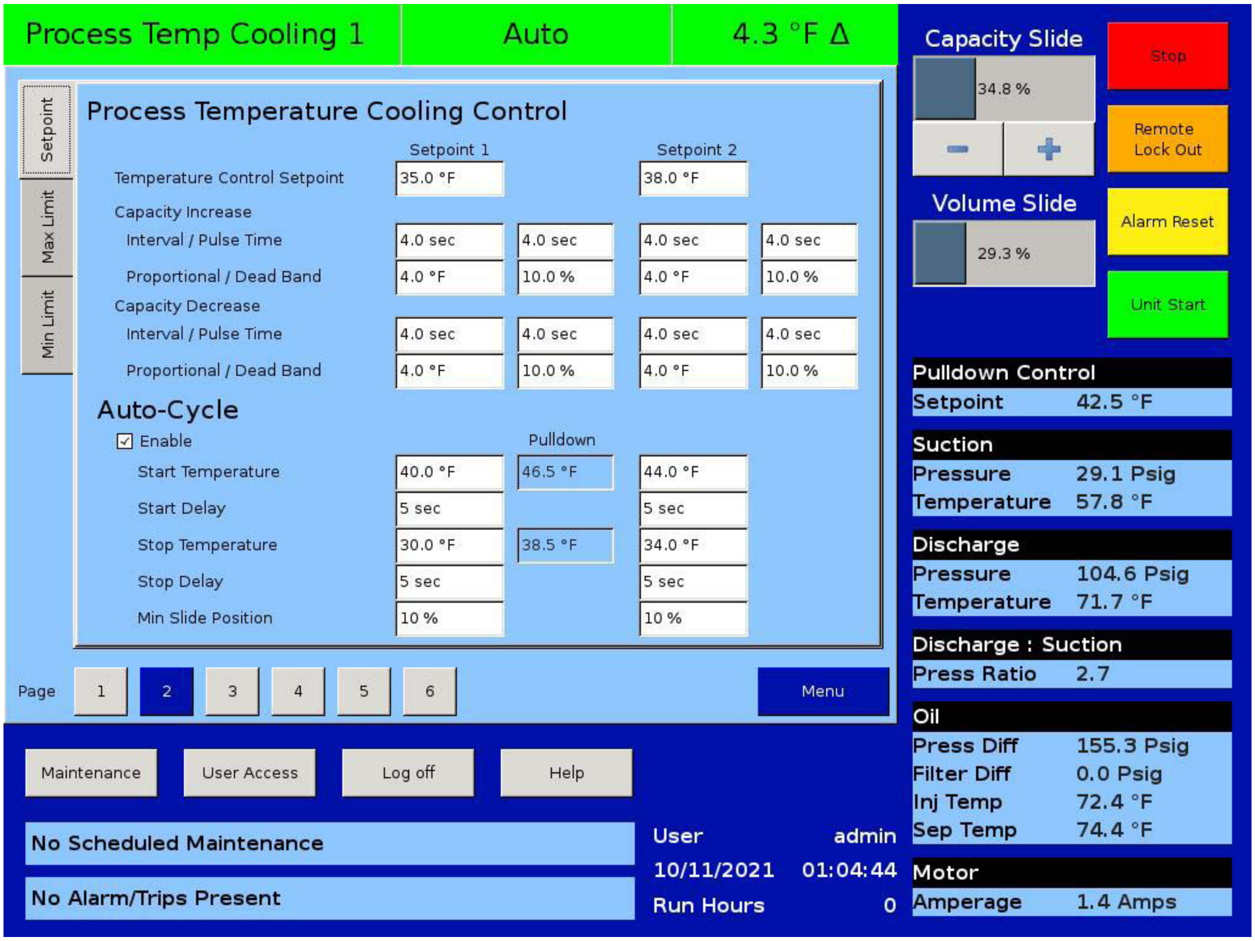


Figure 6-14(c). Pulldown Control – Auto-Cycle Start / Stop Process Temperature Cooling

- Auto-Cycle Start Process Pressure Setpoint 1 & Stop Process Pressure Setpoint 1 as set in Process Pressure Cooling Control Page will get ignored. Instead Start Pressure & Stop Pressure as displayed in Pulldown Column will be used by Auto-Cycle Feature to Start & Stop Compressor respectively. Refer Figure 6-14(b).
- Auto-Cycle Start Process Temperature Setpoint 1 & Stop Process Temperature Setpoint 1 as set in Process Temperature Control Page will get ignored. Instead Start Temperature & Stop Temperature as displayed in Pulldown Column will be used by Auto-Cycle Feature to Start & Stop Compressor respectively. Refer Figure 6 -14(c).

If Pulldown Operation is not running, then Pulldown Auto Cycle Start Pressure / Temperature & Stop Pressure / Temperature values will not be displayed in Auto-Cycle section.

Pulldown operation can be aborted through –

3. Switching Run Mode to Manual / Remote from Auto run Modes.
4. When Compressor is Stopped due to Trip or on press of ‘Stop’ button.

NOTE

If Run Mode is changed from Local Auto run mode to Direct I/O Auto run Mode during Pulldown operation. Pulldown operation will continue.

Example:

Assume Control mode as Suction Pressure1, Suction Pressure is at 85 psig and the setpoint we want to get to is 20 psig. The operator wants to allow 48 hours of pull-down time. Pick a reasonable step pressure of 5 psig for every step. This defines a change of (80 – 20 = 60) psig.

1. Note: the first step is applied immediately. So first step starts at (85 – 5 = 80) psig.

2. Number of steps = delta (60 psig change * 1 step/5 psig) = 12 steps.
3. Delay per Step = (48 hours / 12 steps) = 4 hours/step.
4. So for the first 4 hours, the compressor runs at 80 psig.
5. Next 4 hours @ 75 psig
6. Next 4 hours @ 70 psig
7. And so forth.

After the 12th step (running at 25 psig), 48 hours will have elapsed, and the new setpoint becomes 20 psig, achieving the 20 psig setpoint after 48 hours. After the pulldown setpoint is equal to or is less than the stop pressure setpoint, the pulldown operation will get completed after three minutes and pulldown feature will also get disabled.

Pulldown:

- This checkbox enables the Pulldown feature. If this box is unchecked, the Pulldown setpoints are ignored and the operator is not allowed to edit them.

Initiate Pulldown at Next Start:

- This checkbox, when enabled, turns on the Pulldown process at the next start cycle.

Initiate Pulldown at Every Start:

- This checkbox, when enabled, turns on the Pulldown process at every start cycle.
    - The Pulldown feature will not disable itself when the stop pressure setpoint is achieved and this checkbox is enabled.

Step Value:

- This setpoint defines the step decrements at which the suction pressure /process pressure /process temperature value will be controlled at.

Delay Per Step:

- This setpoint defines the time increment at which the compressor will be controlled at each step, in hours and minutes. Minimum range of 1, maximum of 1259.

Stop Value:

- This setpoint defines the suction pressure/process pressure /process temperature value at which the Pulldown operation will get completed. When the suction pressure /process pressure / process temperature value is equal to or goes below this setpoint, the Pulldown feature disables itself.

Auto Cycle Start Offset Value:

- This setpoint defines the offset value for the Pulldown Auto Cycle Start value from the Pulldown Control setpoint. The Pulldown Auto Cycle Start value as displayed in Figure 6-14(a) /6-14(b) /6-14(c) will be the Pulldown Control setpoint increased by this setpoint pressure/temperature value.

Auto Cycle Stop Offset Value:

- This setpoint defines the offset value for the Pulldown Auto Cycle Stop value from the Pulldown Control setpoint. The Pulldown Auto Cycle Stop Pressure value as displayed in Figure 6-14(a) / 6-14(b) /6-14(c) will be the Pulldown Control setpoint decreased by this setpoint pressure / temperature value.

When the Pulldown feature is enabled, the Pumpdown checkbox is automatically grayed out. Similarly when the Pumpdown feature is enabled, the Pulldown checkbox is automatically grayed out and hence, the user will not be able to operate the Pulldown feature. This is done to keep the Pulldown & Pumpdown features mutually exclusive.

Active Control Mode

This drop down box gives the operator the ability to change the type of Active Control Mode such as suction pressure, process temp cooling, process press cooling, discharge pressure, process temp heating or process press heating. The operator can also switch from setpoint 1 and setpoint 2 for each control method. What is available in this dropdown box depends on the number and type of control selected in the configuration screen, see Figure 6-15.

Load Anticipating[3]

The purpose of the load anticipating algorithm is to reduce the amount of overshoot of the capacity slide position while the compressor attempts to meet the control setpoint. This advanced feature of the Vission 20/20 closely monitors the rate of change of the process variable and compares it to the control setpoint. If the process variable is changing in the direction of the control setpoint at the specified rate or greater, then the normal command to move the capacity slide is interrupted. The rate is calculated between time intervals set in the proportional control section of this screen.

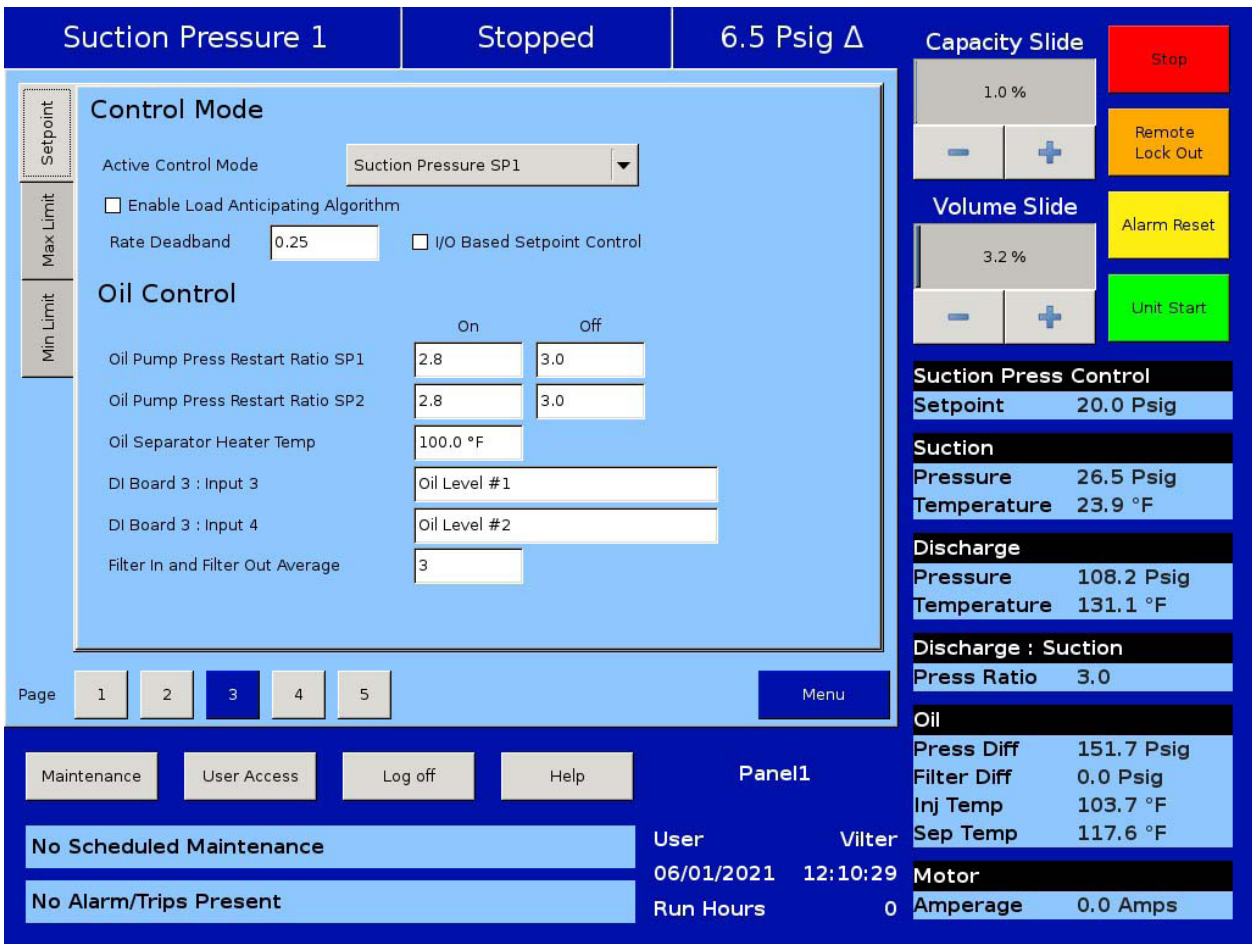


Figure 6-15. Compressor Control Screen - (Active Control Mode, Oil Control)

3 Load Anticipating and Rate Band will not function when working without slides (VFD only). The setpoints will be grayed out.

Enable Load Anticipation Algorithm:

- Allows the operator to choose if the load anticipation algorithm runs.

Rate Deadband:

- Defines the rate at which the capacity slide movement will be interrupted. This value is an absolute value of the process variable. For example, the default value is 0.25. If the control mode is suction pressure, then this value is 0.25 Psig or if process temperature is the control mode then the value would be 0.25°F.

I/O Based Control Mode:

- This checkbox, when enabled, monitors the Remote Select #1/#2 Digital Input (5th Digital Input on Digital Input Board 1). When Remote Select #1/#2 digital input is energized, Setpoint #2 will be used as Control Setpoint and if input is de-energized then Setpoint #1 will be used as Control Setpoint to modulate the compressor capacity.
- When this checkbox is enabled, Active Control Mode dropdown box will be greyed out and not be available for selection as the selection of Active Control Setpoint will depend upon the state of Remote Select #1/#2 Digital Input.

Oil Control

These setpoints determine how the Vission 20/20 will manage the compressor's oil, see Figure 6-15.

Oil Pump Press Restart Ratio SP1:

- The ON and OFF values for active control setpoint 1 define when the oil pump will cycle on and off, if the oil pump has been selected to cycle from the Configuration screen.

Oil Pump Press Restart Ratio SP2:

- The ON and OFF values for active control setpoint 2 define when the oil pump will cycle on and off, if the oil pump has been selected to cycle from the Configuration screen.

Oil Separator Heater Temp:

- When the oil temperature falls below this setpoint the oil heater will turn on. Note, there is a 5°F differential associated with this setpoint. For example, when set at 100°F, the heater will turn on at 95°F and off at 105°F.

DI Board 3: Input 3:

- This label offers flexibility to set name for digital input 3 on digital input board 3. User defined name set here is reflected in Timers, Input/Output States & Auxiliary I/O Screens.

DI Board 3: Input 4:

- This label offers flexibility to set name for digital input 4 on digital input board 3. User defined name set here is reflected in Timers, Input/Output States & Auxiliary I/O Screens.

Filter In and Filter Out Average:

- This setting defines the number of readings to be averaged and used by Vission 20/20 to calculate Filter In Pressure & Filter Out Pressure values.

For example, if Filter In and Filter Out Average is 3, there will be 3 sensor readings averaged and used in calculations for Filter In Pressure & Filter Out Pressure.

Suction Oil Injection Solenoid[4]

The Vission 20/20 offers the flexibility to control a SOI Solenoid when an Oil Pump is not present. The SOI Solenoid should be wired to "Oil Pump Start" Digital Output, see Figure 6-16.

SOI Solenoid Press Restart Ratio:

- The On and Off setpoints define when the SOI solenoid will Cycle On and Off depending on Discharge to Suction Pressure Ratio.

SOI Solenoid ON Timer:

- This setpoint defines the time interval for which the SOI Solenoid is Forced ON when the compressor is started or when the SOI Solenoid is Cycled On when the compressor is running.

SOI Load Limit:

- This setpoint defines the maximum value for the capacity slide position when SOI Solenoid is ON.

No Oil Pump[5]

Refer to Figure 6-17 for the No Oil Pump Control Setpoints. When No Pump is selected in the Configuration Screen, the Oil Pump digital Output is Forced OFF.

No Oil Pump Pressure Ratio:

- This setpoint defines the load limit condition of No Oil Pump when No Pump is selected in the configuration screen. This setpoint is monitored against Pressure Ratio.

No Oil Pump Load Limit:

- This setpoint defines the maximum value for the capacity slide position when the Pressure Ratio drops below the No Oil Pump Pressure Ratio Setpoint.

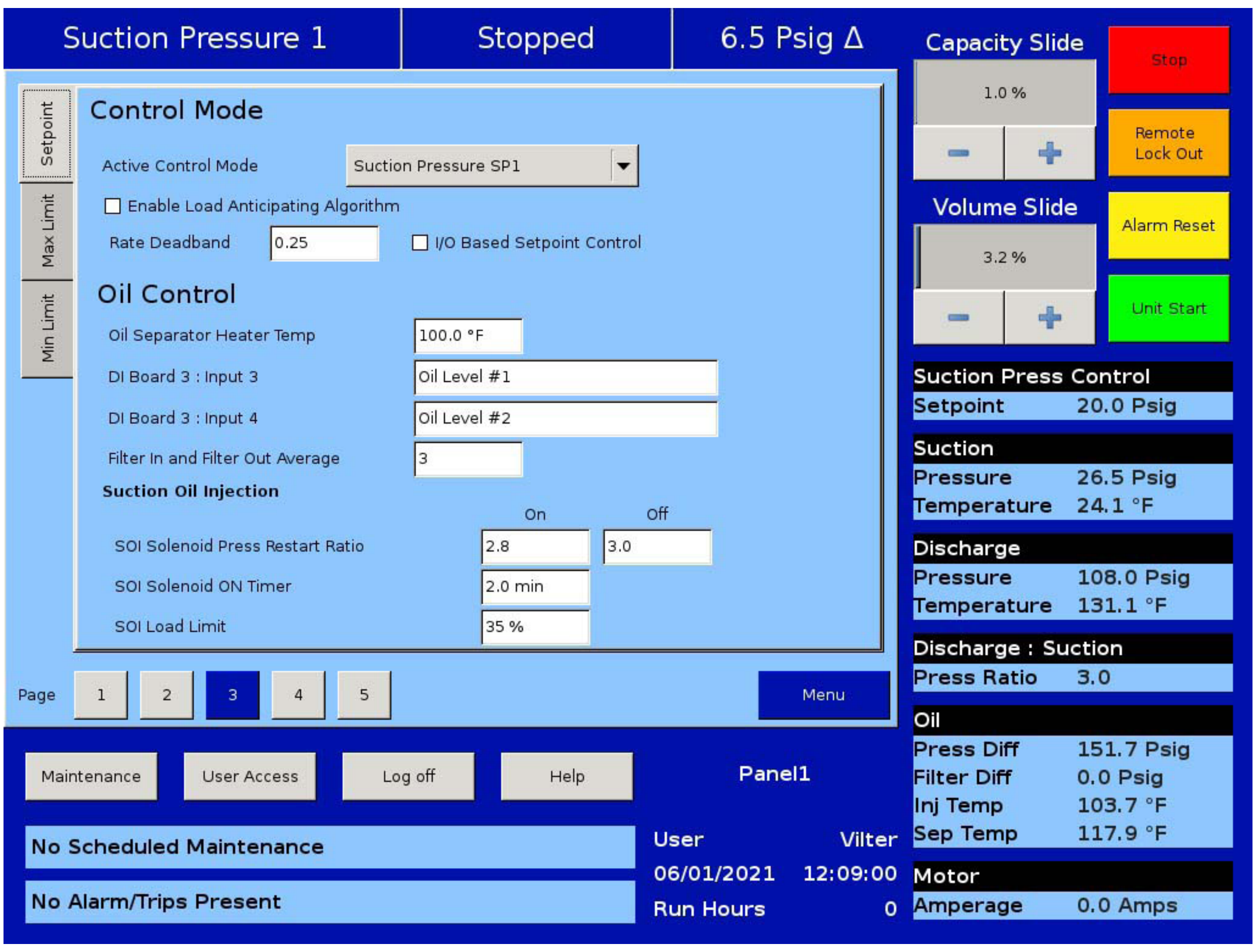


Figure 6-16. Compressor Control Screen - Control Mode (SOI)

4 The Suction Oil Injection Solenoid is not available when working with the No Slides feature.

5 The No Oil Pump feature will not function when working without slides (VFD only).

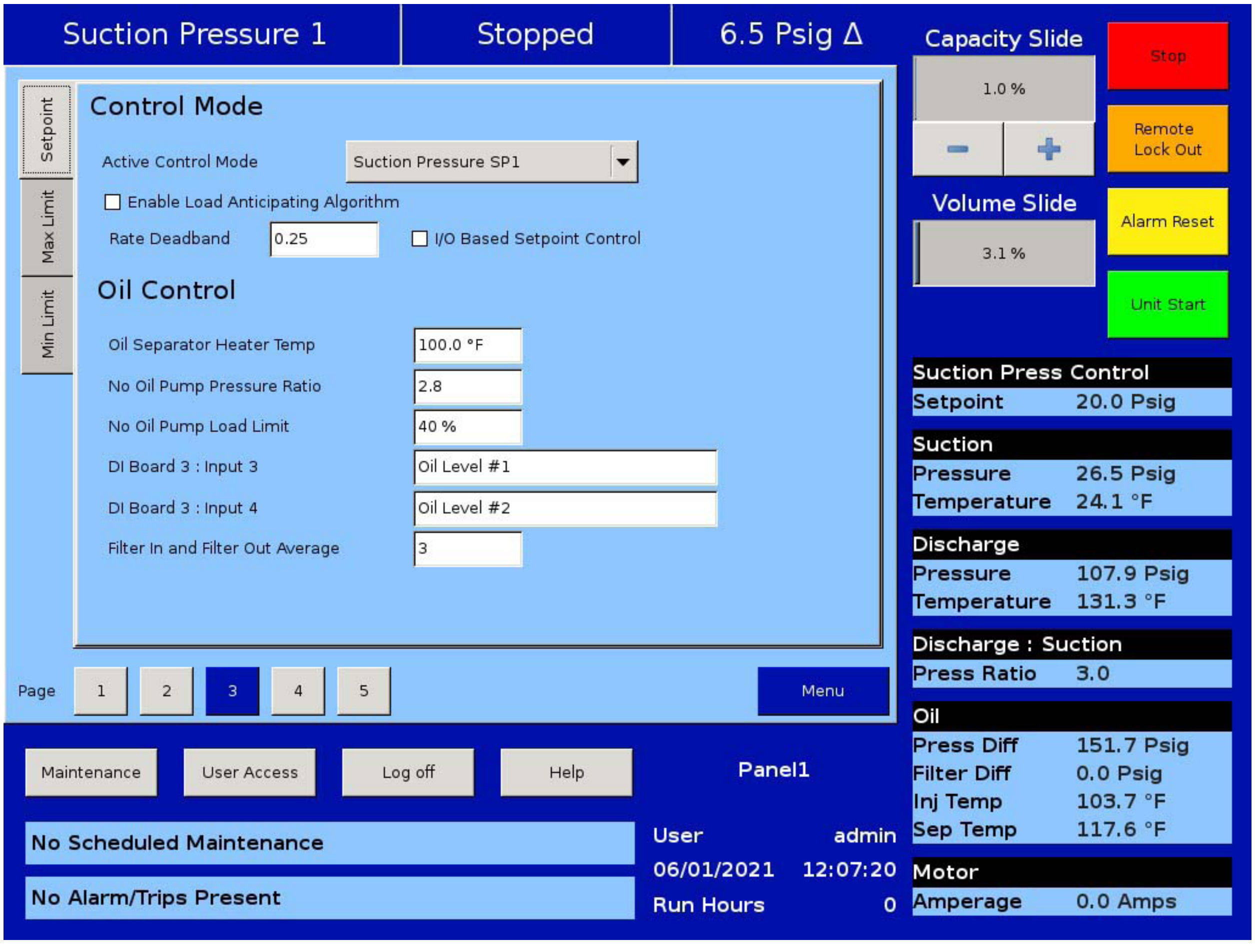


Figure 6-17. Compressor Control Screen - Control Mode (Oil Control for No Oil Pump)

Stop Load and Force Unload

The stop load and force unload feature's primary purpose is to attempt to prevent the compressor from tripping off due to a particular instrument reading. For example, if the suction pressure drops too low, the compressor will trip off for safety reasons. However, the stop load & force unload algorithm recognizes a potential trip and either stops the compressor from loading up or even unloads the compressor to prevent the trip.

Stop load:

- When this value is reached, the capacity slide will not advance in any condition.

Force Unload:

- When this value is reached, the capacity slide position will decrease until the variable reading is below this value.

High Motor Amps:

- The motor current values for stop load and force unload.

High Discharge Pressure:

- Discharge pressure value for stop load and force unload.

Low Suction Pressure:

- Suction pressure values for stop load and force unload.

High Discharge Superheat:

- Discharge temperature superheat values for stop load and force unload. This is only used for Cool Compression.

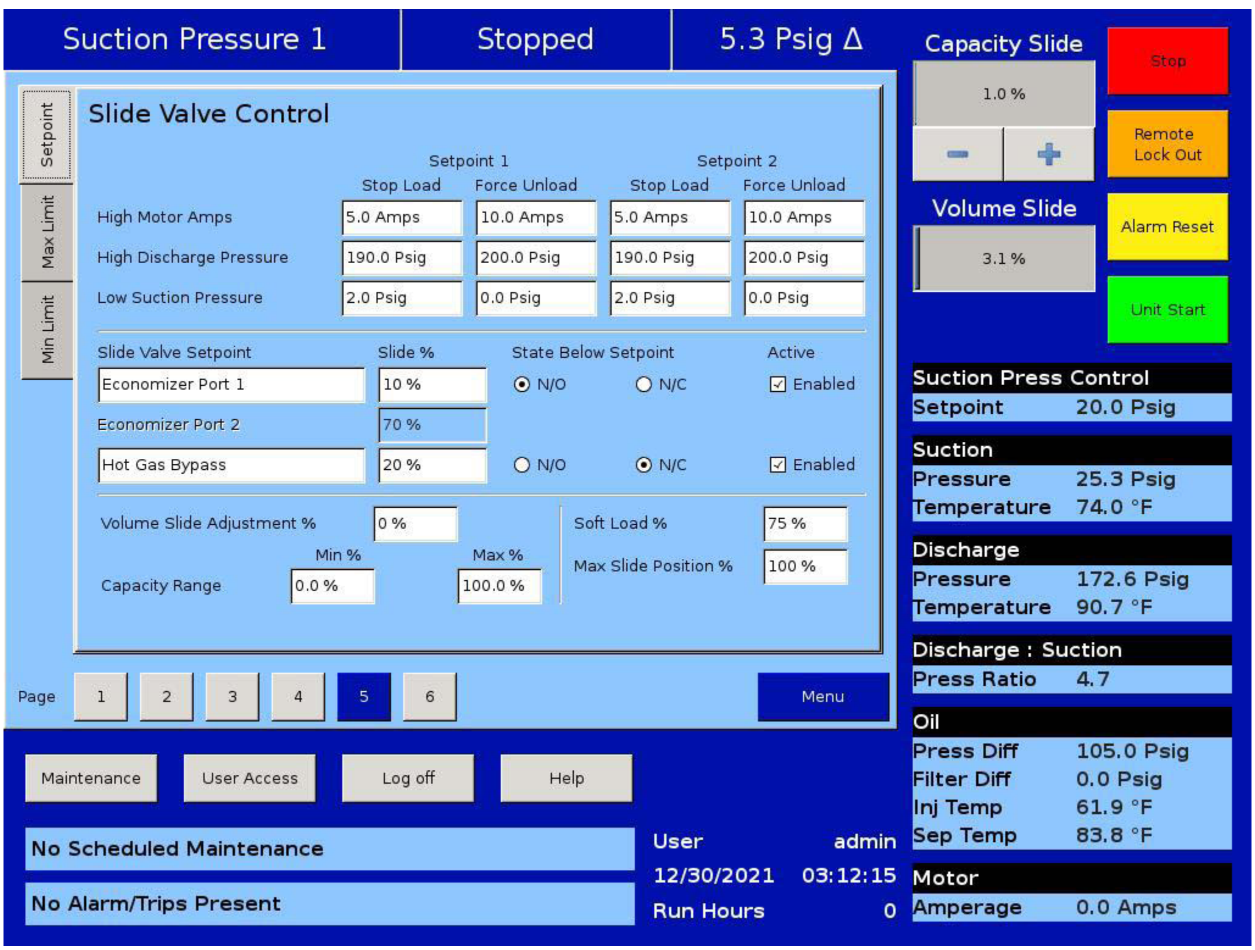


Figure 6-18. Compressor Control Screen - Stop Load, Force Unload and Slide Valve Control

Capacity Slide Triggered Outputs

The Vission 20/20 offers two digital outputs that can be triggered at a specified capacity slide position. By default, the outputs are preselected for the economizer and the hot gas bypass. However, these preselected outputs are customizable by the operator, see Figure 6-18.

Slide Valve Setpoint:

- Operator editable labels for the each output. Only the Economizer Port 2 label is non-editable.

Slide %:

- Indicates the capacity slide position where the digital output is triggered.
- When operating without slides, this box would indicate the VFD speed position at which the digital output is triggered.

State Below Setpoint:

- Defines the state of the digital output when the slide position is below the “Slide %” setpoint. The operator can choose between “N/O” or “N/C”. This setpoint is not available for the Economizer Port 2, so the Economizer Port 2 follows the setpoint of Economizer Port 1.

Active:

- Check box to enable the digital outputs. There is no check box to enable the Economizer Port 2 digital output. The economizer Port 2 digital output is enabled when the compressor type selected from the configuration screen is “VSM7” and the Economizer Port 1 digital output is enabled.

Volume Slide Position Offset[6]

These setpoints offer the ability to alter the Volume position table to take advantage of potential energy savings. Since the volume position is a function of the capacity position, the offset to the volume is based on the position of the capacity slide. The volume offset can be applied to the entire capacity slide range or just a portion using the Capacity Range minimum and maximum setpoints.

Volume Slide Adjustment %:

- The value in percentage of the volume slide offset.

Capacity Range:

- Defines the range where the volume position slide offset will be applied.

Soft Load

This setpoint is used to slow the loading of the compressor. In some refrigeration systems, a loading compressor can have dramatic effects on the system parameters. This setpoint allows an operator to reduce the continuous load pulse as defined in the proportional control section to a percent duty cycle.

Soft load %:

- Defines the duty cycle of the continuous load pulse. At 100%, the continuous pulse will truly be continuous. At 50%, the continuous pulse would be reduced to half time on and half time off in the time interval defined in the proportional control section.

Max Slide Position %:

- Defines the maximum value for Capacity slides. Capacity Slides would not be allowed to load beyond this setpoint. This setpoint would not be available when Compressor VFD is selected. In case of Compressor VFD, Step 1 Maximum Capacity Slide Position or Step 2 Maximum Capacity Slide Position will be used to limit Capacity slides.

Liquid Injection

The setpoints in this section are to control the behavior of the liquid refrigerant injected into the compressor for oil cooling purposes. The liquid injection solenoid control is based off the discharge temperature whether the compressor uses just an injection solenoid or a motorized valve in conjunction with the solenoid, see Figure 6-19.

Liquid Injection Solenoid Control ONLY:

- When using only the liquid injection solenoid, the solenoid is activated once the value of discharge temperature meets or exceeds the value of “Liquid inj. Setpoint” and the value of the oil separator temperature meets or exceeds the value of “Oil Sep. Temp. Override”. The injection solenoid will deactivate if either setpoints are not met. This will prevent situations where the discharge temperature may rise quickly, but the oil temperature is still very cold. By preventing the liquid injection solenoid from turning on at this point, the oil separator will not be subjected to additional liquid refrigerant that would cool the oil even further.

6 Not available when working without slides.

Liquid Injection Control using a 4-20mA motorized valve:

- When a motorized valve is used to control the amount of liquid being injected into the compressor the previously mentioned setpoints have a slightly different function. The Oil Sep. Temp. Override is still used in controlling the injection solenoid, however, the Liquid Inj. Setpoint is now used as the target temperature for the PID Algorithm that controls the position of the motorized valve. The algorithm compares the actual discharge temperature against the Liquid Inj. Setpoint. The difference between these is the error. The PID algorithm tries to drive the error to "zero" by moving the positioning valve to allow more or less liquid refrigerant to be injected into the compressor.
- A PID algorithm can be notoriously hard to tune. As a result the Vission 20/20 offers a couple of additional features to help control wild fluctuations in oil temperatures that could result in the compressor tripping off. The operator can choose to enable the minimum value position that automatically sets the liquid injection motorized valve to the specified value whenever the discharge temperature has fallen below the Liquid inj. Setpoint. This feature nearly eliminates the overshoot of the PID in the downward direction and reduces the chance of the compressor tripping off due to low oil temperature. The operator can also choose to use an average of the discharge temperature and the oil manifold temperature as the control variable. The discharge temperature can vary quite drastically forcing the PID algorithm to drastically adjust the motorized value. By averaging the more stable oil manifold temperature and discharge temperature, the control variable stabilizes and the PID is more easily tuned.

Please note that as stated above, PID algorithms can be difficult to tune and there is no one set of PID values that will work. The work required for a compressor to meet the requirement of its installation vary greatly and therefore the amount of heat transferred to the oil varies just as greatly. We recommend the operator consult PID tuning guides available from many different sources before attempting to tune this PID.

Liquid Inj. Setpoint:

- Setpoint at which the liquid solenoid will activate if in solenoid control or if the setting for the control variable for the PID is in liquid motorized valve control.

Oil Sep. Temp. Override:

- Defines the temperature the oil must reach before the liquid injection solenoid is allowed to be activated.

P = Proportional (Gain):

- Used to adjust the positioning valve in direct proportion to the difference between the control setpoint and the discharge temperature (SP - DT = error). The proportional term is a unitless quantity and is used for coarse adjustment. This setpoint should be set to the lowest value that gives adequate response to the control system. Increasing the proportional setting increases the control system's sensitivity to small discharge temperature fluctuations and the tendency to hunt.

I = Integral (reset):

- This parameter integrates the error over time, to account for a small error that has persisted for a long time. This quantity is used for fine adjustment. This setpoint is used to smooth out discharge temperature variations. This setpoint should be set high enough to prevent hunting but not too high or it will cause control system overshoot.

D = Derivative (rate):

- This parameter accounts for how fast the error is changing, positively or negatively.

Minimum Valve Open %:

- When enabled, this is the valve position used whenever the control variable drops below Liquid inj. Setpoint 1. Use only if the compressor is tripping off for low oil temperature due to large overshoots and all other tuning methods have failed.

Avg. with Oil Manifold Temperature:

- When enabled, averages the Oil manifold temperature and the discharge temperature. This creates a more stable control variable and should result in more stable control.
- This selection should be determined by the operator through testing.

NOTE

For more information on oil cooling setups, see Appendix B.

Dual Liquid Injection[7]

The Dual Liquid Injection controls the Liquid Injection # 2 digital output. The Liquid Injection # 2 digital output is controlled depending on Liquid Pressure and Slide % value. Refer to Figure 6-19 for Dual Liquid Injection Setpoints.

Dual Liquid Injection:

- This check-box is used to Enable the Dual Liquid Injection Feature. The Enable/Disable functionality of this box depends on Selected Compressor Type and Model in the Configuration Screen.

Valve Loss:

- This Setpoint defines the Valve Train Loss for the Dual Liquid Injection Feature.

Safety Loss:

- This Setpoint defines the Safety Loss for the Dual Liquid Injection Feature.

Slide %:

- This Setpoint defines Slide % Value. The Liquid Injection # 2 digital output depends on this setpoint.

Liquid Pressure:

- This is the measured value at available Dual Liquid Injection port.

Switch Pressure:

- This value is used to control the Liquid Injection # 2 digital output. When the Liquid Pressure is less than the Switch pressure then Liquid Injection # 2 digital output will be Turned OFF. When the Liquid Pressure is greater than Switch Pressure & Slide Position is greater than the Slide % Setpoint Liquid Injection # 2 digital output will be Turned ON.

Orifice Loss:

- This is the measured value for liquid port orifice Loss.

Port Selection:

- User can select the “Low-Medium”, “Low-High” or “Medium-High” port option. This selection depends on Compressor Type & Compressor Model.

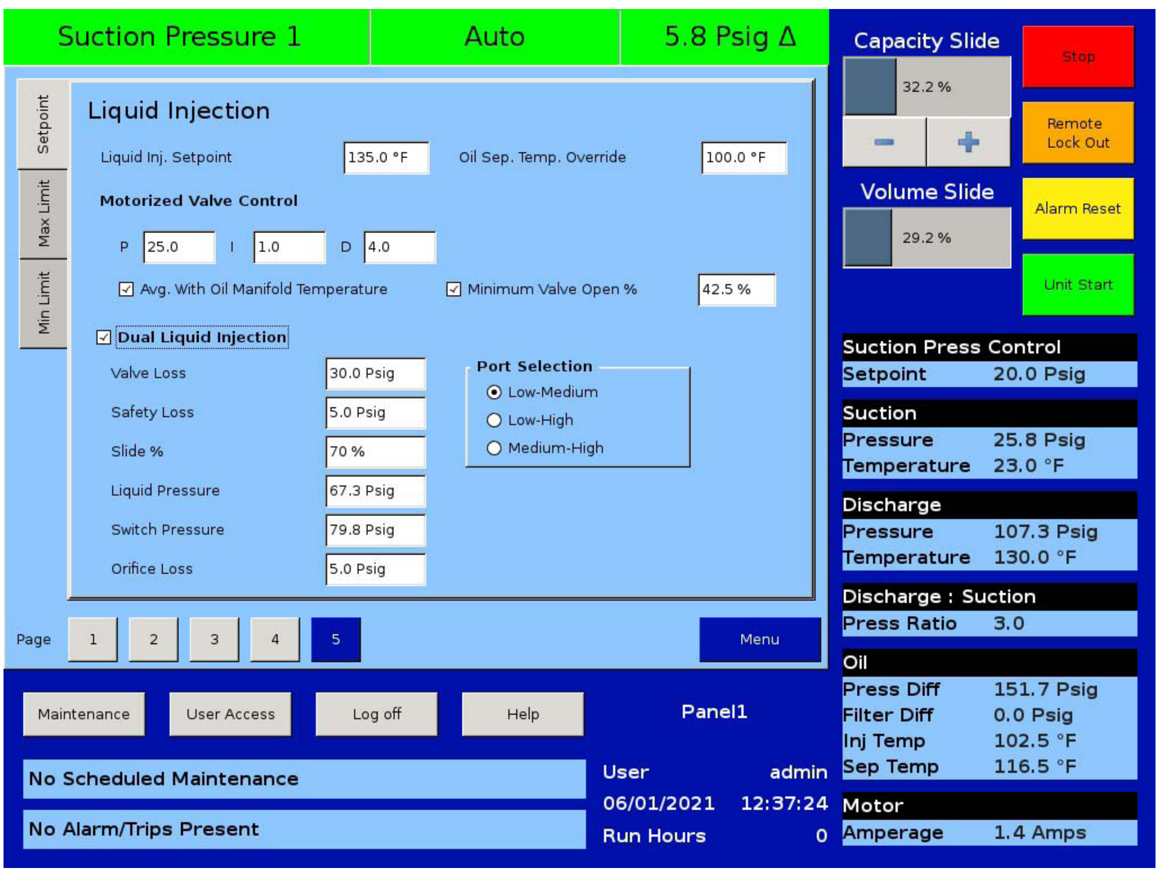


Figure 6-19. Compressor Control Screen - Liquid Injection & Dual Liquid Injection Control

7 Not available when working without slides.

Liquid Injection Outlet Port Direction

The toggle switch (S1) on the circuit board is used to select which port is the preferred "Pre Start-Up" outlet position. The valve shall be at the lowest-pressure outlet position at "Pre Start-Up" (i.e. low or medium, depending on tubing positions).

In the "SIG CCW" position, the actuator moves CCW when the signal is energized during operation (based on the switch pressure), until it reaches the limit - this makes the 3 o'clock port the outlet port (Figure 6-20, right image). Conversely, the other switch position, "SIG CW," makes the 12 o'clock port the outlet when the signal is energized during operation (Figure 6-20, left image).

Each rotor diameter has a different port configuration on the compressor housing.

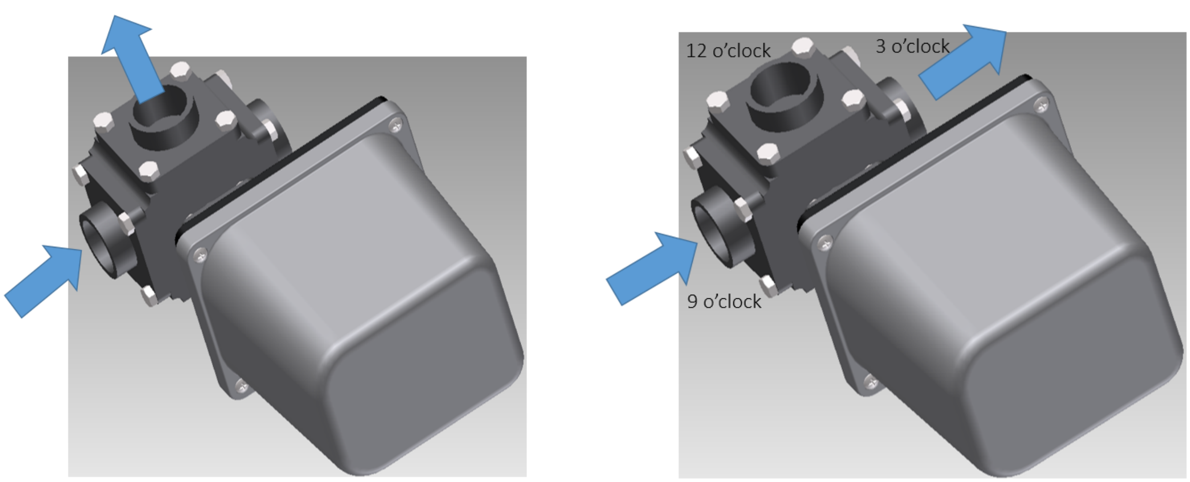
For 205mm: there are only medium and low-ratio ports, both of which are located on both top and bottom of the housing.

For 240mm-350mm: low ports are located on the top and bottom of the compressor, the medium port is on the top, and the high port is on the bottom.

For 401mm: all three ports are located on both the top and bottom of the housing.

Table 6-1. Compressor Size and Liquid Injection Outlet Port Direction

Compressor Size	Tubing Lines	Toggle Switch	Outlet Port (de-energized)
VSM152-401 (205mm)	Low-Medium	SIG CW	3 o'clock
	Low-High	N/A	N/A
	Medium-High	N/A	N/A
VSM501-701 (240mm)	Low-Medium	SIG CW	3 o'clock
VSS751-901 (280mm)			
VSS1051-1301 (310mm)	Low-High	SIG CCW	12 o'clock
VSS1551-2101 (350mm)	Medium-High	SIG CCW	12 o'clock
VSS2401-3001 (401mm)	Low-Medium	Incomplete	Incomplete
	Low-High	Incomplete	Incomplete
	Medium-High	Incomplete	Incomplete



12 o'clock outlet port

3 o'clock outlet port

Figure 6-20. Port Inlet and Outlet Flow Directions

VI Control - Twin Screw

This is the page where VI Control settings can be configured. This feature is only available for Twin Screw Compressors. There are three types of VI Control methods which can be configured as follows:

Fixed VI

- If this method is selected then there will be no volume control for Twin Screw compressors.

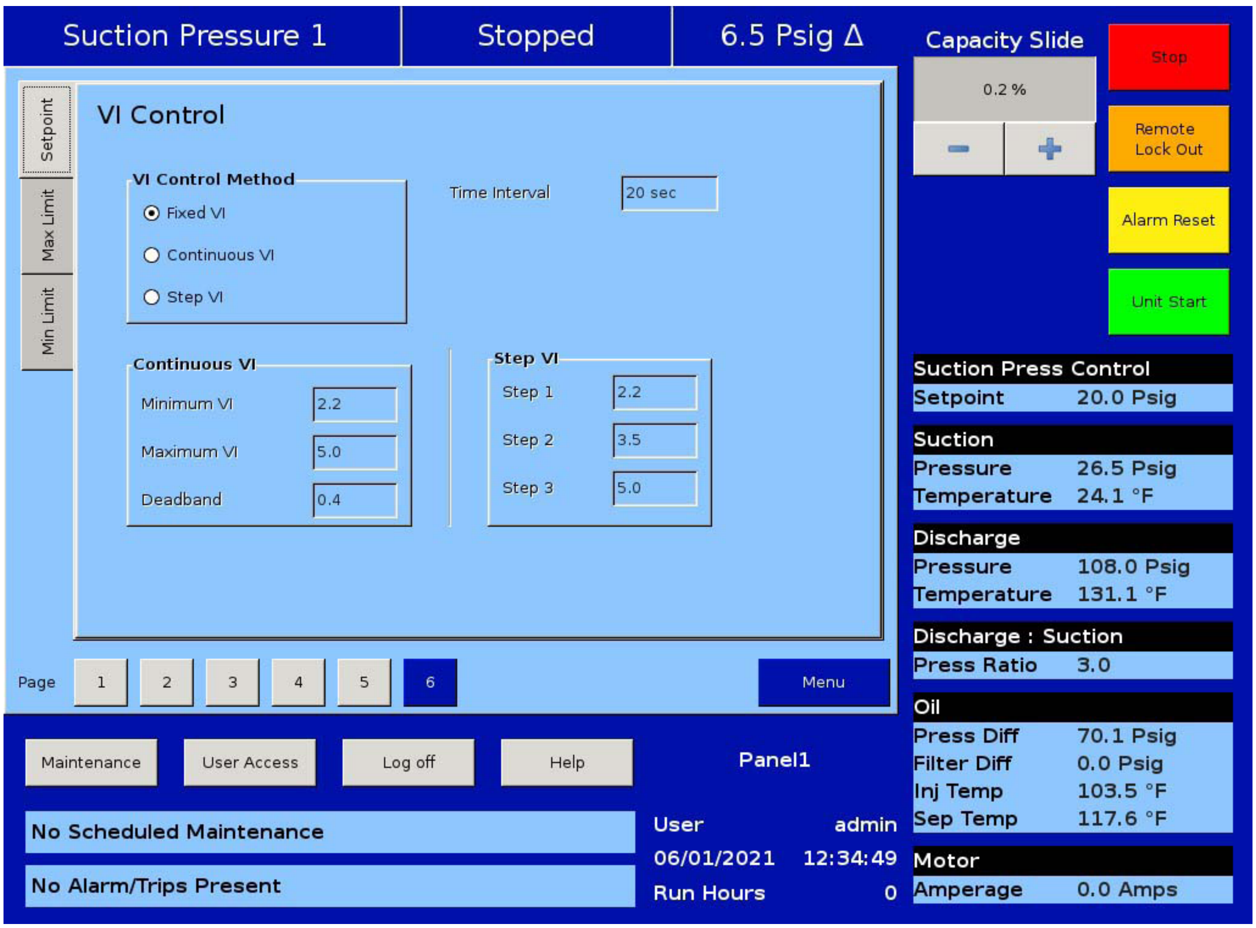


Figure 6-21. Compressor Control Screen - Fixed VI (Twin Screw)

Continuous VI

If this method is selected then the volume slide valve will be controlled according to the current volume ratio.

Minimum VI

- This setpoint defines the minimum slide position value (0%) for volume slide valve. The default value for Minimum VI is 2.2.

Maximum VI

- This setpoint defines the maximum slide position value (100%) for volume slide valve. The default value for Maximum VI is 5.0.

Deadband

- This setpoint defines the deadband for the calculation of the volume slide position. Volume will not be changed till the Volume Ratio changes by this amount. The default value for Deadband is 0.4.

Time Interval

- This setpoint specifies the time interval after which the volume ratio is calculated to determine the position of the volume slide valve.

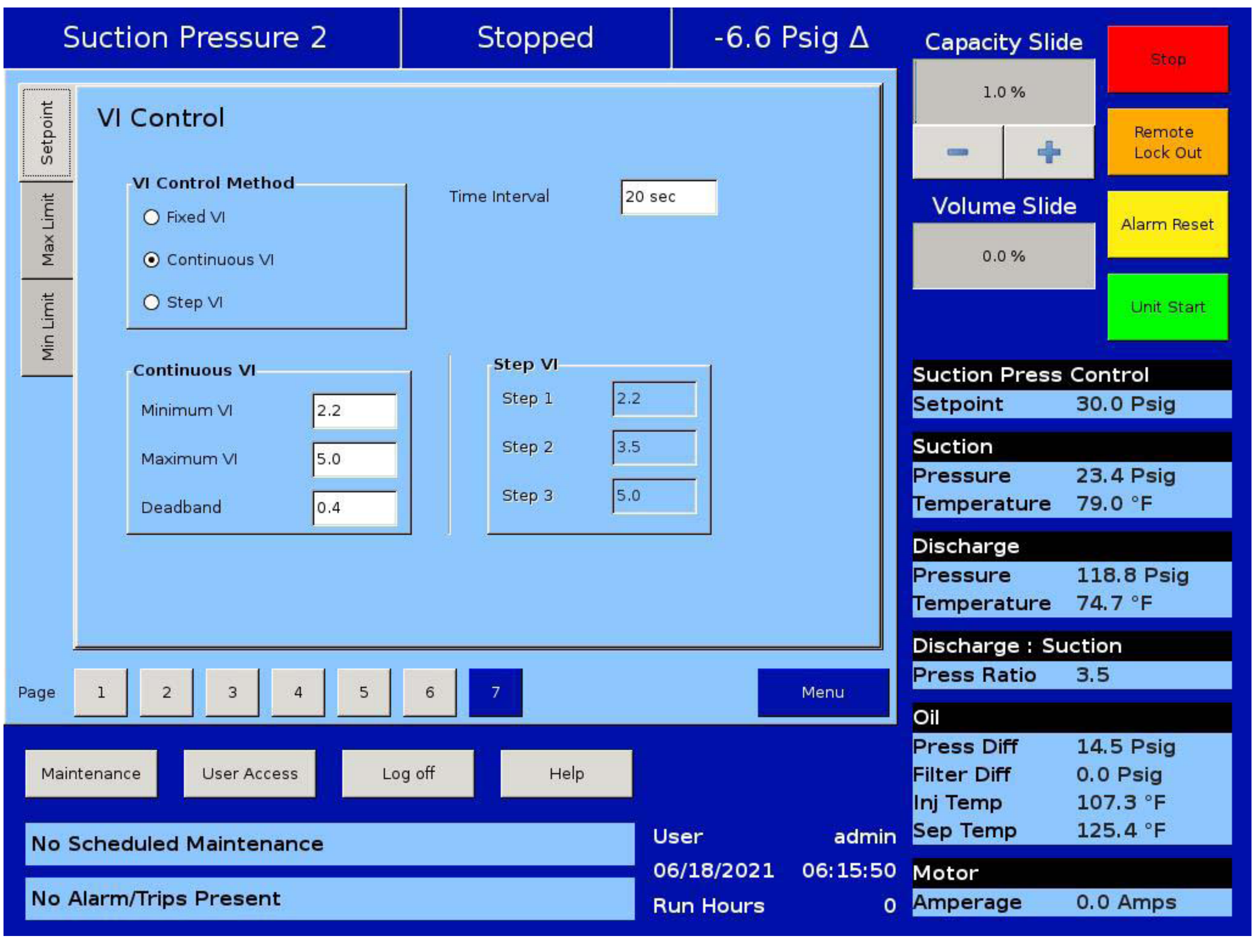


Figure 6-22. Compressor Control Screen - Continuous VI (Twin Screw)

Step VI

If this method is selected then the VI Digital Outputs will be controlled according to the current volume ratio.

Step 1

- This setpoint defines the minimum step value for Step VI control. The default value for Step 1 is 2.2. This value is used for the calculation of Step 1 & Step 2 Digital Outputs. When Volume Ratio is less than average of Step 1 & Step 2, Low VI Output will be ON and High VI Digital Output will be OFF.

Step 2

- This setpoint defines the intermediate step value for Step VI control. The default value for Step 2 is 3.5. This value is used for calculation of Step 2 & Step 3 Digital Outputs. When Volume Ratio is greater than average of Step 1 & Step 2 and also less than average of Step 2 & Step 3, Low VI Digital Output will be OFF and High VI Digital Output will be ON.

Step 3

- This setpoint defines the maximum step value for Step VI control. The default value for Step 3 is 5.0. This value is used for calculation of Step 2 & Step 3 Digital Outputs. When Volume Ratio is greater than average of Step 2 & Step 3, both Low VI and High VI Digital Outputs will be OFF.

Time Interval

- This setpoint specifies the time interval after which the volume ratio is calculated to determine the current step in Step VI Control.

Table 6-2. Step VI Digital Outputs depending on Volume Ratio

Volume Ratio	LOW VI DIGITAL OUTPUT	HIGH IV DIGITAL OUTPUT
< Average (Step1 & Step2)	ON	OFF
> Average (Step1 & Step2) and < Average (Step2 & Step3)	OFF	ON
> Average (Step2 & Step3)	OFF	OFF

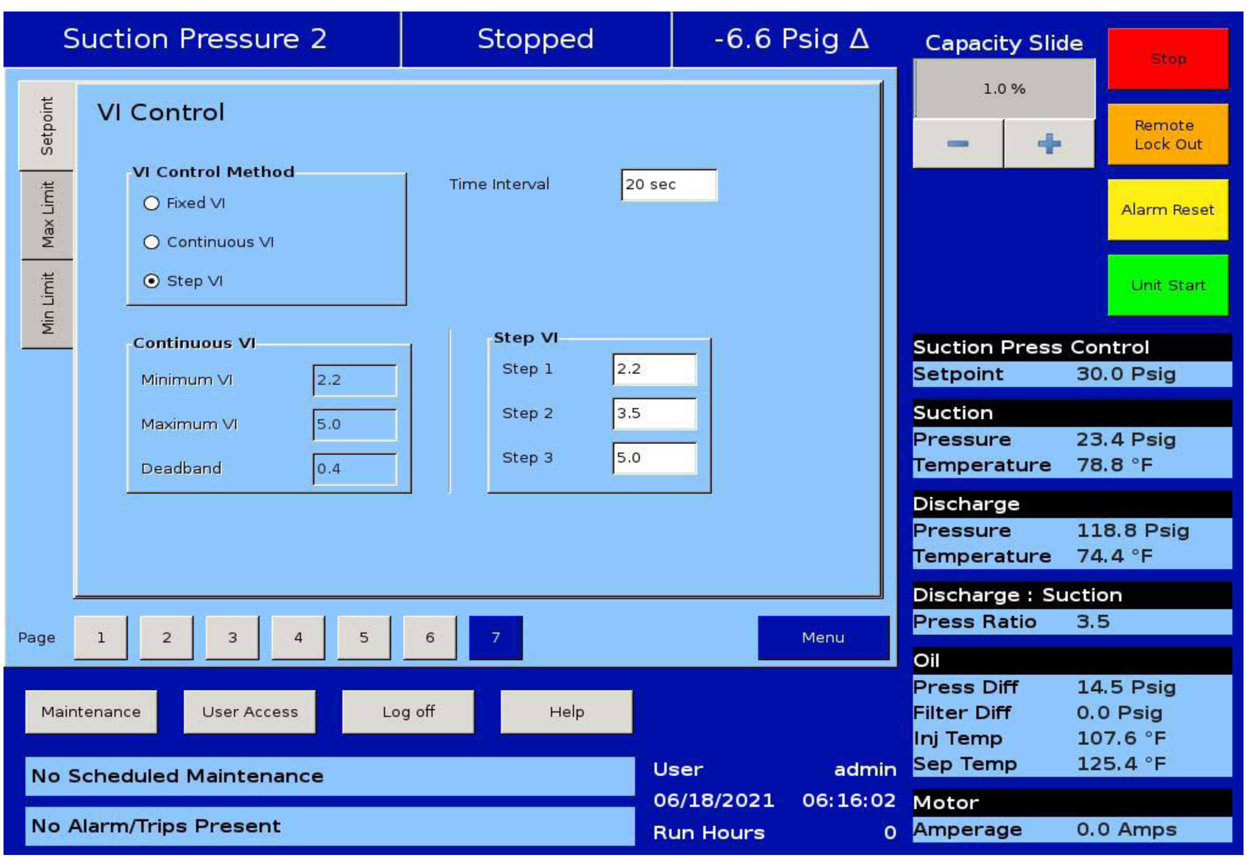


Figure 6-23. Compressor Control Screen - Step VI (Twin Screw)

Section 7 • Alarms and Trips

Overview

The Alarms and Trips screen allows the operator to view and adjust settings for compressor safety and alarm settings.

Warnings

The Vission 20/20 uses Warnings as a way to notify the operator of parameters that may inhibit the compressor when started. Warnings are monitored only when compressor is not running. Unless otherwise specified, Warnings use alarm setpoints for detection and message generation.
All warning messages present can be seen collectively in a pop-up window. This pop-up is displayed when a warning condition is present and the bottom status bar used for displaying warnings is pressed.

Warnings are always displayed as an orange banner on the bottom status bar.

Inhibits

The Vission 20/20 uses several start Inhibits to prevent the compressor from starting to protect the compressor and the refrigeration system. Inhibits are only active during Pre-Start condition. While starting the compressor, the Inhibits are checked first before the oil pump is started or the motor is started. Failed starts due to an Inhibit do not count toward any of the anti-recycle timers including hot starts. Unless otherwise specified, Inhibits use Alarm Setpoints to trigger an aborted start and message.

Inhibits are always displayed as a red banner.

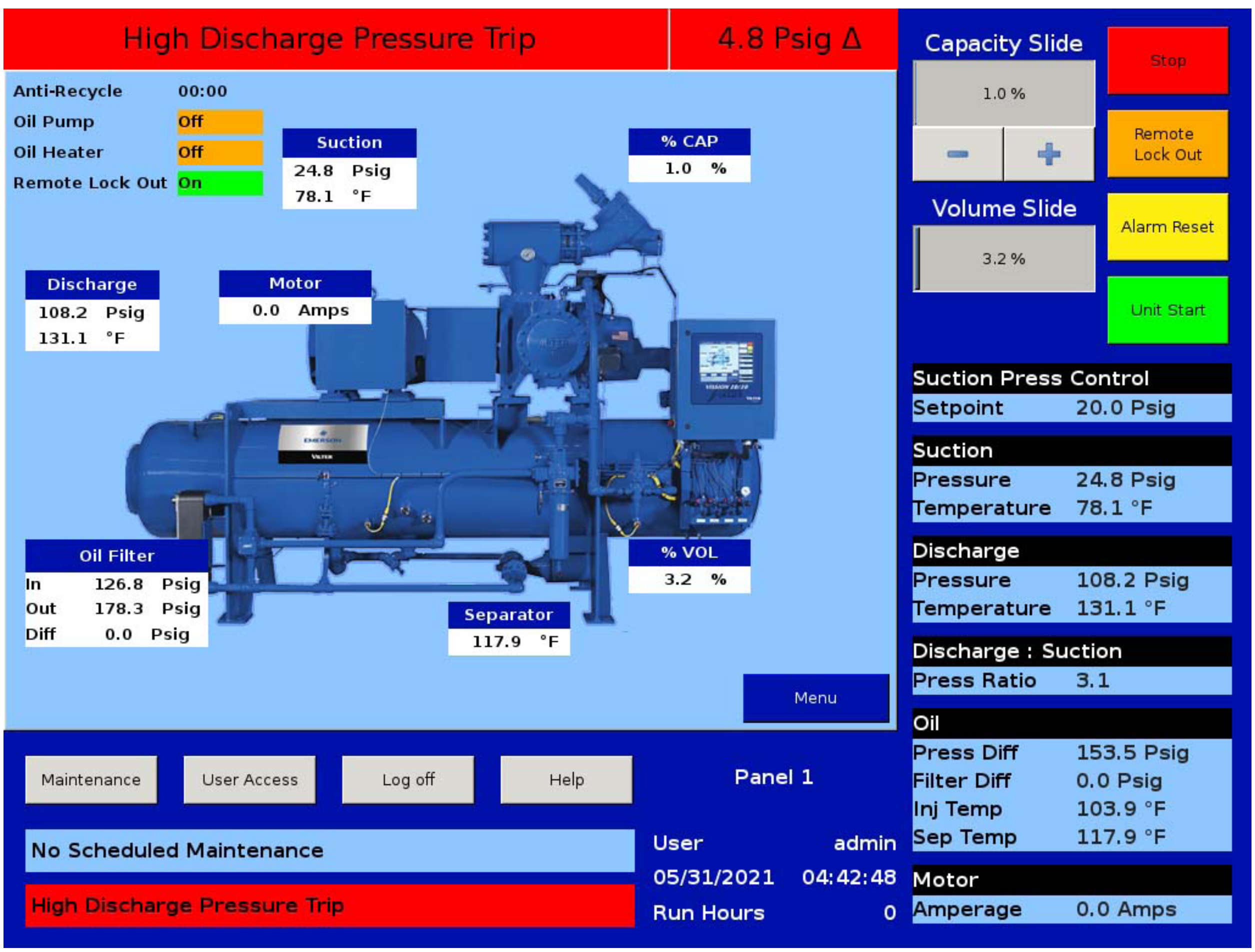


Figure 7-1 - Typical Status Banner Message Display

Alarms

Vission 20/20 uses Alarms as a way to notify the operator of running parameters that if left unchecked could result in the compressor shutting down due to a trip. Alarms

Alarms are always displayed as yellow banners on the top and bottom status bars.

are only active when compressor is running.

Trips

Trips are the conditions that exceed the safety limits of the compressor or refrigeration system and stop the compressor. Trips are only active when compressor is running.

Trips are always displayed as a red banners on the top and bottom status bars.

Freeze Screens

Trips also trigger the input/output screen to take a snapshot of all input and output values as Freeze 1 screen. The five most recent Freeze screens are saved. The Freeze screens are available as left side tabs in the input/output screens and are very useful as a troubleshooting tool for the operator.

Refer to Section 17 / Figure 17-7 for a typical Freeze Data (Trip) Screen.

Logging – Event List

All Inhibit, Alarm and Trip conditions are logged in the Event List to provide an operational history for the operator. The Event List is accessible from the menu screen.

Setpoints

All possible Warning, Inhibit, Alarm and Trip messages are listed here alphabetically with relevant notes.

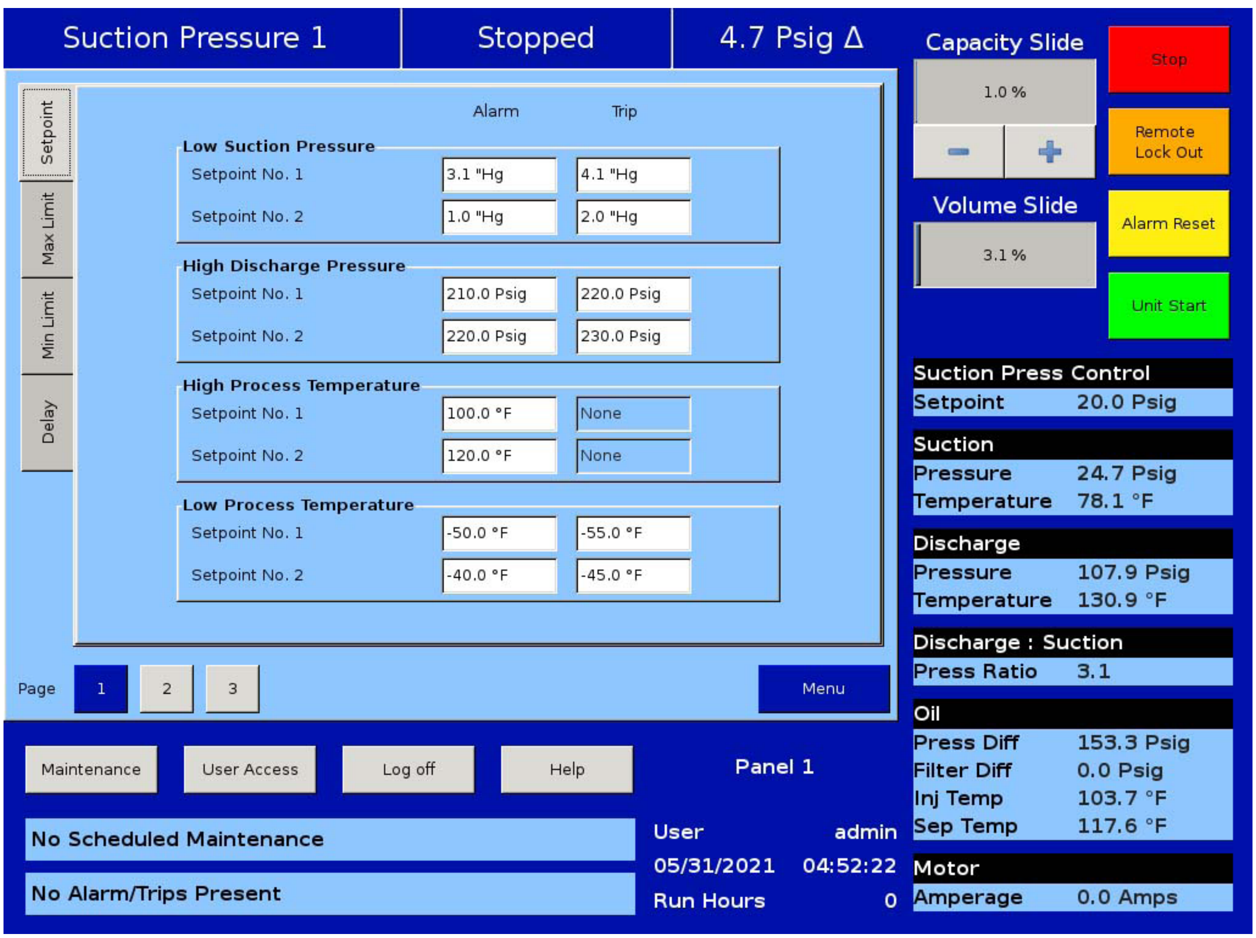


Figure 7-2. Alarms and Trips Screen - (Process Temperature) Page 1

Figure 7-2(a). Alarms and Trips Screen - (High Process Temperature Heating) Page 1

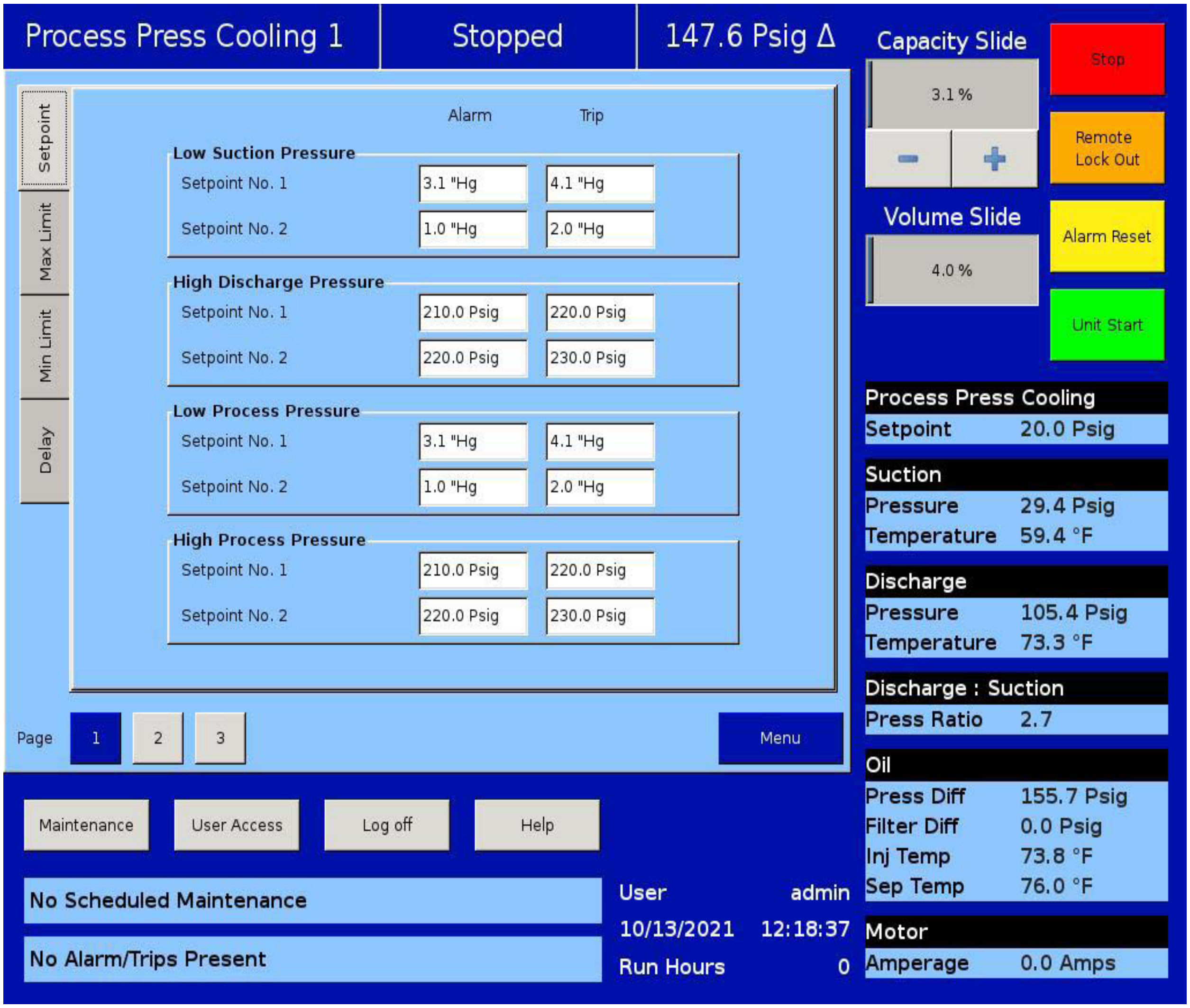


Figure 7-3. Alarms and Trips Screen - (Process Pressure)
Page 1

Figure 7-4. Alarms and Trips Screen Page 2

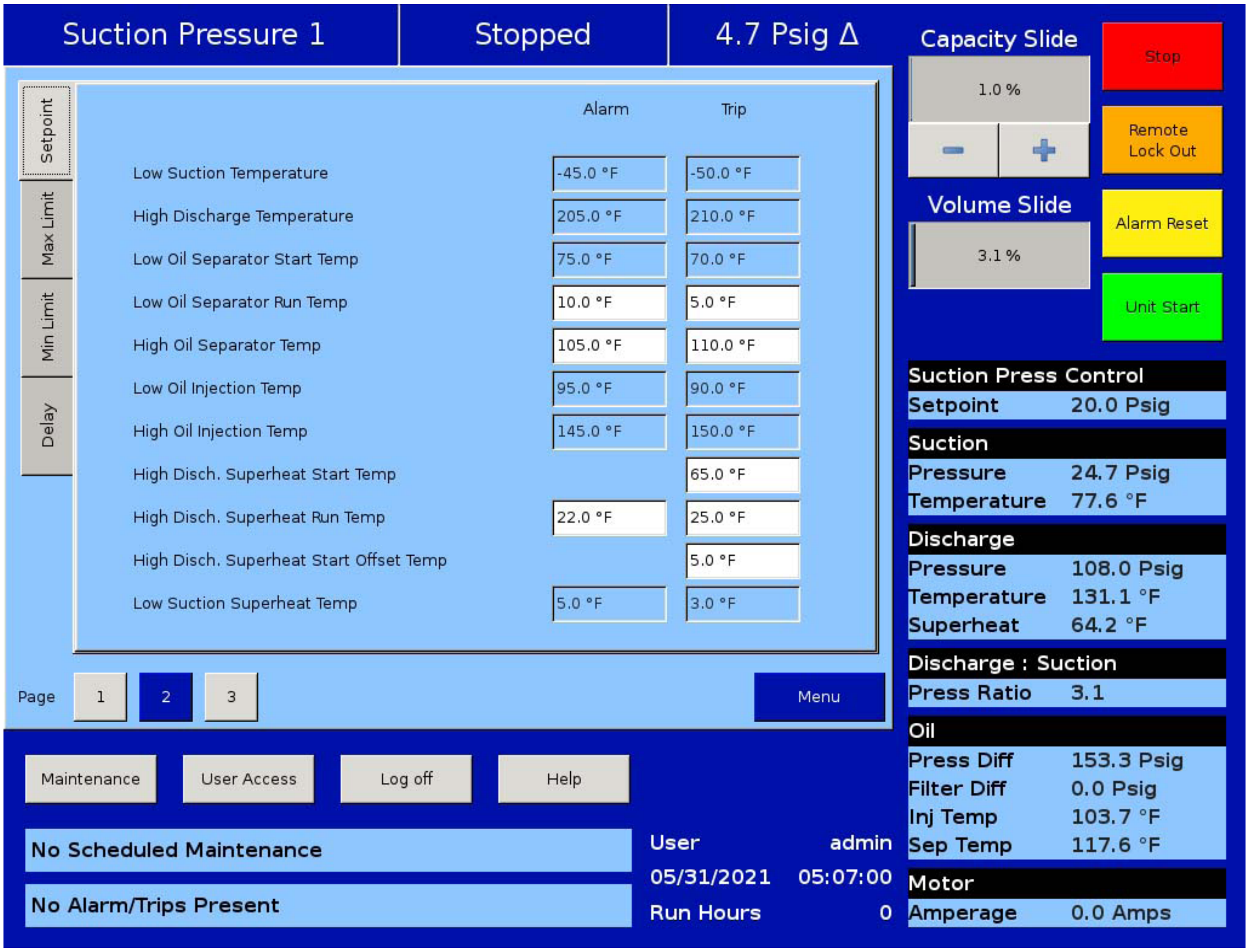


Figure 7-5. Alarms and Trips Screen - Cool Compression
Page 2

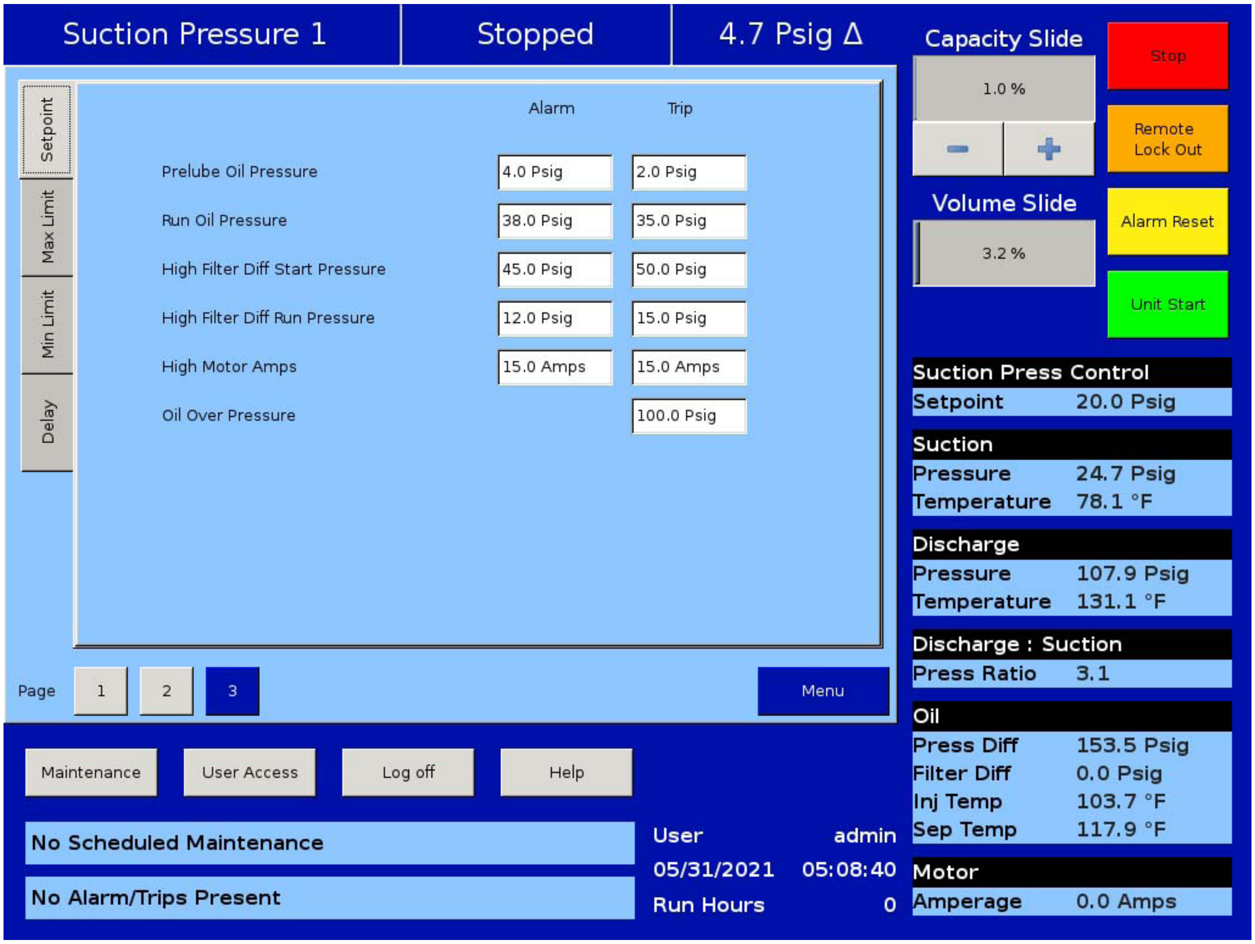


Figure 7-6. Alarms and Trips Screen
Page 3

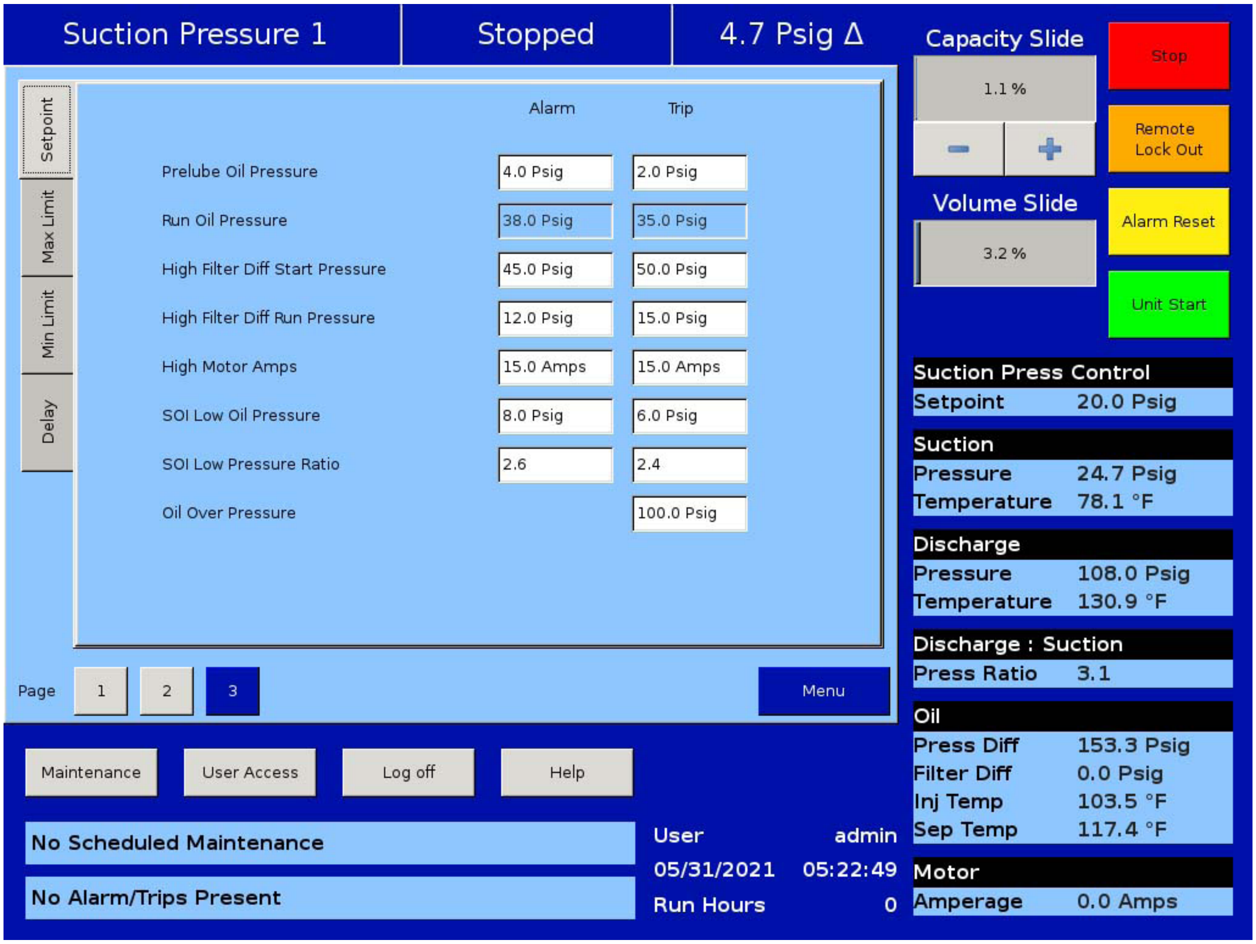


Figure 7-7. Alarms and Trips Screen - (SOI Solenoid)
Page 3

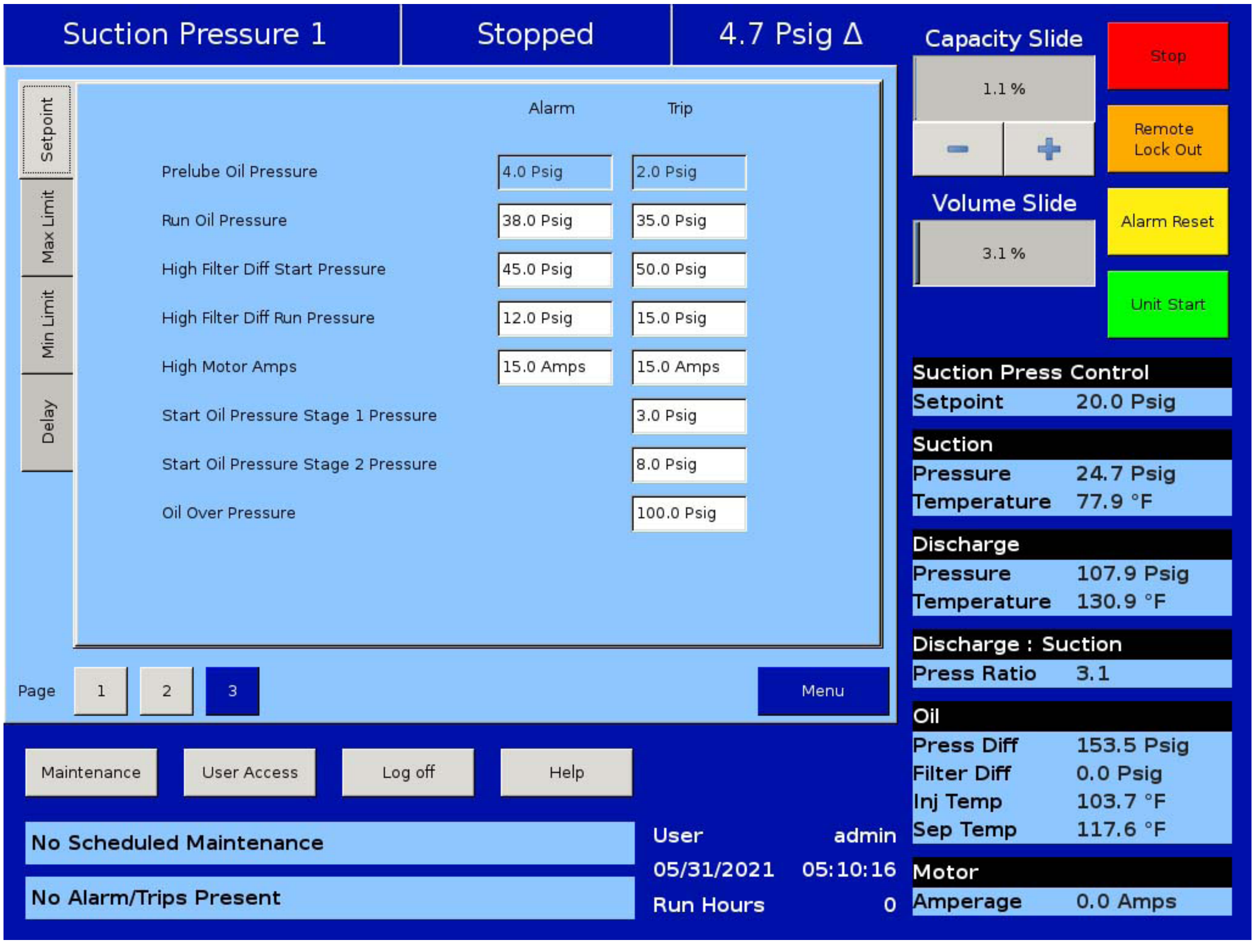


Figure 7-8. Alarms and Trips Screen - (No Oil Pump)
Page 3

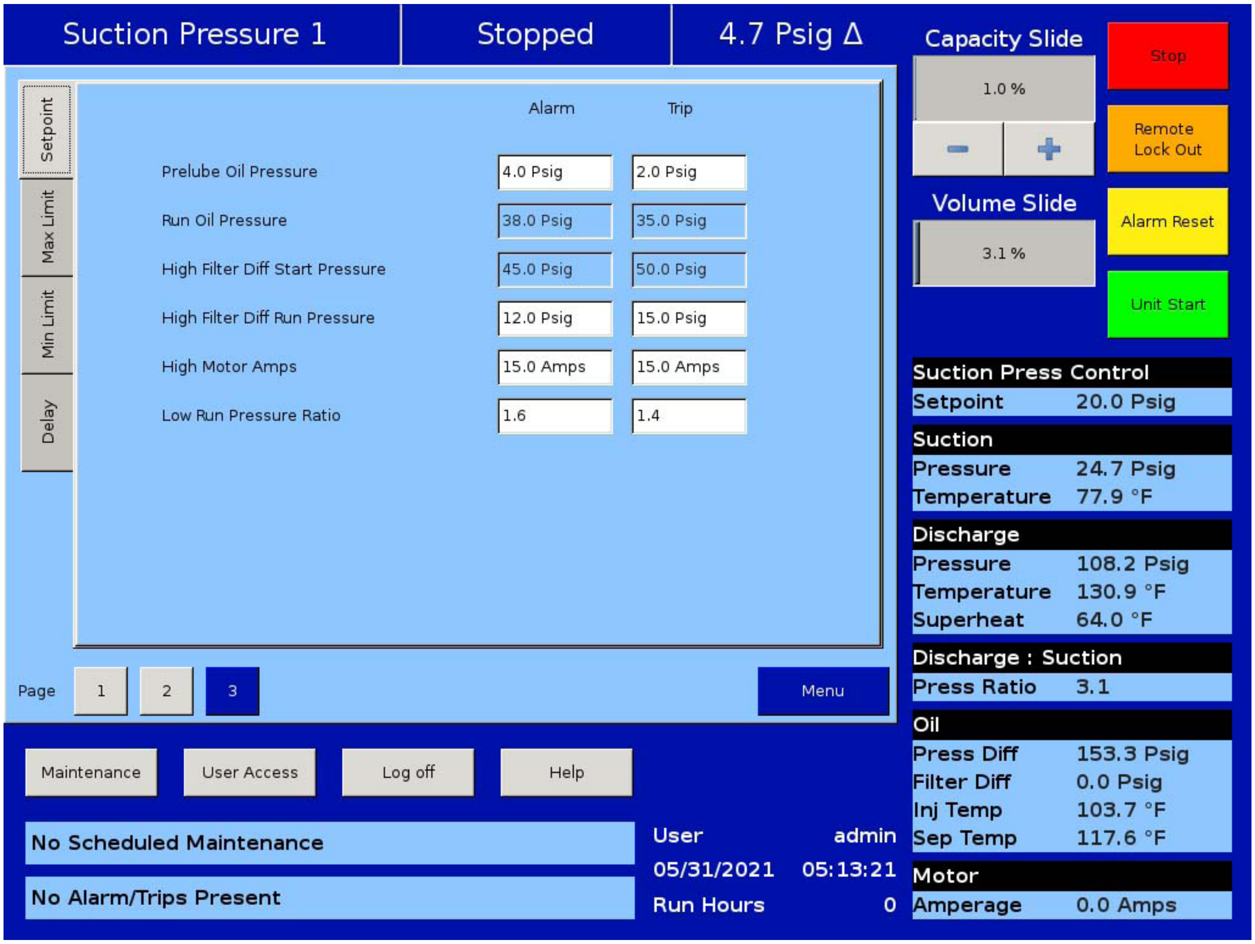


Figure 7-9. Alarms and Trips Screen - (Cool Compression)
Page 3

Warnings	Inhibits	Alarms	Trips
Not Running (Idle)	Pre-Start	Running	Running
Add Oil to the Appropriate Level Only when Cool Compression is enabled.			
		Add Oil to the Appropriate Level	
		Oil Level Float Switch #1 is Open	
Analog AUX In 1-16 This message will appear when the Analog Aux in 1-16 exceeds / falls below the safety setting of the High / Low Alarm Setpoint.			
Analog Aux in 1-16 Warning	Analog Aux in 1-16 Inhibit	Analog Aux in 1-16 Alarm	Analog Aux in 1-16 Trip
Analog AUX In 1-16 > or < Analog AUX In 1-16 Safety Setting	Analog AUX In 1-16 > or < Analog AUX In 1-16 Safety Setting	Analog AUX In 1-16 > or < Analog AUX In 1-16 Safety Setting	Analog AUX In 1-16 > or < Analog AUX In 1-16 Safety Setting
Capacity Position Trip This message will appear if the condition exists following any shutdown. This trip is not present in the No Slide Operation.			
			Capacity Position Trip
			Capacity Slides failing to unload < 5% during Capacity Unload Cycle
Compressor Interlock Trip Compressor Interlock Trip message will appear if the Motor Auxiliary contact fails to close before the Compressor Starter Auxiliary Contact Bypass timer times out. Refer to the wiring diagram provided with unit.			
	Compressor Interlock Inhibit		Compressor Interlock Trip
	Motor Auxiliary Contact Fails to Close when Compressor is starting		Motor Auxiliary Contact Fails to Close before Compressor Starter Auxiliary Contact Bypass Timer times out
Digital AUX In 1-8 This message will appear when the Digital Aux in 1-8 is Active High / Low.			
Digital Aux in 1-8 Warning	Digital Aux in 1-8 Inhibit	Digital Aux in 1-8 Alarm	Digital Aux in 1-8 Trip
Digital AUX In 1-8 > or < Digital AUX In 1-8 Active High / Low	Digital AUX In 1-8 > or < Digital AUX In 1-8 Active High / Low	Digital AUX In 1-8 > or < Digital AUX In 1-8 Active High / Low	Digital AUX In 1-8 > or < Digital AUX In 1-8 Active High / Low

Warnings	Inhibits	Alarms	Trips
Not Running (Idle)	Pre-Start	Running	Running

Discharge Pressure

High Discharge Pressure
This message will appear when the Discharge Pressure exceeds the safety setting of the High Discharge Pressure Alarm (or Trip) Setpoint No.1 or No. 2.
See Figure 7-3.

High Discharge Pressure Warning	High Discharge Pressure Inhibit	High Discharge Pressure Alarm	High Discharge Pressure Trip
Discharge Pressure > High Discharge Pressure Alarm Setpoint No. 1 or No. 2	Discharge Pressure > High Discharge Pressure Alarm Setpoint No. 1 or No. 2	Discharge Pressure > High Discharge Pressure Alarm Setpoint No. 1 or No. 2	Discharge Pressure > High Discharge Pressure Trip Setpoint No. 1 or No. 2

Low Discharge Pressure
This is not a user adjustable setpoint. The value is used to test for a failure in the measuring instrument.

Low Discharge Pressure Warning	Low Discharge Pressure Inhibit		Low Discharge Pressure Trip
Discharge Pressure < -66.5 psig	Discharge Pressure < -66.5 psig		Discharge Pressure < Low Discharge Pressure Trip [-66.5 psig]

Discharge Superheat Temperature

These safeties are active when Discharge Superheat Monitor is enabled in the configuration screen. Discharge Superheat Temperature depends on Discharge Pressure and Discharge Temperature.

High Discharge Superheat Start Temperature
The Warning & Inhibit messages will appear when the Discharge Superheat Temperature exceeds the safety setting of the High Disch. Superheat Start Temp Trip Setpoint. See Figure 7-5.

If more than 10 minutes have elapsed after the compressor is stopped, then Discharge Superheat Temperature will be checked against value of 100° F instead of High Disch. Superheat Start Temp Trip Setpoint.

The High Superheat Start Temp Trip safety will be only active if the Discharge Superheat Temperature at compressor start is greater than High Disch. Superheat Run Temp Trip Setpoint. This safety will remain active for the time delay as defined by High Superheat Temp Changeover Timer in Timers Screen. This safety is deactivated when the timer lapses or if the Discharge Superheat Temperature falls below the High Disch. Superheat Start Offset Temp Trip Setpoint. The Trip message will appear when the Discharge Superheat Temperature does not fall at the rate of 1°F every 15 seconds.

High Superheat Temp Warning	High Superheat Temp Inhibit		High Superheat Start Temp Trip
Discharge Superheat Temperature > High Discharge Superheat Start Temperature Trip	Discharge Superheat Temperature > High Discharge Superheat Start Temperature Trip		Discharge Superheat Temperature does not fall at the rate of 1 F every 15 seconds

Warnings	Inhibits	Alarms	Trips
Not Running (Idle)	Pre-Start	Running	Running

High Discharge Superheat Rise Temperature
This message will appear when the the Discharge Superheat Temperature from the compressor start rises above the safety setting of the High Disch. Superheat Start Offset Temp Trip Setpoint.

This safety will be only active if the Discharge Superheat Temperature at compressor start is greater than the High Disch. Superheat Run Temp Trip Setpoint. This safety will remain active for the time delay as defined by the High Superheat Temp Changeover Timer in Timers Screen. This safety is deactivated when the timer has elapsed or if the Discharge Superheat Temperature falls below the High Disch. Superheat Start Offset Temp Trip Setpoint.

See Figure 7-5.

Warnings	Inhibits	Alarms	Trips
			High Superheat Rise Temp Trip
			Discharge Superheat Temperature > High Discharge Superheat Start Offset Temperature Trip

High Discharge Superheat Run Temperature
This message will appear when the Discharge Superheat Temperature exceeds the safety setting of the High Disch. Superheat Run Temp Alarm or Trip Setpoint. This safety will become active only once Timer as defined by High Superheat Temp Changeover Timer in Timers Screen is lapsed or if Discharge Superheat Temperature is found below High Disch. Superheat Run Temp Trip Setpoint after Compressor has started

See Figure 7-5.

Warnings	Inhibits	Alarms	Trips
		High Superheat Run Temp Alarm	High Superheat Run Temp Trip
		Discharge Superheat Temperature > Discharge Superheat Run Alarm Temperature	Discharge Superheat Temperature > High Discharge Superheat Run Temperature Trip

Discharge Temperature

High Discharge Temp
See Figure 7-5.

Warnings	Inhibits	Alarms	Trips
High Discharge Temp Warning	High Discharge Temp Inhibit	High Discharge Temp Alarm	High Discharge Temp Trip
Discharge Temperature > High Discharge Temperature Alarm	Discharge Temperature > High Discharge Temperature Alarm	Discharge Temperature > High Discharge Temperature Alarm	Discharge Temperature > High Discharge Temperature Trip

Low Discharge Temp
This is not a user adjustable setpoint. The value is used to test for a failure in the measuring instrument.

Warnings	Inhibits	Alarms	Trips
Low Discharge Temp Warning	Low Discharge Temp Inhibit		Low Discharge Temp Trip
Discharge Temperature < -100 °F	Discharge Temperature < -100 °F		Discharge Temperature < Low Discharge Temperature Trip [-100 °F]

Warnings	Inhibits	Alarms	Trips
Not Running (Idle)	Pre-Start	Running	Running
Emergency Shutdown Activated			
			Emergency Shutdown Activated
			Compressor in False Start Condition After Emergency Stop Timer times out
False Start			
			False Start
			Motor Auxiliary Contact Fails to Open OR Motor Amperage > 20% Maximum Amps
Filter Differential Pressure (Oil Filter Inlet Pressure - Oil Manifold Pressure) – Absolute Value of this difference is used as Filter Differential Pressure			
High Filter Differential - Start This safety allows a higher than normal filter differential pressure to exist during the first minute after a compressor starts. This allows time for cold oil that is present in the oil piping and filters to be passed and replaced with warmer oil. After a time delay (setting of the Filter Diff Pressure Safety Changeover timer), this safety is deactivated and the High Filter Differential Pressure-Run alarm and safety setpoints become active. See Figure 7-6.			
High Filter Differential Warning	High Filter Differential Inhibit	High Filter Differential Alarm	High Filter Differential Trip
Filter Differential Pressure > High Filter Differential Start Pressure Alarm	Filter Differential Pressure > High Filter Differential Start Pressure Alarm	Filter Differential Pressure > High Filter Differential Start Pressure Alarm	Filter Differential Pressure > High Filter Differential Start Pressure Trip
High Filter Differential - Run After the Filter Differential Pressure Safety Changeover Timer times out. This safety setpoint is active when the compressor has started and the Filter Diff Pressure Safety Changeover timer has timed out. See Figure 7-6.			
		High Filter Differential Alarm	High Filter Differential Trip
		Filter Differential Pressure > High Filter Differential Run Pressure Alarm	Filter Differential Pressure > High Filter Differential Run Pressure Trip

Warnings	Inhibits	Alarms	Trips
Not Running (Idle)	Pre-Start	Running	Running
High Level Shutdown (Level Shutdown) This message will appear when power is removed from the input module during Compressor start. High Level Shutdown switch is wired to the digital input normally closed. Usually connected to a float switch on a vessel containing liquid refrigerant. In case of multiple switches, any open switch will generate a relevant message depending on compressor operating mode.			
High Level Shutdown Warning	High Level Shutdown Inhibit		High Level Shutdown Trip
Level > High Level Shutdown Switch Opens	Power removed from input module during Compressor start		Power removed from input module while compressor is running
Motor Current This safety setpoint is active after the Volume Decrease at Start Timer expires. The timer is not adjustable by the operator. See Figure 7-6.			
		High Motor Current Alarm	High Motor Current Trip
		Motor Current > High Motor Current Alarm	Motor Current > High Motor Amps Trip
Oil Filter Inlet Pressure **Low Oil Filter Inlet Pressure** This Safety will be active only when Cool Compression is not enabled. This is not a user adjustable setpoint. The value is used to test for a failure in the measuring instrument.			
Low Oil Filter In Pressure Warning			Low Oil Filter In Pressure Trip
Oil Filter Inlet Pressure < -66.5 psig			Oil Filter Inlet Pressure < Low Oil Filter In Pressure Trip [-66.5 psig]
Oil Filter Outlet Pressure **Low Oil Filter Outlet Pressure** This Safety will be active only when Cool Compression is not enabled. This is not a user adjustable setpoint. The value is used to test for a failure in the measuring instrument.			
Low Oil Filter Out Pressure Warning			Low Oil Filter Out Pressure Trip
Oil Manifold Pressure < -66.5 psig			Oil Filter Inlet Pressure < Low Oil Filter Out Pressure Trip [-66.5 psig]

<table>
<tr><th>Warnings
Not Running (Idle)</th><th>Inhibits
Pre-Start</th><th>Alarms
Running</th><th>Trips
Running</th></tr>
<tr><td colspan="4">Oil Injection Temperature
High Oil Injection Temp
This Safety will be active only when Cool Compression is not enabled. See Figure 7-5.</td></tr>
<tr><td>High Oil Injection Temp Warning</td><td>High Oil Injection Temp Inhibit</td><td>High Oil Injection Temp Alarm</td><td>High Oil Injection Temp Trip</td></tr>
<tr><td>Oil Injection Temperature > High Oil Injection Temperature Alarm</td><td>Oil Injection Temperature > High Oil Injection Temperature Alarm</td><td>Oil Injection Temperature > High Oil Injection Temperature Alarm</td><td>Oil Injection Temperature > High Oil Injection Temperature Trip</td></tr>
<tr><td colspan="4">Low Oil Injection Temp
The Alarm and Trip Setpoints are bypassed at start for a time period (setting of the Oil Injection Temperature Safety Changeover timer). This Setpoint will be activated after the time delay has expired. The Warning condition goes off when the temperature goes below -100 or -73°C.
See Figure 7-5.</td></tr>
<tr><td>Low Oil Injection Temp Warning</td><td></td><td>Low Oil Injection Temp Alarm</td><td>Low Oil Injection Temp Trip</td></tr>
<tr><td>Oil Injection Temperature < -100°F</td><td></td><td>Oil Injection Temperature < Low Oil Injection Temperature Alarm</td><td>Oil Injection Temperature < Low Oil Injection Temperature Trip</td></tr>
<tr><td colspan="4"></td></tr>
<tr><td colspan="4">Oil Level
Oil Level #1 or #2
This message will appear when Oil Level Float Switch#1 or #2 input is de-energized. Oil Level #1 Inhibit will be monitored only when Cool Compression is Enabled. Oil Level #2 Trip will be monitored only when Cool Compression is Disabled. Trips will be monitored only once Oil Level #1/#2 Delay Time is Lapsed. In case of Cool Compression Delay Time would be 10 minutes and it is not configurable</td></tr>
<tr><td></td><td>Oil Level #1 or #2 Inhibit</td><td></td><td>Oil Level #1 or #2 Trip</td></tr>
<tr><td></td><td>Oil Level Float Switch #1 is Open</td><td></td><td>Oil Level Float Switch #1 or #2 is Open</td></tr>
<tr><td colspan="4">Low Oil Level Trip after Stop
This Trip will be monitored only in case of Cool Compression. Delay Time would be 2 minutes and it is not configurable. This Safety is monitored only when Compressor is Stopped.</td></tr>
<tr><td></td><td></td><td></td><td>Low Oil Level Trip after Stop</td></tr>
<tr><td></td><td></td><td></td><td>Oil Level Float Switch #1 is Open</td></tr>
<tr><td colspan="4"></td></tr>
</table>

Warnings	Inhibits	Alarms	Trips
Not Running (Idle)	Pre-Start	Running	Running

Oil Pressure

Oil Pressure = (Oil Manifold Pressure – Suction Pressure)
When Compressor Type Selected is Single Screw in Configuration Screen
Oil Pressure = (Oil Manifold Pressure – Discharge Pressure) or (Oil Manifold Pressure – Suction Pressure)
Depending on the Run Oil Pressure radio button selected in the VRS Compressor Configuration screen.

Low Oil Pressure - Run

After the Oil Pressure Bypass Start Timer times out. This is the running oil pressure safety. The normal alarm and trip setpoints of this safety are displayed as soon as the compressor starts. The Prelube Oil Pressure Alarm and Trip setpoints are substituted into this safety setpoints for the duration of the Oil Pressure Bypass timer (typically 60 seconds). After this timer expires, then the setpoints return back to the normal settings. The action of adjusting the setpoints for about a minute allows the (Run) Oil Pressure to build up to normal running pressures after the compressor starts. After the Oil Pressure Bypass Timer has expired, the Oil Pressure must be above the normal setpoints, or else an Alarm or Trip will occur. An alarm or trip will be active if the oil pressure drops below the normal setpoint values after the Oil Pressure Bypass timer has expired. This time limit is set on the Timer menu screen. Run oil pressure is defined as manifold pressure minus suction pressure. See Figure 7-6.

		Low Oil Pressure Alarm	Low Oil Pressure Trip
		Oil Pressure < Run Oil Pressure Alarm	Oil Pressure < Run Oil Pressure Trip

Start Low Oil Pressure - Start

Safeties are active when No Pump is enabled in the configuration screen. Start Low Oil Pressure Stage 1 Pressure Trip will be active if the Oil Pressure drops below this Setpoint value after the Start Oil Pressure Stage 1 Safety timer has expired and Start Oil Pressure Stage 2 and Low Oil Pressure Safety Bypass Timers are active.
Start Low Oil Pressure Stage 2 Pressure Trip will be active if the Oil Pressure drops below this setpoint value after the Start Oil Pressure Stage 2 Safety timer has expired and Low Oil Pressure Safety Bypass Timer is active. Safety timer values are set on the Timer menu screen.
See Figure 7-8.

			Start Low Oil Pressure Trip
			Oil Pressure < Start Low Oil Pressure Stage 1 or Stage 2 Trip

Oil Over Pressure

Oil Over Pressure = Oil Filter Inlet Pressure – Discharge Pressure. This Oil Over Pressure Setpoint is not for the Cool Compression feature.

	Oil Over Pressure Inhibit		Oil Over Pressure Trip
	Oil Over Pressure > 200 Psig		Oil Over Pressure > Oil Over Pressure Trip Setpoint

Warnings	Inhibits	Alarms	Trips
Not Running (Idle)	Pre-Start	Running	Running
Pre-Lube Oil Pressure Start sequence will be aborted if Inhibit is not cleared within Minimum Compressor Pre-Lube Time. Oil Pump will attempt to generate pre-lube pressure within Low Oil Pressure Safety Bypass timer. This is the prelube oil pump failure safety. If prelube oil pressure does not rise to the prelube alarm setting within the number of set prelube oil pressure trials, (with each trial being the duration of pre-lube oil pressure monitor time), and the prelube oil pressure is not maintained for a minimum time set at Minimum Comp. Prelube Time, then the start sequence will be aborted. The prelube oil pressure trials, prelube oil pressure monitor time, Minimum Comp. Prelube Time are set on the Timer screen. The prelube oil pressure is defined as (manifold pressure - discharge pressure) during the start sequence; zeroed prelube oil pressure difference value is shown on main screen during start sequence. This safety insures adequate lubrication of the compressor at startup. The safety activates for Cycling and Full Time Oil Pump selection. See Figure 7-6.			
	Prelube Oil Pump Inhibit		Prelube Oil Pressure Trip
	Pre-Lube Pressure < Low Pre-Lube Pressure Alarm		Pre-Lube Pressure (Manifold - Discharge) < Low Pre-Lube Pressure
Oil Separator Temperature **High Oil Separator Temp** This safety is active when Cool Compression is selected in Configuration Screen. See Figure 7-5.			
		High Oil Separator Temp Alarm	High Oil Separator Temp Trip
		Oil Separator Temperature > High Oil Separator Temperature Alarm	Oil Separator Temperature > High Oil Separator Temperature Trip
Low Oil Separator Temp - Start After Oil Separator Temp Safety Changeover Timer times out at start-up. After a time delay (setting of the Oil Separator Temperature Safety Changeover timer), this safety is deactivated and the Low Oil Separator Run Temperature alarm and safety Setpoints become active. See Figure 7-5.			
Low Oil Separator Start Temp Warning	Low Oil Separator Start Temp Inhibit	Low Oil Separator Temp Alarm	Low Oil Separator Temp Trip
Oil Separator Temperature < Low Oil Separator Start Temperature Alarm	Oil Separator Temperature < Low Oil Separator Start Temperature Alarm	Oil Separator Temperature < Low Oil Separator Start Temperature Alarm	Oil Separator Temperature < Low Oil Separator Start Temperature Trip
Low Oil Separator Temp - Run After Oil Separator Temp Safety Changeover Timer times out at start-up. After a time delay (setting of the Oil Separator Temperature Safety Changeover timer), this safety is deactivated and the Low Oil Separator Run Temperature alarm and safety Setpoints become active. See Figure 7-5.			
		Low Oil Separator Temp Alarm	Low Oil Separator Temp Trip
		Oil Separator Temperature < Low Oil Separator Run Temperature Alarm	Oil Separator Temperature < Low Oil Separator Run Temperature Trip

Warnings	Inhibits	Alarms	Trips
Not Running (Idle)	Pre-Start	Running	Running
Process Pressure This option is only available for Process Press Cooling/ Process Press Heating Control mode, selected in the Control Mode dropdown selection found in the Compressor Control screen.			
High Process Pressure See Figure 7-3.			
High Process Pressure Warning	High Process Pressure Inhibit	High Process Pressure Alarm	High Process Pressure Trip
Process Pressure > High Process Pressure Alarm Setpoint #1 or #2	Process Pressure > High Process Pressure Alarm Setpoint #1 or #2	Process Pressure > High Process Pressure Alarm Setpoint #1 or #2	Process Pressure > High Process Pressure Trip Setpoint #1 or #2
Low Process Pressure See Figure 7-3.			
Low Process Pressure Warning	Low Process Pressure Inhibit	Low Process Pressure Alarm	Low Process Pressure Trip
Process Pressure < Low Process Pressure Alarm Setpoint #1 or #2	Process Pressure < Low Process Pressure Alarm Setpoint #1 or #2	Process Pressure < Low Process Pressure Alarm Setpoint #1 or #2	Process Pressure < Low Process Pressure Trip Setpoint #1 or #2
Process Temperature This option is only available for Process Temp Cooling/ Process Temp Heating Control mode, selected in the Control Mode dropdown selection found in the Compressor Control screen. High Process Temp Trip will be monitor when Process Temp Heating Control mode is selected.			
High Process Temperature See Figure 7-2.			
High Process Temp Warning	High Process Temp Inhibit	High Process Temp Alarm	High Process Temp Trip
Process Temperature > High Process Temperature Alarm Setpoint #1 or #2	Process Temperature > High Process Temperature Alarm Setpoint #1 or #2	Process Temperature > High Process Temperature Alarm Setpoint #1 or #2	Process Temperature > High Process Temperature Trip Setpoint #1 or #2
Low Process Temperature See Figure 7-2.			
Low Process Temp Warning	Low Process Temp Inhibit	Low Process Temp Alarm	Low Process Temp Trip
Process Temperature < Low Process Temperature Alarm Setpoint #1 or #2	Process Temperature < Low Process Temperature Alarm Setpoint #1 or #2	Process Temperature < Low Process Temperature Alarm Setpoint #1 or #2	Process Temperature < Low Process Temperature Trip Setpoint #1 or #2

Warnings	Inhibits	Alarms	Trips
Not Running (Idle)	Pre-Start	Running	Running
Compressor Started in Remote Mode (Remote Comm Time-Out)			
		Remote Comm Time-Out Alarm	Remote Comm Time-Out Trip
		Remote Comm Inactive Time > Communication Failure Detect Timer	Remote Comm Inactive Time > Communication Failure Detect Timer
			Remote Comm Time-Out
			On a Communication Failure, is configured as Stop Compressor with Trip
Run Pressure Ratio **Low Run Pressure Ratio** This safety is active when Cool Compression is enabled in the configuration screen. These Setpoints will be active if the pressure ratio drops below the setpoint values after the Low Pressure Ratio Bypass timer has expired. See Figure 7-9.			
		Low Run Pressure Ratio Alarm	Low Run Pressure Ratio Trip
		Run Pressure Ratio < Low Run Pressure Ratio Alarm	Run Pressure Ratio < Low Run Pressure Ratio Trip
SOI (Suction Oil Injection) Oil Pressure SOI Oil pressure (Oil Manifold Pressure - Suction Pressure) Available when SOI Solenoid is enabled in the configuration screen. These safeties are active after the SOI Low Oil Pressure Bypass timer has expired. This time limit is set on the Timer menu screen.			
SOI Low Oil Pressure This is the running oil pressure safety. See Figure 7-7.			
		SOI Low Oil Pressure Alarm	SOI Low Oil Pressure Trip
		SOI Oil Pressure < Low SOI Oil Pressure Alarm	SOI Oil Pressure < Low SOI Oil Pressure Trip
SOI Low Pressure Ratio This is the low run pressure ratio safety. Depends on Suction and Discharge Pressure value. This Safety is active if Suction Oil Injection Solenoid is enabled in configuration screen. See Figure 7-7.			
		SOI Low Pressure Ratio Alarm	SOI Low Pressure Ratio Trip
		Pressure Ratio < SOI Low Pressure Ratio Alarm	Pressure Ratio < SOI Low Pressure Ratio Trip

Warnings	Inhibits	Alarms	Trips
Not Running (Idle)	Pre-Start	Running	Running
Starter			
This message will appear when the starter is commanded to stop (by removing the start signal to the starter), but the auxiliary contact signal that returns to the Vission 20/20 fails to be removed within 10 secs. This is typically controlled by settings in the starter options.			
			Starter Shutdown Trip
			Starter Problem
Suction Pressure			
Low Suction Pressure This message will appear when Suction Pressure falls below the safety setting of Low Suction Pressure Alarm (or Trip) Setpoint #1 or #2. This Safety will get generated only when “Low Suction Pressure Safety Bypass” Timer is elapsed. Inhibit & Warning will get generated only when “Low Suction Pressure Safety Bypass” Timer value is set to Zero This safety is active in both temperature and pressure control modes. See Figure 7-2.			
Low Suction Pressure Warning	Low Suction Pressure Inhibit	Low Suction Pressure Alarm	Low Suction Pressure Trip
Suction Pressure < Low Suction Pressure Alarm Setpoint No. 1 or No. 2	Suction Pressure < Low Suction Pressure Alarm Setpoint No. 1 or No. 2	Suction Pressure < Low Suction Pressure Alarm Setpoint No. 1 or No. 2	Suction Pressure < Low Suction Pressure Trip Setpoint No. 1 or No. 2
Suction Superheat Temperature			
Low Suction Superheat Temperature This is the lowest suction superheat temperature safety. This safety is active when suction superheat monitor is enabled in the configuration screen. See Figure 7-5.			
		Low Suction Superheat Alarm	Low Suction Superheat Trip
		Suction Superheat Temperature < Low Suction Superheat Temperature Alarm	Suction Superheat Temperature < Low Suction Superheat Temperature Alarm
Suction Temperature			
Low Suction Temperature See Figure 7-5.			
		Low Suction Temp Alarm	Low Suction Temp Trip
		Suction Temperature < Low Suction Temperature Alarm	Suction Temperature < Low Suction Temperature Trip
Volume Position Trip			
This message will appear if condition exists following any shutdown. This trip is not present in the No Slide Operation. See Figure 7-5.			
			Volume Position Trip
			Volume Slides failing to unload < 5% during Volume Unload Cycle

Warnings	Inhibits	Alarms	Trips
Not Running (Idle)	Pre-Start	Running	Running
Suspction Over Pressure			

Suction Over Pressure

Suction Over Pressure = Suction Pressure – Discharge Pressure

This safety is monitored when Compressor is not Running. This trip will be generated when Suction Over Pressure is Greater than 50 Psig. This is not a user adjustable setpoint.

			Suction Over Pressure Trip
			Suction Over Pressure > 50 Psig

Overview

The timers screen allows the operator to view and adjust timer settings associated with compressor operation. There are different types of timers that the operator should be aware of listed below. For Timer Screen Pages, see Figures 8-1 and 8-2.

Changeover:

- The changeover timers will change from one type control to another once the compressor has started and then the timer has expired.

Bypass:

- The bypass timers prevent certain alarm and trip checks from occurring until the compressor has started and then the time has expired.

Delays:

- Delays require the condition to occur for the specified amount of time.

Timers:

- A general timer requiring the time to expire before the listed event can occur.

Timer Setpoints

Capacity Increase Start Delay:

- At compressor startup, the capacity slide position or VFD speed is held at minimum position/0 RPM for this time period. This is to allow compressor and system conditions to stabilize. After the timer expires, the slide/VFD is free to react in accordance to the system demands.

Minimum Compressor Pre-lube Time:

- This is the length of time the oil pump will run, after establishing Pre-lube Oil Pressure, to prime the oil circuit before starting the compressor.

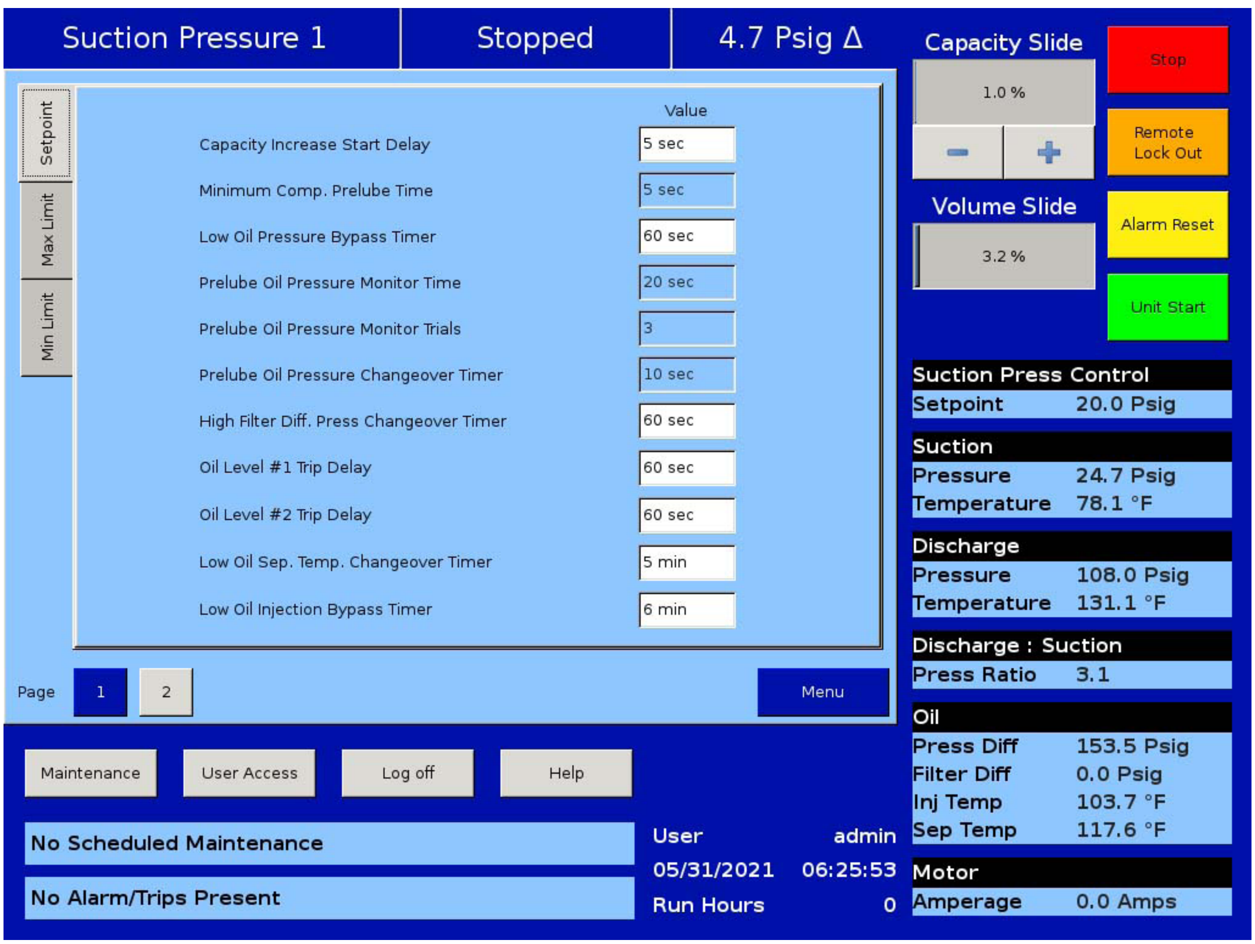


Figure 8-1. Timers Screen - Page 1

Low Oil Pressure Bypass Timer:

- This is the length of time in which the normal Low (Run) Oil Pressure setpoints will be adjusted by the values of the Pre-lube Oil Pressure setpoints. After the timer has expired, the normal Low Oil Pressure setpoints become active.

Prelube Oil Pressure Monitor Time:

- The Prelube Oil Pressure Monitor time defines timer to monitor raise in prelube oil pressure against prelube oil pressure alarm settings. If prelube oil pressure is unable to raise by oil pressure alarm settings in Prelube oil pressure monitor time then it restarts oil pump.

Prelube Oil Pressure Monitor Trials:

- The Prelube oil pressure monitor trials defines maximum number of retries to monitor prelube oil pressure.

Prelube Oil Pressure Changeover Timer:

- After compressor starts, the drop in prelube oil pressure is monitored for prelube oil pressure changeover time. If prelube oil pressure drops within prelube oil pressure changeover time then the compressor trips on prelube oil pressure trip.

High Filter Differential Pressure Changeover:

- This timer bypasses the High Filter Differential Run Pressure safety settings when the compressor starts. It defines how long the High Filter Differential Start Pressure setpoints will be active after the compressor starts. After the timer has expired, then the High Filter Differential Run Pressure safety setpoints will be active.

Oil Level #1 Trip Delay:

- This timer bypasses the low oil level switch for momentary drops in the oil level. This timer activates when the low oil level switch opens, and deactivates when the switch closes. If the switch is still open after the timer has timed out, the compressor will be shut down and a trip message will be displayed. This timer is available if the unit is equipped with a low oil separator float switch (the oil level switch is standard on all liquid injection units and optional on all others).

Oil Level #2 Trip Delay:

- This timer bypasses the low oil level switch for momentary drops in the oil level. This timer activates when the low oil level switch opens, and deactivates when the switch closes. If the switch is still open after the timer has timed out, the compressor will be shut down and a trip message will be displayed. This timer is available if the unit is equipped with a low oil separator float switch (the oil level switch is standard on all liquid injection units and optional on all others).

Low Oil Separator Temperature Changeover:

- This timer allows Low Oil Separator Start Temperature safety setpoint to protect the compressor against cold oil during starting. After the timer has expired, the Low Oil Separator Run Temperature is then active.

Low Oil Injection Bypass:

- This timer bypasses the Low Oil Injection Temperature Safety setpoint during start-up, to allow any cold oil in the oil lines and filter to pass. After the timer expires, the Low Oil Injection Temperature safety is active.

Communication Failure Detect Timer:

- This timer forces the compressor to wait for the set time period before displaying "Remote Comm Timeout" Alarm in yellow banner or "Remote Comm Time-out" Trip in red banner when there is no remote communication to Vission 20/20 for configured time.

Restart After Power Failure Timer:

- This timer forces the compressor to wait for the set time period after a power failure and for the panel's restart before it can be started automatically. By staggering the time settings of this timer between other compressor panels, the compressors can be allowed to start automatically, one at a time, after a power failure. This will prevent excessive load demand on the power system that could occur if all of the compressor equipment were to start at the same time. The Power-up Auto Re-Start [x]Enable option must be selected on the Configuration screen for this option to be active.

Hot Starts per Hour:

- This counter counts compressor starts. After every start, a one-hour timer is reset and starts timing. If the timer times out, the hot starts counter is reset. When the counter reaches its preset value, it will not allow another compressor start until the one-hour timer times out and resets the counter. The hot starts counter, therefore, will be reset when the time between compressor starts total one hour. This counter allows repetitive compressor starts, but once the counter has reached its set point, it requires a one-hour window between compressor starts in order for the counter to be reset.

True Anti-Recycle Timer:

- Once the compressor turns off, this timer will keep the compressor off for the setting of the True Anti-Recycle Timer. This timer is used to prevent short cycling of the compressor.

Accumulative Anti-Recycle Timer:

- This timer forces a specified time between compressor starts. When the compressor starts, the timer resets and starts timing and accumulates running time. Once the compressor shuts down, it will not be allowed to restart for the remainder of time left on the Accumulative Anti-Recycle Timer. Unlike the True Anti-Recycle Timer, if the compressor has run for a time period that exceeds the setpoint of the Accumulative Anti-Recycle Timer, then when the compressor shuts down, it will be allowed to restart immediately.

Compressor Interlock Bypass:

- Once the Vission 20/20 has sent a command to the compressor starter to start, a return signal is expected. This timer defines how much time to wait for that signal before setting a trip condition.

High Motor Amps Safety Bypass:

- Starting motors can typically pull much more than its rates full load amps for a short time. This timer ignores that sudden inrush of current for the specified time.

Emergency Stop Timer:

- Defines the amount of time the compressor is in a False start condition before activating the Emergency stop. The emergency stop output can be connected to a shunt-trip in the case of a run away compressor to remove all power to the system.

Low Suction Pressure Safety Bypass:

- Sets the time that the compressor is allowed to run at lower suction pressure than would usually be allowed at start-up.

High Superheat Temp Changeover Timer:

- This timer bypasses the High Disch. Superheat Run Temp safety settings when the compressor starts. It defines how long the High Disch. Superheat Start Temp & High Disch. Superheat Start Offset Temp setpoints will be active after the compressor starts. After the timer has expired, then the High Disch. Superheat Run Temp safety setpoints will be active.

Low Pressure Ratio Bypass Timer:

- This timer bypasses the Low Run Pressure Ratio setpoints when compressor is running. After the timer expires, the Cool Compression Low Run Pressure Ratio safety is active.

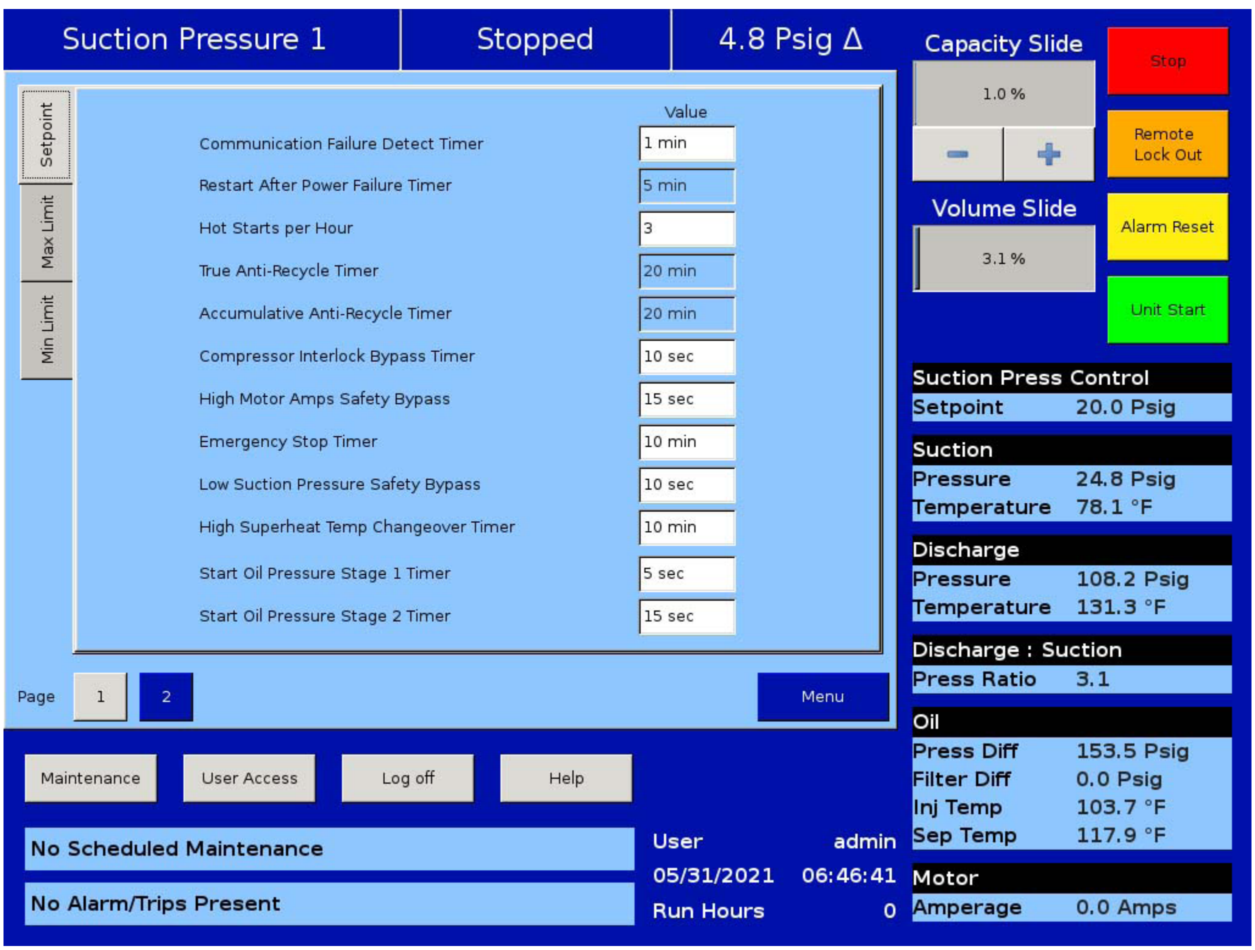


Figure 8-2. Timers Screen - Page 2 (Cool Compression)

Reference Figure 8-3.

SOI Low Oil Pressure Bypass:

- This timer bypasses the SOI Low Oil Pressure Safety setpoints during start-up. After the timer expires, the SOI Low Oil Pressure safety is active.

SOI Low Pressure Ratio Bypass:

- This timer bypasses the SOI Low Pressure Ratio Safety setpoints during start-up. After the timer expires, the SOI Low Pressure Ratio safety is active.

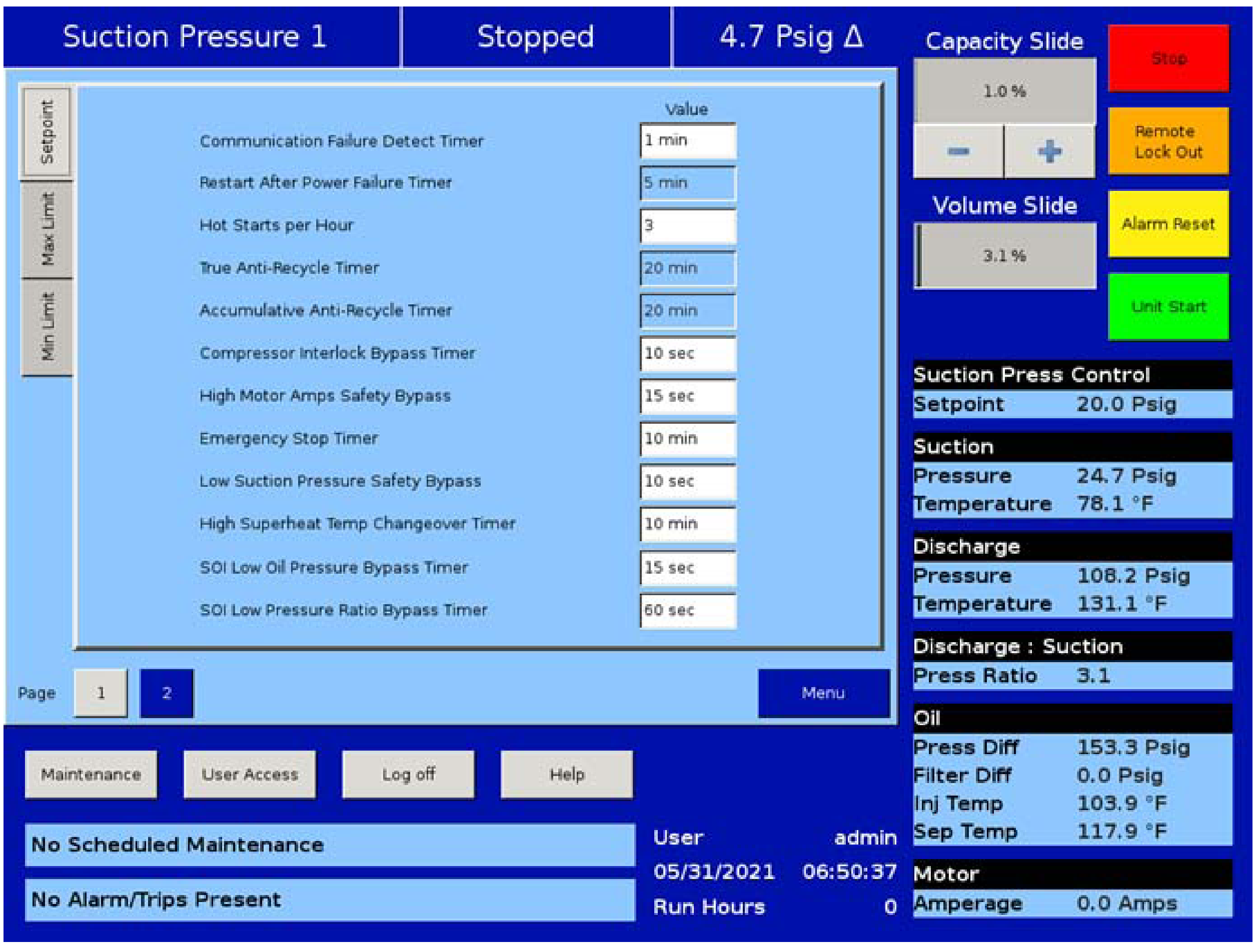


Figure 8-3. Timers Screen - Page 2 (SOI Solenoid)

Reference Figure 8-4.

Start Oil Pressure Stage 1 Timer:

- This timer starts when compressor is started. Once this timer is lapsed Oil Pressure will get monitored against Start Oil Pressure Stage 1 Pressure Trip Setpoint. This Setpoint is configurable only when No Pump is selected in Configuration Screen.

Start Oil Pressure Stage 2 Timer:

- This timer starts when compressor is started. Once this timer is lapsed Oil Pressure will get monitored against Start Oil Pressure Stage 2 Pressure Trip Setpoint. This Setpoint is configurable only when No Pump is selected in Configuration Screen.

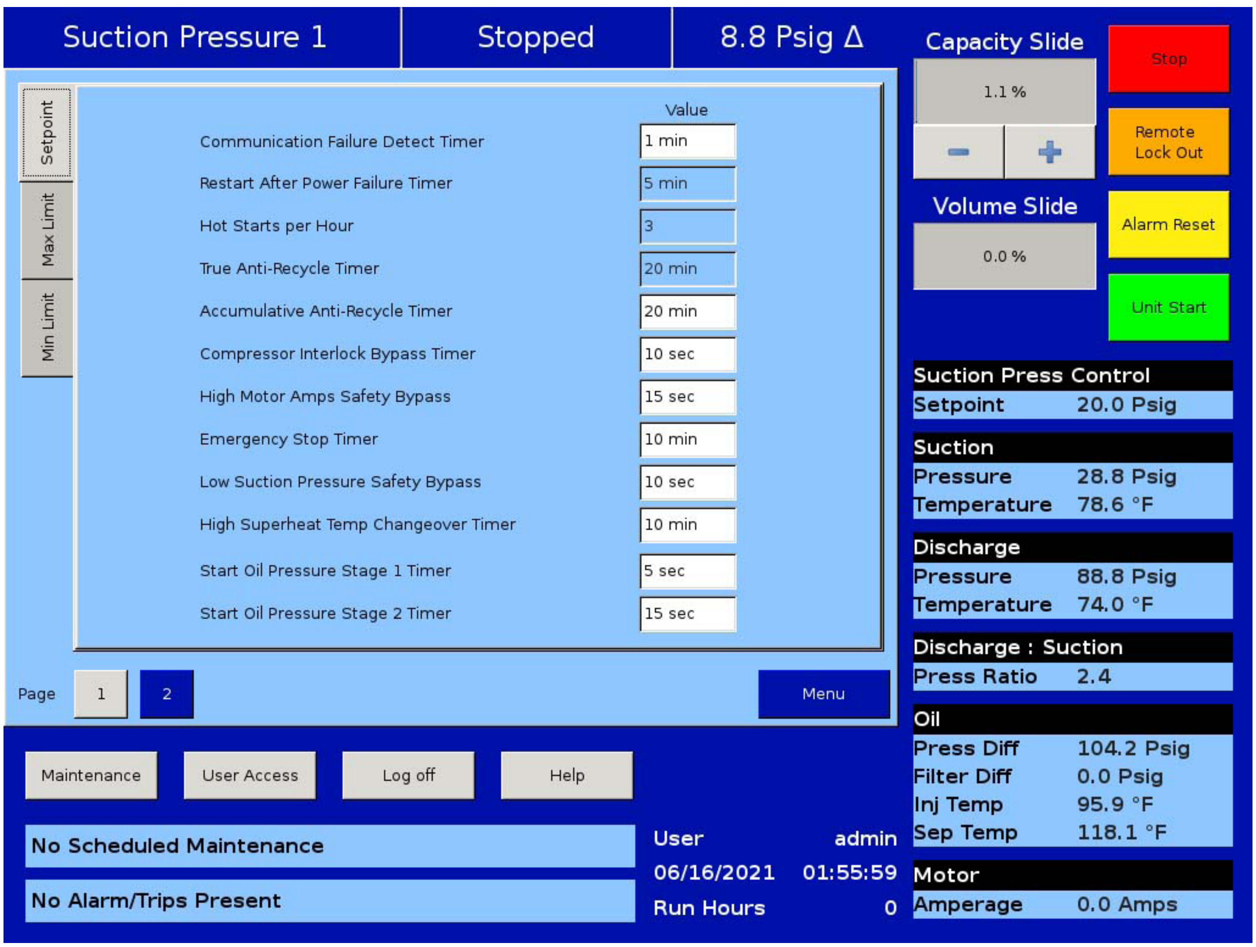


Figure 8-4. Timers Screen - Page 2 (No Oil Pump)

Overview

This menu allows the operator to schedule control setpoint switching during the day and week. This feature can be enabled and disabled from the Compressor Schedule screen. Up to four setpoint "switch" events can be scheduled per day, see Figure 9-1.

Scheduling Setpoint

Schedule:

- The options for selection are "Enable" & "Disable". The operator is allowed to configure setpoints related to scheduled events, but only when the schedule is disabled.
- The operator can Enable Compressor Scheduling Feature, only if Time Intervals are in order of Event 1 < Event 2 < Event 3 < Event 4 for all days. If events are not in order, invalid events are marked with caution symbol to indicate the operator to correct events and then enable feature.

Control Mode:

- These drop-down boxes allow selection of operating modes which get switched once schedule event time is achieved.
- The list of allowable modes depends on the number of controllers selected in the configuration screen. For example, if the number of Suction Pressure Control Setpoints selected is "2" and the number of Process Temperature Cooling Control Setpoints selected is "1", then Control Mode drop-down box will have "Unscheduled", "Suction Pressure SP1", "Suction Pressure SP2" and "Process Temperature Temp Cooling SP1" as options for selection.
- If Control Mode is selected as "Unscheduled" and Time set in an event is achieved, then control mode will not get switched. Hence Control Mode can be set as "Unscheduled" if operator does not want to use all 4 events per day.

Figure 9-1. Compressor Scheduling Screen

Time:

- This setpoint allows selection of Hours, Minutes and AM/PM values for an event. When time set for an event is achieved, control mode will get changed as selected for that event.
- The range of values allowed to set for Hours setpoint is 1 – 12 for 12 hour format and 0 – 23 for 24 hour format. The range of values allowed to set for Minutes setpoint is 0 – 59. AM/PM selection is active for selection only when Time Format selected in configuration screen is 12 hour.

When the scheduling feature is enabled and No. of controllers for Suction Pressure Control & Process Control Cooling are changed in configuration screen (which makes control modes selected in compressor scheduling screen invalid), then the feature will get disabled automatically and indication will be sent to operator to correct the setting.

Overview

The compressor sequencing screen is where more than one Vission 20/20 panel can be sequenced in network using Modbus TCP. These settings define how the master compressor should control sequenced Vission 20/20 panels. This feature is enabled from the Configuration Screen, see Section 19 for Configuration.

When Compressor Sequencing is running, a status icon will appear on the bottom left corner of the main screen to make the user aware of it.

Compressor Sequencing Table

The compressor sequencing table's menu allows the operator to view and adjust settings that are used for compressor sequencing, see Figure 10-1.

Device Name:

- This is a read-only value. The device Name can be changed from the Configuration Screen.

Min Trigger:

- Defines the Master's capacity value in percentage which is used as a trigger to step wise decrease the slave's compressor capacity. Slave compressor capacity is decreased only if the Master is running with capacity lower than set Min Trigger value.

Max Trigger:

- Defines the Master's capacity value in percentage which is used as a trigger to step wise increase the slave's compressor capacity. Slave compressor capacity is increased only if the Master is running with capacity higher than set Max Trigger value.
- If Max Slide Position % setpoint in Compressor Control Screen is set less than this setpoint on Master Compressor, then this setpoint will be ignored and slave compressors will start loading once Master is loaded till Max Slide Position % setpoint.

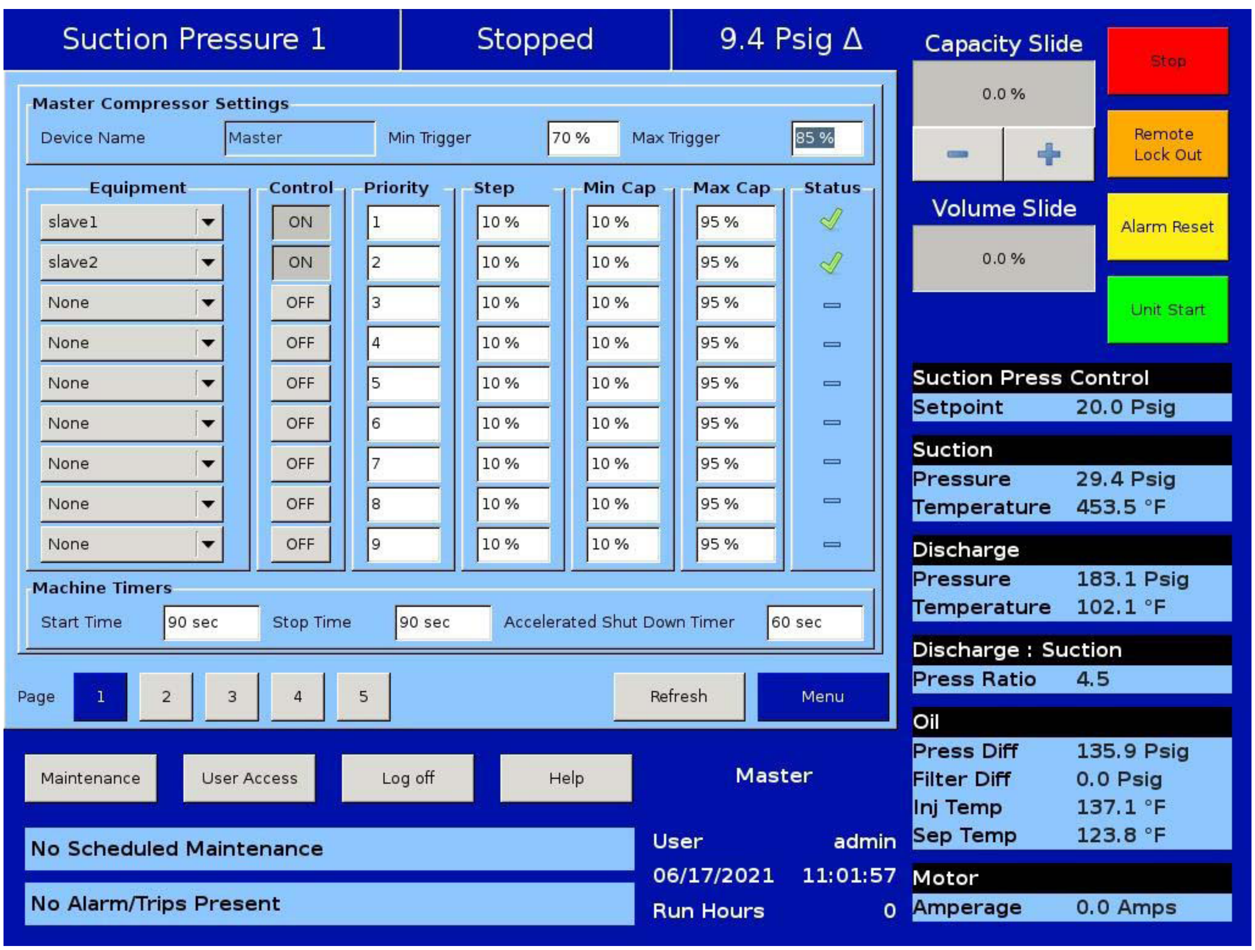


Figure 10-1. Compressor Sequencing Screen - Page 1

Equipment:

- Options of this combo box are updated depending on devices shown in Devices List Page. This contains names of all the compressors in the network communicating with the Master compressor. The equipment name can be selected from the drop-down list. The same Equipment name should not be configured more than once in the sequencing table.

Control:

- Inclusion/exclusion of compressor partaking in the sequencing can be decided on basis of this toggle button. Compressors can be included/excluded by toggling ON/OFF.

NOTE

Switching a compressor control to OFF when running in Auto Seq mode puts the respective slave compressor into local auto mode. This feature is used to add or remove slave compressors from the sequence table when running in Auto Seq mode.

Priority:

- This defines the priorities of the compressors on the network. This priority will decide the sequence in which compressors will be turned on and off during the sequence cycle. The lower the priority number, the greater the priority of the compressor.

Step:

- This parameter would decide the stepwise increase or decrease value in percentage of the compressor capacity. In the case the last step makes the total capacity greater than the maximum capacity, total capacity will get reduced to maximum capacity. Same is applicable when the last step makes the total capacity lower than the minimum capacity, then minimum capacity takes priority.

Min Cap:

- Defines the lowest capacity in percentage at which a compressor is allowed to run. Minimum capacity value has precedence over first step value. If Max Slide Position % setpoint on slave compressor is set below this setpoint, then this setpoint will be ignored and slave compressor will be loaded till Max Slide Position % setpoint as set on slave compressor.

Max Cap:

- Defines the highest capacity in percentage at which a compressor is allowed to run. Maximum capacity value has precedence over last step value. If Max Slide Position % setpoint on slave compressor is set below this setpoint, then this setpoint will be ignored and slave compressor will be loaded till Max Slide Position % setpoint as set on slave compressor.

Status Symbols:

- The status symbols show status of Slave compressors on the sequencing table, see Table 10-1. For further details, see Application Notes.

Machine Start Timer:

- Machine Start timer shows the time in seconds that the Master Compressor will hold before starting slave compressor once the Start decision is taken.

Machine Stop Timer:

- Machine Stop timer shows the time in seconds that the Master Compressor will hold before stopping slave compressor once the Stop decision is taken.

Accelerated Shut Down Timer:

- Accelerated Shut Down timer shows the time in sec that the Master Compressor will hold before stopping slave compressors due to Auto-Cycle Stop Setpoint.

Status Symbols

Compressor sequencing status symbols are automatically refreshed every 10 seconds. For symbols, see Table 10-1.

NOTE

Before configuring the Sequencing table on the Master Compressor, log on to the slave compressors one by one and enable sequencing in slave mode, and put each slave in Remote mode. Then log on to Master Compressor and wait till all slaves show up under detected devices pop-up screen. Add slaves, which in turn will get shown in Devices List Screen and also in Equipment combo-box.

Table 10-1. Status Symbols

Symbol	Description
	Default, If slave Compressor is not present.
	Slave Compressor is configured in sequencing table but is not configured in “Remote” mode or is not detected in network.
	Slave Compressor configured in sequencing table and is in ready to run state.
	Slave Compressor is running with Alarm condition.
	Slave Compressor stopped due to Error Condition.
	Slave Compressor running at maximum capacity without any error.
	Slave Compressor under active control of Master Compressor
	Slave Compressor running into its stop timer, will be stopped.
	Slave Compressor is next in sequence for unloading.
	Slave Compressor running into its start timer, will be started.

Suction Pressure Control Setpoints

The Compressor sequencing screen defines settings that are used by the master compressor for sequencing. For Suction Pressure Control Setpoints see Figure 10-2.

Pressure Setpoints

Start Offset:

- Defines the offset from suction pressure control setpoint to start slave compressor. If suction pressure surpasses start offset setpoint and master compressor's capacity has reached max trigger setpoint, then the sequencing algorithm allows the starting and loading of slave compressors to cater for increasing load requirements.

Setpoint:

- The target setpoint is a read-only value here. This setpoint can be changed by logging on to the "Compressor Control" Screen.

Fast Load Pressure Offset:

- Defines the offset from suction pressure control setpoint to monitor compressor load. If suction pressure surpasses this setpoint's value then sequencing decisions are made according to the Fast Load Timer.

Fast Unload Pressure Offset:

- Defines the offset from suction pressure control setpoint to monitor compressor load. If suction pressure drops below this setpoint's value then sequencing decisions are made according to Fast Unload Timer.

Capacity Load/Unload Timers

One of the following Capacity Load/Unload timers is used to make sequencing decisions periodically. Suction Pressure setpoints are monitored to identify which one of the following timers will be used.

Slow Load Timer:

- If suction pressure surpasses the suction pressure control setpoint then this timer's value is used to make periodic sequencing decisions.

Fast Load Timer:

- If suction pressure surpasses the fast load pressure offset setpoint then this timer's value is used to make periodic sequencing decisions.

Slow Unload Timer:

- If suction pressure drops below the suction pressure control setpoint then this timer's value is used to make periodic sequencing decisions.

Fast Unload Timer:

- If suction pressure drops below the fast unload pressure offset setpoint then this timer's value is used to make periodic sequencing decisions.

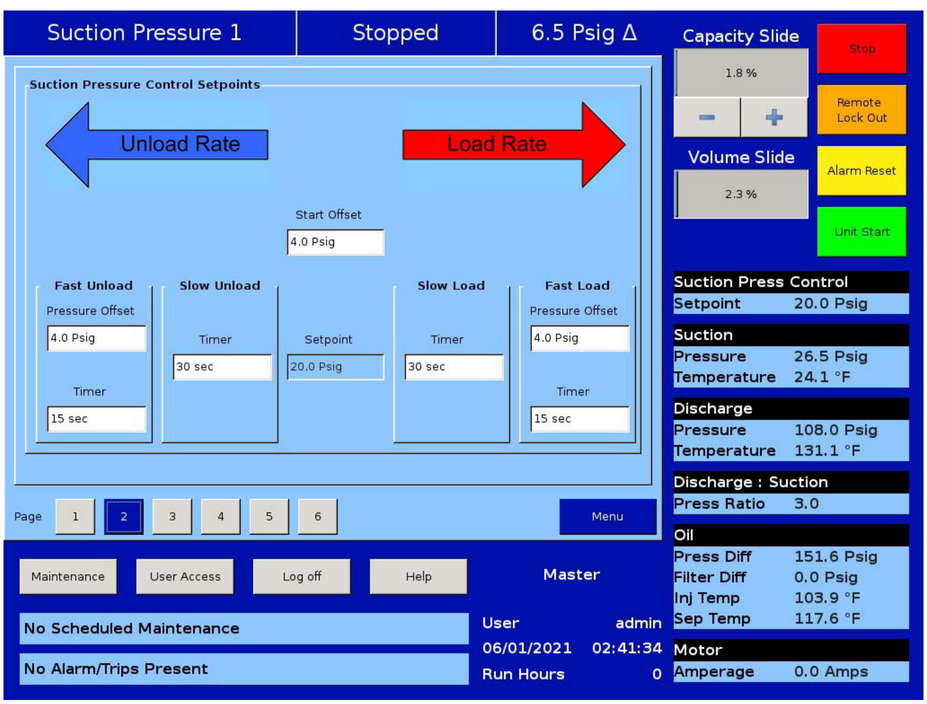


Figure 10-2. Compressor Sequencing Screen - Suction Pressure Control Setpoints (Page 2)

Process Control Cooling Setpoints - Temperature

The compressor sequencing screen defines settings that are used by the master compressor for sequencing, depending on the Process Control Mode.

When the Process Control Mode selected is Temperature, sequencing uses temperature setpoints, see Figure 10-3.

Temperature Setpoints

Start Offset:

- Defines the offset from the process temperature cooling control setpoint to start the slave compressor. If the process temperature surpasses the start offset setpoint and the master compressor's capacity has reached max trigger setpoint then the sequencing algorithm allows the starting and loading of slave compressors to cater for increasing load requirements.

Setpoint:

- The target setpoint is a read-only value here. This setpoint can be changed by logging on to "Compressor Control" Screen.

Fast Load Temp Offset:

- Defines the offset from the process temperature cooling control setpoint to monitor compressor load. If process temperature surpasses this setpoint's value then the sequencing decisions are made according to Fast Load Timer.

Fast Unload Pressure Offset:

- Defines the offset from the process temperature control cooling setpoint to monitor compressor load. If process temperature drops below this setpoint's value then the sequencing decisions are made according to Fast Unload Timer.

Capacity Load/Unload Timers

One of the following Capacity Load/Unload timers is used to make sequencing decisions periodically. Process Temperature cooling setpoints are monitored to identify which one of the following timers to be used.

Slow Load Timer:

- If process temperature surpasses the process temperature cooling control setpoint then this timer's value is used to make periodic sequencing decisions.

Fast Load Timer:

- If process temperature surpasses the fast load temp offset setpoint then this timer's value is used to make periodic sequencing decisions.

Slow Unload Timer:

- If process temperature drops below the process temperature control setpoint then this timer 's value is used to make periodic sequencing decisions.

Fast Unload Timer:

- If process temperature drops below the fast unload temp offset setpoint then this timer's value is used to make periodic sequencing decisions.

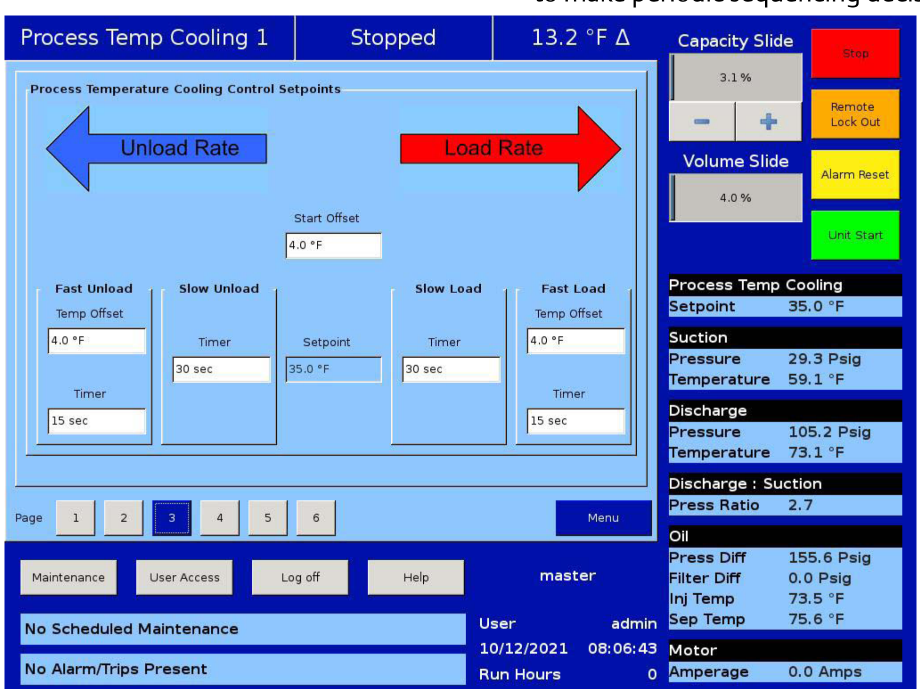


Figure 10-3. Compressor Sequencing Screen - Process Control cooling Setpoints for Temperature

Process Control Cooling Setpoints - Pressure

The compressor sequencing screen defines settings that are used by the master compressor for sequencing depending on the Process Control Mode.

When the Process Control Cooling Mode selected is Pressure, sequencing uses pressure setpoints, see Figure 10-4.

Pressure Setpoints

Start Offset:

- Defines the offset from the process pressure cooling control setpoint to start slave compressor. If the process pressure surpasses the start offset setpoint and master compressor's capacity has reached max trigger setpoint then the sequencing algorithm allows the starting and loading of slave compressors to cater for increasing load requirements.

Setpoint:

- The target setpoint is a read-only value here. This setpoint can be changed by logging on to the "Compressor Control" Screen.

Fast Load Temp Offset:

- Defines the offset from the process pressure cooling control setpoint to monitor compressor load. If process pressure surpasses this setpoint's value then sequencing decisions are made according to Fast Load Timer.

Fast Unload Pressure Offset:

- Defines the offset from the process pressure control cooling setpoint to monitor compressor load. If process pressure drops below this setpoint's value then sequencing decisions are made according to Fast Unload Timer.

Capacity Load/Unload Timers

One of the following Capacity Load/Unload timers is used to make sequencing decisions periodically. Process Pressure cooling setpoints are monitored to identify which one of the following timers will be used.

Slow Load Timer:

- If process pressure surpasses the process pressure control cooling setpoint then this timer's value is used to make periodic sequencing decisions.

Fast Load Timer:

- If process pressure surpasses the fast load temp offset setpoint then this timer's value is used to make periodic sequencing decisions.

Slow Unload Timer:

- If process pressure drops below the process pressure control cooling setpoint then this timer's value is used to make periodic sequencing decisions.

Fast Unload Timer:

- If process pressure drops below the fast unload temp offset setpoint then this timer's value is used to make periodic sequencing decisions.

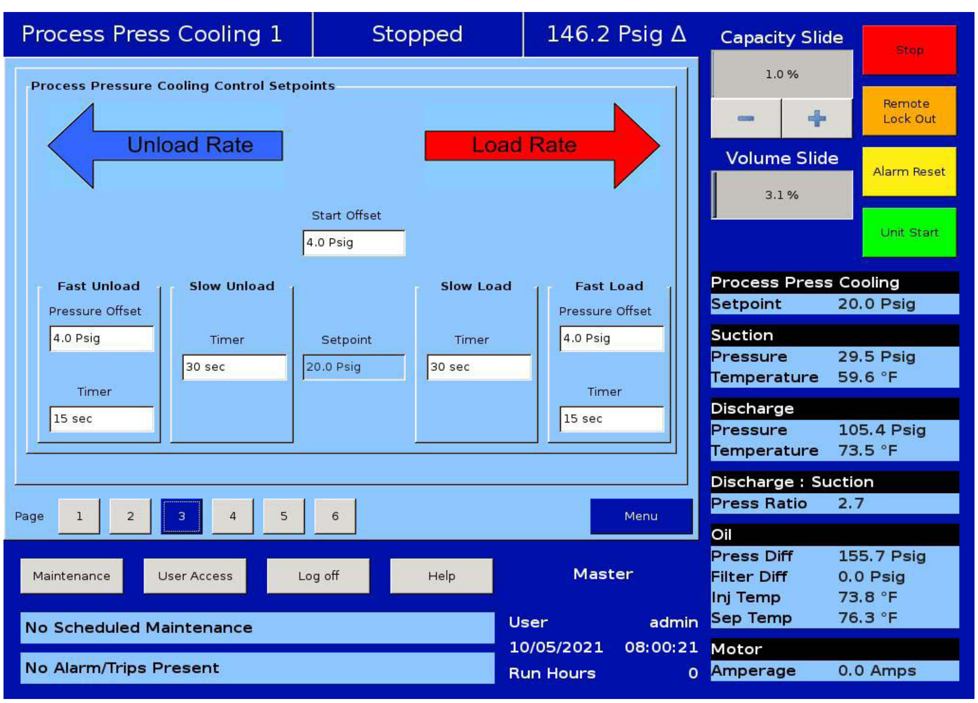


Figure 10-4. Compressor Sequencing Screen Process Control Cooling Setpoints for Pressure

Discharge Pressure Control Setpoints

The compressor sequencing screen defines settings those are used by the master compressor for sequencing. For Discharge Pressure Control Setpoints, see Figure 10-5.

Pressure Setpoints

Start Offset:

- Defines the offset from the discharge pressure control setpoint to start the slave compressor. If discharge pressure drops below the start offset setpoint and master compressor's capacity has reached max trigger setpoint then the sequencing algorithm allows the starting and loading of slave compressors to cater for increasing load requirements.

Setpoint:

- The target setpoint is a read-only value here. This setpoint can be changed by logging on to the "Compressor Control" Screen.

Fast Load Pressure Offset:

- Defines the offset from the discharge pressure control setpoint to monitor compressor load. If the discharge pressure drops below this setpoint's value then sequencing decisions are made according to Fast Load Timer.

Fast Unload Pressure Offset:

- Defines the offset from the discharge pressure control setpoint to monitor compressor load. If the discharge pressure surpasses this setpoint's value then sequencing decisions are made according to Fast Unload Timer.

Capacity Load/Unload Timers

One of the following Capacity Load/Unload timers is used to make sequencing decisions periodically. Discharge Pressure setpoints are monitored to identify which one of the following timers to be used.

Slow Load Timer:

- If discharge pressure drops below the discharge pressure control setpoint then this timer's value is used to make periodic sequencing decisions.

Fast Load Timer:

- If discharge pressure drops below the fast load pressure offset setpoint then this timer's value is used to make periodic sequencing decisions.

Slow Unload Timer:

- If discharge pressure surpasses the discharge pressure control setpoint then this timer's value is used to make periodic sequencing decisions.

Fast Unload Timer:

- If discharge pressure surpasses the fast unload pressure offset setpoint then this timer's value is used to make periodic sequencing decisions.

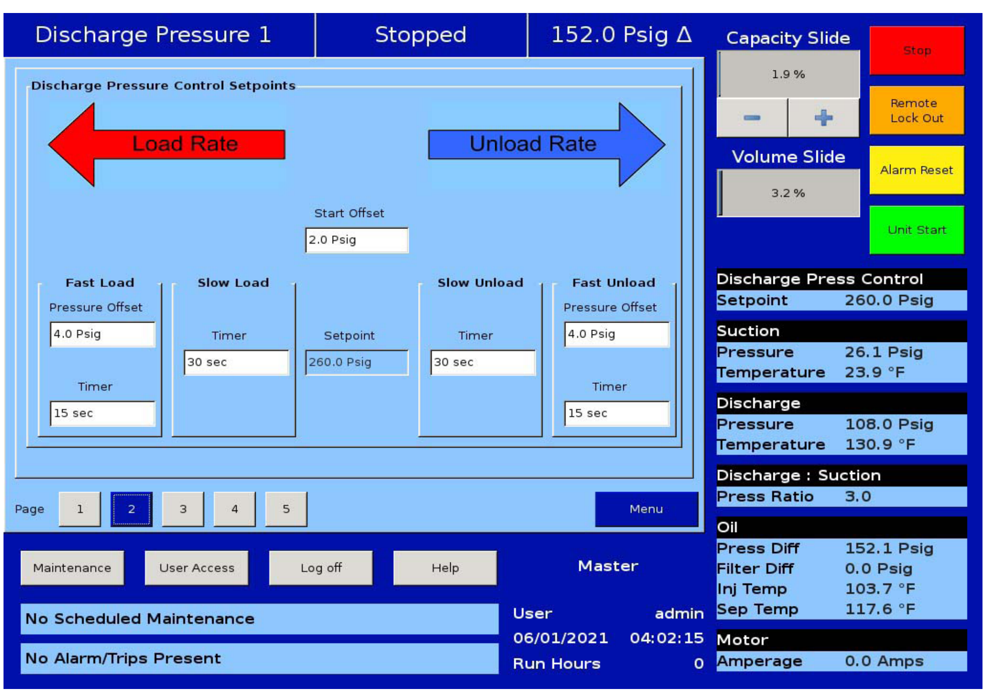


Figure 10-5. Compressor Sequencing Screen - Discharge Pressure Control Setpoints (Page 2)

Process Control Heating Setpoints - Temperature

The compressor sequencing screen defines settings that are used by the master compressor for sequencing depending on the Process Control Heating Mode.

When the Process Control Heating Mode selected is Temperature, sequencing uses temperature setpoints, see Figure 10-6.

Temperature Setpoints

Start Offset:

- Defines the offset from the process Temperature heating control setpoint to start the slave compressor. If process Temperature drops below the start offset setpoint and master compressor's capacity has reached max trigger setpoint then the sequencing algorithm allows the starting and loading of slave compressors to cater for increasing load requirements.

Setpoint:

- The target setpoint is a read-only value here. This setpoint can be changed by logging on to the "Compressor Control" Screen.

Fast Load Pressure Offset:

- Defines the offset from the process Temperature heating control setpoint to monitor compressor load. If the process Temperature drops below this setpoint's value then sequencing decisions are made according to Fast Load Timer.

Fast Unload Pressure Offset:

- Defines the offset from the process Temperature heating control setpoint to monitor compressor load. If the process Temperature surpasses this setpoint's value, then sequencing decisions are made according to Fast Unload Timer.

Capacity Load/Unload Timers

One of the following Capacity Load/Unload timers is used to make sequencing decisions periodically. Process Temperature heating setpoints are monitored to identify which one of the following timers to be used.

Slow Load Timer:

- If process Temperature drops below the process Temperature heating control setpoint then this timer's value is used to make periodic sequencing decisions.

Fast Load Timer:

- If process Temperature drops below the fast load pressure offset setpoint then this timer's value is used to make periodic sequencing decisions.

Slow Unload Timer

• If process Temperature surpasses the fast unload Temperature offset setpoint then this timer's value is used to make periodic sequencing decision.

Process Control Heating Setpoints - Pressure

The compressor sequencing screen defines settings that are used by the master compressor for sequencing depending on the Process Control Heating Mode.

When the Process Control Heating Mode selected is Pressure, sequencing uses pressure setpoints, see Figure 10-6.

Pressure Setpoint

Start Offset:

- Defines the offset from the process Temperature heating control setpoint to start the slave compressor. If process Temperature drops below the start offset setpoint and master compressor's capacity has reached max trigger setpoint then the sequencing algorithm allows the starting and loading of slave compressors to cater for increasing load requirements.

Setpoint:

- The target setpoint is a read-only value here. This setpoint can be changed by logging on to the"Compressor Control" Screen.

Fast Load Pressure Offset:

- Defines the offset from the process Temperature heating control setpoint to monitor compressor load. If the process Temperature drops below this setpoint's value then sequencing decisions are made according to Fast Load Timer.

Fast Unload Pressure Offset:

- Defines the offset from the process Temperature heating control setpoint to monitor compressor load. If the process Temperature surpasses this setpoint's value, then sequencing decisions are made according to Fast Unload Timer.

Capacity Load/Unload Timers

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Fast Load Timer:

- If process Temperature drops below the fast load pressure offset setpoint then this timer's value is used to make periodic sequencing decisions.

Slow Unload Timer

- If process Temperature surpasses the fast unload Temperature offset setpoint then this timer's value is used to make periodic sequencing decision.

Slow Unload Timer

- If process Temperature surpasses the fast unload Temperature offset setpoint then this timer's value is used to make periodic sequencing decision.

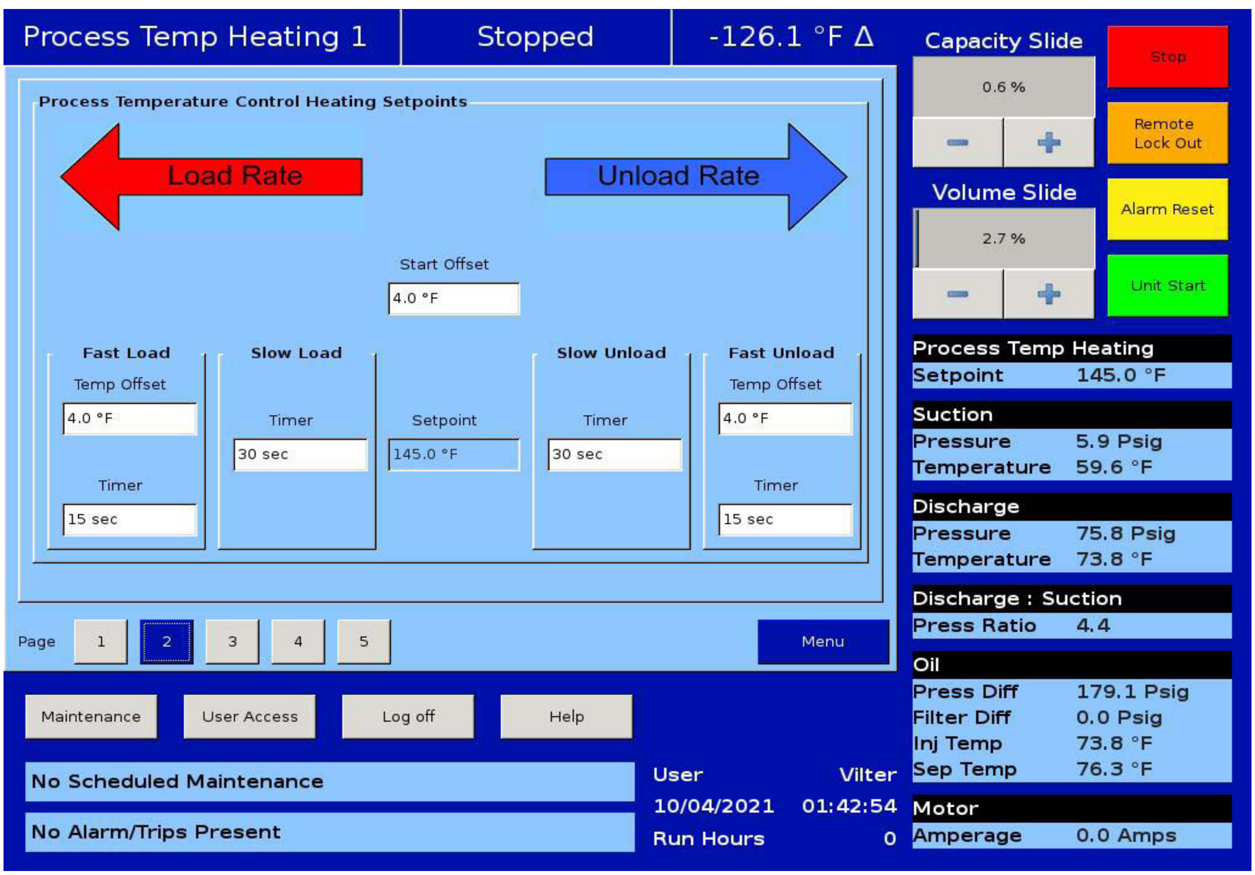


Figure 10-6. Compressor Sequencing Screen - Process Temperature Control Heating Setpoints (Page 3)

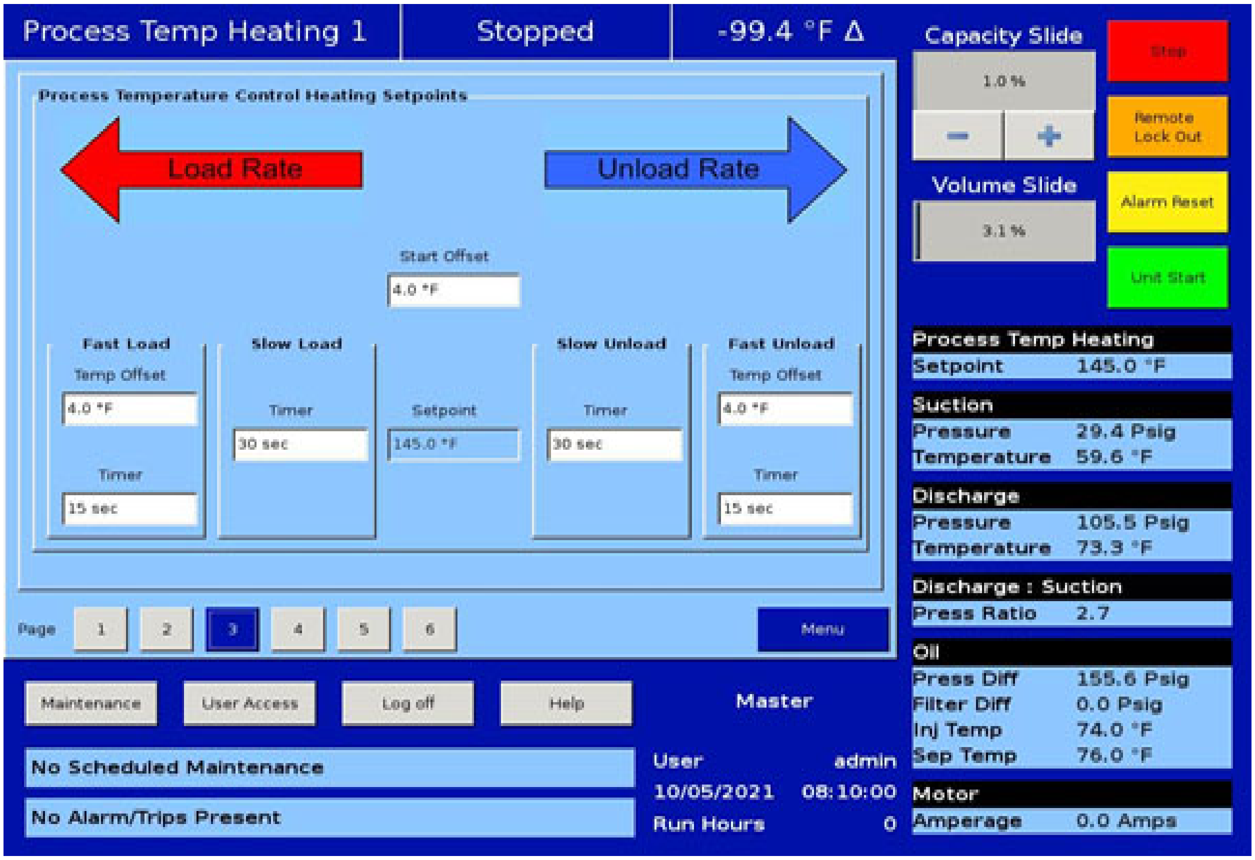


Figure 10-7. Compressor Sequencing Screen - Process Pressure Control Heating Setpoints (Page 3)

Devices List

This screen is designed to add, display, delete and test connection with slave compressors that are used by the master compressor for sequencing. For Devices List screen see Figure 10-8.

Devices List Columns

Device Name:

- Displays the Name of the Slave Compressor.

Device Type:

- Displays the type of the Slave Compressor controller, whether it's Vission 20/20 or Vission.

IP Address:

- Displays the IP Address of the Slave Compressor.

Device ID:

- Displays the Device ID of the Slave Compressor.

CFM:

- Displays the CFM of the Slave Compressor.

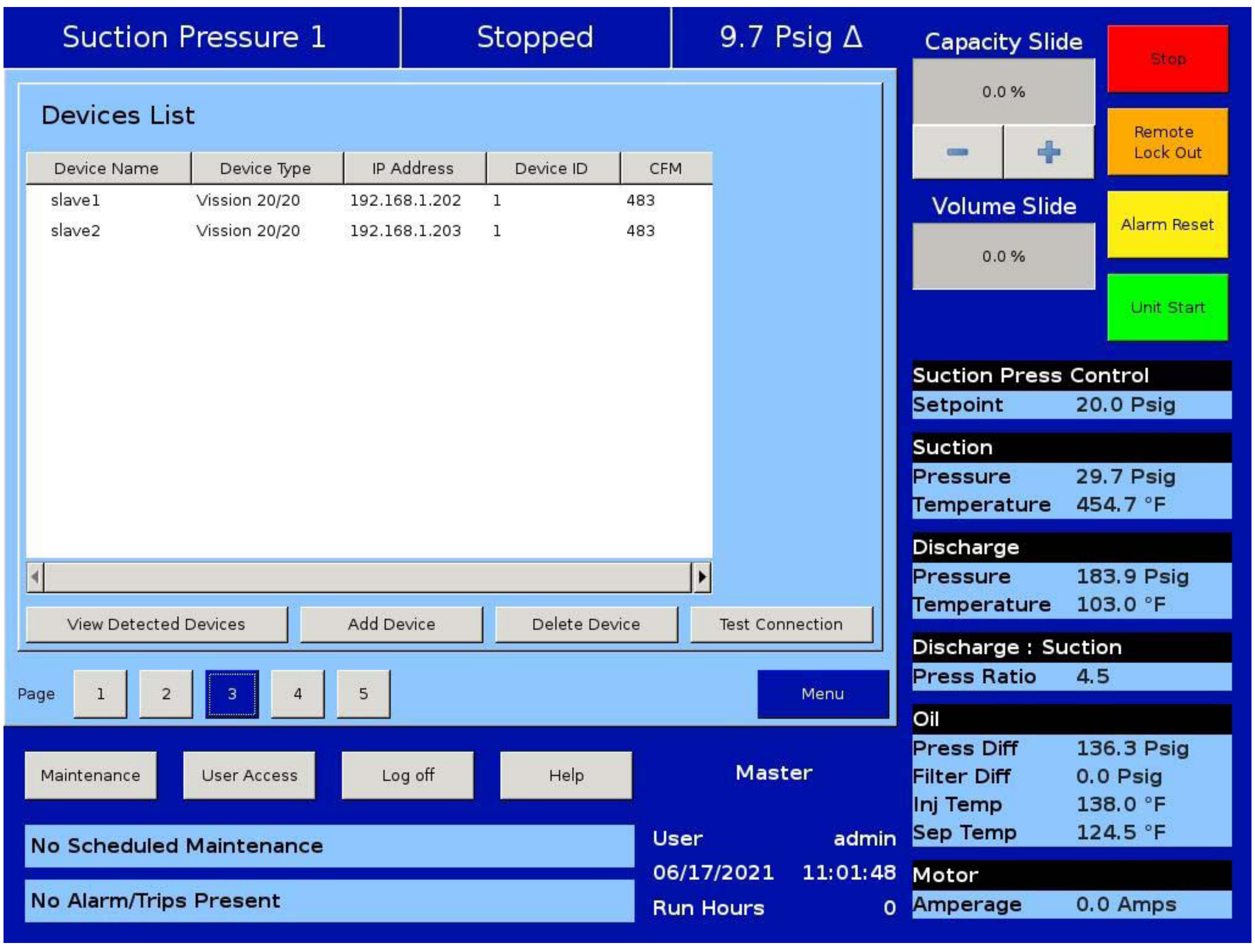


Figure 10-8. Compressor Sequencing Screen - Device List (Page 4)

View Detected Devices

This pop-up is displayed when clicking the View Detected Devices button in the Device List Screen. Vission 20/20 slave devices or automatically detected devices are shown by the Master compressor as in Figure 10-9.

Device Name:

- Displays the Name of the Detected Device.

IP Address:

- Displays the IP Address of the Detected Device.

Device ID:

- Displays the Device ID of the Detected Device.

CFM:

- Displays the CFM of the Detected Device.

Add:

- Checkbox to select the Detected Device.

OK:

- This button allows the addition of Detected / Vission 20/20 devices as Slave Compressors.

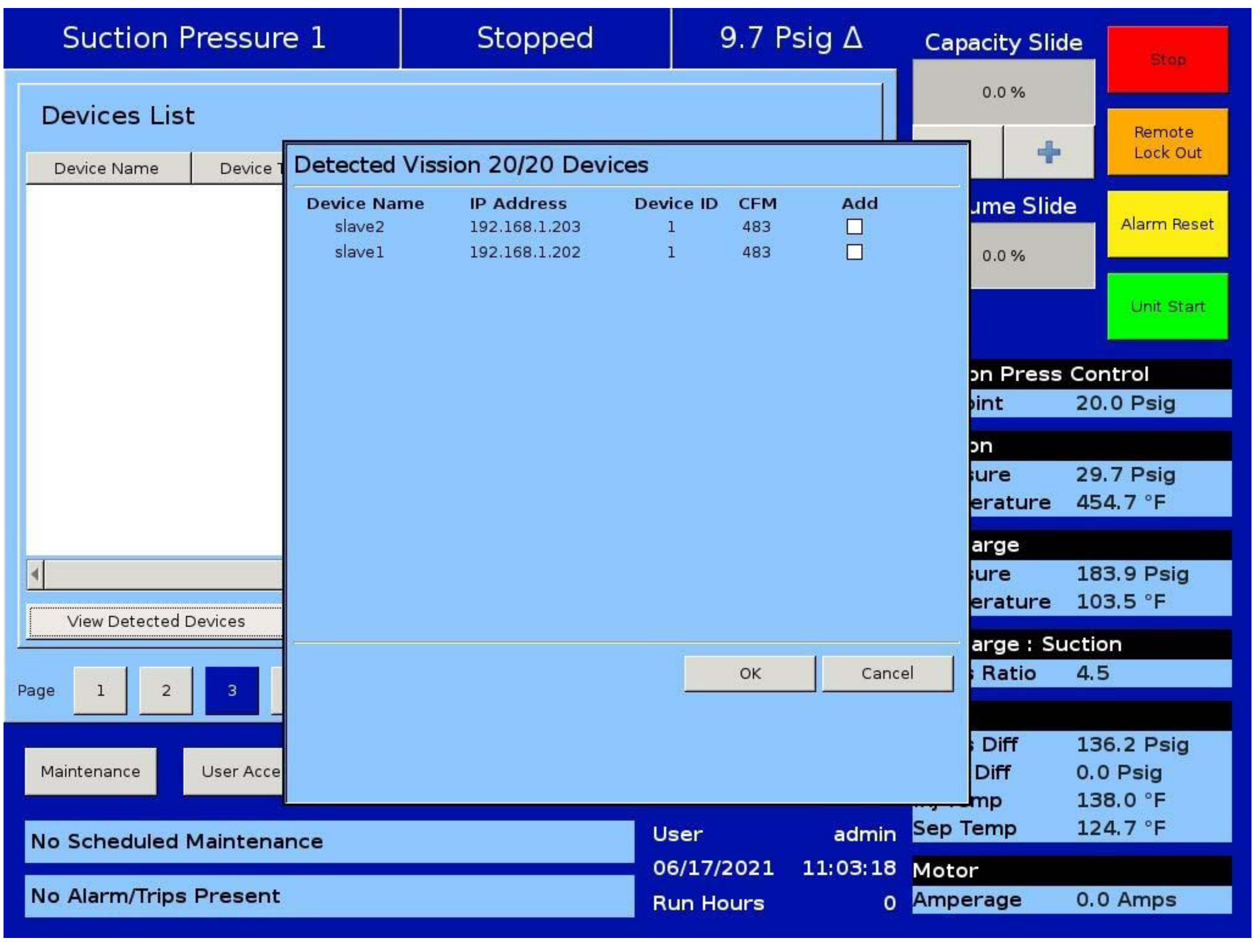


Figure 10-9. Compressor Sequencing Screen - View Detected Devices (Page 4)

Add Device

This screen is displayed when clicking the Add Device button in the Device List Screen. A Vission device can be added as a Slave compressor by the Master compressor from this screen as shown in Figure 10-10.

Device Name:

- Entry box to set the Name of a Vission Device.

IP Address:

- Entry box to set the IP Address of a Vission Device.

Device ID:

- Entry box to set the Device ID of a Vission Device.

Compressor Model:

- The model of the compressor being added can be selected from this combo box.

OK:

- This button allows the addition of a Vission Device as a Slave Compressor.

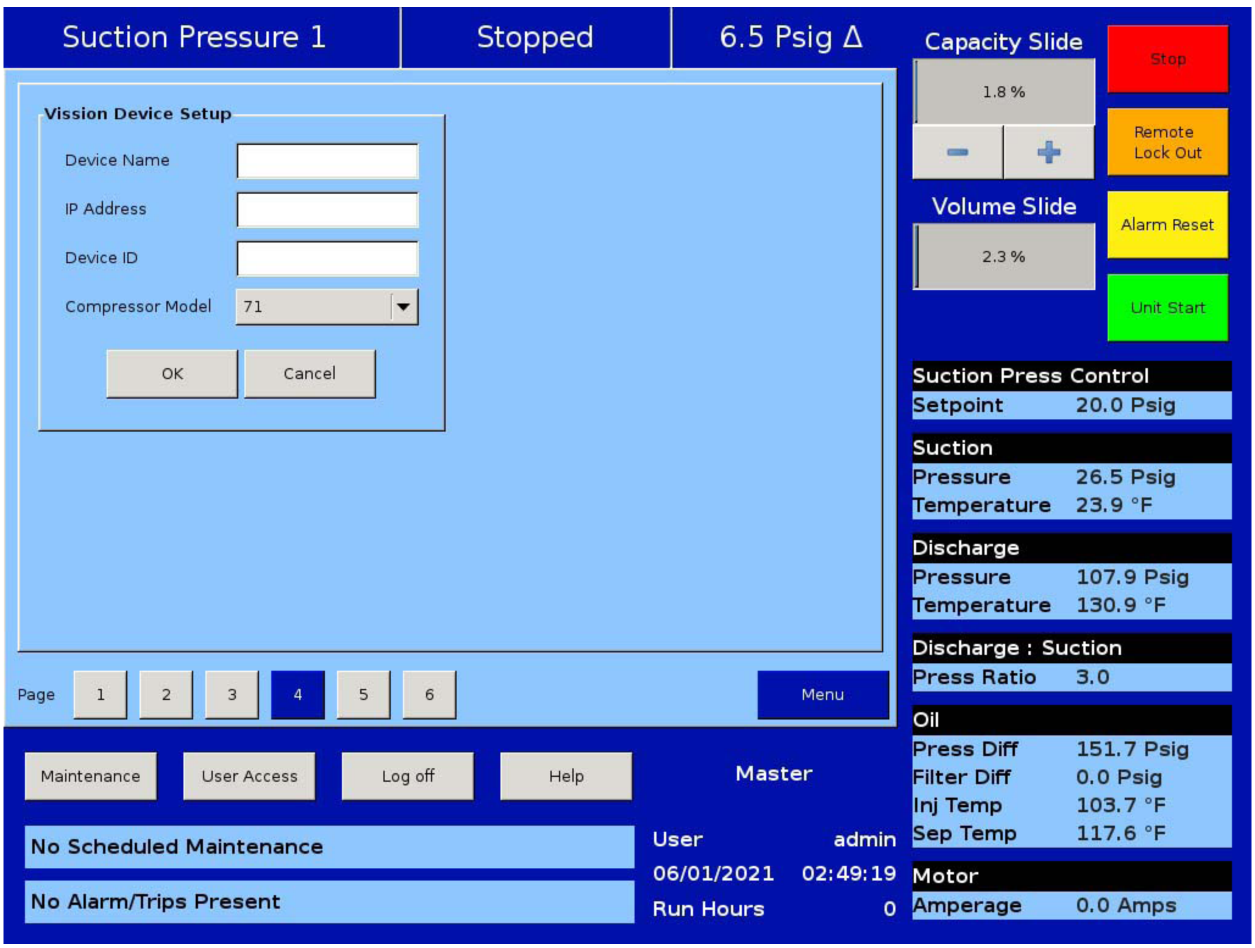


Figure 10-10. Compressor Sequencing Screen - Add Device (Page 4)

Delete Device

This popup is displayed when clicking the Delete Device button in the Device List Screen. Slave compressors can be removed from the sequencing network by the Master Compressor from this screen, as shown in Figure 10-11.

Yes:

- This button allows the deletion of a Slave Compressor from the Sequencing Network.

No:

- This button cancels the deletion of a Slave Compressor from the Sequencing Network.

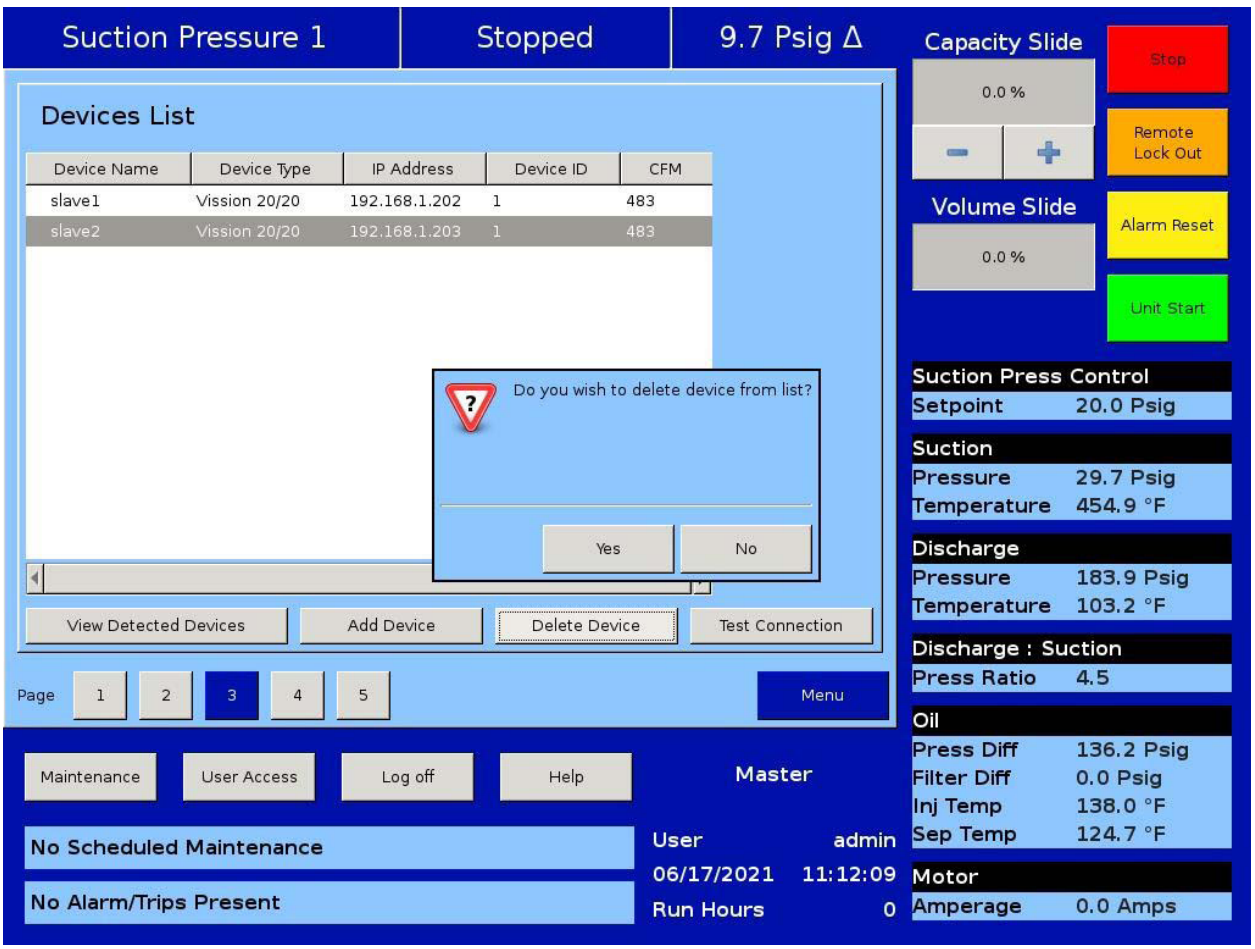


Figure 10-11. Compressor Sequencing Screen - Delete Device (Page 4)

Test Connection

The Master Compressor offers an easy way to test the physical connection with the slave compressors. This can be mainly used for troubleshooting slave devices in the network. By clicking the Test Connection button, the connection result is displayed as shown in Figure 10-12.

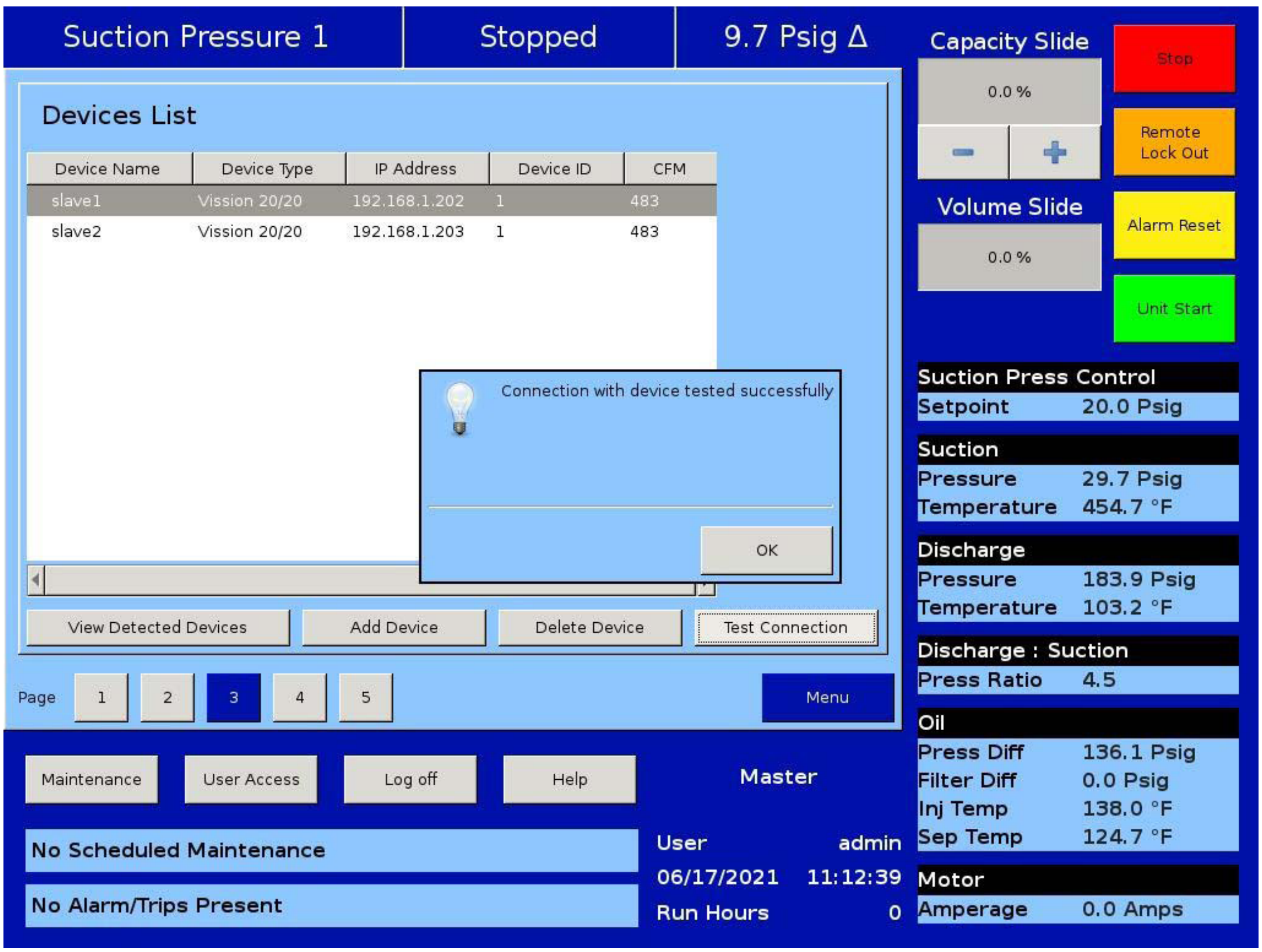


Figure 10-12. Compressor Sequencing Screen – Test Connection

Sync Sequencing Parameters

This screen offers the ability to sync Vission device's information with Vission 20/20 slave compressors. This feature is basically used in situations where the Vission 20/20 Compressor role needs to change from a Slave to Master. Hence operator does not require to Add Vission Devices again as Slave Compressors in the Sequencing Network. For the Sync Sequencing Parameters screen see Figure 10-13.

Sync:

- By pressing this button, the Vission device's information is sent over the network to the Vission 20/20 Slave Compressors.

NOTE

Follow these steps to use this feature:

1. Sync Data by pressing the Sync Button in the Master compressor.
2. Change the intended Vission 20/20 Slave Compressor to Master Compressor from the Configuration Screen.
3. Log on to the Compressor Sequencing Screen to view the Vission devices in the Devices List Screen of the new Master Compressor.

Please make sure at the same time that there is only one Master in the Compressor Sequencing Network to ensure the proper working of the Compressor Sequencing Algorithm.

Figure 10-13. Compressor Sequencing Screen - Sync Sequencing Parameters (Page 5)

Compressor Sequencing Events Log

This screen is designed to display sequencing events in chronological order. The information available on the screen is valuable to understand the operation of the sequencing feature and for troubleshooting, see Figure 10-14. This screen Is divided into four columns and can list up to 256 separate events. The operator can download the information on the sequencing event list through the Data Backup Screen.

Events List Columns

Date:

- Displays the date of the event in MM-DD-YYYY format.

Time:

- Displays the time of the event in HH:MM:SS format.

Event Type:

- Displays the type of message for a particular listing. The common types are “Error”, “Alarm” and “Info”. These help the operator to understand the meaning of the message in the next column.

Message:

- Displays the informational string that describes the event.

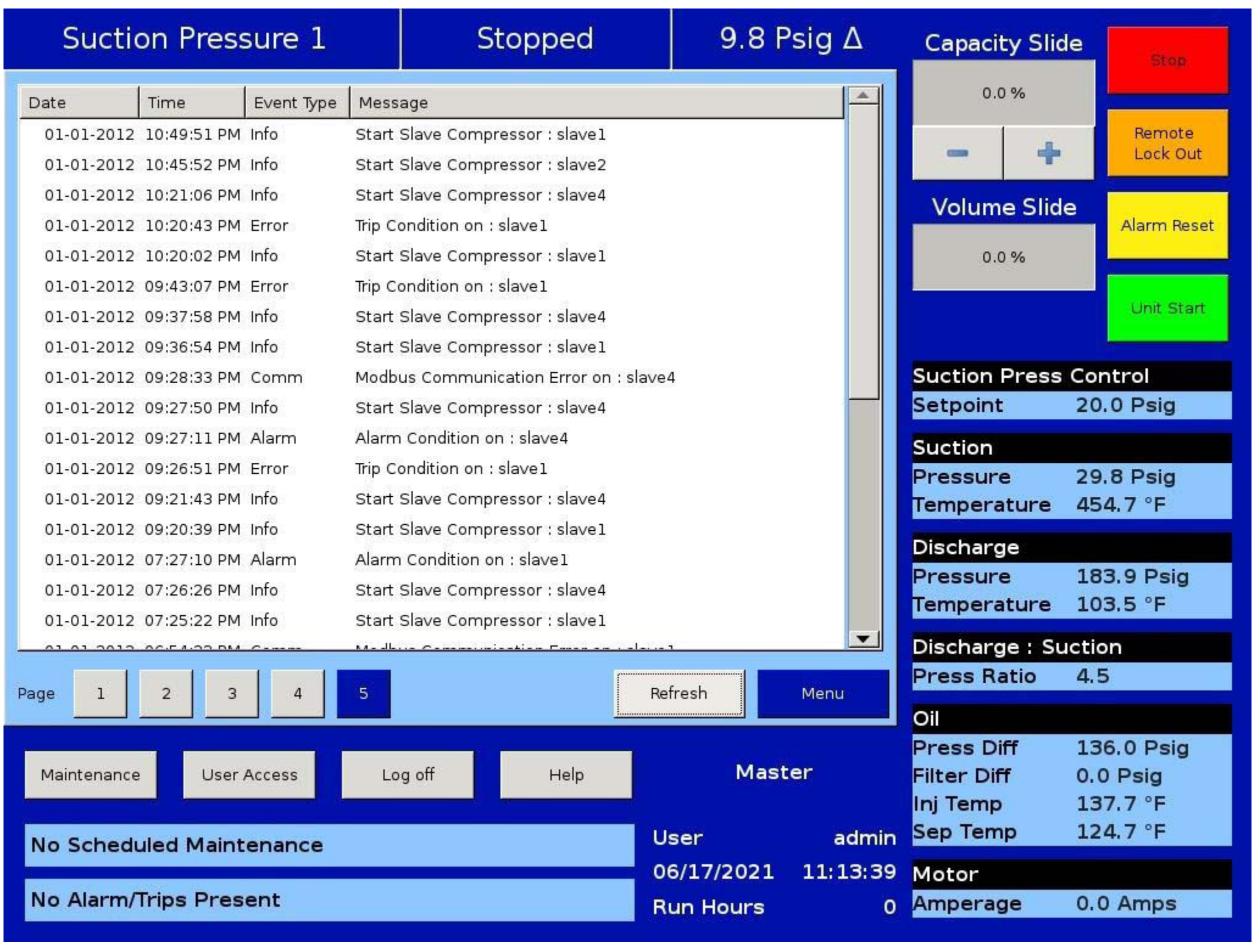


Figure 10-14. Compressor Sequencing Screen - Events Log (Page 5)

Configuration Overview

NOTE

Slave Compressors should be configured first, and then configure the Master Compressor.

The Configuration screen allows the operator to:

- Enable / Disable Compressor Sequencing
- Select Slave / Master Mode of operation for the compressor
- Assign a unique compressor name
- Enable Ethernet port
- Select Modbus TCP protocol
- Assign a unique Ethernet IP address

Setting Up The Slave Compressors For Sequencing

1. Log onto each of the slave compressors one by one and navigate to the Configuration screen, see Figure 10-15.
2. Enable the Ethernet port and select the Modbus TCP protocol.
3. Set up a unique Ethernet IP address for each slave.
4. Set up the Subnet Mask for the IP address.
5. Set up the Gateway address (MUST DO!)
6. Enable the sequencing in slave mode.
7. Select a Network Name for sequencing.
8. Select a Unique Name for each slave compressor.
9. Set the Communications Active Remote Control to “ETHERNET” for each slave compressor.
10. Apply these settings before exiting the Configuration screen.

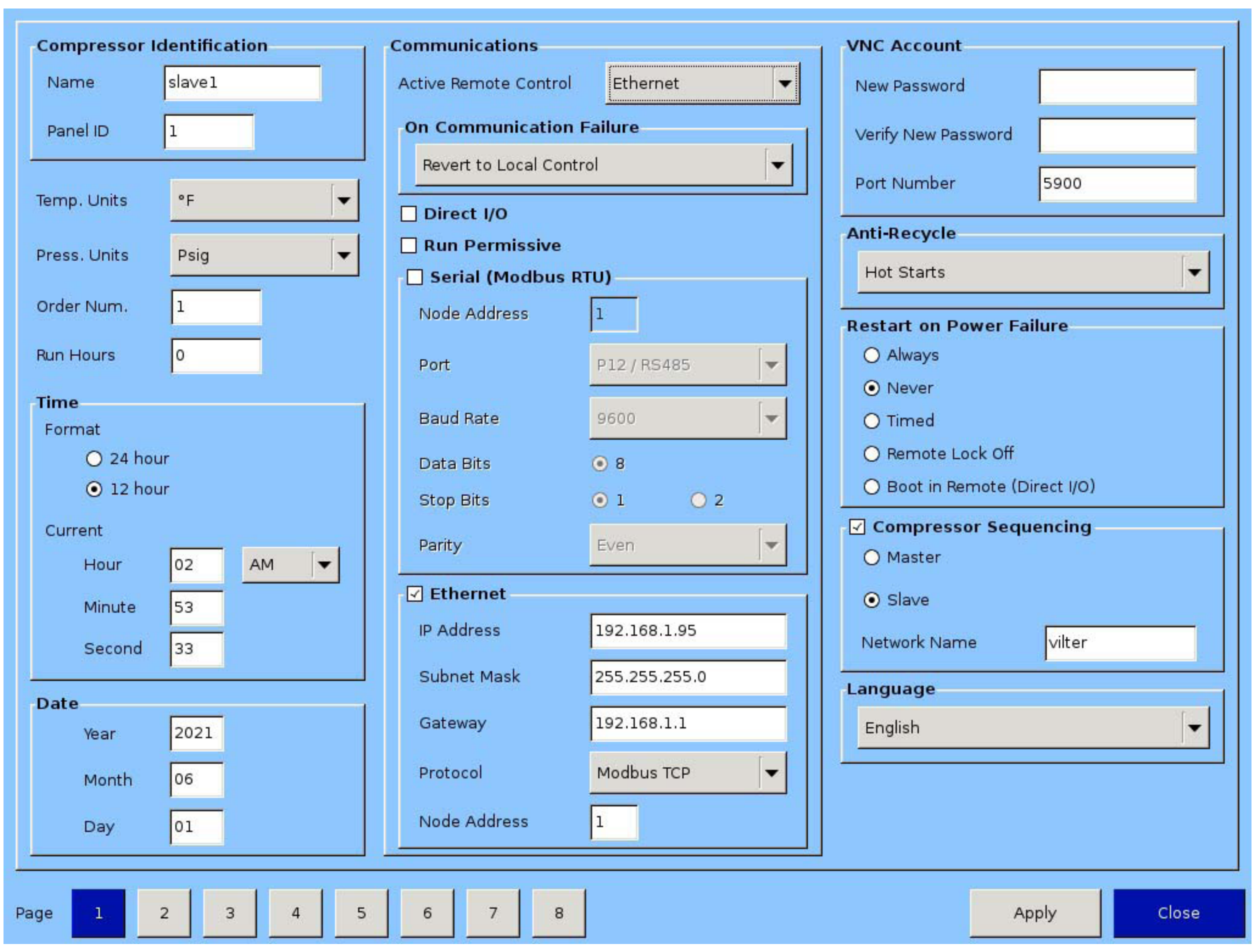


Figure 10-15. Compressor Setup for Compressor Sequencing (Slave)

At this point the slave compressor will begin multicasting its status information over the network at a rate of every 15 seconds. (After the Master Compressor is configured, the slave information will be populated in the Sequencing menu of the Master Compressor).

11. Exit out of the configuration screen and then put the slave in Remote mode by pressing Unit Start->Remote, see Figure 10-16.

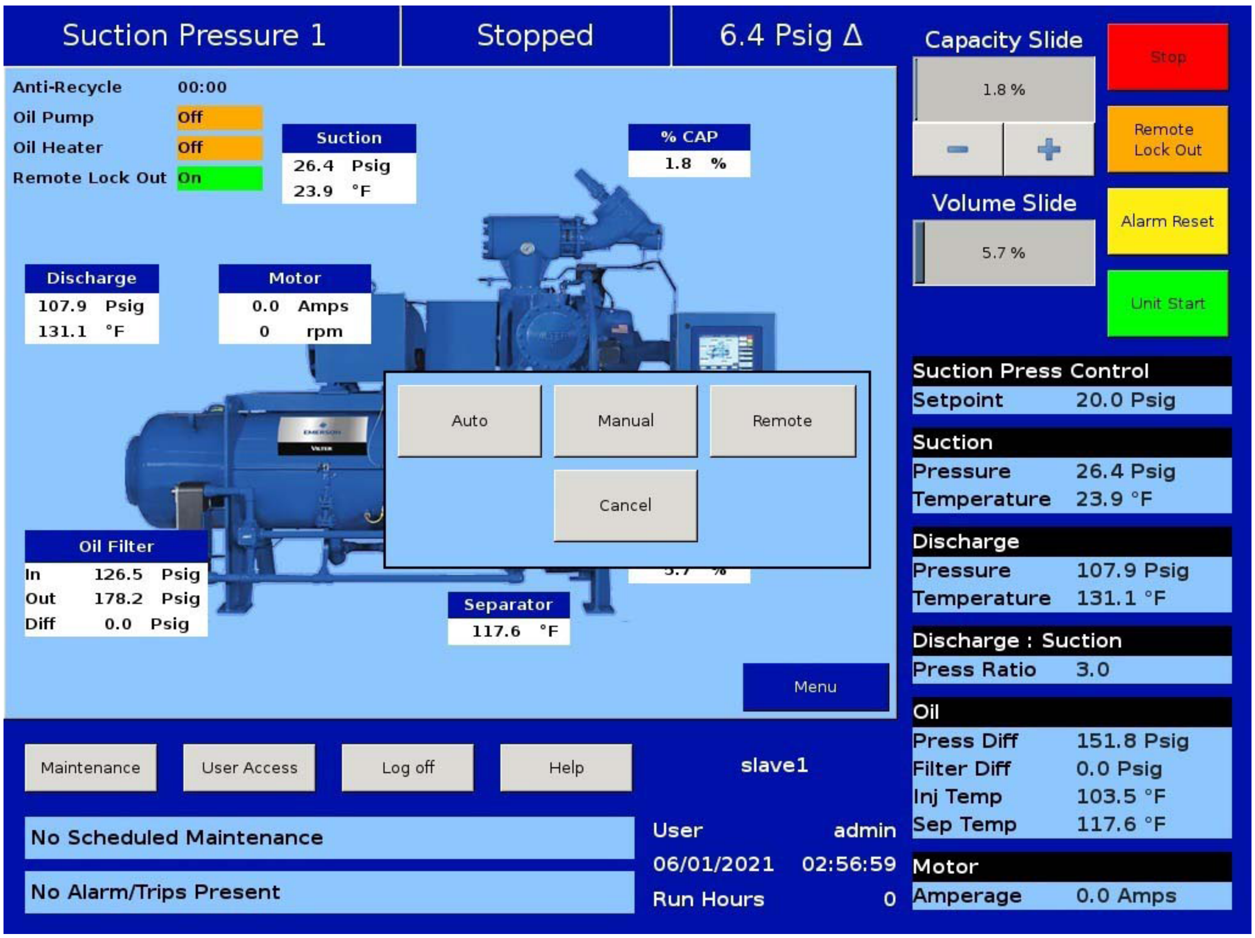


Figure 10-16. Placing Slave Compressors into Remote Mode

Setting Up The Master Compressor

NOTE

The master compressor will ALWAYS be the highest priority compressor – and act as the trim compressor. So this must be taken into account when deciding which compressor is to act as the master compressor.

Log onto the master compressor and navigate to the Configuration screen, see Figure 10-17.

1. Enable the Ethernet port and select the Modbus TCP protocol.
2. Setup a unique Ethernet IP address for the master.
3. Setup the Subnet Mask for the IP address.
4. Setup the Gateway address. (MUST DO!)
5. Enable the Compressor Sequencing check box and select “Master”.
6. Select a Network Name for the master compressor. (Network Name must be same for Master & Slave Compressors).
7. Select a Unique Name for the master compressor.
8. Set the Communications Active Remote Control to “ETHERNET”.
9. Apply these settings before exiting the Configuration screen.

At this point, the master will begin receiving the slave compressors information from the network and will populate it in the View Detected Devices pop-up of the Compressor Sequencing screen. If after a couple of minutes you do not see the slave compressors listed under the View Detected Devices list, then power cycle the master compressor panel.

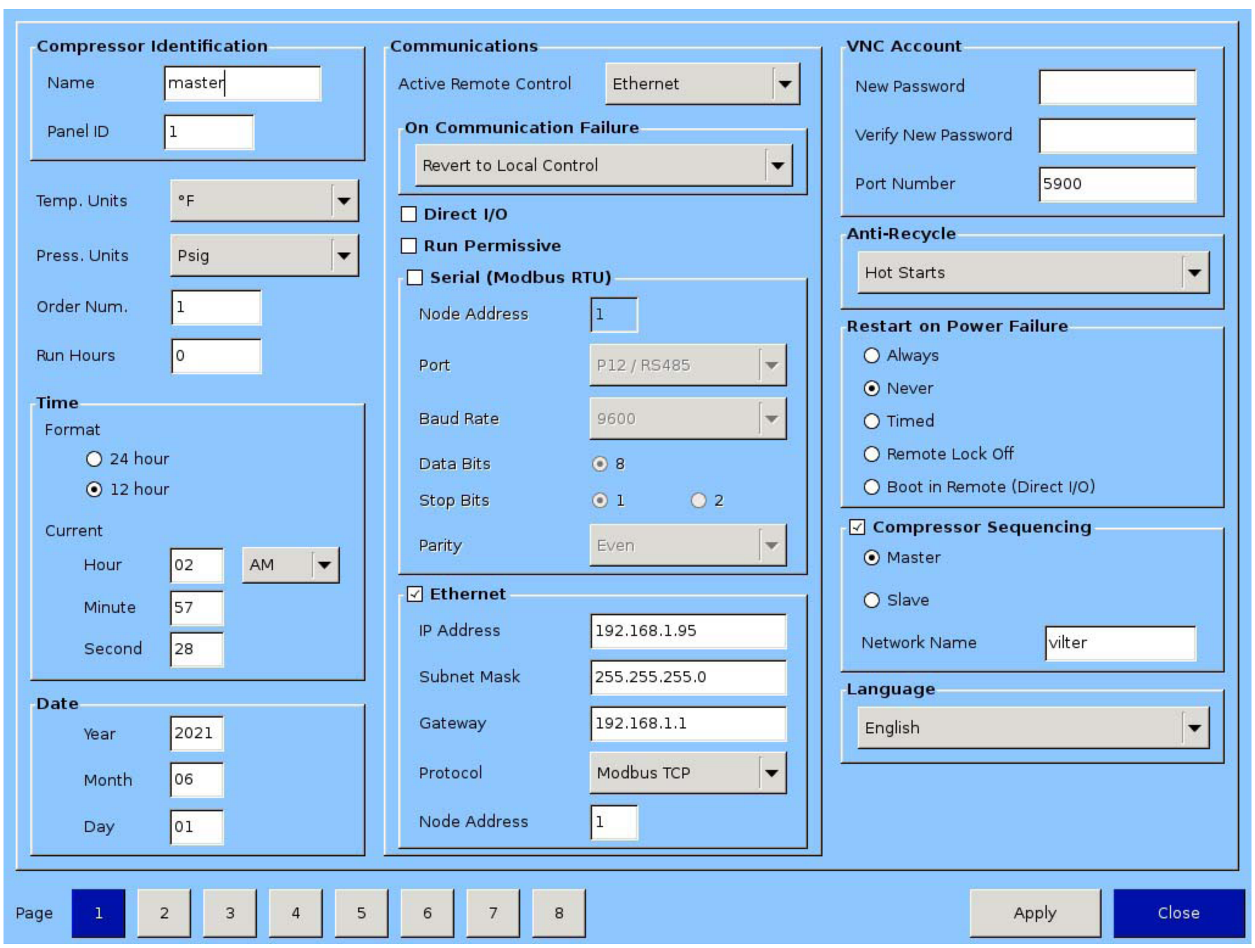


Figure 10-17. Compressor Setup for Compressor Sequencing Master

Overview

This screen allows the operator to view and adjust condenser setpoint settings associated with condenser operation. This screen will only be active if the Condenser Control option has been enabled from the Configuration Screen, see Figure 11-1.

The Condenser Control operation allows the cycling of fans and pumps in order to maintain a specific condensing pressure. The five different steps in step control allow selection of fans, pumps and VFD in one or more steps. When a VFD is employed, VFD is allowed to reach maximum speed, if additional capacity is needed, the next fan or pump is turned on. The VFD will modulate down and then once it is back up to 100% again, then the next fan or pump is turned on. This method allows the smoothest condenser control by spacing the VFD between the fan and pump steps, while maintaining a condenser pressure that matches the setpoint.

Condenser Control Setpoint

Run Mode:

- Run Mode allows the selection of different modes of operation for condenser control. The choices for selection are:

Run Never:

- The mode of operation by default. Condenser Control operation will not be performed when this mode is active.

Run With Comp:

- Automatic operation of condenser control selected when control of the condenser is required to only run when the compressor is running.

Run Always:

- Automatic operation of condenser control selected when control of the condenser is required to run even when the compressor is off.

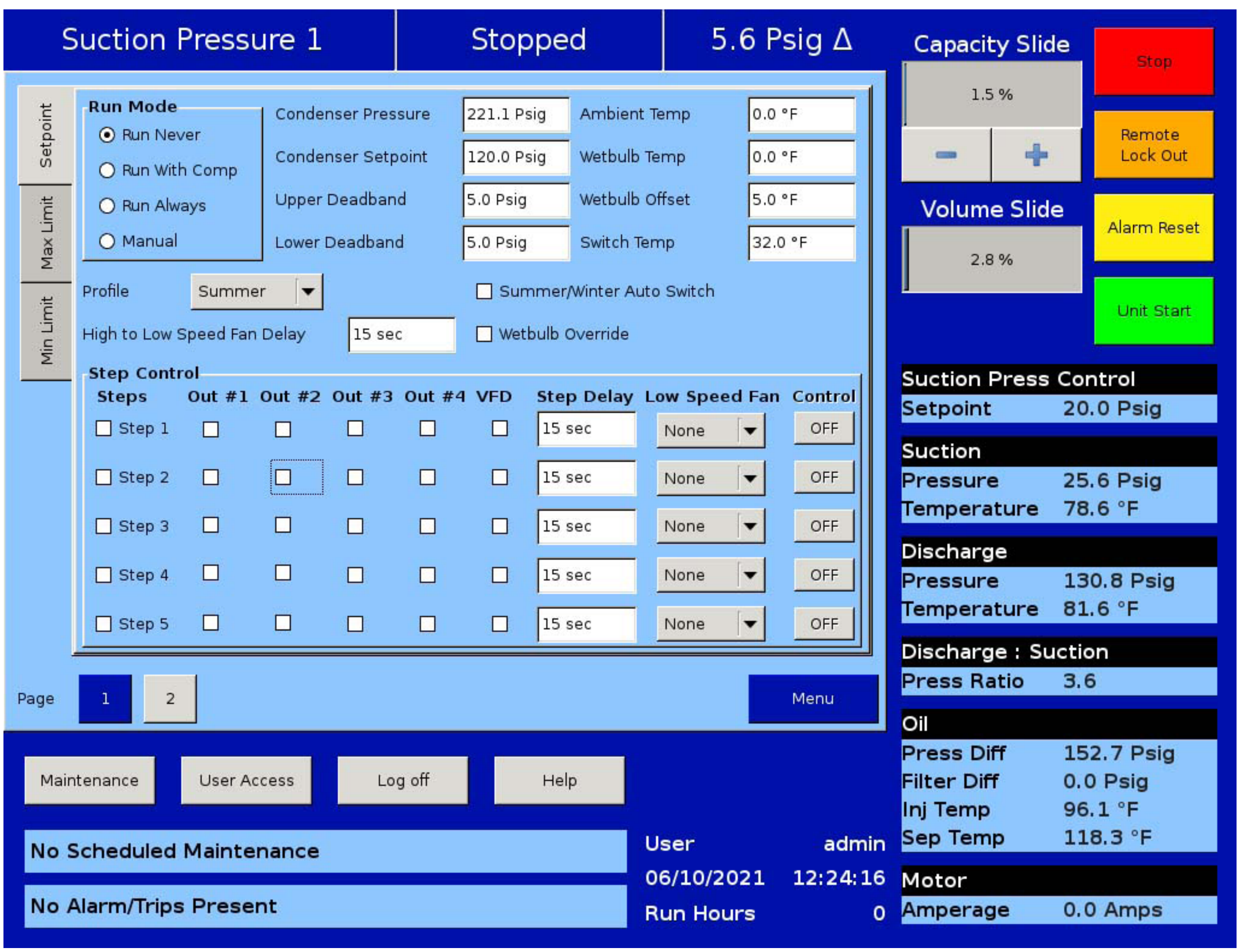


Figure 11-1. Condenser Control Screen Page 1

Manual:

- Mode for controlling condenser operation manually. Operator controls the operation by manual stepping using an on/off toggle button at each step.

Condenser Press:

- This is a read only parameter and it displays the present value of condenser pressure.

Condenser Setpoint:

- This is the condenser pressure setpoint that needs to be maintained.

Upper Deadband:

- This is the condenser pressure setpoint, upper deadband value. No additional condenser capacity is added when the condenser is selected for automatic step control and the condenser pressure falls within this deadband.

Lower Deadband:

- This is the condenser pressure setpoint, lower deadband value. Condenser capacity is not reduced when the condenser is selected for automatic step control and the condenser pressure falls within this deadband.

Ambient Temp:

- This is a read-only parameter and it displays the present value of ambient temperature. This is displayed only when Ambient Sensor is enabled from Configuration Screen.

Wetbulb Temp:

- This is a read-only parameter and it displays the present value of wetbulb temperature. This is displayed only when Wetbulb Sensor is enabled from Configuration Screen.

Wetbulb Offset:

- This is the offset value from wetbulb temperature as the override point.

Switch Temp:

- This is the ambient temperature setpoint used for automatic switching of profile from summer to winter and vice-versa.

Profile Selection:

- Profile selection allows operator to have two different output profiles for summer and winter. Operator can have different selection of fans, pumps & VFD in five steps of step control table. Different profiles allow inclusion/exclusion of water pumps in cold weather when summer/winter auto switch is enabled. This selection is inactive when Run mode is Auto and Summer/Winter Auto Switch is enabled.

High to Low Speed Fan Delay:

- This is a time delay for the fan spin down in case of 2- speed motor/dual speed fan.

Summer/Winter Auto Switch:

- This checkbox, when enabled, allows profiles to switch automatically depending on the ambient temperature setpoint when Run Mode is “Auto”. When ambient temperature falls below the ambient temperature setpoint, winter profile is used. Similarly when ambient temperature is above the ambient temperature setpoint, summer profile is used.

Wetbulb Override:

- This checkbox, when enabled, gives the operator a functionality to control energy wastage. When the condenser temperature reaches wetbulb temperature plus the operator given offset, then the condenser control operation does not add additional steps. This is done as it is not possible to lower the temperature anymore, and by adding more fans or pumps controls the operation by manually stepping using an on/off toggle button at each step.

Step Control

The Step Control allows the operator to setup the manner in which Fans, Pumps & VFD will be turned on/off. Fans & Pumps are connected on digital outputs Out #1 to Out #4. VFD Fan is connected on Analog Output. Each step can have a maximum of five outputs connected to it. Each step can be opted in or out depending on enabling of checkbox.

When Run Mode is Auto and condenser pressure rises above the upper deadband, the condenser step increments from Step 1 up to Step 5 and hence switching on/off Pumps, Fans & VFD connected on outputs. This holds true when decreasing steps from Step 5 to Step 1 when condenser pressure falls below the lower deadband.

Step Delay:

- Allows operator to set time delays between condenser steps. Condenser Pressure must be outside upper or lower deadband continuously for delay time in order to increase or decrease condenser steps. While in a VFD step, an additional step can only be added once VFD has reached its maximum speed setpoint and the delay timers are satisfied.
- Similarly in a VFD step, a step can only be removed once VFD has reached its minimum speed setpoint and the delay timers are satisfied. Step Delay acts as “ON” timer while loading and acts as “OFF” timer

while unloading for the same step.

Low Speed Fan:

- Allows steps to have option for time delay in case of fan spin down. Any of Out #1 to Out #4 can be selected as Low Speed Fan through combo box. E.g.: Let's say Out #2 is selected as Low Speed Fan in Step 2. When step 2 becomes active during condenser control operation which is after Step 2 time-out delay, Out #2 is left off for time as set by the operator in High to Low Speed Delay. After low speed fan energizes, then timer for Step 3 starts timing.

Control:

- Toggle any of the steps On/Off during Manual operation of Condenser Control. This button is active only when Run Mode selected is Manual. During Auto operation of Condenser Control, control button for active step will be "ON".

VFD Settings

This page is active only when Condenser VFD is selected in the Configuration Screen, see Section 19. For VFD controls refer to Figure 11-2. When a VFD Fan is used for condenser control operation, the speed of the VFD is controlled using PID algorithm.

P = Proportional (gain):

- Used to adjust the fan speed action in direct proportion to the difference between the control setpoint and the process variable (SP - PV = error). The proportional term is a unitless quantity and is used for coarse adjustment. This setpoint should be set to the lowest value that gives adequate control system response. Increasing the proportional setting increases the control system's sensitivity to small process fluctuations and the tendency to hunt.

I = Integral (reset):

- Used to adjust the capacity control action, integrating the error over time, to account for a small error that has persisted for a long time. This quantity is used for fine adjustment. This setpoint is used to smooth out process variations. This setpoint should be set high enough to prevent hunting but not too high or it will cause control system overshoot.

D = Derivative (rate):

- Used to adjust the capacity control action, accounting for how fast the error is changing, positively or negatively.

Maximum Speed:

- This setpoint defines the maximum speed in percentage for Condenser VFD Fan at which it should run for continuous step delay time to increase condenser steps. E.g. let's say setpoint is kept at 95%. Then condenser VFD fan will have to run at speed of 95% or more to advance to next step. Maximum Speed can be set as 100%, which is when analog output (at which condenser VFD fan is connected) reaches to 20mA in its normal range of 4-20 mA.

Minimum Speed:

- This setpoint defines the minimum speed in percentage for Condenser VFD Fan at which it should run for continuous step delay time to decrease condenser steps. E.g. let's say setpoint is kept at 5%. Then condenser VFD fan will have to run at speed 5% or less to advance to next step. Minimum Speed can be set as 0%, which is when analog output (at which condenser VFD fan is connected) reaches 4mA in its normal range of 4-20 mA.

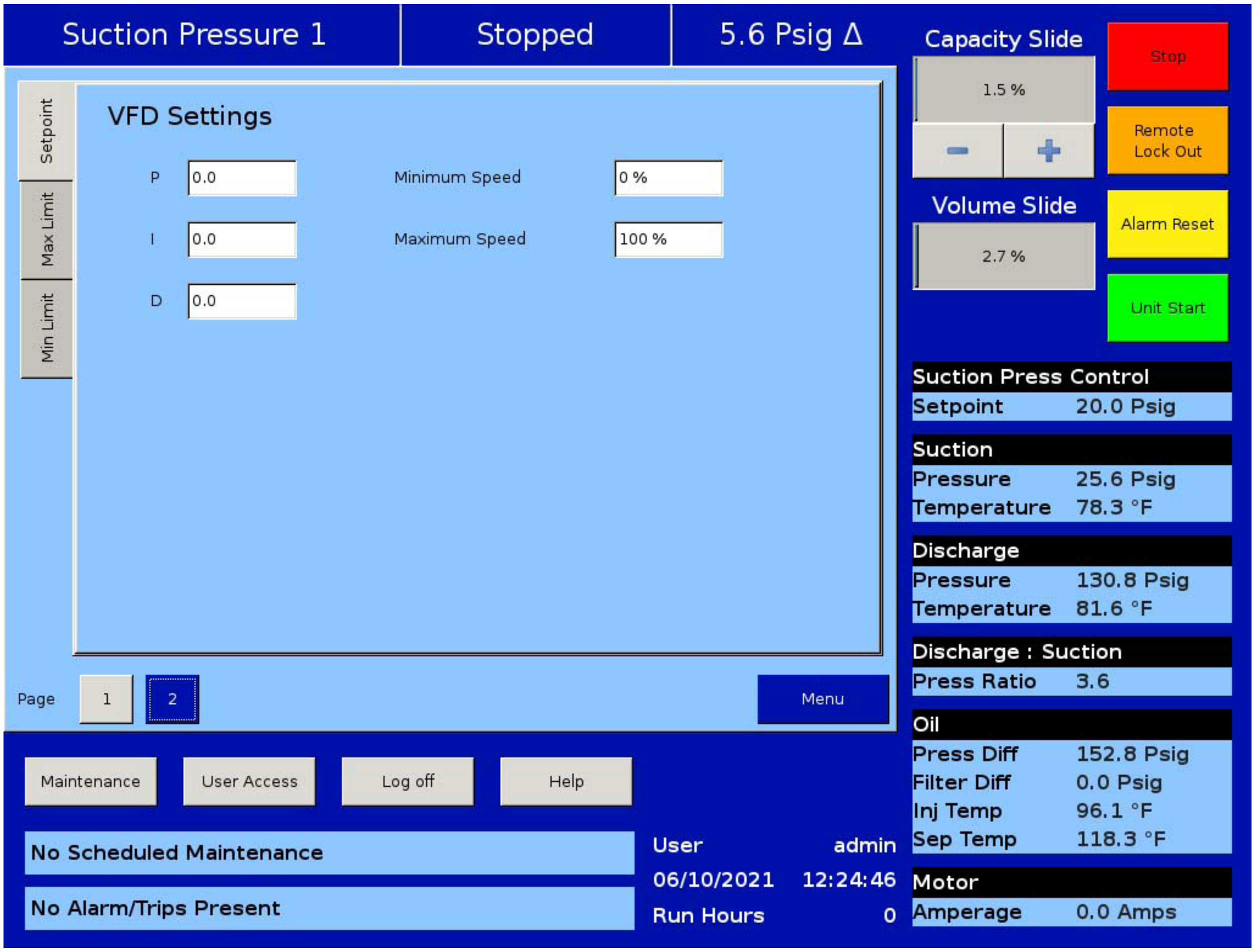


Figure 11-2. Condenser Control Screen
Page 2

Overview

The Service Option screen allows the operator the ability to force individual digital or analog outputs ON. This feature is used for diagnostic purposes during initial setup and/or if the operator suspects an issue with the outputs. The buttons in this screen are not available while the compressor is running.

Digital Outputs

The digital output buttons are momentary toggle buttons. The output will be active while the operator has his finger on the button. The output will deactivate when the operators finger is removed. The operator can measure the output at the terminal block or view the output by watching the LEDs located on the cards. For Digital Output screens, see Figures 12-1, 12-2, 12-3 and 12-4.

Reference Figure 12-1.

Compressor Start:

- Activates the output assigned to the compressor motor starter. The output is connected to terminal 11 and is the 1st LED on card 1.

Oil Pump Start:

- Activates the output assigned to the oil pump. The output is connected to terminal 12 and is the 2nd LED down on card 1.

Capacity Increase Motor:

- Activates the output assigned to the increase input of the capacity actuator. The output is connected to terminal 13 and is the 3rd LED down on card 1.

Capacity Decrease Motor:

- Activates the output assigned to the decrease input of the capacity actuator. The output is connected to terminal 14 and is the 4th LED down on card 1.

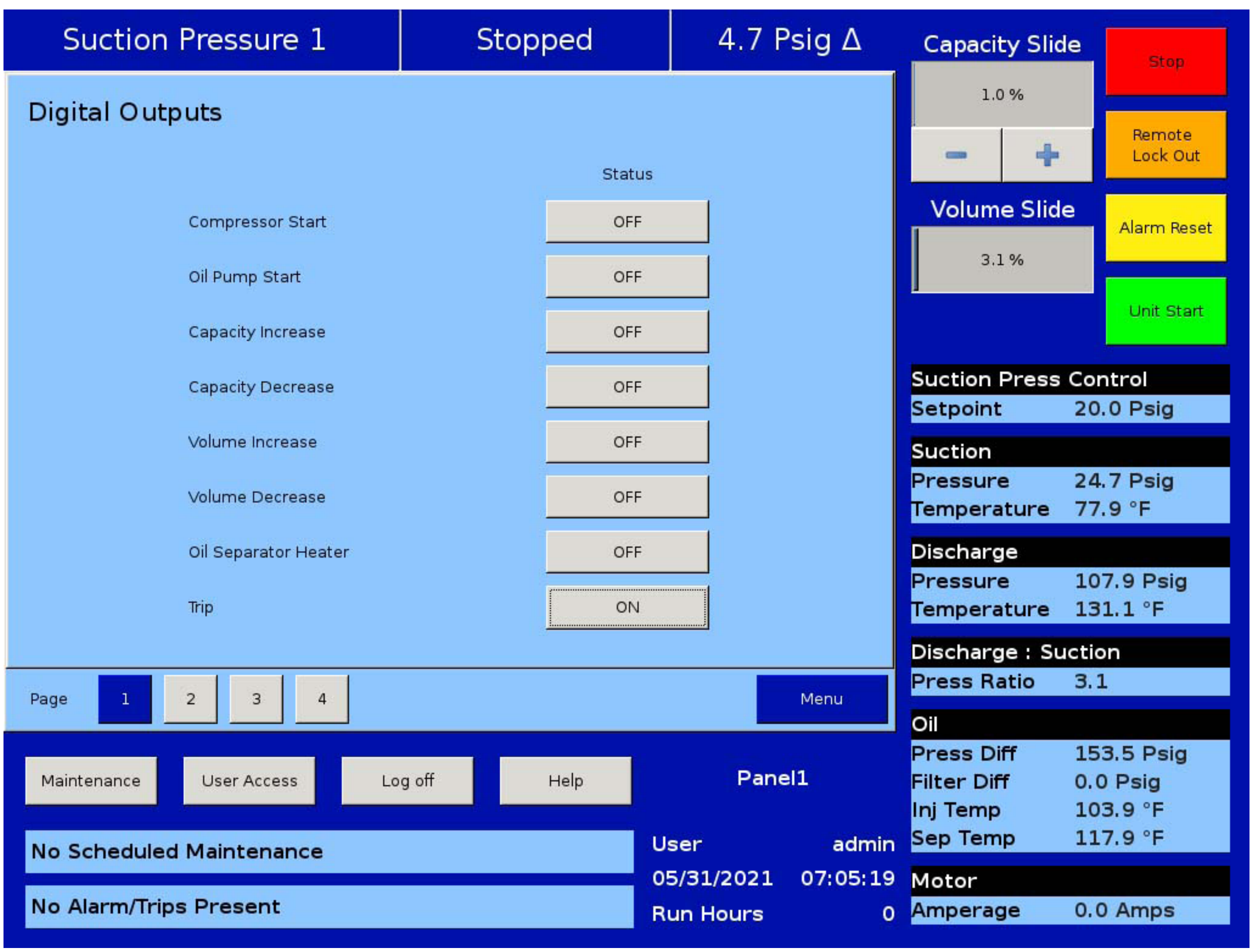


Figure 12-1. Service Options Screen - Digital Outputs (Page 1)

Volume Increase Motor:

- Activates the output assigned to the increase input of the volume actuator. The output is connected to terminal 15 and is the 5th LED down on card 1.

Volume Decrease Motor:

- Activates the output assigned to the decrease input of the volume actuator. The output is connected to terminal 16 and is the 6th LED down on card 1.

Oil Separator Heater:

- Activates the output assigned to the oil separator heater. The output is connected to terminal 17 and is the 7th LED down on card 1.

Trip:

- Deactivates the output during a trip or inhibit condition. This is a inverse acting output. The output is connected to terminal 18 and is the bottom LED on card 1.

Reference Figure 12-2.

Slide Valve Setpoint # 1 (Economizer):

- Activates the output typically assigned to the economizer solenoid, but can be changed by the operator. The output is connected to terminal 21 and is the 1st LED on card 2.

Slide Valve Setpoint # 2 (Hot Gas Bypass):

- Activates the output typically assigned to the hot gas bypass solenoid, but can be changed by the operator. The output is connected to terminal 22 and is the 2nd LED on card 2.

Alarm:

- Activates the output during an alarm condition. This is a inverse acting output. The output is connected to terminal 23 and is the 3rd LED on card 2.

Economizer Port # 2 :

- Activates the output typically assigned to the economizer solenoid. The output is connected to terminal 24 and is the 4th LED down on card 2.

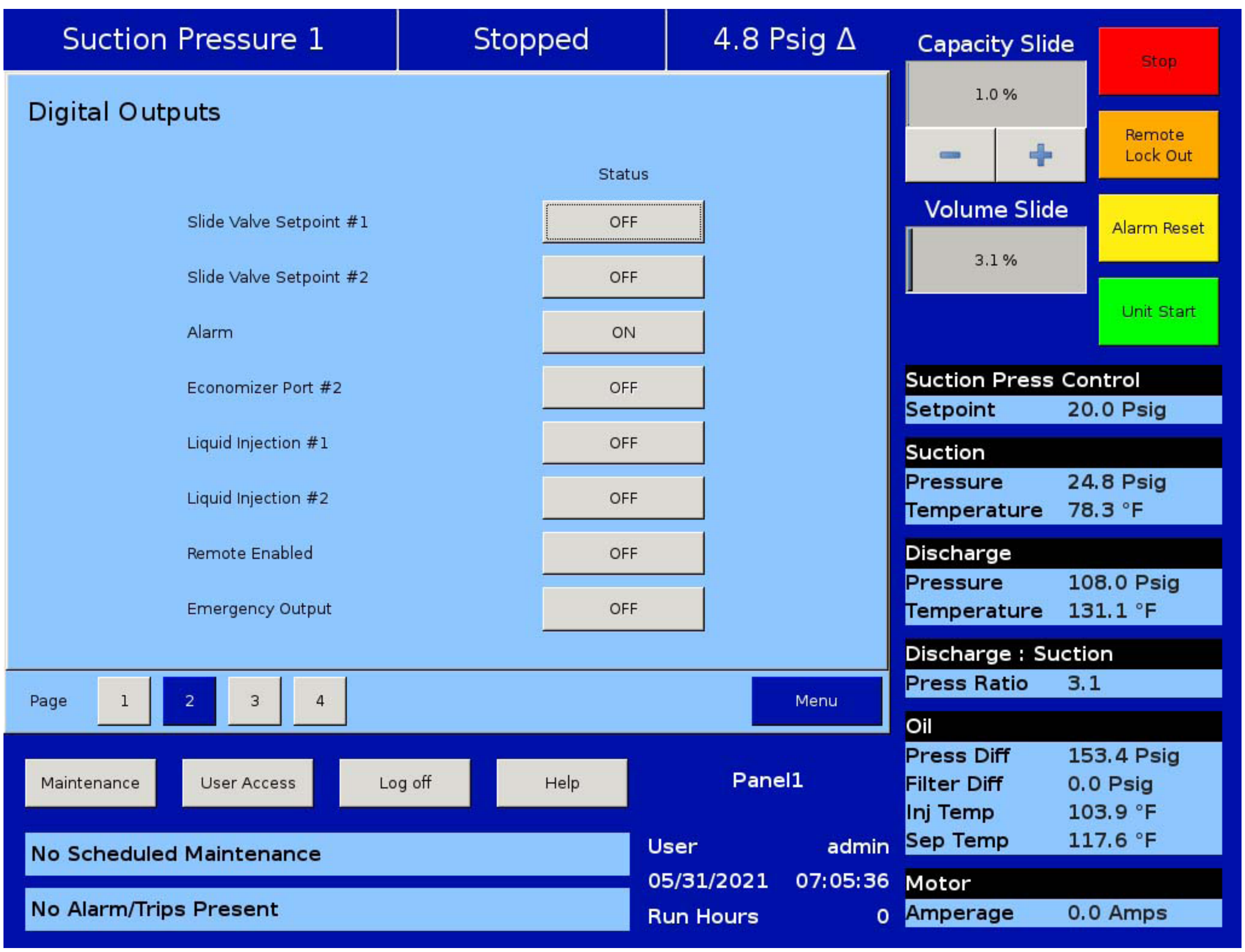


Figure 12-2. Service Options Screen - Digital Outputs (Page 2)

Liquid Injection # 1:

- Activates the output assigned to the liquid injection solenoid. The output is connected on terminal 25 and is the 5th LED on card 2.

Liquid Injection # 2:

- Activates the output assigned to the liquid injection solenoid. The output is connected on terminal 26 and is the 6th LED on card 2.

Remote Enabled:

- Activates the output assigned to notify a central control system of the Vission 20/20 running status. The output is connected to terminal 27 and is the 7th LED on card 2.

Shunt Trip:

- Activates the output during a false start condition when the emergency stop timer has expired. This output could be wired to a breaker with a shunt trip that feeds power to a starter to force a shutdown. The output is connected to terminal 28 and is the 8th LED on card 2.

Reference Figure 12-3 and Figure 12-4.

When Auxiliary Digital Input/Output board 4 and 5 is disabled in configuration screen, the corresponding Condenser / Remote Oil Cooler Step and Digital Aux out Button will not available.

Condenser / Remote Oil Cooler Step # 1:

- Activates the output assigned to the 1st step of the Condenser / Remote Oil Cooler. The output is connected to terminal 41 and is the 1st LED on card 4. When Run Always or Manual option is selected in Condenser control Screen, then this button will not be available for selection.

Condenser / Remote Oil Cooler Step # 2:

- Activates the output assigned to the 2nd step of the Condenser / Remote Oil Cooler. The output is connected to terminal 42 and is the 2nd LED down on card 4. When Run Always or Manual option is selected in Condenser control Screen, then this button will not be available for selection.

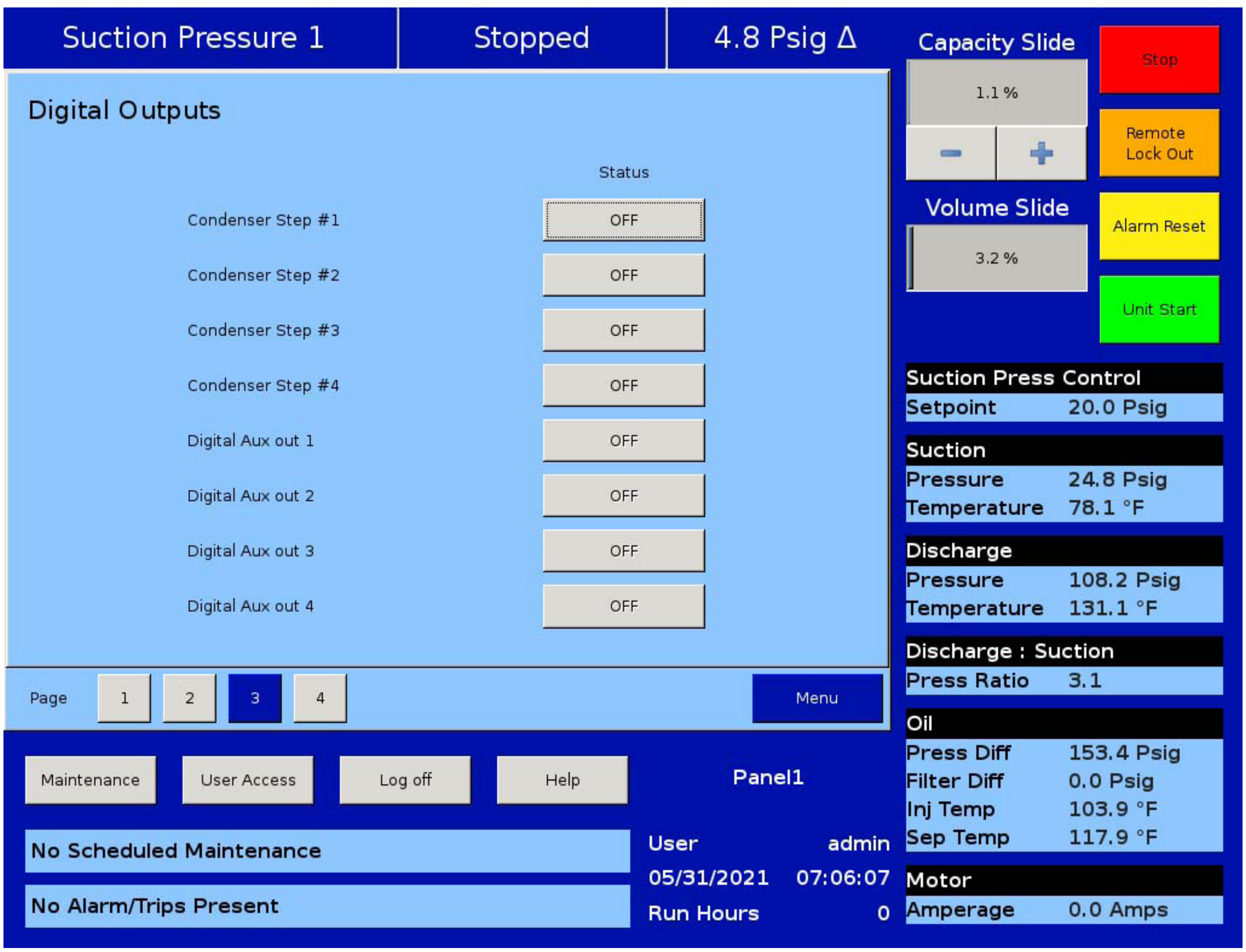


Figure 12-3. Service Options Screen - Digital Outputs (Page 3)

Condenser / Remote Oil Cooler Step # 3:

- Activates the output assigned to the 3rd step of the Condenser / Remote Oil Cooler. The output is connected to terminal 43 and is the 3rd LED down on card 4. When Run Always or Manual option is selected in Condenser control Screen, then this button will not be available for selection.

Condenser / Remote Oil Cooler Step # 4:

- Activates the output assigned to the 4th step of the Condenser / Remote Oil Cooler. The output is connected to terminal 44 and is the 4th LED down on card 4. When Run Always or Manual option is selected in Condenser control Screen, then this button will not be available for selection.

Digital Aux out 1:

- Activates the output assigned to the Digital Aux out 1. The output is connected to terminal 51 and is the 1st LED on card 5. If this output is enabled in Configuration Screen and Run Always option is selected in Auxiliary I/O Screen, then this button will not be available for selection.

Digital Aux out 2:

- Activates the output assigned to the Digital Aux out 2. The output is connected to terminal 52 and is the 2nd LED on card 5. If this output is enabled in Configuration Screen and Run Always option is selected in Auxiliary I/O Screen, then this button will not be available for selection.

Digital Aux out 3:

- Activates the output assigned to the Digital Aux out 3. The output is connected to terminal 53 and is the 3rd LED on card 5. If this output is enabled in Configuration Screen and Run Always option is selected in Auxiliary I/O Screen, then this button will not be available for selection.

Digital Aux out 4:

- Activates the output assigned to the Digital Aux out 4. The output is connected to terminal 54 and is the 4th LED on card 5. If this output is enabled in Configuration Screen and Run Always option is selected in Auxiliary I/O Screen, then this button will not be available for selection.

Figure 12-4. Service Options Screen - Digital Outputs for Remote Oil Cooler (Page 3)

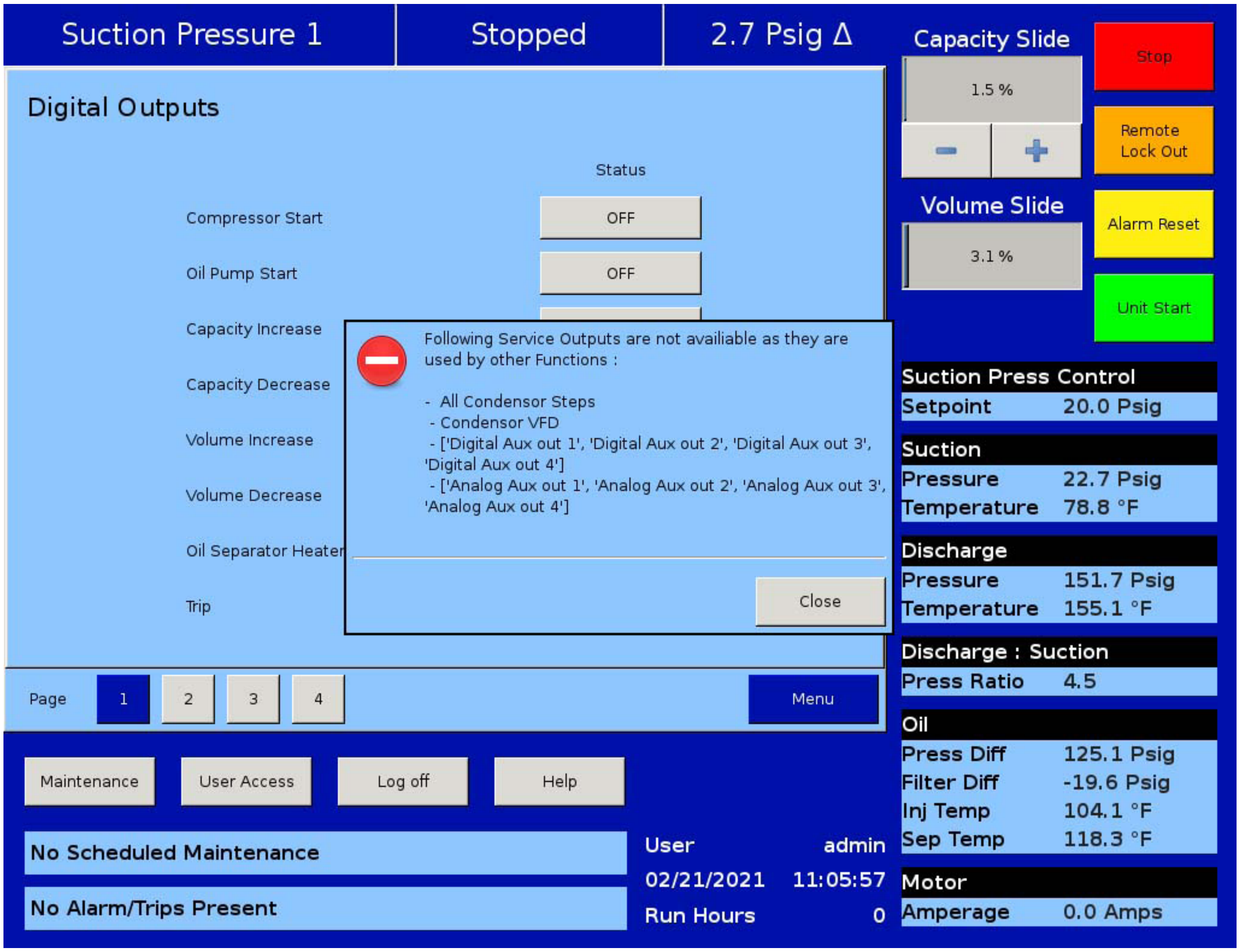


Figure 12-5. Service Options Screen - Digital Outputs with Info Dialog Box (Page 1)

Analog Outputs

The Analog Output (AO) selections allow the operator to enter a desired value of the output then turn on the output, see Figure 12-6 and 12-7. The operator will have to measure the output using a meter capable of measuring a 4-20mA signal.

Compressor VFD:

- Sets the analog output assigned to the compressor VFD. The output is connected to AO #1 on card 10.

Condenser / Remote Oil Cooler VFD:

- Sets the analog output assigned to the Condenser / Remote Oil Cooler VFD. The output is connected to AO #2 on card 10. When Run Always or Manual option is selected in Condenser control Screen, then this button will not be available for selection.

% Slide Valve Position

- Sets the analog output assigned to the Slide Valve position used to inform a central control system of the capacity position. The output is connected to AO #3 on card 10.

Liquid injection Motorized Valve:

- Sets the analog output assigned to the liquid injection motorized valve position. The output is connected to AO #4 on card 10.

Analog Aux out 1:

- Sets the analog output assigned to Analog Aux out 1. The output is connected to AO #5 on card 10. If this output is enabled in Configuration Screen and Run Always option is selected in Auxiliary I/O Screen, then this button will not be available for selection. See Figure 12-7.

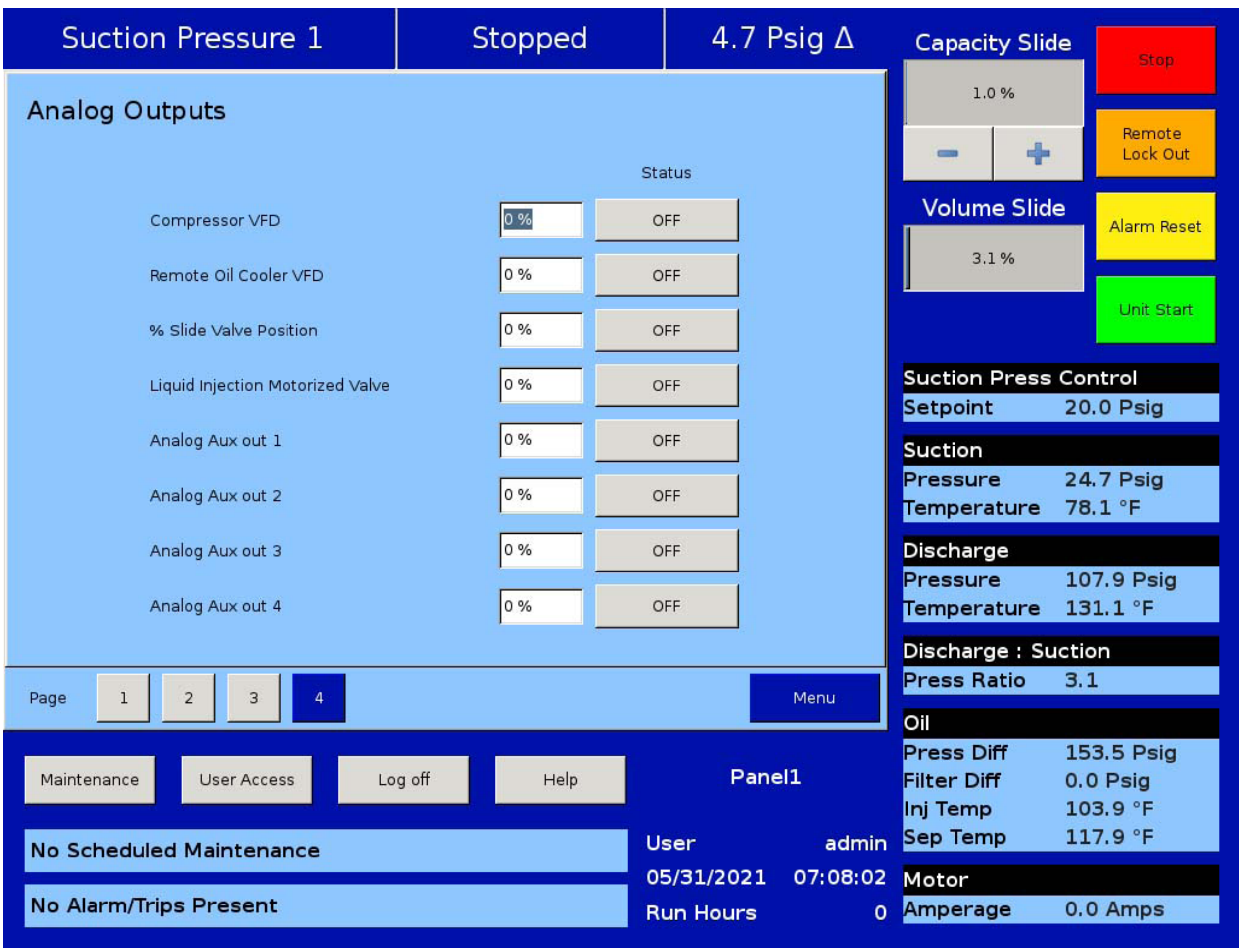


Figure 12-6. Service Options Screen - Analog Outputs (Page 4)

Analog Aux out 2:

- Sets the analog output assigned to Analog Aux out 1. The output is connected to AO #6 on card 10. If this output is enabled in Configuration Screen and Run Always option is selected in Auxiliary I/O Screen, then this button will not be available for selection. See Figure 12-7.

Analog Aux out 3:

- Sets the analog output assigned to Analog Aux out 1. The output is connected to AO #7 on card 10. If this output is enabled in Configuration Screen and Run Always option is selected in Auxiliary I/O Screen, then this button will not be available for selection. See Figure 12-7.

Analog Aux out 4:

- Sets the analog output assigned to Analog Aux out 1. The output is connected to AO #8 on card 10. If this output is enabled in Configuration Screen and Run Always option is selected in Auxiliary I/O Screen, then this button will not be available for selection. See Figure 12-7.

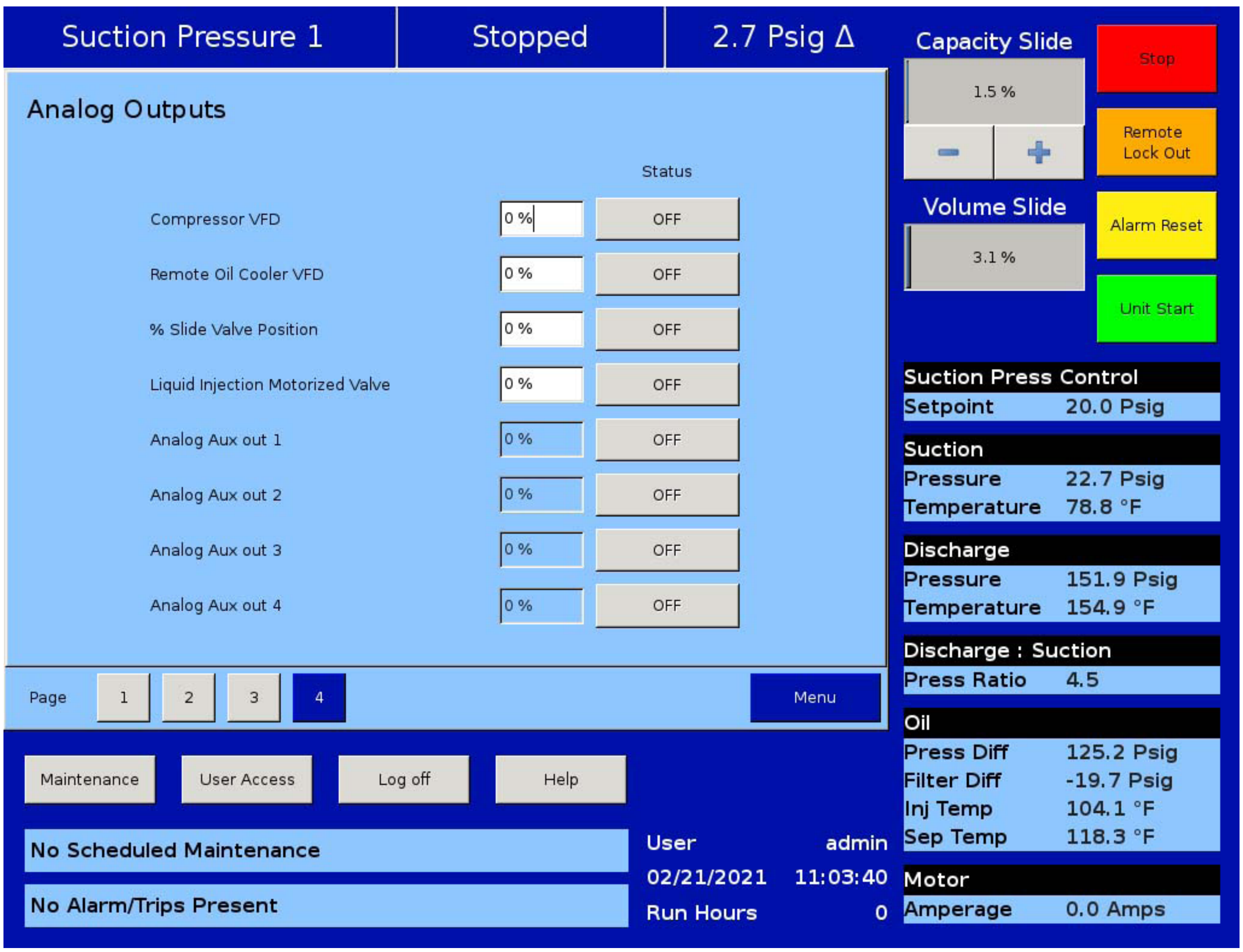


Figure 12-7. Service Options Screen - Analog Auxiliary Outputs – Greyout (Page 4)

Overview

The Instrument Calibration screen allows the operator to define how the Vission 20/20 will interpret the signal from any devices attached to the panel's analog inputs. The instrument calibration screen is organized in up to six pages. Each page is then divided into several left side selected tabs. Each tab will be headed with an information bar labeled "I/O" that gives the basic information for that device. The "A/D bit Value" display box shows the unmodified value read by the Vission 20/20 analog to digital converters. This display box is not affected by any changes to the calibrations settings. As long as a device is connected to the associated input, there will be a value in this display box. The "Calibrated Value" display box shows the end result of the calibration process. Therefore, any changes to the calibration setpoint will effect what value is shown.

All instruments are calibrated using a two point linear calibration process. Any device that has a non-linear response to environmental stimuli will not be able to be calibrated through the Vission 20/20.

Pressure and Temperature Inputs

The most commonly used instruments are temperature and pressure sensors. The first two pages of the Instrument Calibration screen are dedicated to these instruments; see Figures 13-1 and 13-2.

Each tab on these two pages is divided into two sections, Device Calibration and Channel Calibration. The device calibration section is where the operation parameters of the instrument are defined. The channel calibration defines the type of signal sent by the instrument.

Default Devices:

- By selecting this option, the operator will have access via a drop-down box to several common devices. The devices are predefined and if one is selected, then all the setpoints will be set for the operator.

Custom Device:

- This option allows the operator to choose the minimum and maximum value of the instrument being used.

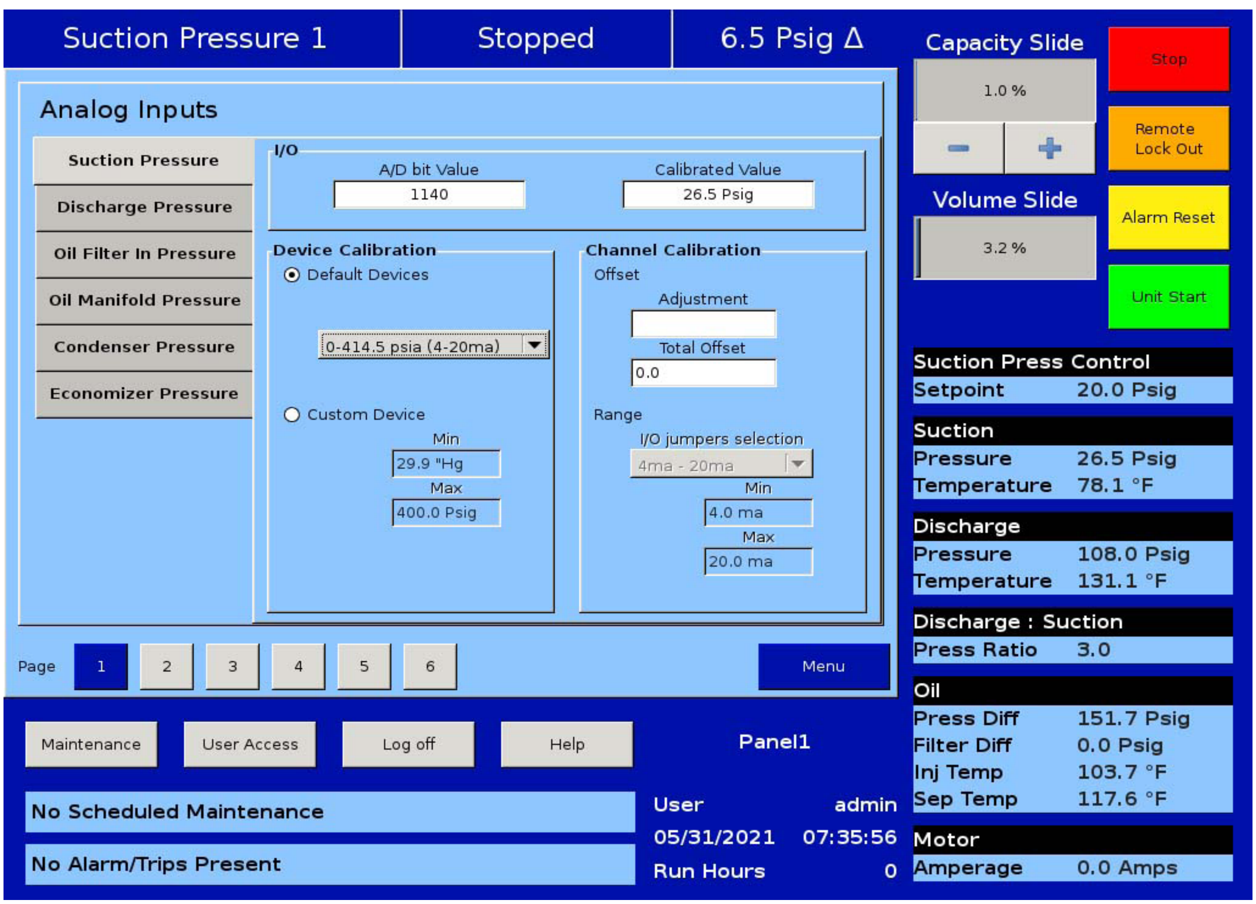


Figure 13-1. Instruments Calibration Screen - Analog Inputs (Page 1)

Offset:

- Once the two point calibration is completed, it is not uncommon for a small error to exist. By entering the value of the error from the calibrated value and the actual value into the adjustment entry box, that error will be added/subtracted from the total offset. The offset is applied to the calibrated value which should correct the error.

Range:

- This option is available when the custom device option is chosen. Here the operator defines the signal type and range transmitted by the instrument. The operator can choose from several predefined ranges in the drop-down box or enter a value.

Process Control Inputs

Page three of the Instrument Calibration screen is dedicated to instruments used for Process Control; see Figures 13-3 and 13-4.

The Process Control tab on this page will display either Temperature or Pressure depending on the selected control model. The tab is divided into two sections, Device Calibration and Channel Calibration with Default and Custom Devices as well as Offset and Range Calibration features as described for the standard Pressure and Temperature Inputs.

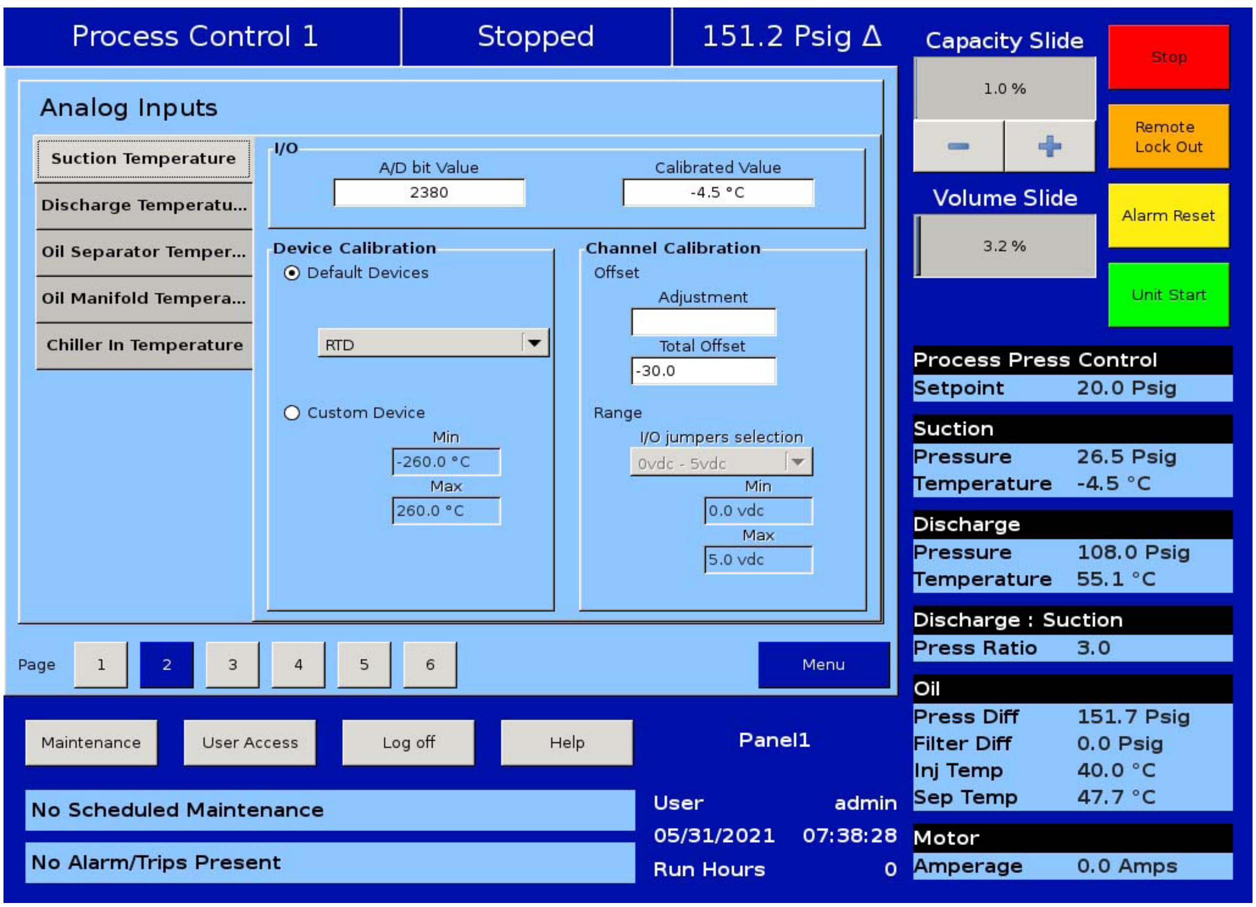


Figure 13-2. Instruments Calibration Screen - Analog Inputs (Page 2)

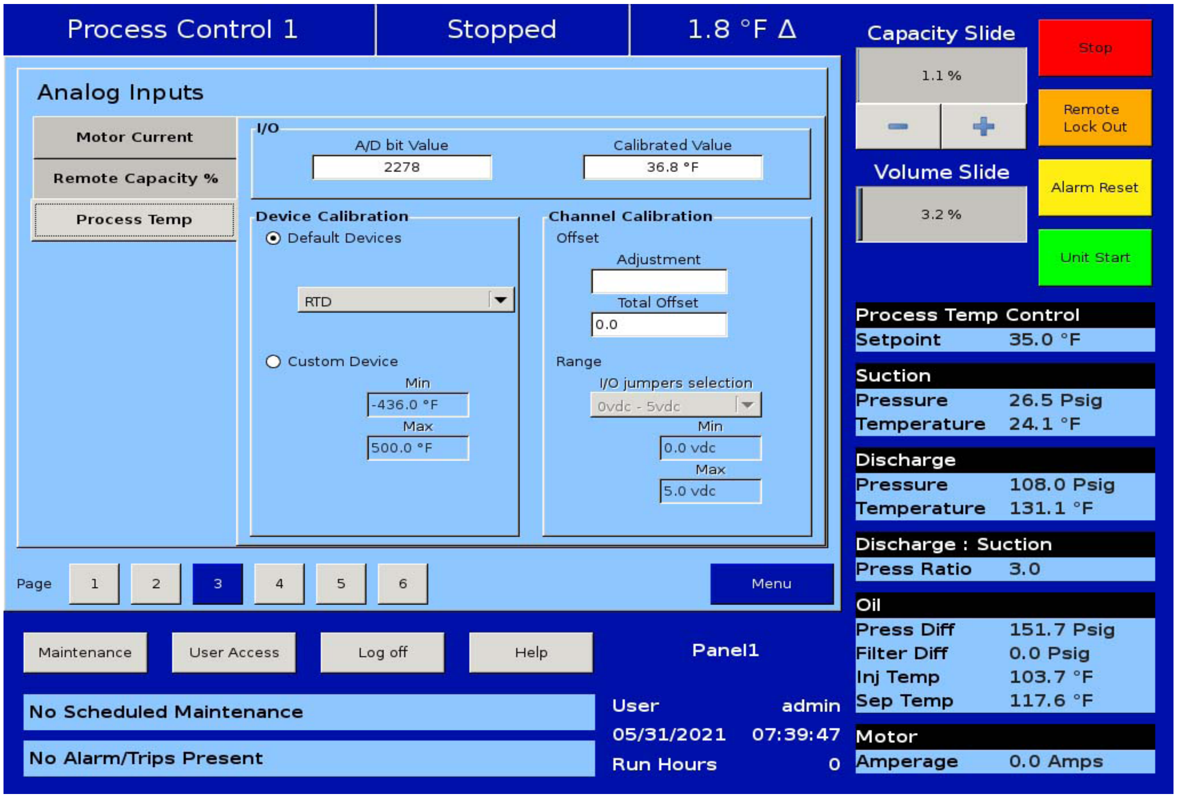


Figure 13-3. Instruments Calibration Screen - Process Temperature (Page 3)

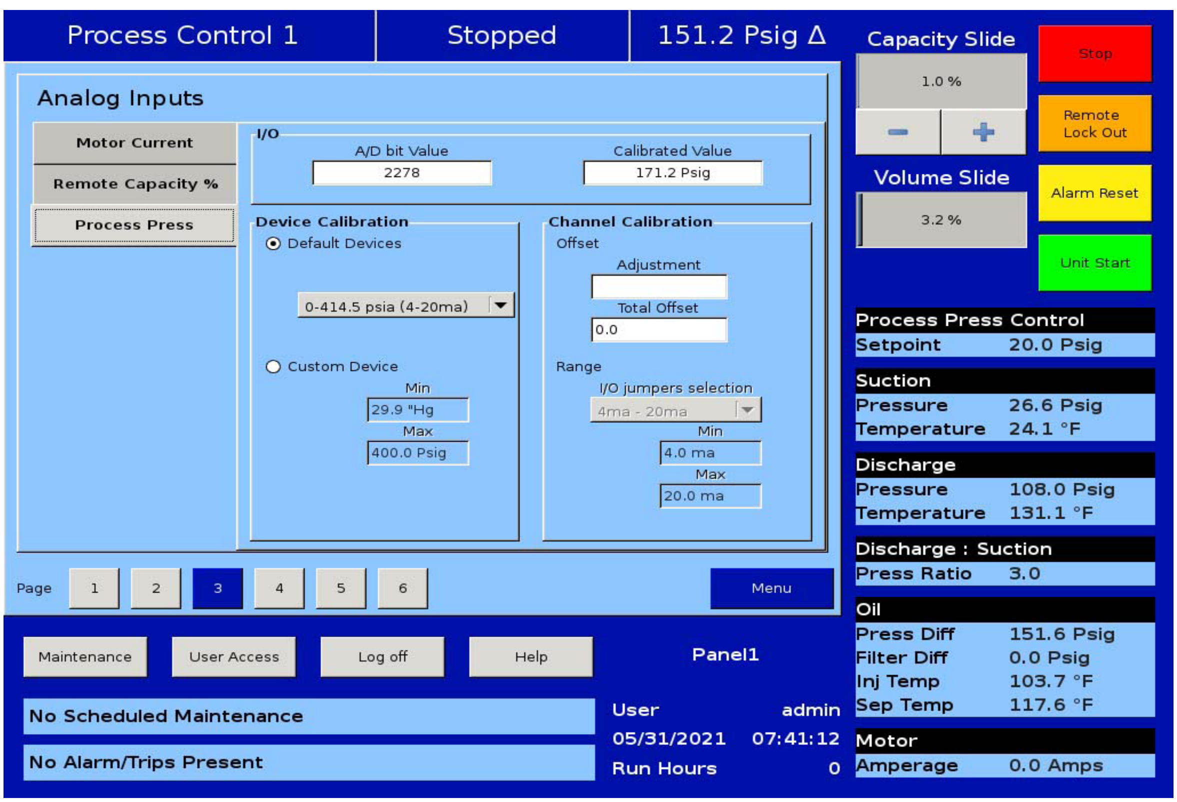


Figure 13-4. Instruments Calibration Screen - Process Pressure (Page 3)

Motor Current

The Vission 20/20 has two options for measuring motor current. A 4-20mA signal transmitted from an external device or a 0-5Amp AC current Transformer. The type of device being used is selected in the Configuration Screen, an Motor Current Device in Section 19.

The motor current tab has the ability to calibrate both measurement options through the 4-20mA scale and current transformer ratio sections, see Figure 13-5. However, the type of device that is selected in the configuration screen will be the only section available to the operator.

The calibration differs from all other calibration procedures in that the motor current must be calibrated while the compressor is running at close to full load amps as much as possible. In addition, the operator will need to enter a value into the "Enter Desired Value" entry box that is equal to the measured value in amps by a calibrating measurement device. After entering the measured value, the displayed motor current may still be off slightly. In this case re-enter the desired value and the displayed value should get progressively closer.

4-20mA Scale:

- **4mA:**

Not editable by the operator. Defines the minimum value in amps represented by a 4mA input.

- **20mA:**

Defines the maximum value in amps represented by a 20mA input.

- **Enter Desired Value:**

The operator enters the correct current value. Each entry will recalculate the point-slope calculations of the current calibration.

- **Total Error:**

Not editable by the operator. Displays the total error offset of the entries from the "Enter Desired Value" setpoint.

Current Transformer Ratio:

- **Primary**

Defines the upper value of the current transformer.

- **Secondary:**

Not editable by the operator. Defines the minimum value of the current transformer.

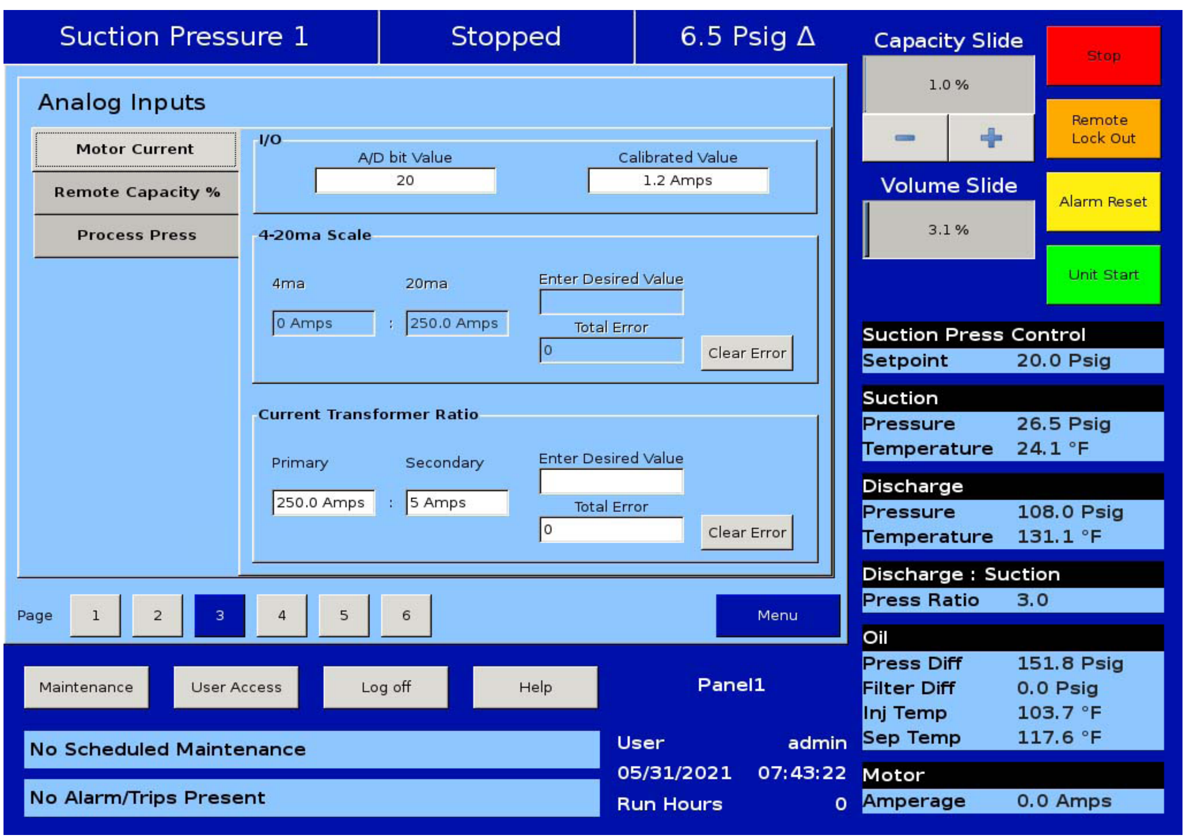


Figure 13-5. Instruments Calibration Screen - Motor Current (Page 3)

- **Enter Desired Value:**

The operator enters the value of the correct current value. Each entry will recalculate the point-slope calculations of the current calibration.

- **Total Error:**

Not editable by the operator. Displays the total error offset of entries from the “Enter Desired Value” setpoint.

Remote Capacity

The remote capacity input allows a system controller (such as a PLC) to control the capacity position during direct I/O control.

Scale:

- Defines the minimum and maximum Capacity position between 0% & 100% for the 4-20ma input.

Offset:

- Used to correct any error in the capacity position. By entering a value into the Adjustment entry box, that value will be added to the total offset displayed in the “total offset” entry box.

Analog Inputs

This section of the Calibration screen allows the operator to define the parameters of an installed auxiliary analog instrument. These instruments are usually not part of a typical compressor set-up but Vission 20/20 provides a way for the operator to add additional capabilities. The layout of this screen is typical to the pressure and temperature calibration screens. For Analog Inputs screens, see Figures 13-6 and 13-7.

Device Calibration:

- These setpoints allow the operator to define what the input from the auxiliary instrument means in terms of units and range. If a temperature measuring instrument is connected, then the operator would select temperature from the Unit drop-down box then set the maximum and minimum value for the scale.

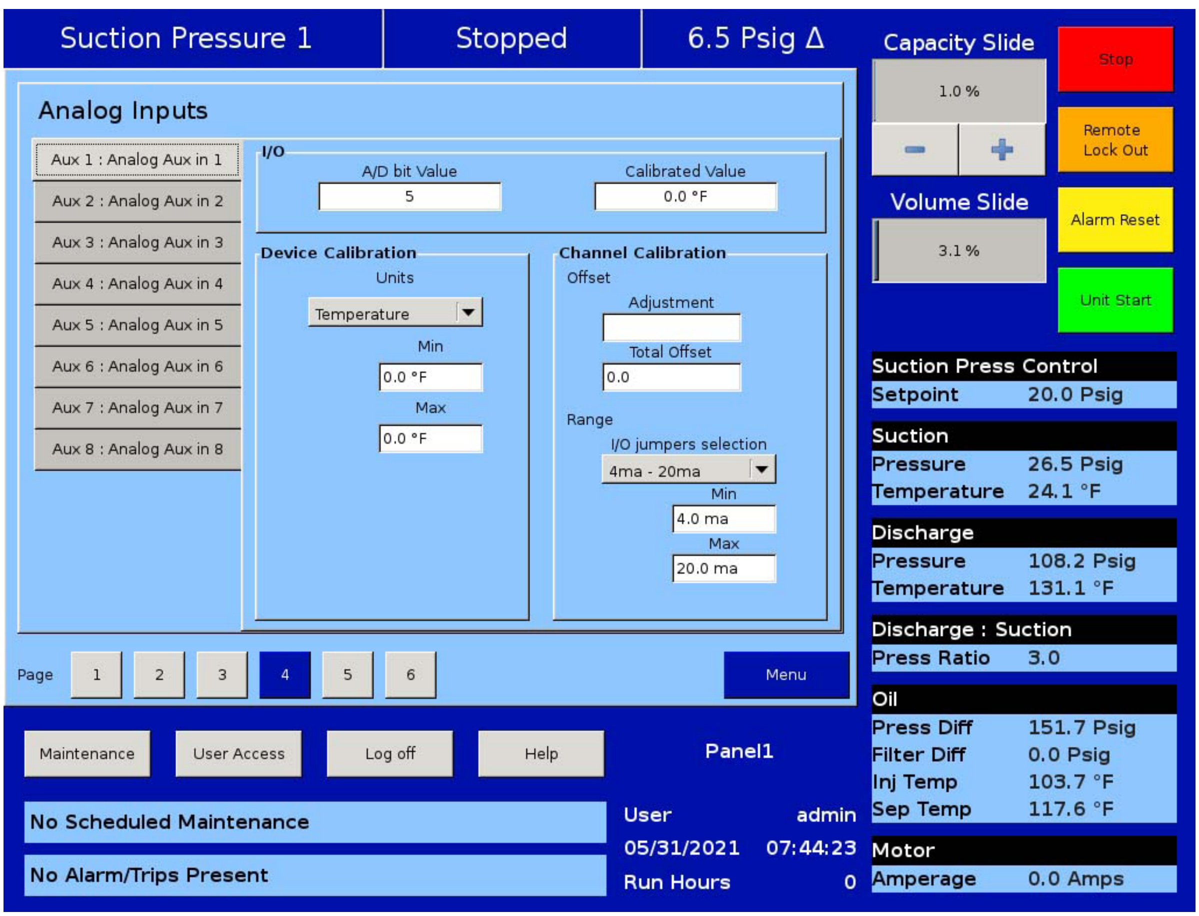


Figure 13-6. Instruments Calibration Screen - Analog Inputs (Page 4)

Offset:

- Once the two-point calibration is completed, it is not uncommon for a small error to exist. By entering the value of the error from the calibrated value and the actual value into the adjustment entry box, that error will be added/subtracted from the total offset. The offset is applied to the calibrated value which should correct the error.

Range:

- Here the operator defines the signal type and range transmitted by the instrument. The operator can choose from several predefined ranges in the drop-down box or enter a value.

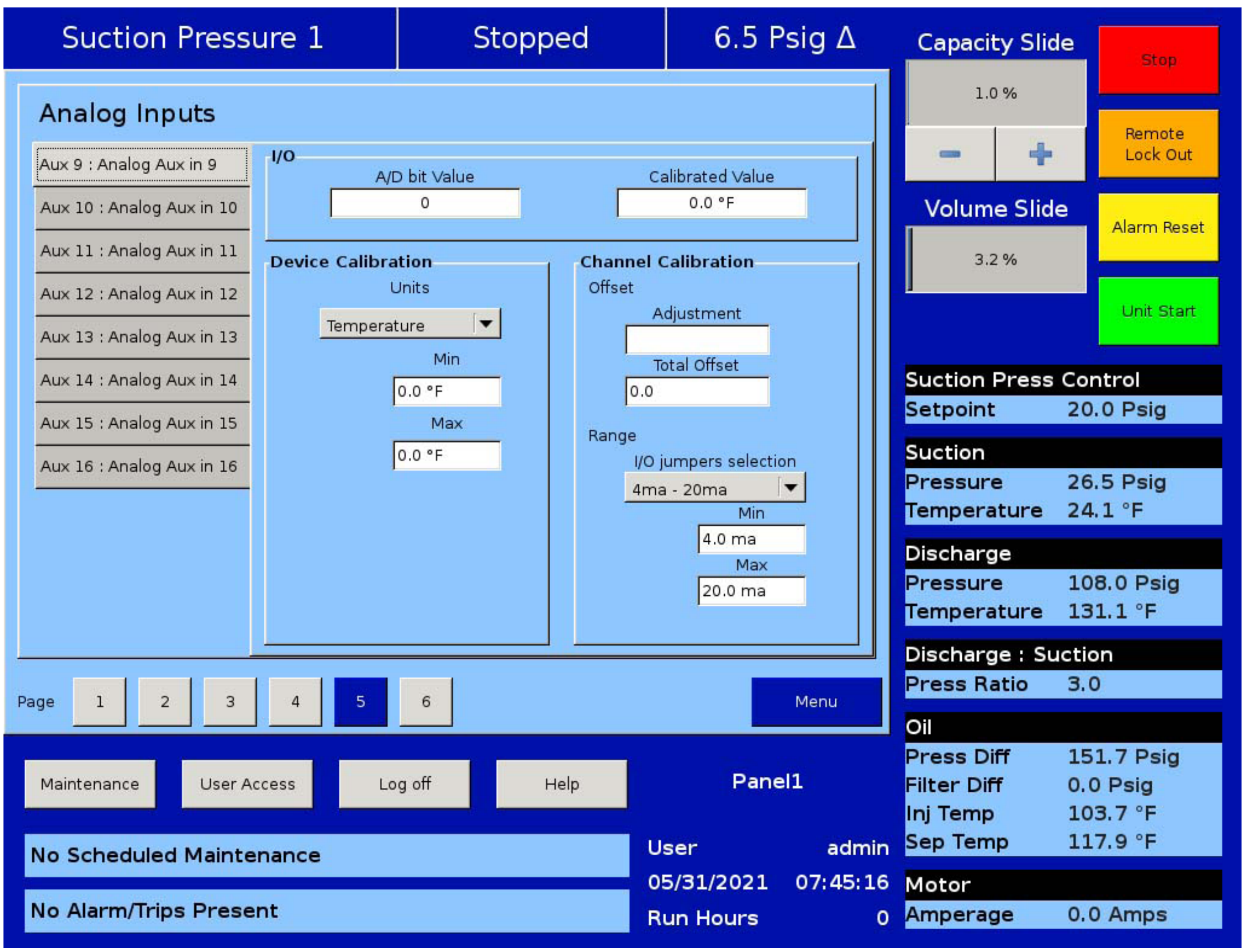


Figure 13-7. Instruments Calibration Screen - Analog Inputs (Page 5)

Analog Outputs

The Analog output card of the Vission 20/20 generates a 4–20mA signal to any attached devices. However, it is not uncommon that a small difference in the board components might result in a small difference in the output. So this screen offers the operator the ability to fine tune the upper and lower output values, see Figure 13-8.

Condenser VFD / Remote Oil cooler VFD is enabled in Configuration Screen and Run Always /Manual option is selected in Condenser Control / Remote Oil Cooler Screen. Condenser VFD /Remote Oil Cooler, Test Limits button and offset will not be available for selection.

Auxiliary Analog Outputs is enabled in Configuration Screen and Run Always option is selected in Auxiliary I/O Screen, then Test Limits buttons and offsets will not be available for selection. See Figure 13-9.

Test Limits:

- By pressing either the Test Min or Test Max buttons, the output will go to either 4mA or 20 mA. The operator can then measure the output for accuracy.

Min (mA):

- If the 4mA output has an unacceptable amount of error, the operator can add or subtract a value to adjust the output.

Max (mA):

- If the 20mA output has an unacceptable amount of error, the operator can add or subtract a value to adjust the output.

Offset (mA):

- By entering the value of the error from the calibrated value and the actual value into the offset entry box, that error will be added/subtracted from the mA value. The offset is applied to the mA value which should correct the error. Resolution of error should not be less than 0.01.

Apply Changes:

- Min (mA) and Max (mA) values are stored to database on by pressing this button. The offset (mA) value which is used to correct 4mA or 20mA output is hence not saved until this button is pressed.

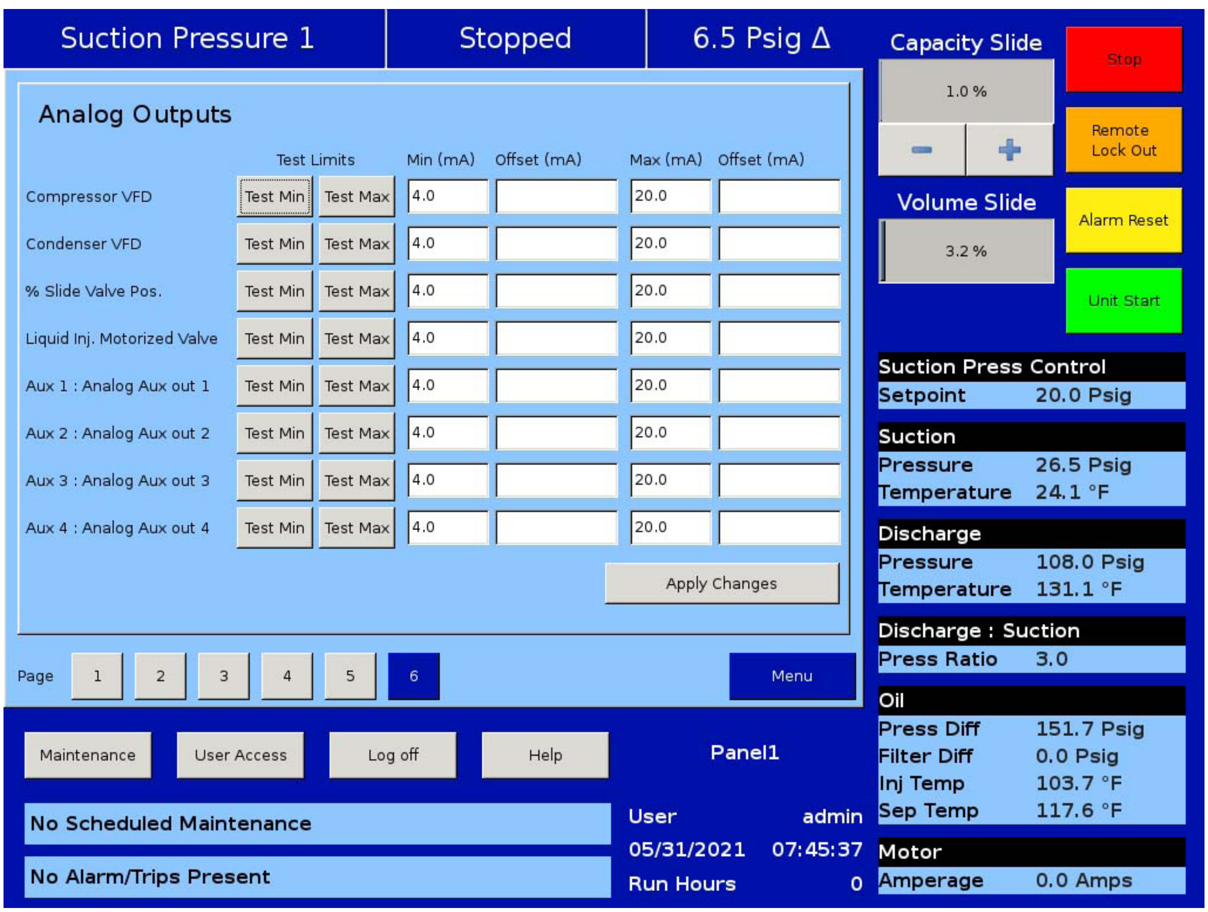


Figure 13-8. Instruments Calibration Screen - Analog Outputs (Page 6)

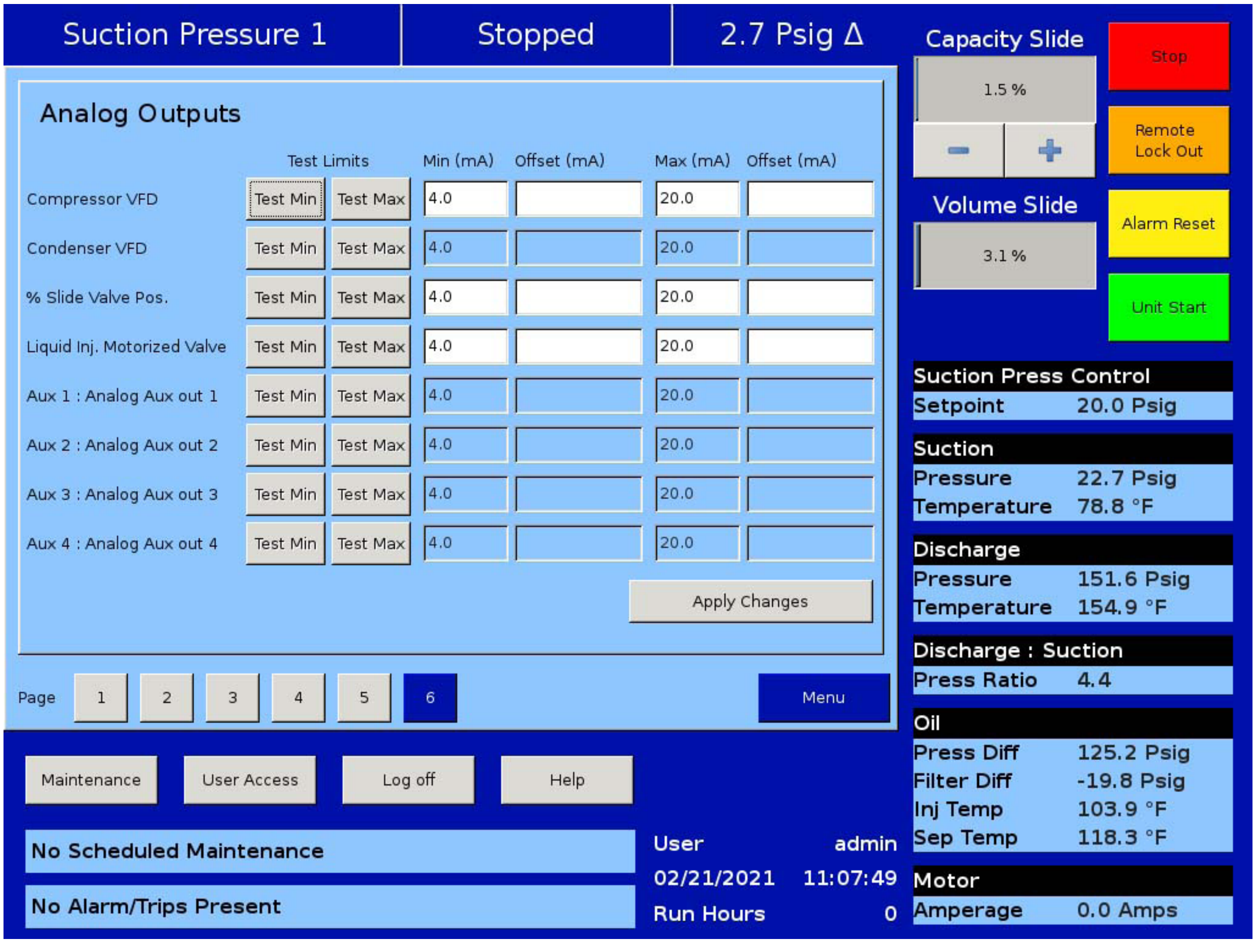


Figure 13-9. Instruments Calibration Screen - Analog Auxiliary Outputs -Greyout (Page 6)

Overview[1]

The Slide Calibration screen is used for calibration of the slide actuators and to establish Vission 20/20 control parameters. It is important that the operator uses caution while operating in this screen, see Figure 14-1. The normal safety checks that prevent the slide from colliding with the mechanical stops are overridden. When the calibration process is completed and the operator exits the screen, both actuators will return the slides back to their minimum positions.

Capacity Slide Valve Potentiometer

This section provides critical information and control parameters related to the capacity slide actuator. The "% cap" display shows the actual value in percent of the capacity slide without any conditioning that might be applied to the other capacity position displays.

In addition, this section displays the value of the actuator's signal in millivolts in the "input Value" display box.

"-" Button:

- When the operator presses and holds this button, the output associated with capacity slide decrease is energized. If the actuator does not turn in the correct direction when this button is pressed, then the operator will have to alter how the actuator is wired to the panel.

"+" Button:

- When the operator presses and holds this button, the output associated with capacity slide increase is energized. If the actuator does not turn in the correct direction when this button is pressed, then the operator will have to alter how the actuator is wired to the panel.

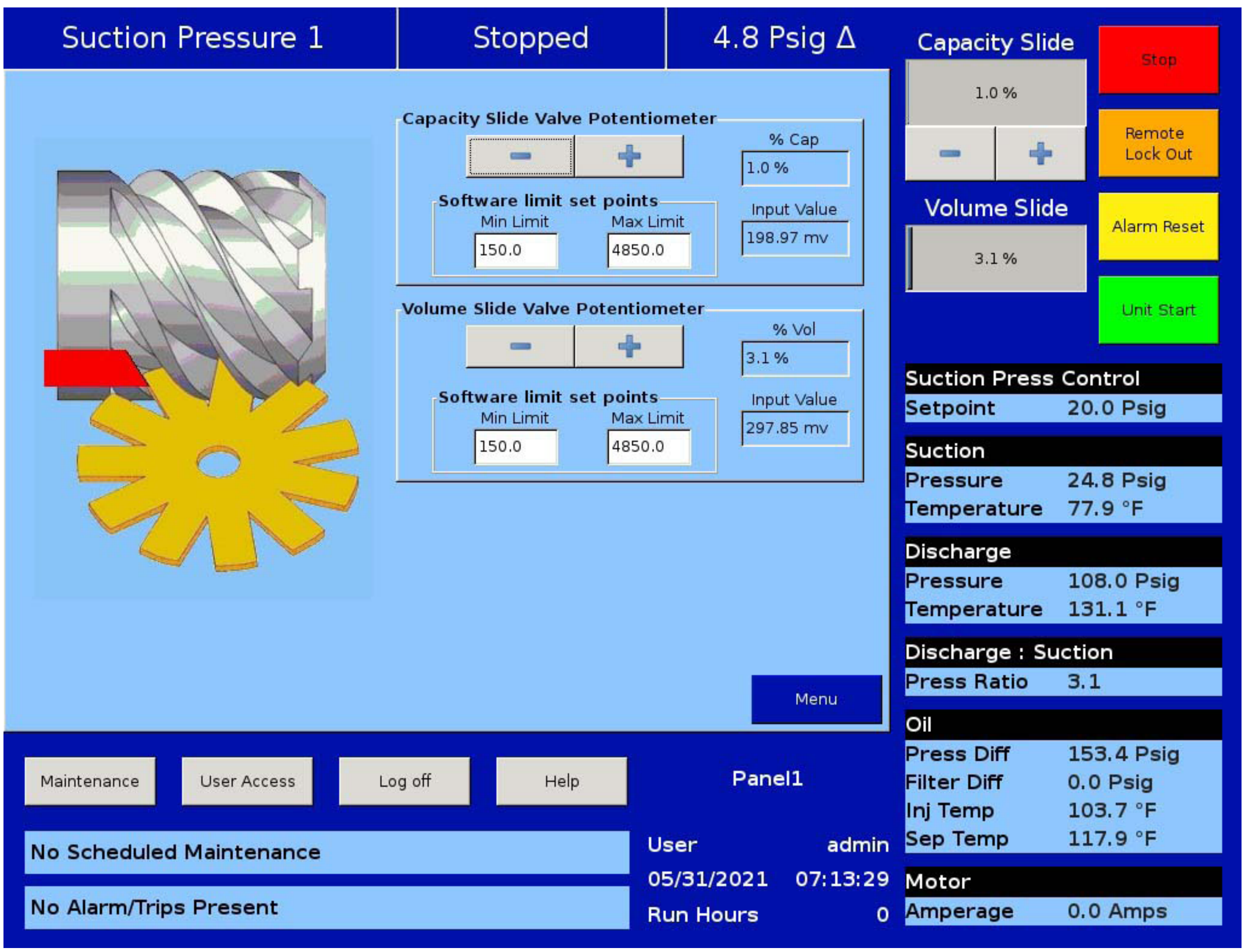


Figure 14-1. Slide Calibration Screen

1 Slide Calibration won´t be available or operational when working without slides (VFD only).

Software limit setpoint:

- The Vission 20/20 uses the "Min Limit" and "Max Limit" setpoints to define an area within the mechanical stops for normal slide travel. These software limits' purpose is to prevent the slide from actually hitting the mechanical stops which could result in a number of undesirable consequences. By default, the software limits are set to 150mV from either end point. The position percentage is calculated from the software limits. Therefore, it is possible to read a value greater than 100% or less than 0% if inertia carries the slides after these limits are reached.

Volume Slide Valve Potentiometer

This section provides critical information and control parameters related to the volume slide actuator. The "% Vol" display shows the actual value in percent of the volume slide without any conditioning that might be applied to the other volume position displays. In addition, this section displays the value of the actuator's signal in millivolts in the "input Value" display box.

"-" Button:

- When the operator presses and holds this button, the output associated with volume slide decreases is energized. If the actuator does not turn in the correct direction when this button is pressed, then the operator will have to alter how the actuator is wired to the panel.

"+" Button:

- When the operator presses and holds this button, the output associated with volume slide increase is energized. If the actuator does not turn in the correct direction when this button is pressed, then the operator will have to alter how the actuator is wired to the panel.

Software limit setpoint:

- The Vission 20/20 uses the "Min Limit" and "Max Limit" setpoints to define an area within the mechanical stops for normal slide travel. These software limits' purpose is to prevent the slide from actually hitting the mechanical stops which could result in a number of undesirable consequences. By default, the software limits are set to 150mV from either end point. The position percentage is calculated from the software limits. Therefore It is possible to read a value greater than 100% or less than 0% if inertia carries the slides after these limits are reached.

Slide Valve Operation

The slide valve actuator is a gear-motor with a position sensor. The motor is powered in the forward and reverse directions from the main computer in the control panel. The position sensor tells the main computer the position of the slide valve. The main computer uses the position and process information to decide where to move the slide valve next.

During calibration, the position sensor records the high and low count of motor turns. The operator tells the position sensor when the actuator is at the high or low position with the push button. Refer to the calibration instructions for the detailed calibration procedure.

The position sensor can get "lost" if the motor is moved while the position sensor is not powered. To prevent this, the motor can only be moved electrically while the position sensor is powered. When the position sensor loses power, power is cut to the motor. A capacitor stores enough energy to keep the position sensor circuitry alive long enough for the motor to come to a complete stop and then save the motor position to non-volatile EEPROM memory. When power is restored, the saved motor position is read from EEPROM memory and the actuators resumes normal function.

This scheme is not foolproof. If the motor is moved manually while the power is off or the motor brake has failed, allowing the motor to freewheel for too long after the position sensor loses power, the actuator will lose its calibrated position.

A brake failure can sometimes be detected by the position sensor. If the motor never stops turning after a power loss, the position sensor detects this, knows it will be lost, and goes immediately into calibrate mode when power is restored.

Calibrate Slide Valve Actuators

Assuming that the actuator's motors have not been calibrated, the transmitter output of the actuator motor will fluctuate wildly until they are calibrated. To prevent damage to actuator's motors, do not connect the Power Cable (Yellow TURCK cable) or the Position Transmitter Cable (Gray TURCK cable) until instructed to do so in this procedure.

1. Open the plastic cover of the capacity motor by removing four screws. Gently lift the cover and tilt it toward the TURCK connectors. Raise the cover enough to be able to press the blue calibrate button and to be able to see the red LED on the top of the assembly, see Figure 14-2.
2. Log into the Vission 20/20.
3. From the main screen select the Menu button, and then the Slide Calibration button, see Figure 14-3.
4. When the "Slide Calibration" screen appears, then you can safely connect the Power Cable (Yellow TURCK cable) and the Position Transmitter Cable (Gray TURCK cable) to the Capacity motor.
5. Press "+" or "-" to move the slide valves to check the rotation, see Table 14-1 for proper shaft rotation. If for any reason the "+" or "-" command on the panel does not correspond to the slide increase or decrease, swap the blue & brown wires of the Yellow TURCK cable in the control panel to reverse the rotation of the motor.

CAUTION

DO NOT CONTINUE TO ENERGIZE THE ACTUATOR MOTOR AFTER THE SLIDE HAS REACHED THE MECHANICAL STOP. Doing so may cause mechanical damage to the motor or shear the motor shaft key. When the slide has reached the mechanical stop position, press the button in the center of the photochopper to release the brake, and thereby release the tension on the actuator motor.

6. Quickly press and release the BLUE CALIBRATION BUTTON on the ACTUATOR motor once, see Figure 14-4. This instructs the ACTUATOR motor to enter the calibration mode. The red LED on the actuator control board will begin flashing. Use the "-" button on the Vission 20/20 panel to drive the capacity slide to its minimum mechanical stop position.

   This will be apparent by a slowing of the motor rotation and a winding sound from the actuator motor. When you hear the motor wind-up, release the "-" button.

   Then use the "+" button to pulse the motor so that the capacity slide is "just off" of its minimum position and there is no tension on the motor shaft.
7. Quickly press and release the BLUE CALIBRATION BUTTON on the ACTUATOR motor once. The red LED will now flash at a slower rate. This now instructs the ACTUATOR motor that this point is the minimum slide position. This point will correspond to 0 volts AFTER the ACTUATOR calibration procedure is completed.

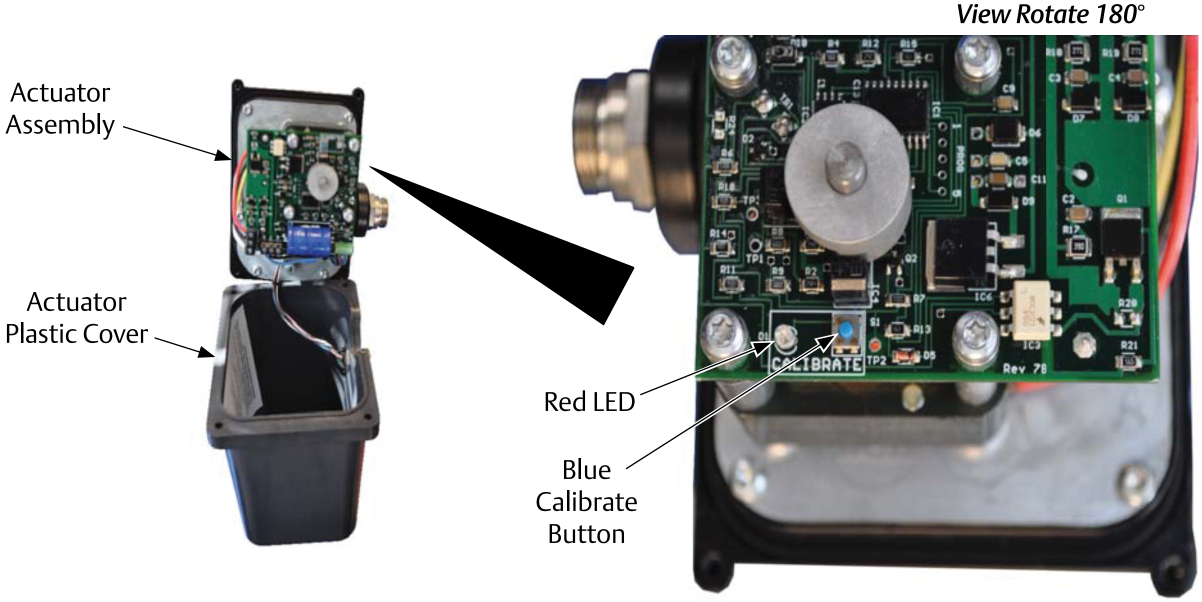
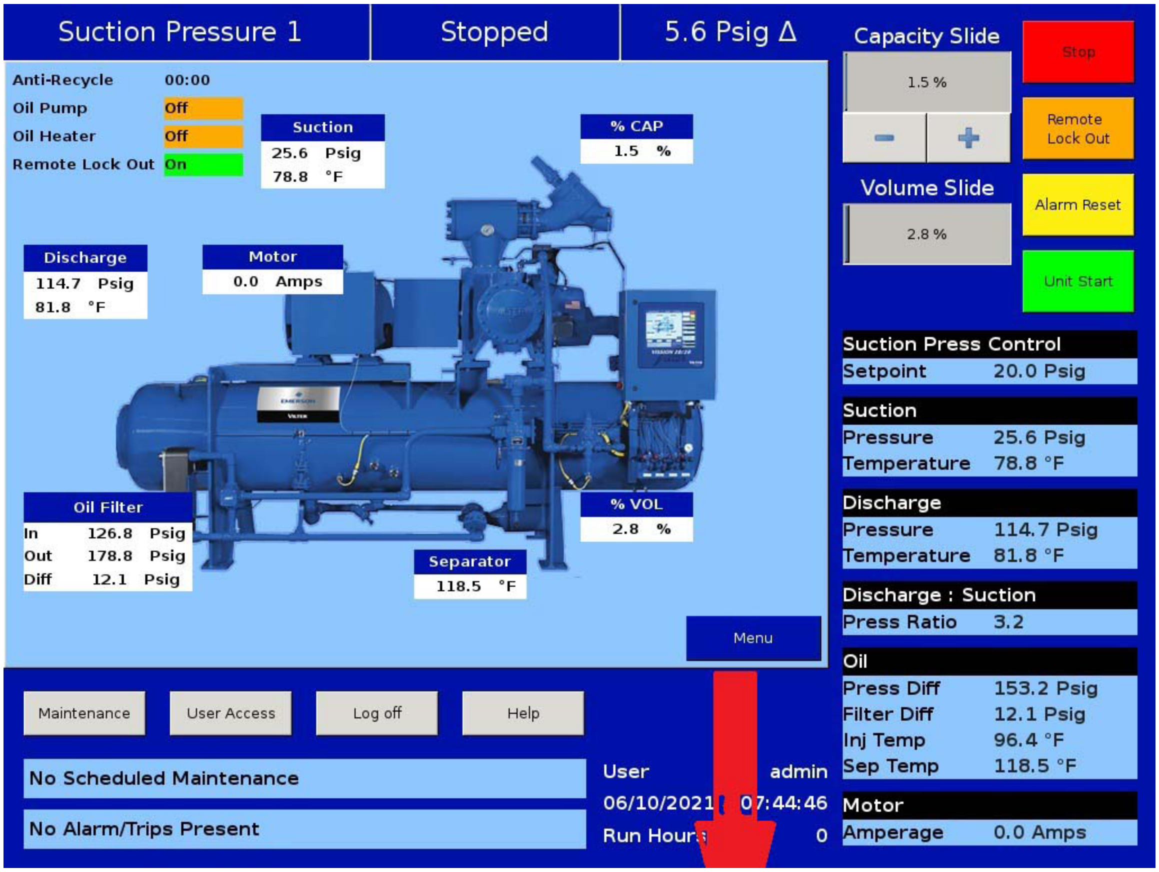


Figure 14-2. Actuator Assembly



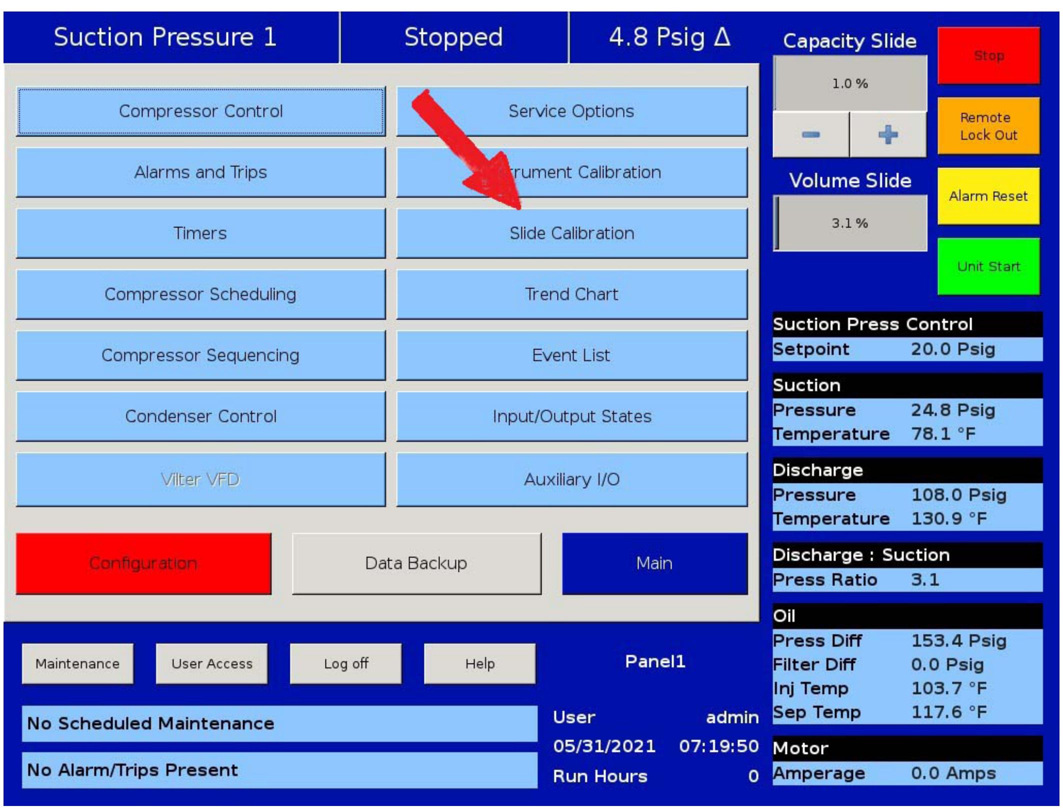


Figure 14-3. Menu Screen and Slide Calibration Button (Vission 20/20)

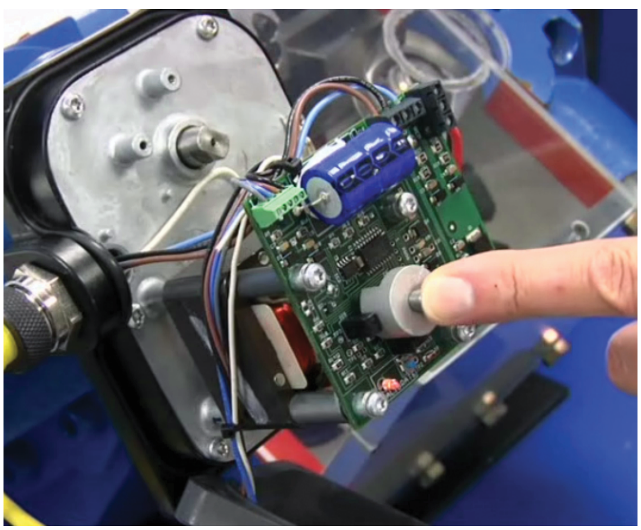
8. Use the "+" button on the Vission 20/20 to drive the capacity slide to its maximum mechanical stop position. This will be apparent by a slowing of the motor rotation and a winding sound from the actuator motor. When you hear the motor wind-up, release the "+" button.
9. Quickly press and release the BLUE CALIBRATION BUTTON on the ACTUATOR motor once. The RED LED will stop flashing. This now instructs the ACTUATOR motor that this point is the maximum slide position. This point corresponds to 5 volts. The ACTUATOR calibration procedure is completed.

   Now the Capacity Channel is automatically calibrated based on the calibration settings made to the actuator.

CAUTION

Do not over tigten screws. Failure to comply may result in damage to equipment.

10. Gently lower the plastic cover to where it contacts the base and O-ring seal. After making sure that the cover is not binding, gently tighten the four screws.
11. Repeat the same procedure for the Volume slide motor.



Press down on Photo-chopper to release tension from motor mount.

Figure 14-4. Photo-chopper

Command Shaft Rotation

The following table describes the rotation direction required by the actuator. Every optical actuator has the ability to be wired to rotate in either direction. Energizing the blue actuator wire results in a CCW rotation and energizing the brown wire results in a CW rotation, see Table 14-1. Command Shaft Rotation Required By Actuator.

Table 14-1. Command Shaft Rotation Required By Actuator

Compressor Model	Command Shaft Rotation				Number of Turns / Rotation Angle / Slide Travel					
	Capacity		Volume		Capacity			Volume		
	INC	DEC	INC	DEC	Turns	Angle	Travel	Turns	Angle	Travel
VSR 111	CW	CCW	CW	CCW	0.91	328	3.568”	0.52	187	2.045”
VSR 151	CW	CCW	CW	CCW	0.91	328	3.568”	0.52	187	2.045”
VSR 221	CW	CCW	CW	CCW	0.91	328	3.568”	0.52	187	2.045”
VSR 301	CW	CCW	CW	CCW	0.91	328	3.568”	0.52	187	2.045”
VSS 451	CW	CCW	CW	CCW	0.91	328	3.568”	0.52	187	2.045”
VSS 601	CW	CCW	CW	CCW	0.91	328	3.568”	0.52	187	2.045”
VSS 751	CCW	CW	CCW	CW	1.09	392	4.283”	0.63	227	2.473”
VSS 901	CCW	CW	CCW	CW	1.09	392	4.283”	0.63	227	2.473”
VSS 1051	CCW	CW	CCW	CW	1.22	439	4.777”	0.74	266	2.889”
VSS 1201	CCW	CW	CCW	CW	1.22	439	4.777”	0.74	266	2.889”
VSS 1301	CCW	CW	CCW	CW	1.22	439	4.777”	0.74	266	2.889”
VSS 1501	CCW	CW	CCW	CW	1.36	490	5.325”	0.82	295	3.200”
VSS 1551	CCW	CW	CCW	CW	1.48	533	5.823”	0.87	313	3.433”
VSS 1801	CCW	CW	CCW	CW	1.36	490	5.325”	0.82	295	3.200”
VSS 1851	CCW	CW	CCW	CW	1.48	533	5.823”	0.87	313	3.433”
VSS 2101	CCW	CW	CCW	CW	1.48	533	5.823”	0.87	313	3.433”
VSS 2401	CCW	CW	CCW	CW	1.80	648	7.072”	1.36	490	5.341”
VSS 2601	CCW	CW	CCW	CW	1.80	648	7.072”	1.36	490	5.341”
VSS 2801	CCW	CW	CCW	CW	1.80	648	7.072”	1.36	490	5.341”
VSS 3001	CCW	CW	CCW	CW	1.80	648	7.072”	1.36	490	5.341”
VSM 71	CW	CCW	CW	CCW	0.80	288	3.141”	0.45	162	1.767”
VSM 91	CW	CCW	CW	CCW	0.80	288	3.141”	0.45	162	1.767”
VSM 101	CW	CCW	CW	CCW	0.80	288	3.141”	0.45	162	1.767”
VSM 151	CW	CCW	CW	CCW	0.80	288	3.141”	0.45	162	1.767”
VSM 181	CW	CCW	CW	CCW	0.80	288	3.141”	0.45	162	1.767”
VSM 201	CW	CCW	CW	CCW	0.80	288	3.141”	0.45	162	1.767”
VSM 301	CW	CCW	CW	CCW	0.80	288	3.141”	0.45	162	1.767”
VSM 361	CW	CCW	CW	CCW	0.80	288	3.141”	0.45	162	1.767”
VSM 401	CW	CCW	CW	CCW	0.80	288	3.141”	0.45	162	1.767”
VSM 501	CCW	CW	CCW	CW	0.91	328	3.568”	0.52	187	2.045”
VSM 601	CCW	CW	CCW	CW	0.91	328	3.568”	0.52	187	2.045”
VSM 701	CCW	CW	CCW	CW	0.91	328	3.568”	0.52	187	2.045”

Slide Valve Troubleshooting Guide

The Analog output card of the Vission 20/20 produces a 4–20mA signal to any attached devices. However, it is not uncommon that small differences in the board components might result in small differences in the output. So this screen offers the operator the ability to fine tune the upper and lower output values, see Table 14-2, Slide Valve Troubleshooting Guide.

Table 14-2. Slide Valve Troubleshooting Guide (1 of 3)

Problem	Reason	Solution
The actuator cannot be calibrated.	Dirt or debris is blocking one or both optocoupler slots.	Clean the optocoupler slots with a cotton swab and rubbing alcohol.
	The photo-chopper fence extends less than about half way into the optocoupler slots.	Adjust the photo-chopper so that the fence extends further into the optocoupler slots. Make sure the motor brake operates freely and the photo-chopper will not contact the optocouplers when the shaft is pressed down.
	The white calibrate wire in the grey Turck cable is grounded.	Tape the end of the white wire in the panel and make sure that it cannot touch metal.
	Dirt and/or condensation on the position sensor boards are causing it to malfunction.	Clean the boards with an electronics cleaner or compressed air.
	The calibrate button is stuck down.	Try to free the stuck button.
	The position sensor has failed.	Replace the actuator.
	Push button is being held down for more that ¾ second when going through the calibration procedure.	Depress the button quickly and then let go. Each ¾ second the button is held down counts as another press.

Table 14-2. Slide Valve Troubleshooting Guide (2 of 3)

Problem	Reason	Solution
The actuator goes into calibration mode spontaneously.	The white calibrate wire in the grey Turck cable is grounding intermittently.	Tape the end of the white wire in the panel and make sure that it cannot touch metal.
	A very strong source of electromagnetic interference (EMI), such as a contactor, is in the vicinity of the actuator or grey cable.	Increase the distance between the EMI source and the actuator. Install additional metal shielding material between the EMI source and the actuator or cable.
	There is an intermittent failure of the position sensor	Replace the actuator.
The actuator goes into calibration mode every time power is restored after a power loss	The motor brake is not working properly.	Get the motor brake to where it operates freely and recalibrate.
	The position sensor's EEPROM memory has failed	Replace the actuator.
The actuator does not transmit the correct position after a power loss.	The motor was manually moved while the position sensor was not powered.	Recalibrate.
	The motor brake is not working properly.	Get the motor brake to where it operates freely and recalibrate.
	The position sensor's EEPROM memory has failed	Replace the actuator.
There is a rapid clicking noise when the motor is operating.	The photo-chopper is misaligned with the slotted optocouplers.	Try to realign or replace the actuator.
	The photo-chopper is positioned too low on the motor shaft.	Adjust the photo-chopper so that the fence extends further into the opto-coupler slots.
	A motor bearing has failed	Replace the actuator.
The motor operates in one direction only	There is a loose connection in the screw terminal blocks.	Tighten
	There is a loose or dirty connection in the yellow Turck cable.	Clean an tighten
	The position sensor has failed.	Replace the actuator.
	There is a broken motor lead or winding	Replace the actuator.

Table 14-2. Slide Valve Troubleshooting Guide (3 of 3)

Problem	Reason	Solution
The motor willl not move in either direction	The thermal switch has tripped because the motor is overheated	The motor will resume operation when it cools. This could be caused by a malfunctioning control panel. Consult the factory.
	Any of the reasons listed in "The motor operates in one direction only"	See above.
	The command shaft is jammed.	Free the command shaft.
	Broken gears in the gear-motor.	Replace the actuator.
	Blown relays or fuses.	Check and replace blown relays and/or fuse
The motor operates intermittently, several minutes on, several minutes off.	Motor is overheating and the thermal switch is tripping.	This could be caused by a malfunctioning control panel. Consult the factory.
The motor runs sporadically	Bad thermal switch.	Replace the actuator.
	Any of the reasons listed in "The motor operates in one direction only"	See above.
The motor runs but output shaft will not turn.	Stripped gears inside the gear rotor, or the armature has come unpressed from the armature shaft.	Replace the actuator.

Slide Valve Actuator Troubleshooting Guide Blink Code

Vilter™ actuators communicate problems discovered by the internal diagnostics to the technician by LED blink codes. Only one blink code is displayed, even though it is possible that more than one problem has been detected. The actuator motor will not operate until the error code is cleared by pressing the blue bottom, see Table 14-3. LED Blink Codes and Troubleshooting Guide.

Table 14-3. LED Blink Codes and Troubleshooting Guide (1 of 2)

Flash Pattern * = ON - = OFF	Meaning
*_*_*_*_*_*_*_*_*_*_*_*_	Calibration step 1.
*___*___*___*___*___*___	Calibration step 2.
*__*____________________	This indicates a zero span. This error can only occur during calibration. The typical cause is forgetting to move the actuator when setting the upper limit of the span. If this is the case, press the blue button to restart the calibration procedure. This error can also occur if either or both of the slotted optocouplers are not working. If this is the case, the slide valve actuator will have to be replac ed. The operation of the slotted optocouplers can be tested as follows: 1. Manually rotate the motor shaft until the aluminum photochopper fence is not blocking either of the optocoupler slots. 2. Using a digital multimeter, measure the DC voltage between terminal 3 of the small terminal block and TP1 on the circuit board (see Note 1). The measurement should be between 0.1 and 0.2 Volts. 3. Next, measure the DC voltage between terminal 3 and TP2 on the circuit board. You should measure be- tween 0.1 and 0.2 Volts.
*________________________	This error means that the slide valve actuator is no longer transmitting accurate position information. The actuator should be recalibrated as soon as possible, after the cause of the over-speed is identified and corrected. This error will not clear until the actuator is re-calibrated. This code can be caused by: 1. The motor speed exceeding the position sensors ability to measure it at some time during operation. A non-functioning motor brake is usually to blame. 2. The actuator is being operated where strong infrared light can falsely trigger the slotted optocouplers, such as direct sunlight. Shade the actuator when the cover is off for service and calibration. Do not operate the actuator with the cover off.

Table 14-3. LED Blink Codes and Troubleshooting Guide (2 of 2)

Flash Pattern * = ON - = OFF	Meaning
*__*__*_________________	The motor is overheated. The actuator motor will not run until it cools. Once the motor cools, the actuator will resume normal operation. Motor overheating is sometimes a problem in hot humid environments when process conditions demand that the slide valve actuators reposition often. Solutions are available; consult your Vilter™ authorized distributor for details. Another possible cause for this error is a stuck motor thermal switch. The thermal switch can be tested by measuring the DC voltage with a digital multimeter be- tween the two TS1 wire pads (see Note 2). If the switch is closed (normal operation) you will measure 0 Volts.
*********************	The 24V supply voltage is low. This will occur mometarly when the actuator is powered up and on power down. If the problem persists, measure the voltage using a digital multimeter between terminals 3 and 4 of the small terminal block. If the voltage is less than 24V, the problem is in the supply to the board. If the voltage is >= 24V, replace the actuator.
_********************	The EEPROM data is bad. This is usually caused by loss of 24V power before the calibration procedure was completed. The actuator will not move while this error code is being displayed. To clear the error, calibrate the actuator. If this error has occurred and the cause was not loss of 24V power during calibration, possible causes are: 1. The EEPROM memory in the micro-controller is bad. 2. The large blue capacitor is bad or has a cracked lead.
*****____*______________	Micro-controller program failure. Please notify your Vilter™ authorized distributor.

*There are two versions of slide valve actuators, version A and B. Only version B is able to display LED blink codes. Slide valve actuator version B can be distinguished by only having a single circuit board as supposed to two circuit boards in version A.

Note 1: TP1 and TP2 are plated-thru holes located close to the slotted optocouplers on the board. They are clearly marked on the board silkscreen legend.

Note 2: The TS1 wire pads are where the motor thermal switch leads solder into the circuit board. They are clearly marked on the board's silkscreen legend and are oriented at a 45 degree angle.

Overview

This screen allows the operator to view and adjust settings for the trend chart, see Figure 15-1. The trending feature can be started & stopped from this screen. Up to four variables can be selected for plotting on screen. Each variable is assigned one of four colors; the plotted trace and the vertical axis labels for a variable will be in its assigned color. The operator can select from viewing the plot to which variables and time intervals to show as often as necessary. The vertical axis scaling and offset for each variable plotted is based on its range of values over the entire data plotted on screen. The data available for display is 120 hours maximum.

Chart Operation

Pen Selection:

- Pen selection allows the operator to select up to four different variables to plot on the screen (In red, blue, green or orange). The operator can select "None" as an option to disable the plotting of data for a particular pen. The options in the pen selection drop-down boxes will depend on the channels selected in the Trend Setup screen.

Start/Stop:

- This button allows the operator to start/stop the trend feature. When the trend feature is not running, the button will display "Start" and will be green in color. While the trend feature runs, the button will display "Stop" and will be red in color. When the "Stop" button is pressed, the trend data is saved to a file.

Figure 15-1. Trend Chart Screen

Zoom In/Out:

- These buttons allow the operator to adjust the number of data points plotted on the screen. At maximum zoom level the operator can view 3 minutes of trend data and the Zoom In button will be inactive. At minimum zoom level the operator can view full 120 hours of trend data and the Zoom Out button will be inactive.

Back/Forward:

- These buttons allow the operator to move the plot and view trend data at different time intervals.
- The forward button will be inactive when the operator is viewing the first data point plotted on the screen (i.e. when the displayed time interval is 0:00). The back button will be inactive when the operator is viewing the last data point on the screen (i.e. when the displayed time interval is 20:00). At minimum zoom level, both Back & Forward buttons will be inactive.

Trace:

- This button allows the operator to move a white cursor line across all four trend lines and receive a readout of all four variables at that point in time. When the Trace button is pressed, the cursor position is displayed along with value of all four variables on the screen.

Hold:

- This button allows the operator to stop the data from advancing on the display without stopping the trend feature. When the Hold button is pressed, the Hold Time is displayed on the screen.

Trace Back(<) / Forward (>):

- These buttons allow the operator to move a white cursor line across trend lines and to view trend data values at that point. These buttons will only be active when the trace button is pressed. When these buttons are pressed, the cursor is moved and the trace position is updated on the screen.

Setup:

- This button allows the operator to open the Trend Setup screen. This button is inactive when the trend feature is running.

Trend Data Storage

The trend analysis screen shows recorded data for problem analysis or tuning improvements. A logging buffer holds 5 minutes of data sampled at 10 second intervals.

When the logging buffer fills with 5 minutes of data, it is automatically transferred to a temp .csv file. A temp trend file will hold up to 1MB of accumulated data. When the temp file has accumulated 1MB of data, the data from the temp file is written to new trend file and the temp file is overwritten with new data in the logging buffer till next 1MB of data. When a total of 15MB of trend data is accumulated, and the logging buffer has filled with another 5 minutes of data to write, the file with the oldest trend data is deleted.

NOTE

Trend data will be stored with either temperature or pressure units depending on the selected Process Control Mode. “Compressor Start” Digital Output will be state will be stored in trend data file by default along with user selected analog I/O channels from setup screen.

Setup

The operator can modify trending options through the Trend Setup screen, see Figure 15-2.

Trend Setup screen can be accessed by pressing the Setup button when the trending feature is not running. Trend Setup screen allows the operator to select a maximum of 10 analog I/O channels for trending. The operator can also set a path for the trend data files from the drop-down box in the setup screen. A USB drive will appear as an option in the drop-down box only when it's already mounted on the panel.

If there is no space available on the USB, the trend data files will be written to hard disk.

If the operator changes Press/Temp units or switches Process Control Modes from the configuration screen when running the trending feature, then the background trending will stop.

If the operator disabled Auxiliary Inputs or Virtual Inputs from the configuration screen when running the trending feature, then the background trending will stop.

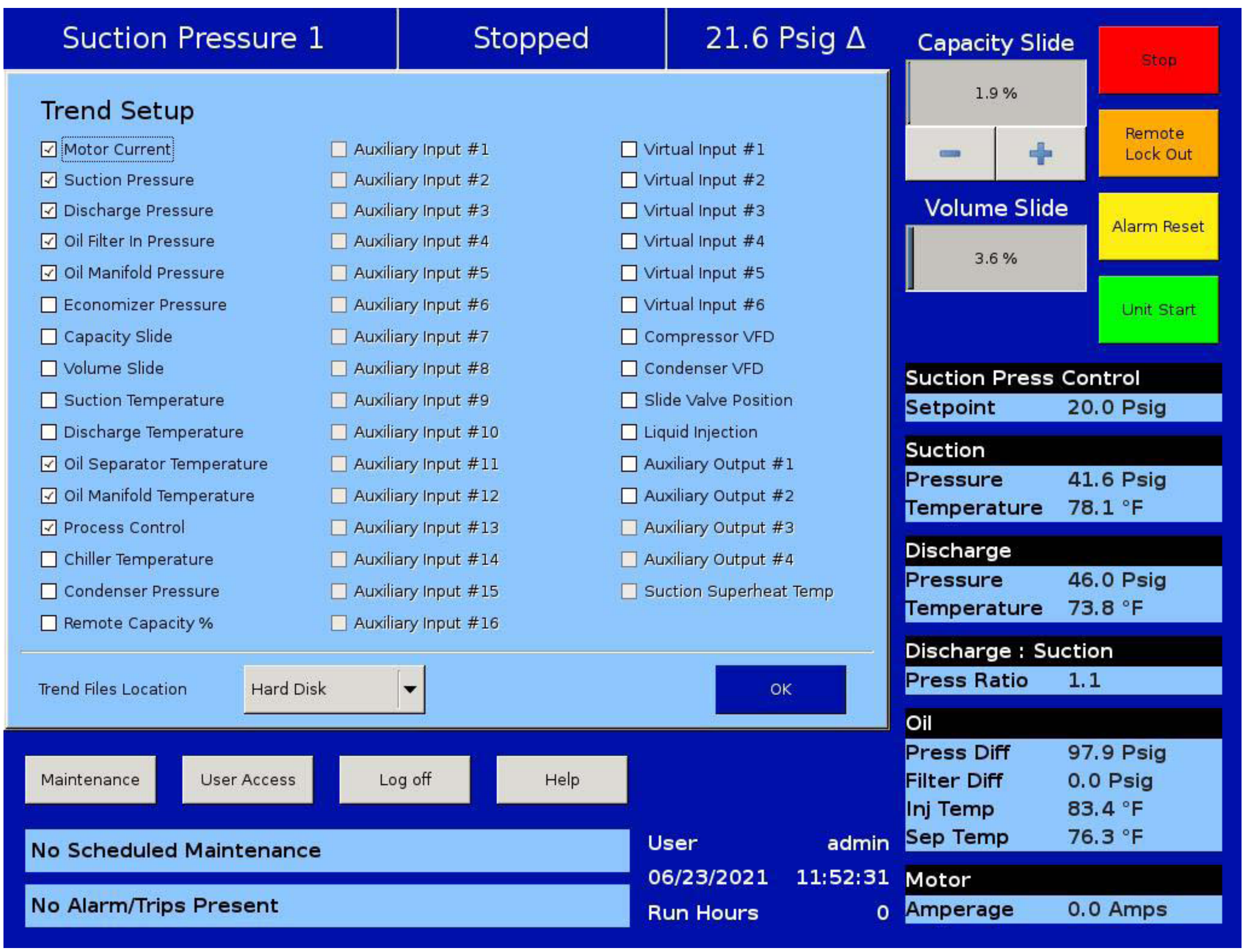


Figure 15-2. Trend Setup Screen

Overview

This screen is designed to display compressor events in chronological order. The information available on the screen is valuable to understand the operation of the compressor and troubleshooting, see Figure 16-1. This screen Is divided into four columns and can list up to 1000 separate events. The operator can download the information on the event list through the Data Backup Screen.

Event list Columns

Date:

- Displays the date of the event in MM-DD-YYYY format.

Time:

- Displays the time of the event in HH:MM:SS format.

Event Type:

- Displays the type of message for a particular listing. Common types are "Start", "Stop", "Trip", "Inhibit", "Alarm", "Info" and "System". These help the operator to understand the meaning of the message in the next column.

Message:

- Displays the informational string that describes the event.

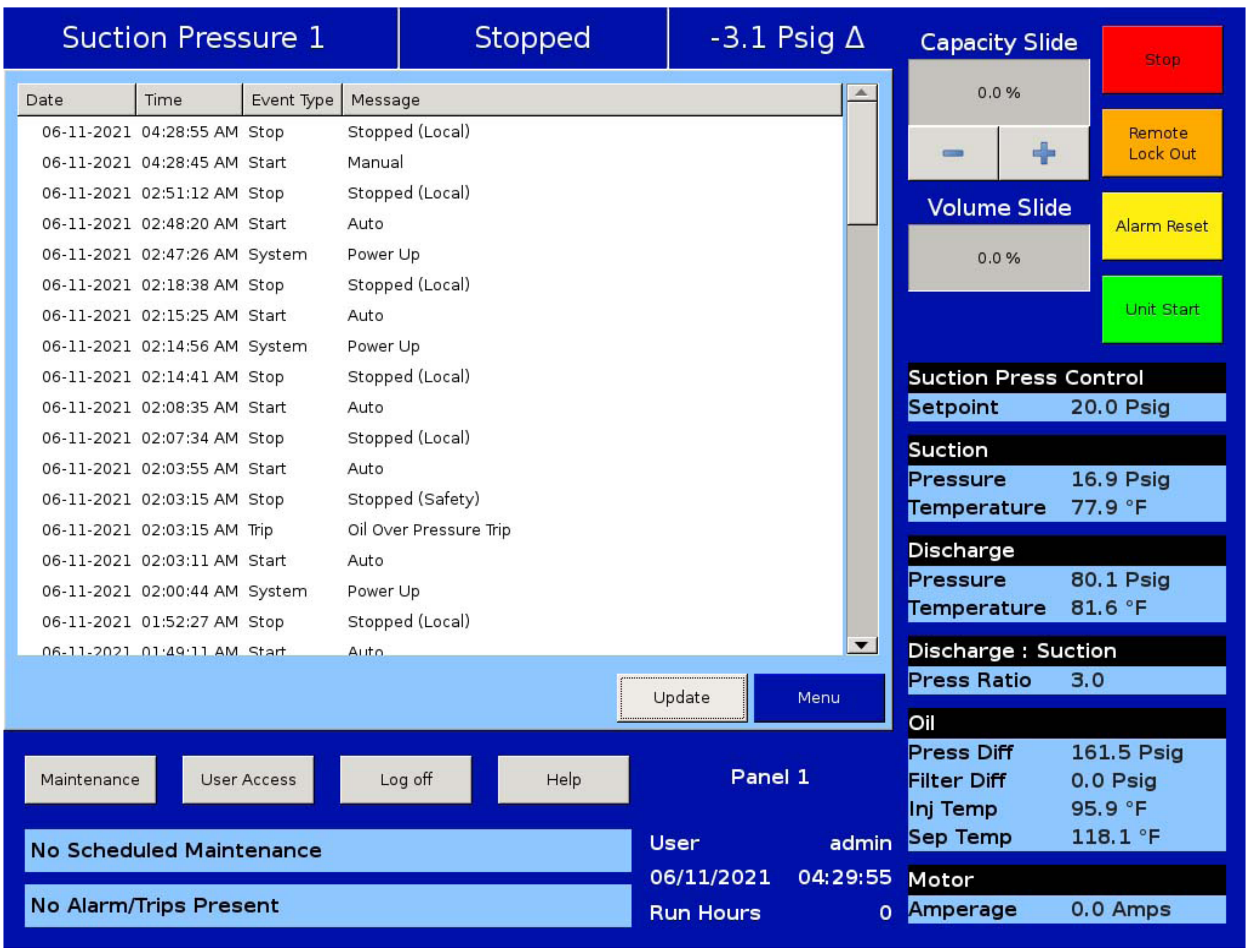


Figure 16-1. Event List Screen

Overview

This screen displays “Live Data” for all the analog points and digital points being monitored. There are four pages of Input / Outputs (I/O) available for viewing, see Figures 17-1, 17-2, 17-3, 17-4, 17-5 and 17-6. This screen also takes a snapshot of all the I/O points. if the compressor experiences a trip condition, it saves this data as Freeze pages, for example, see Figure 17-7. Up to five Freeze pages can be saved. The oldest Freeze page will be removed when more than five Freeze events occur. These Freeze events can be downloaded to a USB drive though the Data Backup screen, see Section 20.

Process Temperature or Process Pressure values will be displayed depending on Process Control Mode selection in Configuration Screen. Refer to Figures 17-1 and 17-2.

Figure 17-1. Input/Output Screen Page 1

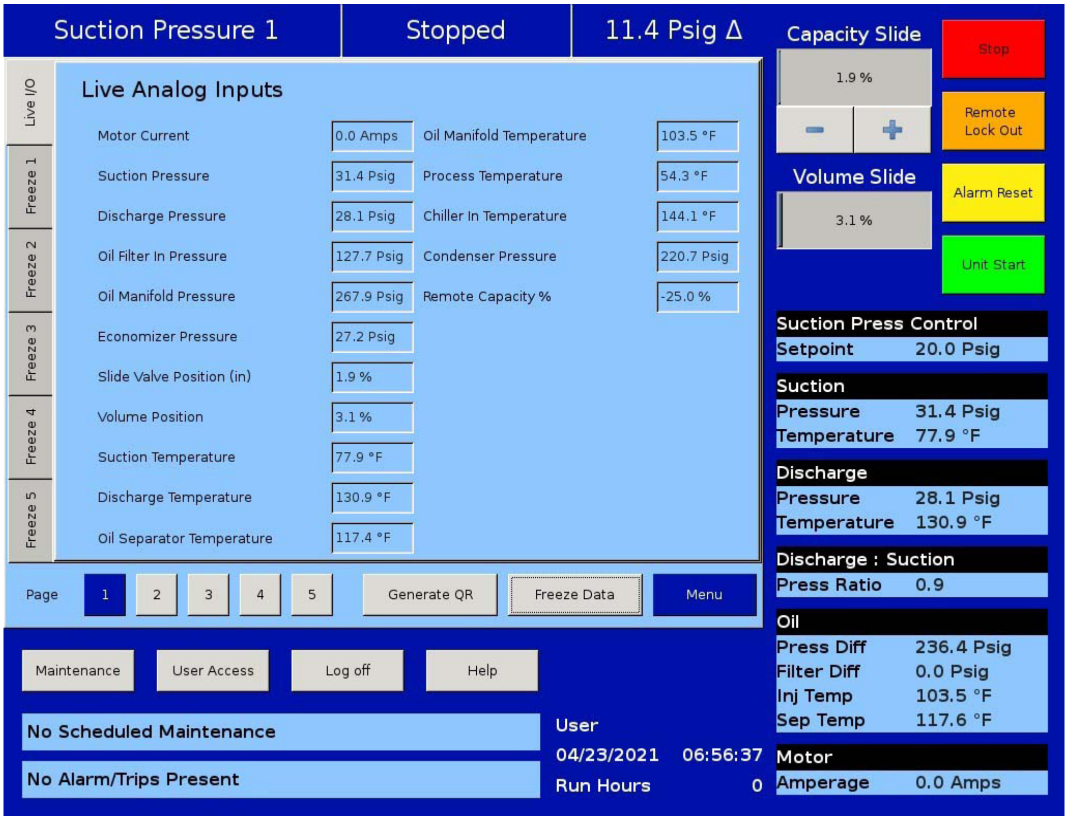


Figure 17-2. Input/Output Screen - (Process Temperature) Page 1

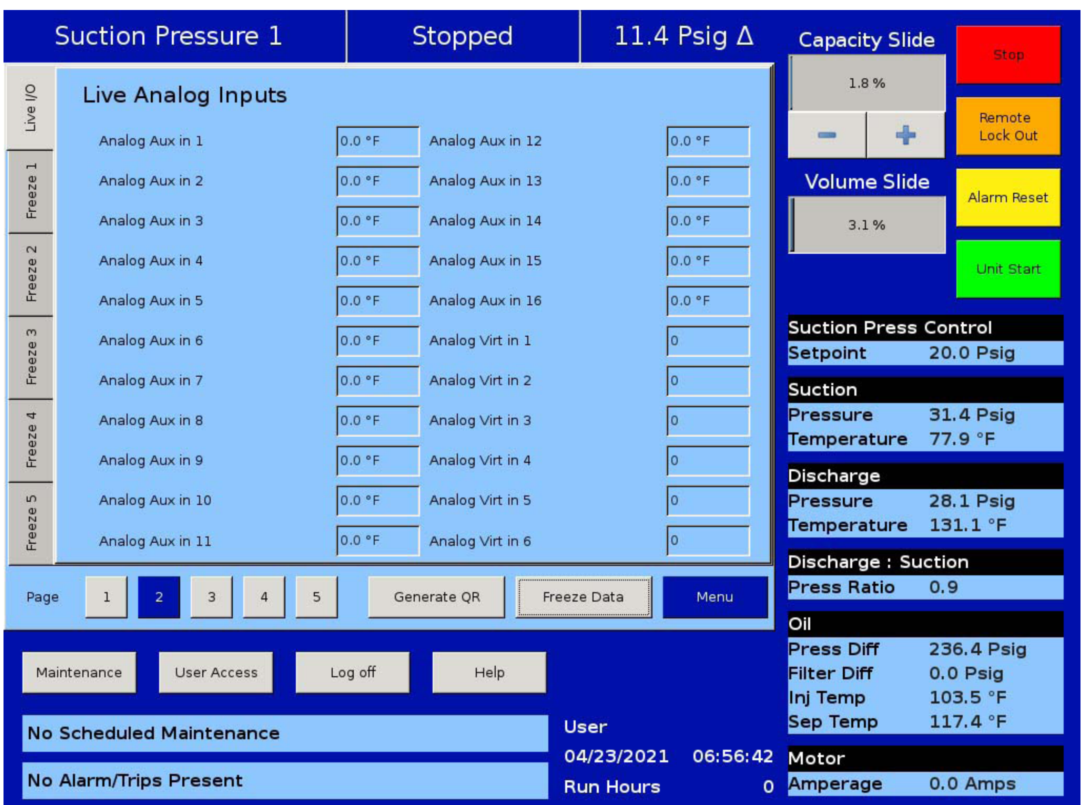


Figure 17-3. Input/Output Screen Page 2

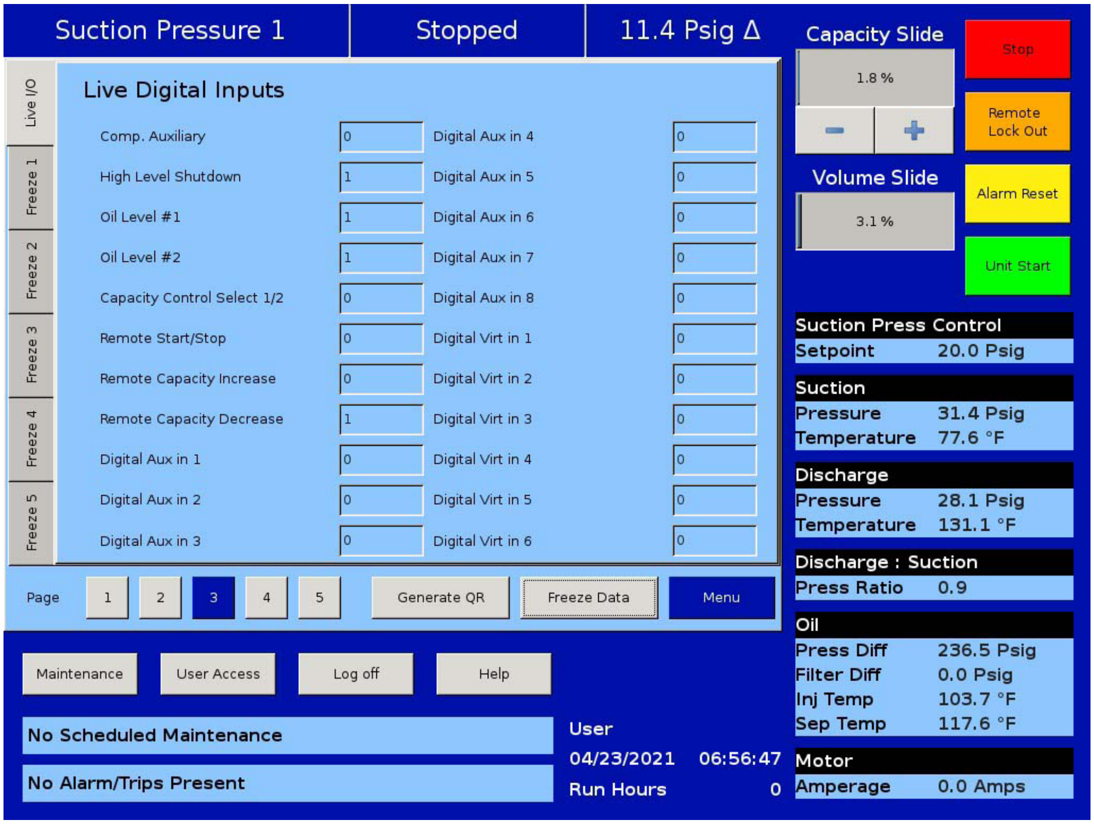


Figure 17-4. Input/Output Screen Page 3

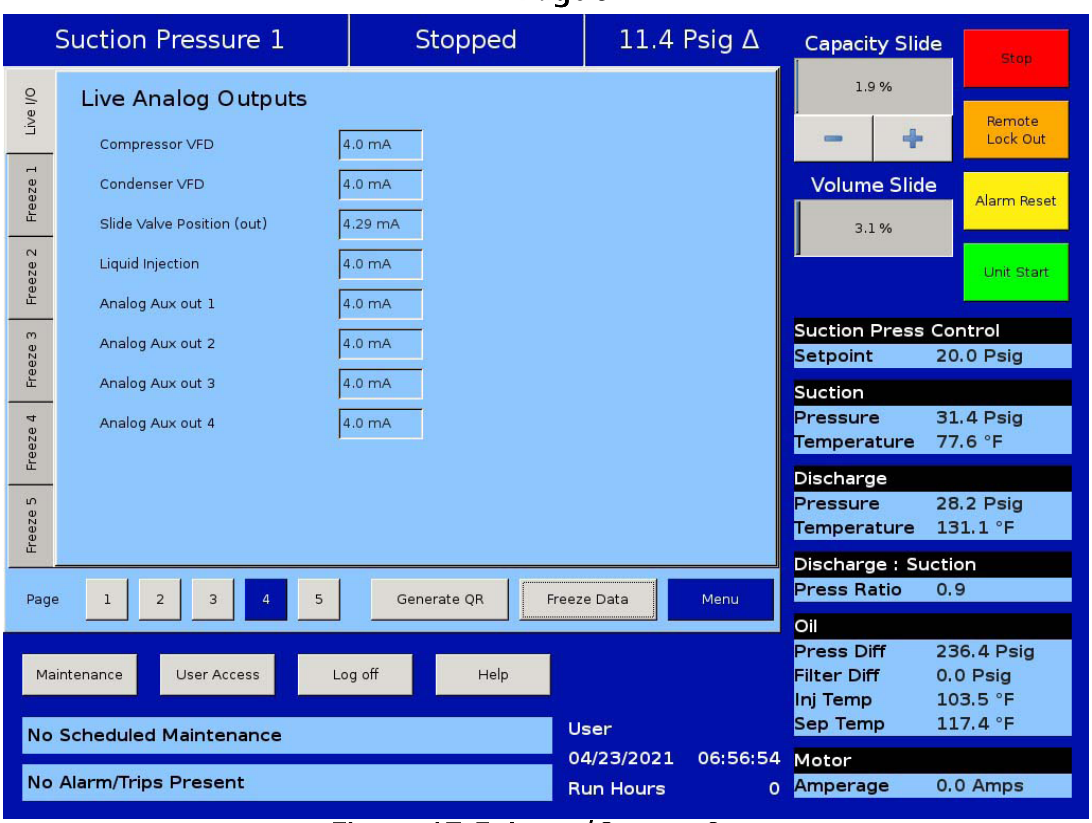


Figure 17-5. Input/Output Screen Page 4

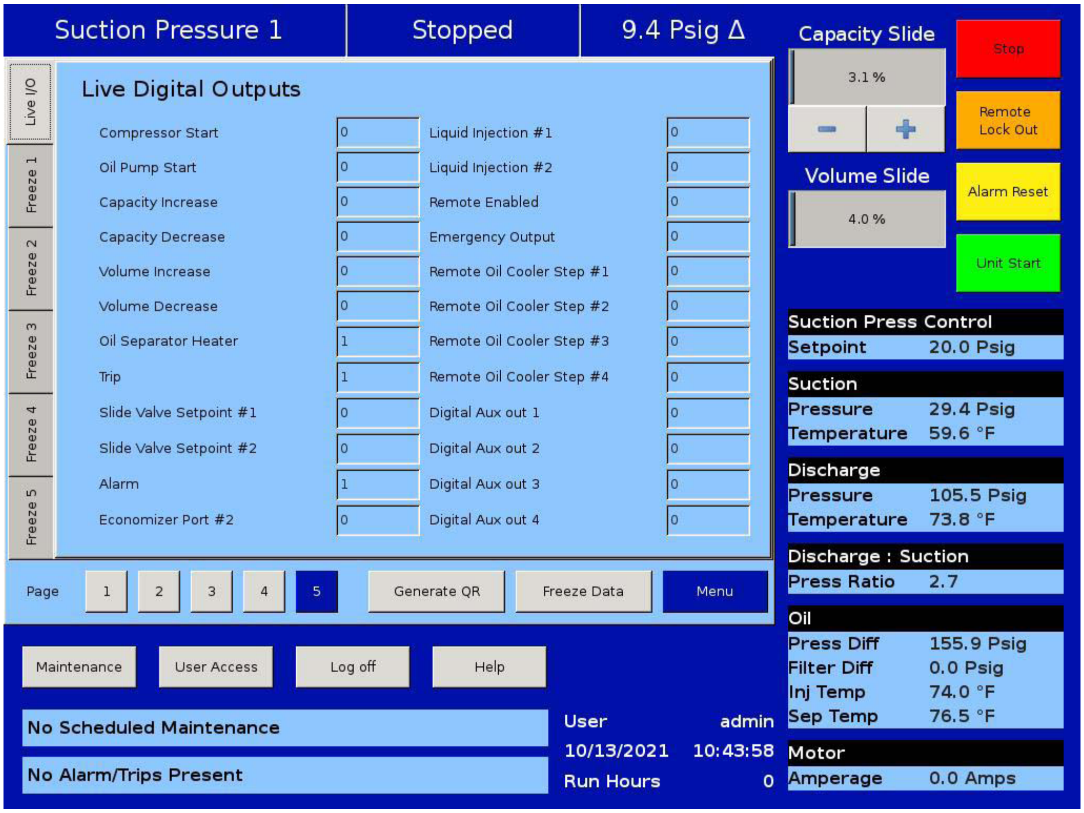


Figure 17-6. Input/Output Screen - (Remote Oil Cooler Enabled) Page 5

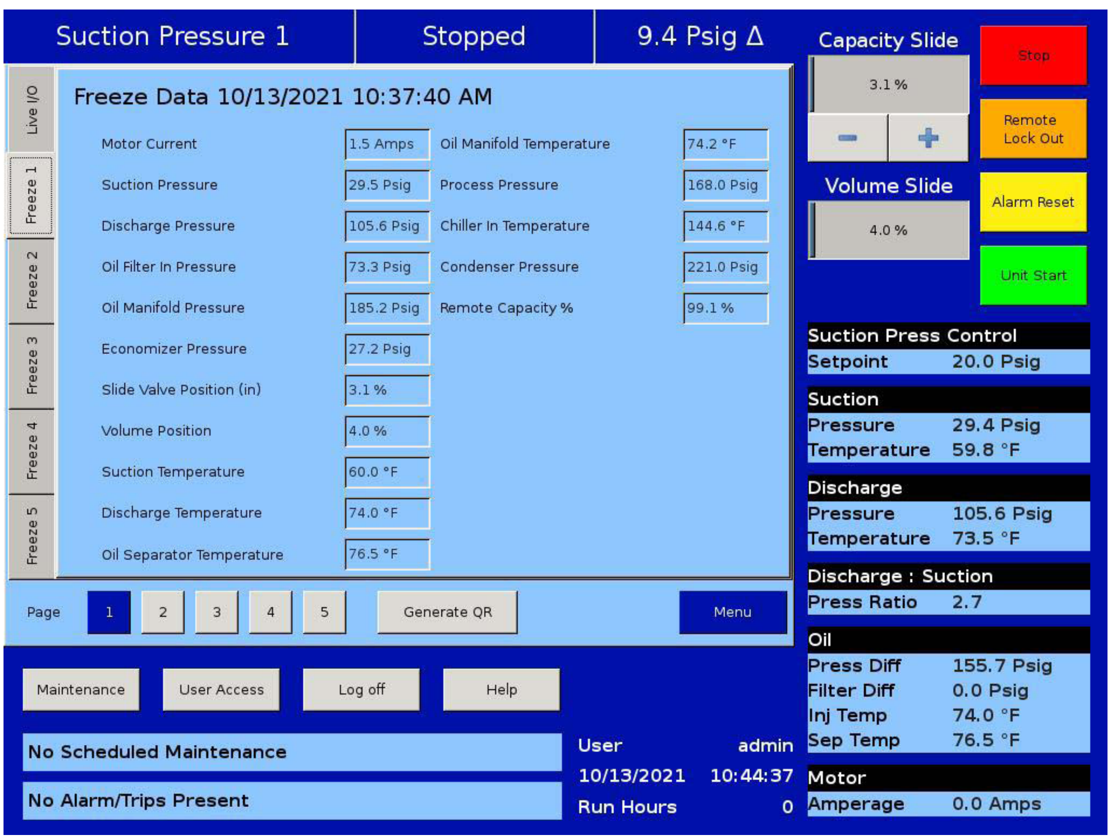


Figure 17-7. Input/Output Screen - Freeze Data Page

QR code

The "Generate QR" button shows the QR image of all Live and Configurational data such as Compressor's serial Number, Compressor Id, Logged User Name and Date. Refer to Figure17-8.

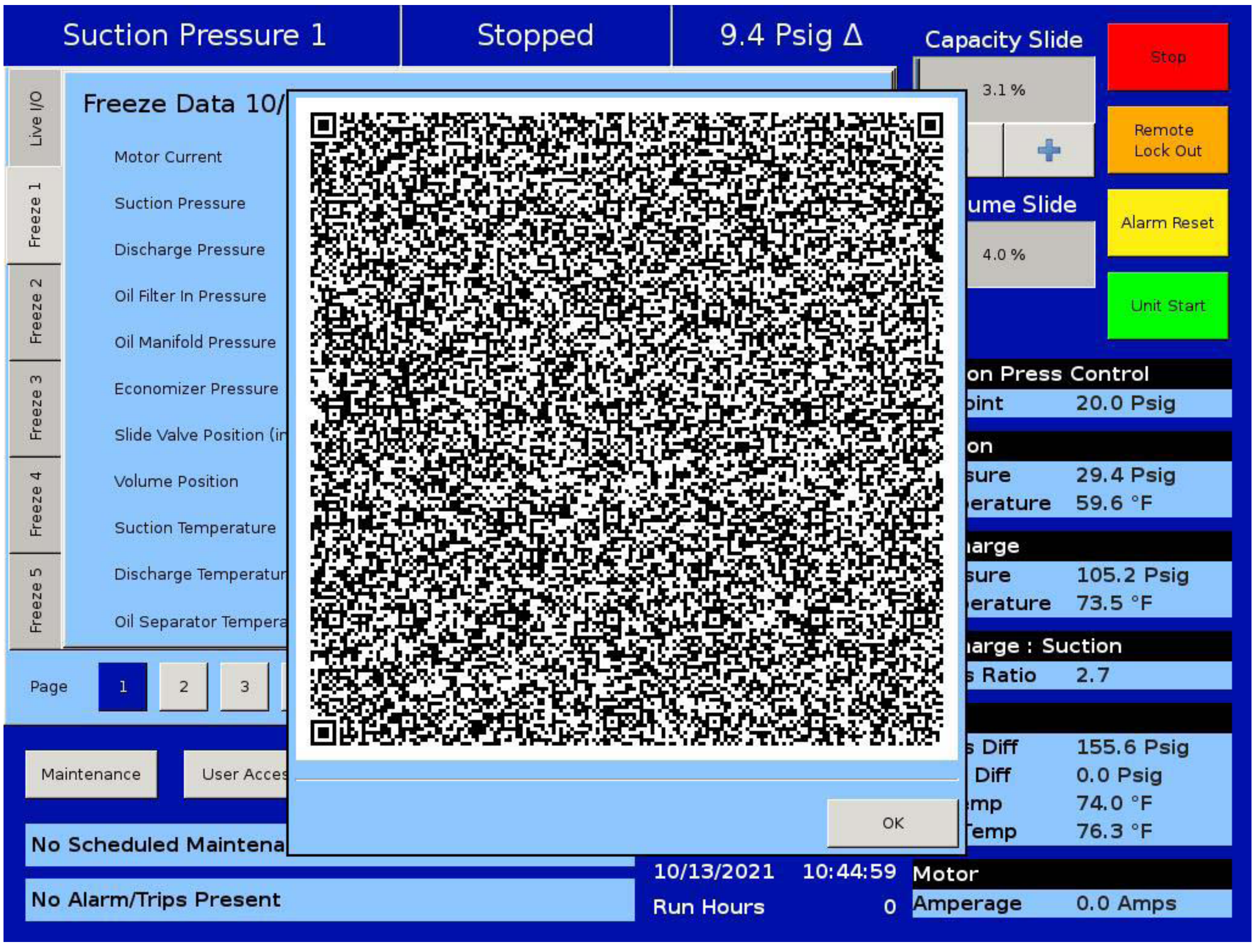


Figure 17-8. Input/Output Screen – Generate QR Page

Overview

The Auxiliary Input/Output (I/O) section of the Vission 20/20 gives the operator flexibility to add peripheral instruments and/or devices such as motors, valves and solenoids. With these additions, customer configurable I/Os are useful to expand the functions of the Vission 20/20 where it was not explicitly designed to control.

Setting up one or more of the auxiliary inputs or outputs starts with the configuration screen. In order to enable the auxiliary I/O, the Vission 20/20 must first be equipped with one of the available expandable I/O cards, and the card must be selected on page 6 of the configuration screen. Once the appropriate card is available, then the operator will be permitted to enable and name the desired auxiliary I/O. The operator can then navigate to the Auxiliary I/O screen where the operation of that I/O can be defined.

Digital Inputs

The Digital Inputs section of the auxiliary I/O allows an operator to configure the auxiliary digital inputs, see Figure 18-1. The digital input can be configured to produce an alarm, a trip, and an inhibit on either a high or low input. A low input is 0VAC and a high is 120VAC on the enabled input. Leaving all options in their default setting will mean no action will be taken on an enabled input. The input will simply be available to view at the panel or by communications.

Trip/Alarm Check:

- Selecting this checkbox enables the alarms and/or trip functions of the Vission 20/20 for the desired digital input. The accompanying drop-down box gives the operator the flexibility to choose whether the alarm and/or trip occurs if the input is high or low.

Inhibit Check:

- Selecting this checkbox enables the inhibit function of the Vission 20/20 for the desired digital input. An inhibit check prevents the compressor from starting if there exists a condition where a trip will shut down the compressor after it starts. The inhibit can be selected to act on a high or low input and can be selected to work with or without the alarm and trip function.

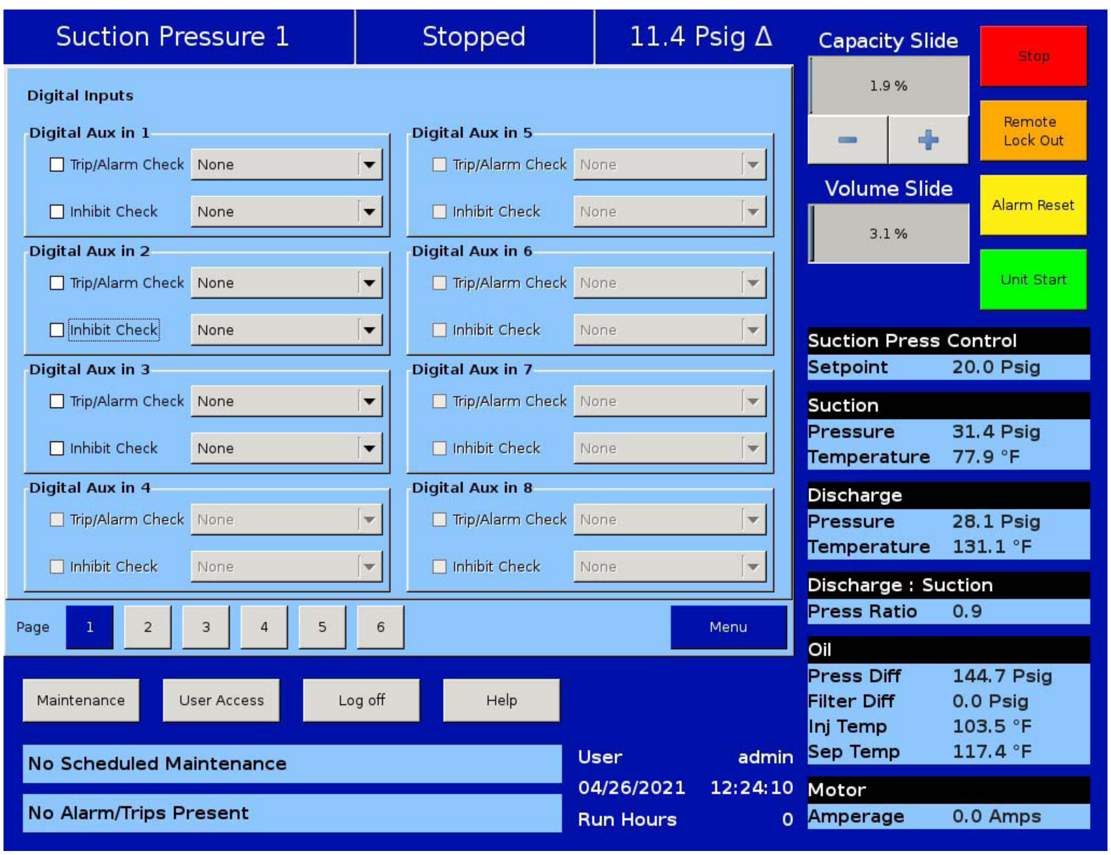


Figure 18-1. Auxiliary I/O Screen - Digital Inputs (Page 1)

Digital Outputs

The digital outputs section of the Auxiliary I/O screen allows an operator to configure the auxiliary digital outputs, see Figure 18-2. The digital output can be configured to activate (go High, 120VAC) based on either a digital input or a specified level on an analog input. Every digital and analog input in the Vission 20/20 is made available to control a digital output.

Analog Input:

- Selecting the Analog Input radio button fills the Active Input drop-down box with all available analog inputs. One of the analog inputs can then be selected to control the digital outputs.

Digital Input:

- Selecting the Digital Input radio button fills the Active Input drop-down box with all available digital inputs. One of the digital inputs can then be selected to control the digital outputs.

Analog Auxiliary Input:

- Selecting the Analog Auxiliary Input radio button fills the Active Input drop-down box with all available analog auxiliary inputs as selected in Configuration Screen. One of the analog inputs can then be selected to control the digital outputs.

Digital Auxiliary Input:

- Selecting the Digital Auxiliary Input radio button fills the Active Input drop-down box with all available digital auxiliary inputs as selected in Configuration Screen. One of the analog inputs can then be selected to control the digital outputs.

Analog Virtual Input:

- Selecting the Analog Virtual Input radio button fills the Active Input drop-down box with all available analog virtual inputs as selected in Configuration Screen. One of the analog inputs can then be selected to control the digital outputs.

Digital Virtual Input:

- Selecting the Digital Virtual Input radio button fills the Active Input drop-down box with all available digital virtual inputs as selected in Configuration Screen. One of the analog inputs can then be selected to control the digital outputs.

Run Always:

- Selecting this checkbox enables the function that controls the digital output to operate only when the compressor is running or runs all the time.

N/O & N/C:

- Choosing the Normally Open (N/O) or Normally Closed (N/C) radio buttons defines what the output will be above or below the trigger value. In the N/O setting, the output will be off (0VAC) while the input value is below the trigger value. In the N/C setting, the output will be high (120VAC) while the input value is below the trigger value.

Analog Trigger:

- The analog trigger toggles the digital output based on a specified value plus the specified differential value. These options will be available only when Analog Input, Analog Auxiliary Input or Analog Virtual Input is selected.

Analog Trigger value:

- This defines the specified value in which the output will toggle. This is an absolute value and not based on units. For example, 100 could mean temperature or pressure depending on the type of input selected.

Differential:

- This is the differential around the trigger value. For example, if a trigger value of 100 is entered with a differential of 1, then as the value increases to 101, the output will be triggered. If the value decreases to 99, then the output will be toggled in the opposite direction.

Enable Timer:

- Selecting this checkbox enables the function that controls the digital output when activated on the basis of ON Time and OFF Time.

Timers:

- **ON Time:**
    - This defines the ON Time for the digital output when it is activated.
- **OFF Time:**
    - This defines the OFF Time for the digital output when it is activated.
    - For example, if an analog input is selected with a trigger value of 100 and differential of 1 and ON Time and OFF Time of 1 min each and N/O setting, then as the analog input value increases to 101, the output will be high (120VAC) for 1 min and then the output will be low (0VAC) for 1 min. The output will keep on toggling from high to low and then low to high until the analog input value decreases to 99.

Latching:

- Selecting this checkbox enables the function that controls the digital output. Latching input can be of two types, one is with Latched with Second Digital Input and another is with the Latched Timer.
- Latched with Second Digital Input This Combo-box is used to select the latching input.

Latched Input:

- This defines the digital inputs that can be selected to control the digital outputs. The below truth table is for the latching with digital input. When Both digital inputs are LOW the output is LOW. Active Input is HIGH, the output will be HIGH. If state of Active Input is changed to Low from High when state of Latching Input is High, Output will stay High until state of Latching Input is turned Low.
- **Table for N/O:**

Active Input	Latching Input	Output
0	0	0
0	1	0
1	0	1
1	1	1
0	1	1
0	0	0

- **Table for N/C:**

Active Input	Latching Input	Output
0	0	1
0	1	1
1	0	0
1	1	0
0	1	0
0	0	1

- **Latched with Timer**

When it is selected in the latching input, the default Timer value will show 60 Sec.

Timer:

- This defines the ON time for digital output when active input is set from high to low. The below truth table is for the Latched with Timer.
- For example, when N/O is selected, and if any digital input is selected in active input which is high then digital output will be high. Once the active input is LOW output will remain High till the timer lapsed. The timer is lapsed the output will go LOW.
- **Table for N/O:**

Active Input	Timer	Output
0	No Timer	0
1	No Timer	1
0	Run Timer	1
0	Expired Timer	0

- **Table for N/C:**

Active Input	Timer	Output
0	No Timer	1
1	No Timer	0
0	Run Timer	0
0	Expired Timer	1

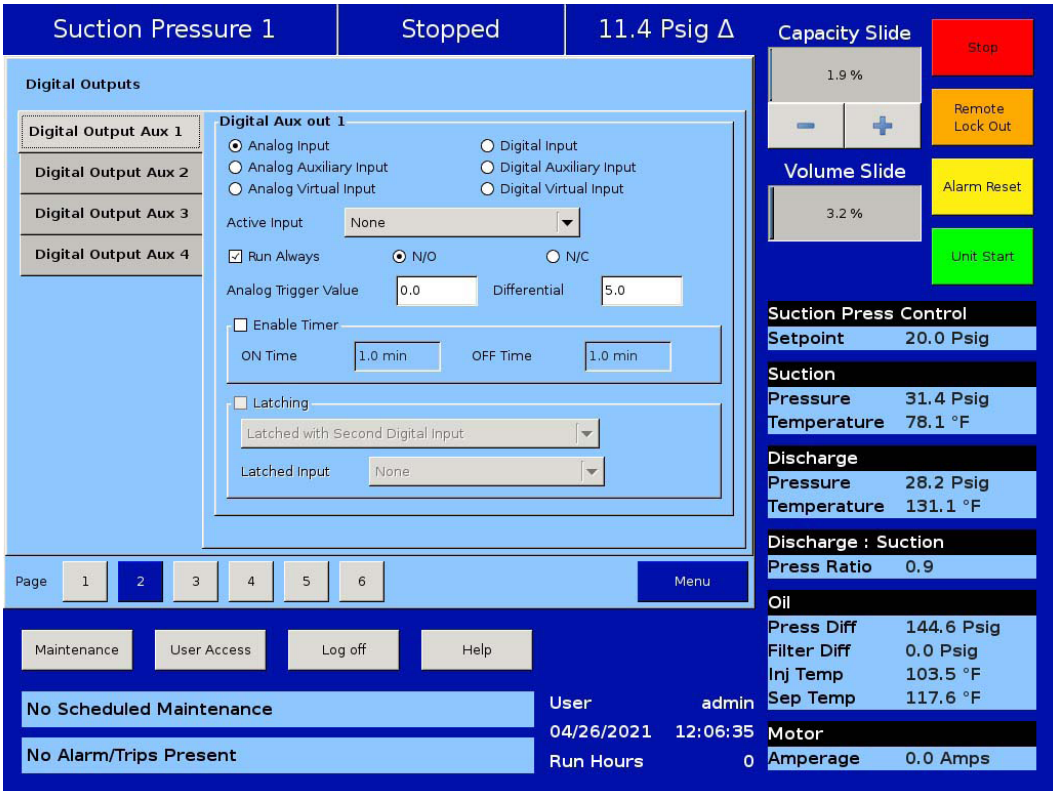


Figure 18-2. Auxiliary I/O Screen - Digital Outputs (Page 2)

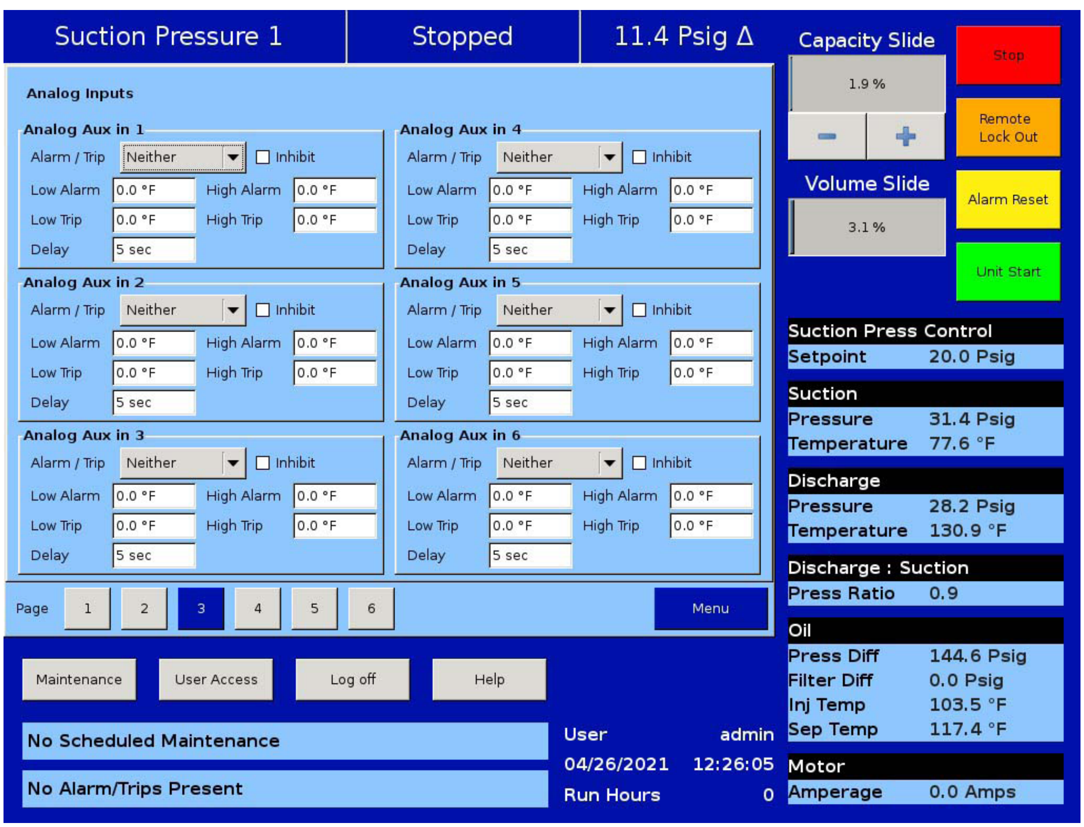


Figure 18-3. Auxiliary I/O Screen - Analog Inputs (Page 3)

Analog Inputs

The Analog inputs section of the auxiliary I/O screen allows an operator to define the function of an instrument connected to the Vission 20/20. For Auxiliary Analog Inputs Screens, see Figure 18-3, 18-4 and 18-5. The analog inputs can be configured to simply monitor an input for informational purposes or used as a control input for the auxiliary digital and analog outputs. The analog inputs can also be configured to alarm, trip, and inhibit on specified values.

- **Alarm / Trip:**
  - This drop-down box allows the operator to select whether the analog input should generate an alarm, trip, or both when the input value exceeds the limits entered into the alarm and trip entry boxes.
- **Inhibit:**
  - Selecting this checkbox will prevent a start if the input value exceeds the alarm limit values.
- **Low Alarm:**
  - This defines the lower limit of the input value that when exceeded will generate an alarm.
- **High Alarm:**
  - This defines the upper limit of the input value, that when exceeded will generate an alarm.
- **Low Trip:**
  - Defines the lower limit of the input value that when exceeded will generate a trip.
- **High Trip:**
  - Defines the upper limit of the input value that when exceeded will generate a trip.
- **Delay:**
  - Defines the time period for which input value is checked with alarm/trip setpoints before showing alarm or trip. If the input value is continuously above or below the alarm or trip setpoints, only then an alarm or trip is generated.

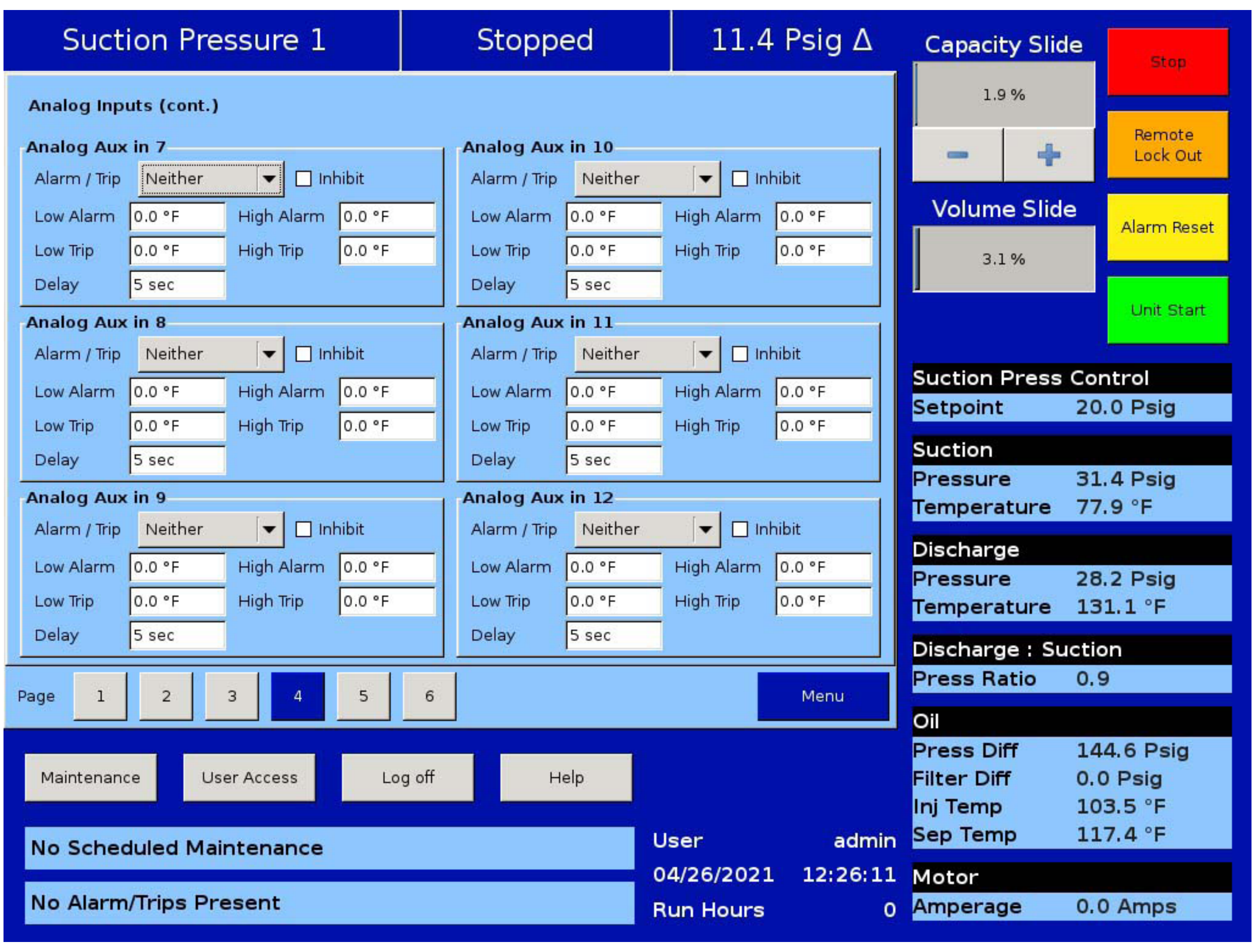


Figure 18-4. Auxiliary I/O Screen - Analog Inputs (Page 4)

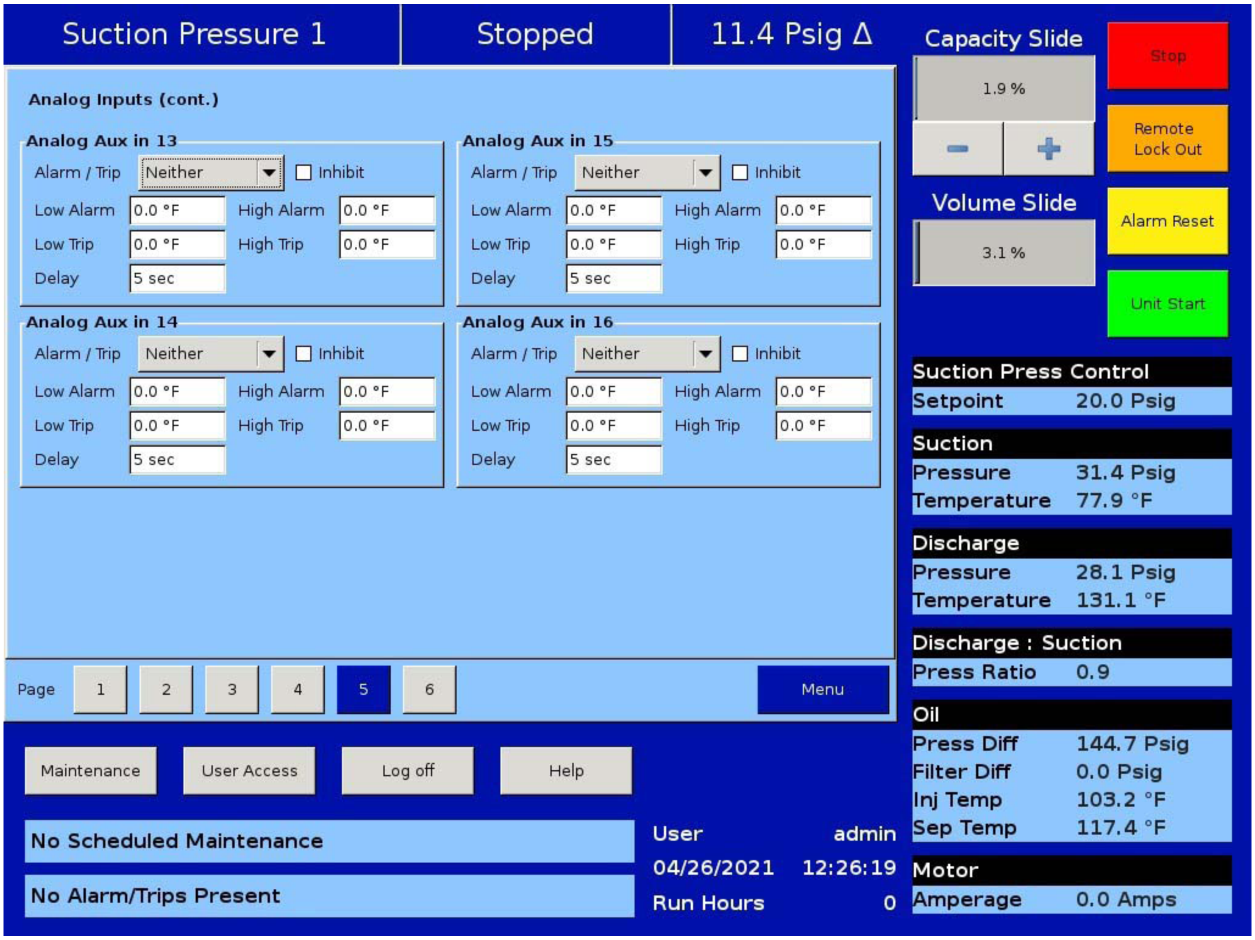


Figure 18-5. Auxiliary I/O Screen - Analog Inputs (Page 5)

Analog Outputs

This screen gives the ability to map any standard analog input or auxiliary input to any of the four analog auxiliary outputs. There are one page of auxiliary output configuration; each tab consist of one analog auxiliary outputs. For Auxiliary Outputs Screens, see Figures 18-6 and 18-7.

- **Active Input:**
  - The active Input can be selected from the available standard analog inputs or auxiliary in- puts or Virtual input or calculated values list. The selected Active Input gets mapped to auxiliary output.
- **Run Always:**
  - "Run Always" option can be selected to enable the mapped auxiliary output irrespective of the compressor's run state. If "Run Always" is not selected then the mapped auxiliary output is enabled only when the compressor is running.
- **Trigger:**
  - Trigger configuration is used to enable / disable an auxiliary output according to the configured trigger input. The trigger input can be selected from the available standard analog inputs, analog auxiliary inputs, digital inputs, digital auxiliary input, analog virtual input or digital virtual input. Trigger value and differential in combination with trigger type ("enable if above / On" or "enable if below / Off") enables or disables the auxiliary output.

Control

Auxiliary outputs can be PID Controlled or Scalable Controlled.

PID Control:

P = Proportional (gain):

- Used to adjust the auxiliary output in direct proportion to the difference between the control setpoint and the active input. The proportional term is a unitless quantity and is used for coarse adjustment. This setpoint should be set to the lowest value that gives adequate control system response. Increasing the proportional setting increases the control system's sensitivity to small process fluctuations and the tendency to hunt.

I + (Reset):

- Used to integrate the error over time, to account for a small error that has persisted for a long time. This quantity is used for fine adjustment. This setpoint is used to smooth out process variations. When this setpoint is set (non-zero), the integral error will get accumulated.

Examples:

Case I

PID Settings	Other Settings
P = 1	Setpoint = 20 , I Op. Band = 0
I+ (Reset) = 1	Interval = 1 sec
I– (Reset) = 1	Negative Error = Disabled
D = 1	Inverse (20 – 4 mA) = Disabled

In this case, the integral error will get accumulated when the process variable is below setpoint, i.e. 20.

Case II

PID Settings	Other Settings
P = 1	Setpoint = 20, I Op. Band = 0
I+ (Reset) = 1	Interval = 1 sec
I– (Reset) = 1	Negative Error = Enabled
D = 1	Inverse (20 – 4 mA) = Disabled

In this case when negative error is enabled, the integral error will get accumulated when the process variable is above setpoint, i.e. 20.

I - (Reset):

- Used to integrate the error over time, to account for a small error that has persisted for a long time. This quantity is used for fine adjustment. This setpoint is used to smooth out process variations. When this setpoint is set (non-zero), the integral error will get subtracted.

Examples:

Case I

PID Settings	Other Settings
P = 1	Setpoint = 20, I Op. Band = 0
I+ (Reset) = 1	Interval = 1 sec
I– (Reset) = 1	Negative Error = Disabled
D = 1	Inverse (20 – 4 mA) = Disabled

In this case, the integral error will get subtracted from the accumulated error when the process variable is above setpoint, i.e. 20.

Case II

PID Settings	Other Settings
P = 1	Setpoint = 20, I Op. Band = 0
I+ (Reset) = 1	Interval = 1 sec
I– (Reset) = 1	Negative Error = Enabled
D = 1	Inverse (20 – 4 mA) = Disabled

In this case when negative error is enabled, the integral error will get subtracted from the accumulated error when process variable is below setpoint, i.e. 20.

D = Derivative (rate):

- Used to account for how fast the error is changing, positively or negatively.

Setpoint :

- Setpoint used by PID engine.

I Op. Band :

- This setpoint defines the operational band for accumulation of integral error as per value of I+ (Reset).}

Examples:

Case I

PID Settings	Other Settings
P = 1	Setpoint = 20, I Op. Band = 5
I+ (Reset) = 1	Interval = 1 sec
I– (Reset) = 1	Negative Error = Disabled
D = 1	Inverse (20 – 4 mA) = Disabled

In this case, the integral error will get accumulated when the value of process variable falls within the lower band as determined by I Op Band setpoint:

(Setpoint – I Op. Band) < Process Variable < Setpoint

Hence:

15 < Process Variable < 20

Case II

PID Settings	Other Settings
P = 1	Setpoint = 20, I Op. Band = 5
I+ (Reset) = 1	Interval = 1 sec
I– (Reset) = 1	Negative Error = Enabled
D = 1	Inverse (20 – 4 mA) = Disabled

In this case when negative error is enabled, the integral error will get accumulated when the value of the process variable falls within the upper band as determined by I Op. Band setpoint :

Setpoint < Process Variable <= (Setpoint + I Op. Band)

Hence:

20 < Process Variable < 25

Inverse (20 – 4 mA):

- This option is used to inverse an Analog Aux Output , to vary its output from 20 mA to 4 mA. Typically used where normally open solenoids are to be operated.

Example:

Case I

PID Settings	Other Settings
P = 1	Setpoint = 20, I Op. Band = 0
I+ (Reset) = 1	Interval = 1 sec
I– (Reset) = 1	Negative Error = Disabled
D = 1	Inverse (20 – 4 mA) = Enabled

In this case, the error calculated by the PID engine will modulate the analog output from 20 mA to 4 mA when the process variable is below setpoint, i.e. 20.

Similarly, the analog output will get modulated towards 20 mA when the process variable is above setpoint.

Case II

PID Settings	Other Settings
P = 1	Setpoint = 20, I Op. Band = 0
I+ (Reset) = 1	Interval = 1 sec
I– (Reset) = 1	Negative Error = Enabled
D = 1	Inverse (20 – 4 mA) = Enabled

In this case, when negative error is enabled, the error calculated by the PID engine will modulate the analog output from 20 mA to 4 mA when the process variable is above setpoint, i.e. 20.

Similarly, the analog output will get modulated towards 20 mA when the process variable is below setpoint.

Negative Error:

- The negative error option determines the calculation of error by the PID engine to modulate the analog output. When the negative error option is enabled, the error will be calculated as Process Variable minus Setpoint (Process Variable – Setpoint).
- Hence, when the Process Variable is above setpoint and the Inverse (20 – 4 mA) option is disabled, the PID engine will ramp up the analog output towards 20 mA.
- Similarly, if the negative error option is disabled, the error will be calculated as Setpoint minus Process Variable (Setpoint – Process Variable).
- Hence when the Process Variable is below setpoint and the Inverse (20 – 4 mA) option is disabled, the PID engine will ramp up the analog output towards 20 mA.

Interval:

- This setpoint defines the time interval for calculation of the Integral Error.

Example:

PID Settings	Other Settings
P = 1	Setpoint = 20, I Op. Band = 0
I+ (Reset) = 1	Interval = 10 sec
I– (Reset) = 1	Negative Error = Disabled
D = 1	Inverse (20 – 4 mA) = Disabled

In this case, the integral error will get accumulated or subtracted every 10 seconds, each time the calculation is made, according to the interval time.

Scalable Control:

- **Minimum Input / Maximum Input:**
    - These setpoints define minimum and maximum Input range for a configured active input.
- **Minimum Output / Maximum Output:**
    - These setpoints define minimum and maximum output. The Auxiliary output produces a linear value based on these settings.

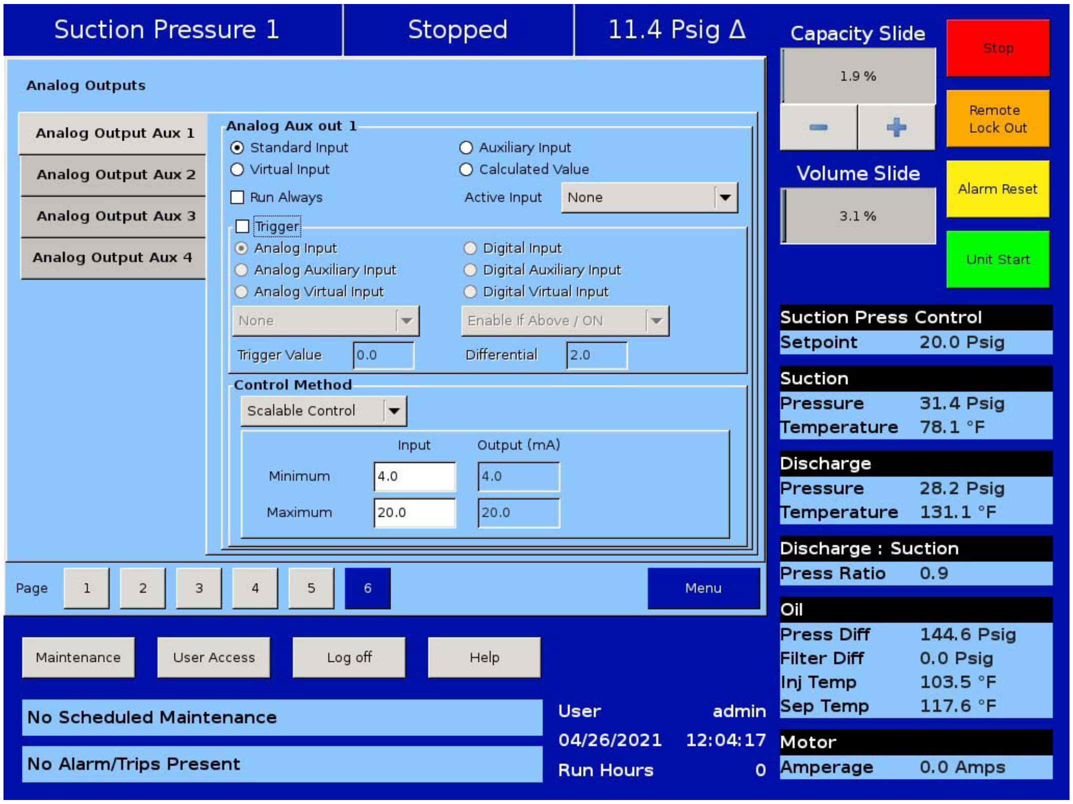


Figure 18-6. Auxiliary I/O Screen - Analog Outputs (Page 6)

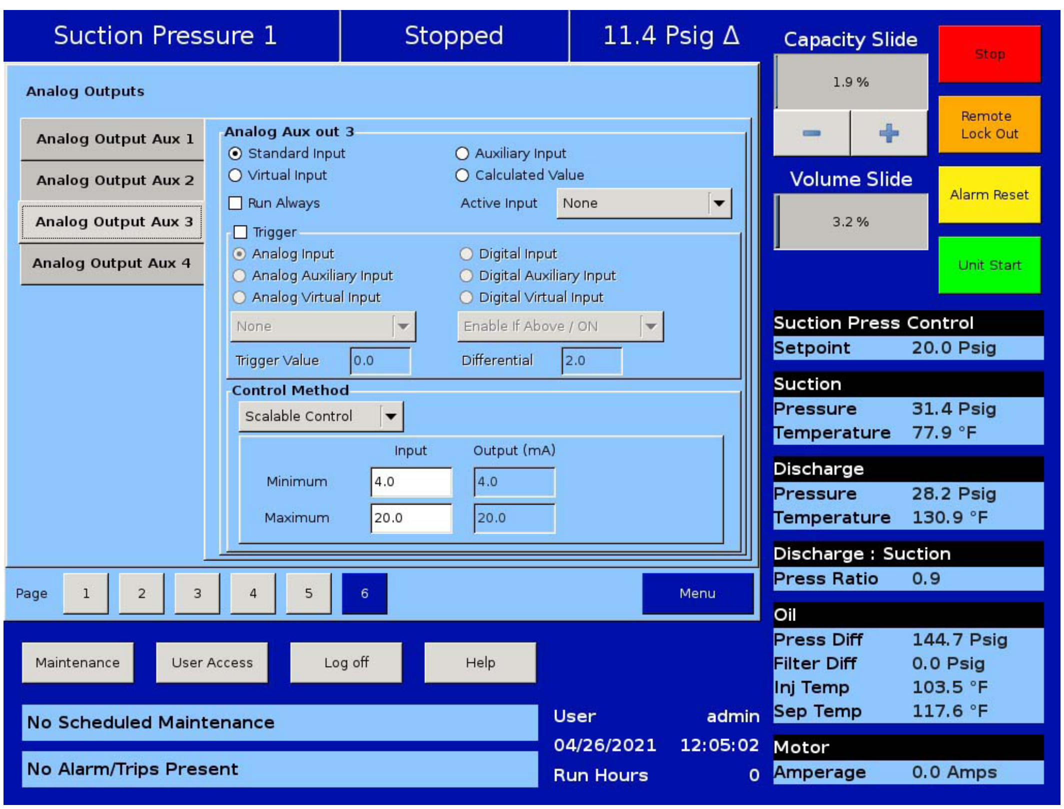


Figure 18-7. Auxiliary I/O Screen - Analog Outputs (Page 6)

Overview

The configuration screen is where most of the Vission 20/20 features are enabled and configured. The initial setup of the Vission 20/20 will generally start here, see Figure 19-1. Depending on what is selected, different portions of the Vission 20/20 will be available to the operator.

Compressor Identification

This section sets the identification for a Vission 20/20 unit.

Name:

- Unique identifier that is used for all Vission 20/20 units.

Panel ID:

- Panel Identifier used by the controller when communicating with multiple panels.

Units

This section sets how values will be represented throughout the program.

Temp Units:

- Drop-down box to select the temperature units from Fahrenheit and Celsius. Once selected, all screen temperatures will be displayed in the chosen units.

Press Units:

- Drop-down Box to select the pressure units. Psig, Bar, and Kpa are the possible selections and the units will be displayed for every pressure value throughout the screens.

Order Num:

- Identifies the Order number of the purchase of the compressor. This Number will be needed If the operator requires help from Vilter™ .

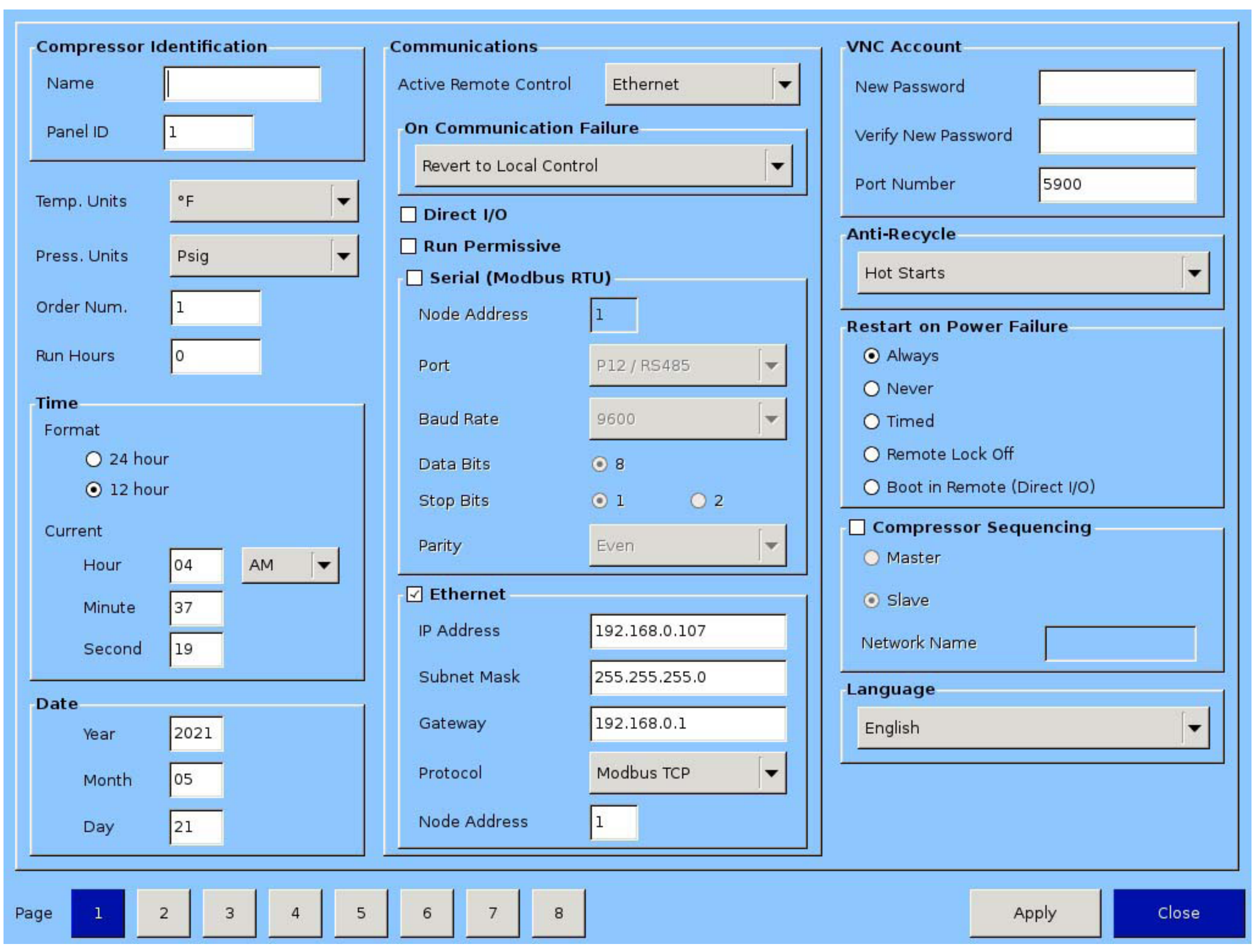


Figure 19-1. Configuration Screen - Initial Setup (Page 1)

Run Hours:

- Offers the ability to change the compressor run hours. This is typically used when replacing an older micro controller on an existing compressor with a new Vission 20/20.

Time & Date

This section sets the time and date of the Vission 20/20. Accurate time and date are essential for accurate logging and troubleshooting. Setting these parameters will set the hardware clock embedded in the Vission 20/20 CPU. If the time is not retained after powering down the panel, the operator should check and/or replace the coin style battery on the panel SBC behind the touchscreen.

Format:

- Selection to choose between 12 hour or 24 hours clock.

Hour:

- Entry box to set the clock hours. AM or PM drop-down box will available if the 12 hour format is selected.

Minute:

- Entry Box to set the clock minutes.

Second:

- Entry Box to set the clock seconds.

Year:

- Entry Box to set the current year.

Month:

- Entry Box to set the current month.

Day:

- Entry Box to set the current date.

Communications

The communication section is the control center for all communications to the Vission 20/20 panel. It is possible to have multiple modes of communications enabled and used. However, only one mode can be used to control the Vission 20/20, which would be the one selected in the "Active Remote Control" drop-down box. For a complete list of communication registers, please refer to the Vission 20/20 communication table.

Active Remote Control:

- Selects the mode of remote control. The operator can select between Direct I/O, Serial, or Ethernet.

On Communication Failure:

- This feature of the Vission 20/20 offers the ability to define how the Vission 20/20 will handle a communication failure.
- **a) Revert to Local Control:**

  • Once the compressor has been running in Remote mode, a communication failure detection timer, as configured in the Timers screen, will start. If no further communication with the Vission 20/20 takes place for the configured time, the Vission 20/20 will be placed in Local Auto mode, a yellow banner will be displayed on the Vission 20/20's screen to show that a "Remote Comm Time-out" occurred, and the Event List will get populated with a time-stamped "Remote Comm Time-out" event.
- **b) Stop Compressor with Trip:**

  • Once the compressor has been running in Remote mode, a communication failure detection timer, as configured in the Timers screen, will start. If no further communication with the Vission 20/20 takes place for the configured time, the Vission 20/20 will be stopped, a red banner will be displayed on the Vission 20/20's screen to show that a "Remote Comm Time-out" occurred, and the Event List will get populated with a time-stamped "Remote Comm Time-out" event.

Direct I/O

Enables the Direct I/O inputs. Once selected, a pop-up will be displayed and the operator will need to choose one of the three Direct I/O options.

Run Permissive

• When this checkbox is enabled, it monitors the Remote Start/Stop Digital Input (6th Digital Input on Digital Input Board 1). If this digital input is energized, the Compressor is allowed to start in the selected run mode (Auto / Manual / Remote). If the Remote Start/ Stop digital input is de-energized the compressor will wait until the Digital Input is Energized.

• When this checkbox is disabled, the Remote Start/Stop Digital Input State is not monitored during Compressor Start.

Serial (Modbus RTU)

Enables the Serial Modbus RTU protocol. Once selected, the remainder of the serial setpoints will be available for editing.

Node Address:

- Address used by the controller when communicating with multiple panels.

Port:

- The Vission 20/20 has two ways to communicate on serial bus. Either via the built in serial port, P12, or through one of the USB ports. This drop-down box allows the operator to choose which one will be used.

Baud Rate:

- Sets the Baud Rate for the serial communication.

Data Bits:

- Fixed at 8 Data bits.

Stop Bits:

- Identifies the end of character for re-synchronizing.

Parity:

- Identifies the type of error detection.

Ethernet

Enables the Ethernet port. Once selected, the remainder of the Ethernet setpoints will be available for editing.

IP Address:

- Entry box to set the IP address.

Subnet Mask:

- Entry box to set the Subnet Mask.

Gateway:

- Entry box to set the Gateway address.

Protocol:

- Drop-down box to select the type of protocol used to remotely control the Vission 20/20.

Node Address:

- Address used by the controller when communicating with multiple panels.

VNC Account

Vission 20/20 panels can be accessed remotely by using a VNC client over TCP/IP network. This section allows the operator to change default VNC Password and VNC Port number, see Figure 19-1.

New Password:

- The operator will add the password by touching the entry box and typing the password via the pop-up keyboard.

Verify New Password:

- The operator will re-enter the password by touching the entry box and typing the password via the pop-up keyboard.

Port Number:

- The operator will change the port number for VNC server by touching the entry box and typing via the pop-up keyboard. Default port number is 5900. Operator can assign port number ranging from 5900 to 6000.

Anti-Recycle

Anti-Recycle defines the method of motor protection due to repeated motor starts. The operator has 3 choices of protection. “Hot starts” allow only a certain number of starts per hour before setting the anti-recycle timer to one hour. The number of starts is set in the timer page. “Accumulative” immediately adds time to the anti-recycle timer once the compressor is started and the time can be set in the timers screen. “True anti-recycle” adds to the anti-recycle timer once the compressor is shutdown. The motor of the compressor cannot be restarted if there is anti-recycle time left, and the operator can view this time on the top left corner of the main screen.

Restart On Power Failure

This feature of the Vission 20/20 offers the ability to define how the Vission 20/20 will handle a power failure. This can also be useful to allow a system controller to regain control of the Vission 20/20 panel without the need of operator intervention.

Always:

- When selected, initiates a start after the panel powers back up after a power failure, but only if the compressor was running before the power failure and starts the compressor in Auto mode.

Never:

- When selected, prevents any automatic action once the panel powers back up after a power failure.

Timed:

- When selected, initiates a start after the panel powers back up after a power failure and the operator-set timer runs out. When there are multiple compressors in a larger system, it is recommended for the operator to give each compressor a different start time. A restart will only occur if the compressor was running before the power failure and starts the compressor in Auto mode.

Remote Lock Off:

- When selected, turns the remote lock out off when the panel powers up. Select this option if the operator wishes a system controller to regain control of the Vission 20/20 without human interference.

Boot in Remote (Direct I/O):

- When selected, places the panel into Remote mode when the panel powers up. Select this option when under Direct I/O control and the system controller is to gain control of the Vission 20/20 without human interference.

Compressor Sequencing

The compressor sequencing feature of the Vission 20/20 allows the operator to setup as many as five compressors to automatically start, stop and maintain system loads. The compressor designated as the master will monitor system parameters and make decisions on how many compressors are required to meet the load as efficiently as possible.

Compressor Sequencing:

- Enables the compressor sequencing algorithms and allows access to the compressor sequencing screen.

Master:

- Identifies the panel as the master while in sequencing control.

Slave:

- Identifies the panel as a slave while in sequencing control.

Compressor Name:

- Unique identifier that is broadcasted to all other Vission 20/20 units in the sequencing network.

Language

Allows the operator to select the language to be displayed on screen.

Model & Refrigerant

The values in this section provide the Vission 20/20 algorithm critical information on how to efficiently and safely control the compressor, see Figures 19-2 and 19-3 & 19-4.

Compressor:

- Drop-down box to select the compressor type. This selection is critical for proper volume slide control.

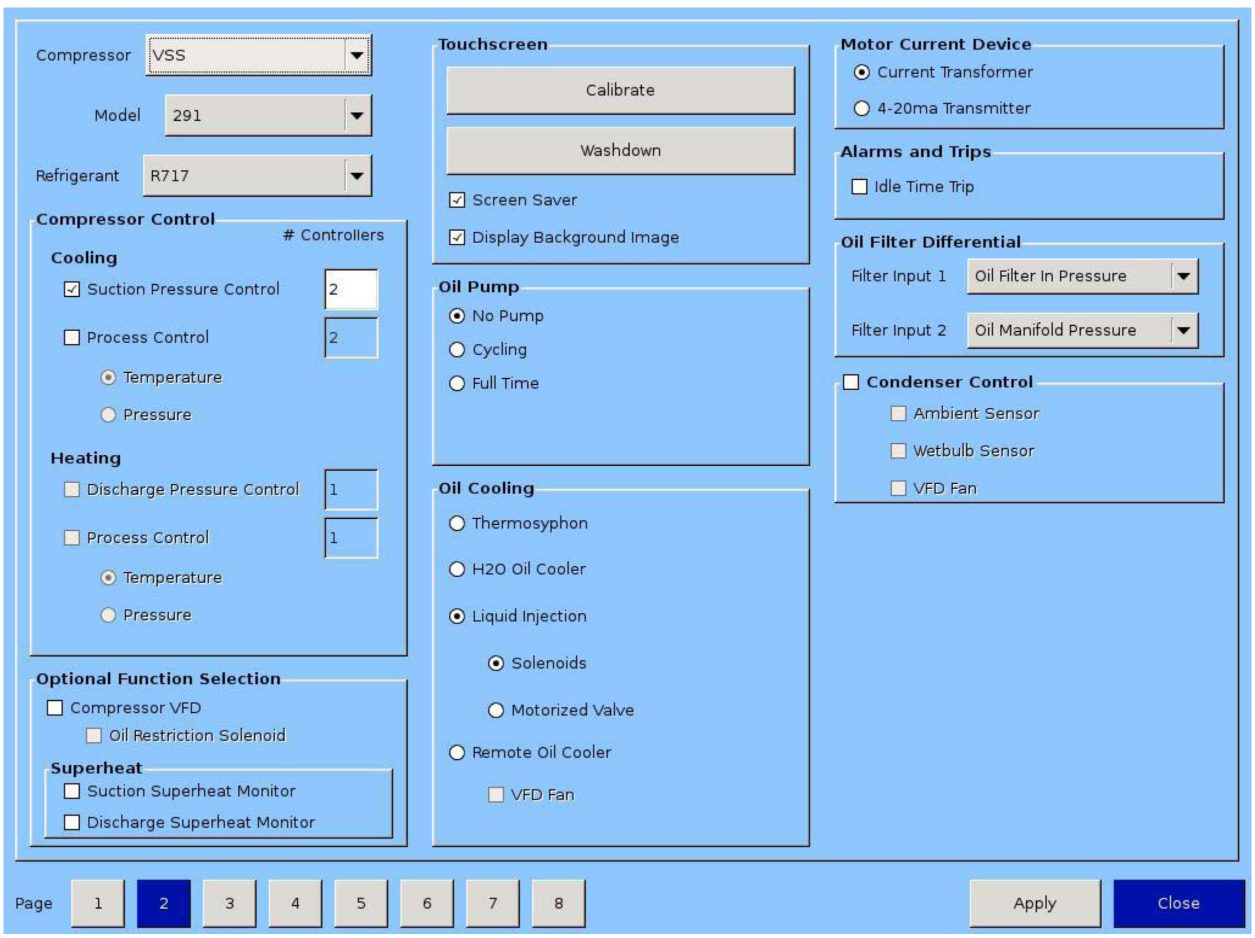


Figure 19-2. Configuration Screen - Compressor Control (Page 2) (Compressor Type – VSS)

Model:

- Drop-down box to select the compressor size. This selection is critical for proper volume slide control. When the selection is VRS, such as in Figure 19-3, the “Model” option becomes the compressor’s CFM.

Refrigerant:

- Drop-down box to select the type of refrigerant. This selection is critical for proper volume slide control.

Compressor Control

Vilter™ compressors typically run in one of Four control modes: Suction Pressure, Process Control Cooling, Discharge Pressure Control or Process Control Heating see Figure 19-2. Discharge Pressure Control and Process Control Heating is mutually exclusive with Suction Pressure Control & Process Control Cooling. When Discharge Pressure Control or Process control Heating is selected, Suction Pressure Control and Process Control Cooling are grayed out and cannot be selected. Similarly, if Suction Pressure Control and/or Process Control Cooling are selected, Discharge Pressure Control or Process Control Heating is grayed out and cannot be selected.

Suction Pressure Control:

- This defines the Suction Pressure input as the process variable and all controls will be based on Suction Pressure. The operator has the option to select up to two controllers where each can have its own set of setpoints.

Process Cooling Control:

- This defines the Process Cooling Control input as the process variable and all controls will be based on either Process Temperature or Process Pressure. The operator has the option to select up to two controllers where each can have its own set of setpoints. The operator has to select one of the process control modes, either temperature or pressure, as a process variable. Temperature and pressure configurations are mutually exclusive. The default setting will have temperature as process control cooling variable.

Discharge Pressure Control:

- This defines the discharge pressure input as the process variable and all controls will be based on discharge pressure. The operator has the option to select up to two controllers where each can have its own set of setpoints.

Process Heating Control

This defines the Process Control Heating input as the process variable and all controls will be based on either Process Temperature or Process Pressure. The operator has the option to select up to two controllers where each can have its own set of setpoints. The operator has to select one of the process control modes, either temperature or pressure, as a process variable. Temperature and pressure configurations are mutually exclusive. The default setting will have temperature as process control heating variable.

Optional Function Selection

The following options are additional features of the Vission 20/20 that can be selected. Some of these options will not be available for selection unless the proper I/O cards are installed and enabled, see Figure 19-2.

Compressor VFD:

- Enables the compressor motor’s VFD option.

Oil Restriction Solenoid:

- Enables the Oil Restriction Solenoid option.

Suction Superheat Monitor:

- Enables the suction superheat safety algorithms. Suction superheat monitor works only with R717 and R507. Suction superheat monitor and Discharge superheat monitor features are mutually exclusive.

Discharge Superheat Monitor:

- Enables the discharge superheat safety algorithms. Discharge superheat monitor works only with R717. Discharge superheat monitor and suction superheat monitor features are mutually exclusive.

Touchscreen

The "Calibrate" button puts the screen into calibration mode. Calibrating the touchscreen is only required if the operator finds that the pointer's arrow no longer follows his finger. The calibration mode requires the operator to touch the four corners of the touchscreen and then the Accept button.

The "Washdown" button will "blank" the screen for 30 seconds. Once this time elapses, a "Close" button will appear to close the blank screen.

Screen Saver check box:

- Enables the option for the Screen Saver.
- The default State of the check box is Enabled.
- If the check box is enabled, then after 15 minutes of inactivity, a blank screen will be displayed as a screen saver.
- If the check box is disabled, then the blank Screen will not be displayed.

Display Background Image:

- The default State of the check box is Enabled.
- If the check box is enabled, then the Main Screen will show the compressor Image and its related parameters.
- If the check box is disabled, the Main Screen will not show the Compressor's Image, instead it will only show compressor related parameters. The table at top left corner will be fixed at the Digital Output table and the other three will be user configurable tables.

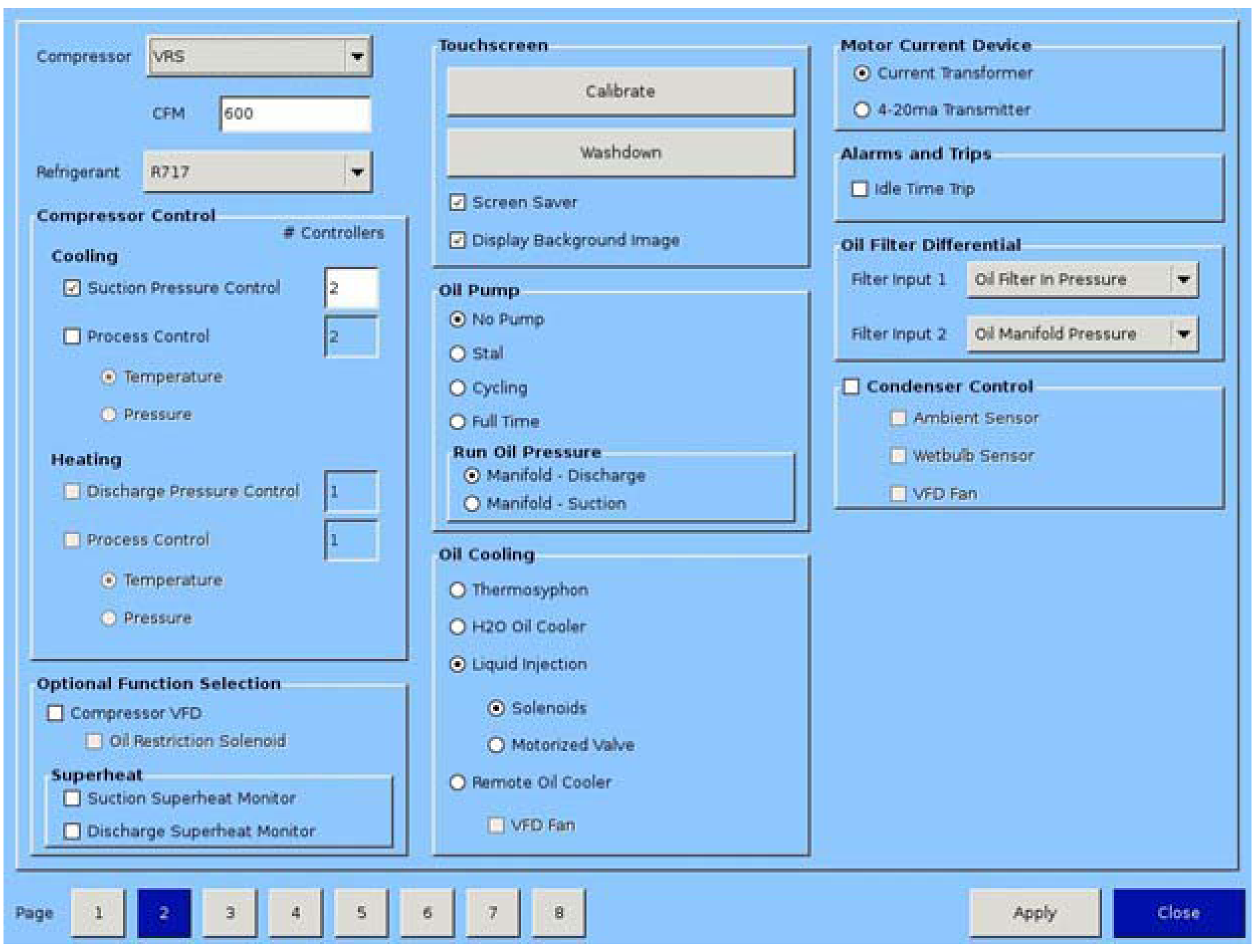


Figure 19-3. Configuration Screen - Compressor Control (Page 2) (Compressor Type – VRS)

Oil Pump

This section defines how the Vission 20/20 will control the oil pump, see Figures 19-2 and 19-3.

No Pump:

- The Oil Pump digital output will be turned off. The oil pump will not be running while the compressor is running. Prelube oil pressure will not be checked. The prelube oil pressure is defined as (manifold pressure - discharge pressure) during the start sequence.

Stal:

- This option is only available for VRS. The Oil pump is cycled on and off depending on compressor's differential pressure. Prelube oil pressure will not be checked. The prelube oil pressure is defined as (manifold pressure - discharge pressure) during the start sequence.

Cycling:

- Enables the option to cycle the oil pump. The Oil pump is cycled on and off depending on compressor's differential pressure.

Full Time:

- Enables the option for full time oil pump. The Oil pump will always be running while the compressor is running.

Run Oil Pressure

This option is only available for VRS. The Run Oil Pressure difference is get calculated depending on radio button selected.

Manifold – Discharge:

- Run Oil Pressure will be difference of Manifold Pressure minus Discharge Pressure

Manifold – Suction:

- Run Oil Pressure will be difference of Manifold Pressure minus Suction Pressure

Oil Cooling

The section defines how the Vission 20/20 will monitor and/or control the temperature of the compressor oil, see Figures 19-2 and 19-3.

Thermosyphon:

- This defines the compressor oil cooling method as thermosyphon.

H20 Oil Cooler:

- This defines the compressor oil cooling method as water heat exchange.

Liquid Injection:

- This defines the compressor oil cooling method as liquid refrigerant injection.

  Solenoids:

  - Enables the solenoid for liquid injection control.

  Motorized Valve:

  - Enables the motorized valve for liquid injection controlled by PID settings.

Remote Oil Cooler:

- Defines the compressor oil cooling method as Remote Oil Cooler. A Remote Oil Cooler VFD fan can be enabled when the Auxiliary Output board is installed and enabled. The rest of the Remote Oil Cooler setpoints can be defined by navigating to the Remote Oil Cooler Screen. The Remote Oil Cooler and Condenser Control feature are mutually exclusive.

Motor Current Device

The Vission 20/20 can read the motor current in a couple of different ways. The following selections define the method, see Figures 19-2 and 19-3.

Current Transformer:

- This defines the input used for motor current when a current transformer is used.

4-20mA Transformer:

- This defines the input used for motor current.

Alarms and trips

The "Idle time trip" check box works in conjunction with the High Level Shutdown digital input. If selected, when the compressor is in idle state and this digital input is off, the compressor should give a "High Level Shutdown Trip" message.

Oil Filter Differential

This section defines the calculation for Oil Filter Differential Pressure. See Figure 19-2 and 19-3.

Oil Filter Differential Pressure will be calculated based on the selections in Filter Input 1 and Filter Input 2 drop-down boxes. Oil Filter Differential Pressure = Filter Input 1 – Filter Input 2.

Filter Input 1

- This drop-down box provides the selection of Analog Inputs for Oil Filter Differential Calculation. Default value for this selection will be "Oil Filter In Pressure". Analog Auxiliary Inputs will be available for selection when Analog Auxiliaries Inputs are enabled and are used for measuring Pressure values. Process Control option will be available for selection when if Suction Pressure Control Type or Discharge Pressure Control Type is selected.

Filter Input 2

- This drop-down box provides the selection of Analog Inputs for Oil Filter Differential Calculation. Default value for this selection will be "Oil Manifold Pressure". Analog Auxiliary Inputs will be available for selection when Analog Auxiliaries Inputs are enabled and are used for measuring Pressure values. Process Control option will be available for selection if Suction Pressure Control Type or Discharge Pressure Control Type is selected.

Condenser Control

The set of values in this section enables the condenser control feature of the Vission 20/20. Once selected the checkboxes will become available for selection and the condenser control screen will be available via the menu screen. Some of the options' check boxes in this section may not be available for selection unless the proper I/O cards are installed and enabled, see Figures 19-2 and 19-3.

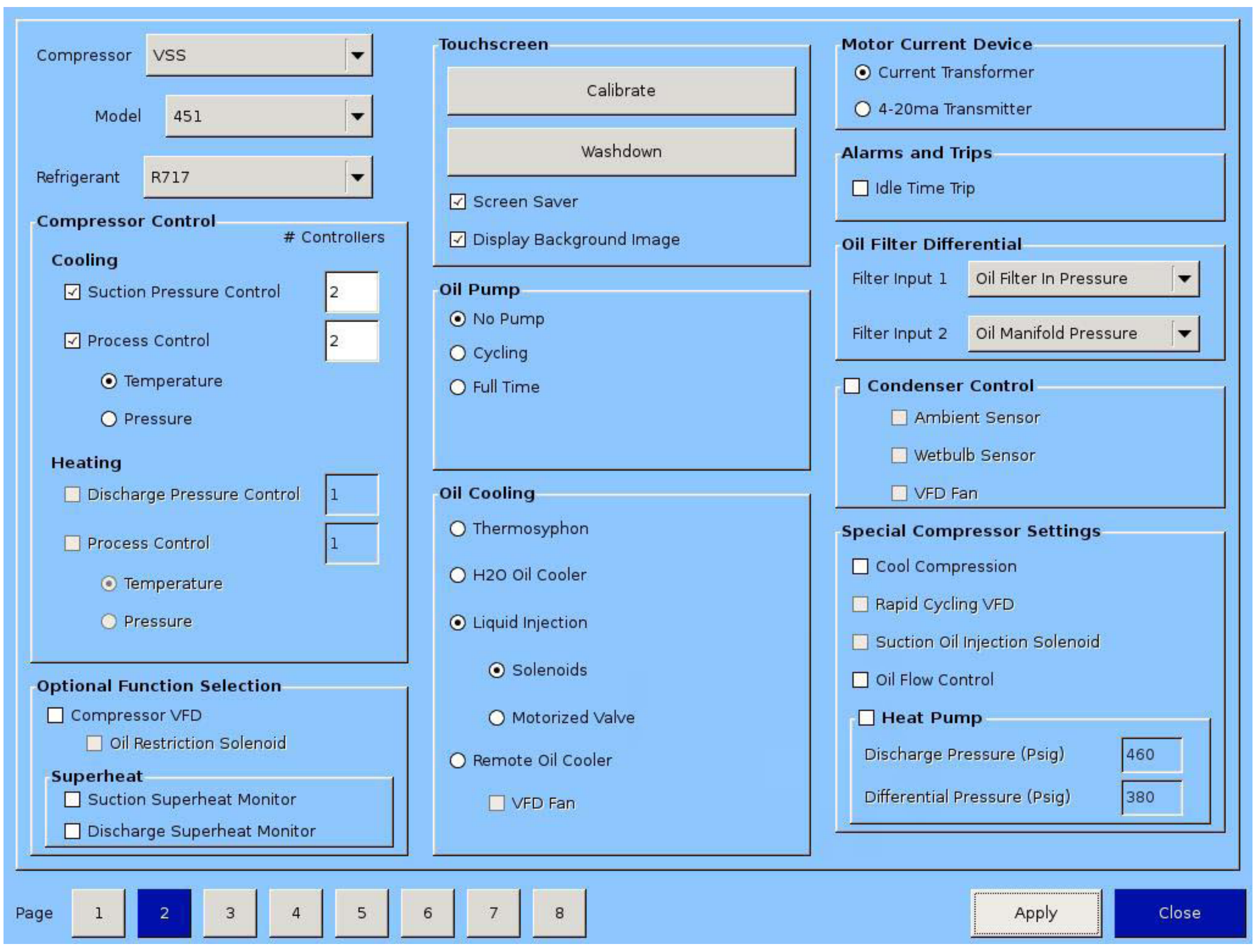


Figure 19-4. Configuration Screen - Compressor Control - (Special Compressor Settings) (Page 2)

Ambient Sensor:

- Enables the ambient temperature option for the condenser control algorithm.

Wetbulb Sensor:

- Enables the wetbulb temperature override option for the condenser control algorithm.

VFD Fan:

- Enables the VFD output option for the condenser control algorithm.

Special Compressor Settings[1]

The following options are special features of the Vission 20/20 that can be only configured by a Vilter™ user (security level 4), see Figure 19-4.

Cool Compression:

- Enables Cool Compression Algorithm to cool oil. A blanket of liquid ammonia is used on top of oil in the Oil Separator.

Rapid Cycling VFD:

- Enables the Rapid Cycling VFD Algorithm to control the Compressor VFD Analog Output.

Suction Oil Injection Solenoid:

- Enables the SOI Solenoid Algorithm. A SOI Solenoid is used when the Oil Pump is not present in the system.

Oil Flow Control:

- Enables the option for oil flow control. Oil flow control will vary the analog output to control the Danfoss valve's opening % depending on the capacity slide position. The Oil flow control output will be regulated only when the compressor is running and the start condition is over, i.e. low oil pressure timer is elapsed, pumpdown control operation is not running and oil

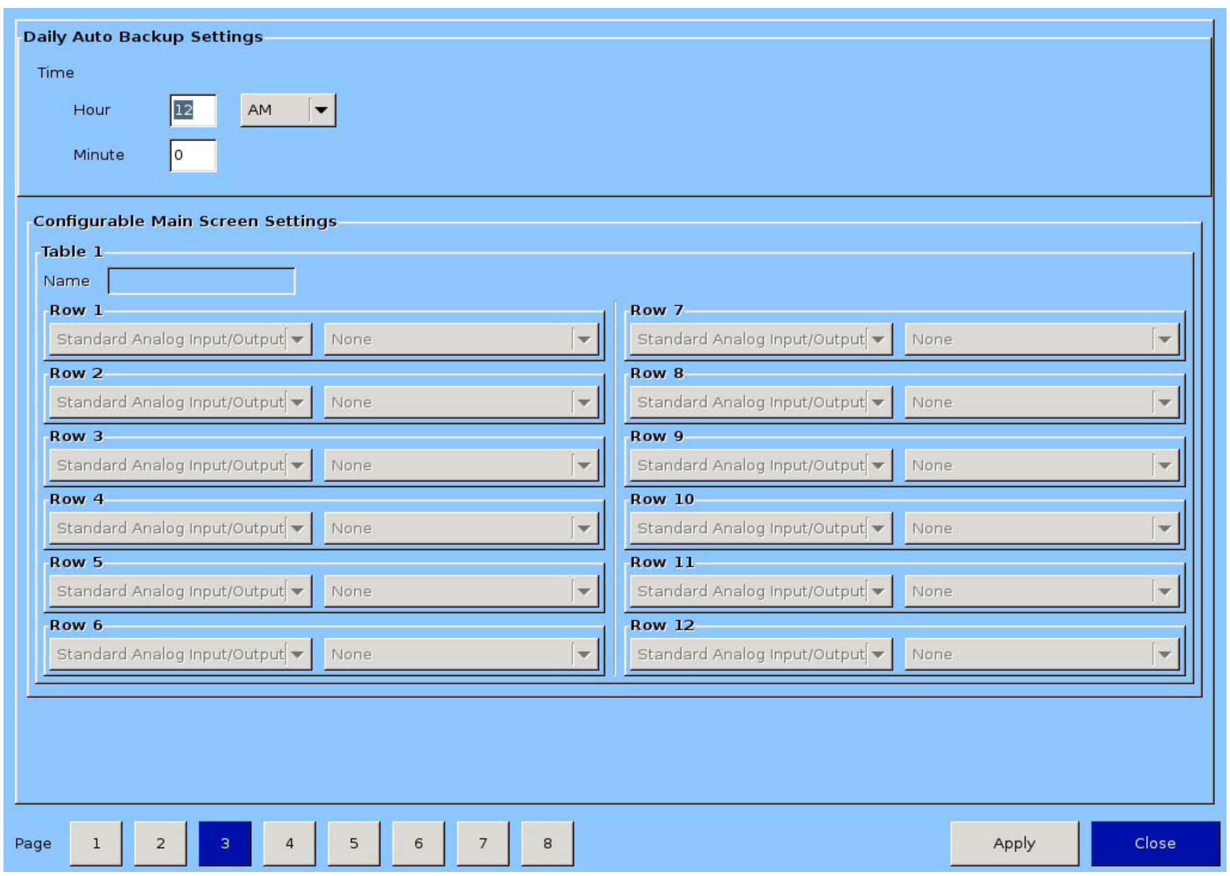


Figure 19-5. Configuration Screen – Configurable Main Screen Settings (Page 3)

1 The following Special Compressor Settings are not supported when using the No Slide Feature: Cool Compression, Rapid Cycling VFD, Suction Oil Injection Solenoid and Oil Flow Control.

injection temperature is above the oil injection temperature override setpoint. If any of the above conditions are not satisfied, then the oil flow analog output will be 4mA, which corresponds to 100 % valve open.

Heat Pump:

- Enables the option for Heat Pump. The maintenance Schedule for a Heat Pump Compressors is different & hence the maintenance Chart is modified when the Heat Pump option is selected.

Discharge Pressure (Psig):

- This setpoint defines a value for the Discharge Pressure. This is typically used to determine the service interval to Inspect a compressor's Maintenance Item in the Maintenance Chart Page of the Maintenance Screen.

Differential Pressure (Psig):

- This setpoint defines the value for the Differential Pressure. This is typically used to determine the service interval to Inspect a compressor's Maintenance Item in the Maintenance Chart Page of the Maintenance Screen.

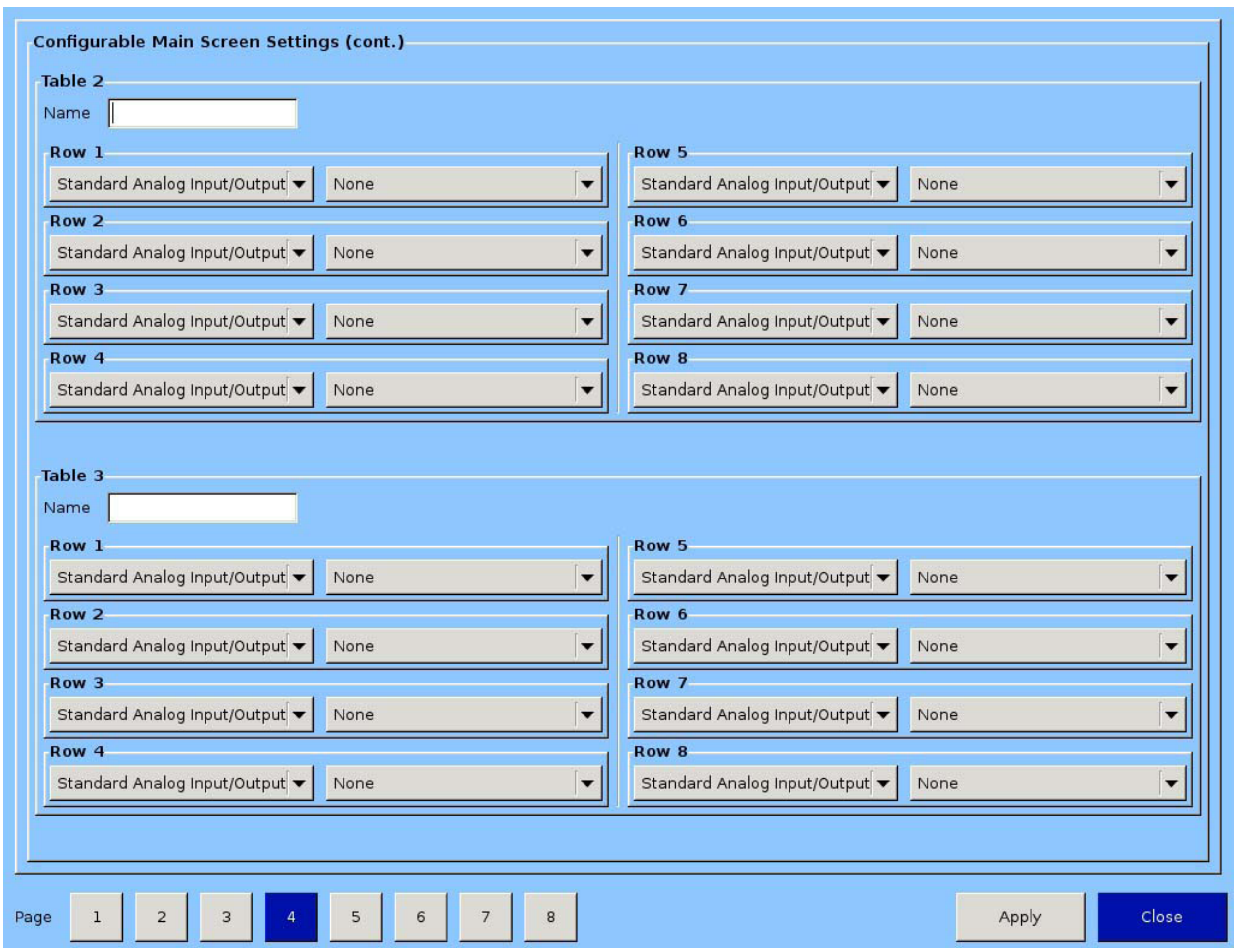


Figure 19-6. Configuration Screen – Configurable Main Screen Settings (Page 4)

Table 19-1. Special Compressor Settings

Sr No	Special Compressor Setting	List of Items / Features to be Kept Enabled (✔)	List of Items / Features to be Kept Disabled (X)
1	Cool Compression	1. Control Mode – Suction Pressure Control / Process Control Cooling. 2. Refrigerant – R717. 3. Analog Input 3 Board. 4. Analog Output Board.	1. Rapid Cycling VFD. 2. Suction Oil Injection Solenoid. 3. Oil Flow Control. 4. Compressor Type – VRS, VSH/VSG, VSM - 97,113,127.
2	Rapid Cycling VFD	1. Digital Input/Output 2 Board. 2. Analog Output Board.	1. Suction Oil Injection Solenoid. 2. Cool Compression. 3. Compressor Type - VSH/ VSG, VSM- 97,113,127. 4. Compressor Sequencing.
3	Suction Oil Injection Solenoid		1. Cool Compression. 2. Rapid Cycling VFD. 3. Oil Flow Control. 4. Compressor Type – VRS, VSH/VSG, VSM - 97,113,127. 5. Compressor Sequencing.
4	Oil Flow Control	1. Analog Output Board.	1. Cool Compression. 2. Suction Oil Injection Solenoid. 3. Compressor Type - VSH/ VSG,VSM - 97,113,127.

Daily Auto Backup Settings

The Vission 20/20 can backup the database every day at a configured time. The following section defines the time setpoints for database backup activity, see Figure 19-5.

Hour:

- Entry box to set the database backup hours. AM or PM drop-down box will be available if the 12 hour format is selected.

Minute:

- Entry box to set database backup minutes.

Configurable Main Screen Settings

Configuration screen's pages 3 and 4 will allow users to configure parameters to display on the Main Screen. These pages will be available for selection only if the Display Background Image option is Disabled.

Name:

- Entry box to set the name of the table which is displayed on Main Screen.

Each row will have two combo boxes. The first combo box will have options to select the type of value to be displayed on the Main Screen, i.e. Standard Analog / Digital Inputs & Outputs, Auxiliary Analog / Digital Inputs & Outputs, Calculated Values and Virtual Input /Output. Based on the first combo box selection, the second combo box will show list of values for selection. The value set from the second combo- box will get displayed on Main Screen.

Table 1 will have 12 different rows for the selected data to be displayed on the Main Screen. Table 2 & 3 will have 8 different rows for the selected data to be displayed on the Main Screen. Please see Figures 19-5 & 19-6.

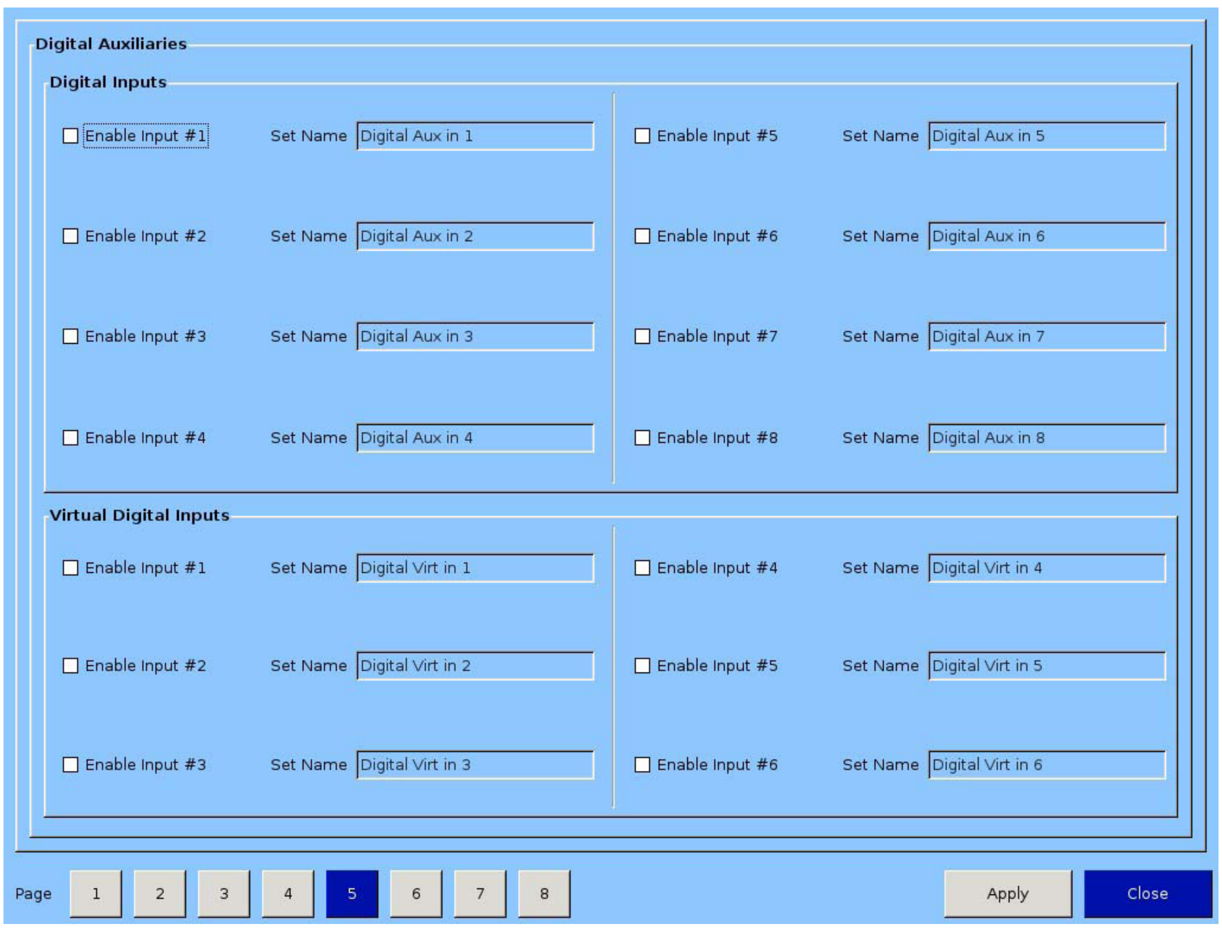


Figure 19-7. Configuration Screen - Digital Auxiliaries (Page 5)

Digital Inputs

The Vission 20/20 has several Digital inputs for which the operator can choose the use. Once an input is enabled, the Auxiliary I/O screen will be available from the menu screen where the operator can further define the input's operation, see Figure 19-7 and also reference Section 18.

Enable Input #:

- Enables the selected digital input.

Set Name:

- Allows the operator to assign a name to the input.

Virtual Digital Inputs

The Vission 20/20 has six Virtual Digital inputs for which the operator can choose the use. Once an input is enabled, the Remote register will be available for write the value where the operator can further define the input's operation, see Figure 19-7 and also reference Section 18.

Enable Input #:

- Enables the selected virtual digital input.

Set Name:

- Allows the operator to assign a name to the input.

Analog Inputs

The Vission 20/20 has several Analog inputs for which the operator can choose the use. Once an input is enabled, the Auxiliary I/O screen will be available from the menu screen where the operator can further define the input's operation, see Figure 19-8 and also reference Section 18.

Enable Input #:

- Enables the selected analog input.

Set Name:

- Allows the operator to assign a name to the input.

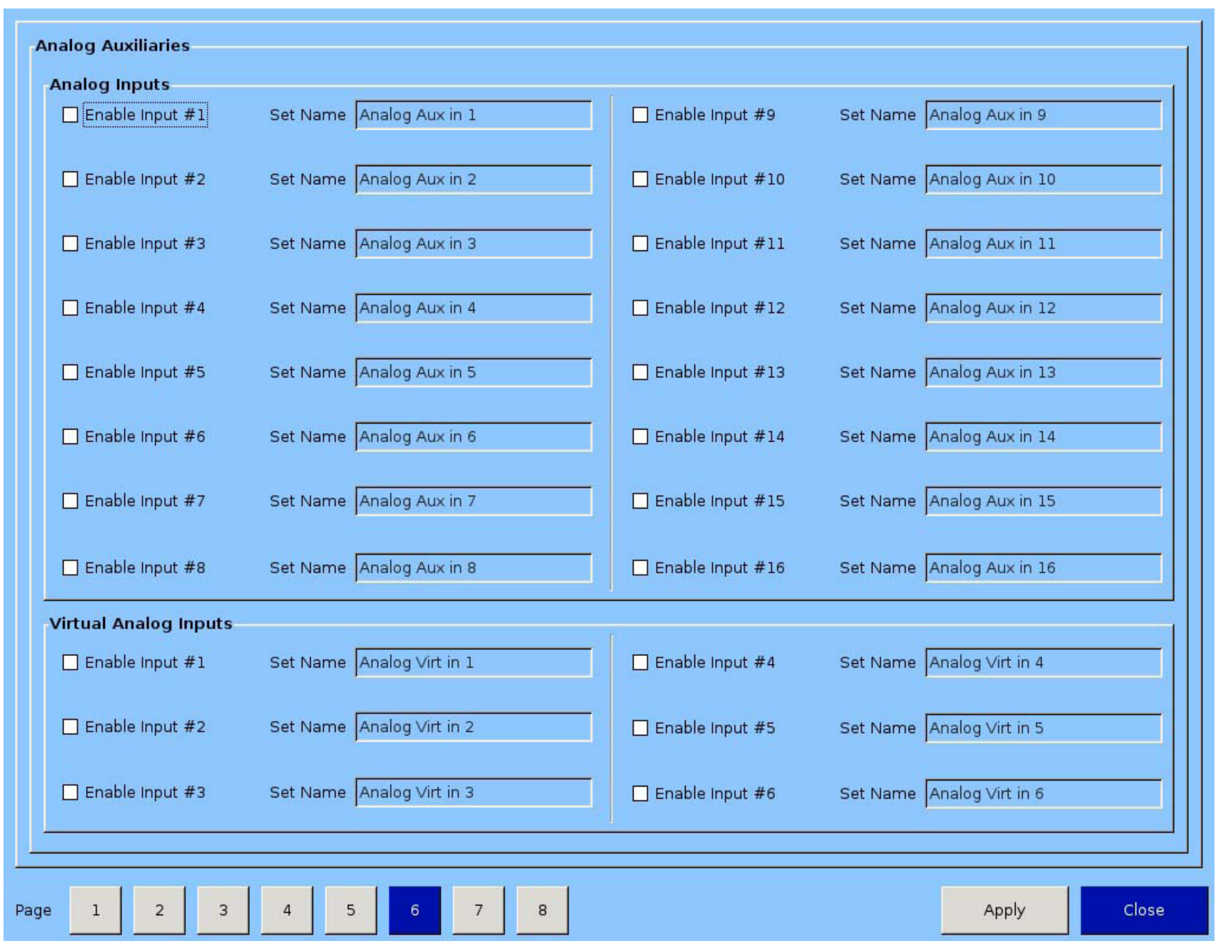


Figure 19-8. Configuration Screen - Analog Auxiliaries (Page 6)

Virtual Analog Inputs

The Vission 20/20 has six Virtual Analog inputs for which the operator can choose the use. Once an input is enabled, the Remote register will be available for write the value where the operator can further define the input's operation, see Figure 19-8 and also reference Section 18.

Enable Input #:

- Enables the selected virtual analog input.

Set Name:

- Allows the operator to assign a name to the input.

Analog Outputs

The Vission 20/20 has several Analog outputs for which the operator can choose the use. Once an output is enabled, the Auxiliary I/O screen will be available from the menu screen where the operator can further define the output's operation, see Figure 19-9 and also reference Section 18.

Enable Output #:

- Enables the selected analog output.

Set Name:

- Allows the operator to assign a name to the output. Digital Outputs.

The Vission 20/20 has several Digital outputs for which the operator can choose the use. Once an output is enabled, the Auxiliary I/O screen will be available from the menu screen where the operator can further define the output's operation, see Figure 19-9 and also reference Section 18.

Enable Output #:

- Enables the selected digital output.

Set Name:

- Allows the operator to assign a name to the output.

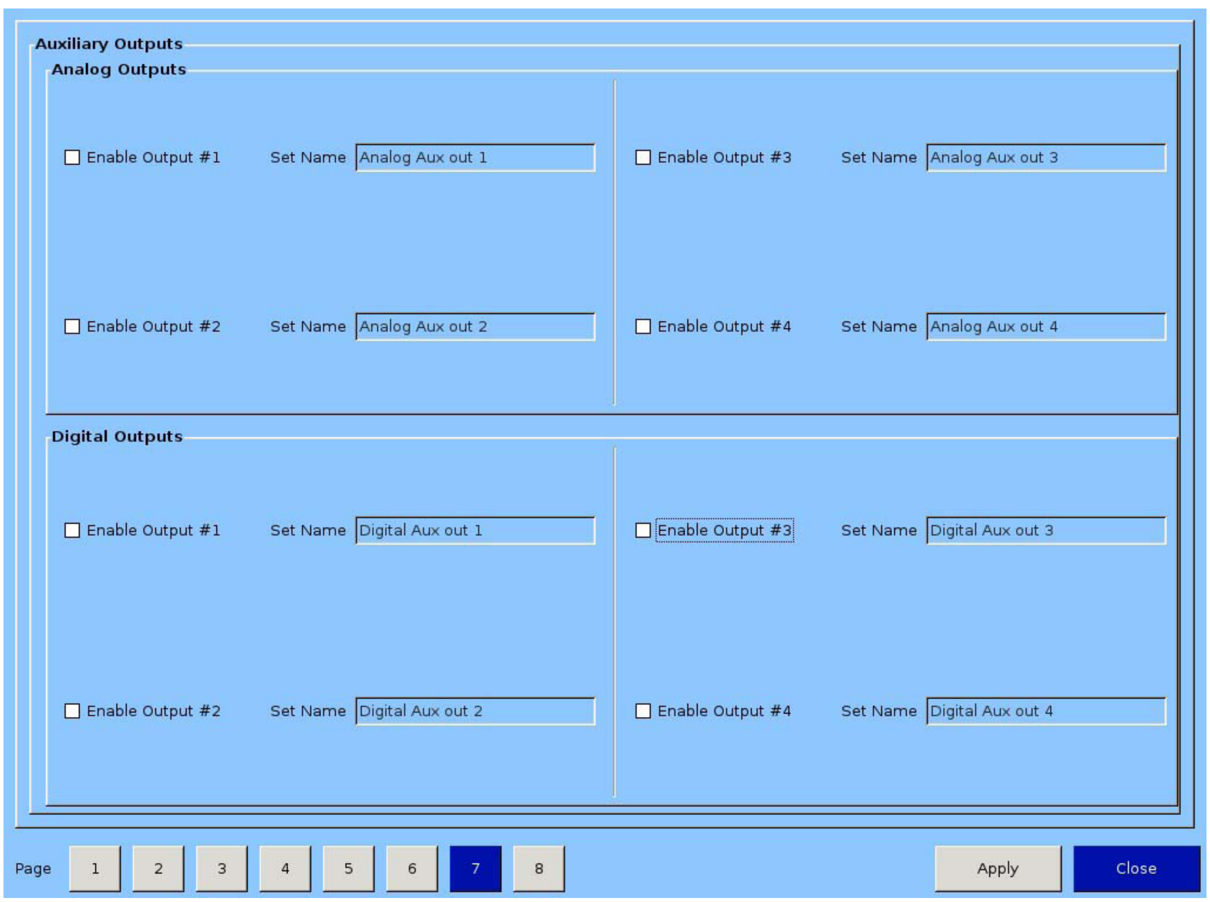


Figure 19-9. Configuration Screen - Auxiliary Outputs (Page 7)

I/O Configuration

If any additional I/O cards are added to the Vission 20/20, this is where these cards are enabled for use by the its algorithms. Some features of the Vission 20/20 will not be available unless specific expansion cards are selected, see Figure 19-10.

Digital Output 1:

- Not editable by the operator. Identifies that the Digital Output card 1 is enabled.

Digital Output 2:

- Not editable by the operator. Identifies that the Digital Output card 2 is enabled.

Digital Input 1:

- Not editable by the operator. Identifies that the Digital Input card 1 is enabled.

Digital Input/Output 1:

- Enables the optional digital input/output card 1.

Digital Input/Output 2:

- Enables the optional digital input/output card 2.

Analog Input 1:

- Not editable by the operator. Identifies that the Analog Input card 1 is enabled.

Analog Input 2:

- Not editable by the operator. Identifies that the Analog Input card 2 is enabled.

Analog Input 3:

- Enables the optional Analog input card 3.

Analog Input 4:

- Enables the optional Analog input card 4.

Analog Output:

- Enables the optional Analog Output card.

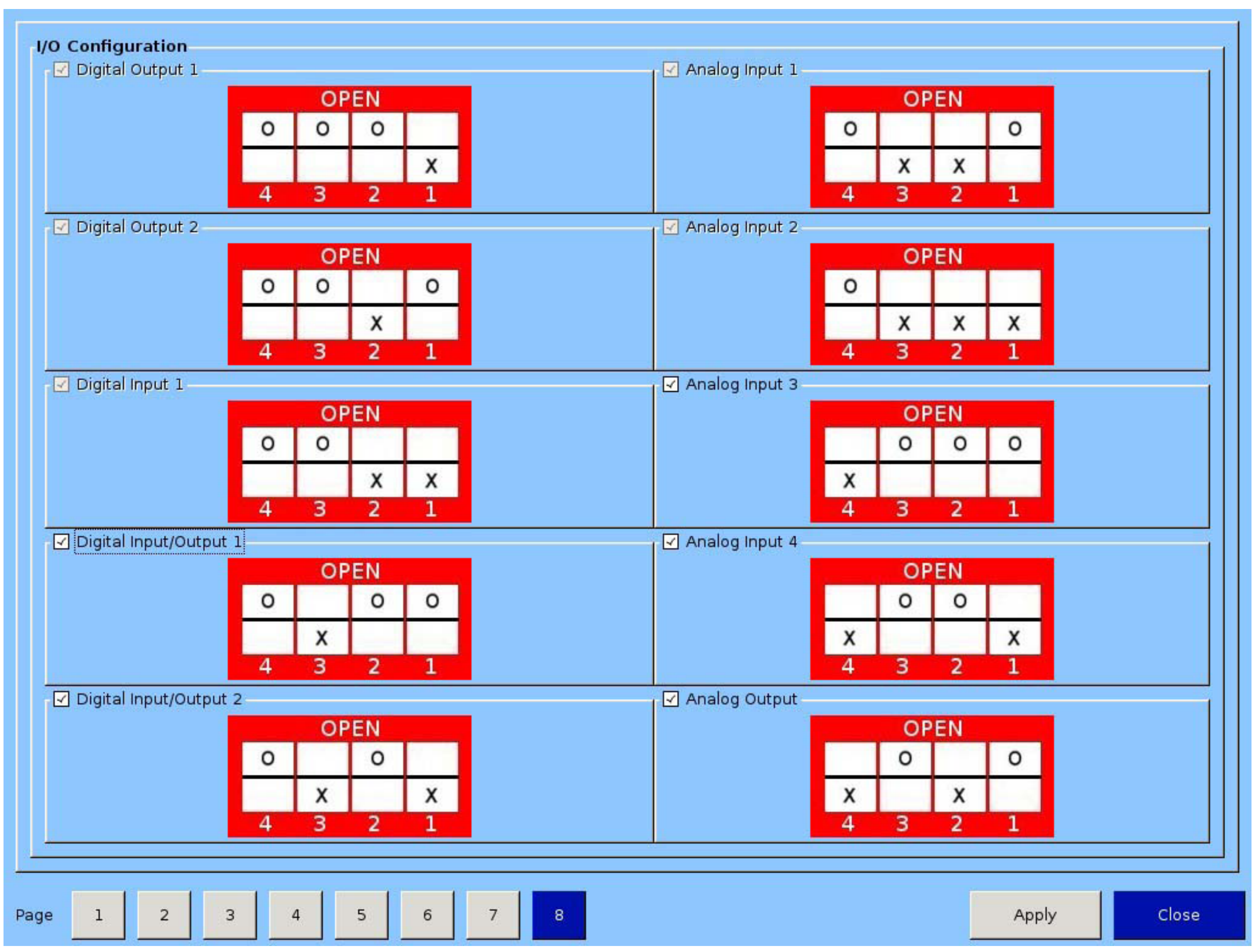


Figure 19-10. Configuration Screen - I/O Configuration (Page 8)

No Slide Operation

No Slide Operation feature does not control capacity/ volume slides operation. This feature controls only Compressor VFD Speed. User is not allowed to calibrate slides when No Slide Operation is enabled.

User can select No Slide Operation by selecting below options for Compressor Type and Model Type.

No Slide Operation is not allowed to select when Analog Output board is disabled and No Pump feature is enabled under Oil Pump settings, See Figure 19-11.

Table 19-2. Compressor Choices for No Slide Operation

COMPRESSOR TYPE	MODEL
VSH/VSG	128, 145, 160, 180, 204, 222, 243
VSM	127, 113, 97

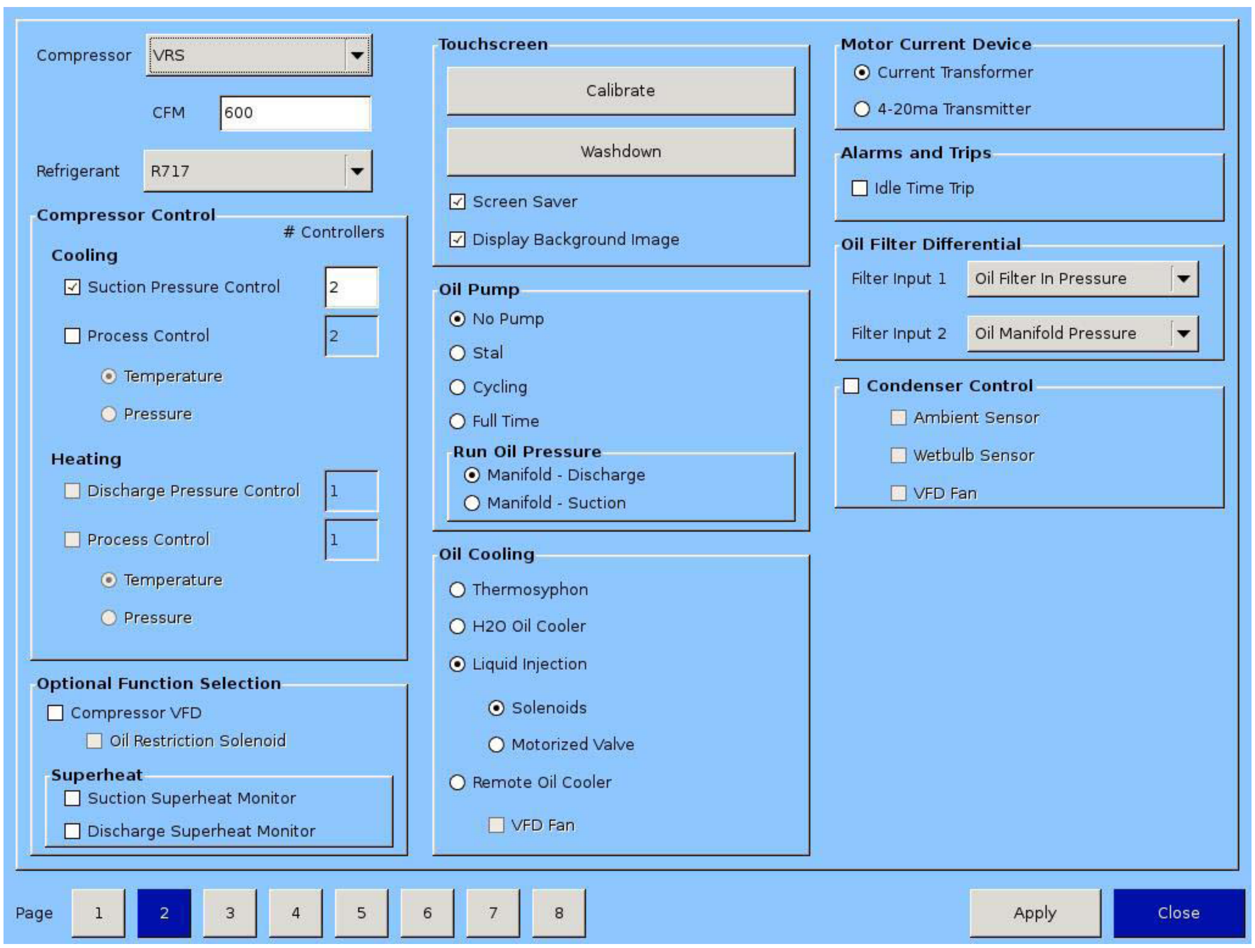


Figure 19-11. Configuration Screen - No Slide Operation (Page 2)

Overview

The database backup screen provides the operator a way to extract information out of the Vission 20/20 for back-up purposes or diagnostics, see Figure 20-1. Through this screen, the operator can download all the Setpoint Databases, Maintenance Logs, Event Lists, Freeze Data, Trend Data and Compressor Run Hours to a portable USB flash drive. That information can then be uploaded back to the Vission 20/20 in the case of data corruption or to update the Vission program. The built-in Migrate function examines the previous setpoint databases, compares them with newer program setpoint database, and moves the old information into the new program. In addition, this screen also allows the operator to reset all values to the factory defaults.

All of the information saved to the USB flash drive is open information, meaning none of it is encrypted and the operator is free to examine it. The log files are all saved as simple ASCII text and the databases can be examined with SQLite.

Refresh:

- The Refresh button is used to initiate a scan of the USB ports and list any devices found in the "Available Devices" window.

Save / Load

Save / Load section is where the operator can either save the Vission 20/20 setpoints and log information to a USB flash drive or load from a USB flash drive back to the Vission 20/20.

Save:

- Selecting save allows the operator to save the Vission 20/20 data to a USB flash drive using the information provided further down the screen. The bottom button will be labeled "Save" when this is selected.

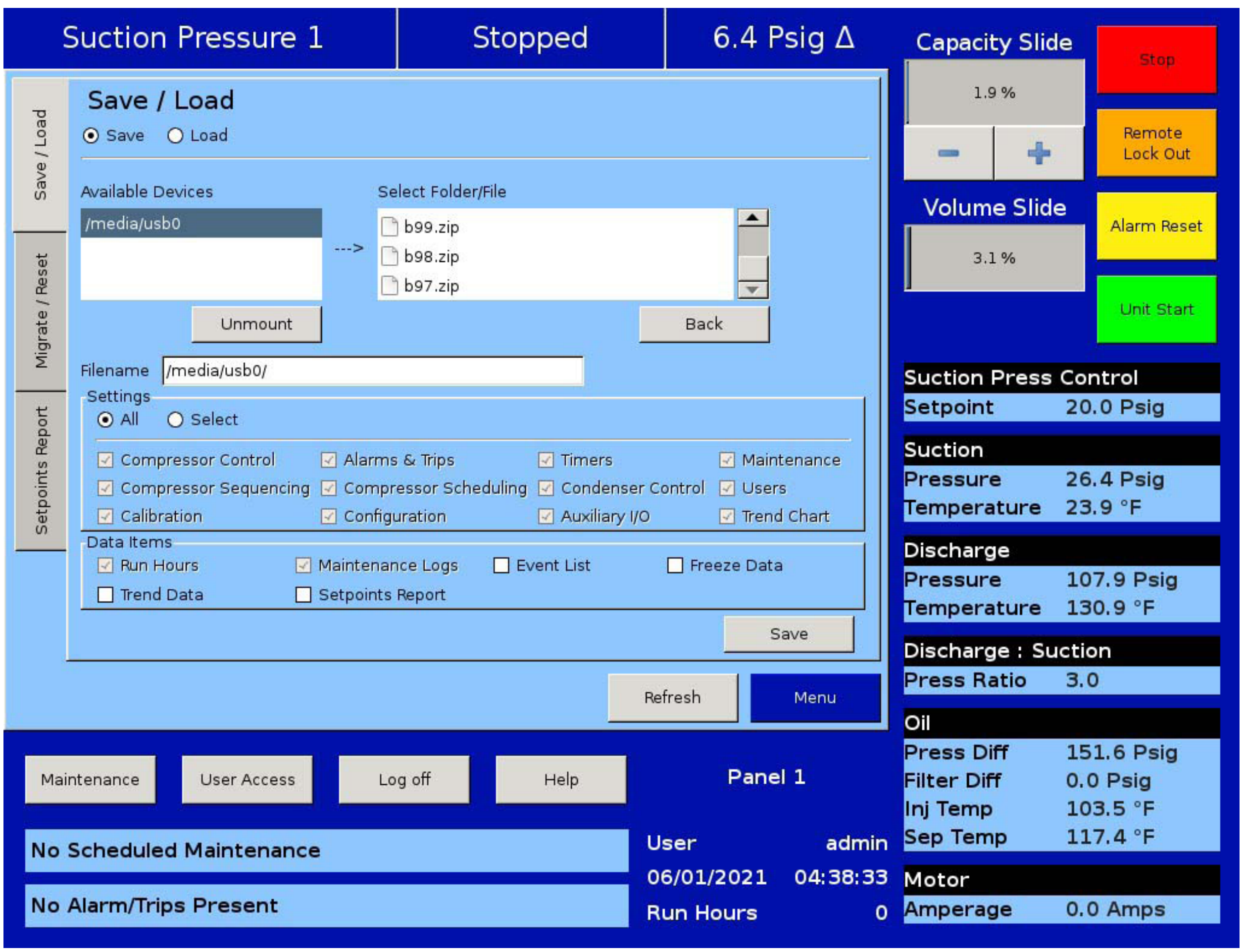


Figure 20-1. Data Backup Screen - Save/Load

Load:

- Selecting Load allows the operator to load data from a USB flash drive to the Vission 20/20 using the information provided further down the screen. The bottom button will be labeled “Load” when this is selected.

Available Devices:

- This window displays any USB flash drive plugged into one of the Vission 20/20 USB ports. Once one of the available devices is selected, then the drive’s contents will be displayed in the “Select Folder / File” window. If the USB flash drive that is plugged in by the operator is not showing up, then the operator can try pressing the “Refresh” button at the bottom of the screen. Unfortunately, not all USB flash drives are compatible with the Vission 20/20 and will never show up as an available device.

Select Folder/File:

- This window displays the folders and files contained in the USB flash drive selected in the “Available Devices” window. The information from the Vission 20/20 will be contained into a .zip file. So a zip file will have to be selected to load or overwritten when saved. Once a zip files is selected, the name will be shown in the filename window.

Unmount:

- By pressing the Unmount button, any USB drive selected in the “Available Devices” window will be disconnected from the operating system and can be safely removed from the USB port.

Back:

- The back button returns the operator to the preceding window display of files and folders.

Filename:

- This window is where the operator can give a name to a saved backup file. This field will automatically be populated if a file is selected in the “Select Folder/ File” window.

Settings:

- Using this table, the operator can choose to save or load all or part of the information contained in the Vission 20/20.

Data Items:

- Using these checkboxes, the operator can choose to save or load all or part of the information contained in the Vission 20/20 according to the selection of options.

Save / Load Button:

- This button initiates the save or load process.

Migrate

Loading data from an older version of the Vission 20/20 software to a newer one can be complicated due to differences in databases. This migrate function closely examines each field in the database being loaded and determines whether it can be used in the new program. The Migrate function is executed automatically when data is loaded from a USB flash drive. The only time an operator should have to use the migrate button is if a new Vission 20/20 program is loaded over an existing Flash card, see Figure 20-2.

Migrate:

- This button initiates the migrate function.

Factory Reset

The Factory reset button offers the operator the ability to reset all the Vission 20/20 setpoints back to the factory default settings or a specific database. If the operator finds that a screen will not load when selected, it is likely that the database associated with that screen has been corrupted. Unfortunately, data corruption is always a possibility in any system. So this function was designed to help the operator to regain control, see Figure 20-2.

Reset:

- This button initiates the process to revert the Vission 20/20 back to the factory default settings.

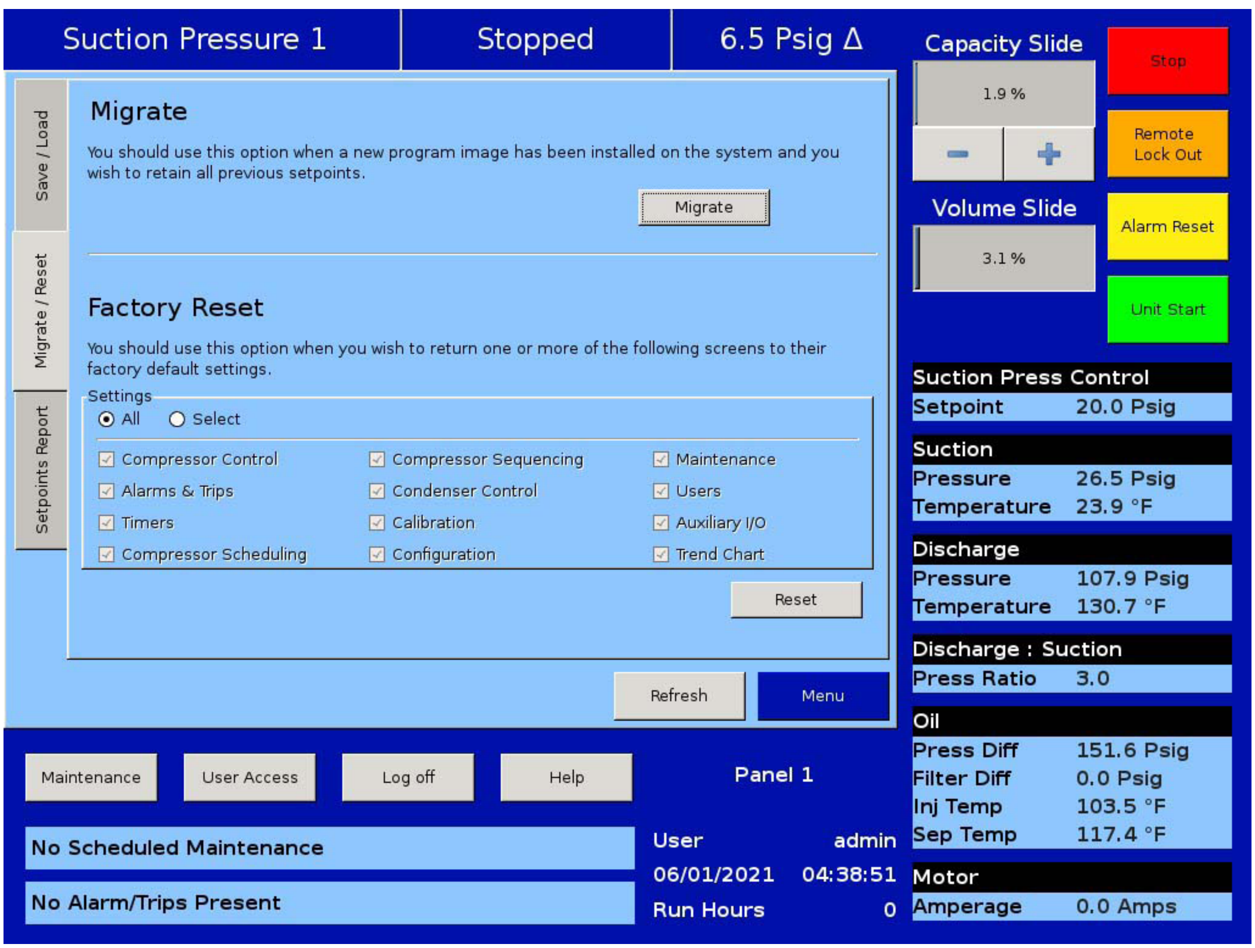


Figure 20-2. Data Backup Screen - Migrate and Factory Reset

Setpoints Report

The setpoints report screen offers the operator the ability to generate a setpoints report for all screens. The reports are stored as .csv files and can be saved to a USB drive from Save/Load screen by selecting the Setpoints Report option in Data Items during backup of database. The .csv file can be imported in any spread sheet application. During the course of operation, the operator can generate reports at any time, see Figure 20-3.

All/ Select:

- Selecting "All" will include all screens in the report that is generated. When "Select" is chosen, the operator can choose which screens will be included in the report.

Generate:

- This button initiates the process to generate setpoints report files.

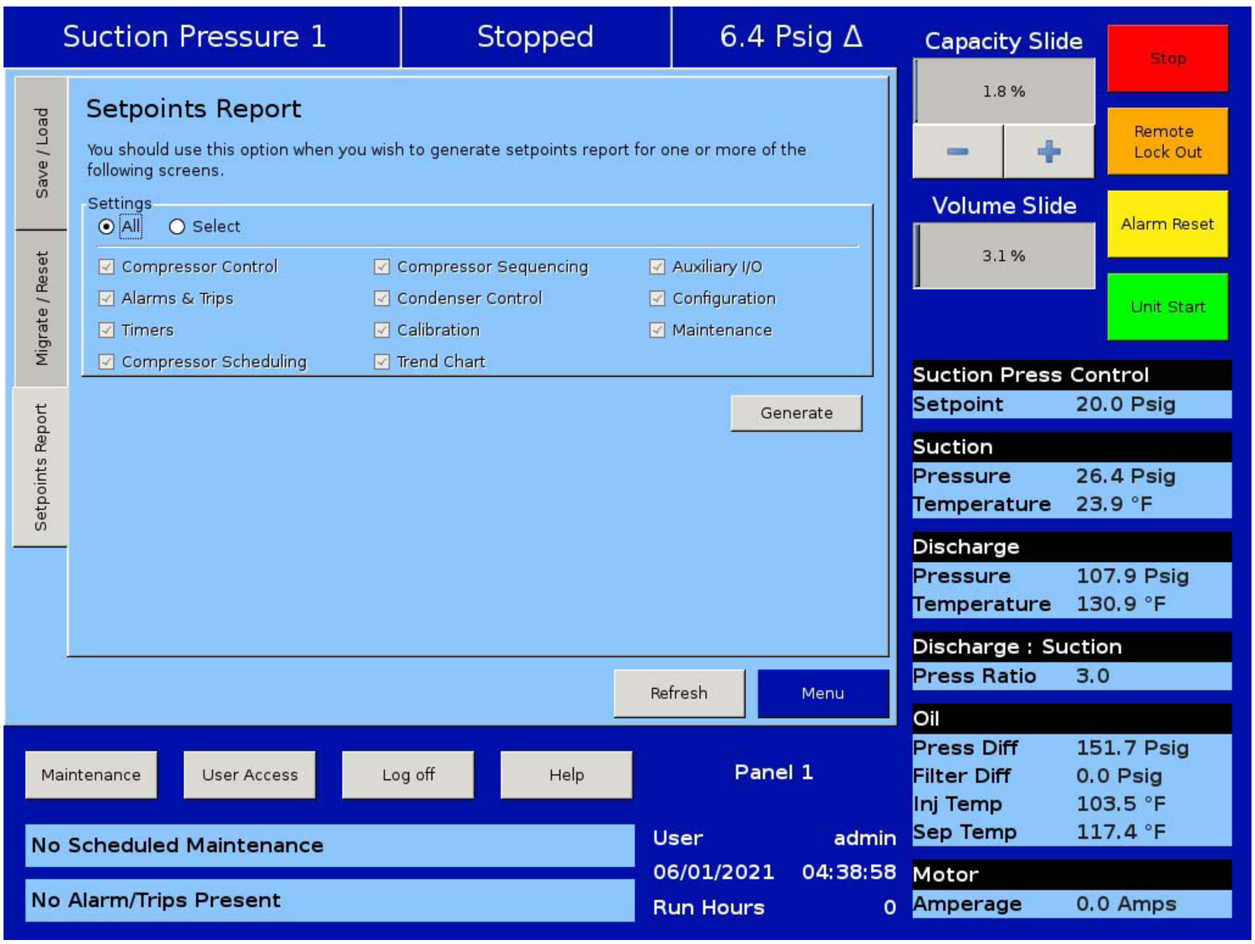


Figure 20-3. Data Backup Screen - Setpoints Report

Database Backup Procedure

Upgrading the program in the Vission 20/20 panel normally involves replacing the flashcard. Note that all compressor operation setpoints, calibration values and maintenance information are held on the flashcard. So when upgrading to a new program (new flashcard), the task is simplified by using the “Database Backup” and “Database Restore” functions provided in the Vission 20/20 to migrate the database of the original flashcard to the new flashcard. There are three main steps to this process:

1. Backup the database of original flashcard (currently in the Vission 20/20 panel) – into a thumbdrive or flashdrive.
2. Replace the original flashcard with new flashcard.
3. Restore the original database to new flashcard.

Backup Database of Original Flashcard

NOTE

It is REQUIRED to re-enter the Alarms and Trip settings by “hand” when upgrading from some older version of programs, therefore it is highly recommended to create a “hardcopy” of all compressor operating setpoints, or to create and have handy a printout of the Setpoints Report .csv file.

It is also recommended that for documentation purposes, a “hardcopy” of all compressor operation setpoints, configuration information and maintenance information be made prior to changing flashcards. Please reference the “Record operating setpoints and configuration information” section below for a list of all the information that you should record.

The data migration procedure (moving the original flashcard database to new flashcard) uses a “thumbdrive” or “flashdrive” to transfer data from the original flashcard to the new flashcard. Note that there have been a few reports of some thumbdrives not being recognized by the Vission 20/20. If you have difficulty in getting the Vission 20/20 to recognize the thumbdrive – then try a different one. Vilter™ have successfully tested a number of different manufacturers and sizes; a partial list is below;

SanDisk micro cruzer 2.0GB

Imation 2.0GB

Kingston DataTraveler 512MB

SanDisk mini cruzer 128MB

AirBus 32MB

1. With the original flashcard installed into the Vission 20/20 SBC, insert the flashdrive into the USB port. This port is located along the right side of the single board computer below the flashcard. (Please reference the picture in the section titled; Flashcard Replacement Procedure Hardcopy.
2. Logon using the your user name and password (you will need to be Level 3 to upload data).
3. Navigate to the Data Backup screen.
4. Under “Available Devices” – you should see something like “/media/usb0”. If you don’t see anything in this box, press the “Refresh” button, wait about 5 seconds and then press it again. If you still don’t see it, then the Vission 20/20 does not recognize the flashdrive – try a different one. If you do see it, highlight it.
5. Now highlight the “Filename” box (which will also contain “/media/usb0”). A keyboard will appear – now type in the name of the file that you want for your database for this compressor. For instance “vss03_month_day_year” or something similar to identify the file to the compressor – then press “Enter” key on keyboard.
6. Now press the SAVE button. A “watch” icon will appear. Shortly thereafter, a popup box should appear telling you that the save was successful, and asking if you want to “unmount” the flashdrive device. Press YES. If the “watch” icon doesn’t go away after a minute or so, then the Vission 20/20 isn’t able to close the backup file it has written to the thumbdrive. Power down the Vission 20/20 and try the procedure with a different thumbdrive.

Replace Original Flashcard With New Flashcard

Now that the database file has been saved to the thumbdrive – the “original” flashcard can be replaced with the new flashcard.

1. Power the Vission 20/20 down, remove the thumbdrive and take out the “original” flashcard and install the new one.
2. Label both the old and new card to identify the compressor it is for.

Restore Original Database To New Flashcard

Now that the new card is inserted, power the Vission 20/20 panel back up. As the Vission 20/20 boots up, a message may appear indicating that an "incompatibility" has been found. This is NORMAL. The new flashcards are built such that they recognize a couple of different single board computers. Upon boot up – the cards are automatically configured for the correct single board computer that is identified. After seeing this message, it will take a minute or so before the Vission 20/20 boots up properly.

1. Once the Vission 20/20 panel is booted back up, Press the "USER ACCESS" button – which is the new wording for the Logon button. Logon. Now insert the thumbdrive back into the USB port.
2. Navigate to the Data Backup screen. You should again see the USB thumbdrive listed under the "Available Devices."
3. Select the LOAD function (above the "Available Devices" field), and then highlight the device that is listed in the "Available Devices" window.
4. To the right of the "Available Devices" – there is a "Select Folder/File" window. In this window, find the backup file for this compressor, and highlight it. Now press the "Load" button.
   a. A pop-up window will appear – saying "Loading new databases will require a program restart. Continue?". Press YES.
   b. Another pop-up window may appear stating something like "One or more settings selected for loading were missing from the archive. And it will then list what is missing. Continue loading anyway? Press "Yes".
5. Another pop-up box may appear – asking if you want to use the IP address it found. Press "OK"
6. A pop-up box will appear saying "Settings were successfully loaded. Program will restart." Press OK button.

When the OK button is pressed, the panel will reboot.

Now – using the "hand documented" settings that you recorded, compare the setpoints on that list against those in the Vission 20/20. They should all be OK. Here are the KNOWN issues that we have found with this procedure.

- The Alarm and Trip setpoints MAY need to be re-entered. Early version programs actually saved two Alarm and Trip setpoints tables onto the old flashcard, and when saving the tables to the thumbdrive during the Database backup procedure, the old program backed up the wrong table to the thumbdrive. When a database "restore" (load) procedure is done with the new program, the new program recognizes that the Alarm and Trip tables are not correct, and refuses to restore them. In this case, you'd need to re-enter your Alarm and Trip setpoints manually.
- If you have any setpoint (including Alarms and Trips and Control settings) that is in " inches of vacuum" that value will be restored as a "positive PSIG" setpoint. That is a known bug of the "Restore" function. So, for instance, say you have the Suction Pressure Trip setpoint set at 3.1"hg. When the value is restored, it will be restored as + 3.1 PSIG. You'll need to re-enter this setpoint as minus 1.5 psig (which correlates to 3.1 inches of Hg.). Do this for any setpoint that was originally set as "inches of Hg."
- If you have communication connection issues after restoring the database, you may have to "re-enter" the IP address that is shown on page 1 of the configuration screen. If you experience communication problems after the "Restore" function – then re-enter you communication settings.
- Navigate to the Maintenance screen and look at the "Time Remaining" column – comparing that calculation against the "Maintenance Interval Hours" and the actual runtime of the compressor. If the calculation isn't correct, then do the following;
  - Navigate to the Configuration screen – page 1 and re-enter the compressor "run hours" – located along the top right of the screen.
  - Once you do that, then press the "APPLY" button, wait about 10 or 15 seconds. Then cycle power on the panel. This will force the Maintenance "Time Remaining" column to be properly calculated.

Record Operating Setpoints and Configuration Information

Before powering down to replace the flashcard, copy down all of the following operating setpoints and configuration information.

1. Configuration Screen - Page 1
   a. Order number
   b. Active Remote Control Setting
   c. If Active Remote Control = Direct I/O, document "type" of Direct I/O selection.
   d. Ethernet IP settings
   e. Anti-Recycle Settings
2. Configuration Screen - Page 2
   a. Compressor Type, Model, Refrigerant
   b. Compressor Control Type & number of Controllers
   c. Oil Pump selection
   d. Oil Cooling type
   e. Motor Current Device
   f. Optional Function Selections
3. Configuration Screen - Page 6
   a. Optional I/O boards
4. Compressor Control Setpoints – all
5. Alarms and Trips Setpoints – all
6. Timer Setpoints – all
7. Instrument Calibration - Pressure page
   a. Record Transducer Range selection for suction pressure, discharge pressure, filter inlet pressure, oil manifold pressure.
   b. Record 'total offset" value for suction pressure, discharge pressure, filter inlet pressure, oil manifold pressure
8. Instrument Calibration - Temperature page
   a. Record 'total offset' for suction temperature, discharge temperature, oil separator temperature, oil manifold temperature and process temperature.
9. Instrument Calibration - Analog Inputs page
   a. Record current transformer ratio
10. Maintenance Notes –all
11. Compressor Runtime.

Replace Flashcard

(Refer to Figure 20-4)

1. Remove power from Vission 20/20 panel.
2. Remove old flashcard and install new flashcard and power panel back up.

Re-Enter Operating Setpoints and Configuration Information

1. Log on as "admin" user (default password = admin).
2. Re-enter all values in Configuration screen. The most vital thing is to re-enter the correct compressor type, model and refrigerant. Re-enter the Compressor Runtime on page 1 of the configuration screen. Make sure you re-select any optional boards that are installed, and apply those additions.
3. Re-enter all Control Limits
4. Re-enter all Alarm and Trip setpoints. The most vital thing is - under the "Delay" tab, enter 5 seconds for all alarm and trip delays.
5. Re-enter all Timer Setpoints
6. Re-enter all Instrument Calibration offsets for pressure transducers. Insure that the Suction Pressure transducer range is properly selected (typically 0-200psia 4-20ma) – but double check proper setting. In the Analo page – re-enter C/T Ratio.
7. Re-enter Maintenance Notes if desired.
8. You do not need to recalibrate the capacity and volume actuators.

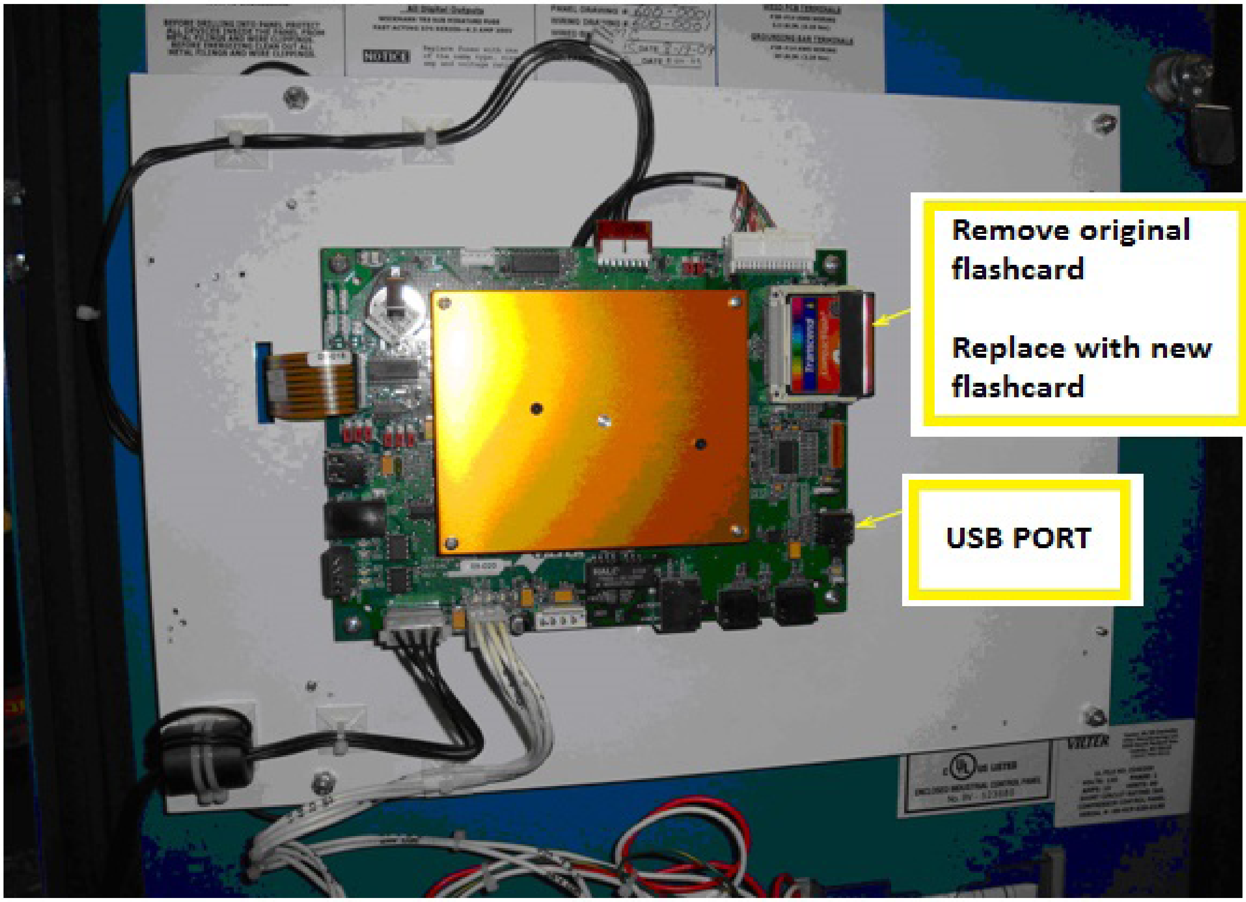


Figure 20-4. Flashcard Replacement

Overview

The maintenance screen is a convenient place to keep track of the maintenance performed and any up-coming maintenance recommended by Vilter™. Based on this page, banners will be displayed on the lower status bar. Yellow banners are to warn the operator of any up-coming maintenance and red banners indicate maintenance that is overdue.

Chart

This chart is the original maintenance chart that is provided with the compressor; see Figure 21-1. The maintenance chart contains the list of maintenance items and their respective service intervals. The operator will also perform maintenance sign-off in the maintenance chart. Once the operator has decided the item to sign off, pressing the service interval item will perform the sign-off operation and list the maintenance performed in the maintenance log.

Maintenance Item:

- This column lists down the all maintenance Items.

Maintenance Notes Icon:

- By pressing the notes icon, a pop-up with Notes will get displayed for maintenance Item. Refer to Figure 21-3.

Service Interval (Hours):

- This indicates the intervals at which the maintenance should be performed.
- When maintenance is up-coming, the service interval field is highlighted with a yellow background. Refer to Figure 21-4.
- When maintenance is overdue, service interval field is highlighted in red background. Refer to Figure 21-5.
- When maintenance is up-coming or already overdue, the operator can sign-off on a maintenance item by pressing on the service interval field, and a confirmation pop-up will get displayed. Refer to Figure 21-6.

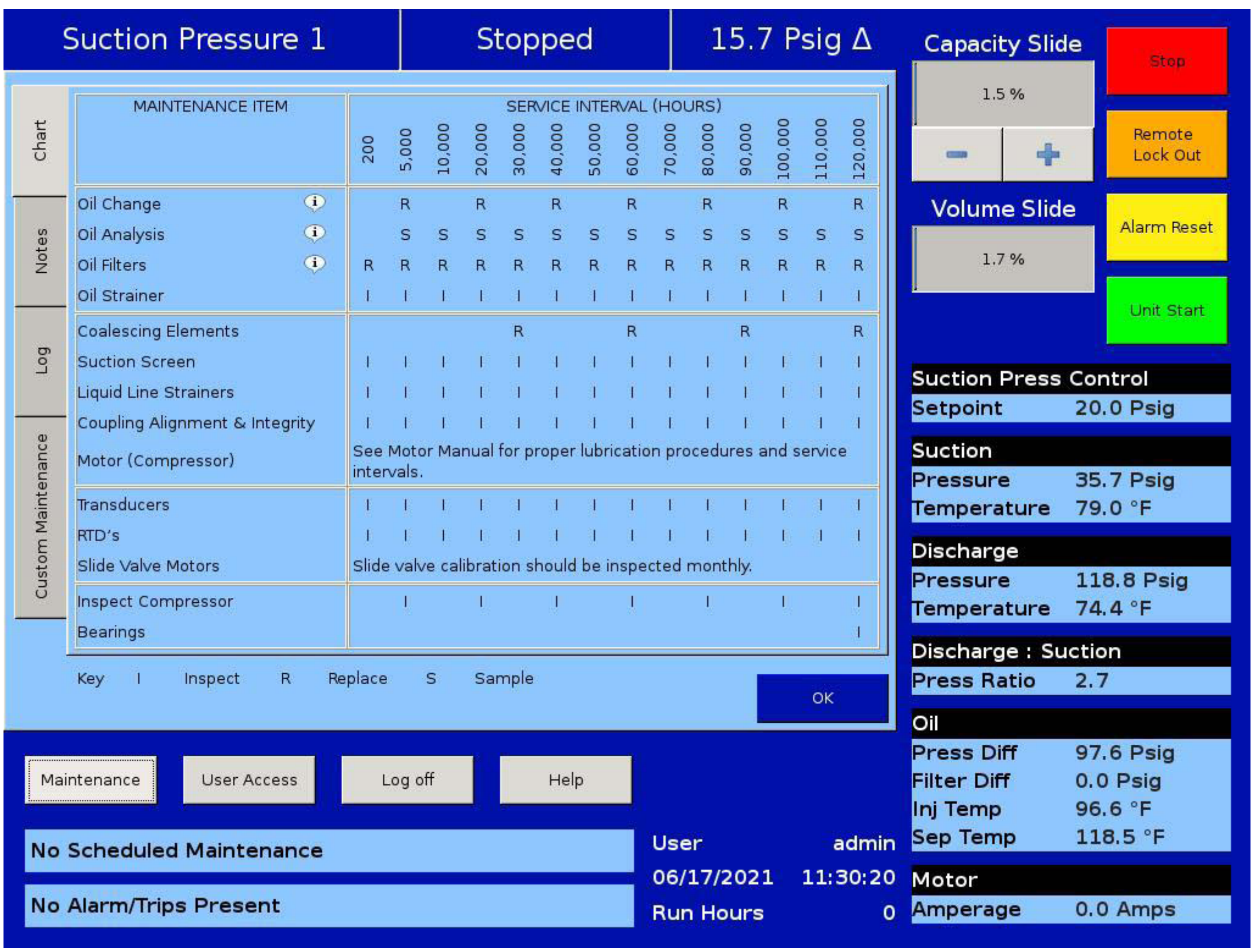


Figure 21-1. Maintenance Screen - Chart

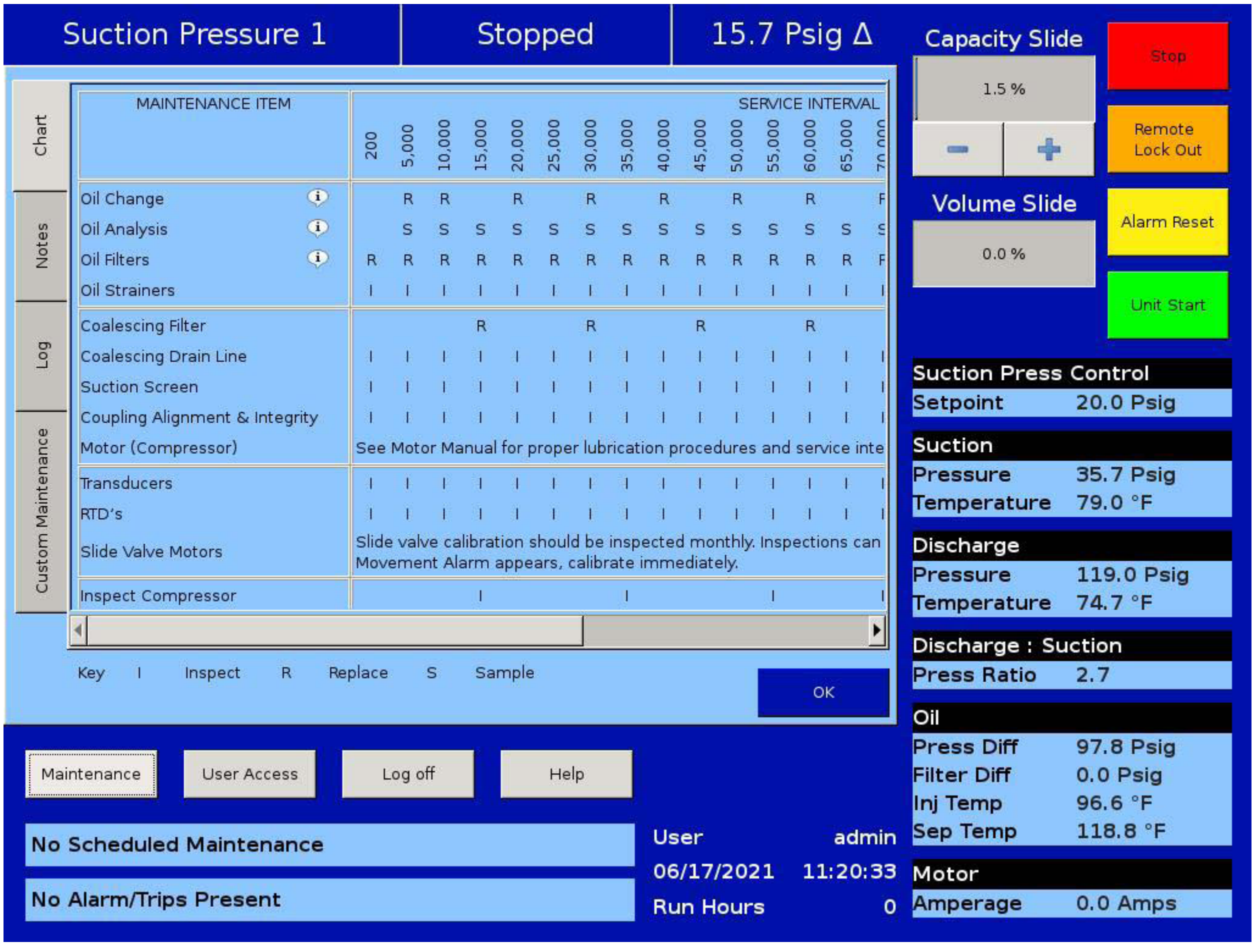


Figure 21-2. Maintenance Screen - Chart for Heat Pump

- On performing the sign-off operation, the service interval field will be highlighted with a green background and the Maintenance Log will get updated. Refer to Figure 21-7 & Figure 21-9.

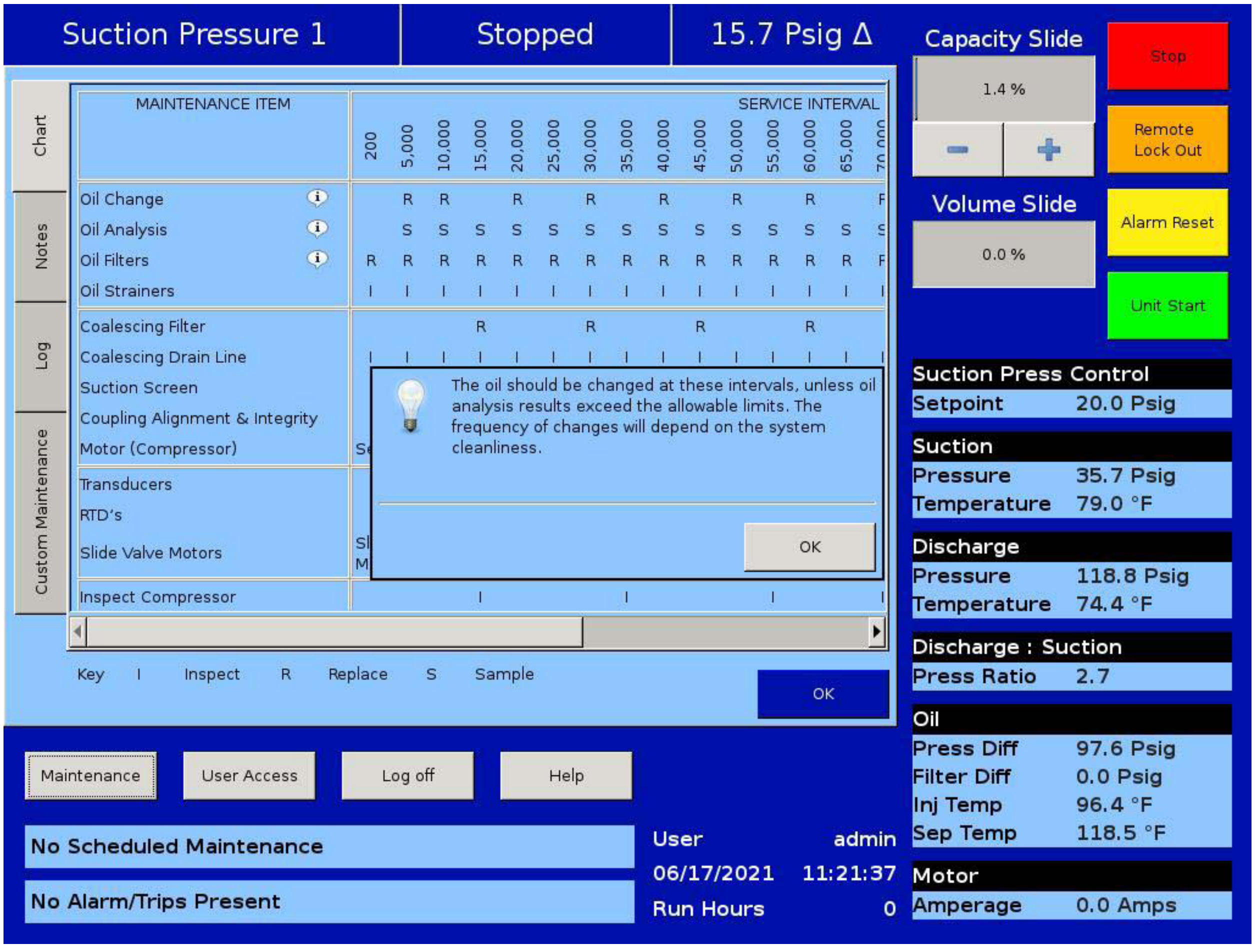


Figure 21-3. Maintenance Screen - Notes Icon

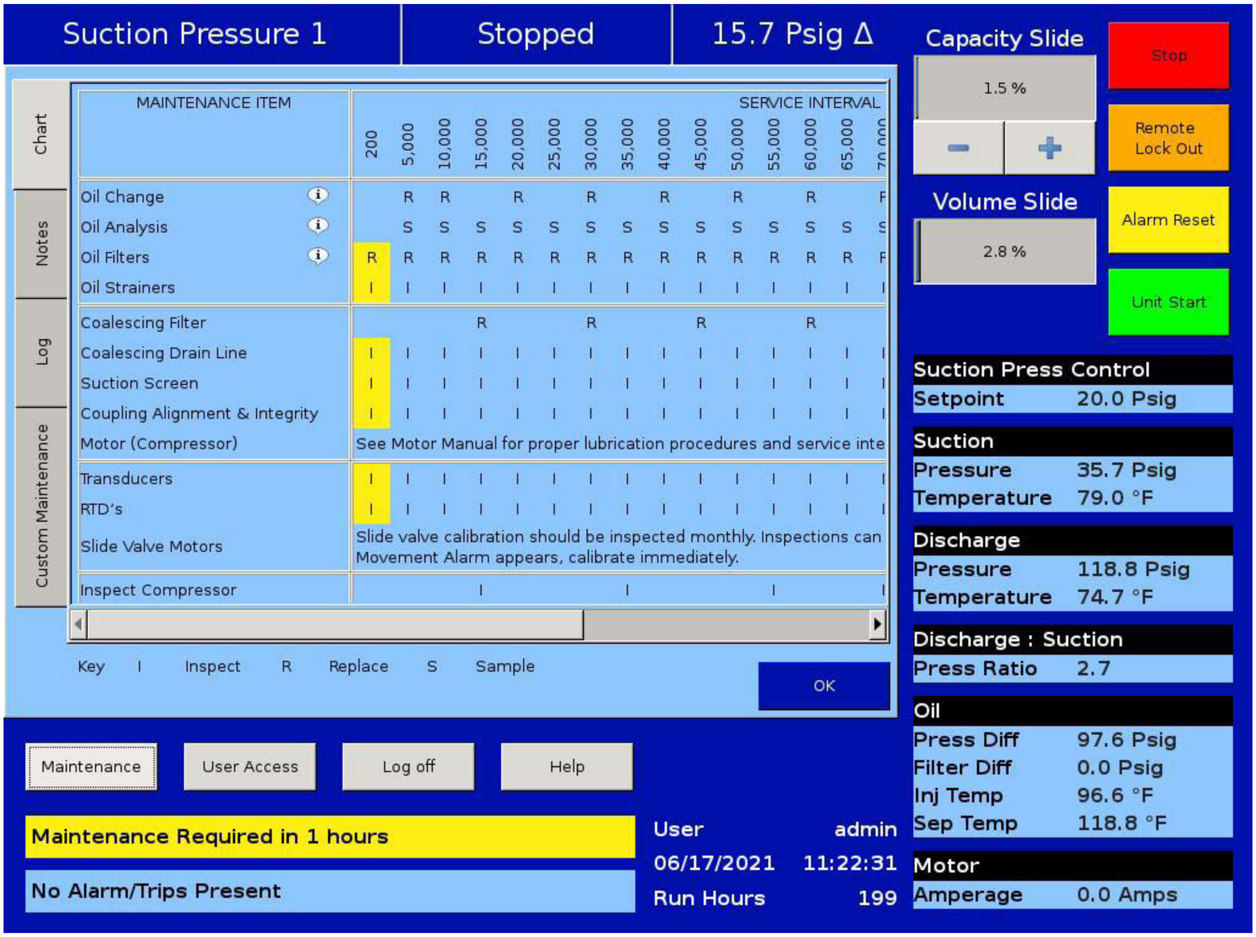


Figure 21-4. Maintenance Screen - Maintenance Due Soon

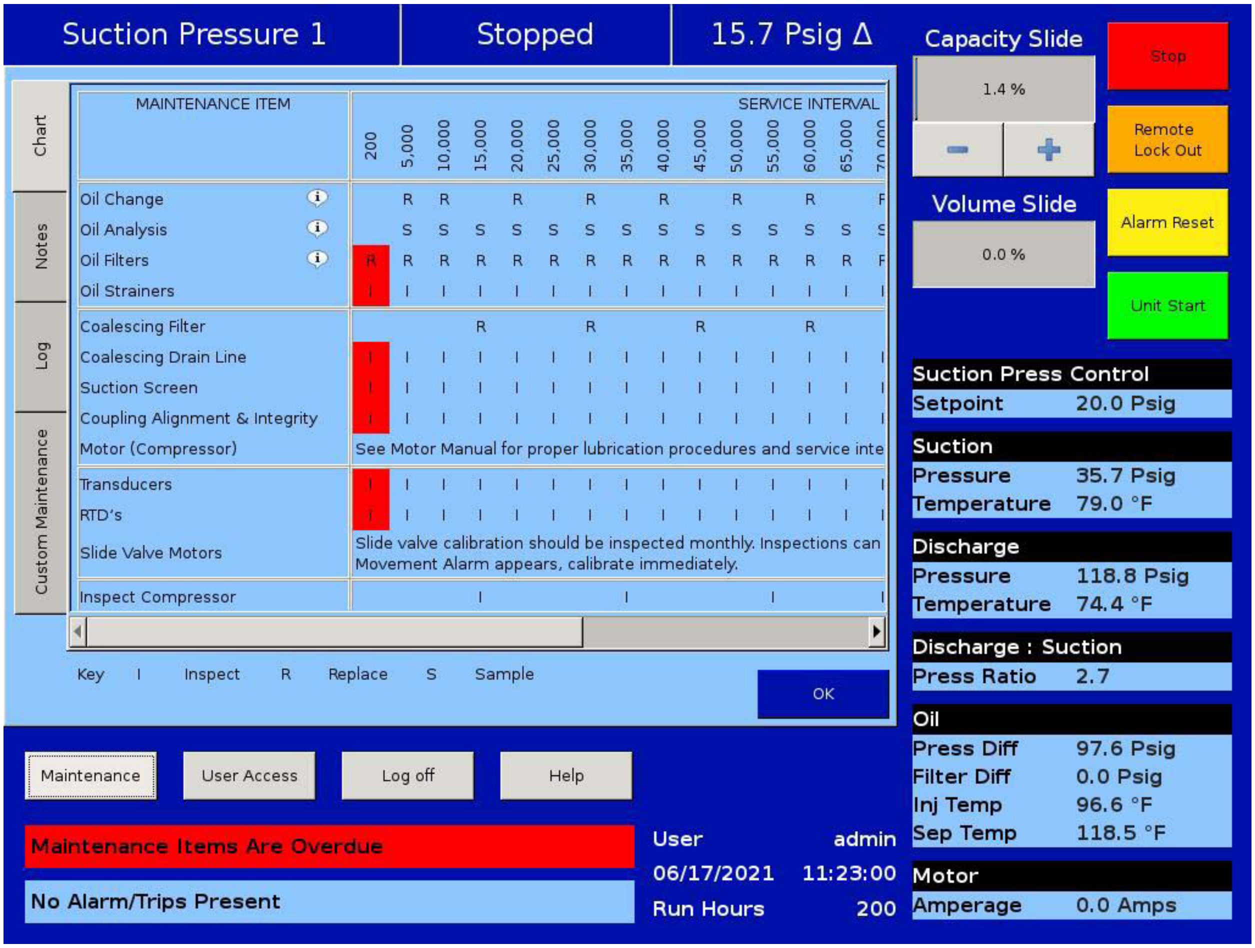


Figure 21-5. Maintenance Screen - Maintenance Overdue

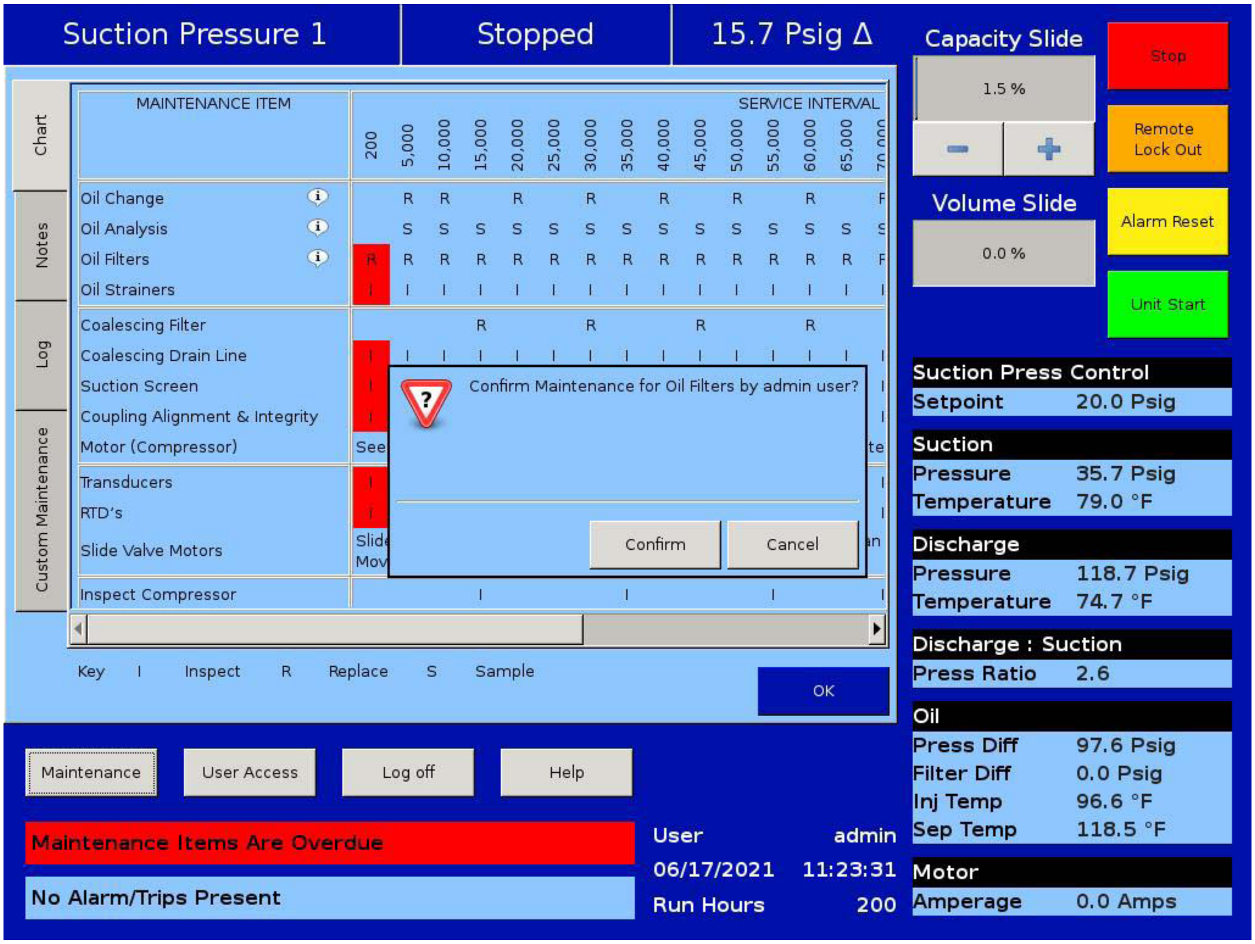


Figure 21-6. Maintenance Screen - Confirmation for Maintenance Sign-Off

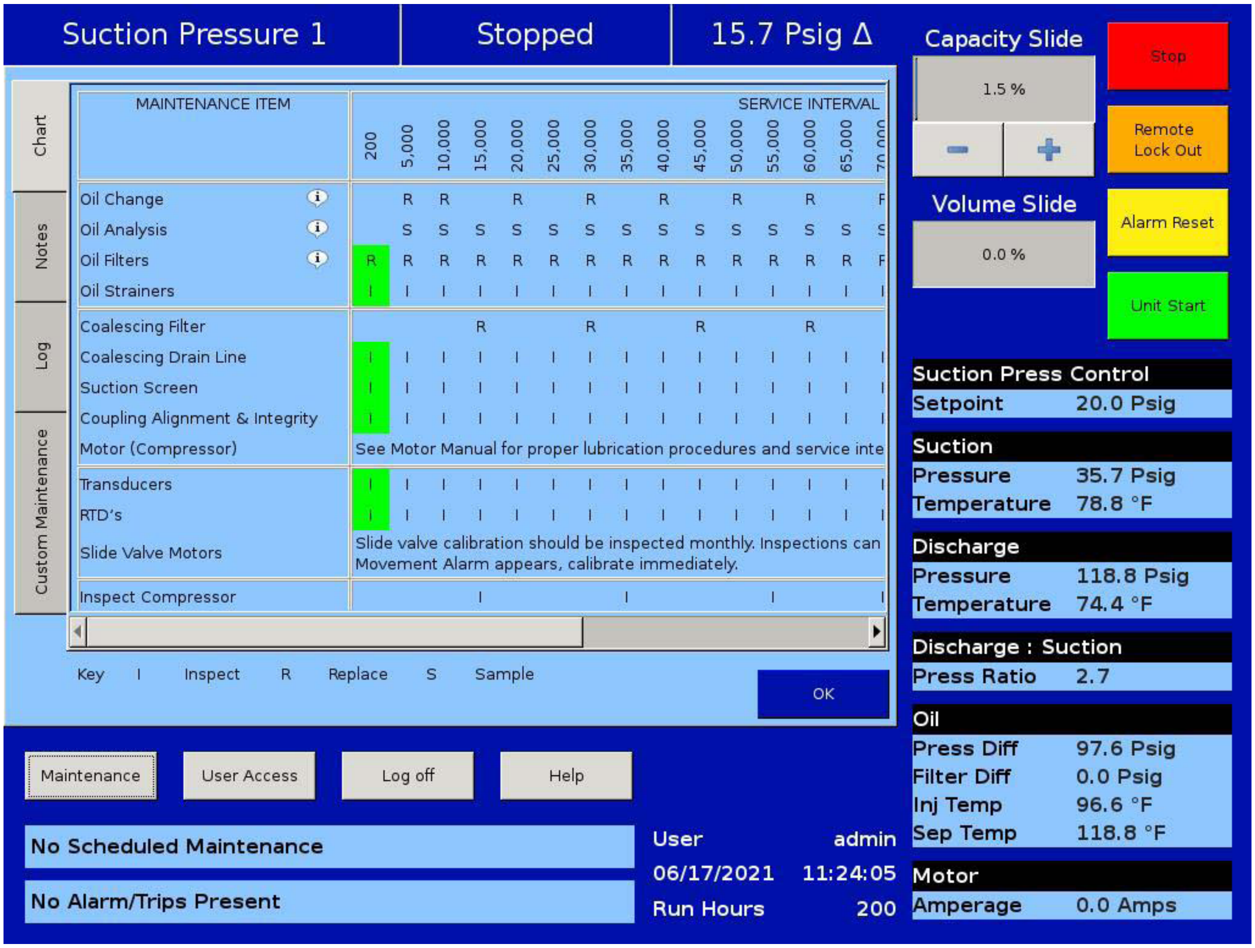


Figure 21-7. Maintenance Screen - Maintenance Sign-Off

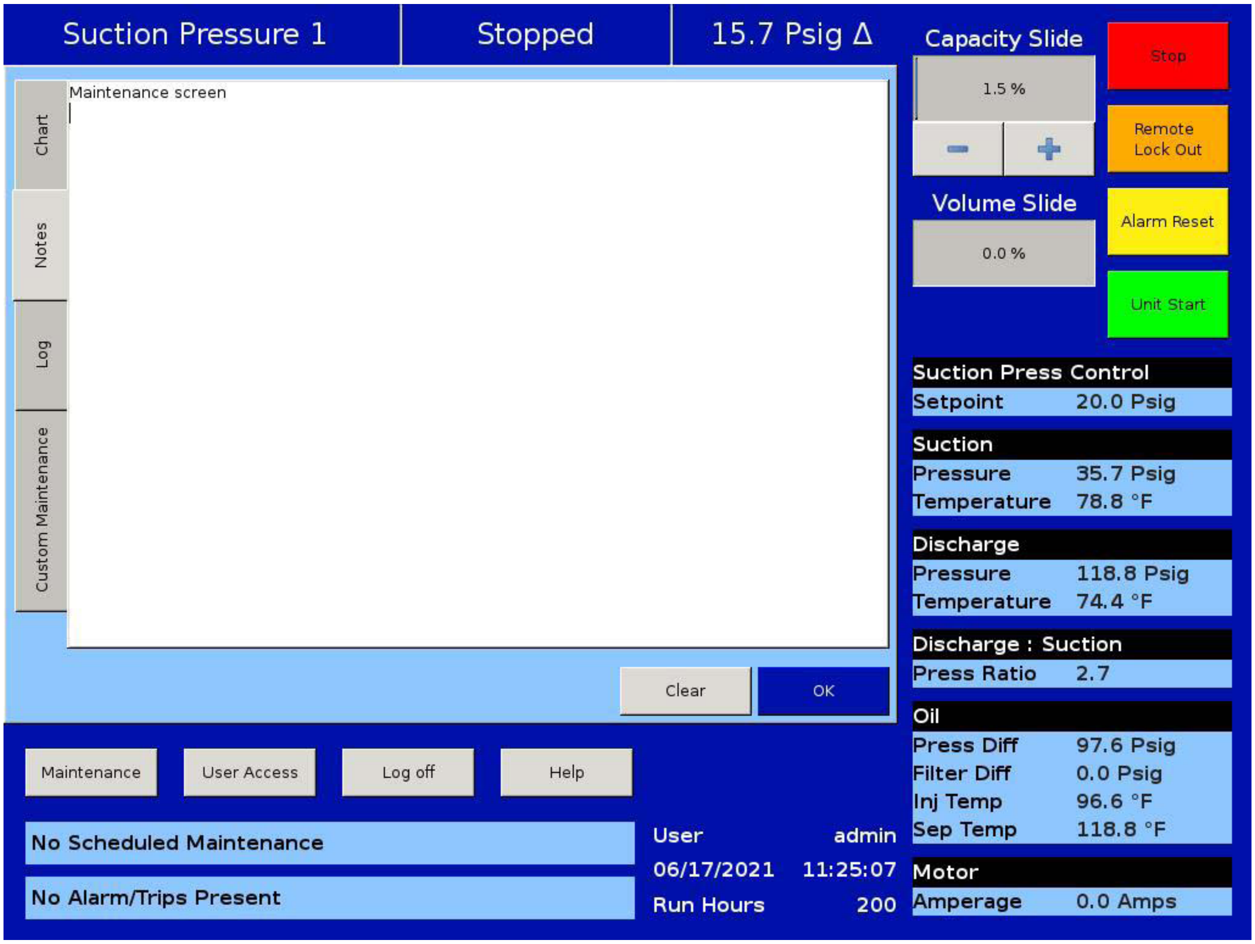


Figure 21-8. Maintenance Screen - Notes

Notes

The notes tab allows the operator to make notes for any other personnel that might have access to the Vission 20/20. Refer to Figure 21-8.

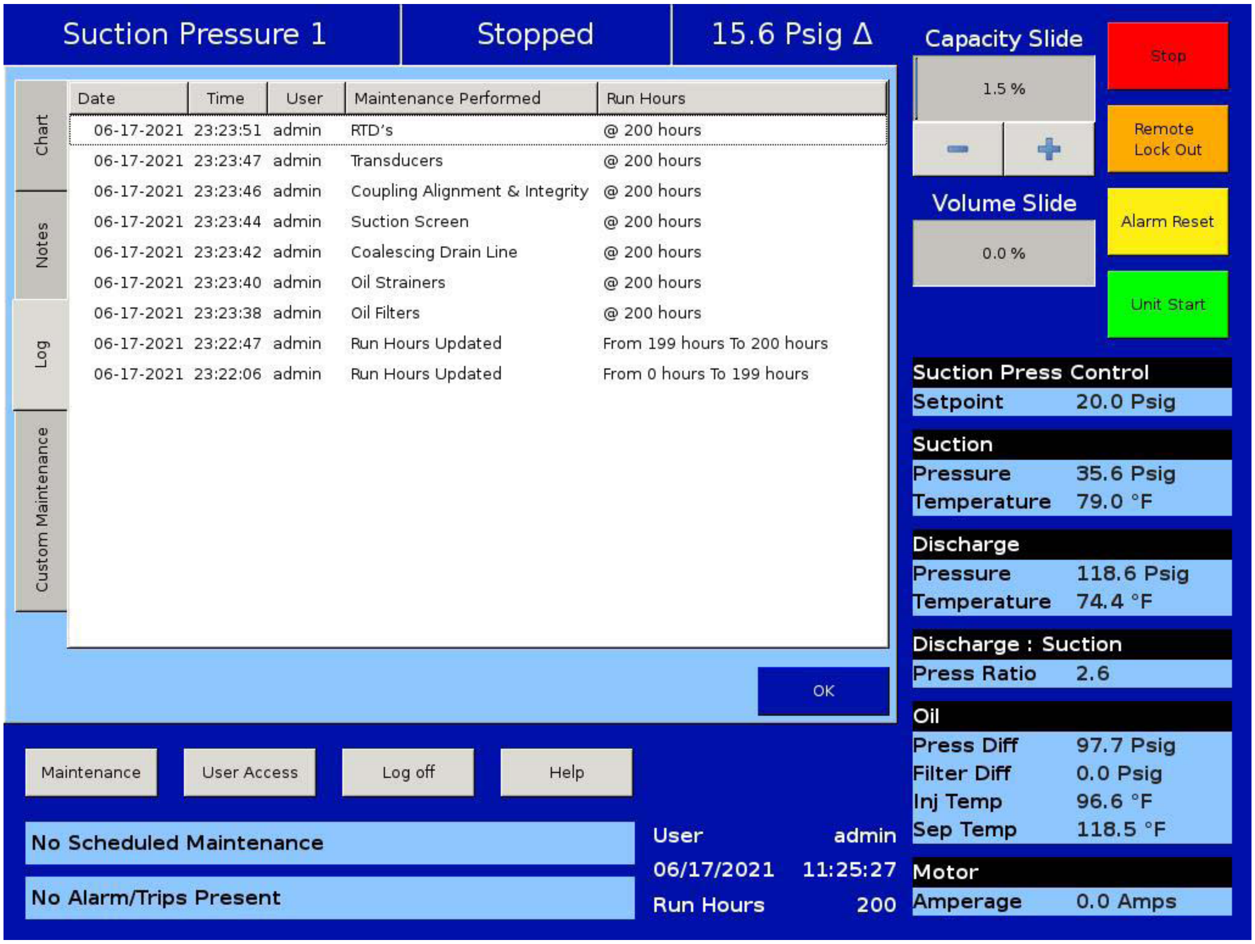


Figure 21-9. Maintenance Screen - Log

Log

- The maintenance log tab lists all the maintenance tasks performed in descending order, see Figure 21-9.

Date

- Lists the date the maintenance task was performed.

Time

- Lists the time the maintenance task was performed.

User

- Lists the name of the operator who performed the maintenance task.

Maintenance Performed

- Lists the maintenance tasks that were performed.

Run Hours

- Lists the run hours at which the maintenance task was performed.

Custom Maintenance

This tab allows the operator to record custom maintenance tasks not listed on the Maintenance Item Column in the "Chart" tab. Refer to Figure 21-10. The operator can enter the description for a task performed in the entry box, and then press on "Confirm" button to save and add it to the Maintenance Log.

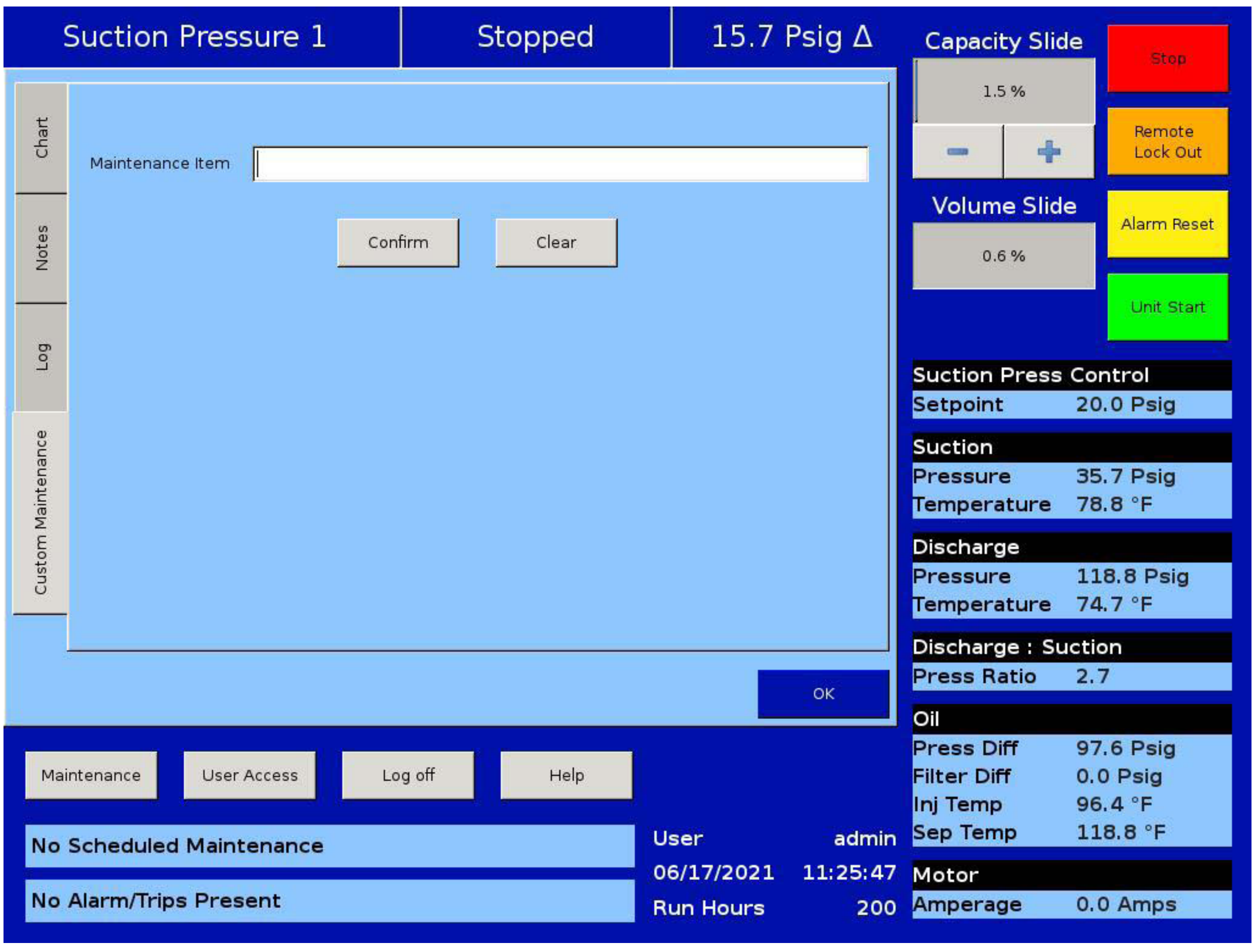


Figure 21-10. Maintenance Screen – Custom Maintenance

Overview

The user access screen is where all operators go to log in. In the Vission 20/20, each screen has a security level, giving operators, technicians and/or supervisors the ability to modify different sets of setpoints. The Vission 20/20 has five levels of security, see Figure 22-1.

- Level 0 – This is the default level with no operator logged in. The functions available to the operator are very limited and basically only allows someone to start and stop the compressor.
- Level 1 – This is a technician level of access. All the setpoints needed to operate and adjust the performance of the compressor will be available to an operator with this level of access.
- Level 2 – This is a supervisor level of access. Setpoints that require a higher level of knowledge such as calibrating instrument will be available to an operator with this level of access.
- Level 3 – This is considered a contractor level of access. The setpoints available at this level have the most potential of causing damage to the compressor. Therefore, this access is restricted to those only with the highest level of competence.
- Level 4 – This is the Service Technician level of access, reserved for adjustments of the Special Compressor Settings and to move the Volume Slide.

The user access screen is also where new operators are added, changed or removed. Any operator can add an additional operator but can only add an operator of lesser or equal security level.

The Vission 20/20 will be shipped with a Level 3 operator and password pre-assigned to the installing contractor. He can then assign all users with security levels as needed.

The procedure to assign user access levels is to first press the User Access button. The User Access screen will appear with the preassigned level 3 operator name visible within the Operators section. Highlight the name, then enter the password associated with that name of the user, then press Enter key to close the keyboard. Then press the "Apply" button. Press the "Manage Accounts" tab to begin the process of entering another Operator

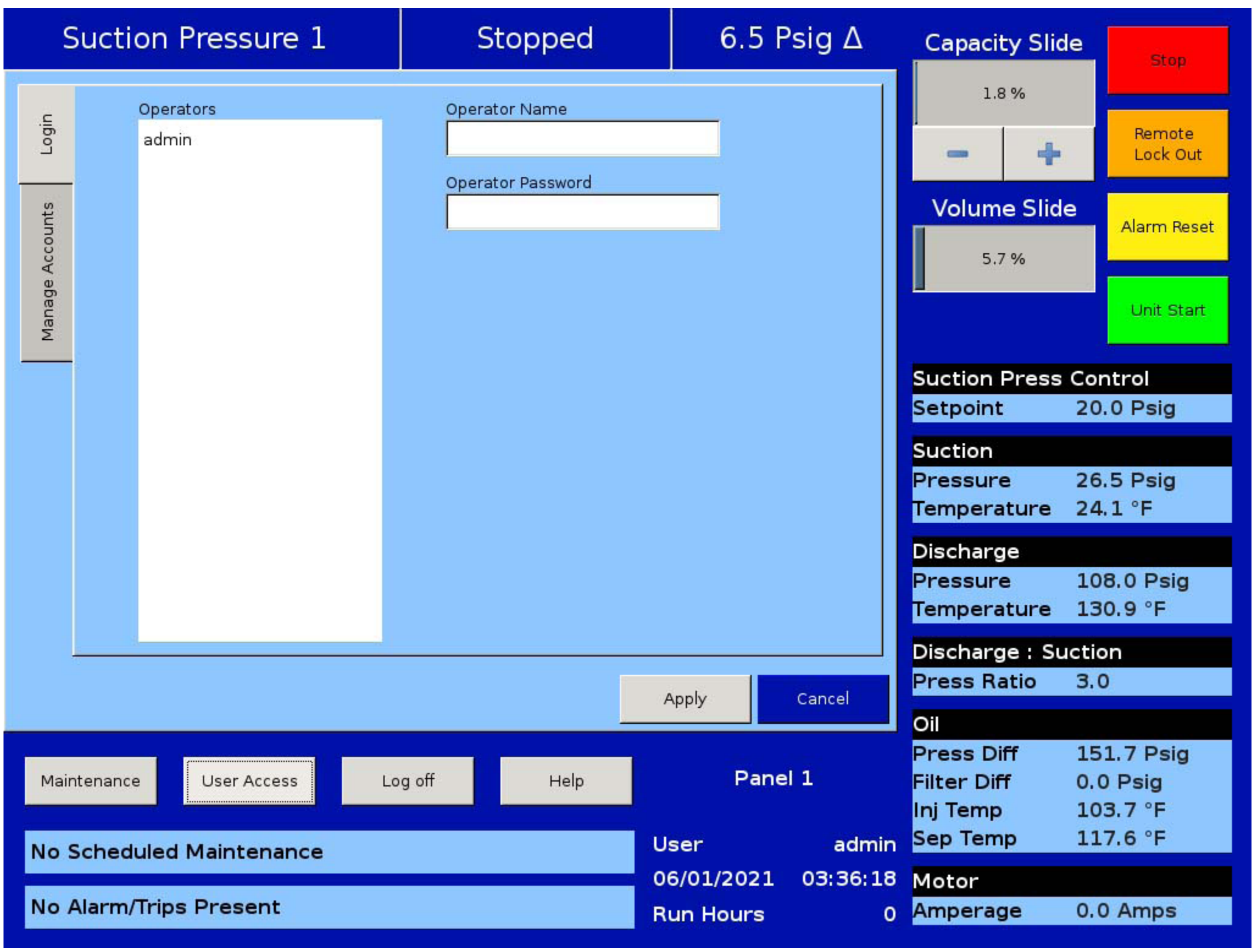


Figure 22-1. User Access Screen - Login

name, and assigning password and user level of this additional user. Lastly – remember to press the Add/Update button to add this user to the list, then press the "Apply" button before exiting the "User access" screen to make this change permanent.

Login

The login tab is where an operator will enter the user's name and password in order to gain access to the Vission 20/20 screens. If the User name and password matches an existing user then the operators name will be applied to the lower status bar and the operator will be given access to screens of equal security level.

Operators:

- All operators that have been added to the Vission 20/20 user tables will be displayed in this window. If a name of an operator is selected from this window, the name is added to the "Operator Name" entry box.

Operator Name:

- This entry box is for the operator's username. The operator can either select the username from the operators window or enter the username manually by touching the entry box and entering the name via the pop-up keyboard.

Operator Password:

- This entry box is for the operator's password. The password can be entered by touching the password entry box and entering the password via the pop-up keyboard.

Manage Accounts

This tab allows the addition, removal, and modification of authorized users, see Figure 22-2.

Operators:

- This window contains the list of authorized users already added to the Vission 20/20. Selecting a name from this list will add that name to the "Operator Name" entry box.

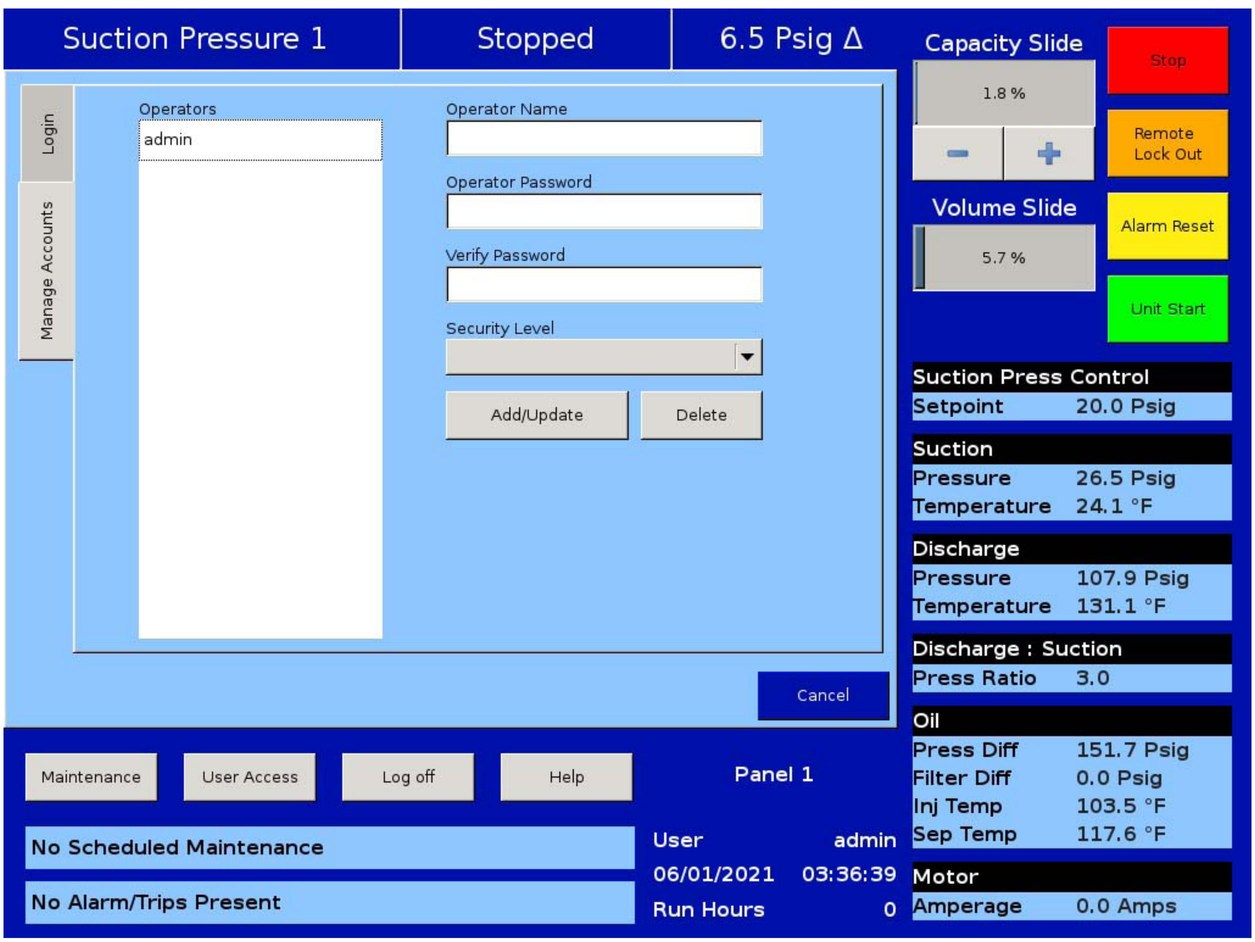


Figure 22-2. User Access Screen - Manage Accounts

Operator Name:

- This entry box is for the operator's username who is to be added, removed or modified. The operator can either select the username from the operators window or enter the username manually by touching the entry box and entering the name via the pop-up keyboard.

Operator Password:

- This entry box is for the operator's password. The password can be entered by touching the password entry box and entering the password via the pop-up keyboard.

Verify Password:

- This entry box is to verify the operator's password. Verifying the password can be entered by touching the "Verify Password" entry box and entering the password via the pop-up keyboard.

Security Level:

- Select a security level for the account being added or modified. Only levels that are equal to or less than the operator's own security level will be shown.

Add / Update:

- Pressing this button will initiate the creation or modification of the specified account.

Delete:

- Pressing this button will delete the specified account.

Screen Security Levels

The following table lists all screen and their base security levels, see Table 22-1. The majority of the screens have more than one security level. The base security level gives the user access to the setpoints that can change to performance of the compressor. The secondary security level is typically level 3 and is reserved for those setpoints that require great care and knowledge of the system in order to change safely.

Table 22-1. Security Access Levels

Security Access Levels		
Page	**User Level**	***Note**
Event List	Level 0	View
Input/Output States	Level 0	View/create freeze screen
Trend Chart	Level 0	View/operate
Help	Level 0	-
Alarms & Trips	Level 1*	Level 3 or Level 4 required for constraints
Compressor Scheduling	Level 1	-
Compressor Sequencing	Level 1	Setpoints can be modified / set at Level 1
Condenser Control / Remote Oil Cooler	Level 1*	Level 3 required for constraints Setpoints can be modified / set at Level 1
Compressor Control	Level 1*	Level 3 or Level 4 required for constraints
Maintenance	Level 1	-
Data Backup	Level 1*	Level 3 required to upload data
Instrument Calibration	Level 2	-
Service Option	Level 2	-
Configuration	Level 2*	Level 3 required for pages 3 - 8
Slide Calibration	Level 2	-
Set Language	Level 2	
Timers	Level 2*	Level 3 or Level 4 required for constraints
Moving Volume Slide	Level 4	-
VNC Account	Level 3	-
Auxiliary I/O	Level 2	-

Overview

Use this screen to receive help on other setpoint screens contained within the software. These help files can be accessed from any screen. The help files describe the functionality of that screen as well as compressor operation.

Screen Features

Manual Tab:

- Contains the list of available manual sections to be displayed in the display window, see Figure 23-1.

USB tab:

- The operator has the option to view other manuals, typically Vilter™ compressor manuals on the Vission 20/20 from a USB drive, see Figure 23-2. If there are any PDF type documents on a connected USB drive, the names will be listed in this section. The operator will have to navigate through the file structure of the USB drive to find the documents. The top box in the USB drive will display any USB drives mounted to the Vission 20/20 OS.
- Touching one of the listed USB devices will select that device and list any files or PDF documents contained on the USB drive. Selecting a folder will open that folder and display any sub-folders of PDF documents.

Unmount:

- Pressing the unmount button will disconnect the USB drive from the Vission 20/20 operating system. Once the device has been removed from the device list, the USB drive can be safely removed.

Refresh:

- Pressing this button will reread the USB ports and display any new USB drives.

Back:

- Pressing the back button will rewrite the file/folder list with the previous folder level.

Display Window:

- This window displays the content of the manual.

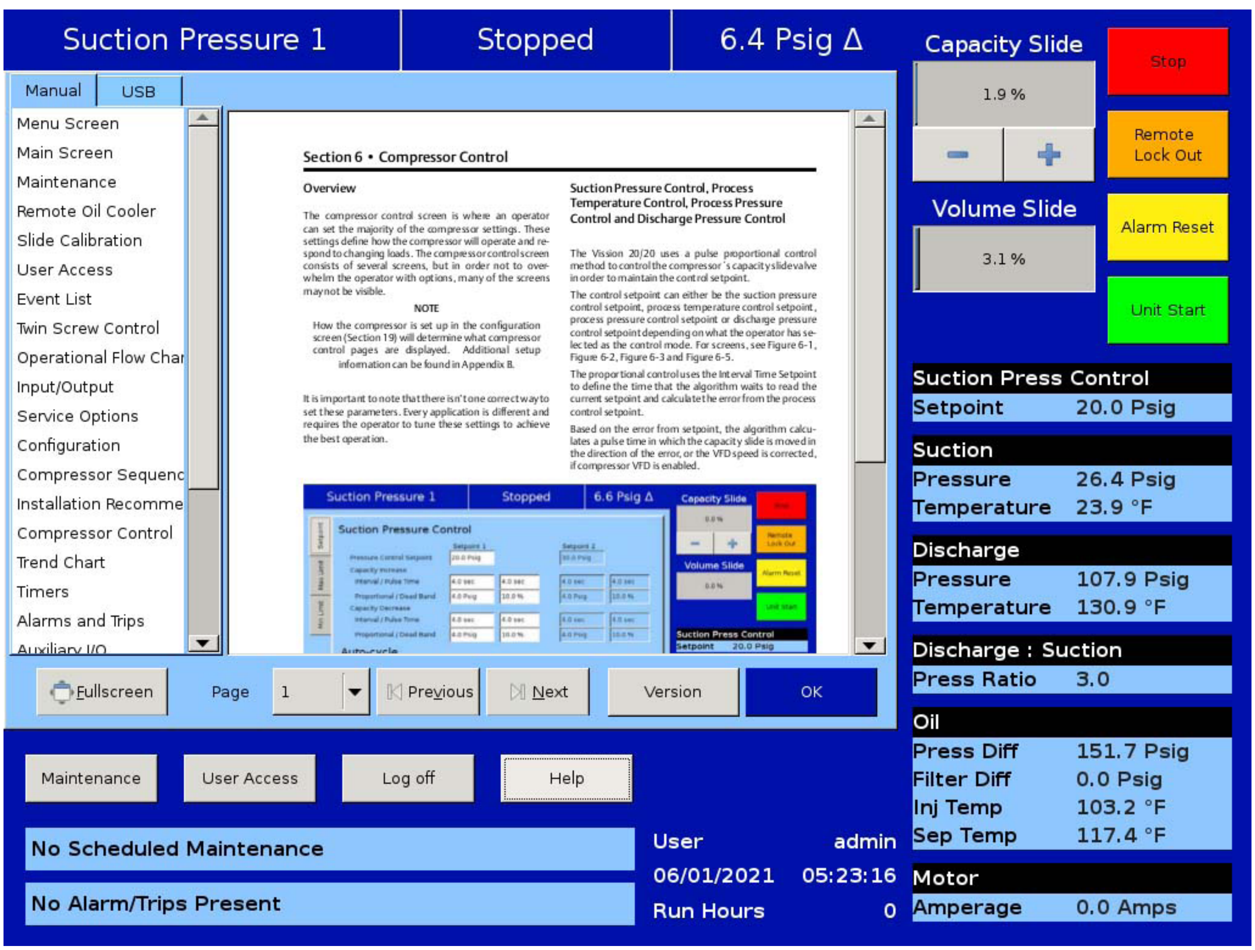


Figure 23-1. Help Screen - Manual

Fullscreen:

- Pressing this button expands the display window to fit the entire screen.

Page:

- Allows the operator to enter the page number he wishes to see displayed in the window.

Previous:

- Goes to the previous page.

Next:

- Goes to the next page.

Version:

- Pressing the Version button displays a pop-up screen that gives the operator information on the software version running on the Vission 20/20, see Figure 23-3.

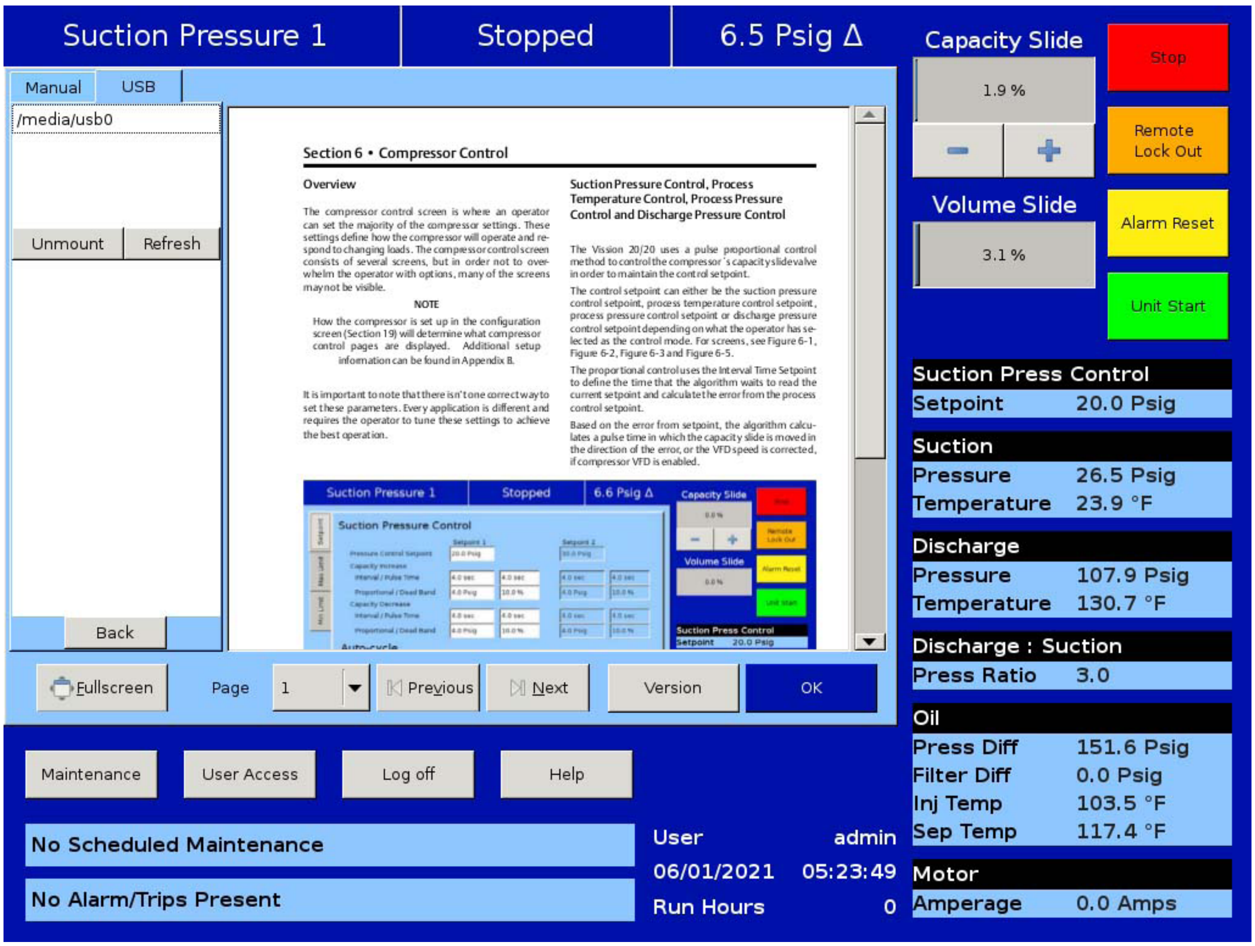


Figure 23-2. Help Screen - USB

Figure 23-3. Version Pop-Up Screen

Overview

The Vission 20/20 is capable of operating a twin screw compressor from a number of different manufacturers. The Vission 20/20 currently operates as a twin screw controller in the full time oil pump and the no oil pump configuration.

Setup - Configuration Screen

Configuration Screen:

- To setup the Vission 20/20 panel for twin screw, navigate to the Configuration Screen, page 2, and select "VRS" from the dropdown box labeled "Compressor", see Figure 24-1.

Menu Changes:

When selecting the twin screw option there will be other changes that occur in other menu pages.

- Volume position indicator will disappear from the main screen and right data panel.
- Prelube oil pump alarms and trip values will be changed to default values for the twin screw.
- Run oil pump alarm and trip values will be changed to default values for the twin screw.

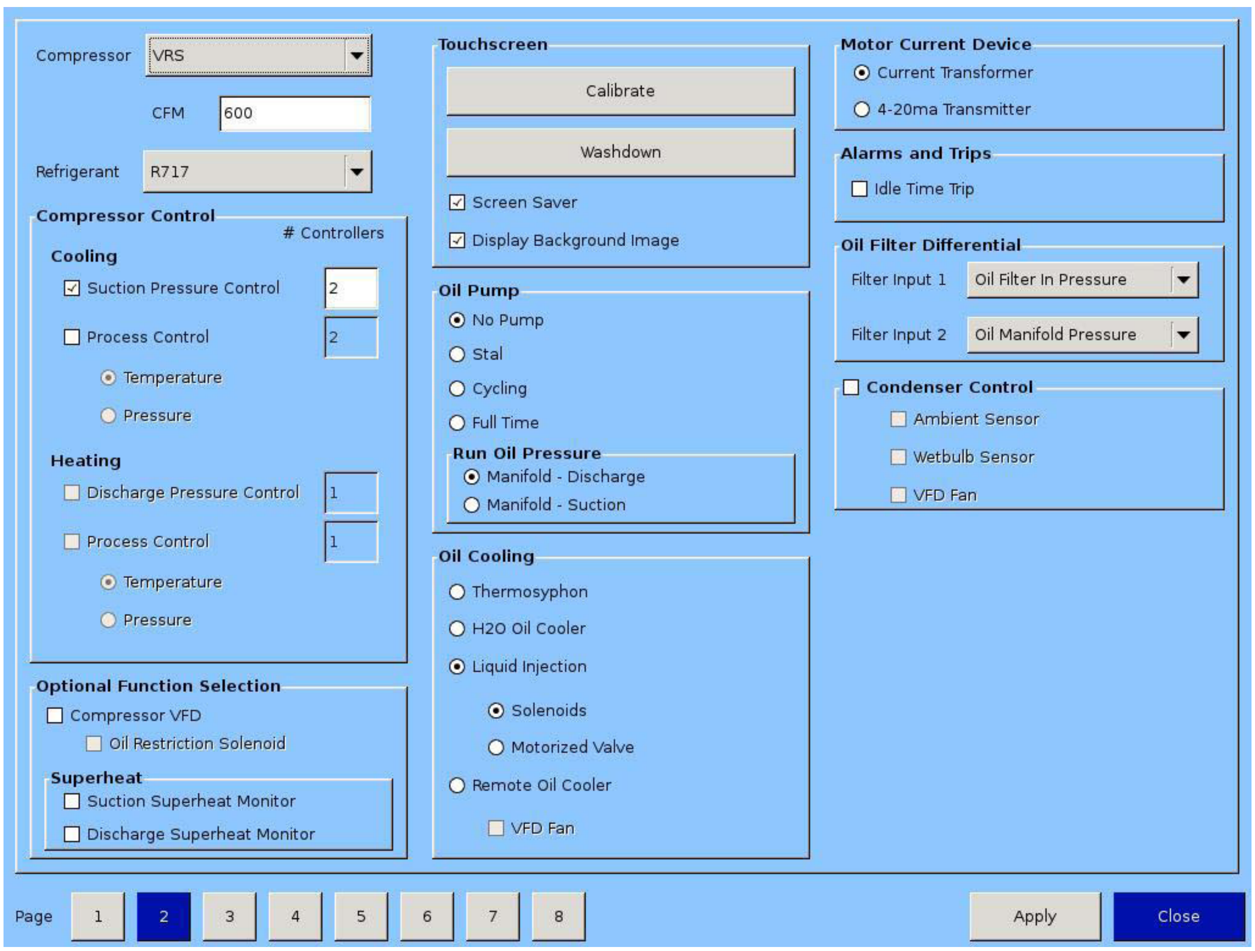


Figure 24-1. Configuration Screen - Twin Screw Option

Operation

Once the twin screw is configured, its operation is very similar to the single screw's, and all options that are available for single screw configuration are also available for twin screw. The only operational difference is the manual mode of operation. Twin screw compressors can experience leaky slide seals that can cause the capacity slide to drift after it has been positioned by the controller. To counteract the capacity slide drift problem, the twin screw manual mode operation has an added anti-drift feature that automatically maintains the position of the hydraulic actuator.

Slide Calibration - Capacity Slide Valve Potentiometer

This section provides critical information and control parameters related to the capacity slide actuator. The "% cap" display shows the actual percentage value of the capacity slide without any conditioning that might be applied to the other capacity position displays. In addition, this section displays the value of the actuator's signals in millivolts in the "input Value" display box, see Figure 24-2.

"-" Button:

- When the operator presses and holds this button, the output associated with the capacity slide decrease solenoid is energized and the oil pump is energized. The oil pump is needed to force oil into the capacity slide chamber to move the capacity slide.

"+" Button:

- When the operator presses and holds this button, the output associated with the capacity slide increase solenoid is energized and the oil pump is energized. The oil pump is needed to force oil into the capacity slide chamber to move the capacity slide.

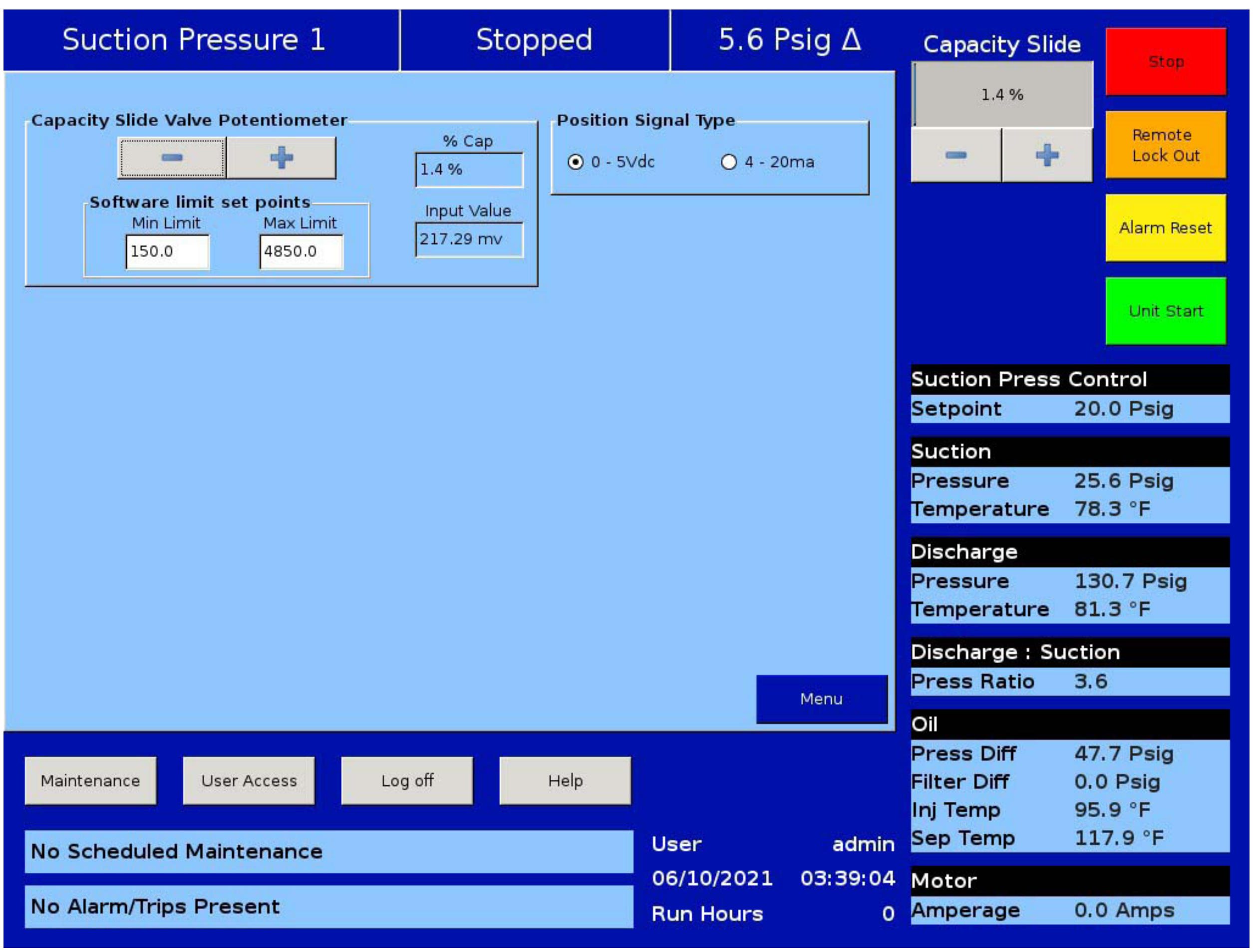


Figure 24-2. Slide Calibration - Fixed VI

Software Limit Setpoints

The Vission 20/20 uses the “Min Limit” and “Max Limit” setpoints to define an area within the mechanical stops for normal slide travel. These software limits’ purpose is to prevent the slide from actually hitting the mechanical stops which could result in a number of undesirable consequences. By default, the software limits are set to 150mV from either end point. The position percentage is calculated from the software limits. Therefore, it is possible to read a value greater than 100% or less than 0% if inertia carries the slides after these limits are reached.

Fixed VI:

- The normal software limits apply without any modification.

Continuous VI:

- “Max Limit” when VI is maximum will be different from “Max Limit” when VI is minimum. Max limit (Min VI)‘s value will be greater than Max Limit (Max VI)’s value. The default value for Max Limit (Max VI) is 3440.0 and the default value for Max Limit (Min VI) is 4850.0.

Step VI:

- Max limits for Step 1, Step 2 and Step 3 will be different. Step 1’s Max Limit will be greater than Step 2’s Max Limit which will be greater than Step 3’s Max Limit.

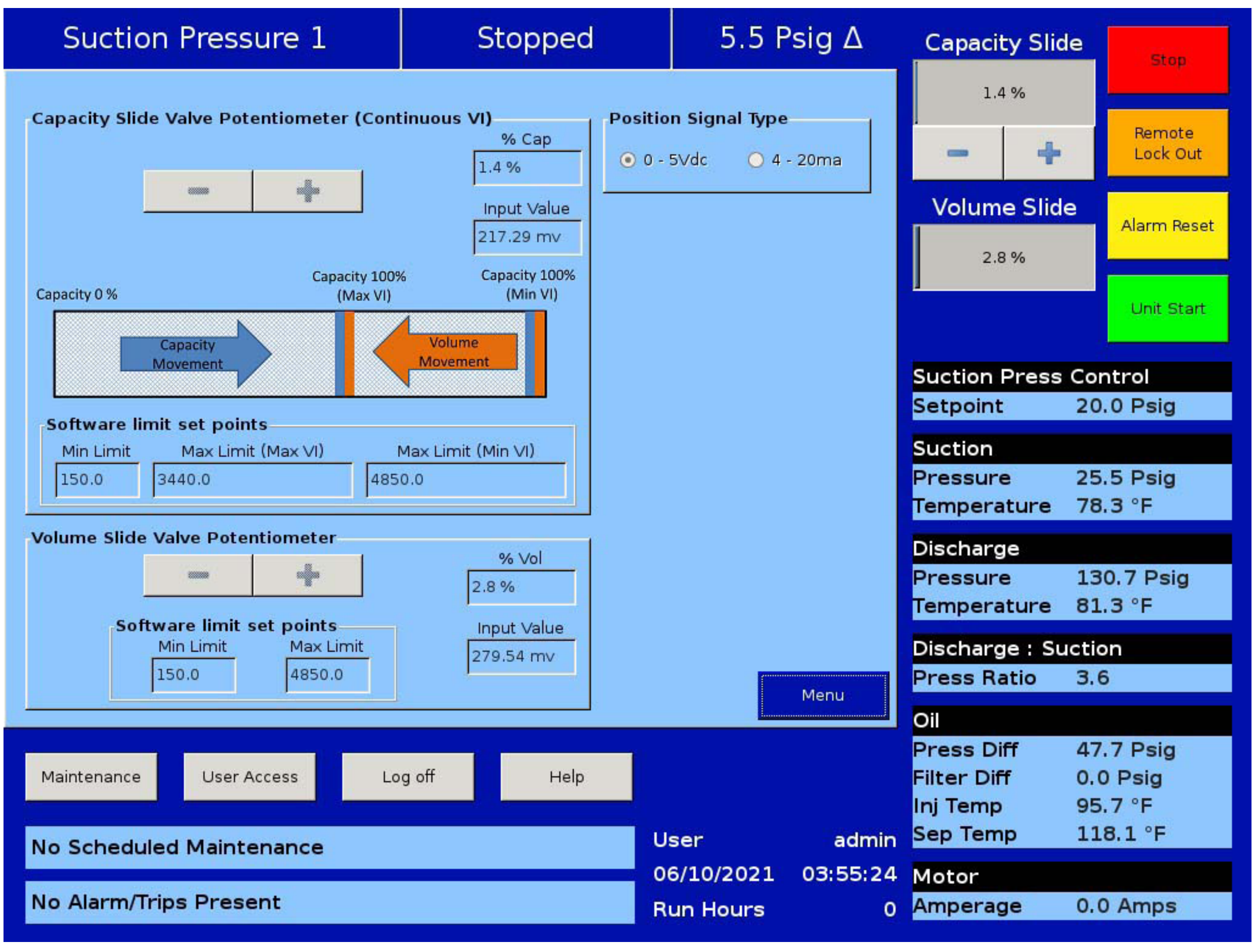


Figure 24-3. Slide Calibration - Continuous VI

Position Signal Type:

- Position signals can be 0-5 VDC or 4-20mA to indicate the current slide valve position.

Compressor Bump Pop-Up Window:

- This window, which pops up when you press the Menu button to go back, allows the operator to bump the compressor to flush out any oil in the compressor after a slide valve calibration, see Figure 24-5. If the oil level is below the lowest sight glass in the oil separator, then bumping the compressor is recommended.

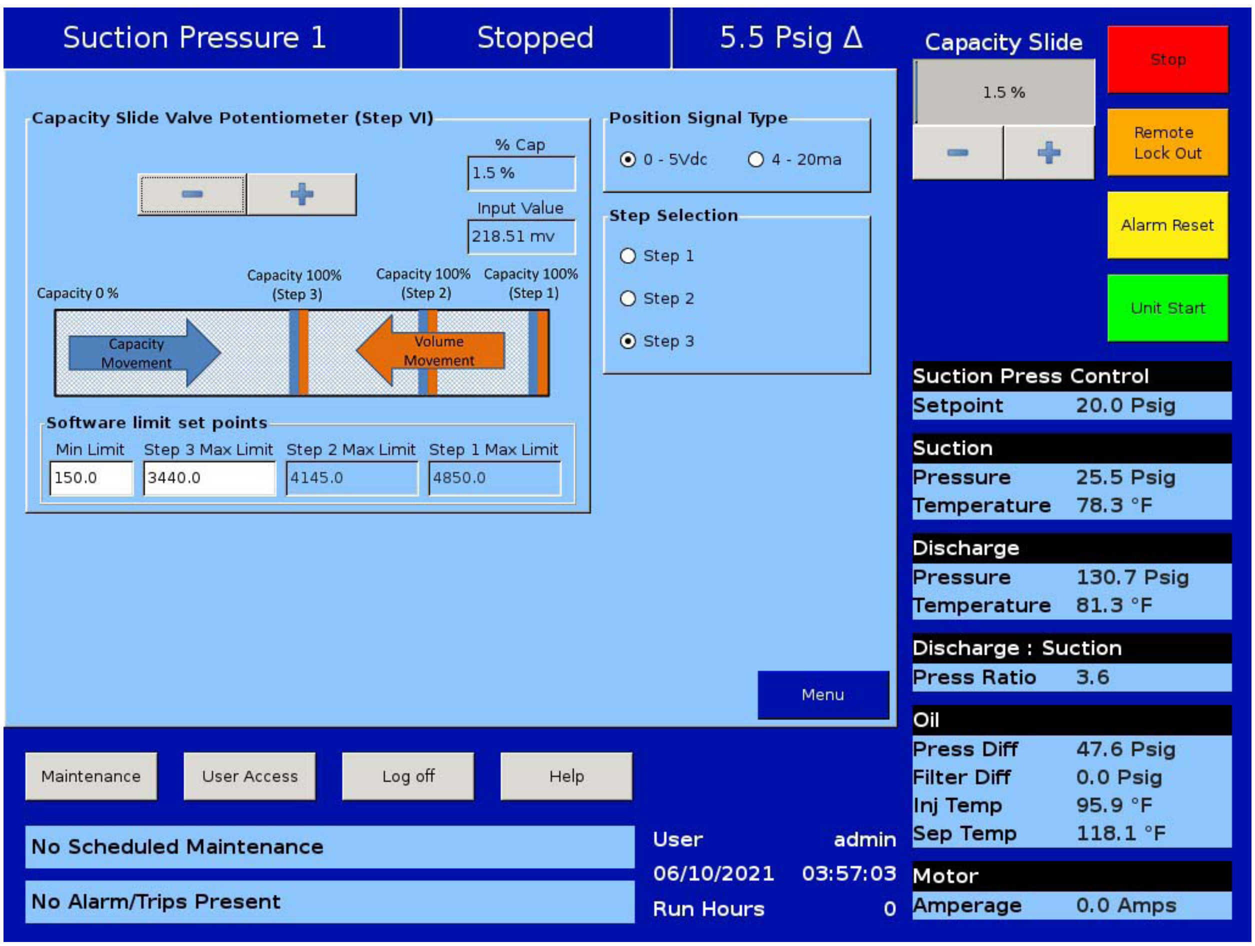


Figure 24-4. Slide Calibration - Step VI

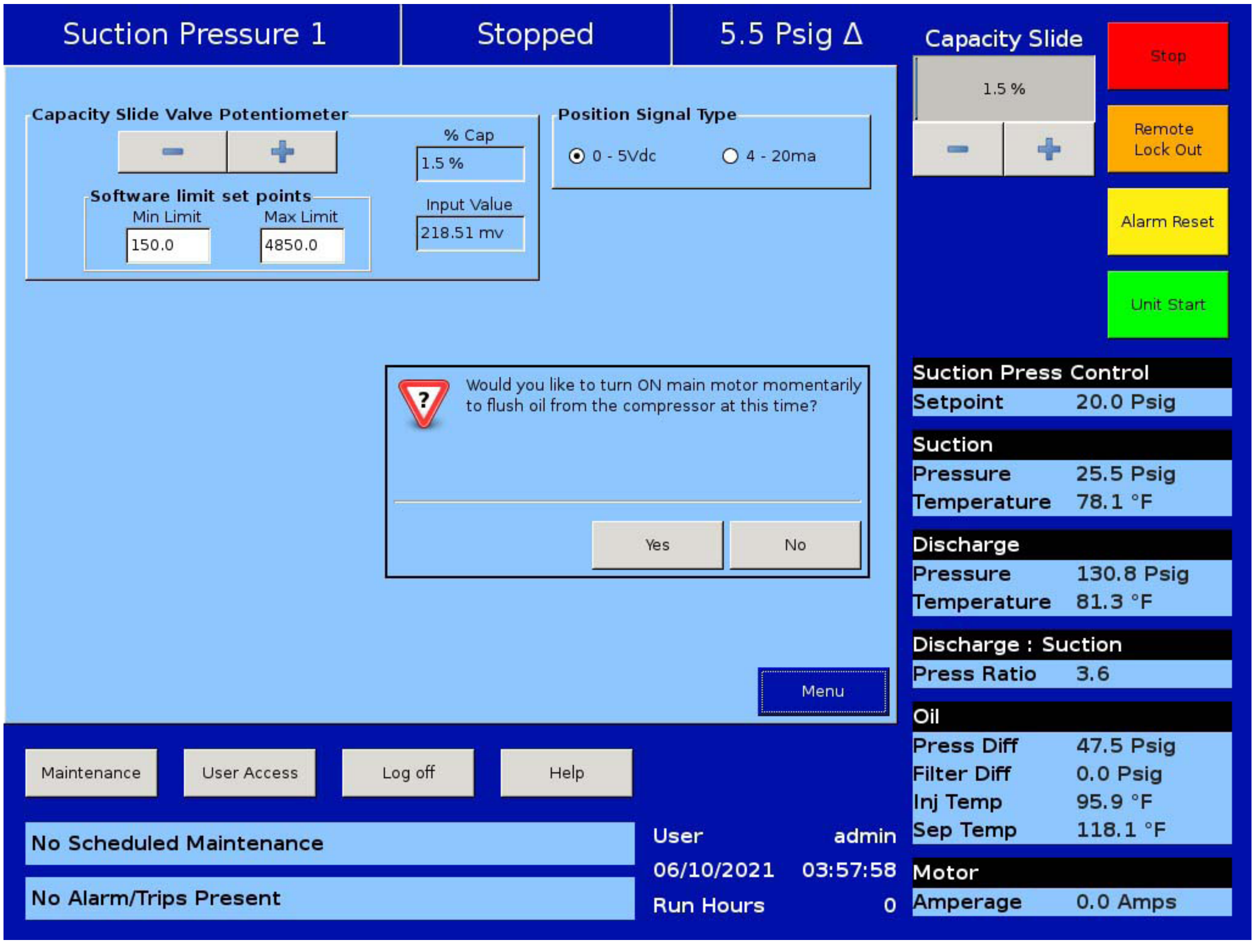


Figure 24-5. Slide Calibration - Twin Screw Bump Pop-up Window

Twin Screw Oil Pressure

The twin screw compressor has two separate oil pressure settings. They are named “Prelube Oil Pressure” and “Run Oil Pressure” in the Alarm and Trips Menu.

Prelube Oil Pressure is calculated as Filter Outlet Pressure minus Discharge Pressure and Run Oil Pressure calculation depends on selection of Run Oil Pressure radio buttons in Configuration Screen as shown in Figure 24-1.

As shown in Figure 24-6, the alarm and trip setpoints for both of these oil pressures are set to the same values and any adjustments to these oil pressures is usually done so that the setpoints are the same.

Oil Pressure Monitoring BEFORE Compressor Starts

Pressing the “Auto” or “Manual” options from the “Unit Start“ pop-up window will start the oil pump. The decrease solenoid will be energized as well if the capacity slide is greater than 5%. A prelub oil pressure timer called “Minimum Compressor Prelub Time” begins timing, see Figure 24-7. This timer is adjustable, while the default time is 5 seconds. This timer allows oil to be pushed into the oil injection lines to fill the lines with oil BEFORE the system starts looking for prelub oil pressure. After the Minimum Comp Prelub Timer times out, then prelub oil pressure monitoring begins. The oil pump will run for the time setting of “Prelub Oil Pressure Monitor Time” (typically 20 seconds) trying to achieve prelub oil pressure. If it fails to establish prelub oil pressure, the oil pump shuts down for 10 seconds, and then starts and tries again. The cycle is repeated for the “Prelube Oil Pressure Monitor Trials” setting, typically set at “3” tries. After the third unsuccessful try, a failure message “Prelub Oil Pump Inhibit” is generated. This indicates a failure to establish Prelub Oil Pressure. When the Prelub Oil Pressure is established, then the compressor is commanded to start.

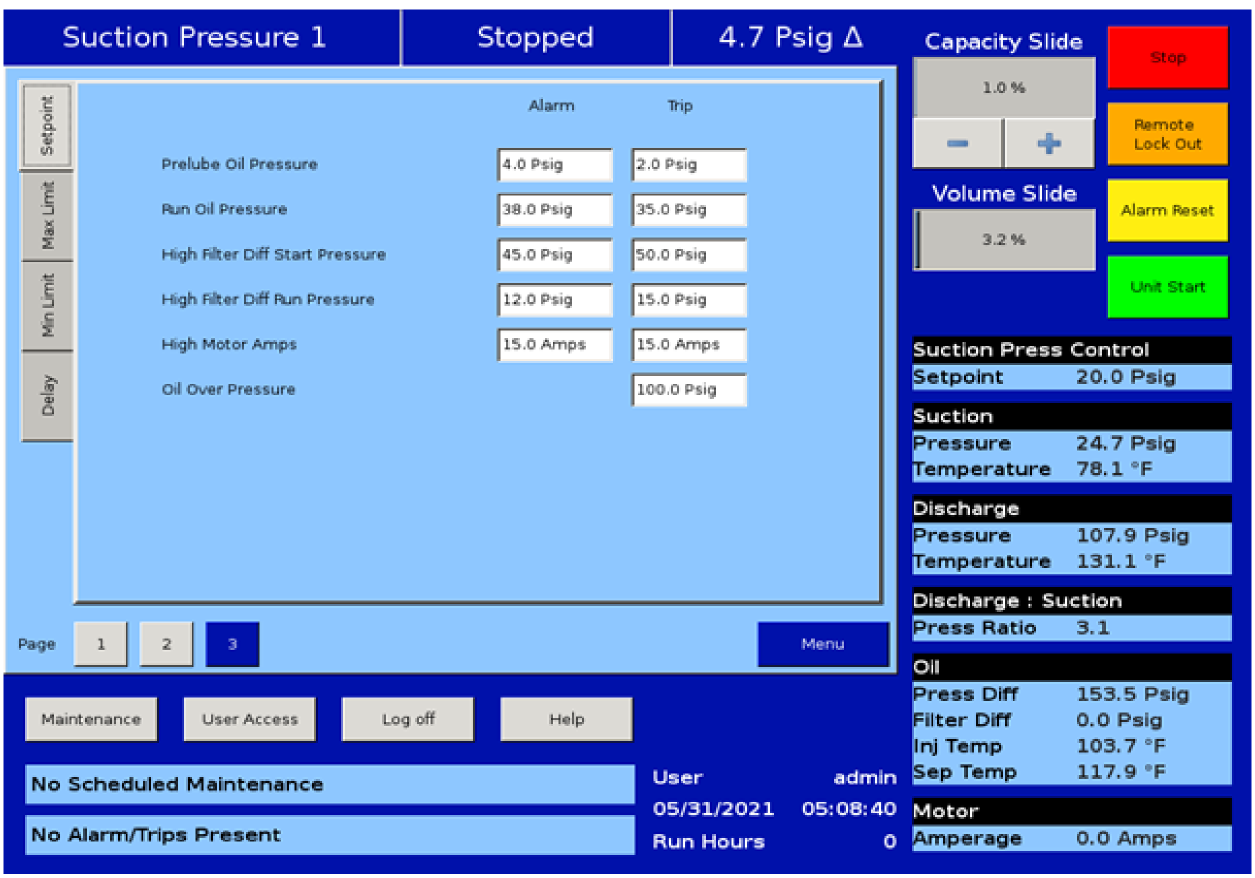


Figure 24-6. Prelube Oil Pressure and Run Oil Pressure Settings

Low Oil Pressure Safety Bypass

When the compressor starts, then the Low Oil Pressure Safety Bypass timer is started (set at 60 seconds by default, but it is adjustable).

During this time, the Prelub Oil Pressure Alarm and Trip setpoints are forced into the Run Oil Pressure Alarm and Trip settings. By default, the Prelub Oil Pressure Alarm and Trip setpoints and the Run Oil Pressure Alarm and Trip settings are the same values, however these settings are adjustable. In some cases it may be advantageous to set the Prelub Oil Pressure Alarm and Trip setpoints to a lower value than the Run Oil Pressure Alarm and Trip setpoints. This will provide more time for the screw compressor to develop running oil pressure after the compressor starts.

After the Low Oil Pressure Safety Bypass Timer expires, the Run Oil Pressure Alarm and Trip setpoints revert to their normal setpoints. At this time, or anytime thereafter, if the oil pressure does not exceed the Run Oil Press Trip setpoint, then the compressor will fail because of “Run Oil Pressure”.

Oil Pressure Monitoring AFTER Compressor Starts

After oil pressure exists and assuming that the capacity slide is less than 5%, the compressor now starts. During the first 5 minutes of the compressor running, if the oil pressure drops to the “Low Oil Pressure Trip” value (or below) for five continuous seconds (settable by a timer called “Oil Pressure Fail Delay” timer), then the compressor will fail on “Low Run Oil Pressure” failure. After five minutes of the compressor running, then if the oil pressure ever drops to the low oil pressure trip value (or below), then the compressor will immediately fail on “Low Run Oil Pressure” failure.

Figure 24-7. Timers Menu - Twin Screw Control

Overview

The cool compression operation is similar to the one of the standard single screw compressor units, except there is no external oil cooler to the unit. A blanket of liquid ammonia lies on top of the oil in the oil separator. The liquid ammonia level is regulated by sensing the liquid ammonia level with a level probe, and using a positioning valve to vary the amount of liquid ammonia being added to the separator. The cooling occurs through the entire compression and separation process.

The Cool Compression compressor does not have an oil pump. When the Cool Compression compressor unit is commanded to start, the control panel first insures that the slide valves are at their minimum positions. The suction oil injection solenoid (SOI) is energized – allowing a path for oil to flow into the compressor. The compressor now starts.

There is an initial pressure drop in the suction chamber of the compressor and a corresponding increase in pressure on the discharge of the compressor. This creates a pressure differential that forces the oil and liquid ammonia mixture through the suction oil injection line into the suction chamber of the compressor. This oil and liquid provides lubrication and cooling until full pressure differential lubrication is attained. As the differential pressure increases, the oil and liquid ammonia is now injected into the screw during the compression process and the oil injection valve is allowed to close.

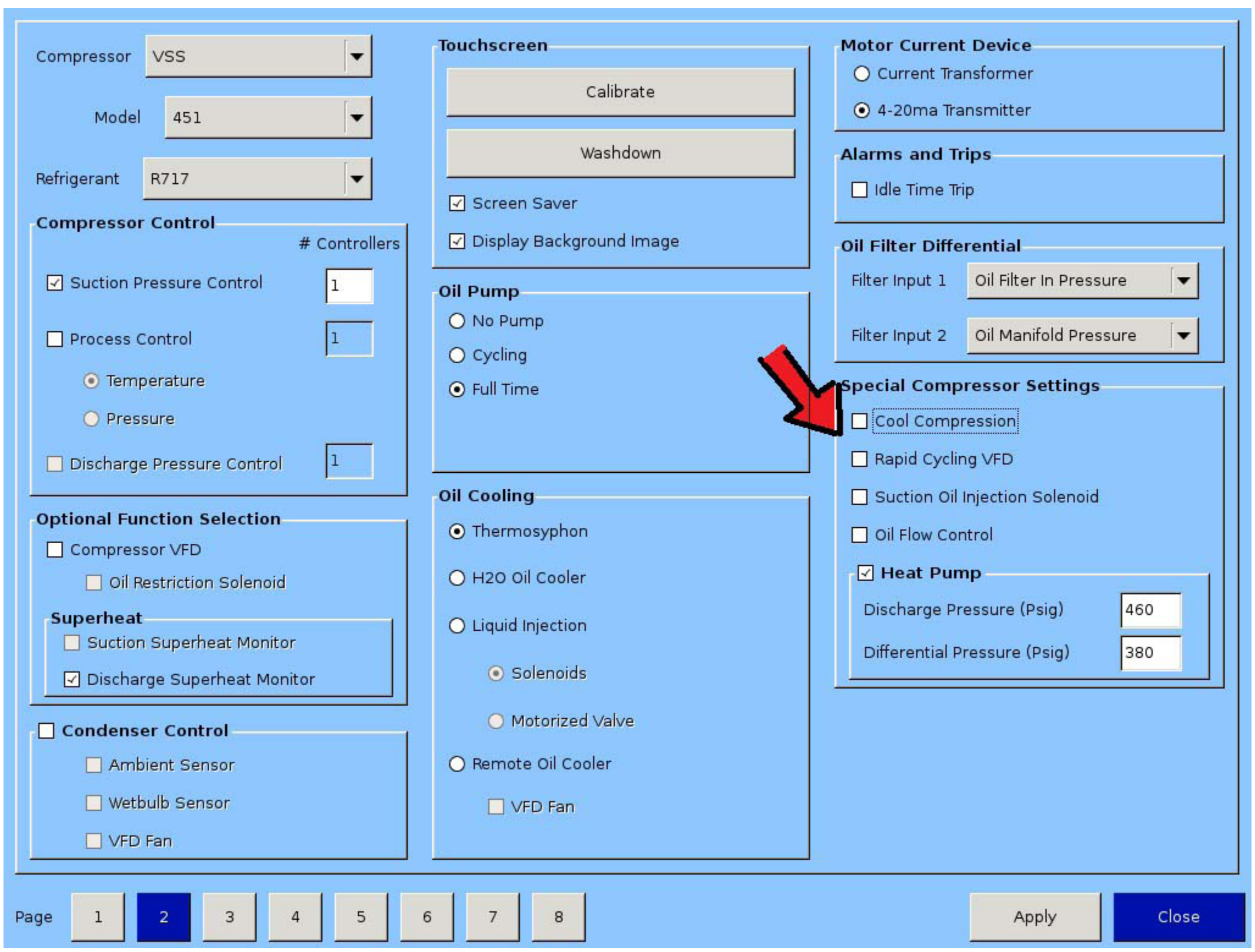


Figure 25-1. Configuration - Cool Compression Setting

Setup

Configuration Screen:

- To setup the Vission 20/20 panel for Cool Compression, first ensure that an analog output card is installed in the panel, and it is selected from page 6 of the configuration screen, see Section 19. Navigate to configuration page 2, and select "Cool Compression" checkbox from the Special Compressor Settings Section, see Figure 25-1. Once selected, the "Cool Compression" option will appear in the Oil Pump and Oil Cooling sections, selected automatically. It will also enable Superheat Monitoring on the screen.
  - As previously described, Cool Compression compressor does not have an oil pump. Instead it has a suction oil injection solenoid to provide oil and liquid ammonia for lubrication and cooling.
  - Cool Compression liquid injection 1 and liquid injection 2 outputs will operate as high / low pressure ratio solenoid outputs.

Control Functions

In the Compressor Control Menu, special cool compression control functions are now available, see Figure 25-2.

Auto Load

- Auto load operation will force the compressor to load to a minimum value once the compressor has started. By loading the compressor to a minimum value, and maintaining this capacity, a pressure ratio is created across the compressor, to ensure its adequate lubrication, and also so that the compressor does not experience high discharge superheat conditions. Since compressor lubrication is of great importance, all load limiting is disabled when auto load is engaged.
- **Auto Load at Start**
  - Defines the value at which Compressor (capacity slide) should be loaded (and maintained) at start if Auto Load is enabled.

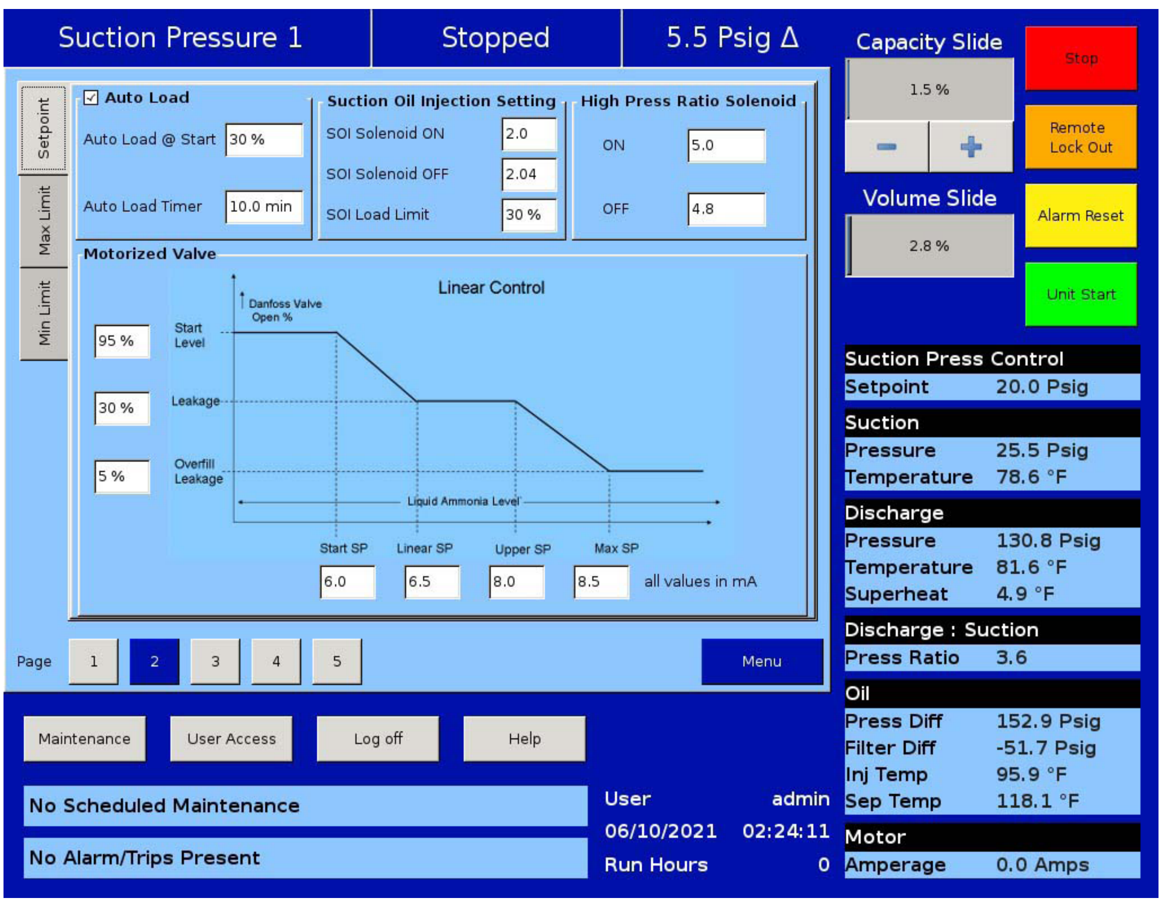


Figure 25-2. Compressor Control Screen - Cool Compression Control (Page 2)

Auto Load Timer

• This timer defines the maximum time that the Auto Load operation will be engaged. After the timer expires, Auto Load will be disengaged.

• Auto load will be disengaged when one of the following conditions occur;

• Pressure ratio reaches a value of 2.0 or greater.

• Compressor has been running for 10 minutes (defined by Auto Load Timer).

• The suction pressure setpoint has been reached.

Suction Oil Injection Setting

- In order to maintain adequate lubrication during low pressure ratio conditions, the Suction Oil Injection (SOI) solenoid is turned ON and the capacity of the compressor is reduced.
- The SOI solenoid will cycle ON and OFF based on the pressure ratio across the compressor.
- **SOI Solenoid ON**

  • Defines the Pressure ratio value at which SOI is turned ON (default 2.00) (Digital Output Board #1:2).

- **SOI Solenoid OFF**

  • Defines the Pressure ratio value at which SOI is turned OFF (default 2.04) (Digital Output Board #1:2).

- **SOI Load Limit**

  • Defines the capacity slide position at which the compressor capacity slide will unload to if pressure ratio falls below "SOI Solenoid ON" setpoint. This setpoint is not active until Auto Load disengages.

- The SOI solenoid will also cycle on if the discharge temperature superheat reaches a value of 5°F (this value is not settable). Generally, anytime the SOI solenoid cycles on, the capacity is limited to the SOI Load Limit setpoint. However, this is not true if the SOI solenoid cycles on based on the discharge temperature superheat 5°F rule. If discharge temperature superheat continues to climb and reaches a value of 6°F, the compressor will be inhibited from loading. If discharge temperature superheat still continues to climb and reaches a value of 8°F or more, then the compressor will be unloaded until the superheat drops below 8°F or the capacity has reached the SOI Load Limit setting.

Using a Positioning Valve for Liquid Ammonia Level Control

- A level probe inserted in the oil separator detects the liquid ammonia level. Based on the level of the ammonia (0-100%), the level probe sends a directly proportional 4-20 mA signal to the Vission 20/20 panel. The positioning valve is then positioned based on the Positioning Valve settings graph shown in Figure 25-2.
- Looking at the graph, when the compressor starts, the positioning valve placement (Vertical Axis) is determined based on the liquid ammonia level that is sensed in the oil separator (Horizontal Axis). It can be seen that as the liquid ammonia level increases (corresponding to a larger mA value), the positioning valve moves towards a closed position.
- The Positioning Valve's position (0-100% limits) is defined at three distinct levels:

  • Start Level (lowest liquid ammonia level - positioning valve at maximum open position).

  • Leakage (normal operating position and ammonia level).

  • Overfill Leakage (highest liquid ammonia level – positioning valve at minimum open position).

- Liquid ammonia levels are defined at four distinct levels (4-20ma limits);

  • Start SP (minimum liquid ammonia level in separator – the positioning valve is at its maximum opening).

  • Linear SP (minimum level of liquid ammonia for normal operating position).

  • Upper SP (maximum level of liquid ammonia for normal operating position).

  • Max SP (maximum liquid ammonia level – positioning valve is at its minimum opening position, maintaining some leakage).

- On the Alarms and Trips screen, the Low Oil Separator Start Temperature and High Filter Diff Start Pressure settings are disabled.
- On the Timers screen the Oil Level #1 Safety Trip Delay and Oil Level #2 Safety Trip Delay settings are disabled.

Operational Differences from Single Screw

Once the Cool Compression is configured, most setup options available for a single screw are also available for Cool Compression. However, there are significant operational differences that are mostly associated with the compressor safeties:

1. The Cool Compression program ignores,

- Low Oil Separator Alarm / Trip at start
- High Filter Differential at start
- Prelube Oil Pressure Alarm and Trip
- Run Oil Pressure Alarm and Trip (Pressure Ratios are monitored instead).
- High Discharge Temp Alarm and Trip (Discharge Temp Superheat is monitored)
- Low Suction Temp Alarm and Trip
- Low Oil Injection Temp Alarm and Trip
- High Oil Injection Temp Alarm and Trip

2. SOI solenoid is forced on for first 60 seconds of running and 10 minutes after compressor is stopped.

3. Auto Load Enabled: When Auto Load is engaged at start, it then maintains the position of the capacity slide to the Auto Load limit (approx: 30 %, but less than 50 %). It displays a status message, "Cool Compression Capacity Hold", when it is running. Unless Auto load is disengaged the compressor will run at the auto load limit position. Auto load disengages if enough Pressure Ratio is built (typically more than 2.04) or setpoints are achieved.

4. SOI Solenoid: During normal operation if the pressure ratio drops to a lower value (typically below 2.00) then it energizes the SOI solenoid and maintains the position of the capacity slide to the SOI Load limit (approx : 30 %, less than 50 %). It also displays a status message, "Cool Compression Capacity Hold". If enough Pressure Ratio is built across the compressor (typically more than 2.04), it again resumes the run and control mode normally.

5. It performs Cool Compression specific checks periodically like:

- Controlling the liquid level positioning valve as liquid ammonia level changes.
- Low / high Pressure Oil Injection ports control as Pressure Ratio and Superheat temperature changes.

Supplemental Oil Cooling Solenoids

- Some cool compression units will have supplemental oil cooling solenoids. One is called the suction liquid injection solenoid and is controlled via discharge superheat. When the discharge superheat reaches 5°F, the solenoid is turned on. When it falls back to below 4°F, the solenoid is turned off. An additional solenoid (referenced as SV4 – as called the High Press Ratio solenoid) provides supplemental oil cooling based on pressure ratio. When the pressure ratio rises above 5.0, the solenoid is turned on. When the pressure ratio falls back to below 4.8, the solenoid is turned off.

Level Switches

- There are two level switches in the oil separator, a "high" and a "low". During normal running operation, the oil level is above both switches. When the oil level starts to drop and opens the high level switch, a 10 minute timer starts. When the timer elapses a flashing "Add Oil to the Appropriate Level" message appears on the main screen. When the operator adds enough oil to close the high level switch, the message disappears.

NOTICE

If oil is not added and the oil level continues to drop thereby opening the "low" oil level switch, a 10 minute timer starts again. When the timer elapses, the compressor shutdowns immediately and displays "Low Oil Level" failure. If enough oil is added to close the low level switch, then this will allow the operator to press the reset button and clear the "Low Oil Level" failure and "Add Oil" message.

Oil Level Messaging After Compressor Stops

- The low level switch is monitored after the compressor stops. If the switch opens after the compressor stops, a two minute timer starts. If the switch stays open, and the timer expires, a failure is generated called "Low Oil Level Trip after Stop" and the compressor is disabled from restarting until oil is added to close the low level switch. Note that this failure is generated ONLY when the low level switch opens after the compressor stops.

Overview

This screen allows the operator to view and adjust Remote Oil Cooler setpoint settings associated with Remote Oil Cooler operation, see Figure 26-1. This screen will only be active if the Remote Oil Cooler Control option has been enabled from the Configuration Screen, see Section 19.

The Remote Oil Cooler Control operation allows the cycling of fans and pumps in order to maintain a specific Remote Oil Cooler Temperature. The five different steps in step control allow the selection of fans, pumps and VFD in one or more steps. When a VFD is employed, the VFD is allowed to reach maximum speed, then if additional capacity is needed, the next fan or pump is brought on. The VFD will modulate down and then back up to 100% again, then the next fan or pump is brought on. This method allows the smoothest Remote Oil Cooler control by spacing the VFD between the fan and pump steps, while maintaining a Remote Oil Cooler Temperature pressure that matches the setpoint.

Remote Oil Cooler Setpoint

Run Mode:

- Run Mode allows the selection of different modes of operation for Remote Oil Cooler. The choices for selection are:

  Run Never:

  The mode of operation by default. Remote Oil Cooler operation will not be performed when this mode is active.

  Run With Comp:

  Automatic operation of Remote Oil Cooler selected when cooling control is required to only run when the compressor is running.

  Run Always:

  Automatic operation of Remote Oil Cooler selected when cooling control is required to run even when the compressor is off.

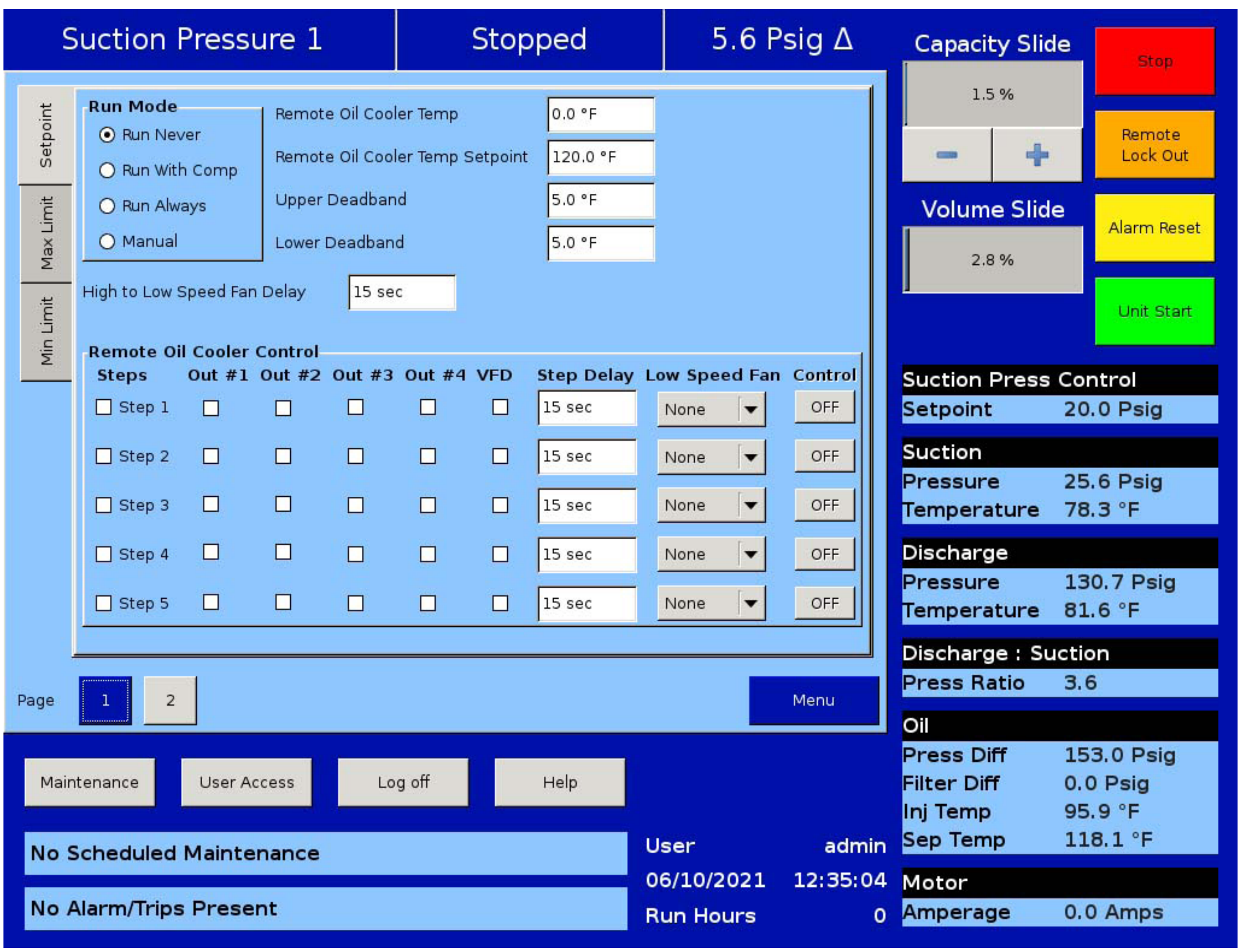


Figure 26-1. Remote Oil Cooler Screen (Page 1)

Manual:

- Mode for controlling the Remote Oil Cooler operation manually. The operation is controlled by manual stepping using an on/off toggle button at each step.

Remote Oil Cooler Temperature:

- This is a read-only parameter and it displays the present value of the Remote Oil Cooler Temperature. The Remote Oil Cooler Temperature is mapped on Analog Auxiliary Input #5.

Remote Oil Cooler Temperature Setpoint:

- This is the Remote Oil Cooler Temperature setpoint that needs to be maintained.

Upper Deadband:

- This is the Remote Oil Cooler Temperature setpoint's upper deadband value.

Lower Deadband:

- This is the Remote Oil Cooler Temperature setpoint 's lower deadband value.

High to Low Speed Fan Delay:

- This is time delay for fan spin down in case of 2 speed motor/dual speed fan.

Step Control

The Step Control allows the operator to setup the manner in which Fans, Pumps & VFD will be turned on/off. Fans & Pumps are connected on digital outputs Out #1 to Out #4. The VFD Fan is connected to the Analog Output. Each step can have a maximum of five outputs connected to it. Each step can be opted in or out depending an enabled checkbox.

When the Run Mode is "Auto" and the Remote Oil Cooler Temperature rises above the upper deadband, the Remote Oil Cooler step gets increased from Step 1 to Step 5, hence switching on/off Pumps, Fans & VFD connected to outputs. This holds true when it comes to decreasing the steps from Step 5 to Step 1 when the Remote Oil Cooler Temperature falls below the lower deadband.

Step Delay:

- Allows the operator to set time delays between the Remote Oil Cooler steps. Remote Oil Cooler Temperature must be outside the upper or lower deadband continuously for the delay time in order to increase or decrease the Remote Oil Cooler steps. While in a VFD step, an additional step can only be added once the VFD has reached its maximum speed setpoint and the delay timers are satisfied. Similarly in a VFD step, a step can only be removed once the VFD has reached its minimum speed setpoint and the delay timers are satisfied. The Step Delay acts as an "ON" timer while loading and acts as an "OFF" timer while unloading for the same step.

Low Speed Fan:

- Allows steps to have an option for time delay in case of fan spin down. Any of Out #1 to Out #4 can be selected as Low Speed Fan through combo box. E.g.: Let's say Out #2 is selected as Low Speed Fan in Step 2. When step 2 becomes active during Remote Oil Cooler operation, which is after Step 2's timeout delay, Out #2 is left off for the time set by the operator in High to Low Speed Delay. After the low speed fan energizes, then the timer for Step 3 starts timing.

Control:

- Toggle any of the steps On/Off during the manual operation of the Remote Oil Cooler. This button is active only when the Run Mode selected is "Manual". During "Auto" operation of the Remote Oil Cooler Control, the control button for the active step will be "ON".

VFD Settings

This page is active only when Remote Oil Cooler VFD is selected in the Configuration Screen, see Section 19. For the Remote Oil Cooler VFD Screen, see Figure 26-2. When a VFD fan is used for the Remote Oil Cooler oil cooling, the speed of the VFD is controlled using a PID algorithm.

P = Proportional (gain):

- Used to adjust the fan speed action in direct proportion to the difference between the control setpoint and the process variable (SP - PV = error). The proportional term is a unitless quantity and is used for coarse adjustment. This setpoint should be set to the lowest value that gives adequate control system response. Increasing the proportional setting increases the control system's sensitivity to small process fluctuations and the tendency to hunt.

I = Integral (reset):

- Used to adjust the capacity control action, integrating the error over time, to account for a small error that has persisted for a long time. This quantity is used for fine adjustment. This setpoint is used to smooth out process variations. This setpoint should be set high enough to prevent hunting but not too high or it will cause control system overshoot.

D = Derivative (rate):

- Used to adjust the capacity control action, accounting for how fast the error is changing, positively or negatively.

Maximum Speed:

- This setpoint defines the percentage maximum speed for the Remote Oil Cooler VFD Fan to run for the continuous step delay time to increase the Remote Oil Cooler steps. E.g. let's say setpoint is kept at 95%. Then the Remote Oil Cooler VFD fan will have to run at a speed of 95% or more to advance to the next step. The Maximum Speed can be set as 100%, which is when the analog output (at which the Remote Oil Cooler VFD fan is connected) reaches 20mA in its normal range of 4-20mA.

Minimum Speed:

- This setpoint defines the percentage minimum speed for the Remote Oil Cooler VFD Fan to run for the continuous step delay time to decrease the Remote Oil Cooler steps. E.g. let's say setpoint is kept at 5%. Then the Remote Oil Cooler VFD fan will have to run at a speed of 5% or less to advance to the next step. The Minimum Speed can be set as 0%, which is when the analog output (at which Remote Oil Cooler VFD fan is connected) reaches 4mA in its normal range of 4-20 mA.

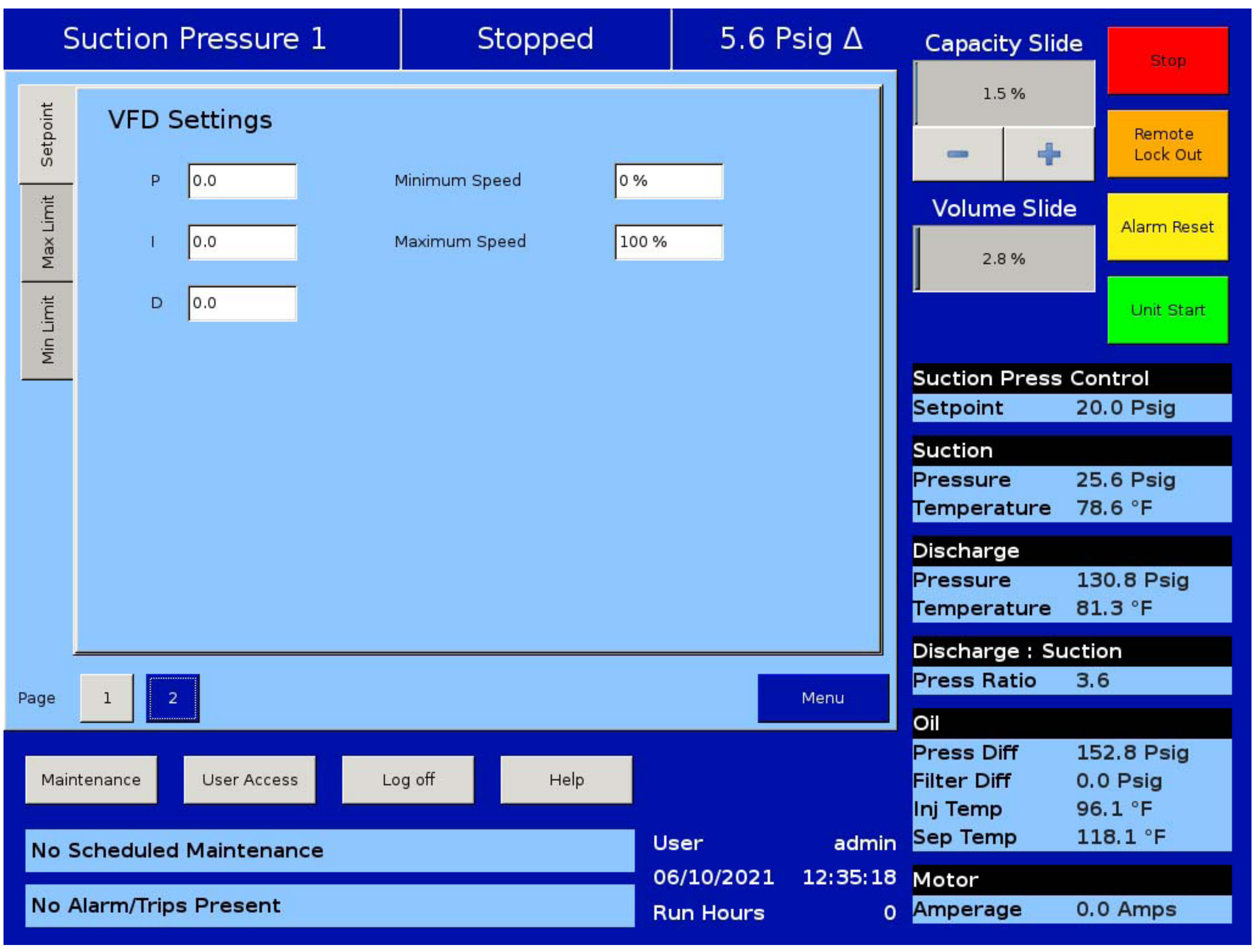


Figure 26-2. Remote Oil Cooler VFD Screen (Page 2)

How to Read a Parts List and Illustration

A parts list may consist of the following information:

- Item No.
    - Item number associated with the number shown in the parts illustration.
- Description
    - A description of the item.
- VPN
    - VPN stands for Vilter™ Part Number.

In the associated illustration, Item numbers are listed in a 11 o'clock format to make finding easier.

Sub assemblies are noted by "." periods. For example, VPN 35197A is a sub assembly of VPN 1833G:

Description	VPN
FILTER, OIL (INCLUDES VPN 35197A)	1833G
.GASKET, OIL FILTER COVER	35197A

Since the Oil Filter Cover Gasket (VPN 35197A) is part of the Oil Filter (VPN 1833G), ordering the Oil Filter (VPN 1833G) will also include the Oil Filter Cover Gasket. Also note that the Oil Filter Cover Gasket can be ordered separately.

Vilter™ Aftermarket Parts Contact Information

Phone 1-800-862-2677
Fax 1-800-862-7788
E-mail Parts.Vilter@Copeland.com
Website Copeland.com/Vilter or Vilter.com

Vission 20/20 - Main Enclosure Electrical Components

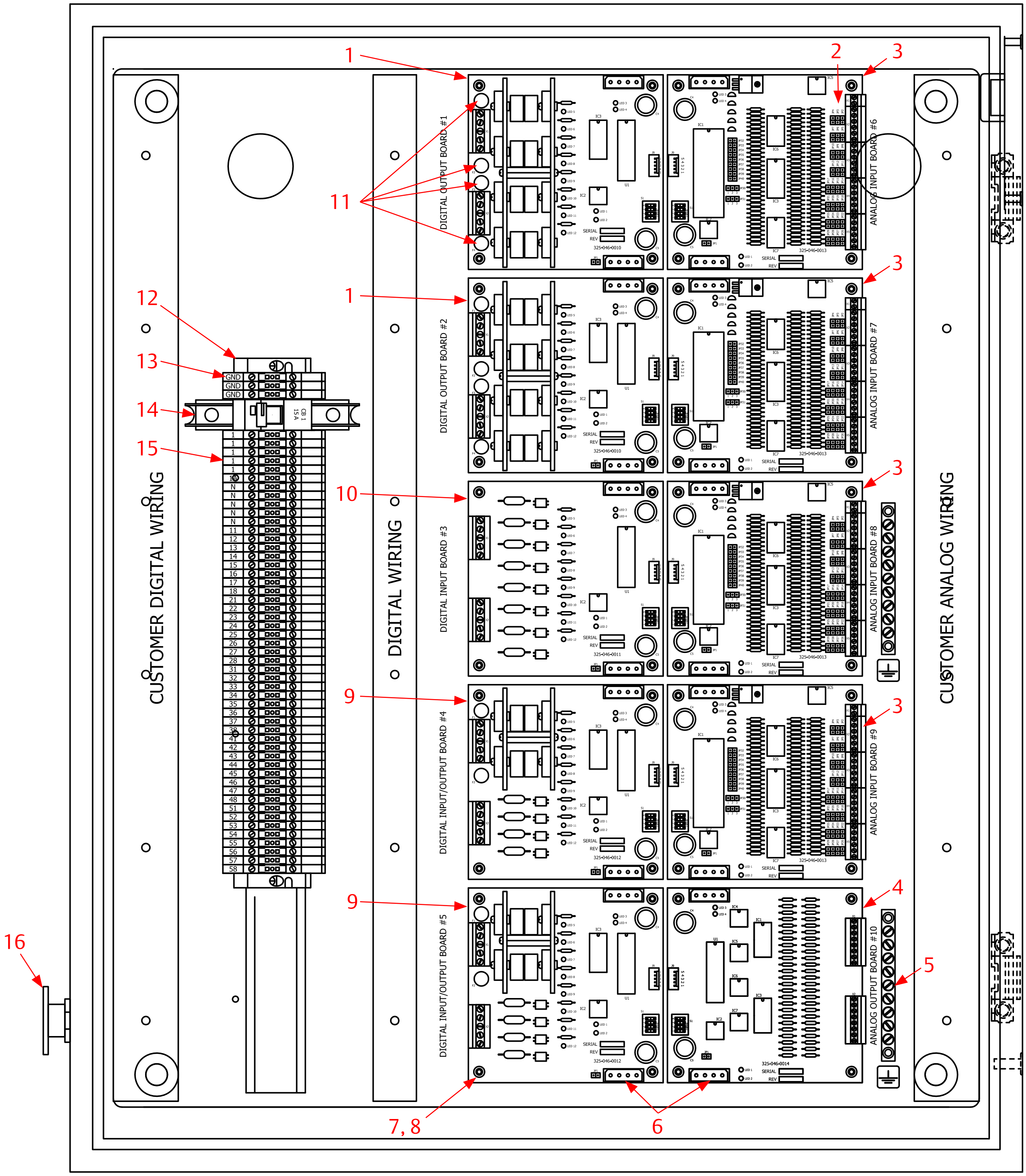


Figure 27-1. Vission 20/20 - Main Enclosure Electrical Components

Table 27-1. Vission 20/20 - Main Enclosure Electrical Components

Item No.	Description	VPN
1	DIGITAL OUTPUT BOARD – 8 OUTPUTS	3485DE8
2	PIN JUMPERS-BERG TYPE. RED. BAG OF 100.	3485PJ
3	ANALOG INPUT BOARD – 8 INPUT	3485A8
4	ANALOG OUTPUT BOARD – 8 OUTPUTS	3485AE8
5	GROUND BAR_11 HOLES, 9 CIRCUIT	3485GB
6	CABLE – JUMPER BOARD TO BOARD	3485X
7	STANDOFF #6X6/32X3/4” STEEL METAL HEX	3485SP
8	SCREW 6-32NCX3/8 MACHINE RD HD GALV	2078B
9	DIGITAL INPUT/OUTPUT BOARD – 4 INPUT AND 4 OUTPUT	3485D4
10	DIGITAL INPUT BOARD – 8 INPUTS	3485D8
11	FUSE PACK CONSISTING OF 4-WICKMANN TR5 SUBMINATURE FAST ACTING 370 SERIES 6.3 AMPS 250V	3485F
12	TERMINAL END BLOCK_SMALL_EW 35 DIN	3485TEB
13	TERMINAL BLOCK_GROUND_CPE, DECA DIN	3485TBG
14	CIRCUIT BREAKER – ABB 15AMP-SINGLE POLE	3485V
15	TERMINAL BLOCK_CDU 2.5, DECA DIN	3485TB
16	EMERGENCY STOP SWITCH W/ 1NO, 1NC (ABB CE4P-10R-11)	3485H

Vission 20/20 - Door Interior Components

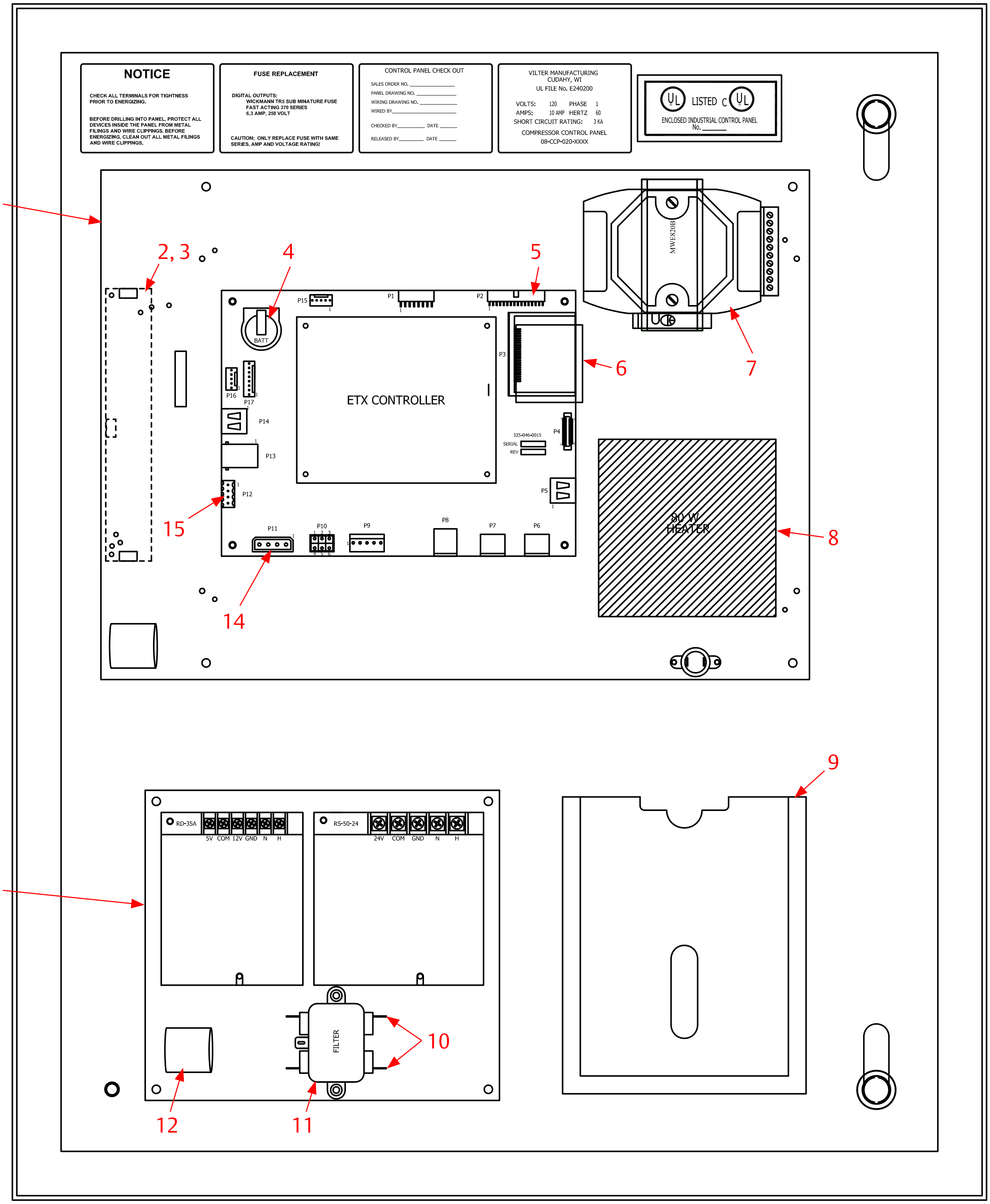


Figure 27-2. Vission 20/20 - Door Interior Components

Table 27-2. Vission 20/20 - Door Interior Components

Item No.	Description	VPN
1.1	SBC ASSEMBLY W/FLASHCARD, LINUX OS, 15"XGA INDOOR DISPLAY, INVERTOR BOARD, ATOM CPU, BASEBOARD, MEMORY CARD.	See Figure 27-3
1.2	SBC ASSEMBLY W/FLASHCARD, LINUX OS, 15"XGA OUTDOOR DISPLAY, INVERTOR BOARD, ATOM CPU, BASEBOARD, MEMORY CARD.	See Figure 27-3
2.1	INVERTER BOARD CCFL W/ PWM DUAL INDOOR (ZIPPY)	3485ED
2.2	INVERTER BOARD CCFL W/ PWM DUAL INDOOR (ERG)	3485EDG
2.3	INVERTER BOARD CCFL W/ PWM QUAD OUTDOOR (ZIPPY)	3485EQ
3.1	CABLE – CCFL ZIPPY INDOOR HARNESS	3485WDH
3.2	CABLE – CCFL (ERG) INDOOR HARNESS	3485WDHG
3.3	CABLE – CCFL ZIPPY OUTDOOR HARNESS	3485WQH
4	BATTERY 3 VOLT 20/20 CNTRL PANEL	3485MCB
5	CABLE – DISPLAY TO INTERFACE BOARD	3485W
6	FLASH CARD, 2GB	3485FC
7	USB TO SERIAL CONVERTER	3485C
8	PANEL HEATER ASSEM. (CAN BE ADDED TO ANY PANEL) HEATER, THERMOSTAT & HARNESS ASSEMBLY	3485PH
9	20/20 CABINET DOOR POCKET	3485DP
10	CABLE -VISSION AC FILTER/PS/HEATER HARNESS	3485WVH
11	QUALTEK EMI FILTER, 5A	3485EMF
12	FERRITE BEAD CORE	3485FBC
13	POWER SUPPLY (DUAL) ASSEMBLY ON MOUNTING PLATE W/ WIRING HARNESS	3485K
14	CABLE – CPU TO I/O POWER/COMM CABLE	3485WC
15	ISOLATOR MODBUS RTU	3485C1

Vission 20/20 - SBC Assembly

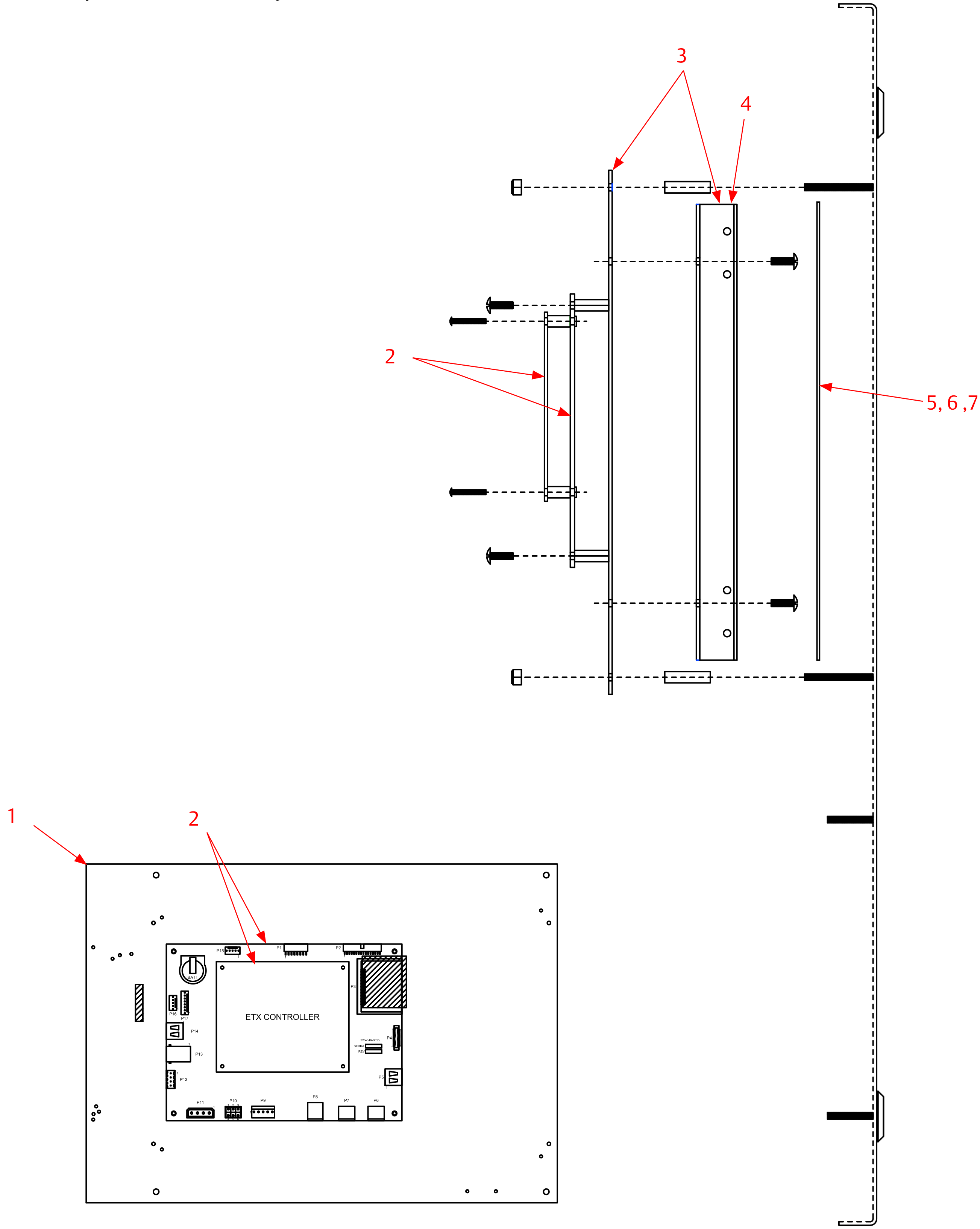


Figure 27-3. Vission 20/20 - SBC Assembly

Table 27-3. Vission 20/20 - SBC Assembly

Item No.	Description	VPN
1.1	SBC ASSEMBLY W/FLASHCARD, LINUX OS, 15"XGA INDOOR DISPLAY, INVERTOR BOARD, ATOM CPU, BASEBOARD, MEMORY CARD.	3485MLA
1.2	SBC ASSEMBLY W/FLASHCARD, LINUX OS, 15"XGA OUTDOOR DISPLAY, INVERTOR BOARD, ATOM CPU, BASEBOARD, MEMORY CARD.	3485MLQA
2	.ATOM CPU ASSEMBLY, BASEBOARD, MEMORY CARD	3485MCA
3.1	.DISPLAY ASSEMBLY (LESS CPU BOARD), 15"XGA INDOOR DISPLAY, MOUNTING PLATE, INVERTER BOARD, DISPLAY AND INVERTER HARNESSES.	3485MDA
3.2	.DISPLAY ASSEMBLY (LESS CPU BOARD), 15"XGA OUTDOOR DISPLAY, MOUNTING PLATE, INVERTER BOARD, DISPLAY AND INVERTER HARNESSES.	3485MDQA
4.1	..DISPLAY BACKLIGHT (INDOOR)	3485DLD
4.2	..DISPLAY BACKLIGHT (OUTDOOR)	3485DLQ
5	.REPAIRED RESISTIVE TOUCHSCREEN, 15" 8 WIRE DAWAR	3485JR
6	.RESISTIVE TOUCHSCREEN, 15" 8 WIRE DAWAR	3485J
7	.TAPE TO SECURE TOUCHSCREEN TO DOOR	3485JT

Warranty Claim Processing:

Process for returning Products covered by the warranty:

STEP 1. To return a defective Product or part under this warranty, you will need to provide the Vilter™ compressor order number on all submitted documents.

For a parts warranty request, you will also need to provide:

- The Vilter™ serial number of the compressor;
- A detailed and accurate description of the issue;
- A valid purchase order for the new part(s)—you must pay the freight;
- One copy of Return Merchandise Authorization (RMA) sent to you for your records;
- One copy of RMA sent to you to include in the return shipment of parts back to Vilter™ for warranty consideration.

STEP 2. Return the parts (freight prepaid) to:

VILTER MANUFACTURING CORPORATION
5555 South Packard Avenue
Cudahy, WI 53110-8904

STEP 3. Upon receipt of the returned part(s), Vilter™ will complete a timely evaluation of the part(s).

STEP 4. You will be contacted with Vilter's decision once the final report is completed.

STEP 5. If approved, the approved warranty will be credited (excluding freight) to your account. Vilter™ will retain the returned part(s) for final disposition. If a warranty request is not approved, you will be provided with a written response and the parts will be held for 30 days. After such time, Vilter™ will dispose of the parts. If you wish to have the part(s) returned, you will need to contact Vilter™ and the part(s) will be returned freight collect.

Procedure for parts not manufactured by Vilter™:

Although Vilter™ does not provide any warranty for parts and products that are not manufactured by Vilter™, Vilter™ does pass through any manufacturer's warranty to you (to the maximum extent permitted by the manufacturer). Vilter™ will work with you in facilitating your warranty claim with the manufacturer.

To facilitate your warranty claim, please follow the following four steps:

STEP 1. Determine if the part or product is within the OEM's warranty.

STEP 2. If it is a general part warranty request, complete the form on the next page and send it to

Parts.Vilter@Copeland.com

If it is an equipment warranty request, complete the form on the next page and send it to

Service.Vilter@Copeland.com.

If the item in question is a motor or starter, please take a photo of the data plate and send it in with the equipment warranty request.

In the case of motors specifically, the motor will need to be pulled and taken to a local approved repair shop for diagnosis. Vilter™ can assist in locating appropriate motor shops in your area. Once there, the shop will determine the cause of failure and then work with the motor manufacturer on determining warranty coverage.

STEP 3. Vilter™ will communicate with you, if necessary, to ascertain additional information and will reasonably assist with the OEM to determine the part/product's warranty status.

COPELAND

VILTER™

To be filled out by Vilter Administrator:

RMA #:

Submitted by: ______________________

____

General Warranty Claim Tag

To facilitate your warranty claim, please follow the steps outlined below:

Please complete the following and return to Service.Vilter@Copeland.com, along with any pictures or additional information.

Company Name: ______________________

Contact Phone/Email: ______________________

Ship To (Name/Address): ______________________

SO #: ______________________

Part #: ______________________

Serial #: ______________________

Customer P.O#: ______________________

Please send a valid purchase order for the replacement parts(s)

When did it happen:

- ☐ During Shipment
- ☐ After _______ hours running
- ☐ Initial Startup
- ☐ Other: ____________

Equipment affected:

- ☐ Screw
- ☐ Recip
- ☐ Starter Control
- ☐ Controller
- ☐ Motor
- ☐ Other: __________

Startup or intallation Date:

_____/_____/_____
Month Day Year

Reported Date:

_____/_____/_____
Month Day Year

This form must be completed and any technical reports and/or pictures attached when sending in your warranty claim.

Detailed Description of Issue (Mandatory)

Upon receipt of the returned part(s), Vilter Manufacturing will complete a timely evaluation of the part(s). You will be contacted with Vilter's decision once the final report is completed.
Approved warranty will be credited (excluding freight) to your account. Vilter Manufacturing will retain the returned part(s) for final disposition.
If warranty is not approved, you will be provided with a written response and the parts will be held for 30 days. After such time, Vilter will dispose of them. If you wish to have the part(s) returned, you will need to contact Vilter and the part(s) will be returned freight collect.

Warranty claims are pursuant to Vilter's standard terms and conditions of sale.
Labor charges for repairs and freight charges for new part(s) and returned part(s) are not covered under warranty.
Customer PO is required for all replacement parts, freight and labor (includes: travel and expense).

Clear Form

Vission 20/20 Troubleshooting Guide

In the event of a problem with the Vilter Vission 20/20, the help screen, along with your electrical drawings will help determine the cause.

NOTICE

Before applying power to the Vission 20/20 control panel, all wiring to the panel should be per the National Electrical Code (NEC). Specifically check for proper voltage and that the neutral is grounded at the source. An equipment ground should also be run to the panel.

Table A. Vission 20/20 Troubleshooting Guide (1 of 3)

Problem	Solution
Vission 20/20 does not boot up, no lights in any of the boards	Check that 120VAC is run to circuit breaker CB1 located on the terminal strip. The neutral should be brought to any "N" terminal on the terminal strip.
	Check that circuit breaker CB1's switch is in the ON position.
	Use a voltmeter to insure 120VAC is being applied to the power supply, located on the door. If all of the above are OK, the power supply may be bad. To test the power supply, check DC voltages at the power supply output. If proper voltages are not found at these test points, the power supply may be faulty.
Vission 20/20 appears to have booted, lights are lit on the boards, but no touchscreen display is evident	Remove power COMPLETELY from the Vission 20/20 and restart the controller. **WARNING** **The inverter board creates a high rms voltage to drive the backlight - it can exceed 1500VAC. Use extreme caution and insure that voltage has been removed from the board before physical inspection. Visually check cable connections located on the LCD inverter board. This board is located inside the door on the LCD touch screen back plane next to the single board computer. Physically inspect board to insure that all cable connectors are connected tightly to the board connectors. If these are inserted correctly, the problem could be a bad LCD inverter board or a component failure.**
	Check the flash card's socket

Table A. Vission 20/20 Troubleshooting Guide (2 of 3)

Problem	Solution
The panel is taking a long time to boot and start, sometimes doesn't start at all	See solutions for "Vission 20/20 does not boot up, no lights in any of the boards"
	Check the flash card's socket
	Check the battery's main board socket
	Check the I/O board cable connectors
Blue or white screen at boot up	Reboot the Vission 20/20
	Change the flashcard (part number 3485FC)*
The screen is black	Reboot the Vission 20/20
	Check the 5 and 12 VDC. If the wrong voltage is detected, adjust the potentiometer. If this doesn't fix the problem, replace it. The part number of the power supply is 3485K
	If the touchscreen is indeed bad, replace it with part number 3485J
The screen is unresponsive or slow to touch	If it's slow, make sure the Trending graph is turned off.
The on-screen cursor doesn't follow the user's finger	Recalibrate the touchscreen, go to Configuration page 2, click on the Calibrate button. The calibration mode requires the operator to touch the four corners of the touchscreen and then the accept button.
Vission 20/20 boots up but all data temperatures and pressures are zeroed and do not update.	Check analog board jumpers to make sure proper node addresses are set up on all boards. Physically inspect power and communication jumper cables to make sure they are inserted properly and completely. Two LEDs on all boards show the status of the communications for the board. LED1 is on when a command is received at the board from the single board computer (SBC), and LED2 is on when a response is sent from the board to the SBC.

Table A. Vission 20/20 Troubleshooting Guide (3 of 3)

Problem	Solution
I/O COMM Trip	Check that the digital and analog boards are selected on Page 6 of the Configuration screen.
	Check that the dipswitches are correctly closed on the board. Open and close them to make sure they are making contact.
	Check that cables are snug on the boards
	Check the "Event List" to see which board is coming up as non-responsive, and replace it
I can't login with the ADMIN username	Use the Vilter App to create a new temporary password. You will need the serial number and date from the "Version" screen (inside the Help screen). The user name for the temporary password is Vilter
An option within configuration cannot be selected	Check Configuration page 6 to see if the board that this option belongs to is selected. Also, make sure that the board is actually installed.
Corrupted program	Write down your settings, or make sure you have created a .csv file with them. Go to "Data Backup" and choose "Migrate/Reset". After the factory reset you can re-enter/load your settings.
The control method being used is not working.	Go to Configuration page 1 and make sure the correct method is selected in the "Active Remote Control" box
The date goes back to 1/1/2002 when the panel reboots	The 5V DC battery on the processor is not connecting properly to the socket handle. Remove the battery and pull out the handle in the socket so the battery fits snugly .
The compressor doesn't start, even if the pressure is above the setpoint	There's an active trip. Read the screen
	Setpoint 2 is active, and setpoint 1 is not.
	The slides' position is above 5%. Check the actuator to make sure there isn't an active alarm on it
Capacity or volume on-screen values are above 100 % or below 0 %	The slides moved beyond the software limits. Recalibrate the slides

Vission 20/20 Application Procedures

Contents

Vission 20/20 Pulldown Control Setup

Scope

Vission 20/20 programs – version 1.6.4550.1 and later.

Pulldown

The Pulldown feature provides a method to slowly pull down the suction pressure from a high value, by slowly lowering the suction pressure control setpoint over a time period. This feature is sometimes required on systems that have liquid recirculation systems. On these systems, if the suction pressure is pulled down too fast, the pumps can cavitate causing vibration and damage to the pumps. By slowly lowering the suction pressure setpoint the suction pressure can be slowly lowered preventing liquid recirculation pump cavitation. Pulldown is also to be used for new plant startups. Pulling the suction pressure (and resultant temperature) of new buildings down too quickly can cause structural damage, so limiting the suction pressure Pulldown rate will prevent this, allowing time to de-humidify the rooms as the temperature in the rooms is pulled down.

Pulldown can only be activated when controlling in Suction Pressure Control mode (Setpoint #1).

NOTE

In new plant construction Pulldown applications, water freezing in the concrete will lead to structural damage. For new plant construction Pulldown applications, it is highly recommended that the Auto-Cycle be enabled while running Pulldown. During Pulldown, when the Suction Pressure Control setpoint is slowly lowered, the Auto-Cycle Start and Stop setpoints are also slowly lowered. The Auto-Cycle Stop setpoint will turn the compressor off should the suction pressure fall too fast. For additional safety, the Low Suction Pressure Alarm and Trip setpoints should also be set so that the suction pressure will not reach a point that can cause building damage due to water freeze.

Setup

The Pulldown section in the Compressor Control Menu provides;

- Selection to enable / disable the Pulldown process.
- Selection to initiate the Pulldown process at the next/ every compressor start.
- Step pressure defines the “steps” (in psig) in which the suction pressure setpoint is decremented.
- Delay per Step setting which defines how long the compressor will be controlled at the current suction pressure setpoint.
- Stop pressure setpoint defines the point at which the Pulldown function will stop operation. Normal compressor control will then resume, with the control setpoint being set to the Pulldown “Stop Pressure” setting.
- Auto-cycle Differential setpoint defines a differential above and below the Pulldown control setpoint. These points define the auto-cycle start and stop pressure setpoints.

Selections For Pulldown Section of Compressor Control Menu

(Reference Figure B-1).

Pulldown

- Enables access to Pulldown control setpoints. Uncheck the box to disable the Pulldown setpoints.

Initiate Pulldown at Next Start

- Enables the Pulldown feature only on next compressor start.

Initiate Pulldown at Every Start

- Enables the Pulldown feature on every compressor start.

Step Suction Pressure

- This setpoint defines the step increments which the suction pressure will be controlled at.

Suction Pressure Delay Per Step

- Defines the time increment at which the compressor will be controlled for each step.

Stop Suction Pressure

- Pressure at which the Pulldown feature is deactivated. After Pulldown has completed, the suction pressure setpoint will remain at this setting and the compressor will continue to control at this pressure.

Auto Cycle Start Suction Pressure Offset

- This setpoint defines the offset value for the Pulldown Auto Cycle Start value from the Pulldown Control setpoint. The Pulldown Auto-Cycle Start Suction Pressure is the Pulldown Control Setpoint + Auto Cycle Start Suction Pressure Offset.

Auto Cycle Stop Suction Pressure Offset:

- This setpoint defines the offset value for the Pulldown Auto Cycle Stop value from the Pulldown Control setpoint. The Pulldown Auto-Cycle Stop Suction Pressure is the Pulldown Control Setpoint - Auto Cycle Stop Suction Pressure Offset.

Setpoint Selection Example

The following example is to illustrate the selection of setpoints for the Pulldown feature. The values picked are NOT representative of actual field applications.

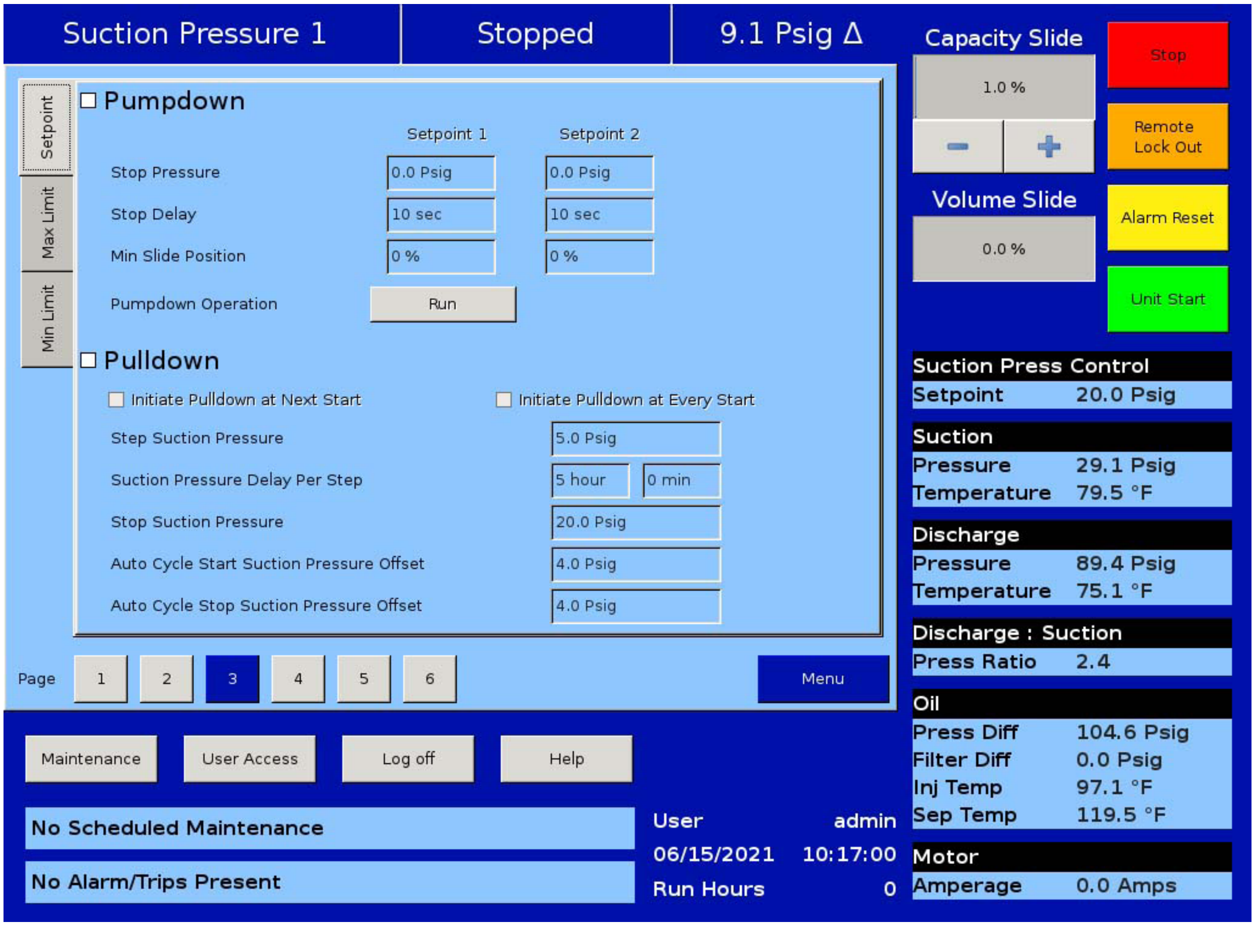


Figure B-1. Pulldown Setpoints

Assumptions and Variables:

- Current suction pressure is at 80 psig
- Target suction pressure is 20 psig. (This defines a change of 60 psig).
- Time duration allowed to get to setpoint is 10 days (240 hours) of Pulldown time.
- Suction pressure change allowed for each step is 5 psig.

To calculate the Delay Per Step setpoint:

Number of Pulldown Steps = Delta 60 psig change * 1 step/5 psig = 12 steps

Delay per step = 240 hours / 12 steps = 20 hours/step

So, for the first 20 hours the compressor runs at 75 psig, then for the next 20 hours at 70 psig, then for the next 20 hours at 65 psig, and so forth.

After the 12th step (running at 25 psig), 240 hours will have elapsed, and the new setpoint changes to 20 psig. After the Pulldown setpoint equals or is less than the control setpoint, the Pulldown feature disables itself.

Pulldown Operation Example

Assumptions:

- Compressor is off
- Pulldown is selected
- “Initiate Pulldown at Next Start” is selected
- Current suction pressure = 80 PSIG
- Auto-cycle setpoints are enabled
- Pulldown setpoints are setup per the Setpoint Selection Example

Variables:

- Step Suction Pressure = 5.0 PSIG
- Suction Pressure Delay Per Step = 20 hours
- Stop Suction Pressure = 20 PSIG
- Auto-Cycle Start Suction Pressure Offset = 4 PSIG
- Auto-Cycle Stop Suction Pressure Offset = 4 PSIG

Operator presses Unit Start Auto button and the compressor starts. Two items occur:

- **The Pulldown feature is now operational**
    - When Pulldown feature is activated:
        - Pumpdown is disabled (Pulldown and Pumpdown operation modes are mutually exclusive).
        - Low Suction Pressure Stop Load and Unload setpoints are active (Make sure that these setpoints do not conflict with the Pulldown Stop setpoint).
- **The Pulldown setpoints are immediately calculated:**

Initial Pulldown setpoint = Current Suction Pressure 80 psig minus Step pressure (5 psig) = 75 psig.

Auto-cycle Start pressure = Pulldown setpoint (75 psig) plus Auto-Cycle Start Suction Pressure Offset (4 psig) = 79 psig.

Auto-cycle Stop pressure = Pulldown setpoint (75 psig) minus the Auto-cycle Stop Suction Pressure Offset (4 psig) = 71 psig.

The compressor will maintain the suction pressure at 75 psig for the first 20 hours, and then the next calculation of Pulldown setpoints will be calculated:

Subsequent Pulldown setpoint = Suction Pressure setpoint (75 psig) minus Step Suction Pressure (5 psig) = 70 psig.

Auto-Cycle Start Pressure = Pulldown setpoint (70psig) plus Auto-Cycle Start Suction Pressure Offset (4 psig) = 74 psig.

Auto-Cycle Start Pressure = Pulldown setpoint (70 psig) minus Auto-Cycle Stop Suction Pressure Offset l(4 psig) = 66 psig.

After 20 hours of running at 70 psig, the next set of Pulldown setpoints are calculated. This is repeated until the target setpoint (Stop Pressure setpoint) is reached. The Pulldown operation is then disabled and the compressor will continue to operate at this setpoint.

Vission 20/20 Compressor Control Setpoints Setup

Scope

Vission 20/20 programs – version 1.6.4550.1 and later.

Compressor Setpoint #1 and Setpoint #2

The Vission 20/20 allows for multiple control setpoints. This can be utilized for night time or weekend setpoint adjustment in cold storage facilities or when a compressor is being used in a swing application, where it swings between booster and high stage operation. Setpoint 1 can be setup to operate as a booster compressor and Setpoint 2 can be setup to operate the compressor to meet the high stage setpoint.

Setup

The configuration screen must first be setup to enable two setpoints, see Figure B-2.

To enable the two setpoint operation, do the following:

- In the section "Compressor Control", enter "2" for each control in the "# Controllers" box.

Compressor Control Setpoints

Navigate to the Compressor Control screen and enter in the desired control setpoints for both Setpoint 1 and Setpoint 2.

Log in to set up both Setpoint 1 and Setpoint 2 as shown in Figure B-3. The load and unloading response of the compressor for both setpoints can also be changed. This will be useful when the compressor is operating between a high stage and booster application.

Set up the "Load Limit" setpoints at different settings when operating the compressor between a high stage and booster application as shown in Figure B-4.

Control Mode Drop-Down Box

In Figure B-4, the Control Mode drop-down box allows selection of the active setpoints.

To change from Setpoint 1 to Setpoint 2 being the active setpoint, do the following:

- Select the Control Mode drop-down box, and then select Setpoint 2.
  - This can be done when the compressor is off or running.

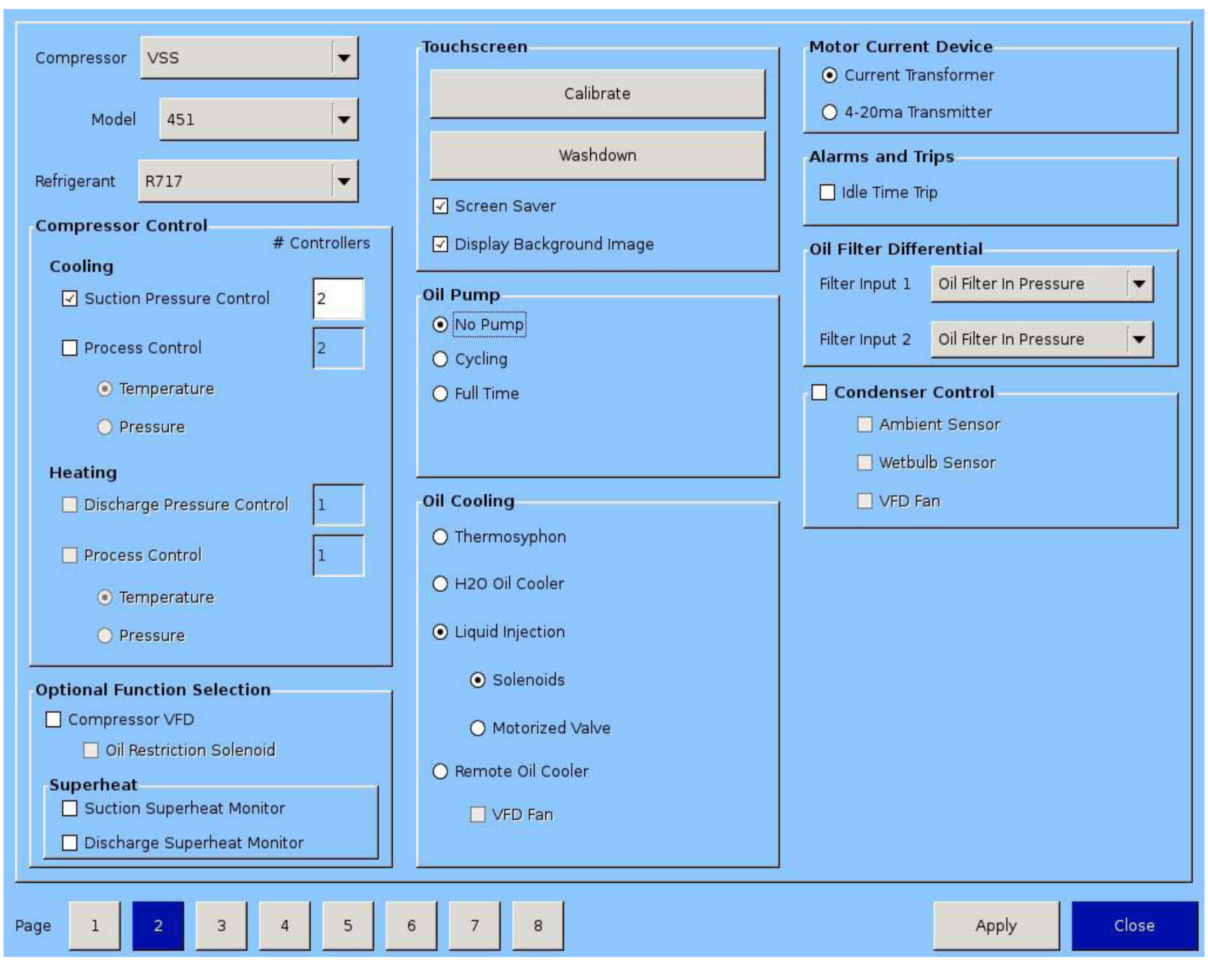


Figure B-2. Configuration Screen (Page 2) - Two Setpoint Operation Setup

Figure B-3. Compressor Control Setpoint 1 and Setpoint 2 Setup

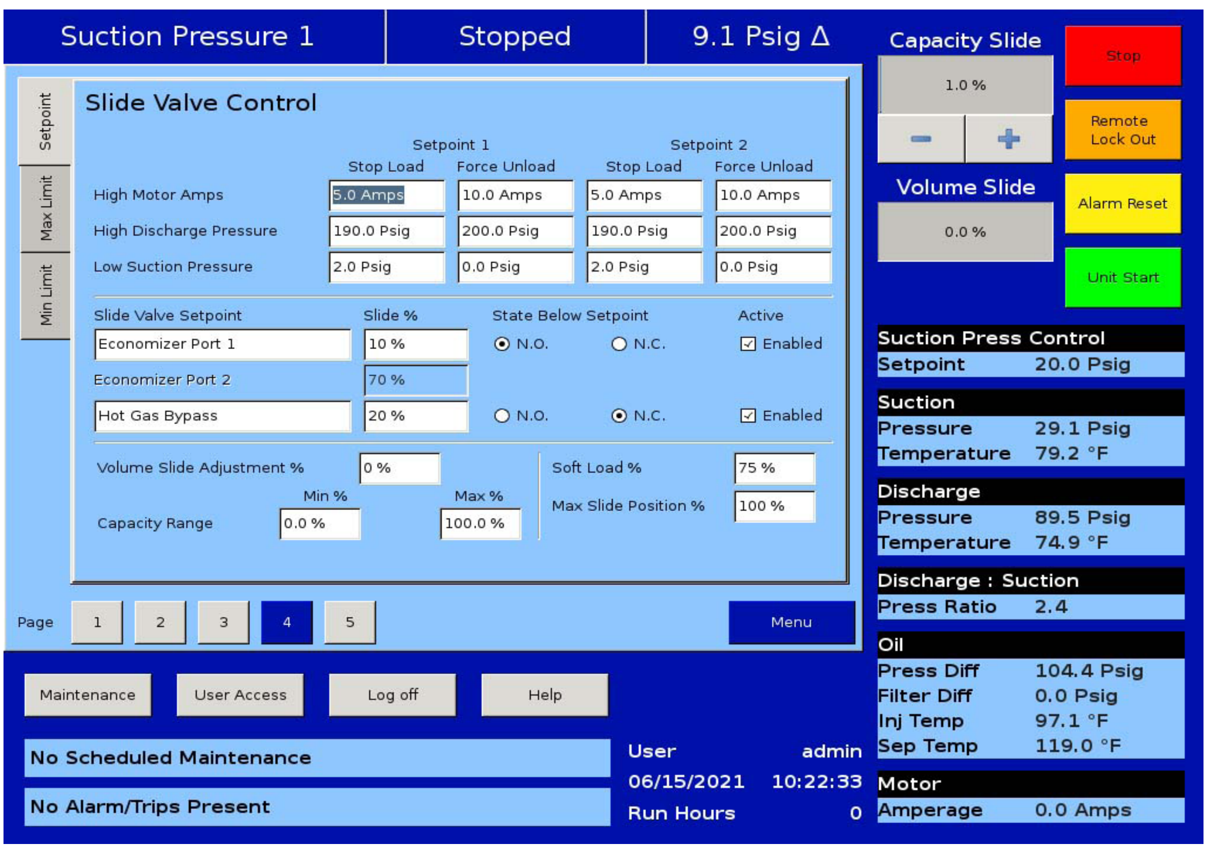


Figure B-4. Compressor Control Load Limit Setpoint 1 and Setpoint 2 Setup

CAUTION

Please be aware that changing the active setpoint while the compressor is running could end up shutting the compressor off. A control setting (i.e. Auto-Cycle Stop setpoint Low Suction Pressure trip setpoint) may shut the compressor down as soon as you make the switch depending upon the setting of the new active setpoint.

Safety Setpoints

In Figure B-5, the Alarm and Trip Safety setpoints also have Setpoint 1 and Setpoint 2 settings. These should be set up for proper operation when operating.

Direct I/O Operation and Setpoint 1 and Setpoint 2 Selection

If the compressor is being operated in Direct I/O mode, then the selection of the active setpoint is accomplished from an input module. Reference the wiring diagram to identify the module. The Setpoint 1 / Setpoint 2 selection module will be recognized when the compressor is placed in REMOTE mode (by pressing the Unit Start button and then the Remote button). When the input module is energized, then Setpoint 2 is active. De-energizing the module places the Vission 20/20 control panel into Setpoint 1 mode.

Serial or Ethernet Operation and Setpoint 1 and Setpoint 2 Selection

Refer to Appendix D, Vission 20/20 Communication Table, for register information(Command No 40508) for setting the active setpoint.

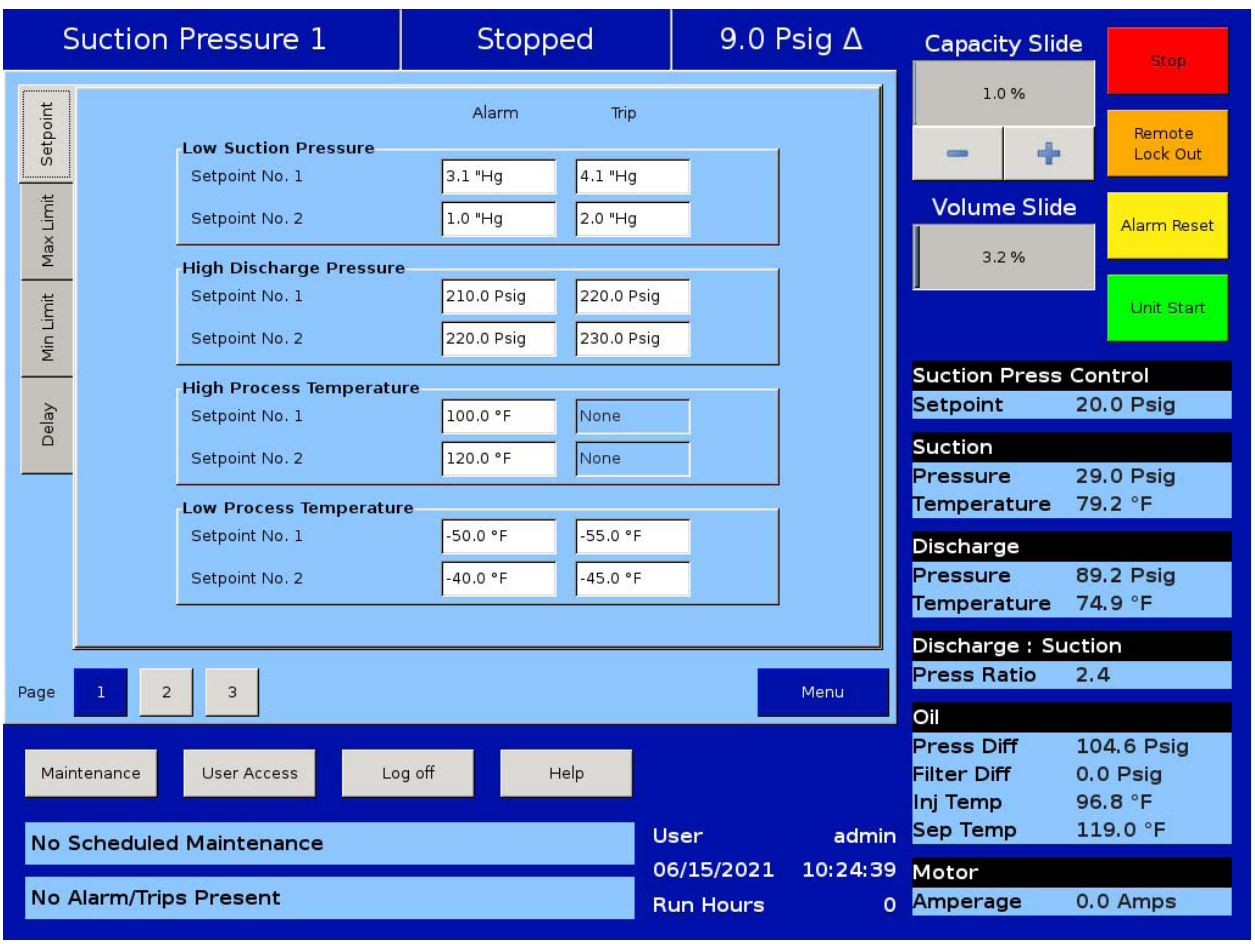


Figure B-5. Alarm and Trip Safety Setpoints for Setpoint 1 and Setpoint 2

Continuous VI Example

Setup:

Compressor - VRS

Refrigerant – R717

Suction Pressure Control Setpoint = 2 psig

VI Control Method - Continuous VI

Time Interval = 20 sec

Min VI = 2.2 (0%)

Max VI = 5.0 (100%)

Deadband = 0.4

Capacity Min Limit = 150mV

Capacity Max Limit (Max VI) = 3910mV

Capacity Max Limit (Min VI) = 4850mV

Start Compressor in Auto Run Mode.

Discharge Pressure = 160 Psig

Scenario 1:

Adjust Suction Pressure = 54 Psig

Calc VR= 2.0

Capacity = 100% (4850mV)

Volume = 0%

Scenario 2:

Adjust Suction Pressure = 40 psig

Calc VR = 2.5

Capacity = 100% (4850mV)

Volume = 0%

Scenario 3:

Adjust Suction Pressure = 35 psig

Calc VR: 2.7

Capacity = 100% (4682.14mV)

Volume = 17.85%

Scenario 4:

Adjust Suction Pressure = 26 psig

Calc VR: 3.2

Capacity = 100% (4514.28mV)

Volume = 35.71%

Scenario 5:

Adjust Suction Pressure = 18 psig

Calc VR: 3.6

Capacity = 100% (4380.00mV)

Volume = 50%

Scenario 6:

Adjust Suction Pressure = 13 psig

Calc VR: 4.2

Capacity = 100% (4178.57mV)

Volume = 71.42%

Scenario 7:

Adjust Suction Pressure = 7 psig

Calc VR: 5.0

Capacity: 100% (3910.00mV)

Volume = 100.00%

Scenario 8:

Suction Pressure = 9 psig

Calc VR: 4.7

Volume = 100.00%

Capacity: 100% (3910.00mV)

Scenario 9:

Suction Pressure = 10 psig

Calc VR: 4.6

Volume = 85.71%

Capacity: 100% (4060.00mV)

Scenario 10:

Suction Pressure = 29 psig

Calc VR: 2.9

Volume = 25.00%

Capacity: 100% (4602.00mV)

Scenario 11:

Suction Pressure = 54 Psig

Calc VR= 2.0

Volume = 0%

Capacity = 100% (4850mV)

Step VI Example

Setup:

Compressor - VRS

Refrigerent – R717

Suction Pressure Control Setpoint = 2 psig

VI Control Method - Step VI

Time Interval = 20 sec

Step 1 = 2.2

Step 2 = 3.5

Step 3 = 5.0

Capacity Min Limit = 150mV

Capacity Step 3 Max Limit = 3440mV

Capacity Step 2 Max Limit = 4145mV

Capacity Step 1 Max Limit = 4850mV

In this example the average of Step 1 and Step 2 will be 2.85 and the average of Step 2 and Step 3 will be 4.25. So the VI values from 2.2 to 2.85 will be considered as Step 1 VI, from 2.86 to 4.25 as Step 2 and more than 4.25 will be considered as Step 3. The step for step VI will not change till the VI value does not go beyond the average of two steps. There is hysteresis of 0.1.

Start Compressor in Auto Run Mode.

Discharge Pressure = 160 Psig

Scenario 1:

Adjust Suction Pressure = 54 Psig

Calc VR= 2.0

Capacity = 100% (4850mV)

Low VI Digital Output = ON

High VI Digital Output = OFF

Scenario 2:

Adjust Suction Pressure = 29 Psig

Calc VR= 2.9

Capacity = 100% (4850mV)

Low VI Digital Output = ON

High VI Digital Output = OFF

Scenario 3:

Adjust Suction Pressure = 28 Psig

Calc VR= 3.0

Capacity = 100% (4145mV)

Low VI Digital Output = OFF

High VI Digital Output = ON

Scenario 4:

Adjust Suction Pressure = 12 Psig

Calc VR= 4.3

Capacity = 100% (4145mV)

Low VI Digital Output = OFF

High VI Digital Output = ON

Scenario 5:

Adjust Suction Pressure = 11 Psig

Calc VR= 4.4

Capacity = 100% (3440mV)

Low VI Digital Output = OFF

High VI Digital Output = OFF

Scenario 6:

Adjust Suction Pressure = 7 Psig

Calc VR= 5.0

Capacity = 100% (3440mV)

Low VI Digital Output = OFF

High VI Digital Output = OFF

Scenario 7:

Adjust Suction Pressure = 13 Psig

Calc VR= 4.2

Capacity = 100% (3440mV)

Low VI Digital Output = OFF

High VI Digital Output = OFF

Scenario 8:

Adjust Suction Pressure = 14 Psig

Calc VR= 4.1

Low VI Digital Output = OFF

High VI Digital Output = ON

Capacity = 100% (4145mV)

Scenario 9:

Adjust Suction Pressure = 31 Psig

Calc VR= 2.8

Low VI Digital Output = OFF

High VI Digital Output = ON

Capacity = 100% (4145mV)

Scenario 10:

Adjust Suction Pressure = 34 Psig

Calc VR= 2.7

Low VI Digital Output = ON

High VI Digital Output = OFF

Capacity = 100% (4850mV)

Scenario 11:

Adjust Suction Pressure = 50 Psig

Calc VR= 2.2

Low VI Digital Output = ON

High VI Digital Output = OFF

Capacity = 100% (4850mV)

Hence we can see that when VI Control is in Step 1 then VI step will not get changed to Step 2 until the VI value goes beyond 2.95 (2.85 + 0.1). Similarly when VI Control is in Step 2 then VI step will not get changed to Step 1 until the VI value drops to 2.75 (2.85 – 0.1).

Similarly when VI Control is in Step 2 then VI step will not changed to Step 3 until the VI value goes beyond 4.35 (4.25 + 0.1). Similarly when VI Control is in Step 3 then VI step will not changed to Step 2 until the VI value drops to 4.15 (4.25 – 0.1)

Notes on Step VI Digital Outputs :

To position the volume slide – we need to use the two outputs designated for volume slide control for the single screw compressors – Digital Output board #1, outputs #5 and #6.

As per Table B-1, we need SV3 and SV4 ON at the same time to position the slide at 2.2 vi position. The table below shows the required states of the solenoids

The program of the digital output board #1 on the Vission 20/20 doesn't allow the volume "increase" and the volume "decrease" outputs (outputs #5 & #6) to be on at the same time. The program was written this way to protect the actuator motor on the single screw compressors.

So on the Twin Screw Compressors with 3 - Step VI Control, the above output states are achieved by redefining the Output states of #5 and #6 at Vol Ratio 2.2, and then use relay logic to achieve the required solenoid states.

Then, using relay logic – we wire the solenoids so that the states of the relays in Table B-2 will translate the states of the solenoids to match Table B-1.

Table B-1. Solenoid States Required For Positioning Volume Slide

	Vol Ratio 2.2	Vol Ratio 3.5	Vol Ratio 5.0
(SV3)	ON	OFF	OFF
(SV4)	ON	ON	OFF

Table B-2. Solenoid States Required For Positioning Volume Slide

	Vol Ratio 2.2	Vol Ratio 3.5	Vol Ratio 5.0
Output #5 (CR5)	ON	OFF	OFF
Output #6 (CR6)	OFF	ON	OFF

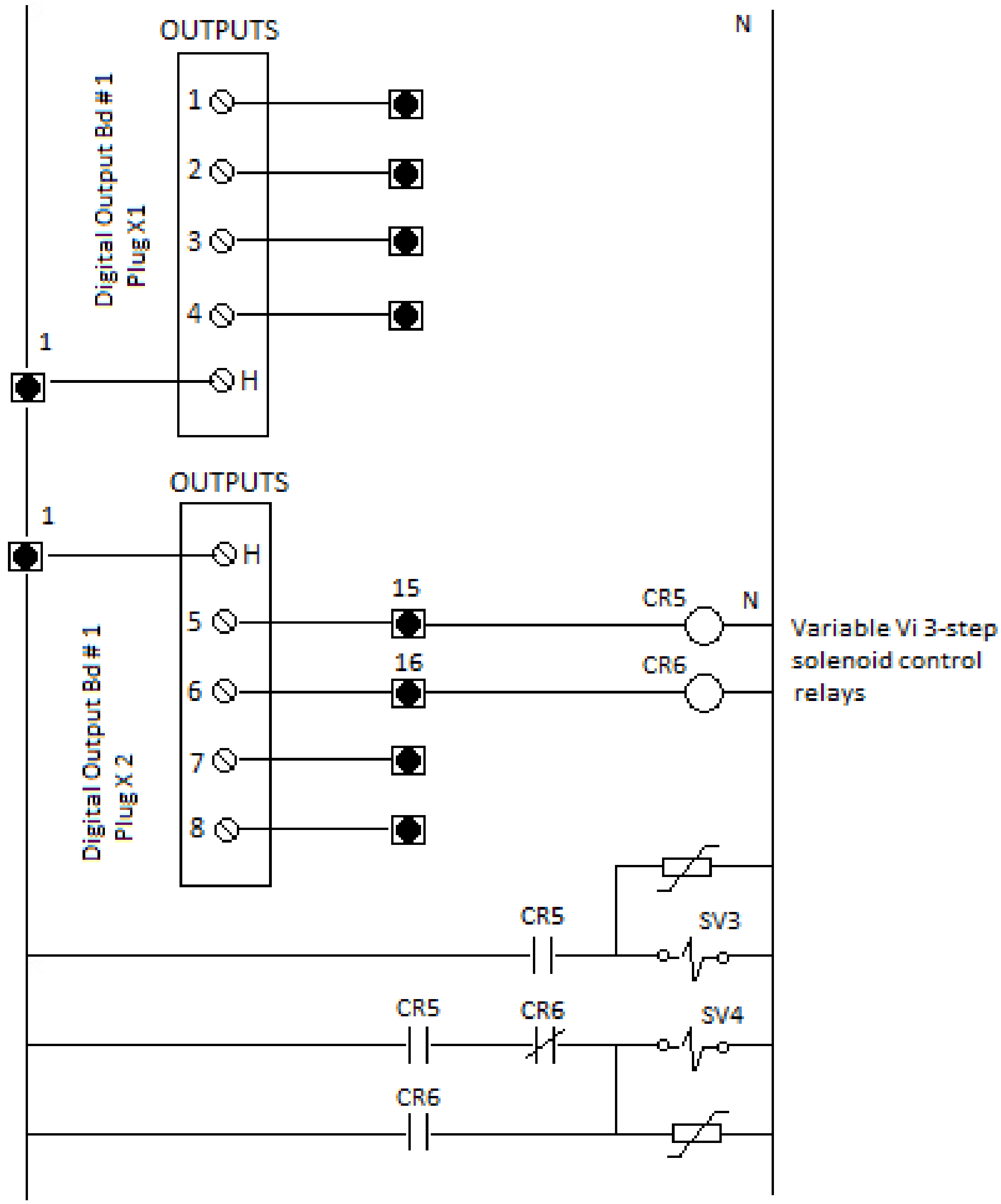


Figure B-6 Required relay logic / wiring to achieve Table B-1 solenoid states

Vission 20/20 Compressor Sequencing Setup

Scope

Vission 20/20 programs – version 1.6.4550.1 and later.

Overview

Compressor sequencing in the Vission 20/20 panel is carried out by utilizing the Ethernet communication port using Modbus TCP protocol. Future program releases will accommodate using the serial RS-485 Modbus RTU port. This will give the Vission 20/20 control panel the ability to sequence Vission control panels acting as Master Control. All legacy Vission panels will always act as slaves.

Compressor sequencing is accomplished by the master compressor, monitoring its own control parameter (either suction pressure, process temperature or discharge pressure). As its control parameter changes value, it will make decisions to start, stop, load and unload slave compressors as needed, to maintain the control setpoint which is defined in the master compressor sequencing screen.

NOTE

The master compressor will ALWAYS be priority #1 compressor – and act as the trim compressor. So this must be taken into account when deciding which compressor is to act as the master compressor.

The following discussion assumes that the physical Ethernet Network has been installed between all Vission 20/20 control panels.

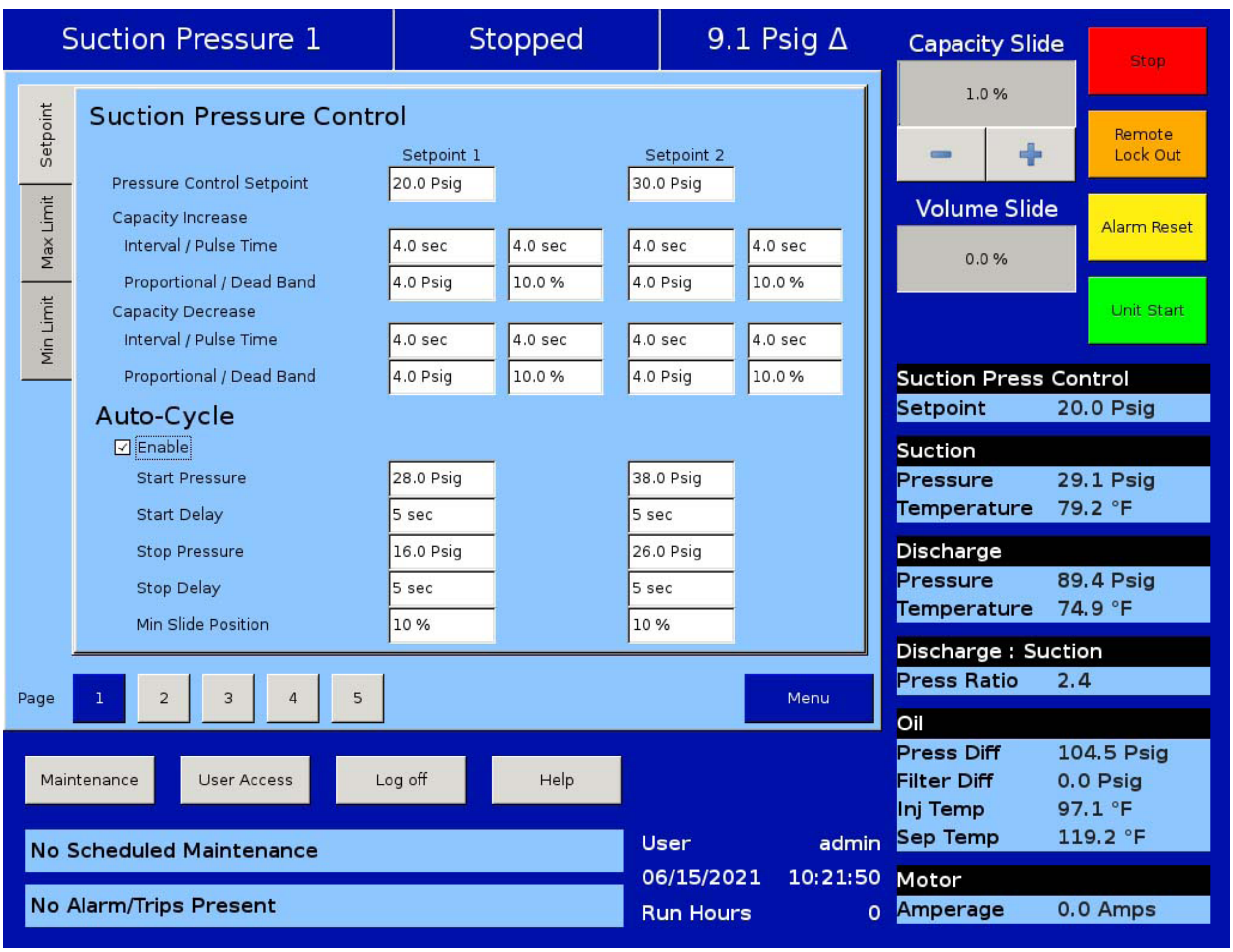


Figure B-7. Master Compressor Loading, Unloading and Auto-cycle Setpoints Setup

Configuration Overview

Master Compressor Control Setpoints Setup

Navigate to the Compressor Control menu of the Master Compressor – page 1, see Figure B-7. The “Pressure Control Setpoint” setting defines the control setpoint for the entire sequencing system. The capacity increase and capacity decrease proportional control settings define the loading and unloading settings for the master compressor ONLY. (The slave compressor(s) load and unloading is setup in the master compressor sequencing menu). The Auto-cycle settings can also be setup for the Master Compressor, to establish settings of when the Master compressor will automatically cycle on and off.

NOTE

The proportional control settings affect the loading and unloading of the master compressor only. The slave compressor loading and unloading rules are defined in the Compressor Sequencing screen of the master compressor. Also, during slave compressor sequencing, the Auto-cycle setpoints are not active for the slave compressors, even if Auto-cycle has been selected. However, it may still be desirable to check the Auto-cycle setpoints for the slave compressors. This can be desirable if the Master Compressor panel is powered down, and the slave compressors then revert to “Local” control. When the panels revert to “Local” control, then the Auto-cycle setpoints would become active.

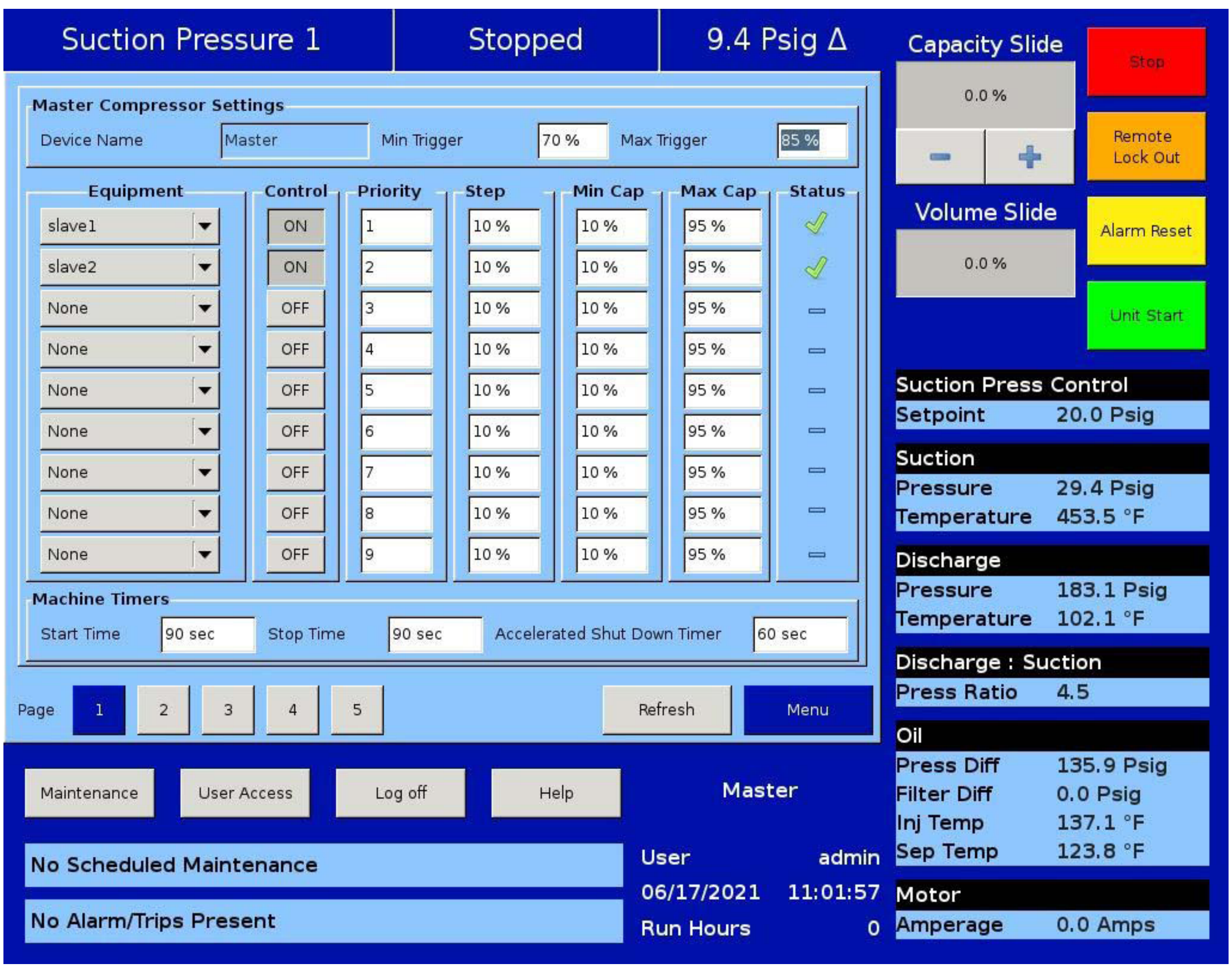


Figure B-8. Setup of Master Compressor for Slave Compressor(s) Loading and Unloading

Setup of Master Compressor For Sequencing Slave Compressors

Logon to the Master Compressor and navigate to the Compressor Sequencing screen, page 1. Slaves can be setup for sequencing from the Equipment List. Options under the Equipment List are populated depending on devices shown in the Device List Screen of the Compressor Sequencing Menu.

Master Compressor Sequencing Menu Setup

The master compressor loads and unloads itself based on the proportional control settings that are set in its own Compressor Control Setpoints menu. The Auto-cycle Setpoints can also be enabled for the master compressor, which would define the setpoints for when the master compressor will stop and start. Auto-cycle settings on the slaves are not active during sequencing; however you still may wish to select Auto-cycle on the slave compressor for the circumstance where the power is removed from the Master panel, and the slave compressors would then revert to “Local” control.

The master compressor controls the slave compressors based on the master compressor control setpoints as well as the setpoints entered in the master compressor sequencing menu. Page 2 of the master compressor sequencing menu (see Figure B-8) allows the operator to view and adjust settings which are used for compressor sequencing. The pressure / temperature control set-points and capacity load / unload timers to accomplish sequencing control are defined here:

1. Start Offset
2. Suction Pressure / Process Temperature Cooling / Process Pressure Cooling / Discharge Pressure / Process Temperature Heating / Process Pressure Heating Control Setpoint
3. Fast Load Offset
4. Fast Unload Offset

Start Offset

- Defines the offset from pressure/temperature control setpoint to start a slave compressor. If suction

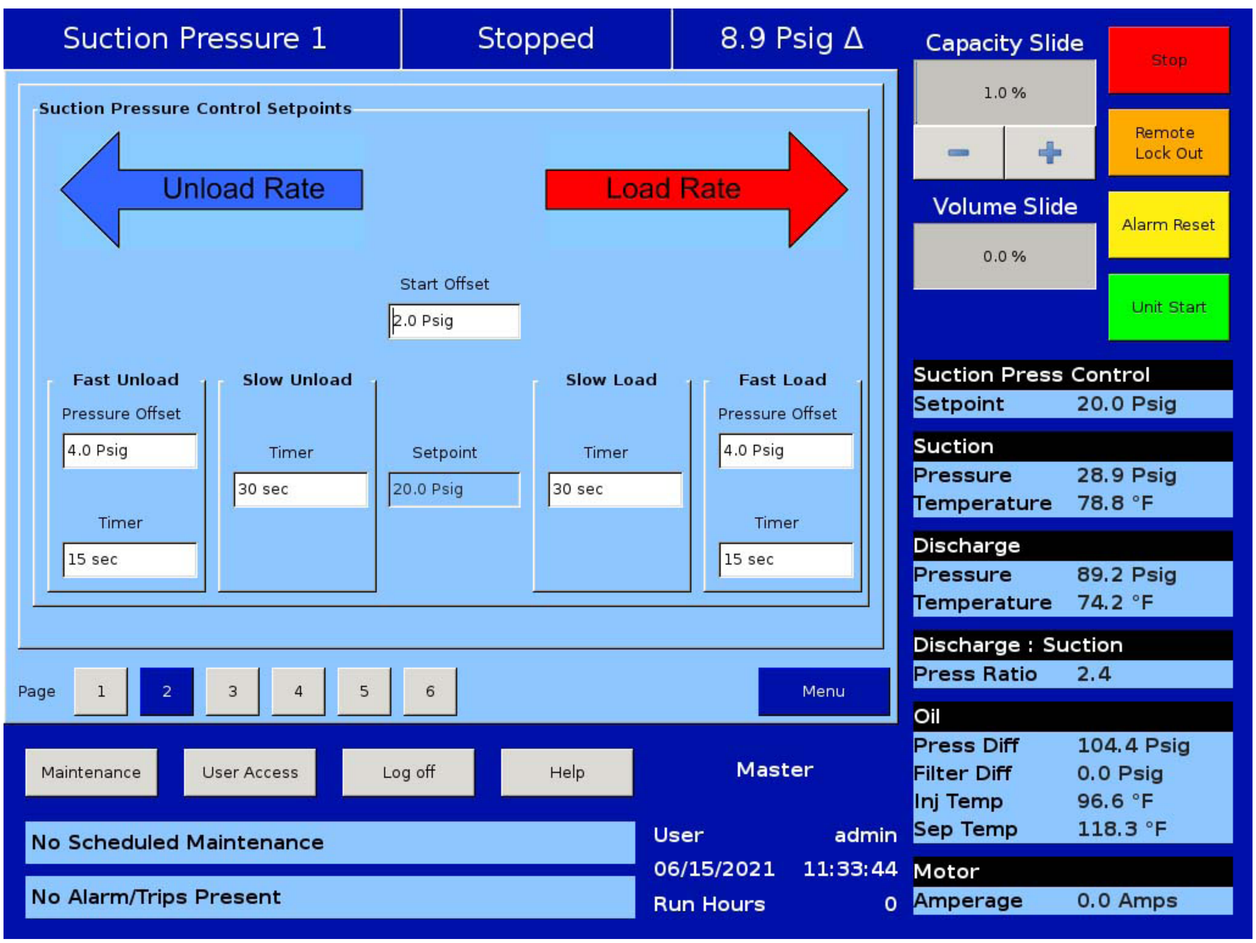


Figure B-9. Slave Compressor(s) Loading and Unloading Setup

pressure / process temperature surpasses the start offset setpoint and master compressor capacity has reached the max trigger setpoint then the sequencing algorithm allows the starting and loading of the slave compressors to cater to increasing load requirements.

Suction Pressure / Process Temperature Cooling / Process Pressure Cooling / Discharge Pressure / Process Temperature Heating / Process Pressure Heating Control Setpoint

- The target setpoints are read-only values here. These setpoints can be changed by logging on to the “Compressor Control” menu of the Master Compressor.

Fast Load Offset

- Defines the offset from the control setpoint to monitor compressor load. If suction pressure / process temperature surpasses this setpoint’s value then sequencing decisions are made according to the Fast Load Timer.

Fast Unload Offset

- Defines the offset from the control setpoint to monitor compressor unload. If suction pressure / process temperature goes below this setpoint’s value then sequencing decisions are made according to Fast Unload Timer.

Users below security level 2 (Supervisor) are not allowed to edit the sequencing settings.

Example:

Pressure control setpoints for setpoint 20 psig,

Start Offset = 2 psig

Fast Load Pressure Offset = 4 psig

Suction Pressure setpoint = 20 psig

Fast Unload Pressure Offset = 4 psig

Slow Load Timer = 30 sec

Fast Load Timer = 15 sec

Slow Unload Timer = 30 sec

Fast Unload Timer = 15 sec

Assumptions:

- Master compressor is at 100% capacity

Suction pressure currently = 21 psig, so it falls within start offset defined above. The sequencing will not start and load highest priority slave when the suction pressure is below start offset setpoint.

Now assume suction pressure currently = 23 psig, it is above start offset, but less than fast load offset, so program will start slave compressor and monitor suction pressure every 30 sec (as per slow load timer).

Now assume suction pressure currently = 25 psig, it is above fast load offset, so program will monitor suction pressure every 15 sec (as per fast load timer).

Suction pressure currently = 17 psig, it is less than suction control setpoint, but greater than fast unload offset, so program will monitor suction pressure every 30 sec (as per slow unload timer).

Suction pressure currently = 15 psig, it is less than fast unload offset, so program will monitor suction pressure every 15 sec (as per fast unload timer).

Compressor Sequencing Equipment List

The first page of the Compressor Sequencing menu allows the operator to view and adjust settings that are used for sequencing the slave compressors, see Figure B-7.

Min Trigger:

- Defines the Master’s capacity value in percentage which is used as a trigger to step wise decrement slave’s compressor capacity. Slave compressor capacity is decremented only if Master is running with capacity lower than set Min Trigger value.

Max Trigger:

- Defines the Master’s capacity value in percentage which is used as a trigger to step wise increment slave’s compressor capacity. Slave compressor capacity is incremented only if Master is running with capacity higher than set Max Trigger value.

Equipment

- The options of this combo box are updated depending on devices shown in the Devices List Page. This contains names of all the compressors in the network communicating with the Master compressor. Equipment names can be selected from drop-down list. The same Equipment name should not be configured more than once in the sequencing table.

Examples of acceptable unique names:

- Master, slave no.1, slave no.2, comp no.1, comp no.2, etc.

Control

- [ON/OFF] Inclusion/exclusion of a compressor partaking in the sequencing is decided on basis of this toggle button. Operator can include / exclude compressor by toggling the ON /OFF button.

Example:

The operator can configure all settings for a particular slave compressor and set the control as OFF, so that it won't be a part of sequencing steps. If the operator decides to enable this compressor by selecting ON, then it will be considered for the next load / unload cycle.

NOTE

Switching a slave compressor control to OFF while it is running in auto sequencing mode puts the respective slave compressor into local auto mode. This feature is used to add / remove slave compressors to sequence table when running in auto sequence mode. The slave compressor can be put back into remote mode for sequencing by pressing Auto Start->Remote again on the slave compressor.

Priority

- This defines priorities of compressors on the network. This priority will decide the sequence order in which compressors will be turned on and off during sequence cycle. The lower the priority number, the greater the priority of the compressor. Operator should choose the priorities of the compressors.

Example:

"1" is highest priority.

A compressor with priority "2" has higher priority than a compressor with priority "4".

Step

- This parameter defines the size of the capacity step, for a slave compressor, that will occur when a change in capacity is needed. The step is defined as a percentage of the compressor capacity. In the case when last step makes total capacity greater than maximum capacity (Max Cap) setpoint, the total capacity will get reduced to maximum capacity setting. Same is applicable when last step makes total capacity lower then minimum capacity (Min Cap) setpoint. The Min Cap setting will take priority.

Example:

Configured step = 20 %

Configured min cap = 10 %

Configured max cap = 80 %

Program starts loading slave compressor in steps of 20%, so the value of each interval will be:

Interval 1 – 10 % (min cap)

Interval 2 – 10% + 20% = 30 %

Interval 3 – 30% + 20% = 50 %

Interval 4 – 50% + 20% = 70 %

Interval 5 – 70% + 20% = 90 % (which is more than max cap, so last step will be 80%)

Min CAP / Max CAP (Slave Compressors)

- Defines the lowest and highest capacity in percentage with which a slave compressor is allowed to run. Minimum capacity value takes preference on first step value. Maximum capacity value takes preference over last step value.

Example:

Configured step = 5 %

Configured min cap = 10 %

Configured max cap = 80 %

Program starts loading compressor in steps of 5%, so the value of each interval will be:

Interval 1 – 10 % (min cap)

Interval 2 – 10% + 5% = 15 %

Interval 3 – 15% + 5% = 20 %

Interval 4 – 20% + 5% = 25 %

Last Interval – 75% + 5 % = 80 % = (max cap)

Max Trigger Example:

Configured Max Trigger = 85 %

Start Offset = 2 psig

Suction Pressure Setpoint = 20 psig

Suction Pressure Currently at 23 psig

Master's Compressor Capacity at 90 %.

At this point, the Master compressor will start the machine start timer to start the next priority slave compressor available.

Min Trigger Example

- When master compressor reaches its "Min Trigger" setpoint and the suction pressure is less than suction control setpoint for the time period of the slow unload / fast unload timer, then the master will adjust (decrease) the slave compressor capacity. When a slave compressor has been unloaded to its MIN CAP setpoint, and the suction pressure is still less than suction control setpoint for the time period of the slow unload / fast unload timer, a calculation of the operating CFM of the slave compressor is made. This value is compared against the available CFM of the other running compressors. If enough CFM is available, then the machine stop timer is started. When it times out, and provided there is still enough CFM available from the remaining running compressors, the slave compressor is stopped.

Machine Start / Stop Timer

- Machine start / stop timers show the time in sec that the Master Compressor will hold before starting / stopping slave compressor once (Start / Stop) decision is taken. See also Walk-through of Sequencing Loading and Unloading for further explanation of the operation of these timers.

Status Symbols shown on the Master Compressor Sequencing menu, showing status of Slave compressors, see Table B-3.

NOTE

Before configuring the Compressor Sequencing table on the master compressor, log on to slave compressors one by one and enable the sequencing in slave mode from the Configuration screen, then put each Vission 20/20 slave in Remote mode. Then log onto the master compressor and add slaves from the Device List Screen. After adding them, configure slaves from Equipment List table.

Table B-3. Status Symbols

	Default, If slave Compressor is not present.
	Slave Compressor is configured in sequencing table but is not configured in “Remote” mode or is not detected in network.
	Slave Compressor configured in sequencing table and is in ready to run state.
	Slave Compressor is running with Alarm condition.v
	Slave Compressor stopped due to Error Condition.
	Slave Compressor running at maximum capacity without any error.
	Slave Compressor under active control of Master Compressor
	Slave Compressor running into its stop timer, will be stopped.
	Slave Compressor is next in sequence for unloading.
	Slave Compressor running into its start timer, will be started.

Configuring Sequencing Table On Master Compressor

1. Select the correct compressor name from Equipment drop down list.
2. Assign the Priority for the slave compressor
3. Assign the Step size in percentage for the slave compressor
4. Assign Min/Max capacity values for the slave compressor
5. Repeat steps #1-4 to configure all slave compressors.

Auto sequencing can be started (from the master compressor) by selecting the green Unit Start button and pressing the “Auto Seq” button.

Walk-Through of Sequencing Loading and Unloading

(Assume Suction Pressure Control)

Example:

Pressure control setpoints for setpoint 20 psig,

Fast load offset = 4 psig

Start offset = 2 psig

Suction pressure control setpoint = 20 psig

Fast unload offset = 4 psig

Timers:

Slow load timer = 30 sec

Fast load timer = 15 sec

Slow unload timer = 30 sec

Fast unload timer = 15 sec

Machine start timer = 90 sec

Machine stop timer = 120 sec

Priorities:

Master -> slave 1 - > slave 2 - > slave 3.

Sequencing Loading mode operates in the following way:

The slave compressors are placed into Remote mode. The Master Compressor is started in “Auto Seq” mode. The Master Compressor program monitors its suction pressure value and identifies the load / unload rate band. During loading cycle when suction pressure reaches a value more than the configured start offset value (20+2 = 22 psig) and if the master compressor reaches its Max Trigger value, then the master compressor starts machine start timer (90 sec). Once machine start timer has elapsed, the master then picks highest priority compressor (slave 1) from the list and starts loading compressor to the Min Cap value for that slave. Program loads slave 1 as per steps configured till it reaches its Max Cap value. Once slave 1 starts running at Max Cap value and suction pressure is still not within deadband (i.e. > start offset value of 20+2 = 22 psig, then program starts machine start timer (90 sec) for next priority compressor slave 2. This process is continued till either setpoint is achieved or all compressors are running at their Max Cap values.

Overview of Compressor Unloading

The compressor unloading scheme incorporates an intelligent algorithm to identify when it is possible to turn a compressor off. When a slave compressor has been unloaded to its Min Cap value of capacity and the suction pressure is still less than a value of suction control setpoint for the time period of the unload timer, then a calculation of the operating CFM of the slave compressor is made. This value is compared against the available CFM of the other running compressors. If enough CFM is available, then the machine stop timer is started. When it times out, and provided there is still enough CFM available from the remaining running compressors, the slave compressor is stopped.

An example of partial loading of slaves, and shutting one off.

slave 3 – CFM (483) – running with Min Cap = 10%,

so the required CFM needed to handle slave 3 load = 483 * 10 / 100 = 48.3 CFM.

Now slave 2 is told to unload.

slave 2 – CFM (408) – running at max cap = 90%, step = 10%

so at Interval 1 – slave 2 receives a cap hold value = 80 %,

So, the available CFM = (408 * (90 - 80) / 100) = 40.8 CFM

and the required CFM to absorb slave 3 load = 48.3 (which is more than is available).

so at Interval 2 – slave 2 cap hold value = 70 %,

Now the available CFM = (408 * (90 - 70) / 100) = 81.6 CFM

and since the required CFM to absorb slave 3 load is = 48.3, there is now enough available and slave 3 will be shutdown.

In this example, during unloading cycle when suction pressure falls below a value less than suction control setpoint value (20 psig) for the time period of the unload timer , then the program picks the lowest priority compressor (slave 3) from the list and starts unloading the compressor. The program unloads slave 3 as per steps configured till it reaches its Min Cap setpoint. Once slave 3 is unloaded to its Min Cap setpoint and suction pressure is still below suction control setpoint, then program picks second lowest priority compressors (in this case slave 2 - eligible active compressor) from all running compressors list and starts unloading it. Program unloads slave 2 (eligible active compressor) to a point where it can handle load of active compressor (running at min cap).

After 2nd interval it can be seen that slave 2 can handle load of slave 3 so slave 3 can be stopped. Program then starts machine stop timer (120 sec) for active compressor (slave 3) and stops the same when timer is lapsed. This process is continued till either setpoint is achieved or all compressors are stopped.

During loading / unloading phase if the communication with any of the active / running / idle compressor is lost then master compressor logs event for the same. Compressor with errors / trip can be identified with its respective status symbol. The Master compressor acts as trim compressor

Slave Experiencing A Failure

When a slave compressor experiences an operational failure, then that slave will be is temporarily skipped during the sequencing decisions. The slave will be placed into a “Local” mode. The fault needs to be reset and cleared before the compressor can be placed back into the sequencing routine. The slave compressor can be put back into remote mode for sequencing by pressing Auto Start->Remote again on the slave compressor. It will resume its “set” priority order and any future command to increase capacity of a slave compressor will result in the compressor being restarted.

1. Master experiencing a Failure

When the master compressor experiences an operational failure, then the master will continue to sequence the slave compressors based on the setpoints that are set in the sequencing menu of the master compressor.

2. Power to master compressor turned off

If the power to the master compressor is turned off, then the slave compressors that are currently being sequenced will experience a “Remote Comm Timeout” – an indication that the slave has lost communication to the master compressor. This takes approximately 1 minute to occur and the “Remote Comm Timeout” message will be logged into the Event List on the slaves.

3. Future Program Release

Advanced Sequence Configuration

Equalized Load Enable

- This selection on the master compressor will provide the ability to equalize (or balance) the load between compressors, allowing them to operate more efficiently. Rather than have one compressor operate at 70% and another operate at 30%, the balancing algorithm with determine a more efficient position for all compressors online.

Troubleshooting

1. If a slave compressor’s status shows this symbol, then the operator should check if the slave compressor is in Remote Idle mode.
2. Check the status symbols of all compressors on the sequencing table.
3. Check errors / info log on the compressor sequencing event log screen.

Vission 20/20 and Legacy Vission Compressor Sequencing Setup and Configuration

Overview

This document should be used as a supplement to the Vission 20/20 micro-controller Operation and Service manual. This document is intended to help with the steps involved in setting up a compressor sequencing network. Compressor sequencing is accomplished using a Master / Slave communication arrangement. When configuring a network that is comprised of both Vission 20/20 panels and legacy Vission panels, one of the Vission 20/20 panels will always act as the master. All legacy Vission panels will always act as slaves. Compressor sequencing in the Vission 20/20 panel is carried out through the Vission 20/20 ethernet communication port, using the Modbus TCP protocol. Legacy Vission panels do not support the Ethernet Modbus TCP protocol, so an ethernet Modbus TCP to serial Modbus RTU convertor is required to allow legacy Vission panels to participate in the sequencing.

A typical network might look like this;

Compressor sequencing is accomplished by the master Vission 20/20 compressor panel monitoring its own control parameter (either suction pressure or process temperature). As the control parameter changes value and deviates from the control setpoint, the master Vission 20/20 compressor panel makes decisions to start, stop, load and unload slave compressors as needed, in order to maintain the control setpoint. The control setpoint is defined in the Master Compressor "Compressor Control" menu.

NOTE

The order of which compressors are started, stopped, loaded and unloaded is determined by "compressor priority" which is defined in the master Vission 20/20 panel – the Compressor Sequencing Menu. The master compressor will ALWAYS be priority#1 compressor – and act as the trim compressor. So this must be taken into account when deciding which compressor is to act as the master compressor.

The following discussion assumes that all panels are connected to the network as shown in Figure B-10.

Configuration Overview

(Slave Compressors should be configured first, then configure the Master Compressor.)

Compressor sequencing is setup and enabled from the Configuration Menu. Log on and navigate to page 1 of the Configuration Menu on the SLAVE compressor. (reference Figure B-11).

- Assign a unique compressor name and panel ID number.
- Set the Active Remote Control to "Ethernet".
- Enable Ethernet port.
- Assign a unique Ethernet IP address. Assign "family" subnet mask and gateway.
- Select Modbus TCP protocol.
- Assign a Modbus node address.

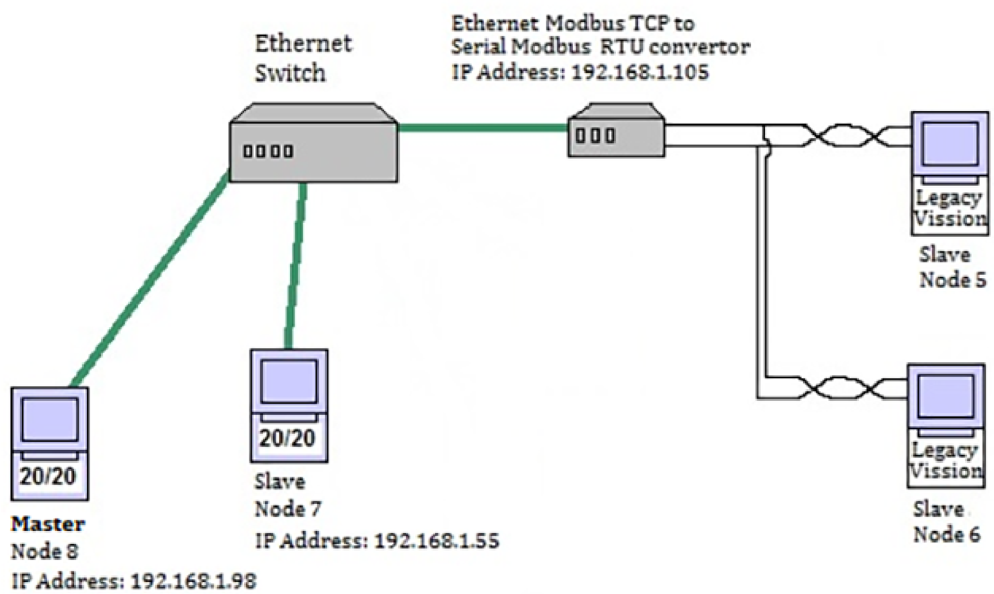


Figure B-10 Sequencing Network for Legacy Vission panel

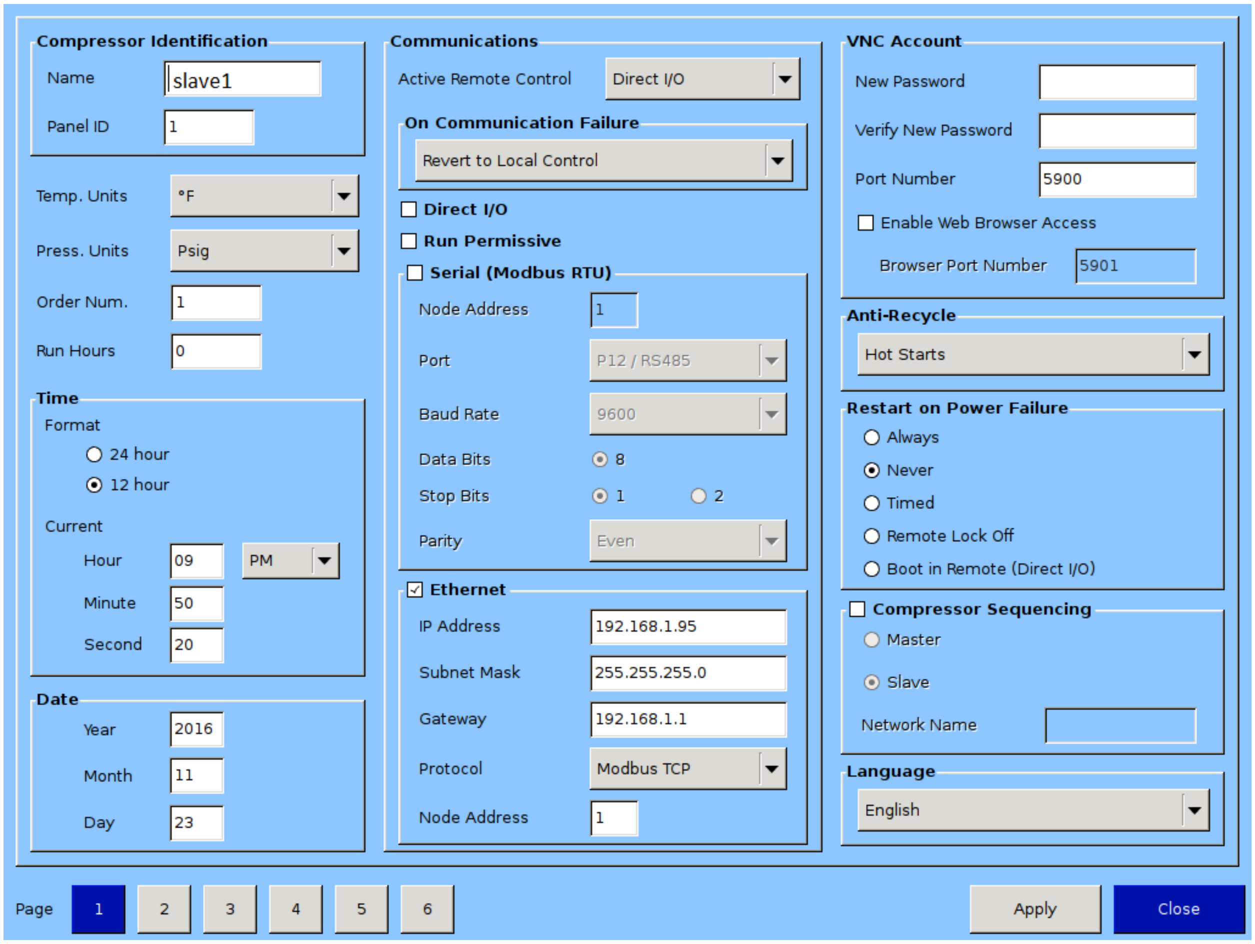


Figure B-11 Configuration Screen Slave Compressor Setup

- Enable compressor sequencing.
- Select "Slave" operation for the compressor.
- Identify (create) compressor sequencing network name.
- After all above has been completed, the press Apply button before exiting the Configuration screen.

The slave compressor will begin multicasting its status information over the network at a rate of once every 15 seconds at this point.

Repeat the setup steps for all Vission 20/20 slaves on the network, assigning unique addresses and compressor name. Make note that the Network Name must be the same for all compressors which will participate in the sequencing and Gateway Address must be of the same family of IP addresses in order for a slave to be recognized by the master.

Steps required for setting up a Legacy Vission (non-Vission 20/20) SLAVE compressor

- Reference Figure B-10. Setup/configure the Ethernet Modbus TCP to Modbus RTU convertor. Follow the setup instructions for your convertor. Depending upon the manufacturer of the convertor, some of the steps involved to do this are;
    A. Assign a Static IP Address to convertor –in the same family address as the compressor sequencing network.
    B. Assign serial port settings – baud rate, # data bits, # stop bits, parity, and protocol = wModbus RTU.
    C. Assign serial interface = RS485.
- Reference Figure B-12. Navigate to "SETUP" screen on the legacy Vission panel (Slave5 in this example) and assign a unique "node number" for each panel. These node numbers should not conflict with any node address chosen for the Vission 20/20 panels. Choose Node #5 for this example and press OK button.
- Navigate to Vilter ONLY screen -> Modbus Settings Menu and setup Modbus RTU Slave port baud rate. Press OK button.
- Cycle power on legacy Vission panel so that serial port settings are re-initialized with new settings.

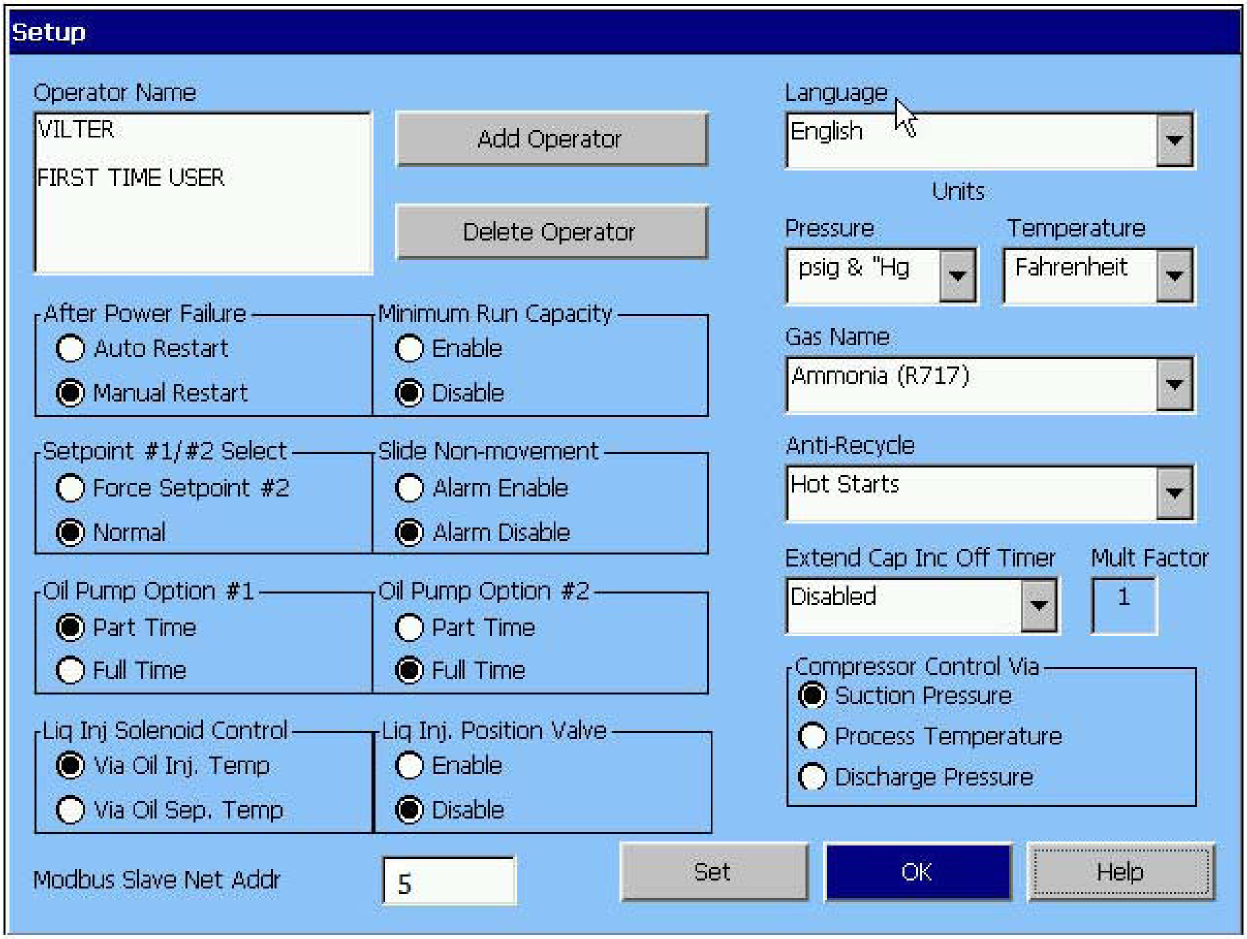


Figure B-12 Legacy Vission Setup Screen

Setting up the Vission 20/20 Master Compressor

NOTE

The master compressor will ALWAYS be priority#1 compressor – and act as the trim compressor. So this must be taken into account when deciding which compressor is to act as the master compressor.

Log onto the master compressor and navigate to the Configuration screen, page 1 (reference Figure B-13).

- Select a unique name for the master compressor.
- Select unique panel ID number for panel.
- Set the Communications Active Remote Control to "ETHERNET".
- Enable the ethernet port and select the Modbus TCP protocol.
- Setup a unique ethernet IP address, in the same address family as the Vission 20/20 slaves.
- Setup the subnet mask for the IP address.
- Setup the gateway address in the same address family as the Vission 20/20 slaves.
- Select unique node address (doesn't have to be the same number as the panel ID number).
- Enable the Compressor Sequencing check box and select "Master".
- Enter the Network Name, same name as that which was chosen for the Vission 20/20 slaves.
- Apply these settings before exiting the Configuration screen.

At this point, the master will begin receiving the Vission 20/20 slave compressor information over the network

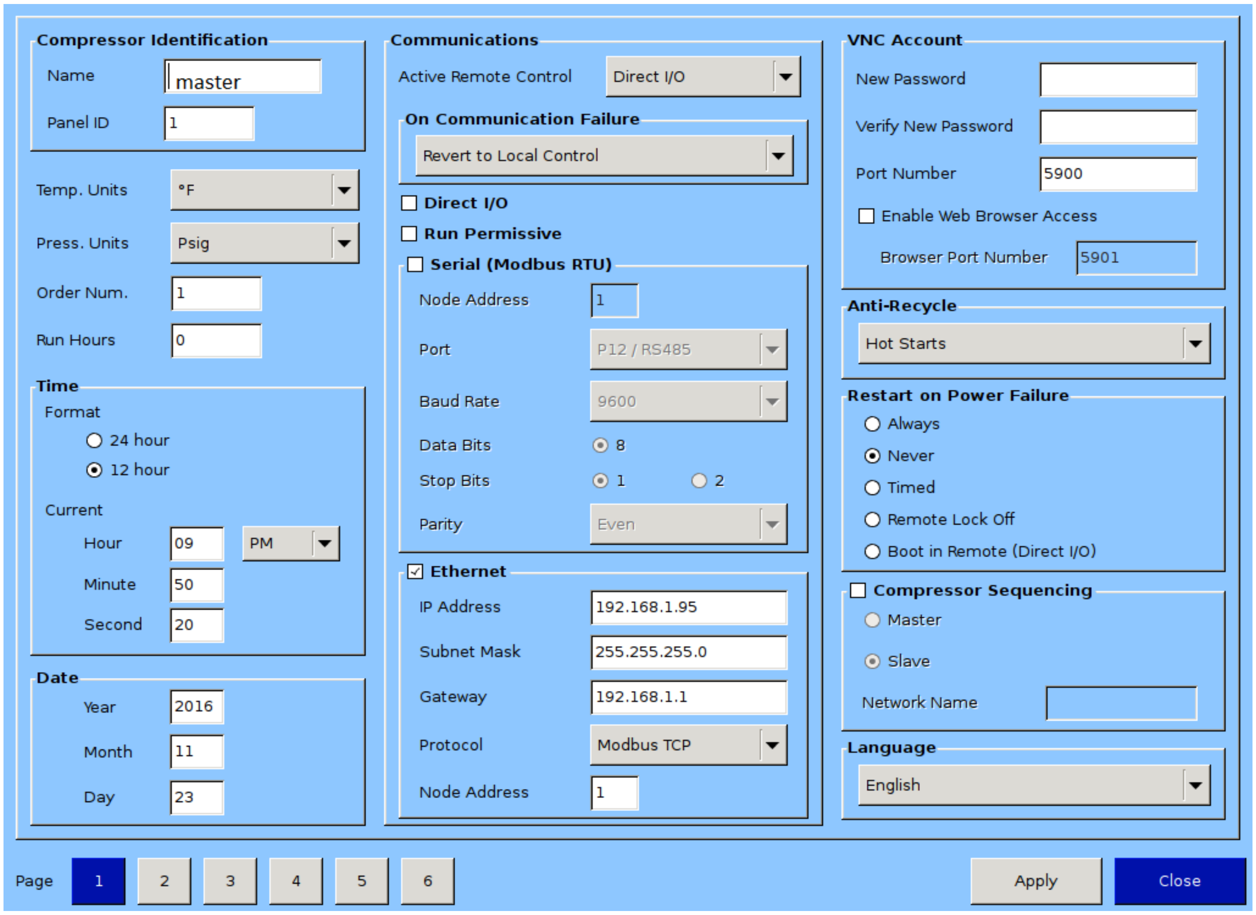


Figure B-13 Configuration Screen Master Compressor Settings

Adding Vission 20/20 slave panels to the Devices List

Now that the network is configured, the next step is to add the slave compressors into the sequencing algorithm and start assigning priorities to the compressors on the network. To add the Vission 20/20 slaves for sequencing, at the master, navigate to the Compressor Sequencing screen – page 3 and press the “View Detected Devices” button, which will display all Vission 20/20 panels that are broadcasting their status over the Ethernet network. See Figure B-14.

In this example – we have only connected one Vission 20/20 slave panel to the ethernet network (node 7) – see Figure B-10. To add this compressor so that it will be included in the compressor sequencing algorithm, check the “Add” box as shown in Figure B-14 Then press the OK button.

After pressing the OK button – you’ll be returned to page 3 of the sequencing screen and you’ll see node 7 compressor listed in the Device List – as shown in Figure B-15.

Adding Legacy Vission slave panels to the Devices List

Once again refer to Figure B-21. The two legacy Vission panels should now be added to the Devices List so that they can also be included in the compressor sequencing algorithm. To do this, press the “Add Device” button on page 3 of the Compressor Sequencing menu – shown above in Figure B-16. After you press the Add Device button, you’ll need to define the legacy Vission slaves details as shown in Figure B-17 below.

1. First select an appropriate name. In this example, we selected “SLAVE5” to coincide with the Modbus serial node address number of this panel, which is Node 5. But you have the freedom to select any name that is appropriate for you.
2. Next define the IP address where “SLAVE5” is going to be located. Reference Figure 1. Slave 5 is located on the serial network side of the Ethernet Modbus TCP to serial Modbus RTU convertor. For this example, the IP of that device was defined as 192.168.1.105. Enter in that address.

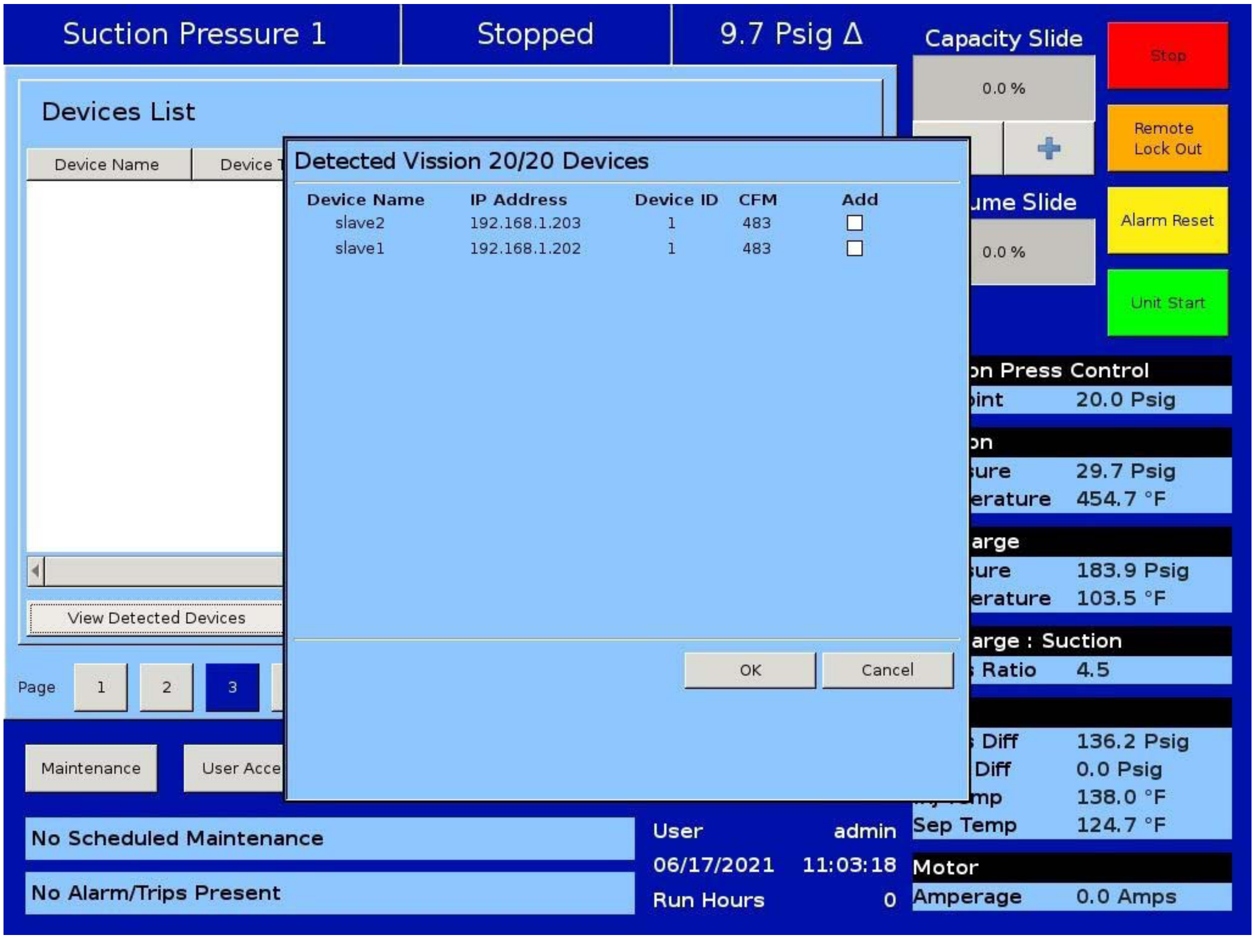


Figure B-14 Compressor Sequencing Screen – View Detected Device

3. Next define the Device ID, which was the Modbus RTU node number assigned to this panel. Reference Figure B-12. For this example, Modbus RTU node number was defined as node 5. Enter in that number.
4. Last define the size of the compressor. In this example, we are defining SLAVE5 as a VSS 451. Press OK button and this device will be added to the Devices List.

After legacy Vission Slave5 has been defined and added, then the Devices List will be repopulated showing the legacy Vission device. In this example, we have two legacy Vission slave panels, Slave5 and Slave6, so both are added. See Figure B-18. Note that the IP address is the same for both Slave5 and Slave6, since they are accessed on the network through the Ethernet Modbus TCP to serial Modbus RTU convertor which has an IP address of 192.168.1.105. The master Vission 20/20 panel differentiates them on the network using their node address. So insure that each legacy Vission panel has a unique node address as Figure B-17 shows (Device ID number = Node Address).

Testing the Vission panel connections

After the Legacy Vission panels have been added to the Devices List, it is a good idea to test out the network connections to these devices. Reference Figure B-18.

Highlight the legacy Vission panel that you'd like to test. Then press the "Test Connection" button. An informational window will appear showing if the test was successful or not. If the test is unsuccessful, double check the baud rate settings and node addresses to insure that those parameters in the legacy Vission panels match the Vission 20/20 information for those slave panels. You should double check the settings of the ethernet Modbus TCP to serial Modbus RTU convertor as well.

Continue to select the compressors listed in the Devices List and test the connection of all compressors, including Vission 20/20 slave panels listed.

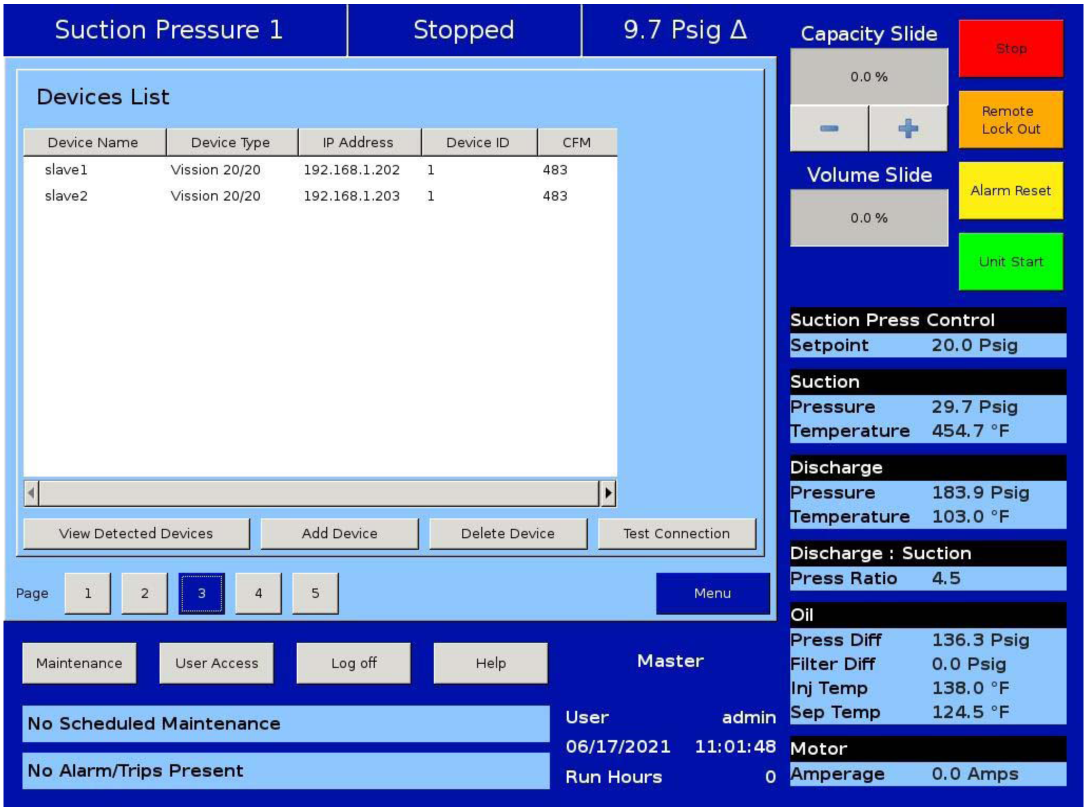


Figure B-15 Compressor Sequencing Device List

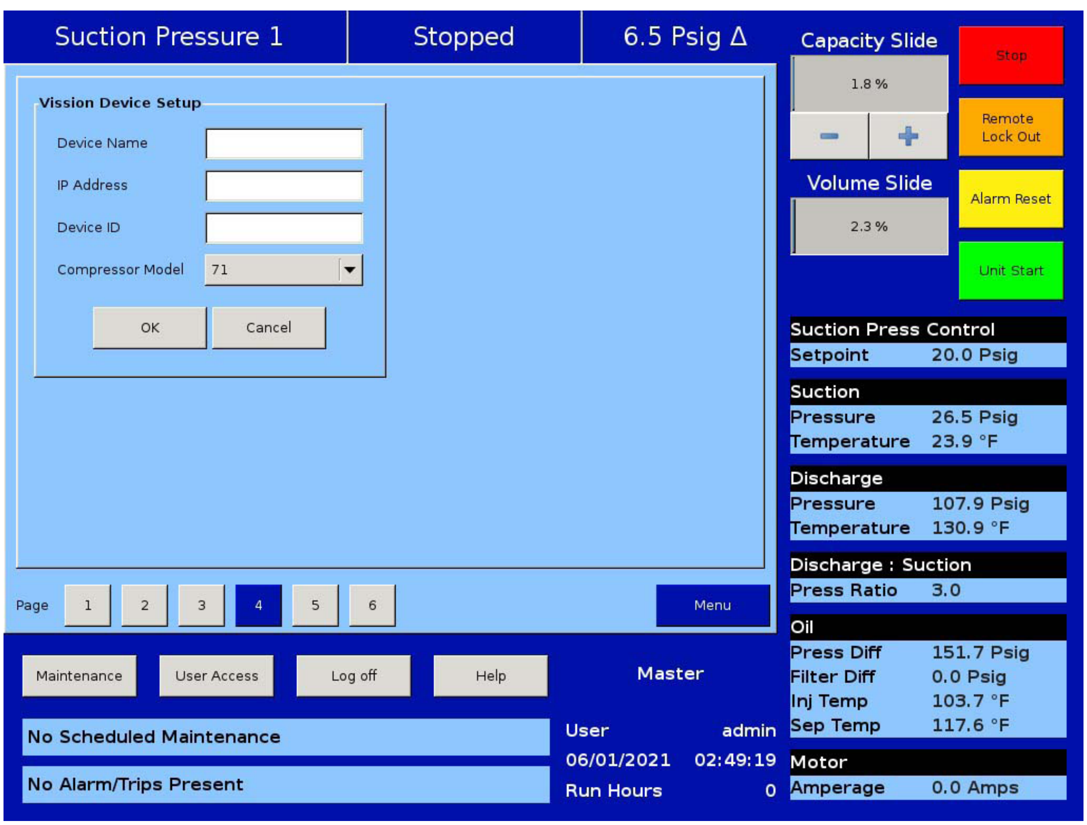


Figure B-16 Compressor Sequencing Vission Device Setup

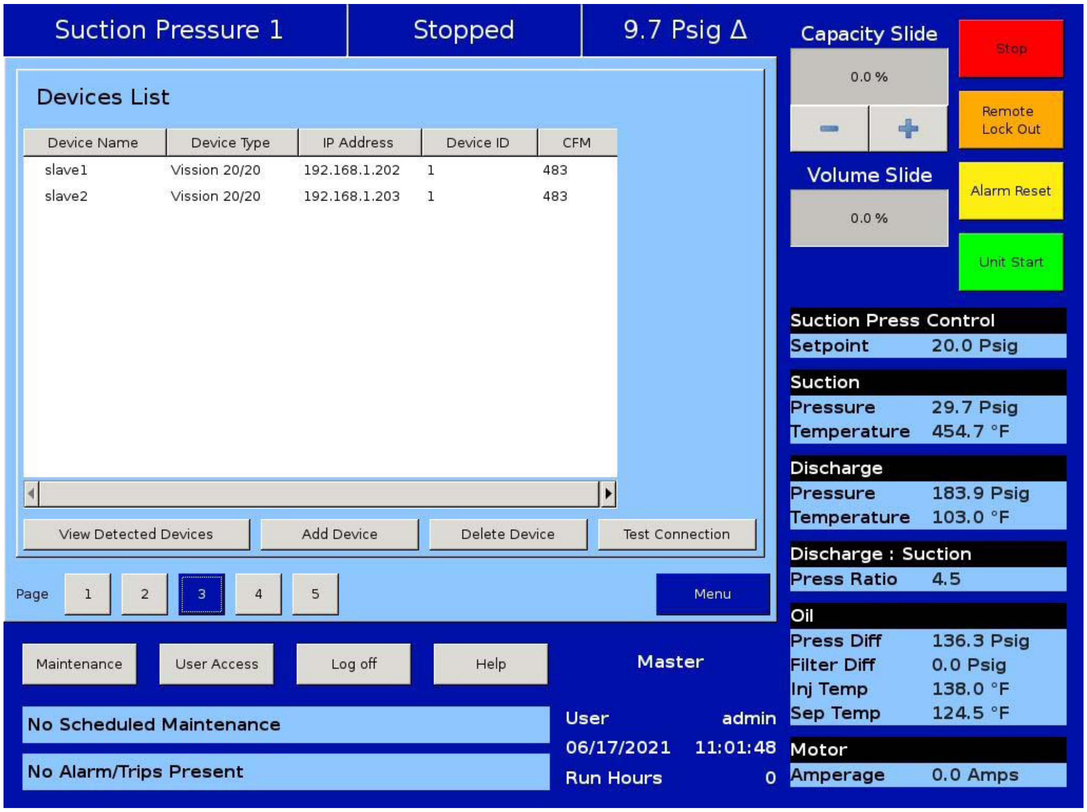


Figure B-17 Compressor Sequencing Device - List

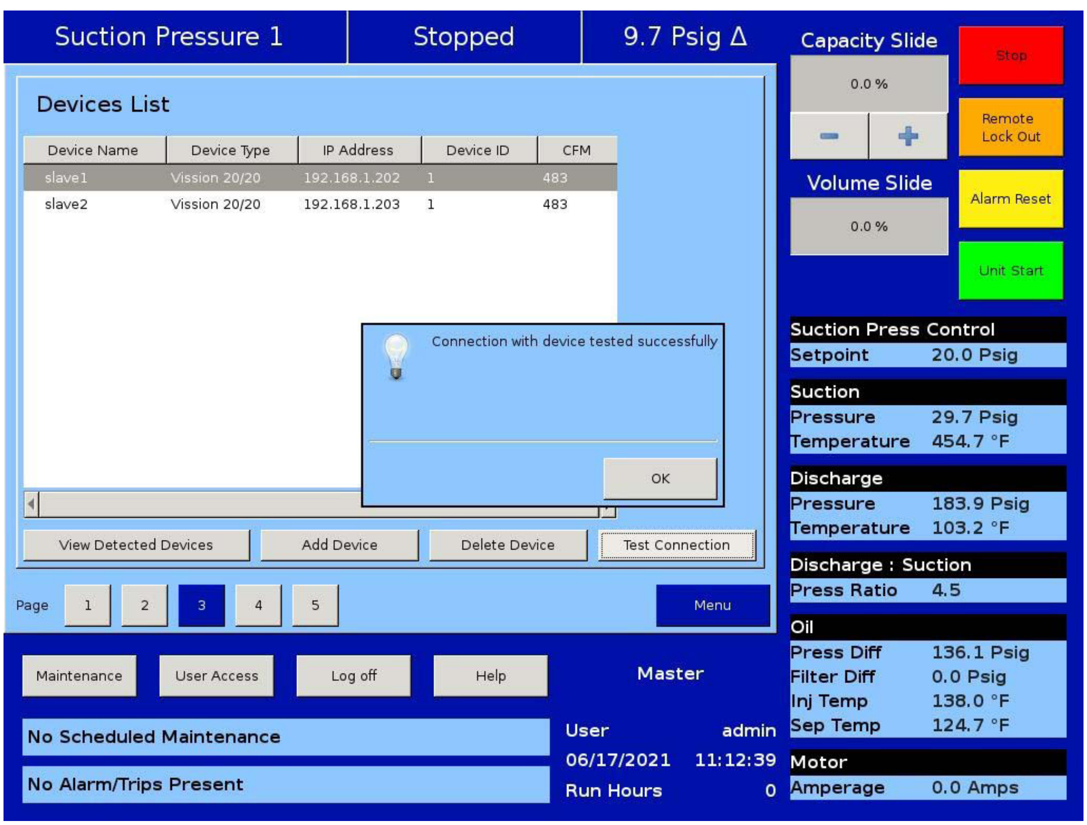


Figure B-18 Compressor sequencing -Test Connection

Final Steps for Setting up Compressor Sequencing

The slave Vission 20/20 panels now need to be placed into Remote mode in order for the Master compressor being allowed to sequencing them. Reference Figure B-19.

At the slave Vission 20/20 panel, press the green UNIT START button, then press the Remote button. This will place Slave7 into Remote mode to allow the slave Vission 20/20 panel to begin receiving commands from the master Vission 20/20 panel. You will see the top banner display "Remote" to signify that the slave Vission 20/20 panel is now in Remote mode.

Setting up the compressor sequencing table

When the network connections to all the compressors have been tested, then they can be added to the compressor sequencing table of the master Vission 20/20 panel. Reference Figure 11. Under the Equipment Column, select the compressor in which you want to be Priority #1, #2, #3 etc. Then to place them into the sequencing algorithm, select the sequencing control button to "ON". When the master Vission 20/20 panel has added the slave compressors to the sequencing algorithm and the master Vission 20/20 panel has verified communication to the compressors, the Status column with show a green check mark as shown in Figure B-20.

For additional information on Compressor Sequencing, see Appendix B – Vission 20/20 Compressor Sequencing Setup, Configuration Overview – Master Compressor Control Setpoints and Master Compressor Sequencing Menu Setup.

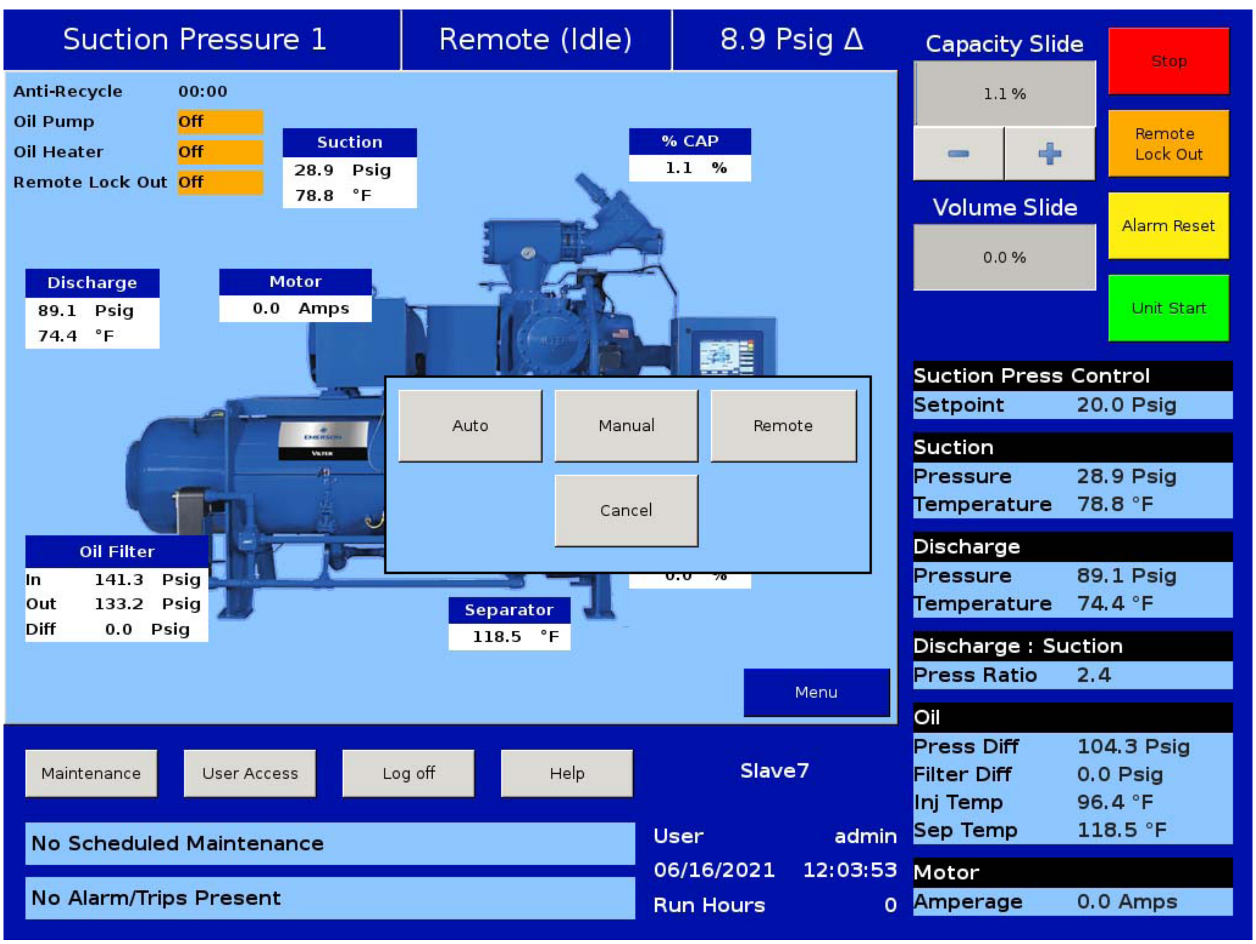


Figure B-19 Main Screen - Slave Compressor Start in Remote Run Mode

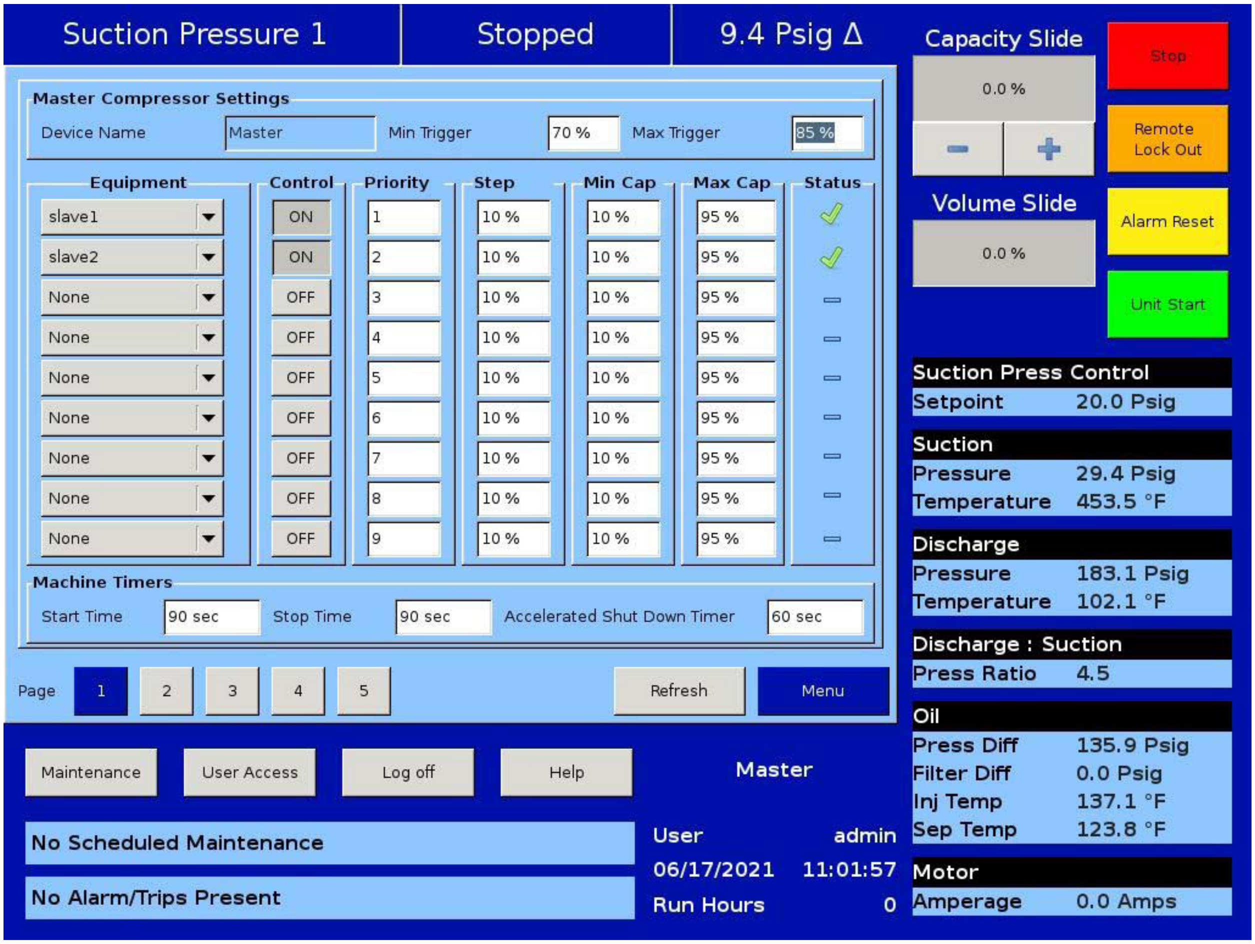


Figure B-20 Compressor Sequencing Page1- Status Icon for Slave Compressor

Database Backup Procedure

Upgrading the program in the Vission 20/20 panel normally involves replacing the flashcard. Note that all compressor operation setpoints, calibration values and maintenance information is held on the flashcard. So when upgrading to a new program (new flashcard), the task is simplified by using the "Database Backup" and "Database Restore" function provided in the Vission 20/20 to migrate the database of the original flashcard to the new flashcard. There are three main steps to this process:

1. Backup the database of original flashcard (currently in the Vission 20/20 panel) – unto a thumbdrive or flashdrive.
2. Replace original flashcard with new flashcard.
3. Restore original database to new flashcard.

Backup Database of Original Flashcard

NOTE

It is REQUIRED to re-enter the Alarms and Trip settings by "hand" when upgrading from some older version of programs, therefore it is highly recommended to create a "hardcopy" of all compressor operating setpoints.

It is also recommended that for documentation purposes, a "hardcopy" of all compressor operation setpoints, configuration information and maintenance information be made prior to changing flashcards. Please reference the document, titled "Flashcard Replacement Procedure – Hardcopy" for a list of the information that you should record.

The data migration procedure (moving the original flashcard database to new flashcard) uses a "thumbdrive" or "flashdrive" to transfer data from the original flashcard to the new flashcard. Note that there have been a few reports of some thumbdrives not being recognized by the Vission 20/20. If you have difficulty in getting the Vission 20/20 to recognize the thumbdrive – then try a different one. Vilter have successfully tested a number of different manufacturers and sizes; a partial list is below;

SanDisk micro cruzer 2.0GB

Imation 2.0GB

Kingston DataTraveler 512MB

SanDisk mini cruzer 128MB

AirBus 32MB

1. With the original flashcard installed into the Vission 20/20 SBC, insert the flashdrive into the USB port. This port is located along the right side of the single board computer below the flashcard. (Please reference the picture in the section titled; Flashcard Replacement Procedure Hardcopy.
2. Logon using the Vilter username and password (= physics)
3. Navigate to the Data Backup screen.
4. Under "Available Devices" – you should see something like "/media/usb0" . If you don't see anything in this box, press the "Refresh" button, wait about 5 seconds and then press it again. If you still don't see it, then the Vission 20/20 does not recognize the flashdrive – try a different one. If you do see it, highlight it.
5. Now highlight the "Filename" box (which will also contain "/media/usb0"). A keyboard will appear – now type in the name of the file that you want for your database for this compressor. For instanc "vss03_month_day_year" or something similar to identify the file to the compressor – then press "Enter" key on keyboard.
6. Now press the SAVE button. A "watch" icon will appear. Shortly thereafter, a popup box should appear – telling you that the save was successful, and asking if you want to "unmount" the flashdrive device. Press YES. If the "watch" icon doesn't go away after a minute or so, then the Vission 20/20 isn't able to close the backup file it has written to the thumbdrive. Power down the Vission 20/20 and try the procedure with a different thumbdrive.

Replace Original Flashcard With New Flashcard

Now that the database file has been saved to the thumbdrive – the "original" flashcard can be replaced with the new flashcard.

1. Power the Vission 20/20 down, remove the thumbdrive and take out the "original" flashcard and install the new one.
2. Label both the old and new card to identify the compressor it is for.

Restore Original Databse To New Flashcard

Now that the new card is inserted, power the Vission 20/20 panel back up. As the Vission 20/20 boots up, a message may appear indicating that an "incompatibility" has been found. This is NORMAL. The new flashcards are built such that they recognize a couple of different single board computers. Upon bootup – the cards are automatically configured properly for the correct single board computer that is identified. After seeing this message, it will take a minute or so before the Vission 20/20 boots up properly.

1. Once the Vission 20/20 panel is booted back up, Press the "USER ACCESS" button – which is the new wording for the Logon button. Logon. Now insert the thumbdrive back into the USB port.
2. Navigate to the Data Backup screen. You should again see the USB thumbdrive listed under the "Available Devices."
3. Select the LOAD function (above the "Available Devices" field), and then highlight the device that is listed in the "Available Devices" window.
4. To the right of the "Available Devices" – is a "Select Folder/File" window. In this window, find the backup file for this compressor, and highlight it. Now press the "Load" button.
   a. A popup window will appear – saying "Loading new databases will require a program restart. Continue?". Press YES.
   b. Another popup window may appear stating something like "One or more settings selected for loading were missing from the archive and it will then list what is missing. Continue loading anyway? Press "Yes".
5. Another popup box may appear – asking if you want to use the IP address it found. Press "OK".
6. A popup box will appear saying "Settings were successfully loaded. Program will restart." Press OK button.

When the OK button is pressed, the panel will reboot.

Now – using the "hand documented" settings that you recorded, compare the setpoints on that list against those in the Vission 20/20. They should all be OK. Here are the KNOWN issues that we have found with this procedure.

- The Alarm and Trip setpoints MAY need to be re-entered. Early version programs actually saved two Alarm and Trip setpoints tables onto the old flashcard, and when saving the tables to the thumbdrive during the Database backup procedure, the old program backed up the wrong table to the thumbdrive. When a database "restore" (load) procedure is done with the new program, the new program recognizes that the Alarm and Trip tables are not correct, and refuses to restore them. In this case, you'd need to re-enter your Alarm and Trip setpoints manually.
- If you have any setpoint (including Alarms and Trips and Control settings) that is in " inches of vacuum" – that value will be restored as a "positive PSIG" setpoint. That is a known bug of the "Restore" function. So, for instance, say you have the Suction Pressure Trip setpoint set at 3.1"hg. When the value is restored, it will be restored as + 3.1 PSIG. You'll need to re-enter this setpoint as minus 1.5 psig (which correlates to 3.1 inches of Hg.). Do this for any setpoint that was originally set as "inches of Hg."
- If you have communication connection issues after restoring the database, you may have to "re-enter" the IP address that is shown on page 1 of the configuration screen. If you experience communication problems after the "Restore" function – then re-enter you communication settings.
- Navigate to the Maintenance screen and look at the "Time Remaining" column – comparing that calculation against the "Maintenance Interval Hours" and the actual runtime of the compressor. If the calculation isn't correct, then do the following;
  - Navigate to the Configuration screen – page 1 and re-enter the compressor "run hours" – located along the top right of the screen.
  - Once you do that, then press the "APPLY" button, wait about 10 or 15 seconds. Then cycle power on the panel. This will force the Maintenance "Time Remaining" column to be properly calculated.

Flashcard Replacement Procedure

Before powering down to replace the flashcard, copy down all of the follow operating setpoints and configuration information.

Record Operating Setpoints and Configuration Information

1. Configuration Screen - Page 1
   a. Order number
   b. Active Remote Control Setting
   c. If Active Remote Control = Direct I/O, document “type” of Direct I/O selection.
   d. Ethernet IP settings
   e. Anti-Recycle Settings
2. Configuration Screen - Page 2
   a. Compressor Type, Model, Refrigerant
   b. Compressor Control Type & number of Controllers
   c. Oil Pump selection
   d. Oil Cooling type
   e. Motor Current Device
3. Configuration Screen - page 3
   a. Optional Function Selections
4. 4. Configuration Screen - Page 6
   a. Optional I/O boards
5. Compressor Control Setpoints – all
6. Alarms and Trips Setpoints – all
7. Timer Setpoints – all
8. Instrument Calibration - Pressure page
   a. Record Transducer Range selection for suction pressure, discharge pressure, filter inlet pressure, oil manifold pressure.
   b. Record ‘total offset” value for suction pressure, discharge pressure, filter inlet pressure, oil manifold pressure.
9. Instrument Calibration - Temperature page
   a. Record ‘total offset’ for suction temperature, discharge temperature, oil separator temperature, oil manifold temperature and process temperature.
10. Instrument Calibration - Misc page
    a. Record current transformer ratio.
11. Maintenance Notes –all.
12. Compressor Runtime.

Replace Flash Card

(Refer to Figure B-21)

1. Remove power from Vission 20/20 panel.
2. Remove old flashcard and install new flashcard and power panel back up.

Re-Enter Operating Setpoints and Configuration Information

1. Log on as “admin” user (default password = admin).
2. Re-enter all values in Configuration screen. Of most importance, is to re-enter the correct compressor type, model and refrigerant. Re-enter Compressor Runtime on page 1 of the configuration screen. Make sure you re-select any optional boards that are installed, and apply those additions.
3. Re-enter all Control Limits
4. Re-enter all Alarm and Trip setpoints. Of most importance - under the “Delay” tab, enter 5 seconds for all alarm and trip delays.
5. Re-enter all Timer Setpoints
6. Re-enter all Instrument Calibration offsets for pressure transducers. Insure that the Suction Pressure transducer range is properly selected (typically 0-200psia 4-20ma) – but double check proper setting. In Misc page – re-enter C/T Ratio.
7. Re-enter Maintenance Notes if desired.
8. You do not need to recalibrate the capacity and volume actuators.

Revisions:

- R1-5/25/10 – added notes to insure that optional boards are re-selected after new flashcard is installed.
- R2 – 6/28/10 – added note to indicate recalibration of actuators is unnecessary.

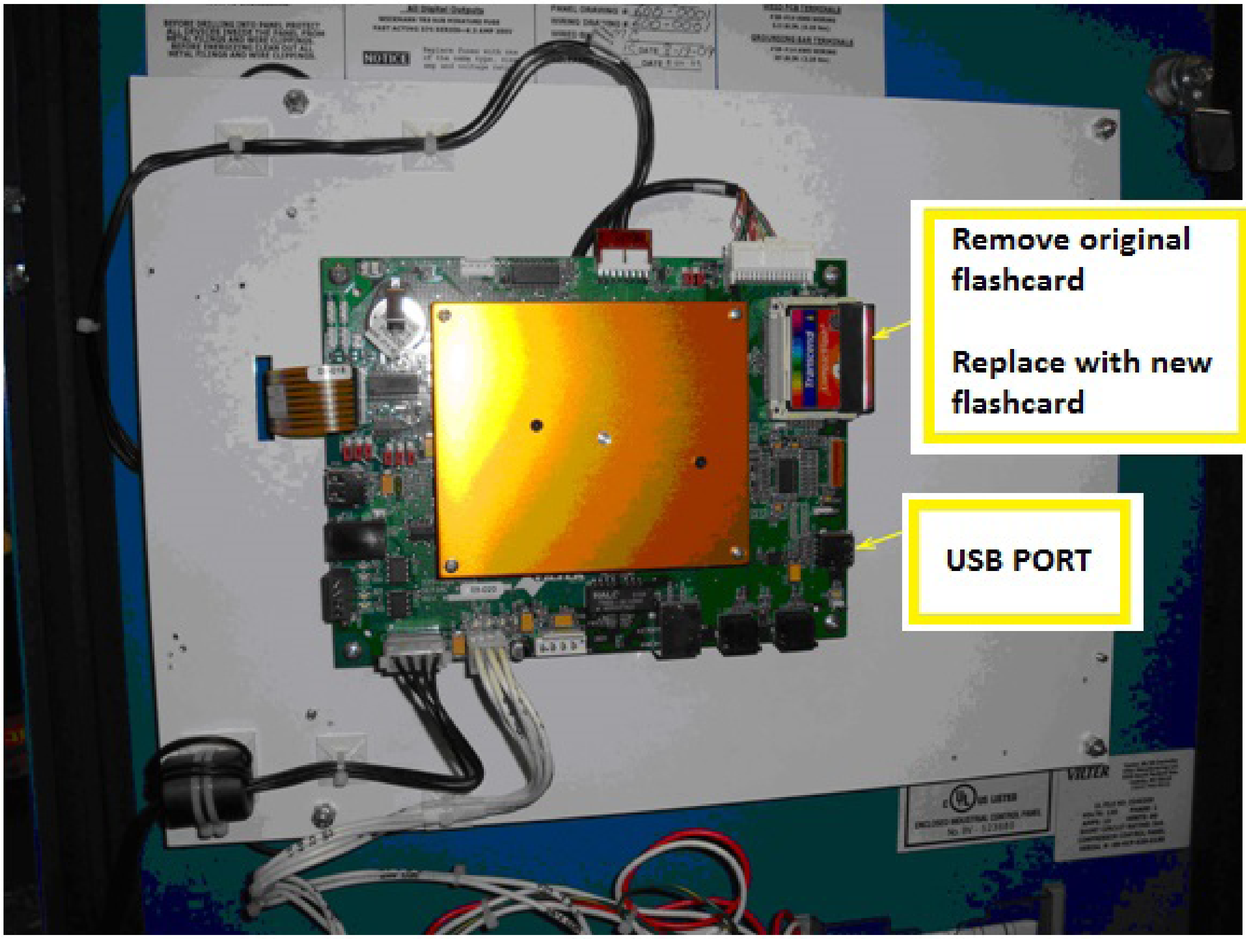


Figure B-21. Flashcard Replacement

Danfoss Liquid Injection Valve Setup

NOTE

Consult the VSS / VSM / VSR Unit Manual for proper Danfoss ICM valve setup procedure.

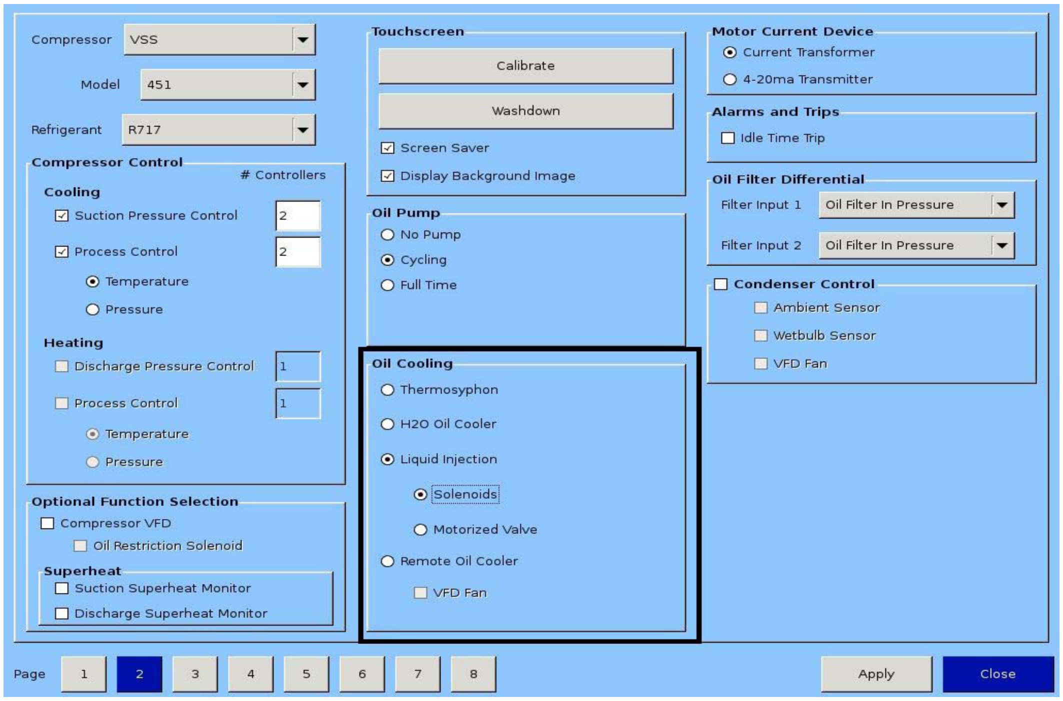


Figure B-22. Configuration Screen - Page 2 (Oil Cooling section)

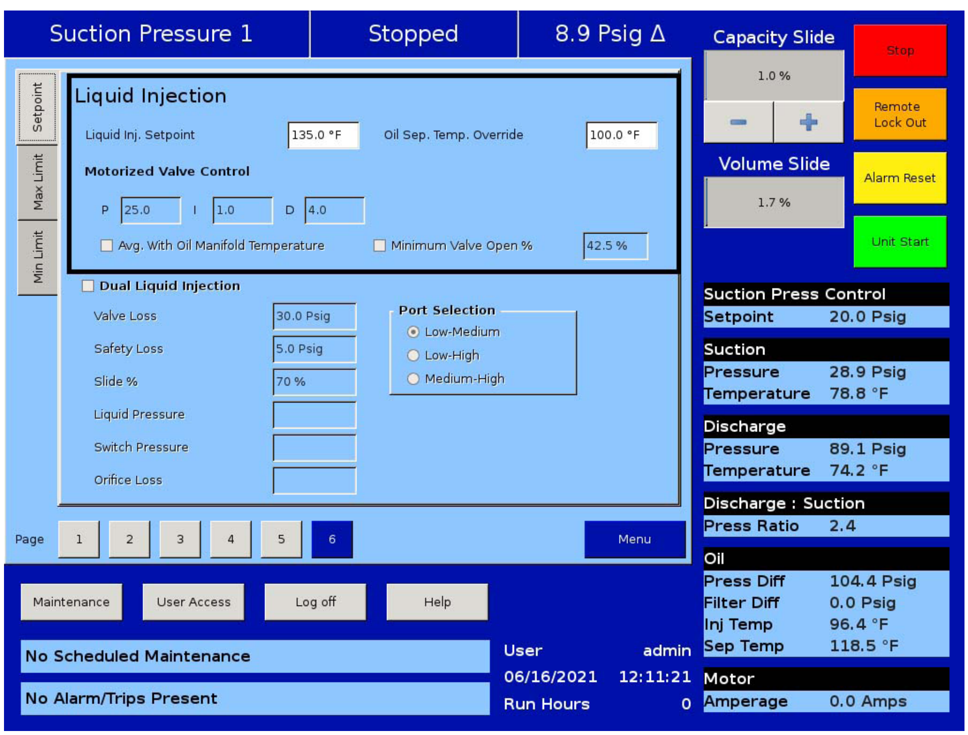


Figure B-23. Compressor Control Menu - Page 4 (Liquid Injection settings)

The Danfoss Liquid Injection valve is selected from the Configuration Screen - Page 2 (Under Oil Cooling Section.) The settings for the Danfoss Liquid Injection are setup in the Compressor Control Menu - Page 4.

User Access Menu

This menu allows the operator to assign user accounts. The Vission 20/20 will be shipped with a Level 3 operator and password pre-assigned to the installing contractor. He can then assign all users with security levels as needed.

The procedure to assign user access levels is to first press the User Access button. The User Access screen will appear with the preassigned level 3 operator name visible within the Operators section. Highlight the name, then enter the password associated with that name of the user, then press Enter key to close the keyboard. Then press "Apply" button. Press the "Manage Accounts" tab to begin the process of entering another Operator name, and assigning password and user level of this additional user. Last – remember to press the Add/Update button to add this user to the list, then press the "Apply" button before exiting the Logon screen to make this change permanent.

Use the information below to determine the user level assignments.

	Actions	Note
Level 0	elementary control.	No password associated with this level.
		(Allowed to view all screens that are enabled.)
Level 1	operator level	low level user
Level 2	operator level	advanced user
Level 3	full access	supervisor

Level 0 user level (no login required) has the ability to start and stop the compressor and change the operating setpoint within the minimum and maximum settings defined by the supervisor. He can not change any alarm and trip setpoints or timer setpoints.

Page	User Level	Note
Event list	level 0	View
Input/output states	level 0	View/create freeze screen
Trend chart	level 0	View/operate
Slide calibration	level 3	
Instrument calibration	level 2	
Service options	level 2	
Condenser control	level 1	Setpoints can be modified / set at Level 1
Compressor sequencing	level 1	Setpoints can be modified / set at Level 1
Compressor scheduling	level 2	
Timer		
Setpoints (page 1)	level 2	
Setpoints (page 2)	level 2	
Constraints	level 3 / level 4	
Alarms trips		
Setpoints	level 2	
Constraints	level 3 / level 4	
Delay	level 3	

Compressor Control

Control setpoint	level 0	Set/Change/Modify within supervisor set constraints
All control setpoints	level 1	All remaining control setpoints are modifiable in level 1
Proportional band	level 1	
Deadband	level 1	
Interval/pulse time	level 1	
Auto-cycle setpoints	level 1	Enable/Disable and modify all setpoints
Pumpdown setpoints	level 1	Enable/Disable and modify all setpoints
Pulldown setpoints	level 1	Enable/Disable and modify all setpoints
Constraints	level 3	

Configuration

Page 1	level 2	Run hours needs to be level 3
Page 2	level 2	
Page 3	level 3	
Page 4	level 3	
Page 5	level 3	
Page 6	level 3	
Set language	level 2	

Help	level 0
Maintenance	level 1

Data Backup

To save data	level 1
To upload date	level 3
Start compressor	level 0
Stop compressor	level 0
Volume slide move	level 3

485OPDRI-PH Heavy Industrial RS-422/485 Isolated Repeater

The ILinx™485OPDRI-PH is used to electrically isolate the RS485 signal from the network and to improve the signal strength of the RS485 signal over long distances It provides powerful isolation on both data ports and protects equipment and data from damaging ground loops and surges. Additional isolation on the power supply circuits adds a third degree of protection It has the added benefit of active noise suppression since it regenerates the active signal in relation to time and amplitude. Therefore, any noise on the signal lines into the device will not be passed through the device onto the network.

Figures B-24A and B-24B show the 2-wire and 4-wire network isolator.

NOTE

The ILinx™485OPDRI-PH was powered from the +24vDC supply from the Vission 20/20 panel in this test, to measure the benefits of the isolator on an RS485 serial network running Modbus RTU protocol.

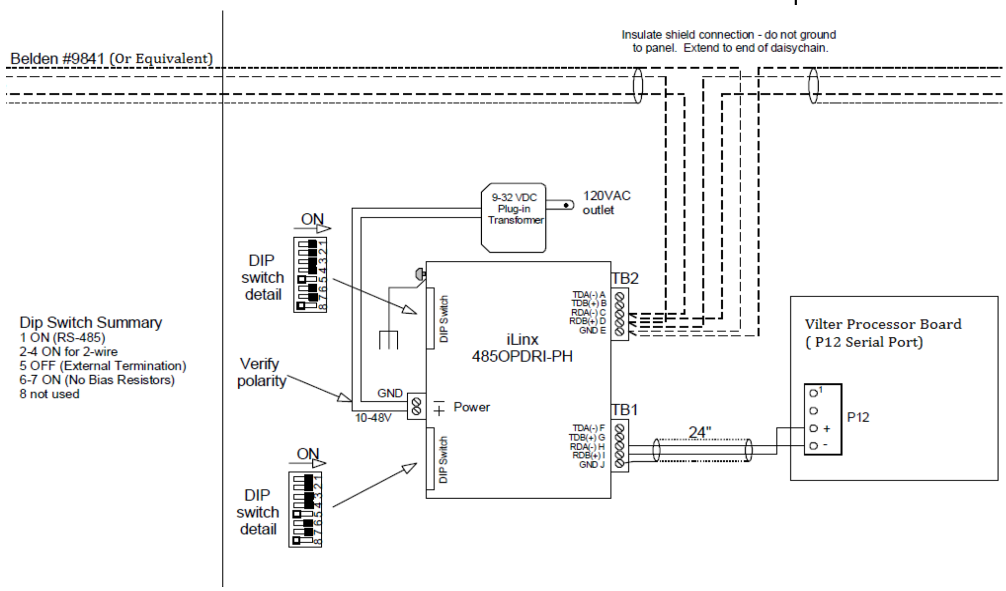


Figure B-24A ILinx 4850PDRI-PH 2-wire Network Isolator

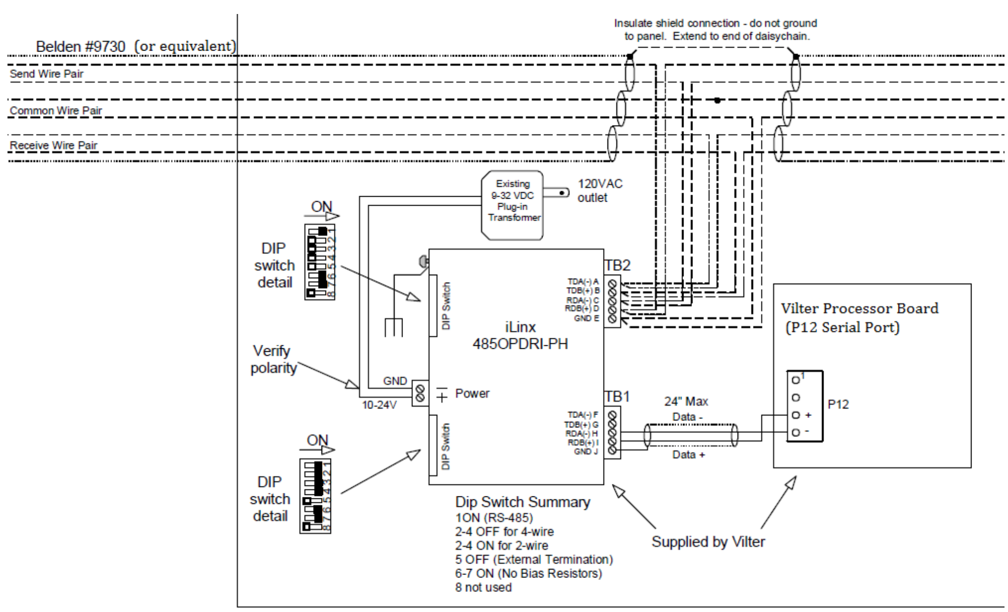


Figure B-24B ILINX 4850PDRI-PH 4-wire Network Isolatorr

Test 1

The first test measured the noise on the active network WITHOUT the ILinx™485OPDRI-PH isolator installed in the network. The USB/RS485 convertor was wired directly to the Vission 20/20 RS485 serial port. The following screen capture from the scope shows the amount of noise on the network signals, see Figure B-25.

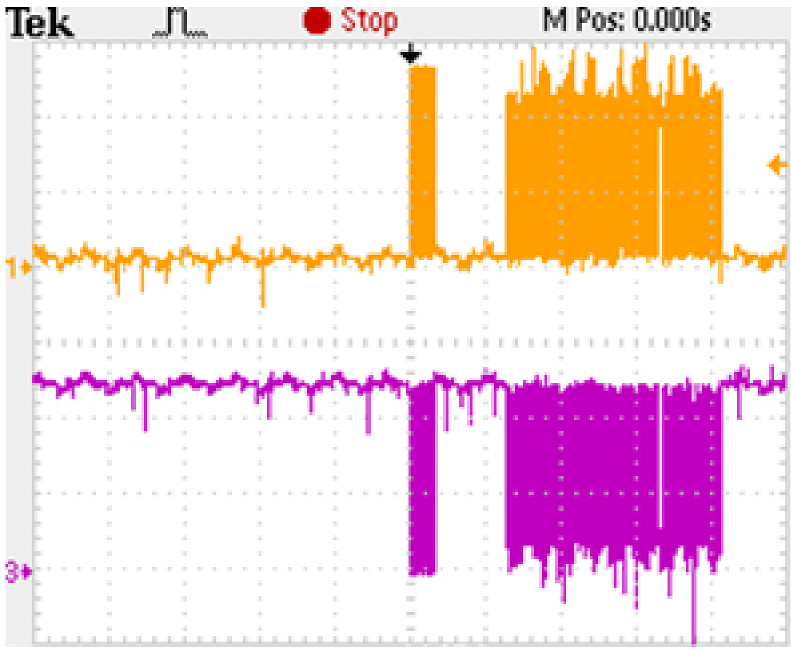


Figure B-25. Network Noise

Test 2

The second test measured the noise on the active network with the ILinx™485OPDRI-PH isolator installed in the network. The following screen capture (Figure B-14) from the scope shows the amount of noise on the network signals.

The noise on the signal lines has been significantly reduced with the addition of the ILinx™ 485OPDRI-PH isolator installed in the network. To order this isolator, please use Vilter part number 3485C1.

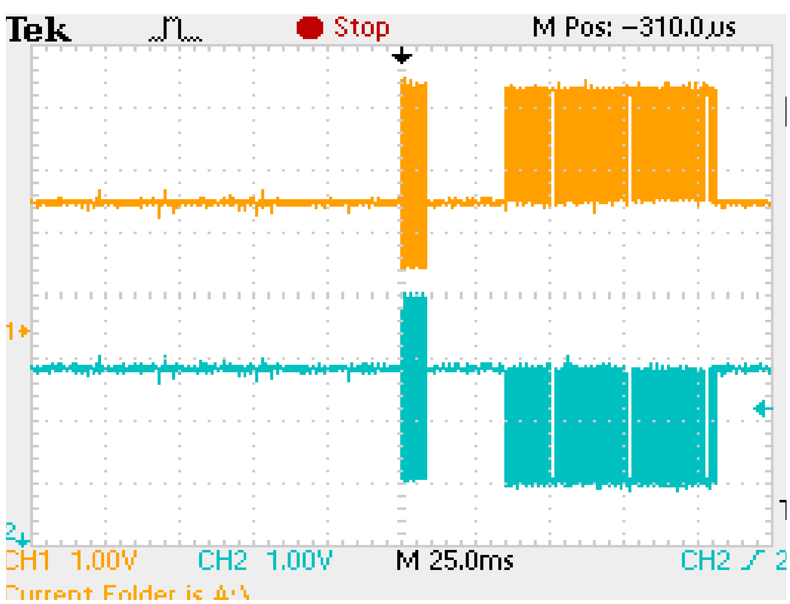


Figure B-26. Network Noise with Phoenix Contact PSM-ME Isolator

Vessel Level Control Setup for Vission 20/20 Panel

Introduction

This document provides guidelines to successfully setup a vessel level control function in the Vilter Vission 20/20 control panel. Vessel level control is achieved using a level probe wired to an auxiliary analog input channel of the Vission 20/20, thereby providing a 4-20ma signal proportional to the vessel liquid level. Then based on the liquid level setpoint entered into the Vission 20/20, the analog output card of the Vission 20/20 will send a varying 4-20ma signal to a positioning valve, to open or close it to achieve a desired level of liquid in the vessel.

Additional Vission 20/20 Hardware

An additional analog input card is required to sense the 4-20mA signal from the level probe.

An analog output card is required to output a 4-20mA signal to the positioning valve, thereby increasing and decreasing the amount of liquid being fed to the vessel.

If a level switch is installed in or on the vessel for an alarm or trip function, then an additional digital input card will be required as well.

Setup

Step 1: Configuration Screen Selection of Installed Boards

Log on and navigate to the Configuration screen, page number 6, see Figure B-27. Insure that all boards that are physically installed into the Vission 20/20 panel have been selected or “checked”. You should have additional boards 8 and 10, and possibly board 4. Board numbering starts from the left column, top to bottom are boards 1 to 5. On the right column, top to bottom are boards 6 to10.

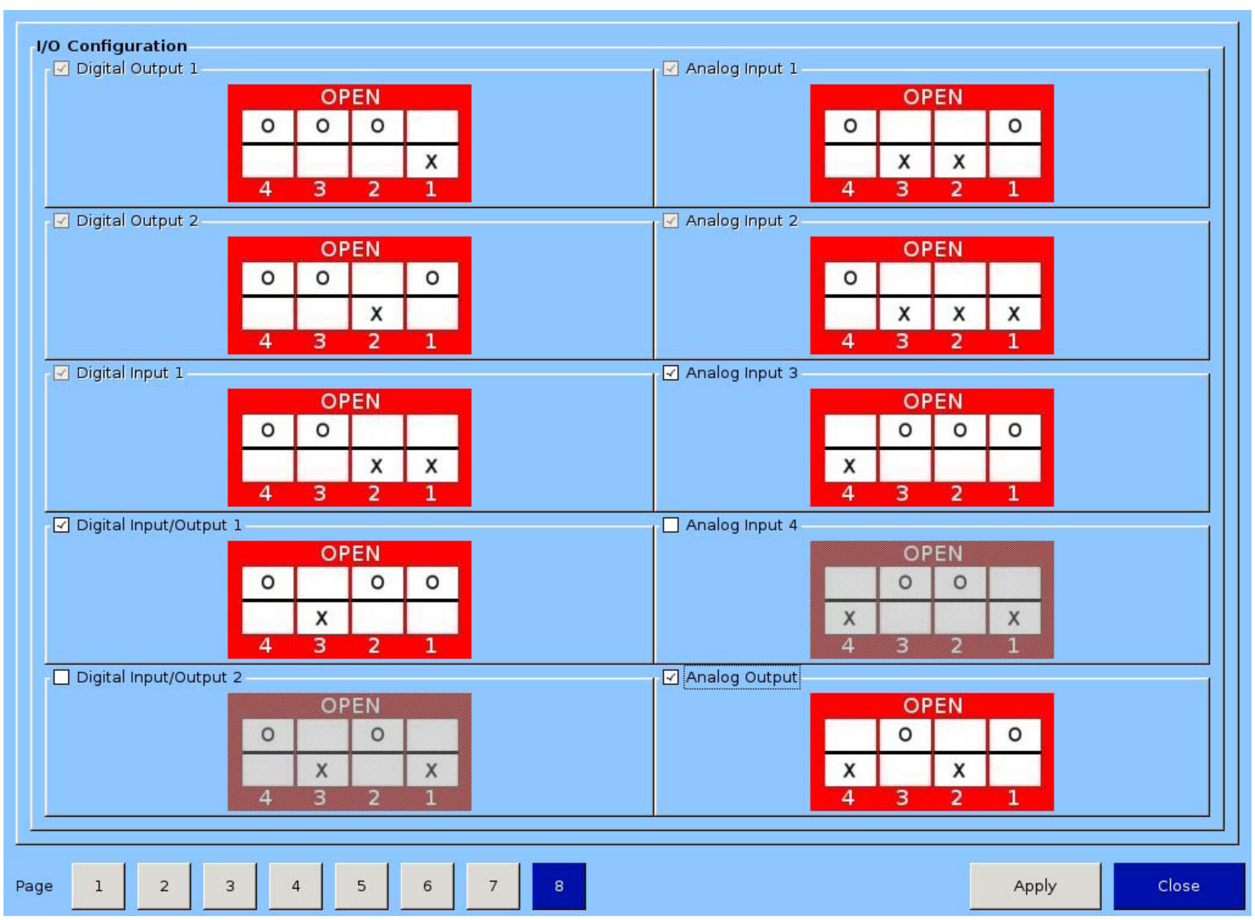


Figure B-27. Selection of Installed Boards from Configuration Screen (Configuration Screen – Page 6)

Step 2: Selection and Naming of Auxiliary Analog Outputs used for Level Control

Navigate to page 7 of the Configuration screen and select the analog output(s) that will be used modulating the positioning valve(s) on the vessel(s). Also provide a name for the analog output(s). You'll need to reference your wiring diagram to determine which analog output(s) need to be enabled.

In Figure B-28, Auxiliary #1 Analog Output was renamed to "Chiller Level 4,20 Out" and Auxiliary #2 Analog Output was renamed to "Condenser Level 4,20 Out". Referencing the wiring diagram, please note that Aux #1 Analog Output corresponds to AO#5 on the wiring diagram, and Aux #2 Analog Output corresponds to AO#6 of the wiring diagram.

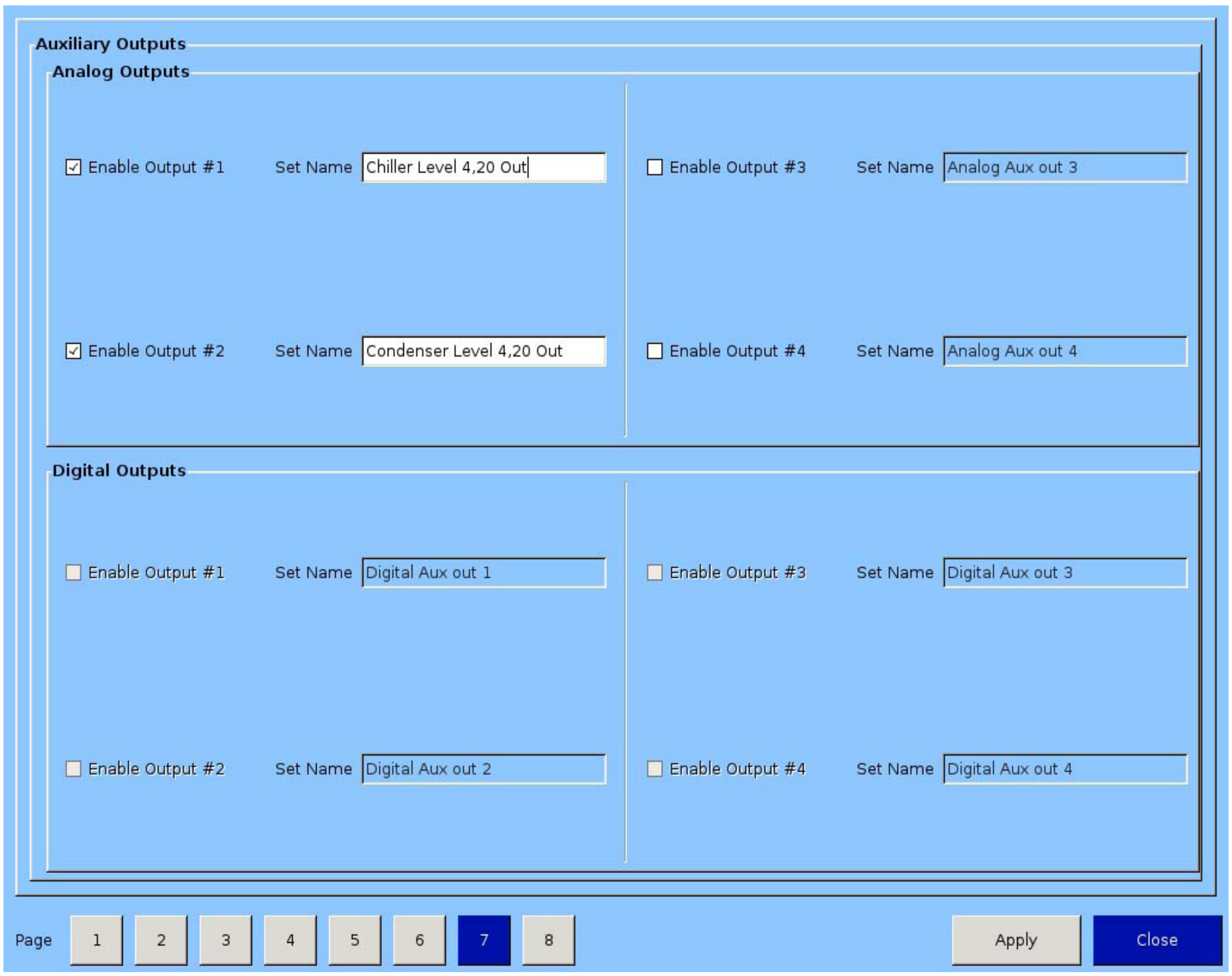


Figure B-28. Enabling and Naming Analog Outputs (Configuration Screen – Page 7)

Step 3: Selection and Naming of Auxiliary Analog Inputs used for Level Control

Navigate to page 6 of the Configuration screen and select the analog inputs(s) that will be used for sensing the 4-20ma signal from the vessel(s) level probe(s). Also provide a name for the analog input(s). You'll need to reference your wiring diagram to determine which analog inputs need to be enabled.

In the above example, Auxiliary #5 Analog Input was renamed to "Chiller Level 4,20 Input" and Auxiliary #6 Analog Input was renamed to "Condenser Level 4,20 Inputs". Referencing the wiring diagram, please note that Aux #5 Analog Input corresponds to Channel #21 on the wiring diagram and Aux #6 Analog Input corresponds to Channel #22 on the wiring diagram.

After steps 1, 2 and 3 have been completed, then press the APPLY button and then press the CLOSE button to exit the Configuration screen.

Continue to step 4.

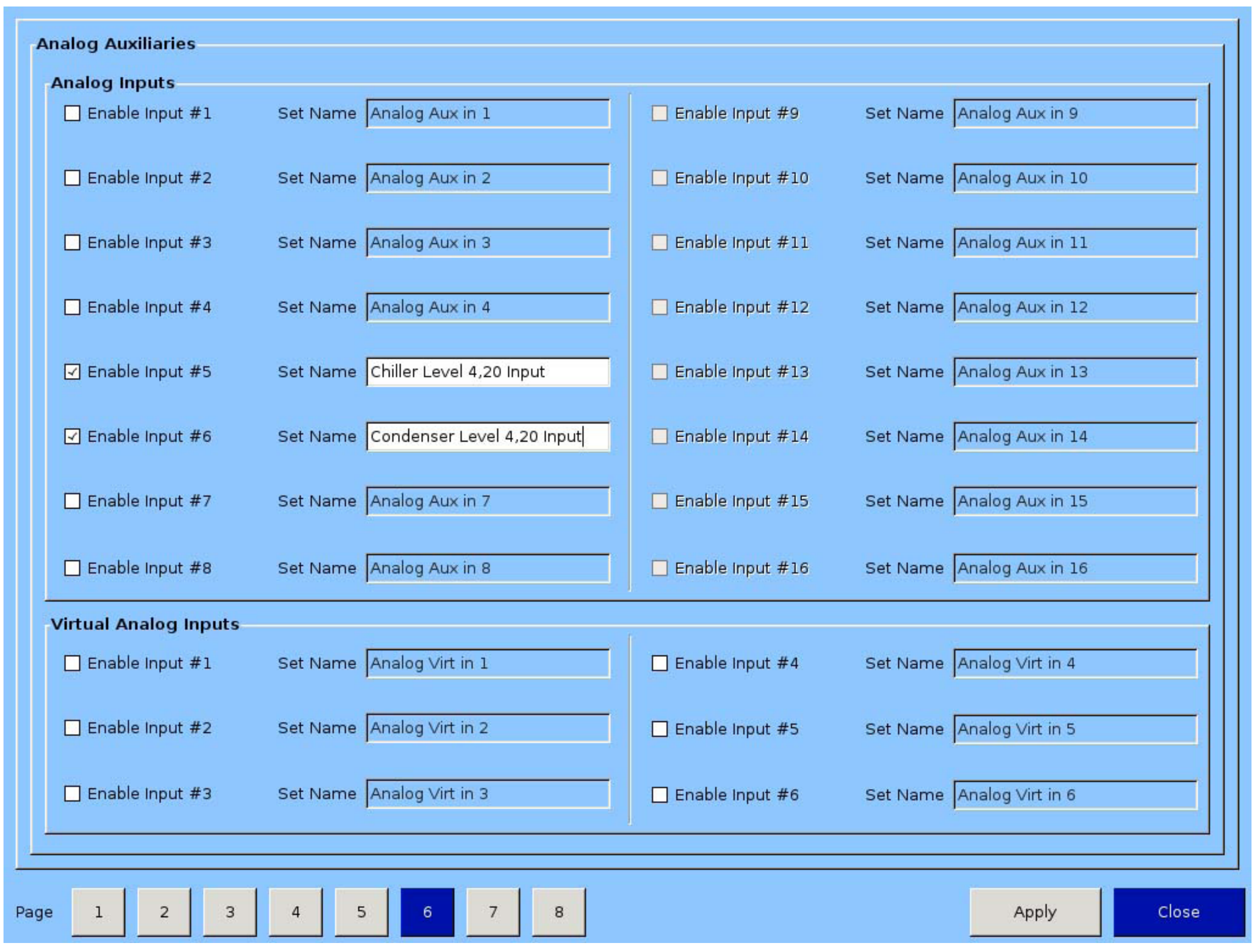


Figure B-29. Enabling and Naming Analog Inputs (Configuration Screen – Page 6)

Step 4: Instrument Calibration Screen Setup of Auxiliary Analog Inputs.

Now that the auxiliary analog inputs have been selected and named, the scaling for the inputs needs to be setup. Navigate to Instrument Calibration screen page 4 and setup the auxiliary analog input(s). These inputs are 4-20ma signals and the scaling will be setup so that:

a. The units of this signal are in “percent”.

b. 4 mA signal corresponds to 0% level.

c. 20 mA signal corresponds to a 100% level.

The setup example shown in Figure B-30, Auxiliary #5 Analog Input was setup so that the units of the input will readout in “percent”. At 4.0ma input, the level percentage is equal to 0.0%. At 20.0ma input, the level percentage is equal to 100.0%. Setup Auxiliary #6 analog input in the same way.

Continue to step 5.

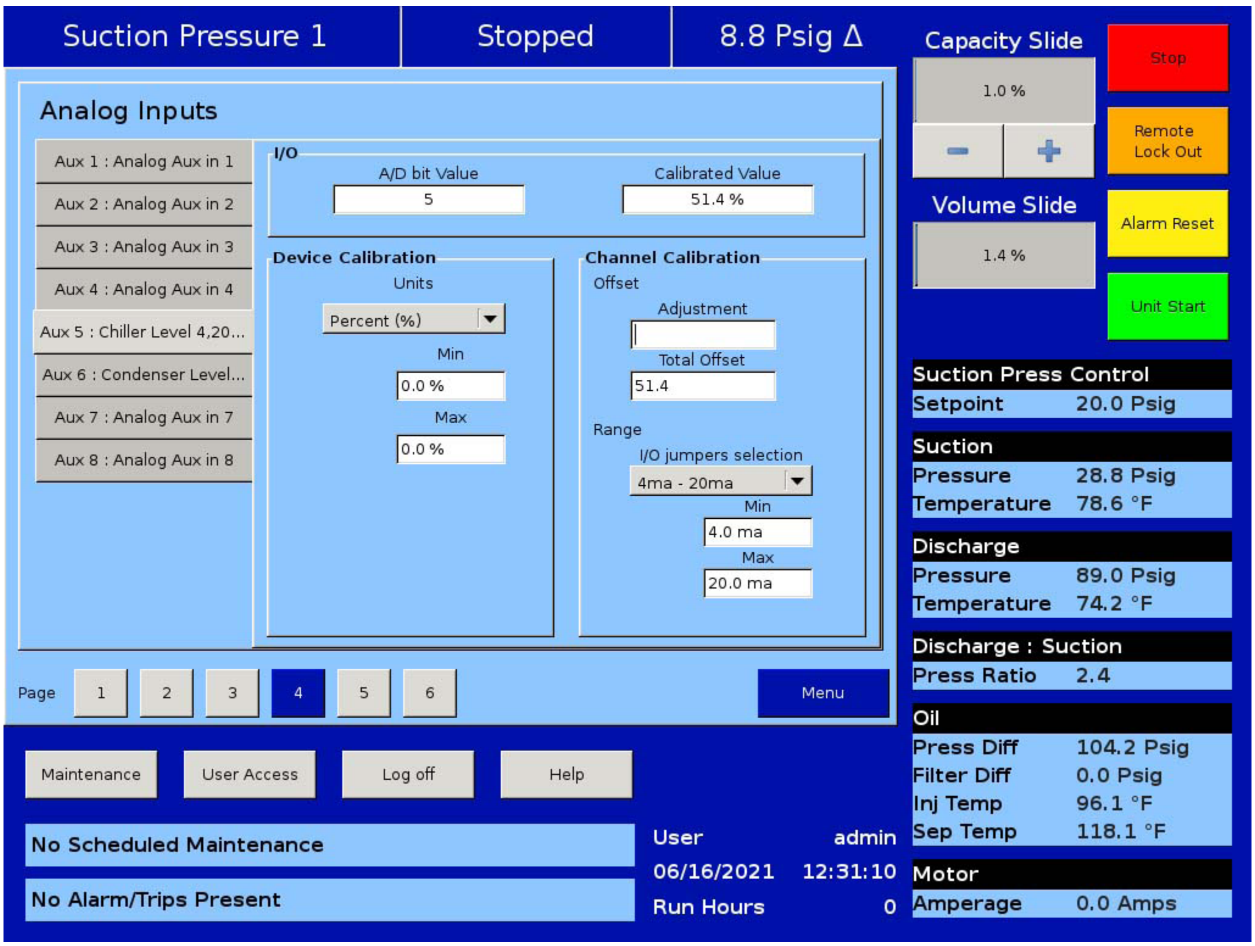


Figure B-30. Scaling Setup for Auxiliary Analog Inputs

Step 5: Auxiliary I/O (Analog Inputs) Alarm and Trip Setup

If an alarm or trip setpoint for the vessel level is desired, then navigate to Auxiliary I/O page 3 and setup any alarm or trip function for the vessel level.

You have the option to select:

- Alarm / Trip : Neither, Alarm Only, Trip Only, Both
- Inhibit: Checking the Inhibit box will prevent the compressor from starting if the analog input falls below the Low Alarm setpoint or above the Hi Alarm setpoint. If the compressor is running while this occurs, it will not shutdown if the "Alarm Only" function were selected (as shown below).

In the above example, Auxiliary #5 and #6 Analog Inputs were setup to function as "Alarm Only". The alarm points have been set to 0% and 75% level. These values would need to be adjusted for appropriate alarm values. The inhibit box was not selected in the example above, so the compressor will start even when the analog inputs are outside the alarm ranges shown.

Continue to step 6.

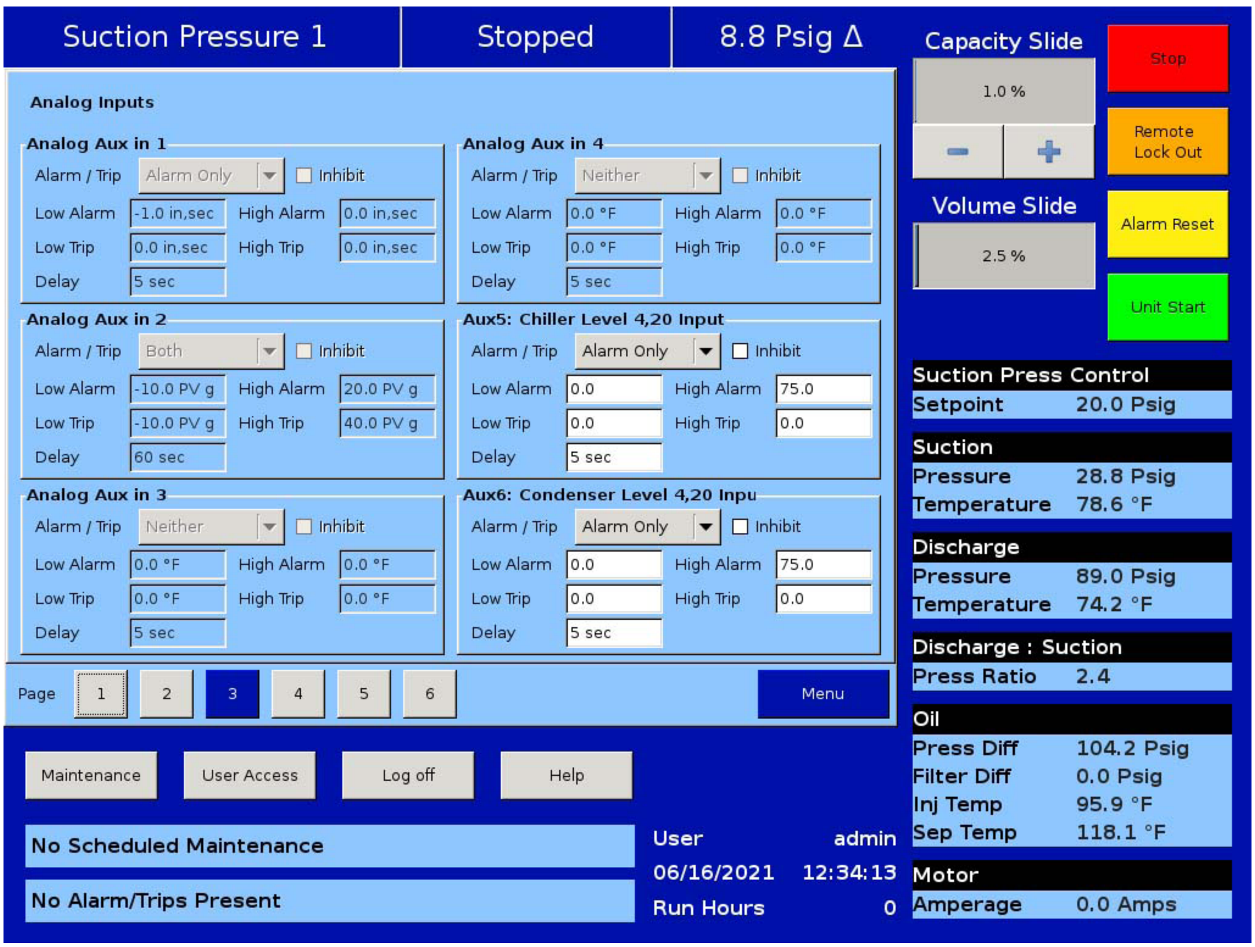


Figure B-31. Auxiliary I/O Alarm and Trip Setup

Step 6: Setup of Analog Output for Vessel Level Control – PID Level Control

Navigate to Auxiliary I/O page 6 and setup analog output control for vessel level.

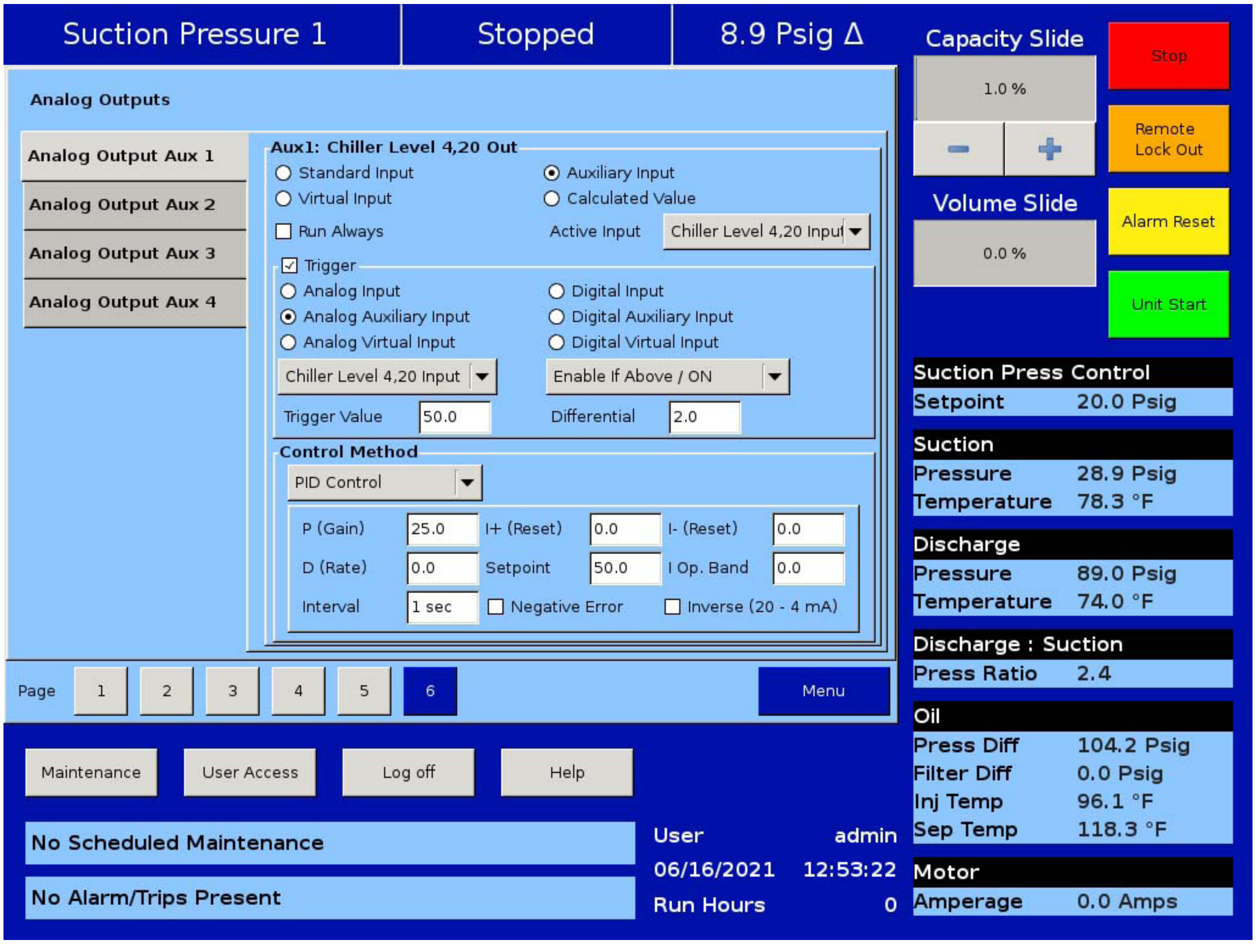


Figure B-32. PID Level Control (Auxiliary I/O – Page 6)

Chiller Level Control

Suppose we are trying to maintain a level of liquid in a chiller. As the level decreases, we want to stroke a positioning valve "more open" to allow more liquid to feed into the chiller.

In the above example, examine the setup of Aux1: Chiller Level 4,20 Output - on the left side of the screen. The "Run Always" selection box is not checked, so the control of the positioning valve will only occur while the compressor is running.

For the setup in Figure B-32, the Auxiliary #1 analog output signal (which is the 4-20 ma signal to the chiller Level positioning valve) is controlled by the Auxiliary Input "Chiller Level 4,20 input" - which was configured in Steps 3, 4 and 5 above. PID Control has been selected, with a 50% setpoint.

The "Trigger Input" is enabled and the trigger setpoint is set at 50% (same as the setpoint). When the trigger input conditions go to a "true" state (in this case, the trigger goes to a true state when the chiller level drops BELOW the setpoint), only then will the auxiliary analog output control be enabled. In the above example, when the chiller level is above 50%, the positioning valve will be fully closed. As it drops below 50%, then the positioning valve will begin to open.

The PID setpoints are selected so that only the P term (gain) is being used. With these settings, the positioning valve will be adjusted in response to the "error" from the desired setpoint.

With the above setting, the response of the Aux1: Chiller Level 4,20 Output is seen to be;

% Level Input		Aux1 Analog Output	
50 %	=	4 ma	(fully closed position)
45 %	=	8 ma	
40 %	=	12 ma	
35 %	-	16 ma	
30 %	=	20 ma	(fully open position)

So a 20 % change in vessel level will cause the positioning valve to go from a closed position to fully open position.

Decreasing the gain (P term) to 12.5 (by half) – will decrease the output sensitivity to a input change. The positioning valve will be stroked from closed to full open position over a larger swing in vessel level. When you decrease the gain by half, then the 4-20ma output signal to the positioning valve is applied over an input range that is doubled;

% Level Input		Aux1 Analog Output
50 %	=	4 ma
40 %	=	8 ma
30 %	=	12 ma
20 %	=	16 ma
10 %	=	20 ma

Now a 40 % change in vessel level will cause the positioning valve to go from a closed position to fully open position.

Condenser Level Control

Suppose we are trying to maintain a level of liquid in a condenser. The condenser has a sump, and as the level in the sump increases, we want to stroke a positioning valve "more open" (to allow more liquid refrigerant to drain) thereby decreasing the amount of liquid in the condenser sump.

Reference the previous page. On the right side is the setup for the condenser PID control. The setup is almost the same with the exception that the trigger condition is selected so that it goes true when the chiller level rises above the setpoint, only then will the auxiliary analog output control be enabled. In the above example, when the chiller level is below 50%, the positioning valve will be fully closed. As it rises above 50%, then the positioning valve will begin to open.

Analog Output Setup For Vessel Level Control – Proportional Level Control

Setting up the vessel level control using proportional control allows you to define the exact percent opening of the positioning valve based on the vessel level input signal. This mode of operation for level control is not as common since the valve opening is in direct proportion to the defined input range, and doesn't consider a "setpoint" or "error from setpoint". It simply moves the positioning valve in direct relation to the defined level input signal. This requires a lot of testing to know what the correct input and output range is needed to achieve a desired level.

You can define an input range to cover the entire 0-100% input span, or you can define a partial range – for instance 0 to 50%, see Figure B-33. The output can be the full 4-20ma output range, or a partial range (for instance 12 to 20 ma). The input and output ranges are completely flexible. In addition, you can define an Inverse output. The proportional control on the left is setup such that for a 0 to 100% input, the respective output ranges 20 ma to 4 ma (reverse acting output).

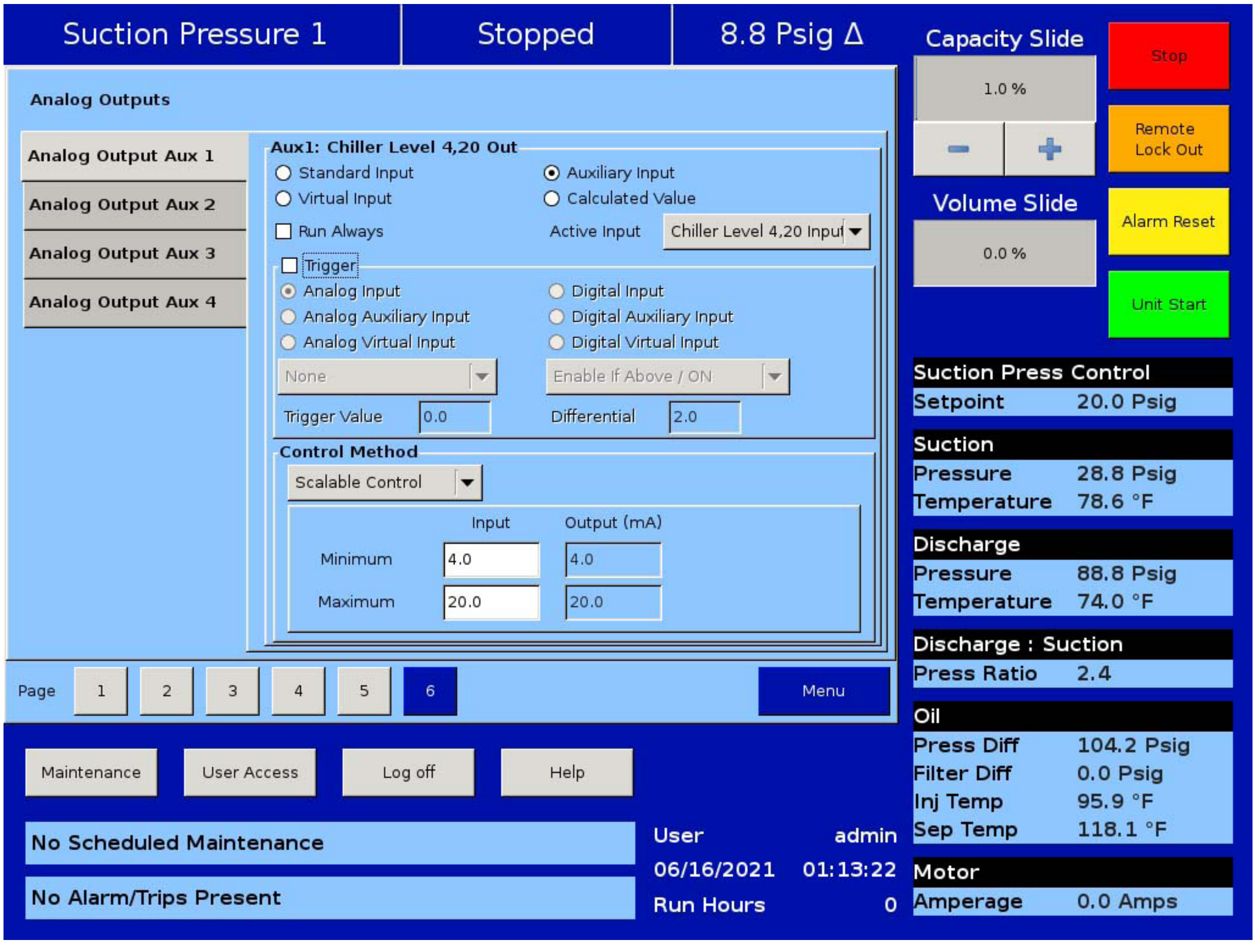


Figure B-33. Proportional Level Control (Auxiliary I/O – Page 6)

VPLUS (AC Motor) Setup Procedure for Vission 20/20 Panel

Introduction

This document provides guidelines to setup AC Motor VPLUS oil cooling system control on the Vission 20/20 panel. Further information can be found in the VPLUS IOM manual (#35391XA).

Scope

Vilter AC VPLUS oil cooling system utilizes a PID algorithm in the Vission 20/20 panel to control the speed of the VPLUS motor. The motor speed controls the amount of liquid refrigerant being injected into the compressor which is used for oil cooling. Motor speed is based on discharge temperature. As the discharge temperature varies from the liquid injection control setpoint, a modulating 4-20ma signal wired to the AC motor VFD will adjust the speed of the motor.

This document provides instructions to help setup the Vission 20/20 for VPLUS(AC Motor) control.

Additional Hardware

In order to control the VPLUS pump motor VFD, an analog output card is required. The 4-20ma signal from the card will be wired to the VFD and will vary the speed of the VPLUS motor - thereby increasing and decreasing the amount of liquid refrigerant that will be injected into the compressor to provide oil cooling.

Hardware Wiring

The analog output card needs to be wired to the V-PLUS VFD, see Figure B-34 and Figure B-35.

The V-PLUS VFD needs to be wired to the V-PLUS Motor, see Figure B-35.

The digital output card needs to wired to the V-PLUS liquid injection solenoid, see Figure B-36.

A control relay must also be installed for the V-PLUS VFD Start, see Figure B-35 and Figure B-36. The control relay is not supplied by Vilter.

VPLUS VFD Settings

In order to achieve a stable liquid injection control, the VPLUS VFD "Maximum Frequency" setting should be set to 38 Hz. This setting is arrived at by matching the historical setting for the DC VPLUS system which used a DC voltage motor controller board to control the speed of a DC motor. On the DC VPLUS system, the DC VPLUS motor had a 90vDC armature. The motor controller board was then set so that the maximum DC voltage to the DC motor was 57 volts DC. This number was arrived at through empirical testing, which provided stable liquid injection control. Translating this to the AC VPLUS system then, the maximum frequency setting on the VFD should be (57/90 x 60 Hz = 38 Hz).

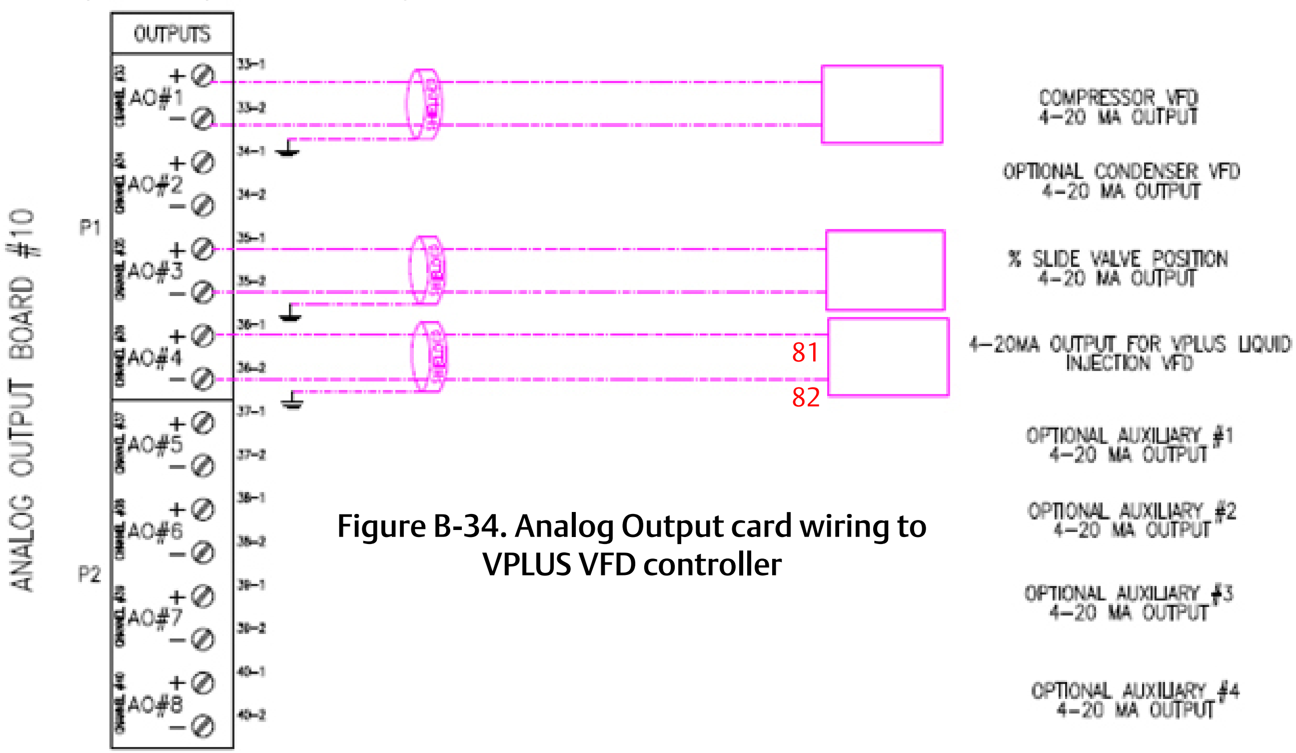


Figure B-34. Analog Output card wiring to VPLUS VFD controller

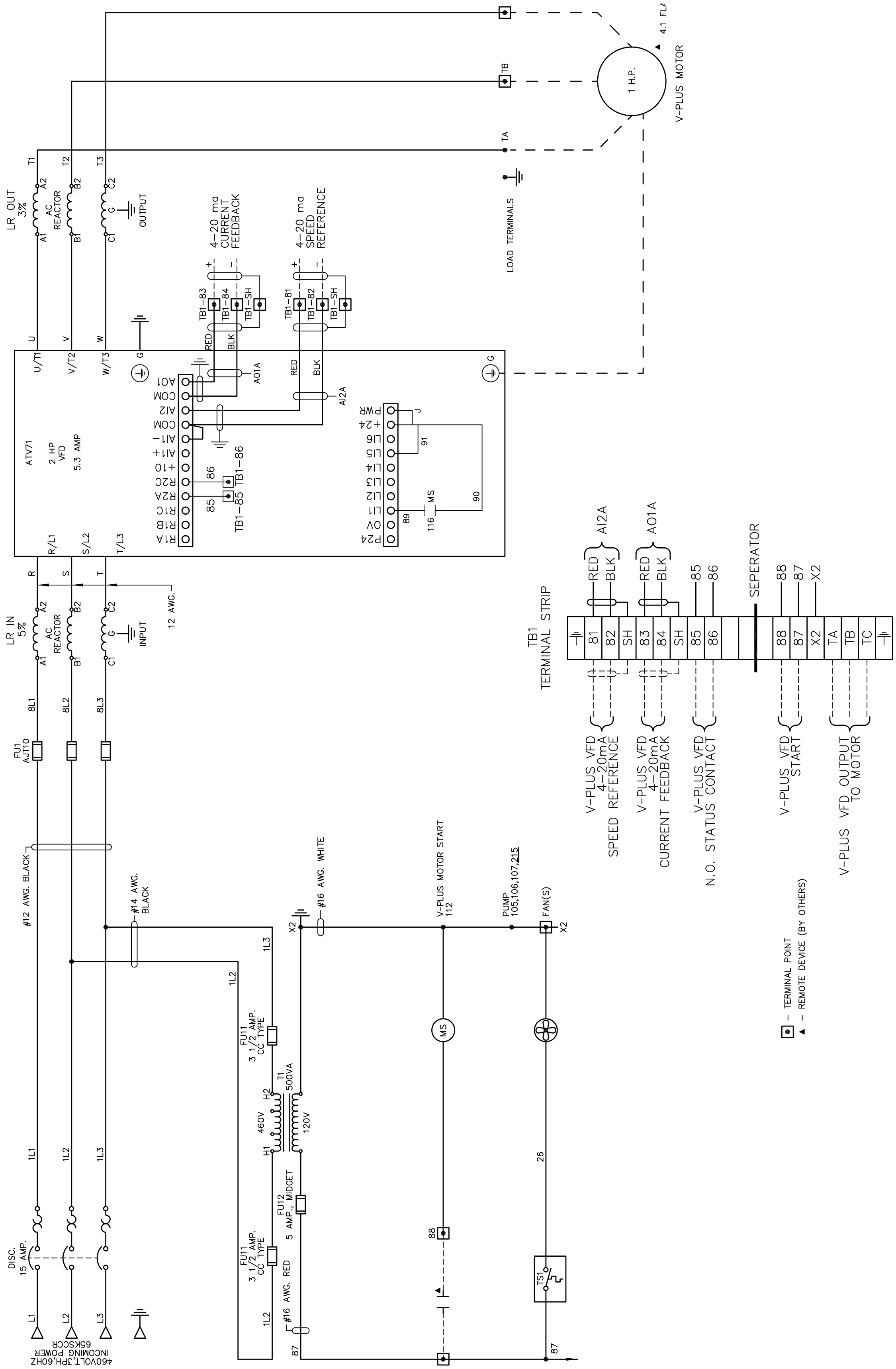


Figure B-35. V-PLUS VFD (Altivar 71) Schematic

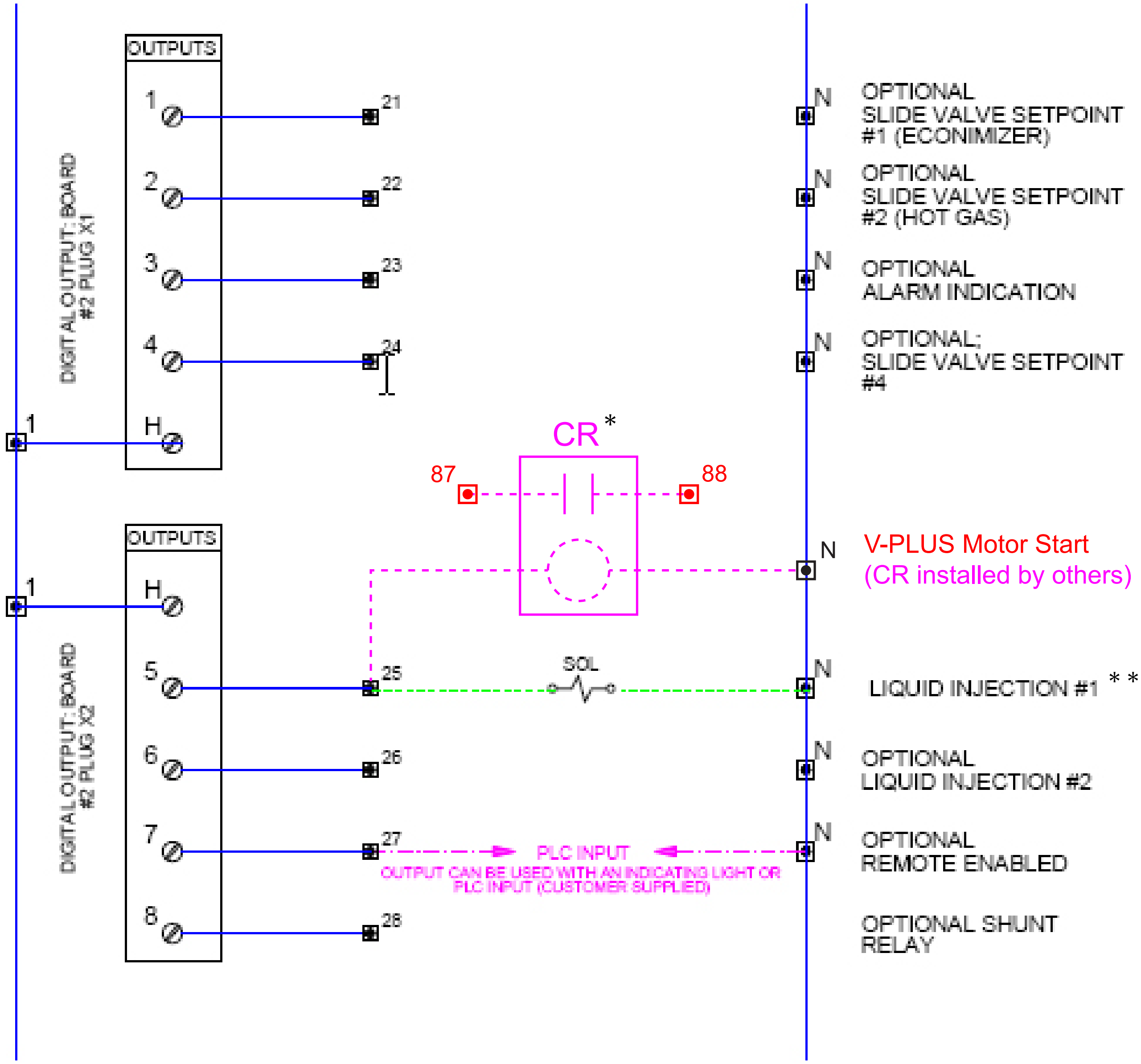


Figure B-36. Digital Output Card Wiring to VPLUS Liquid Injection Solenoid

* *The Control Relay (CR) can be installed in the V-PLUS panel or Vission 20/20 panel. Connections 87 and 88 are in the V-PLUS panel, see Figure B-35.*

* * *Liquid Injection #1 Solenoid is energized and de-energized via the "Liquid Injection Setpoint #1" setpoint in the Control Limits Menu (Liquid Injection Section). The Oil Separator Temp Override Setpoint is also active and will not allow the Liquid Injection solenoid to energize until the Oil Separator Temp is above the Oil Separator Temp Override Setpoint.*

VISSION 20/20 SOFTWARE SETUP

Step 1: Configuration Screen Selection of Installed Boards

Log on and navigate to the Configuration screen, page number 6. Insure that all boards that are physically installed into the Vission 20/20 panel have been selected or "checked". You should have the additional board #10 installed (analog output board) and selected.

Continue to Step 2.

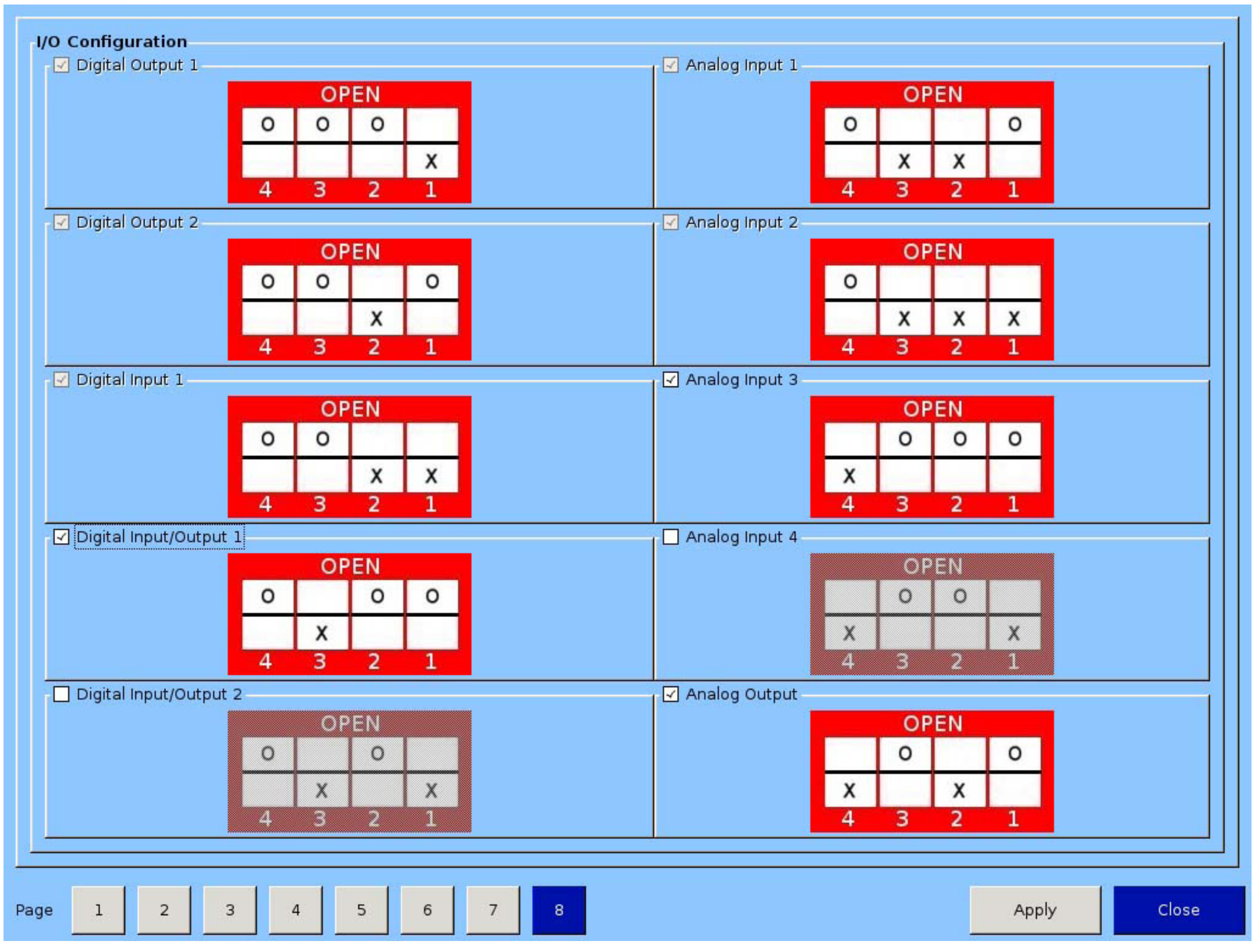


Figure B-37. Selection of Installed Analog Output Board (Configuration Screen – Page 8)

Step 2: Setup and selection of Oil Cooling from page 2 of the Configuration screen

The oil cooling VPLUS algorithm must be enabled from the configuration screen. The algorithm used for this is the same one that is used to control the oil cooling motorized positioning valve. Navigate to page 2 of the Configuration screen. In the middle column, towards the bottom of page 2 are the Oil Cooling selections, see Figure B-38. Select "Liquid Injection" method and then select the "Motorized Valve" selection. Note that by selecting the positioning valve algorithm, the speed of the VPLUS motor is being controlled based on the discharge temperature only.

Continue to step 3.

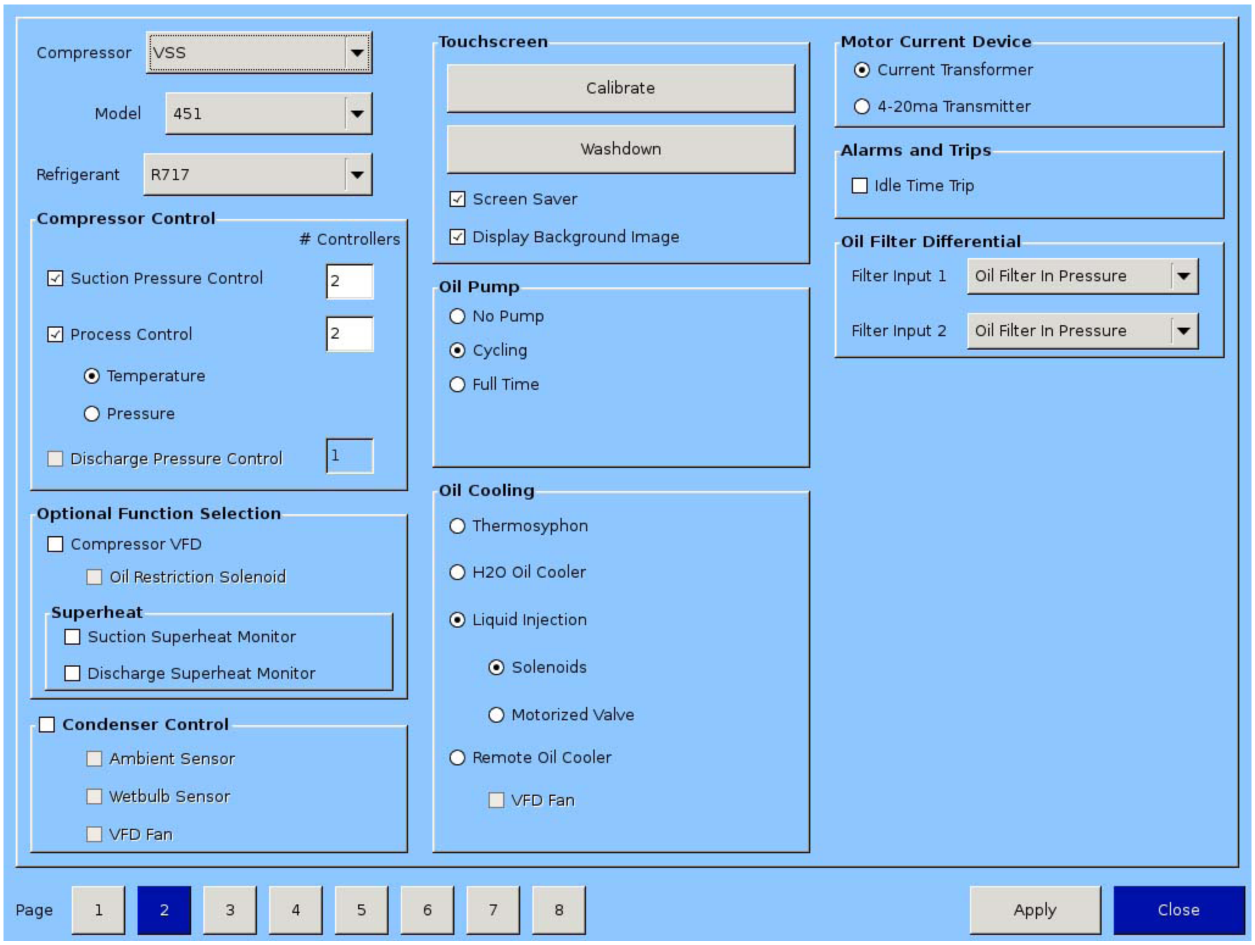


Figure B-38. VPLUS Oil Cooling Selection

Step 3: Setup and selection of VPLUS / Motorized Valve Configuration.

The oil cooling VPLUS control parameters must now be setup. Navigate to the last page of the Compressor Control settings page. Setup the Motorized Control Valve setting as show below in Figure B-39.

- Setpoint : 135 deg F.
- Motorized Valve Control: P = 25.0 I = 1.0 D = 4.0
- Minimum Valve Open Percent = De-selected.
- Avg. with Oil Manifold Temperature = De-selected.
    - This selection should be determined by the operator through testing.
- Oil Separator Temp. Override = 100 deg F.

Depending upon the size of the oil separator, the P term may have to be adjusted to give proper response of the 4-20ma signal to the VFD for the VPLUS motor.

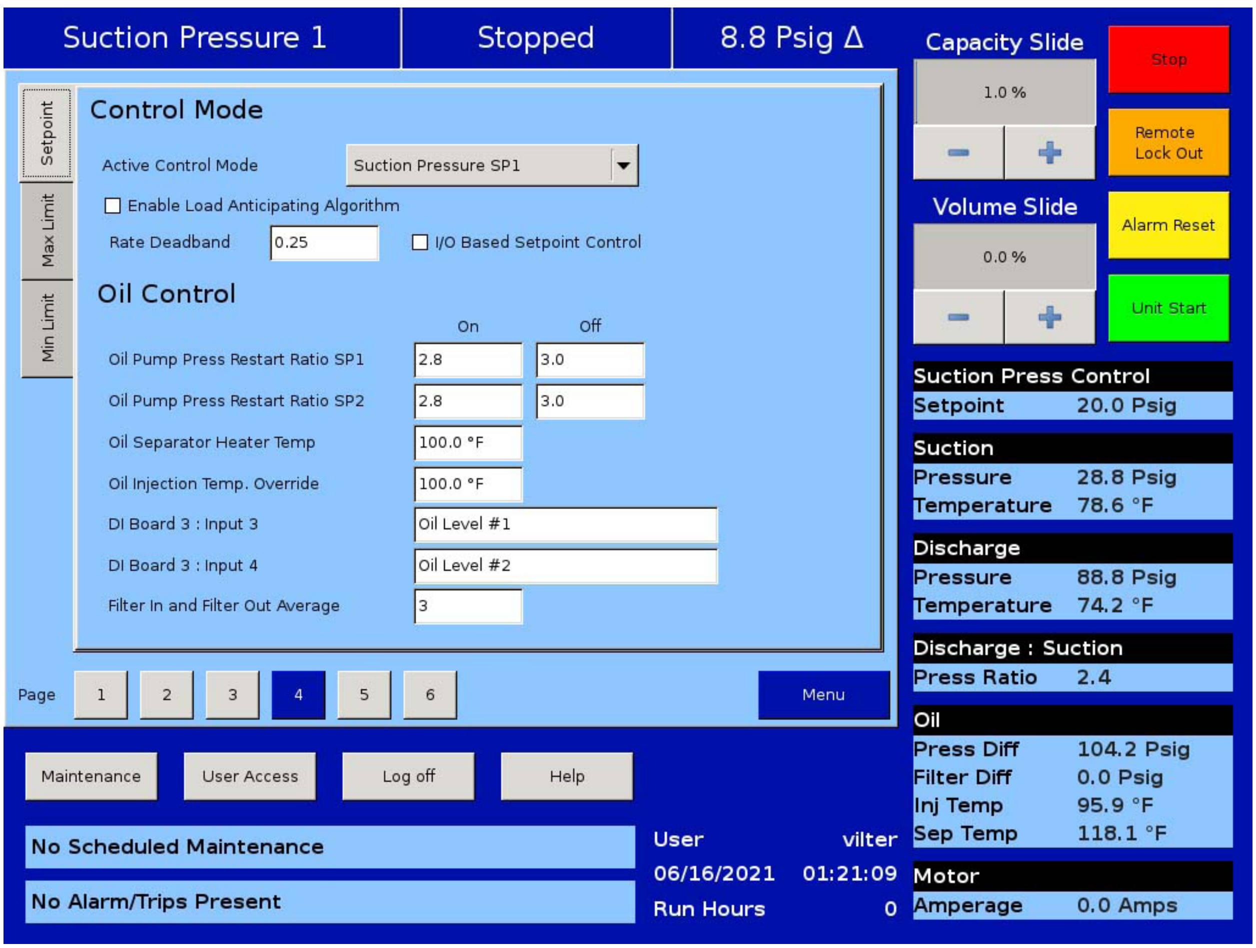


Figure B-39. VPLUS / Motorized Valve Control PID Parameter Setup

VPLUS (DC Motor) Setup Procedure for Vission 20/20 Panel

Introduction

This document provides guidelines to setup a DC Motor VPLUS oil cooling system control on the Vission 20/20 panel.

Scope

The Vilter standard VPLUS oil cooling system uses a mini-temperature controller to monitor both discharge and oil injection temperature, averages those temperatures and compares the average to a setpoint. Based on the error from the setpoint, the temperature controller then sends a varying 4-20ma signal to a Dart speed control board – which varies the speed of a DC motor. The speed of the motor controls the amount of liquid refrigerant that is injected into the compressor to provide oil cooling.

The Vission 20/20 has oil cooling controller algorithms built into the program, and therefore allows for removal of the temperature controller from the VPLUS panel. This document provides instructions to help setup the Vission 20/20 for VPLUS control.

After removing the temperature controller wiring, the wiring diagram will look like Figure B-41

Additional Hardware

In order to control the Dart speed control from the Vission 20/20, an analog output card is required. The 4-20ma signal from the card will wired to the Dart speed control and will vary the speed of the VPLUS motor - thereby increasing and decreasing the amount of liquid refrigerant that will be injected into the compressor to provide oil cooling.

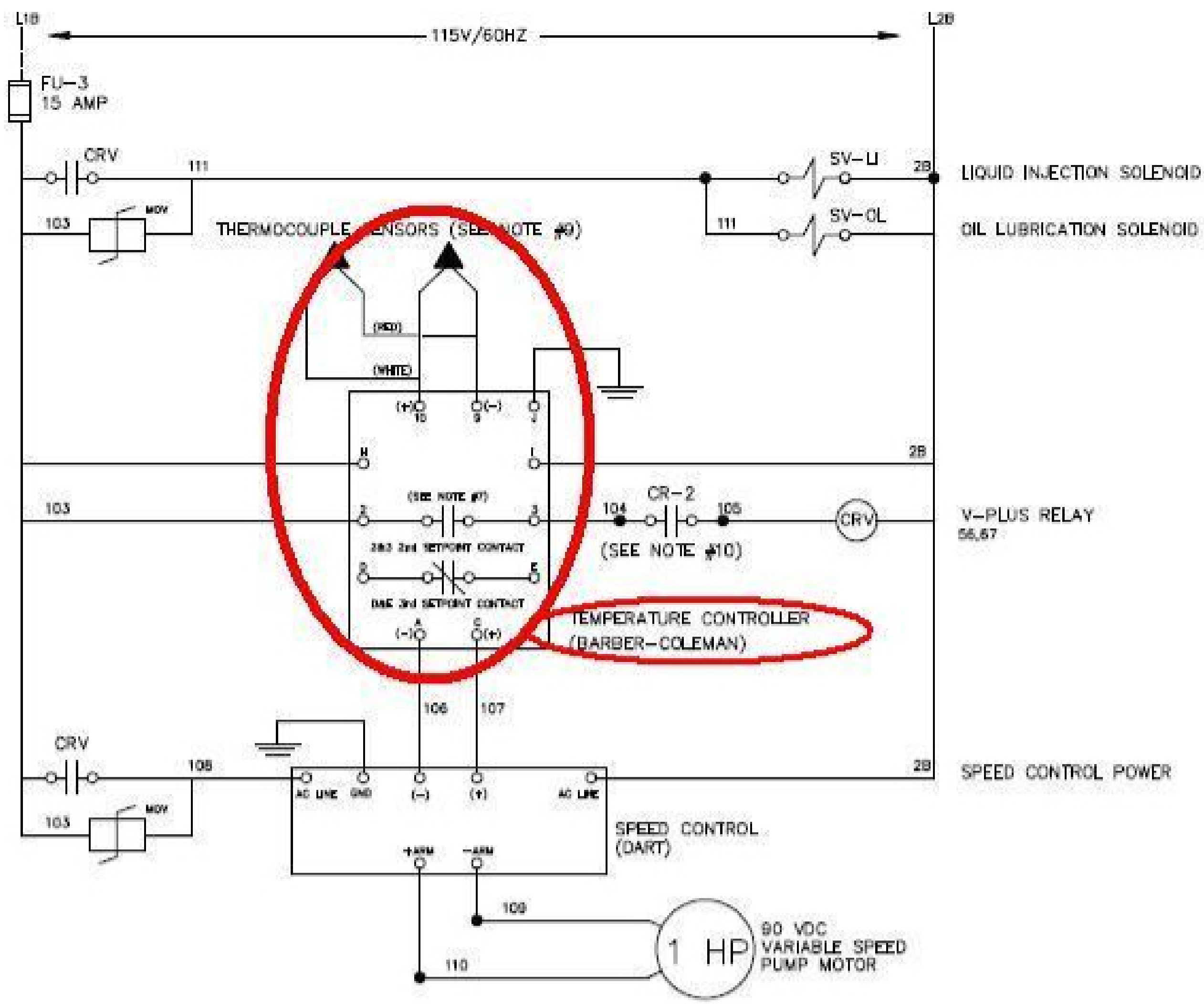


Figure B-40. Standard VPLUS Oil Cooling System Wiring (Eliminating Temperature Controller)

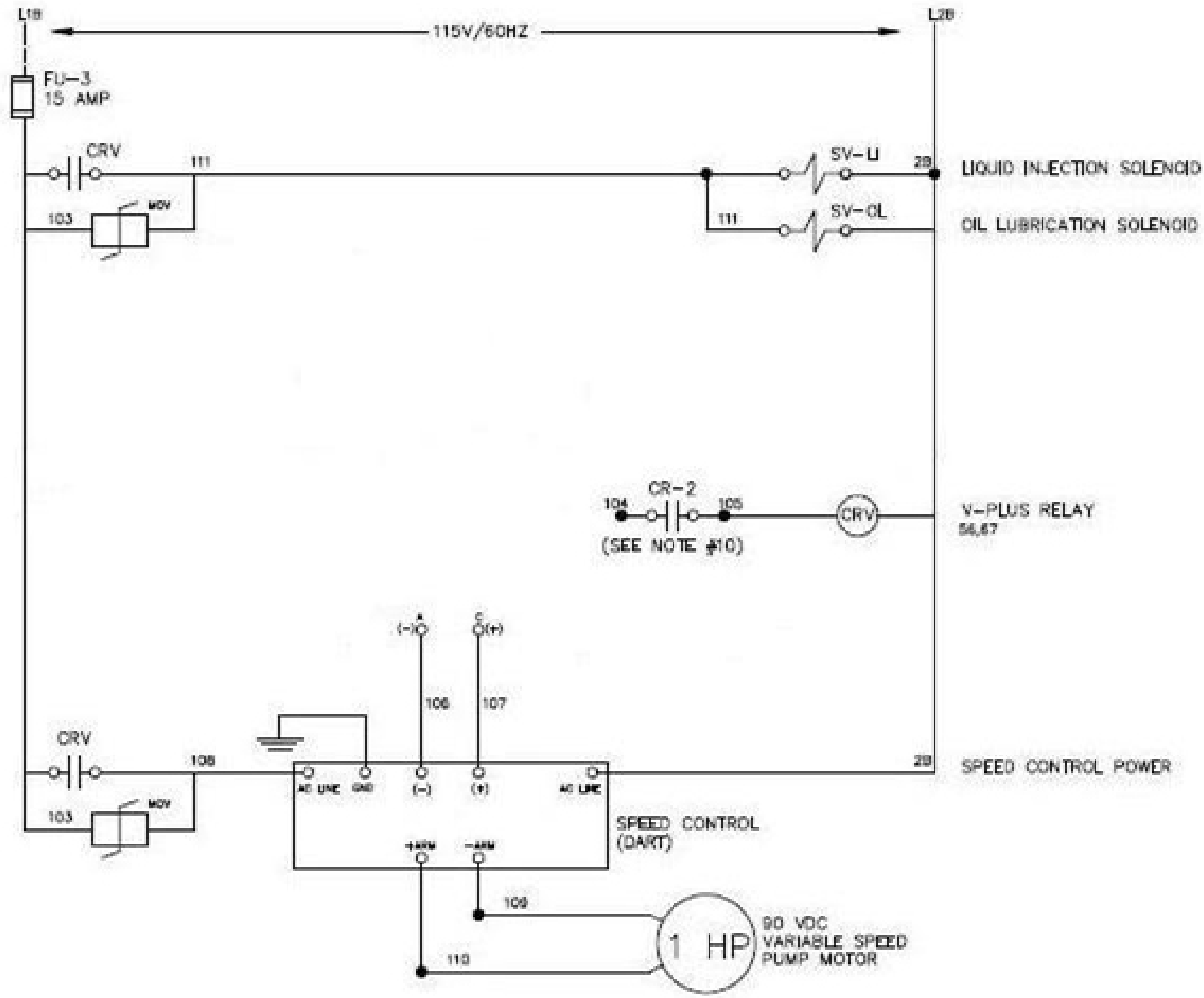


Figure B-41.Temperature Controller Wiring Removed

Hardware Wiring

Interconnect wiring between the Vission 20/20 panel and the VPLUS panel now needs to be done.

1. First make sure that the VPLUS panel and the Vission 20/20 panel control power comes from the same source.
2. Next, the Vission 20/20 analog output card must be wired to the Dart speed controller board. The analog output that is used for this is AO#4, see Figure B-42. Wires from AO#4 will land on wires 106 and 107, see Figure B-41.
3. Finally, the VPLUS relay (CRV) shown in Figure B-40 must also be wired to the Vission 20/20. This relay will be controlled by the Vission 20/20 digital output (board #2, output #5) – the liquid injection solenoid output. Run a wire from terminal 25 in the 20/20 panel to terminal 104 in the VPLUS panel, see Figure B-43.

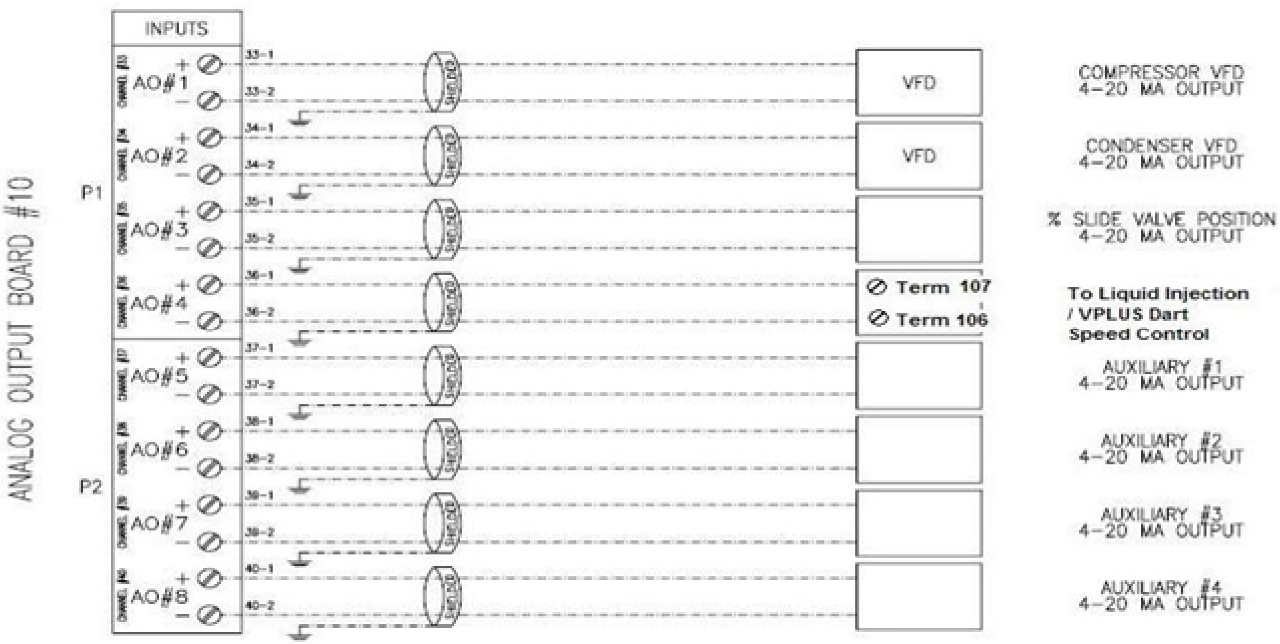


Figure B-42. Analog Output Card Wiring to VPLUS Dart Speed Controller (Wire 106 and 107)

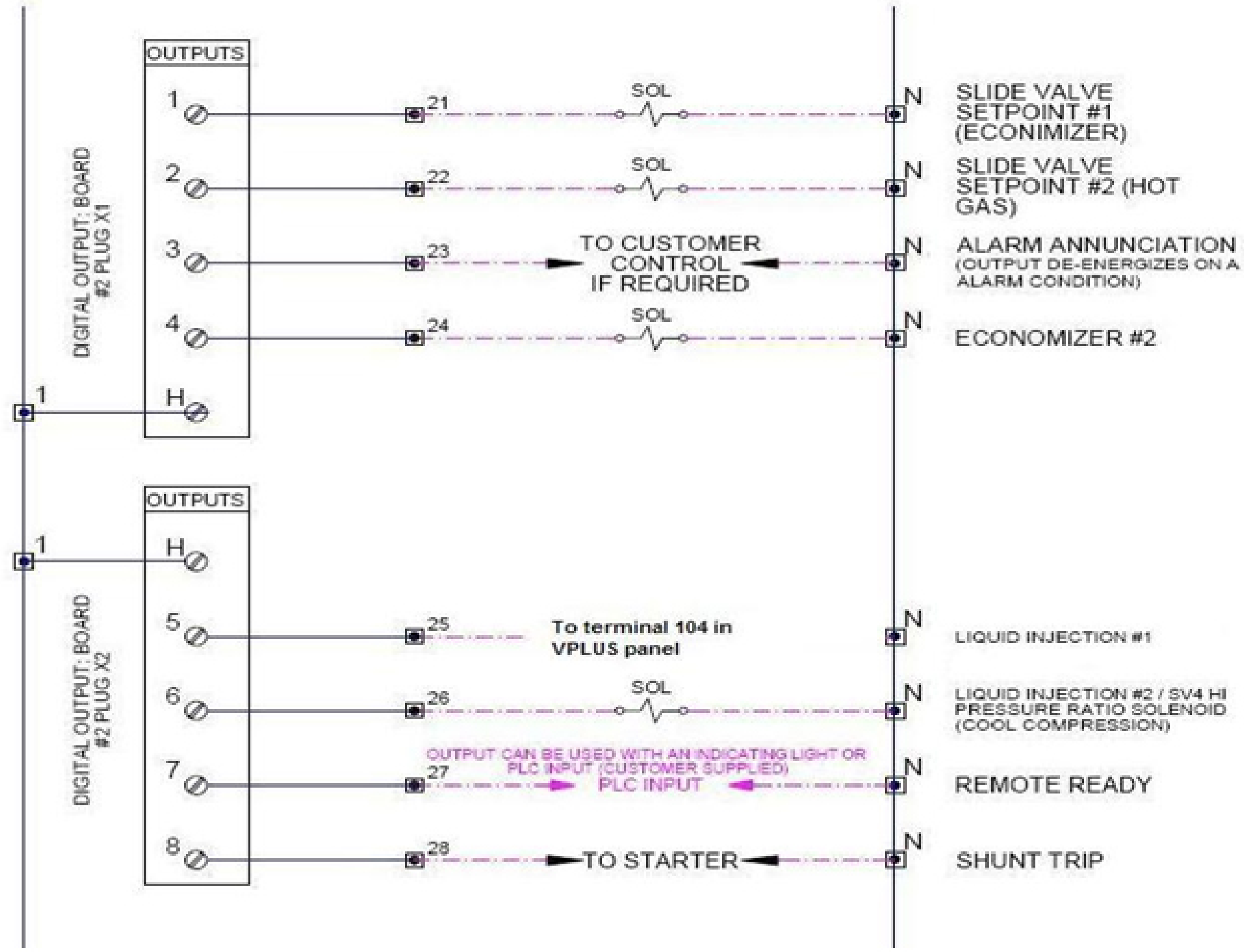


Figure B-43. Digital Output Card Wiring to VPLUS CRV Relay Terminal 104

Vission 20/20 Software Setup

Step 1: Configuration Screen Selection of Installed Boards

Logon and navigate to the Configuration screen, page number 8. Insure that all boards that are physically installed into the Vission 20/20 panel have been selected or "checked". You should have the additional board #10 installed (analog output board) and selected.

Continue to step 2.

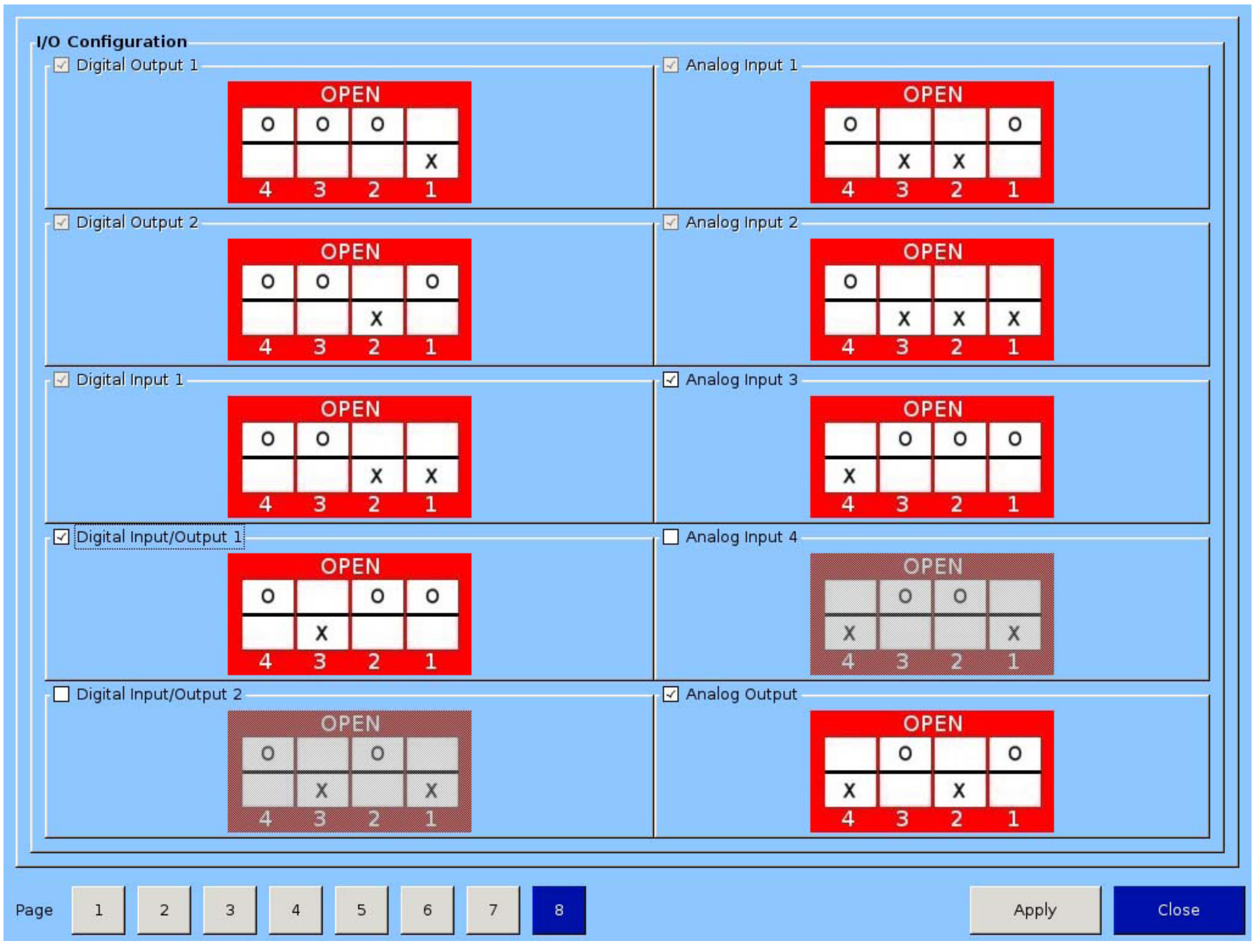


Figure B-44. Selection of Installed Boards (Configuration Screen – Page 8)

Step 2: Setup and selection of Oil Cooling from page 2 of the Configuration screen

The oil cooling VPLUS algorithm must be enabled from the configuration screen. The algorithm used for this is the same one that is used to control the oil cooling motorized positioning valve. Navigate to page 2 of the Configuration screen. In the middle column, towards the bottom of page 2 are the Oil Cooling selections, see Figure B-45. Select "Liquid Injection" method and then select the "Motorized Valve" selection. Note that by selecting the positioning valve algorithm, the speed of the VPLUS motor is being controlled based on the discharge temperature only. (The original VPLUS temperature controller had thermocouples that sensed both the discharge temperature and the oil injection temperature and then averaged those two temperatures together, in order to control the speed of the VPLUS motor.

Continue to step 3.

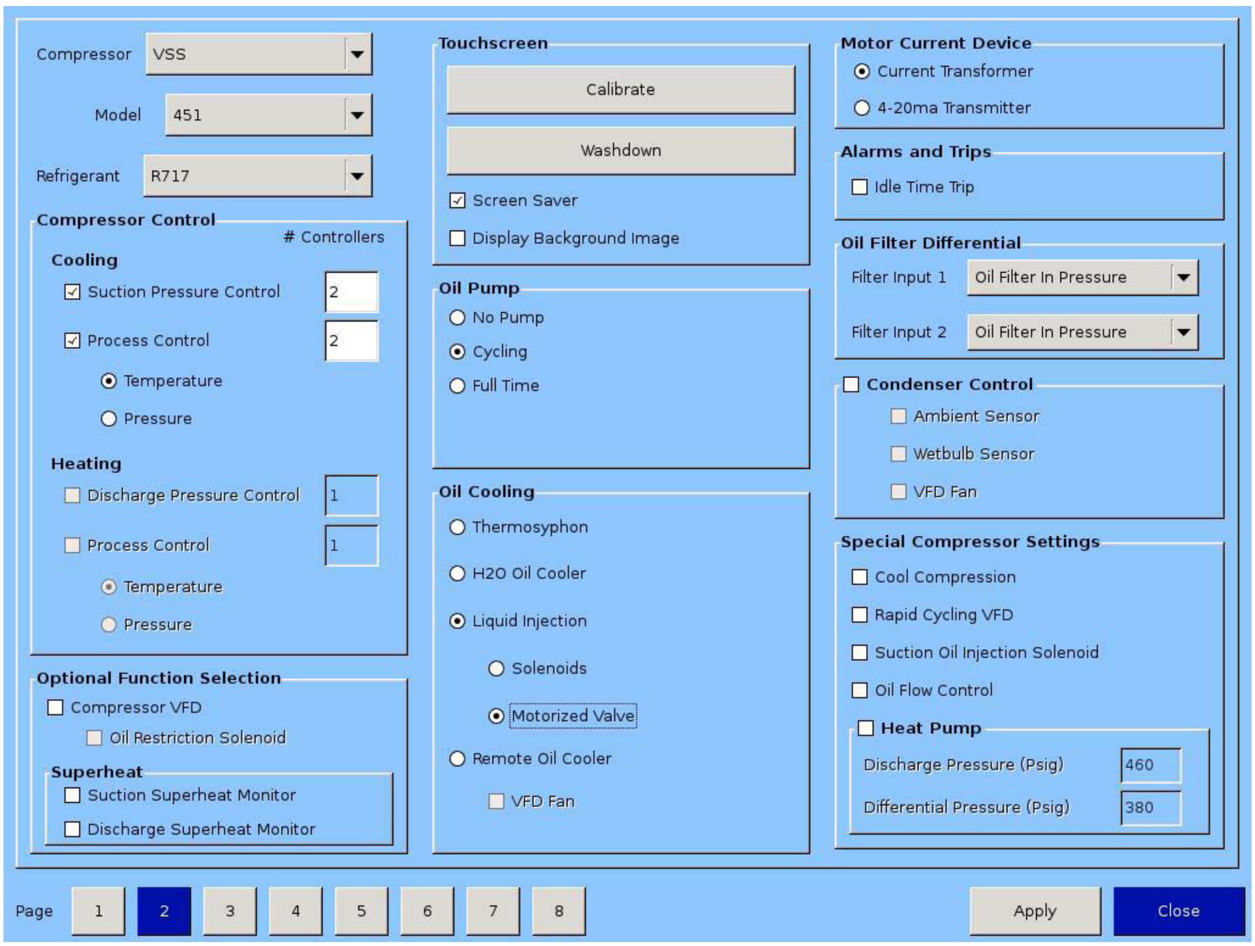


Figure B-45. Oil Cooling Selection for VPLUS Oil Cooling

Step 3: Setup and selection of VPLUS / Motorized Valve Control PID parameters.

The oil cooling VPLUS control parameters must now be setup. Navigate to the last page of the Compressor Control settings page. Setup the Motorized Control Valve setting as show in Figure B-46.

- Setpoint : 135 deg F.
- Motorized Valve Control: P = 25.0 I = 1.0 D = 4.0
- Minimum Valve Open Percent = De-selected.
- Avg. with Oil Manifold Temperature = De-selected.
    - This selection should be determined by the operator through testing. In some applications, selecting this option can provide a more stable control of the VPLUS motor, compared to only using discharge temperature to control the motor.
- Oil Separator Temp. Override = 100 deg F.

Depending upon the size of the oil separator, the P term may have to be adjusted to give proper response of the 4-20ma signal to the Dart Speed controller board for the VPLUS motor.

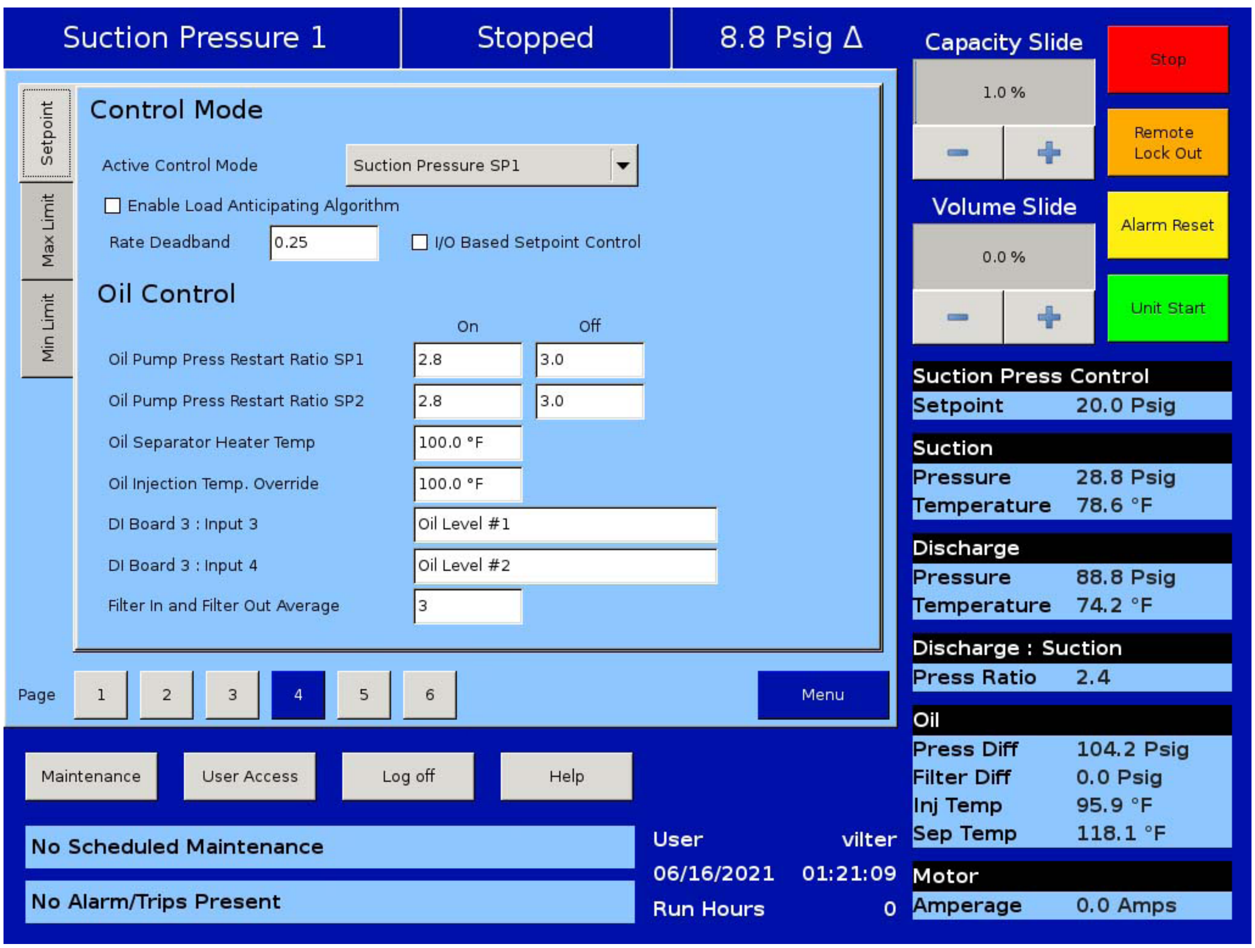


Figure B-46. Setting the VPLUS / Motorized Valve Control PID Parameters

Vibration Monitoring Setup Procedure

Introduction

Follow these steps to setup the vibration monitoring system on the unit.

All electrical wiring and boards must be installed before proceeding with this procedure.

NOTE

This procedure will only show the steps to set up one vibration monitoring set (one Vibration Sensor and one Transmitter).

Step 1: Select Analog Input Boards

From the Configuration screen, page 6, select the number of Analog Input boards installed. In this case, an additional analog input board was installed, Analog Input 3.

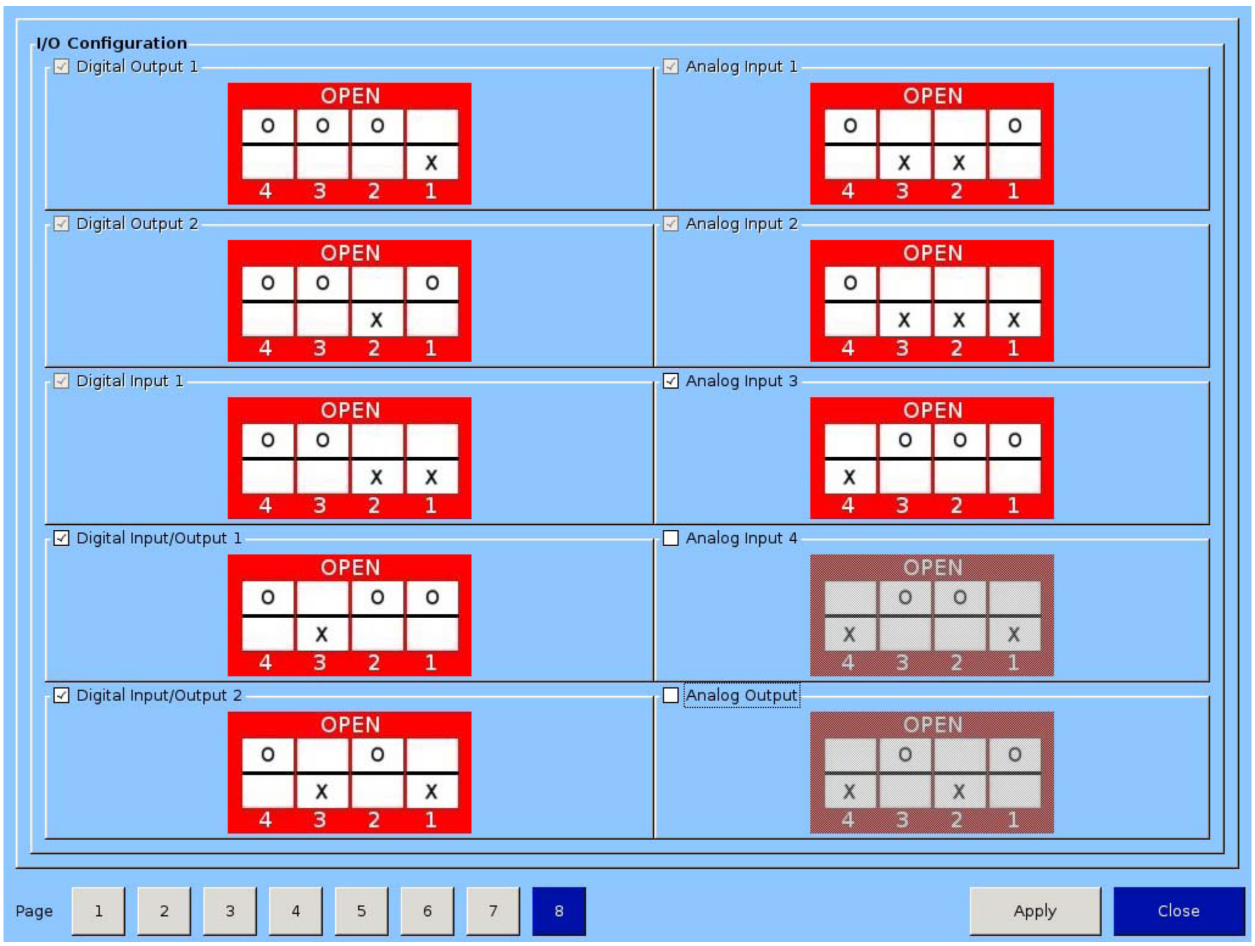


Figure B-47. Vibration Monitoring - Step 1 (Configuration Screen, Page 8)

Step 2: Configure Analog Auxiliary Inputs

From the Configuration screen, page 4, select the number of Analog Auxiliary Inputs. In this case, since the Vibration Transmitter outputs two signals, a 4-20 mA Fault Detector signal and a 4-20 mA Overall Vibration signal, two auxiliary inputs are needed, Input #1 and Input #2

In the Set Name field, add a description for each auxiliary input. In this case, Input #1 is "overall vibration" and Input #2 is "Fault Detector". Adding in the names here will now allow other associated name fields to be populated as shown in Step 3.

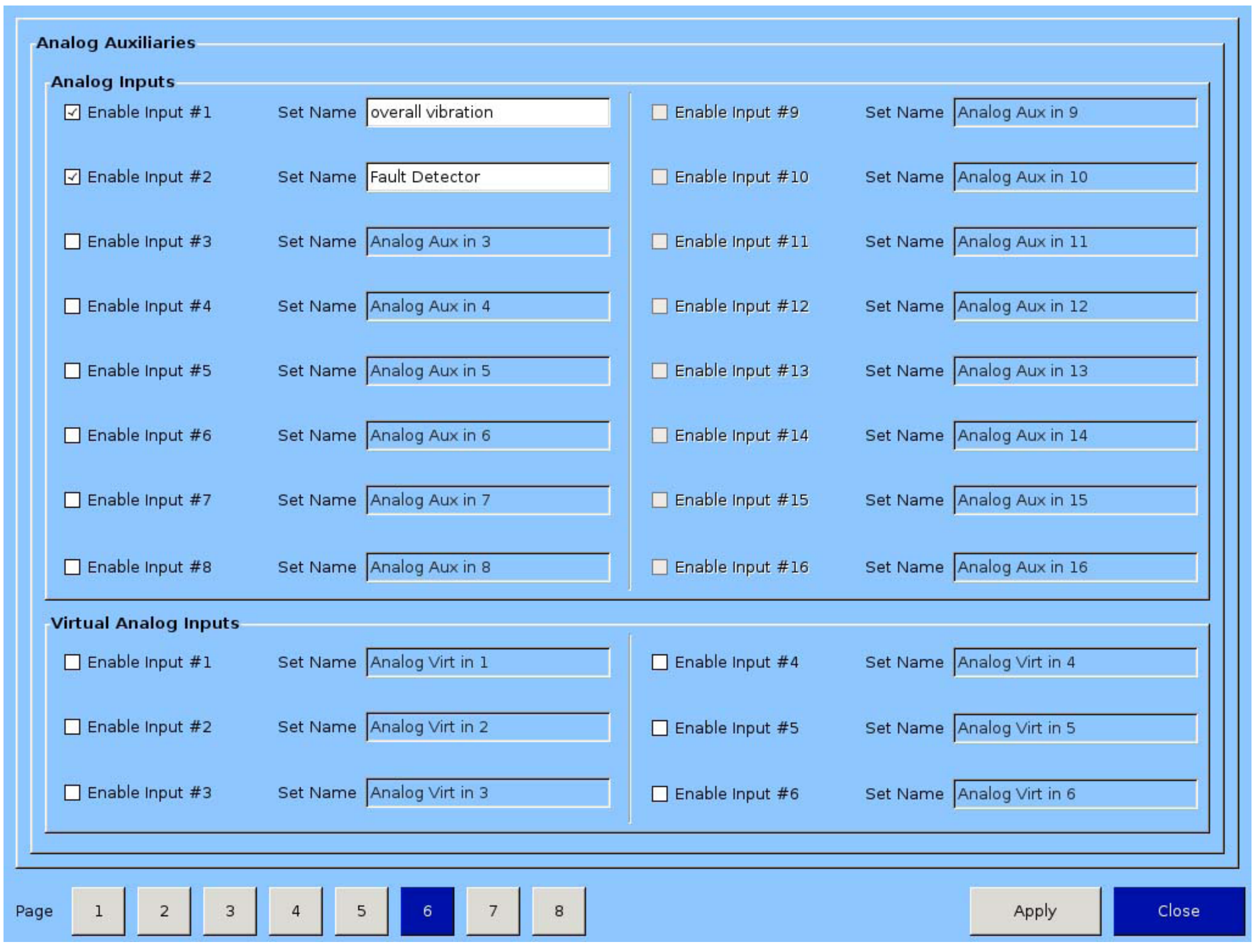


Figure B-48. Vibration Monitoring - Step 2 (Analog Auxiliary Screen, Page 6)

Step 3: Calibrate Instruments (1 of 2)

From the Instrument Calibration screen, page 4, with Input #1 and Input #2 configured, the Set Names will be shown in Aux 1 and Aux 2 tabs.

To set up Aux 1, in the Device Calibration window, select "Other" from the drop-down menu and enter the desired unit, in this case, "in,sec". Then add in the Min and Max values, in this case, "0.0 in,sec" and "1.0 in,sec", respectively. Since the Range for the device (Vibration Transmitter) is 4-20 mA, "0.0 in,sec" will correspond to 4 mA and "1.0 in,sec" will correspond to 20 mA. No further set up is required, other than what has been explained.

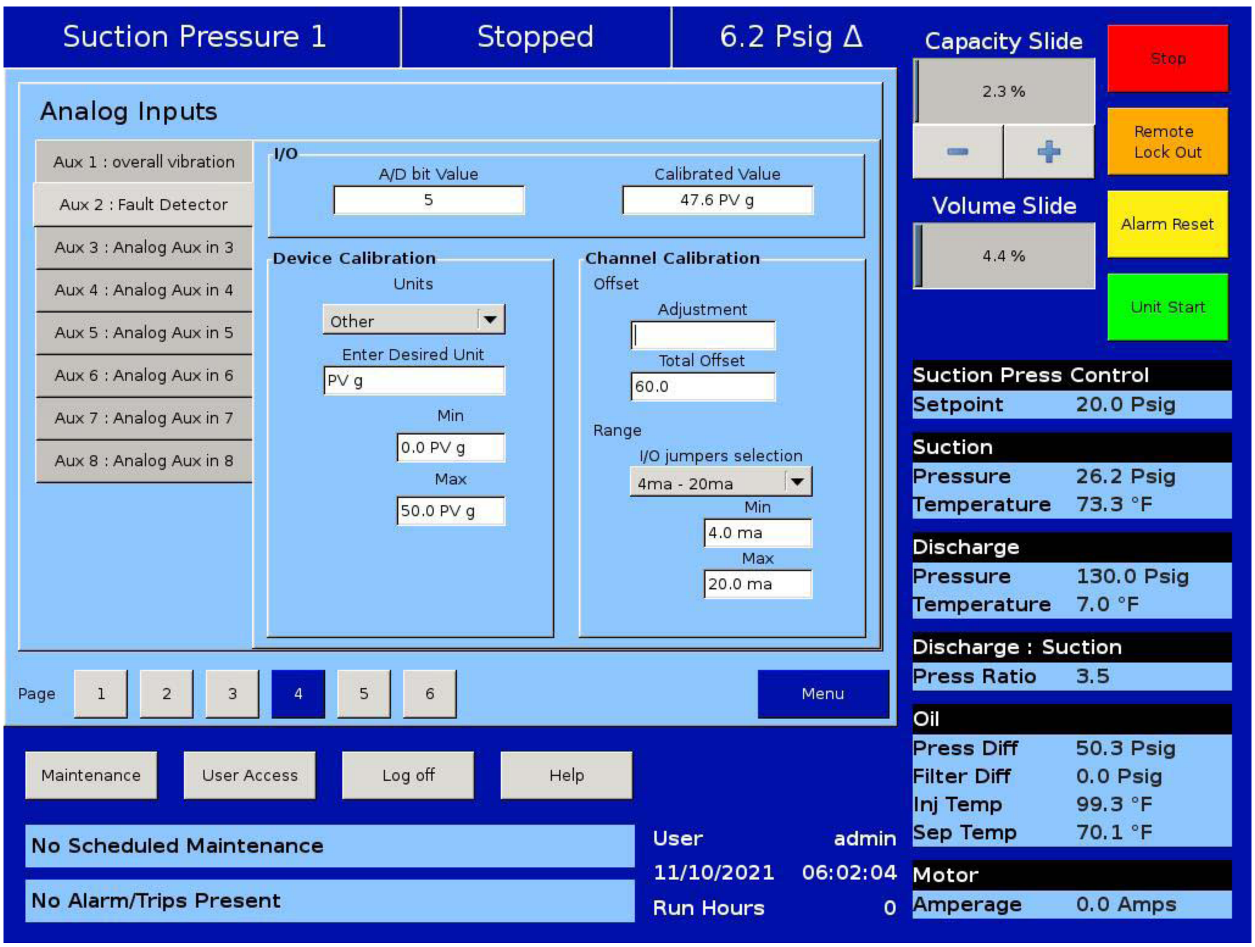


Figure B-49. Vibration Monitoring - Step 3 (Instrument Calibration, Page 4)

Step 4: Calibrate Instruments (2 of 2)

Now that calibrating Aux 1 is complete, continue to calibrate Aux 2.

To set up Aux 2, in the Device Calibration window, select "Other" from the drop-down menu and enter the desired unit, in this case, "PV g".

NOTE

"PV g" is "PeakVue™ g". This unit is in no relation to g as in g-force. This unit is used to describe the frequency of stress waves caused by defects in the moving component. So a high PV g value, indicates a major defect in the component (i.e. a crack in the race of a roller bearing).

Then add in the Min and Max values, in this case, "0.0 PV g" and "50.0 PV g", respectively. Since the Range for the device (Vibration Transmitter) is 4-20 mA, "0.0 PV g" will correspond to 4 mA and "50.0 PV g" will correspond to 20 mA. No further set up is required, other than what has been explained.

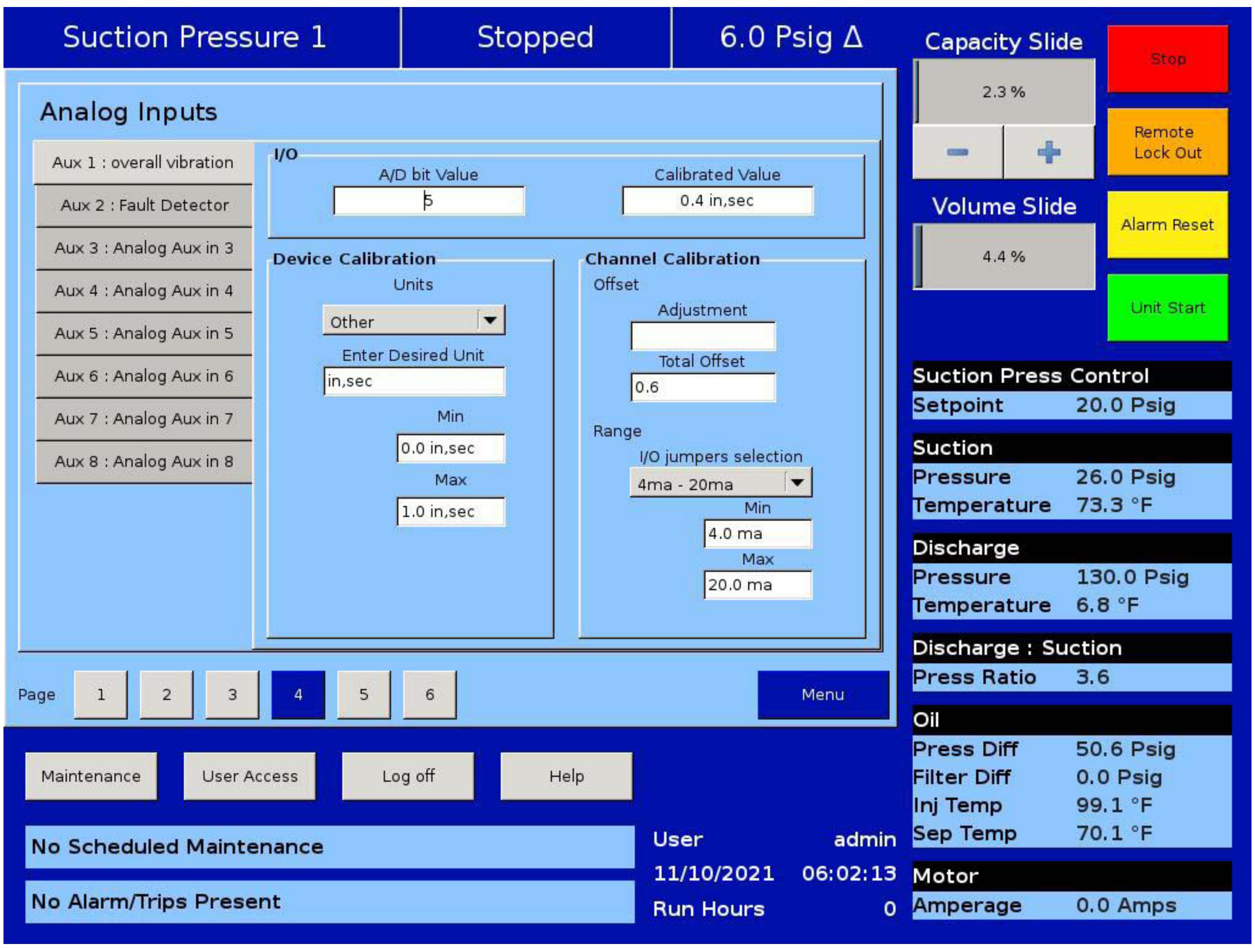


Figure B-50. Vibration Monitoring - Step 4 (Instrument Calibration, Page 4)

Step 5: Set Up Alarms and Trips

From the Auxiliary I/O screen, page 3, setup the alarms and trips for Aux 1 and Aux 2.

In the example shown in Figure B-51, for Aux 1, the "Alarm Only" is selected. The "Low Alarm" setpoint is set to "-1.0 in,sec" so that the low alarm will not activate. The "High Alarm" is set to "1.0 in,sec" so when that setpoint is reached, the alarm will activate. The "Low Trip" and "High Trip" setpoints are left at "0.0 in,sec" since the "Alarm Only" is selected. The "Delay" is set to "5 sec".

NOTE

The "Delay" setpoint is the amount of time monitored when the setpoint is reached. For example, if the setpoint continues to be equal or greater past the "Delay" time, then the alarm or trip will activate.

In the example shown in Figure B-52, for "Aux 2: Fault Detector", the alarm and trip are both selected with the selection of "Both" from the drop-down menu. The "Low Alarm" setpoint is set to "-10.0 PV g" so that the low alarm will not activate. The "High Alarm" is set to "20.0 PV g" so when that setpoint is reached, the alarm will activate. The "Low Trip" is set to "-10.0 PV g" so that the low trip will not activate. The "High Trip" is set to "40.0 PV g" so when that setpoint is reached, the trip will activate. The "Delay" is set to "60 sec".

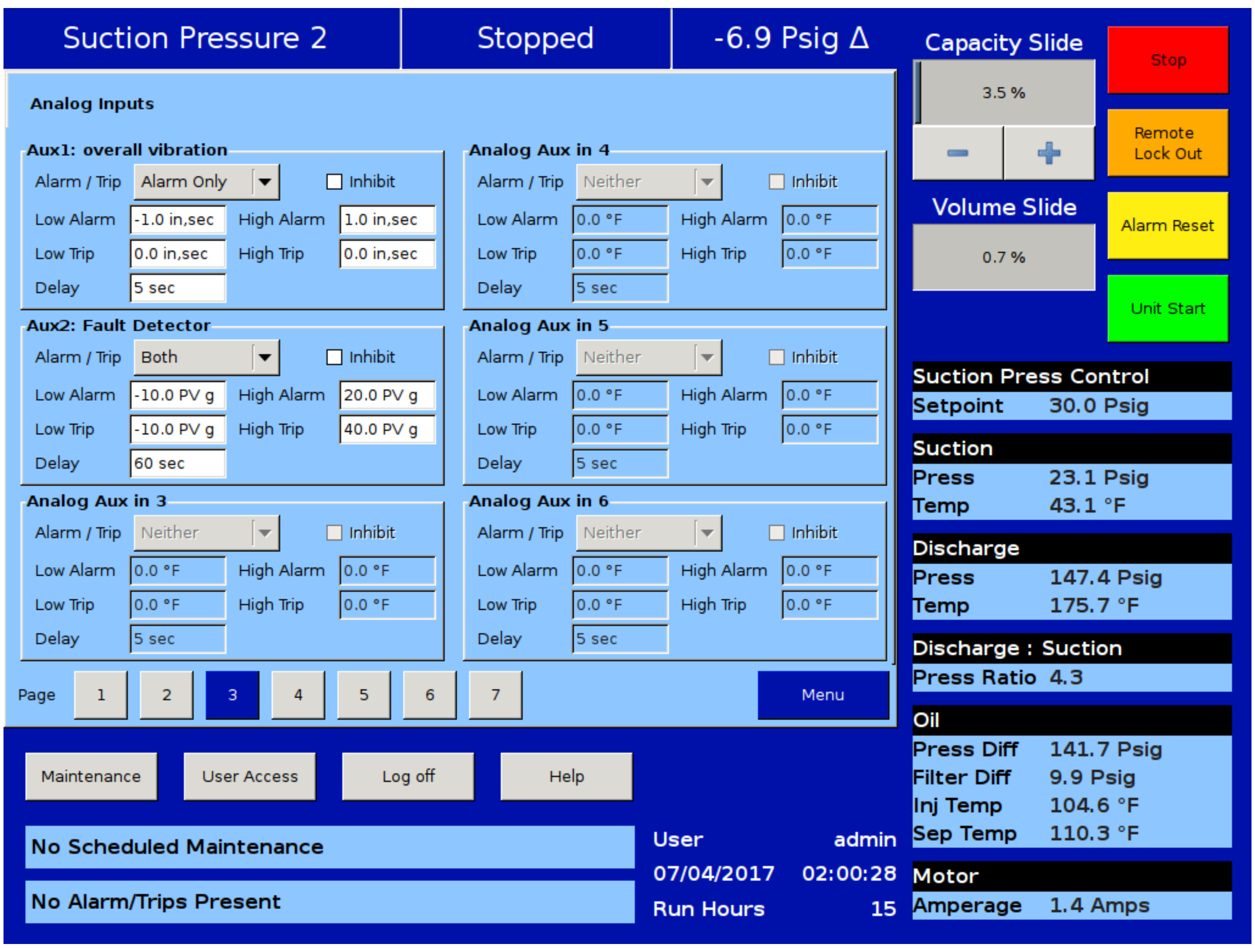


Figure B-51. Vibration Monitoring - Step 5 (Auxiliary I/O Screen, Page 3)

Step 6: Trending

To view the trend data for the vibration monitoring devices Aux 1 and Aux 2; from the Trend screen, go to the Trend Setup screen by pressing the "Setup" button, see Figure B-52.

From the Trend Setup screen, in Figure B-53, select "Auxiliary Input #1" and "Auxiliary Input #2". Then press "OK" to return to the Trend screen.

NOTE

Only a maximum of 10 devices can be selected from the Trend Setup screen and only a maximum of 4 devices can be viewed at one time on the Trend screen chart.

Select the corresponding trending line colors for "Auxiliary Input #1" and "Auxiliary Input #2" from the drop-down menus. There are four trending colors to choose from; red, blue, green and yellow.

Then press "Start" to start viewing the trending data of Auxiliary Input #1 and #2.

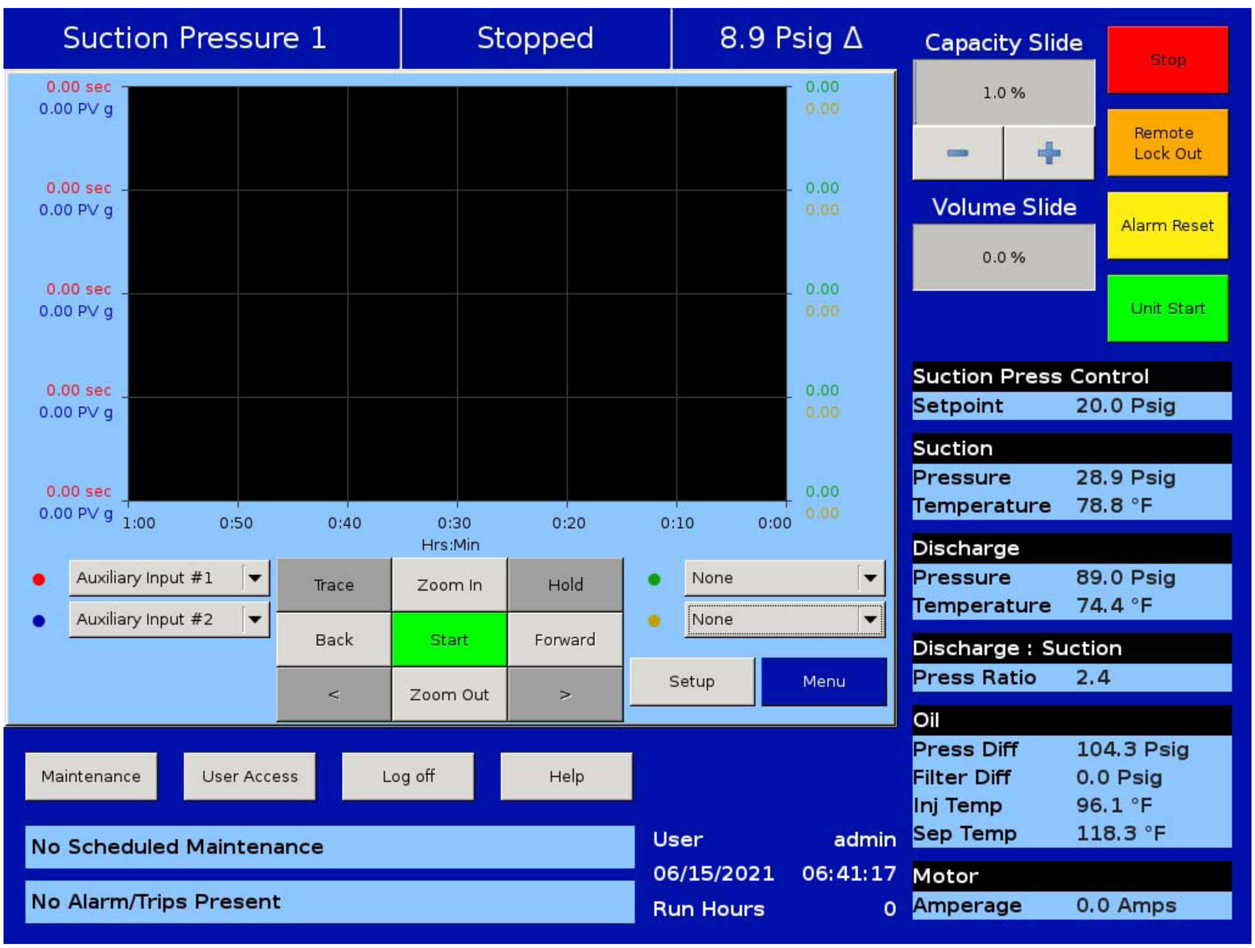


Figure B-53. Vibration Monitoring - Step 6 (Trend Setup Screen)

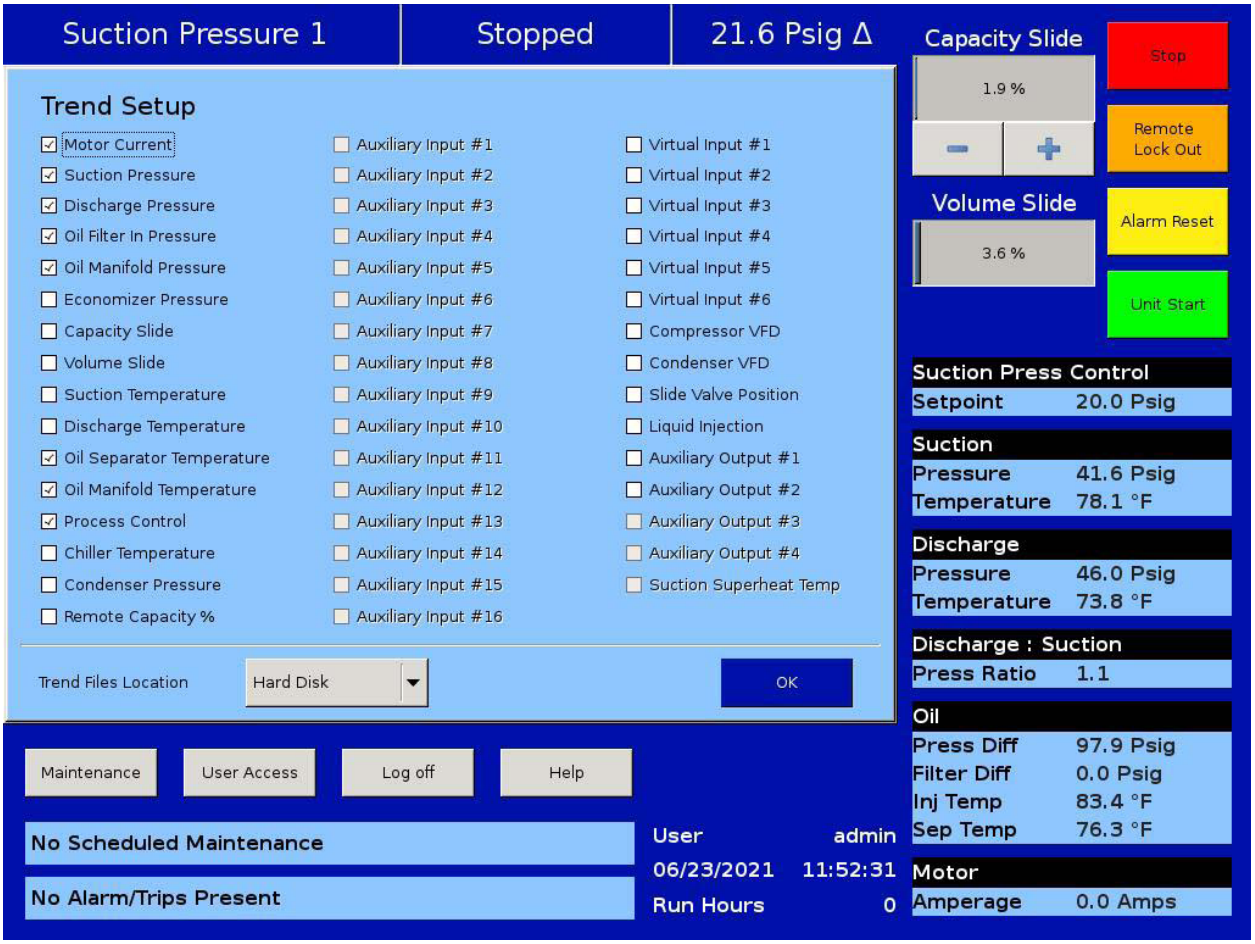


Figure B-54. Vibration Monitoring - Step 6 (Trend Setup Screen)

Remote Control and Monitoring of Vission 20/20 Panel

Contents

INTRODUCTION

This document provides the reader with guidelines to successfully communicate to and integrate with the Vilter Vission 20/20 control panel.

NETWORKING

The Vission 20/20 directly supports two different hardware networks;

a. Ethernet – supporting Modbus TCP and Ethernet I/P protocols

b. RS485 – supporting serial Modbus RTU protocol

COMMUNICATION WIRE

For any communication network to work properly, it is important to use the proper wire.

Ethernet Cable Specifications

Category 6 cable is recommended. Many installations are now using gigahertz switches, and category 6 provides greater immunity to signal crosstalk.

RS-422/485 Cable Specifications

The following cables are recommended for RS-422/485 serial communications. Although you may elect to use other cables, keep in mind that low capacitance (less than 15 pF/ft.) is important for high-speed digital communication links. The cables listed below are all 24-gauge, 7x32 stranded, with 100-ohm nominal impedance and a capacitance of 12.5 pF/ft.

Select from the following four-, three-, and two-pair cables, depending on your application needs. All will yield satisfactory results. It is recommended that you choose a cable with one more pair than your application requires.

Use one of the extra wires, rather than the shield, for the common.

Four-Pair

- Belden P/N 8104 (with overall shield)
- Belden P/N 9728 (individually shielded)
- Belden P/N 8164 (individually shielded with overall shield)
- Manhattan P/N M3477 (individually shielded with overall shield)
- Manhattan P/N M39251 (individually shielded with overall shield)

Three-Pair

- Belden P/N 8103 (with overall shield)
- Belden P/N 9730 (individually shielded)
- Belden P/N 8163 (individually shielded with overall shield)
- Manhattan P/N M3476 (individually shielded with overall shield)
- Manhattan P/N M39250 (individually shielded with overall shield)

Two-Pair

- Belden P/N 8102 (with overall shield)
- Belden P/N 9729 (individually shielded)
- Belden P/N 8162 (individually shielded with overall shield)
- Manhattan P/N M3475 (individually shielded with overall shield)
- Manhattan P/N M39249 (individually shielded with overall shield)

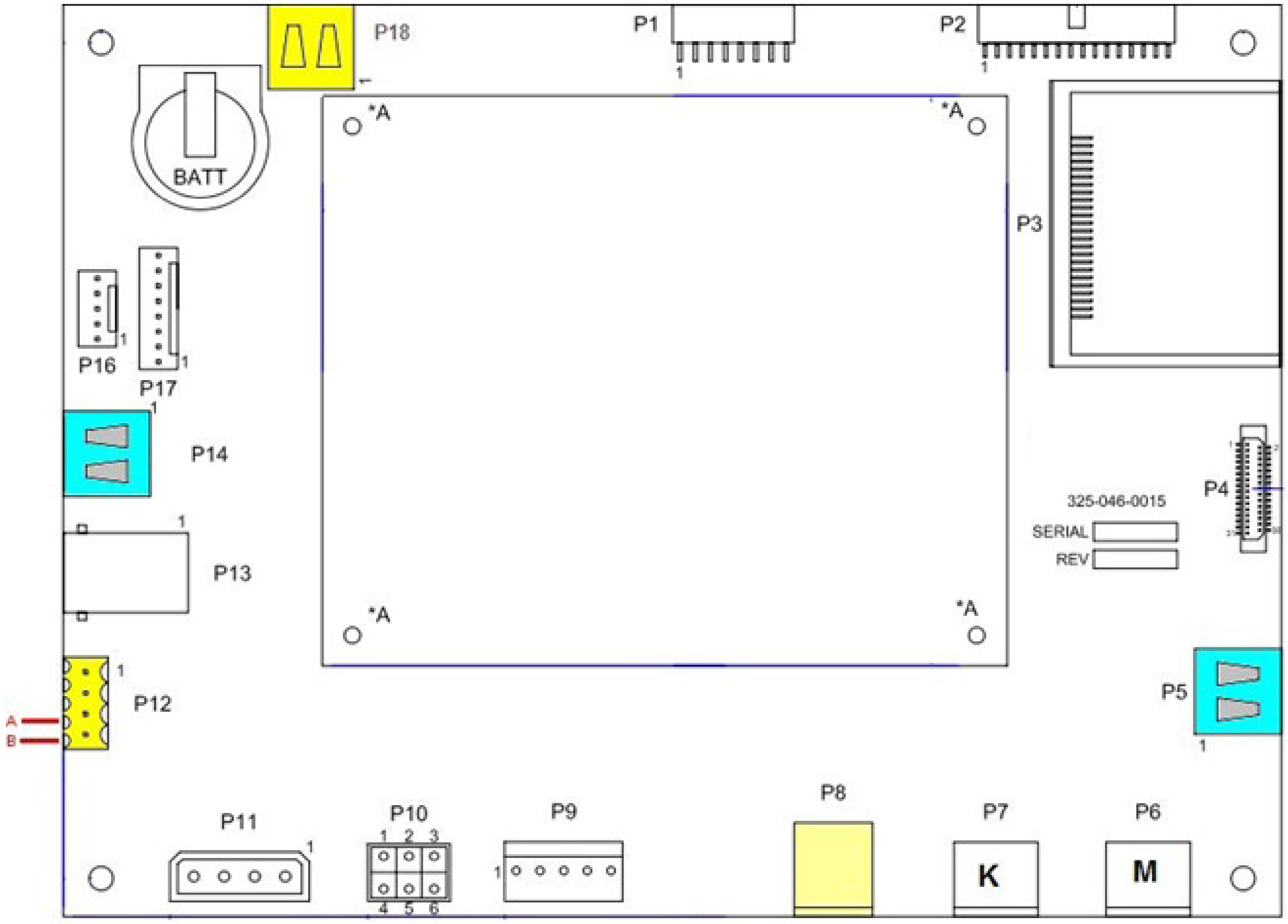


Figure C-1. Serial Communication Ports on Single Board Computer

VISSION 20/20 SINGLE BOARD COMPUTER COMMUNICATION CONNECTORS

*P12 = RS485 Serial Modbus RTU connector **

P14, P18 = USB Serial Modbus RTU connectors

P8 = Ethernet RJ45 connector

The Vission *20/20 offers two solutions for serial communications. The first option is connector P12 which uses traditional serial UART hardware. The second option uses the USB ports, P14 or P18. These ports require the use of an inexpensive, industrial USB to RS422/RS485 convertor. Vilter can supply these, or you can purchase your own. For serial communications, we recommend using the USB ports, first because of the robustness of the USB ports. They also offer increased speed. The third reason is that computer manufacturers are steering serial network users to move towards using the USB ports for serial communications.*

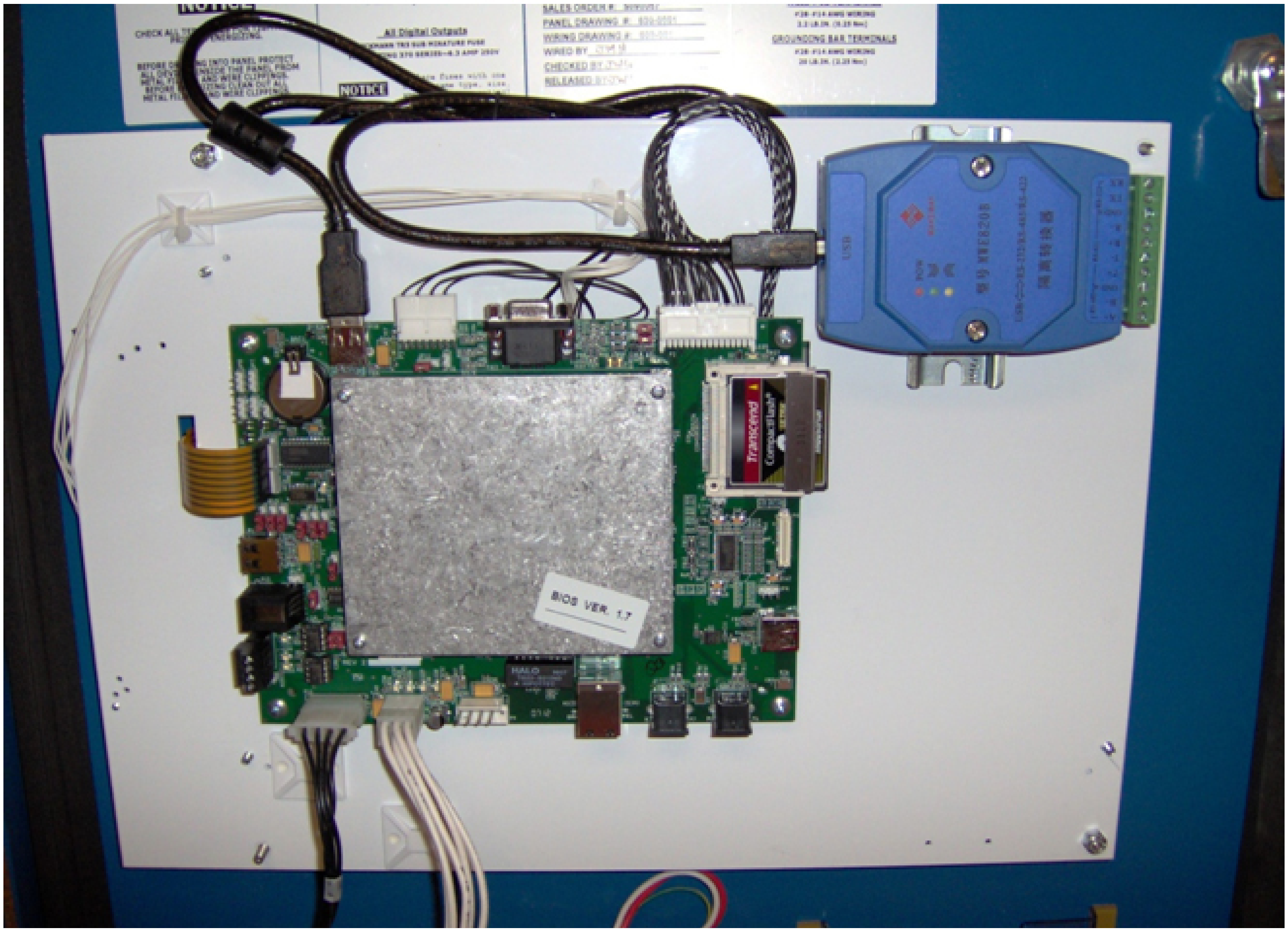


Figure C-2. Vission 20/20 Single Board Computer with USB to RS422/RS485 Converter (VPN3485C) on USB port P18

The above photo shows a typical connection for using one of the USB ports (in this case P18) for Modbus RTU serial communications. The USB port has a USB to RS422/RS485 convertor attached to it (VPN 3485C). One side of the convertor attaches to the USB port. The green plug of the convertor would then be connected to the RS422 or RS485 network (network wiring is not shown).

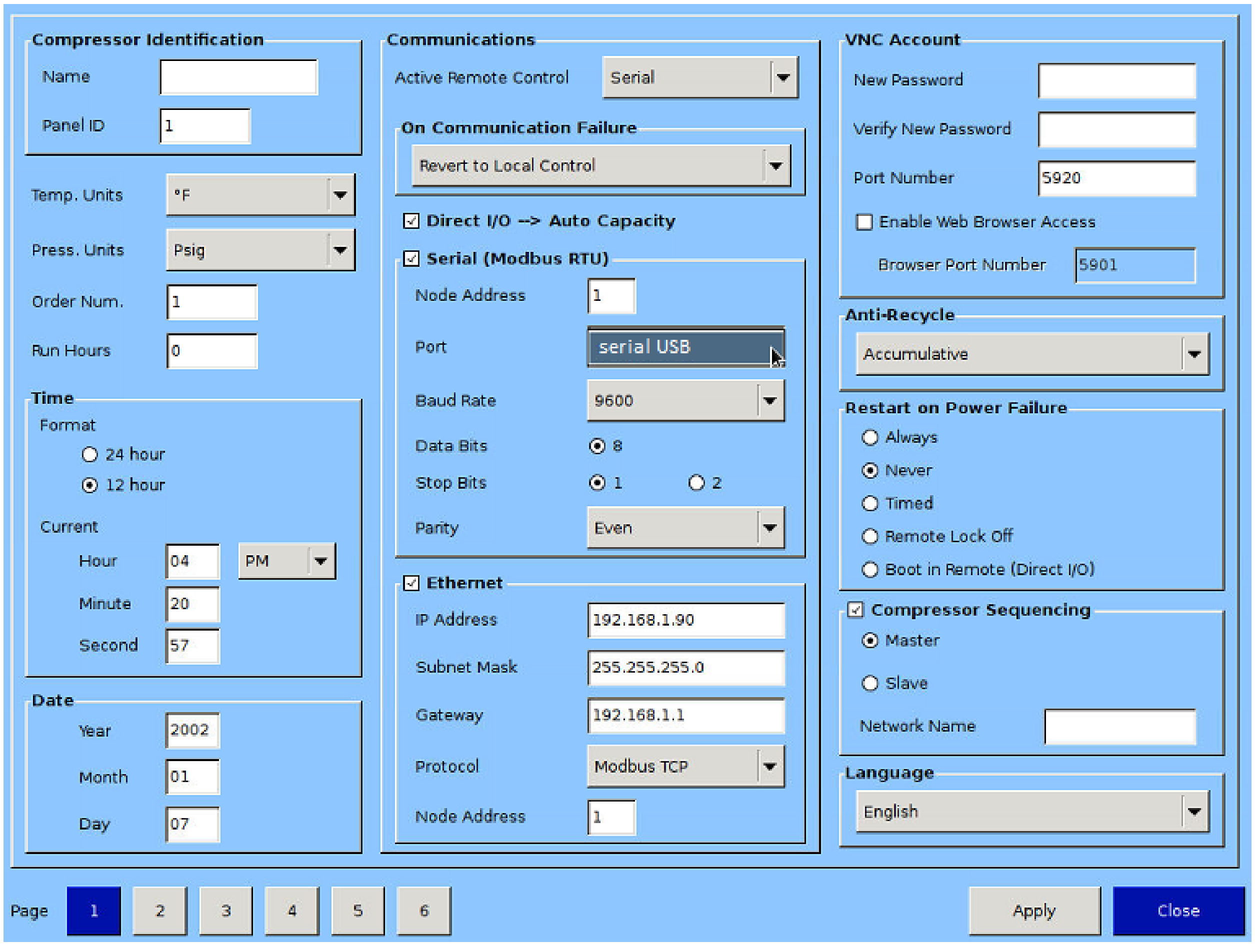


Figure C-3. Selecting USB Port for Serial Communication

The Vission 20/20 panel allows designating the USB port to be used for serial Modbus RTU communication from the Configuration screen. A USB device must be plugged into one of the USB ports in order for the “Serial USB” option to appear from the drop-down box.

NETWORK TOPOLOGY

RS422/RS485 Networking Topology

Many articles have been written about the different topologies of RS422/RS485 networks. Vilter recommends that a daisy chain topology be used for any RS422/RS485 network that incorporates a Vilter Vission 20/20 panel as a network slave node. Refer to Figure C-4.

USING A NETWORK ISOLATOR / REPEATER

The RS422/RS485 repeater/isolator can be used to provide a device on the serial network with isolation. The isolator/repeater suppresses surges that may be present on the network wires, and optically isolates and converts unbalanced lines to balanced lines. It can also act as an RS422 to RS485 convertor while providing the same network isolation. Vilter stocks a network repeater/isolator for the Vission 20/20 panels – VPN 3485MS.

USING THE VPN 3485C1 DEVICE AS A NETWORK CONVERTER

Figure C-5 is a typical connection wiring diagram for using the device as an RS422 to RS485 converter/isolator.

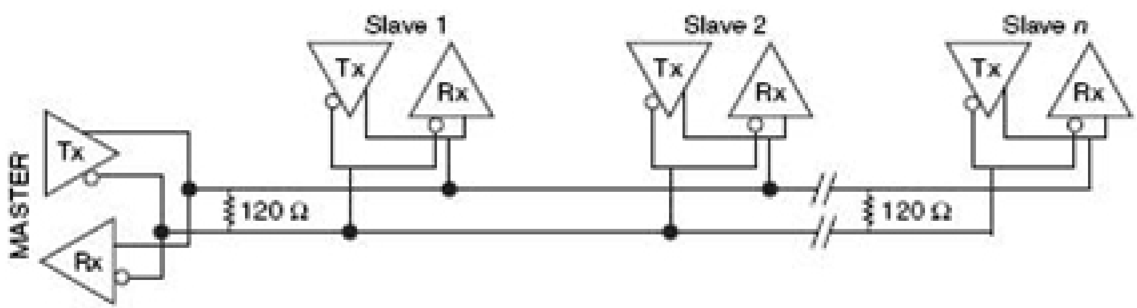


Figure C-4. 2-Wire Multidrop Network Using Terminating Resistors

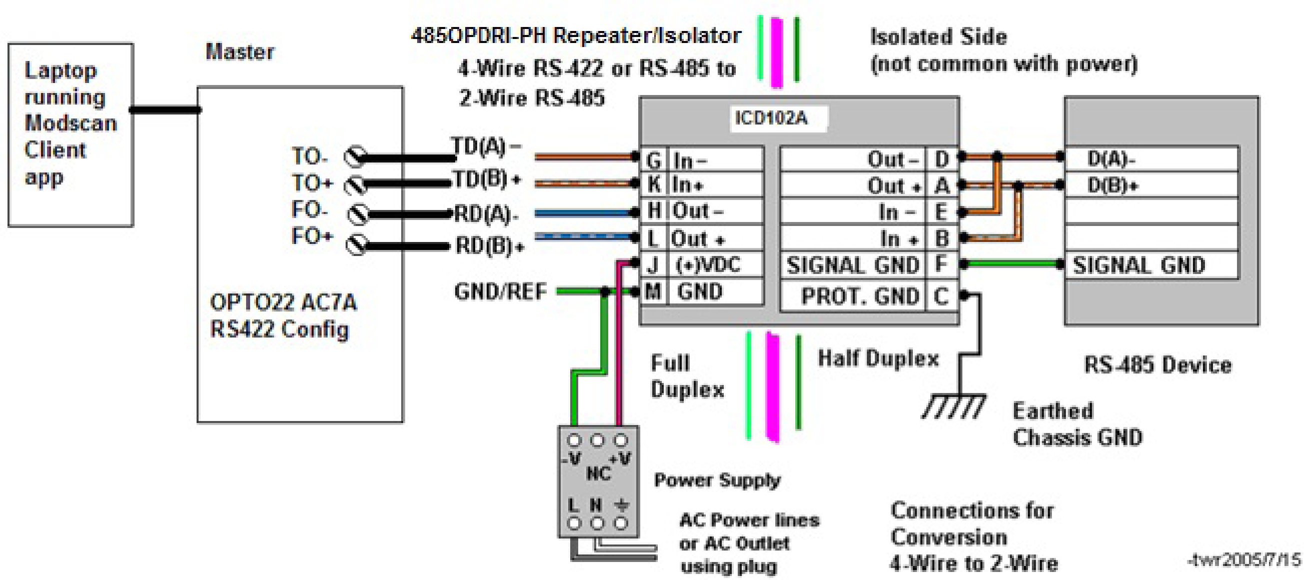


Figure C-5. Wiring Diagram – VPN 3485C1 Device as RS422 to RS485 Converter/Isolator

USING THE DEVICE AS A NETWORK ISOLATOR/ REPEATER

(Reference Figure C-6)

1. A DC power supply is required to power the device (+10 VDC to +48 VDC)
2. Dip switches on the side of the device must be configured for the baud rate of the network, see Table C-1.

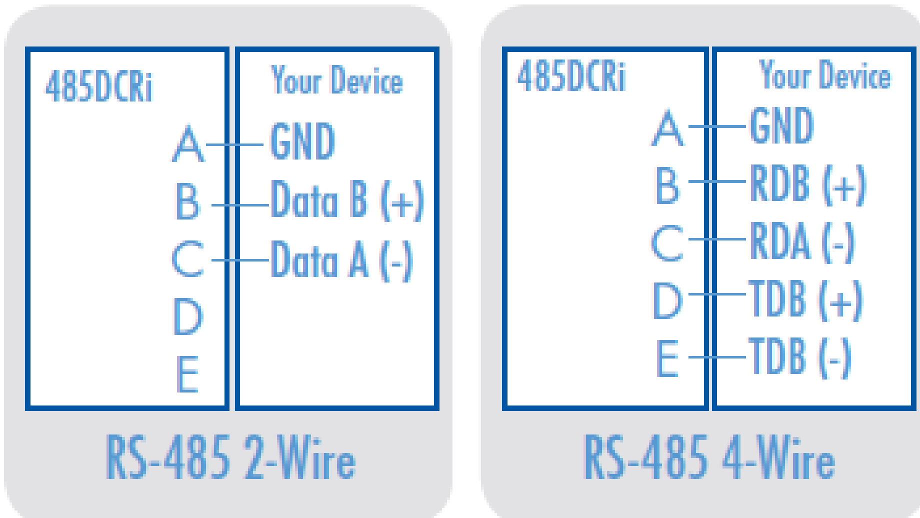


Figure C-6. Wiring Diagram – VPN 3485C1 Device as Network Isolator/Repeater

Table C-1. Dipswitches and Baud Rate Selection

DIP Switch						RS-485 2-Wire
1	2	3	4	5	6	7
ON	ON	ON	ON	**	**	**
Positions 5-7 are used for termination and biasing Positions 8-12 are used to set the baud rate						

DIP Switch						RS-422/485 4-Wire
1	2	3	4	5	6	7
**	OFF	OFF	OFF	**	**	**
Position 1 = ON for RS-485 Position 1 = OFF for RS-422 Positions 5-7 are used for termination and biasing Positions 8-12 are used to set the baud rate						

Switch Selectable

Baud (kbps)	8	8	10	11	12	Timeout (ms)
2.4	ON	OFF	OFF	OFF	OFF	4.37
4.8	OFF	ON	OFF	OFF	OFF	2.03
9.6	OFF	OFF	ON	OFF	OFF	1.02
19.2	OFF	OFF	OFF	ON	OFF	0.57
38.4	OFF	OFF	OFF	OFF	ON	0.27

Resistor Selectable

Baud (kbps)	8-12	R-11 Value	Timeout (ms)
1.2	OFF	820 KΩ	8.32
57.6	OFF	16 KΩ	0.16
115.2	OFF	8.2 KΩ	0.08
230.4	OFF	4.3 KΩ	0.04
460.8	OFF	2.2 KΩ	0.02

Table C-2. RS422/485 Switch Settings

Communications Mode	Switch			
	1	2	3	4
RS-485 2-Wire Half Duplex	ON	ON	ON	ON
RS-485 4-Wire Full Duplex	ON	OFF	OFF	OFF
RS-422 Full Duplex	OFF	OFF	OFF	OFF

Figure C-7. VPN 3485C1 DIN Rail Mounted

ETHERNET NETWORK TOPOLOGY

The configuration of the plant Ethernet network might be dictated by the plant IT department. One common configuration is the star type topology, where a master device will connect to a switch, and all devices participating on the network (Vission 20/20 panels) will also be connected to the switch. All Vission 20/20 panels would have unique static IP addresses and the master would communicate to each.

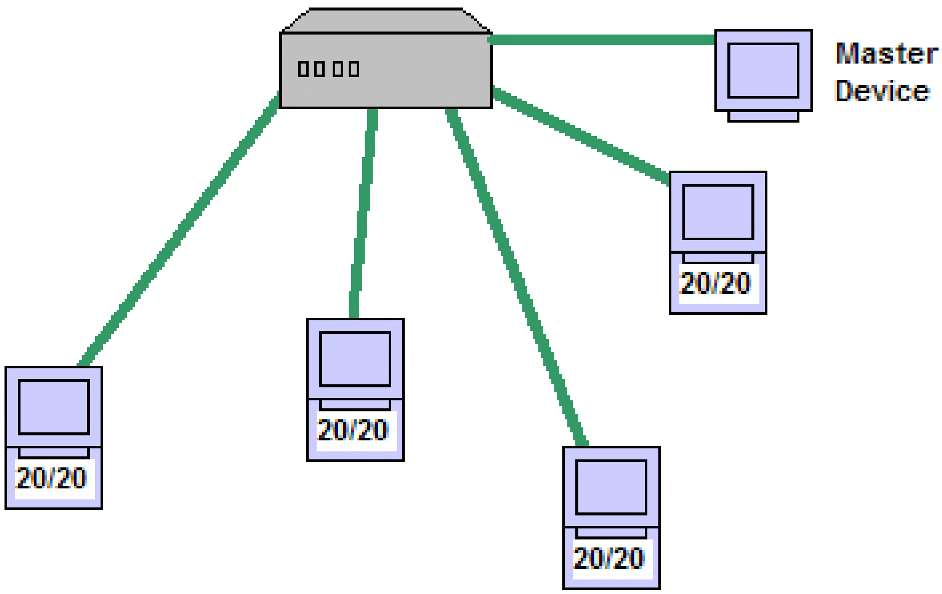


Figure C-8. Ethernet Network Topology

ADDITIONAL NETWORK CONFIGURATIONS FOR ACCESS VIA INTERNET

There are many network configurations that will allow access to the Vilter Vission 20/20 panels via an internet connection. Cost and network support is a consideration when the plant IT department has restrictions about outside access. It is recommended to work with them to setup an acceptable network. The configurations below are examples only. Setup and support of these networks are beyond the ability of Vilter.

Example 1

In Figure C-9, this example shows a PC connected to the internet, running a program which accesses a PC within a plant. Both computers would have a Remote Desktop program running on them that allows the off-site PC to connect to the plant PC, gain control of it, and then run a VNC program that resides on the plant's PC to gain access to the Vission 20/20 panels.

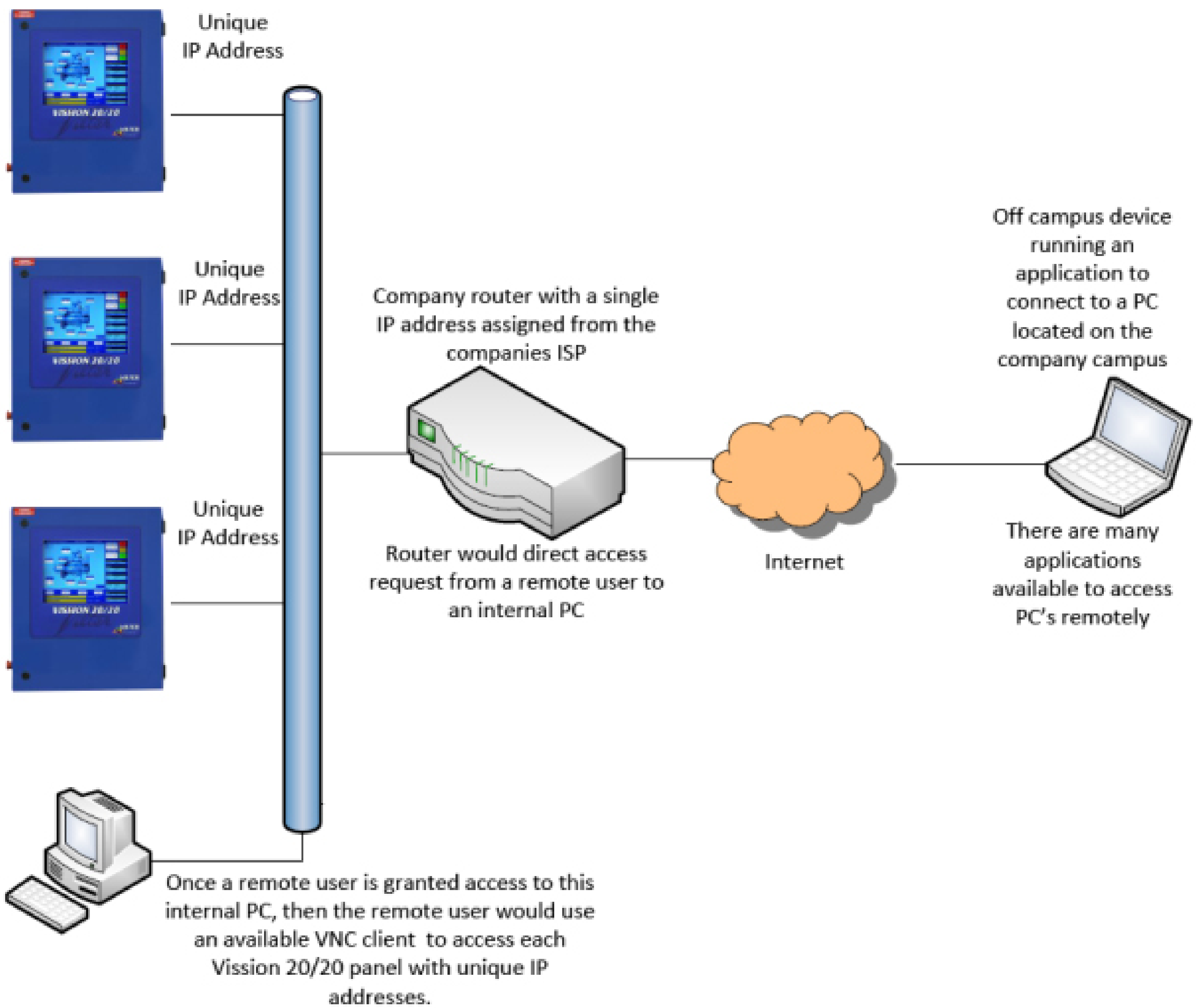


Figure C-9. Network Configuration for Access via Internet – Example 1

Example 2

In Figure C-10, this example shows a PC connected to the internet, running a VNC client program which accesses the Vission 20/20 panels by specifying an IP address assigned to a company router. There would be a separate IP address for each Vission 20/20 panel in the plant.

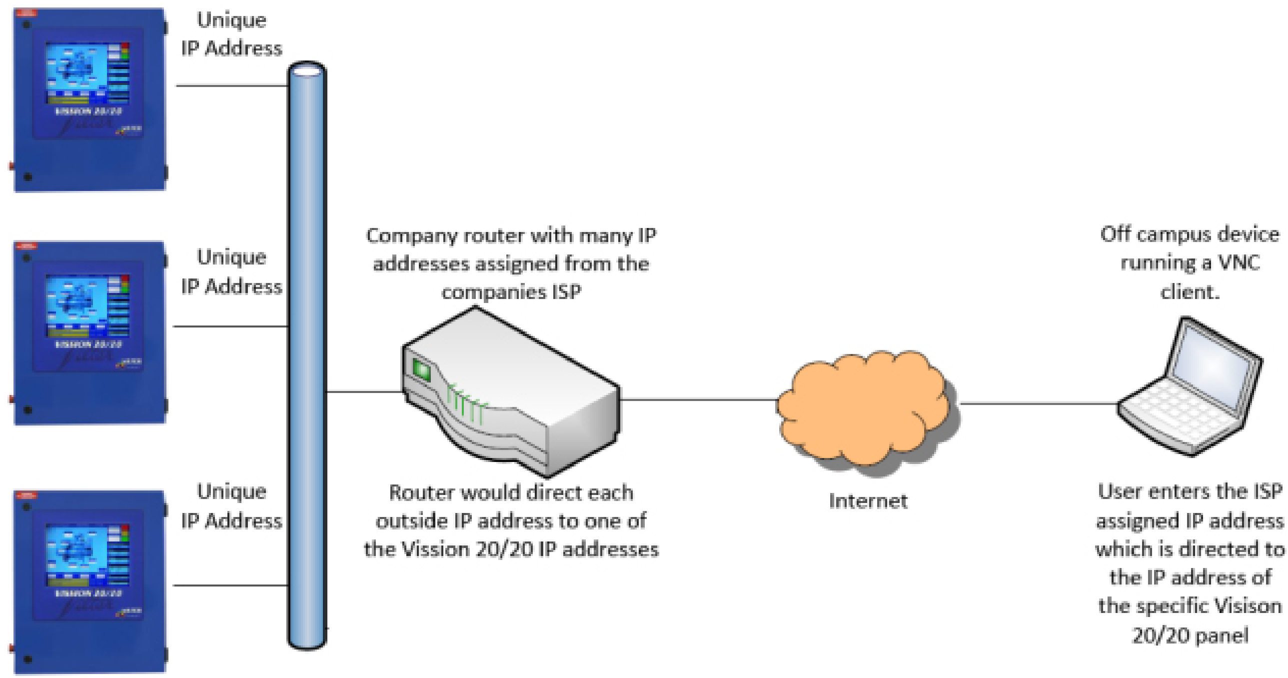


Figure C-10. Network Configuration for Access via Internet – Example 2

Example 3

In Figure C-11, this example shows a PC connected to the internet, running a VNC client program which accesses the Vission 20/20 panels by specifying an IP address along with a router port designation. Each Vission 20/20 panel has an assigned router port.

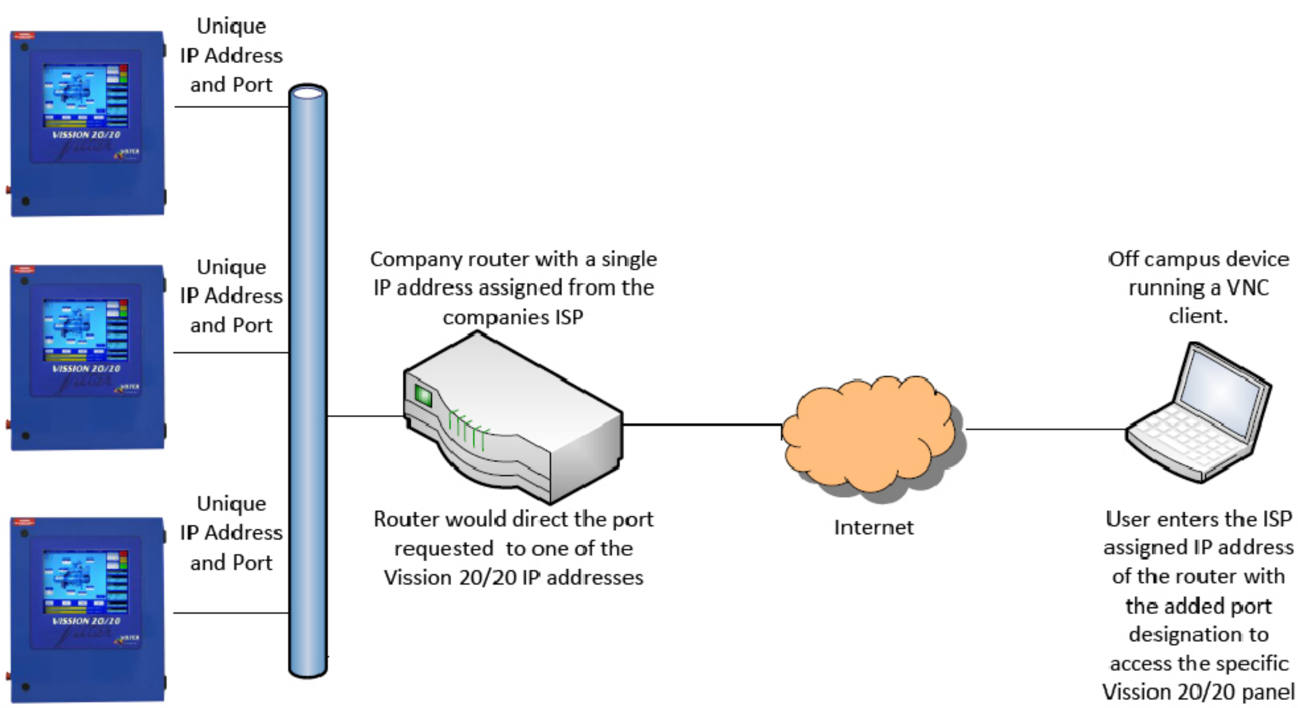


Figure C-11. Network Configuration for Access via Internet – Example 3

Example 4

In Figure C-12, this example shows a hybrid network. An off campus PC and smartphone are connected to the internet, running VNC client programs which access the Vission 20/20 panels by specifying an IP address along with a router port designation. Each Vission 20/20 panel has an assigned router port. The company router is a wireless router which also forms a wired LAN network.

EXAMPLE SETUP USING A WIRELESS ROUTER

An example of an Ethernet radio transmitter is a Phoenix Contact RAD 80211 XDB.

VNC CLIENTS

Smartphone runs VNC client application – connecting to internet.

Home computer runs VNC client application – connecting to the internet.

The VNC client connects to the “remote site” router which has an outside accessible IP address. The Vission 20/20 boxes have built-in VNC servers. The Ethernet ports on the Vission 20/20 panels would be setup for Modbus TCP protocol. When the connection is made, the VNC client application will ask for password for Vission 20/20 panel access. Password = VVNC.

PLC REMOTE COMPRESSOR CONTROL OF VISSION 20/20

PLC remote compressor control of the Vission 20/20 panel (either via communications or hardwired) is accomplished by placing the panel into Remote mode.

Remote Control Mode in the panel refers to two distinct ways of controlling the compressor.

1. Control via communication port. This can be accomplished through:
   - Ethernet (via Ethernet I/P or Modbus TCP/IP)
   - Serial (RS485 Modbus RTU)
2. Control via Direct I/O (Digital inputs)

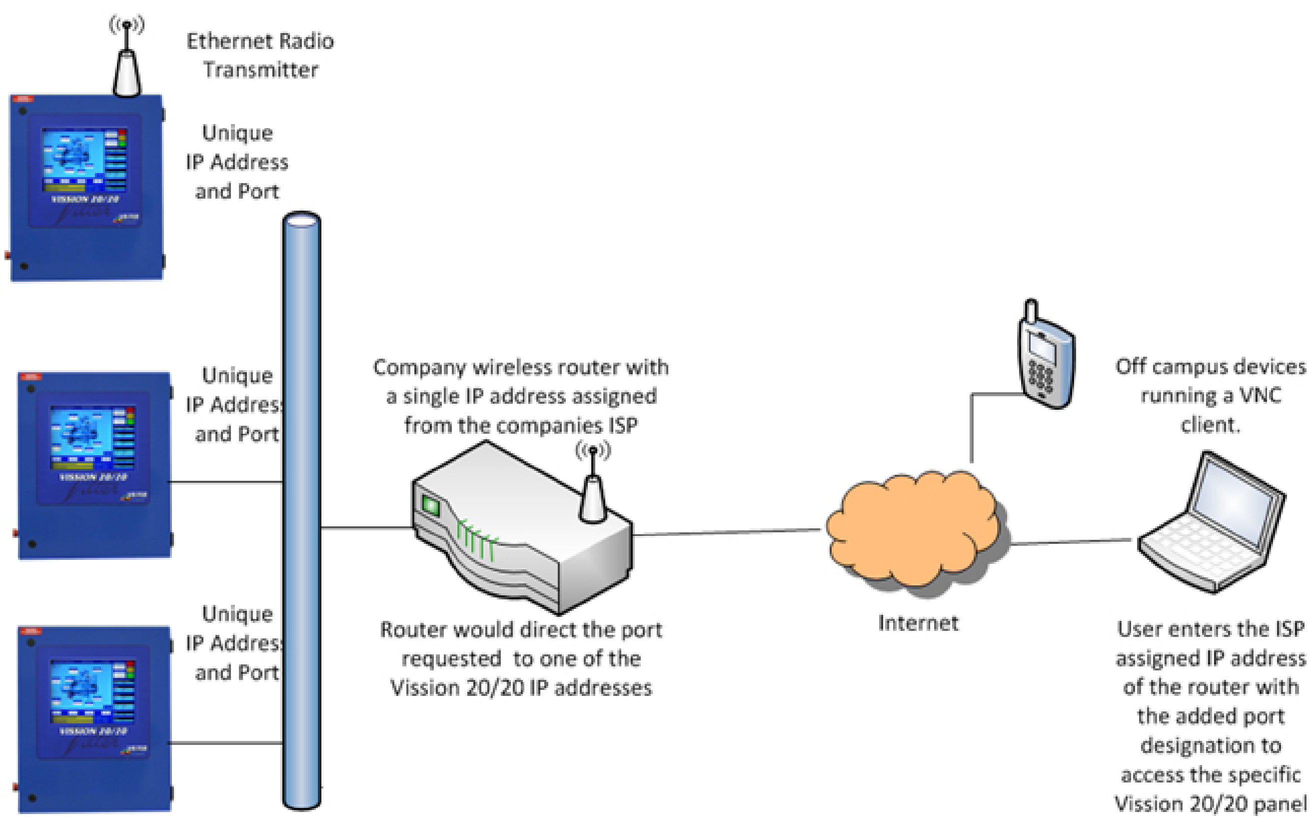


Figure C-12. Network Configuration for Access via Internet – Example 4

REMOTE COMPRESSOR CONTROL VIA COMMUNICATIONS

A compressor control scheme that is accomplished via communications must follow some general rules. The Vission 20/20 panel does not have a separate processor to handle communications from a computer or PLC. All tasks that the panel needs to accomplish are done by a single processor. So when a device communicates to the panel, the polling rate to the Vission 20/20 panel can't be unlimited, it needs to be governed.

A typical compressor control scheme might look like this: For communication register information, Refer to Appendix D, Vission 20/20 Communication Table,

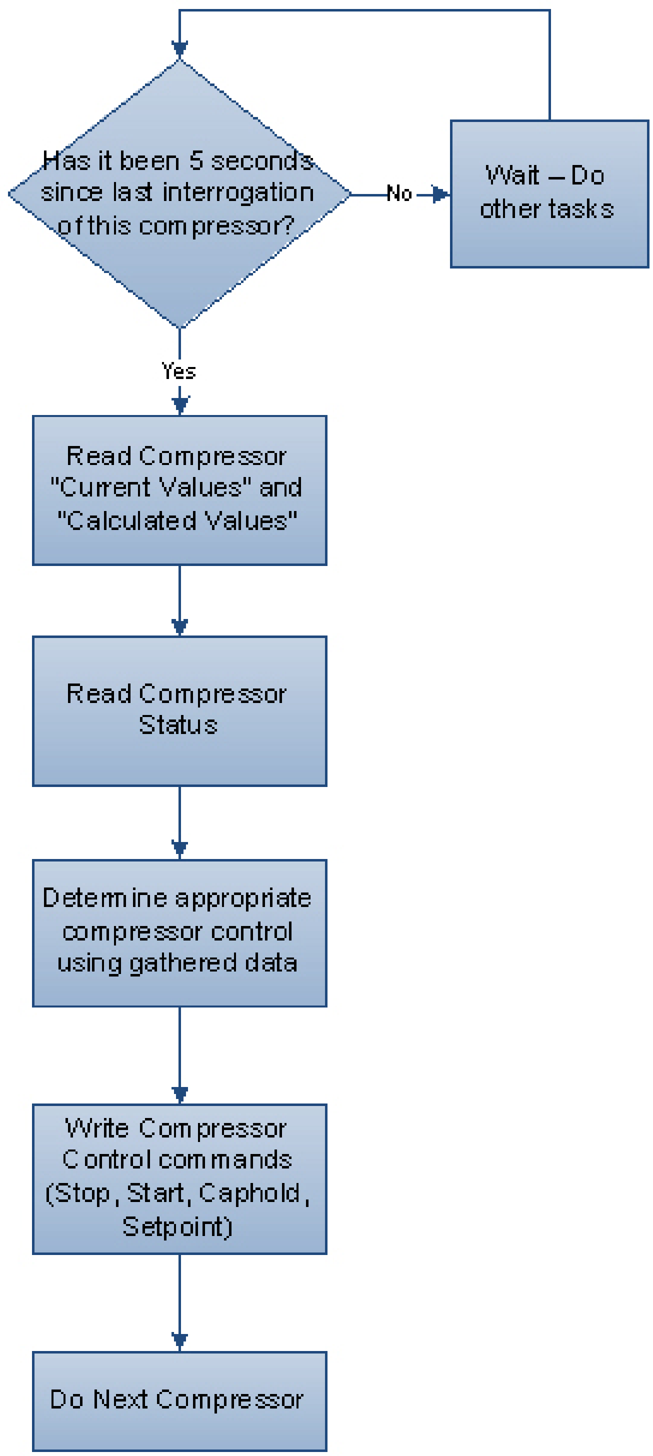


Figure C-13. Typical Block Diagram of a Multi-Compressor Control Scheme (1 of 4)

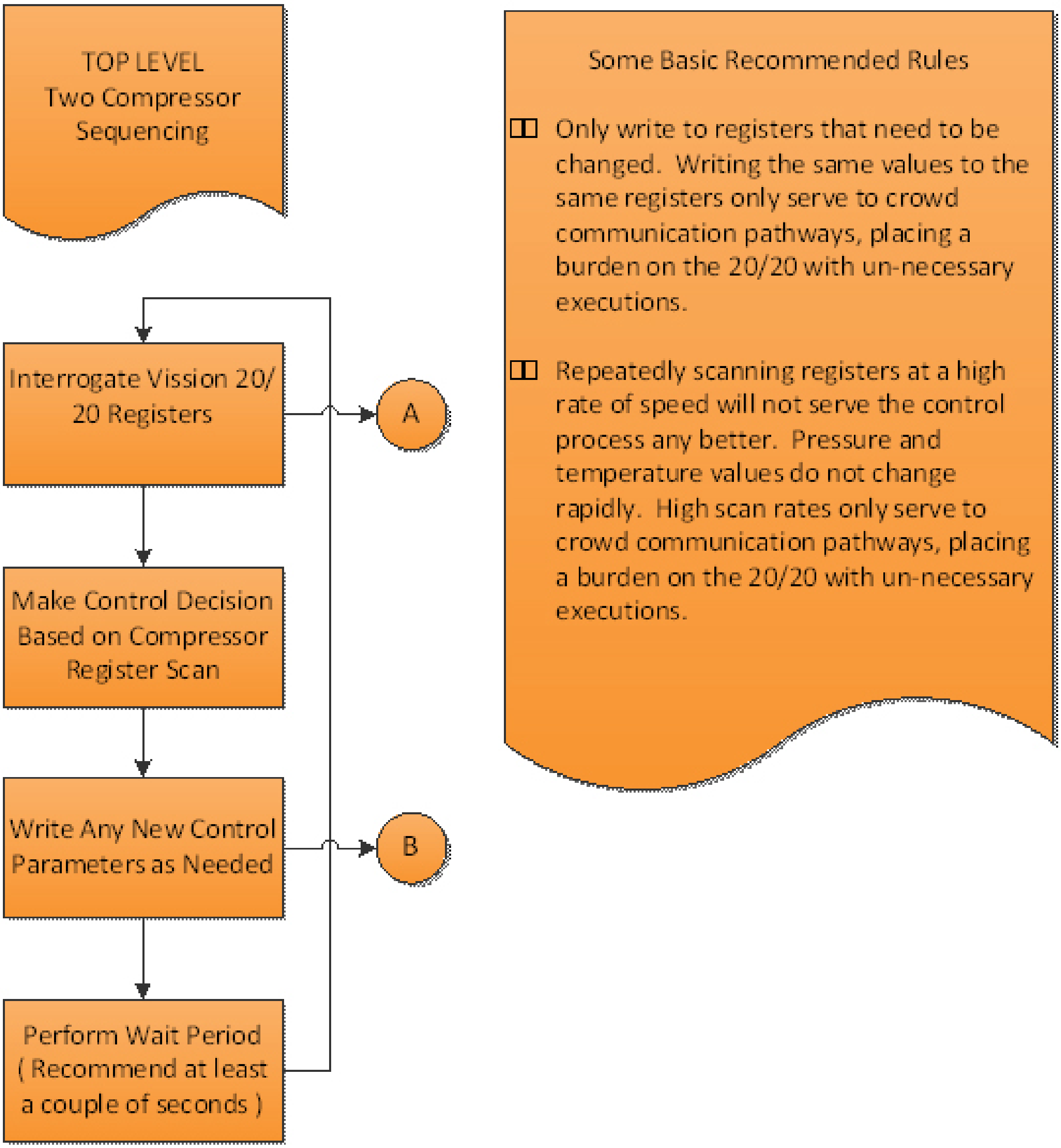


Figure C-13. Typical Block Diagram of a Multi-Compressor Control Scheme (2 of 4)

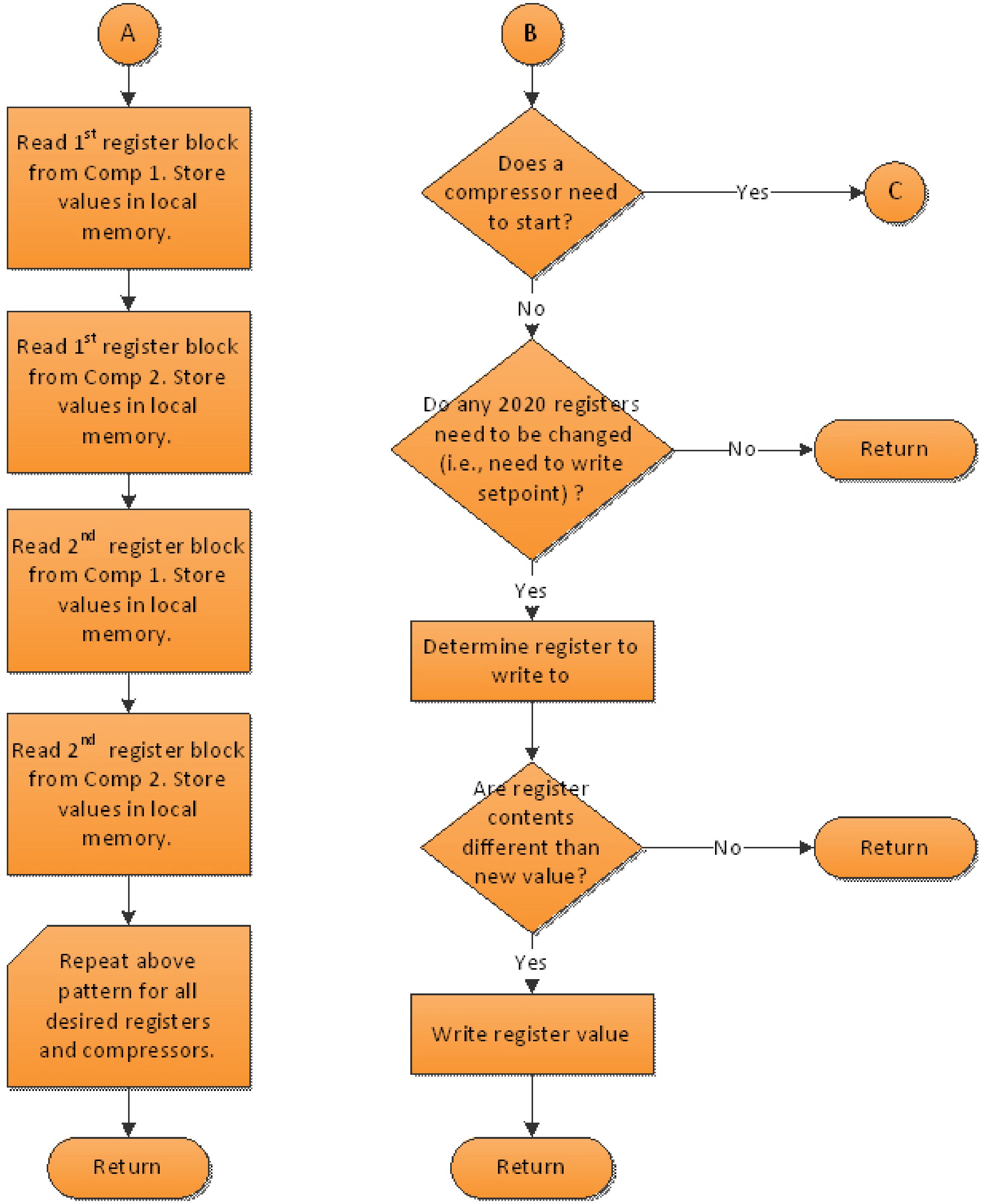


Figure C-13. Typical Block Diagram of a Multi-Compressor Control Scheme (3 of 4)

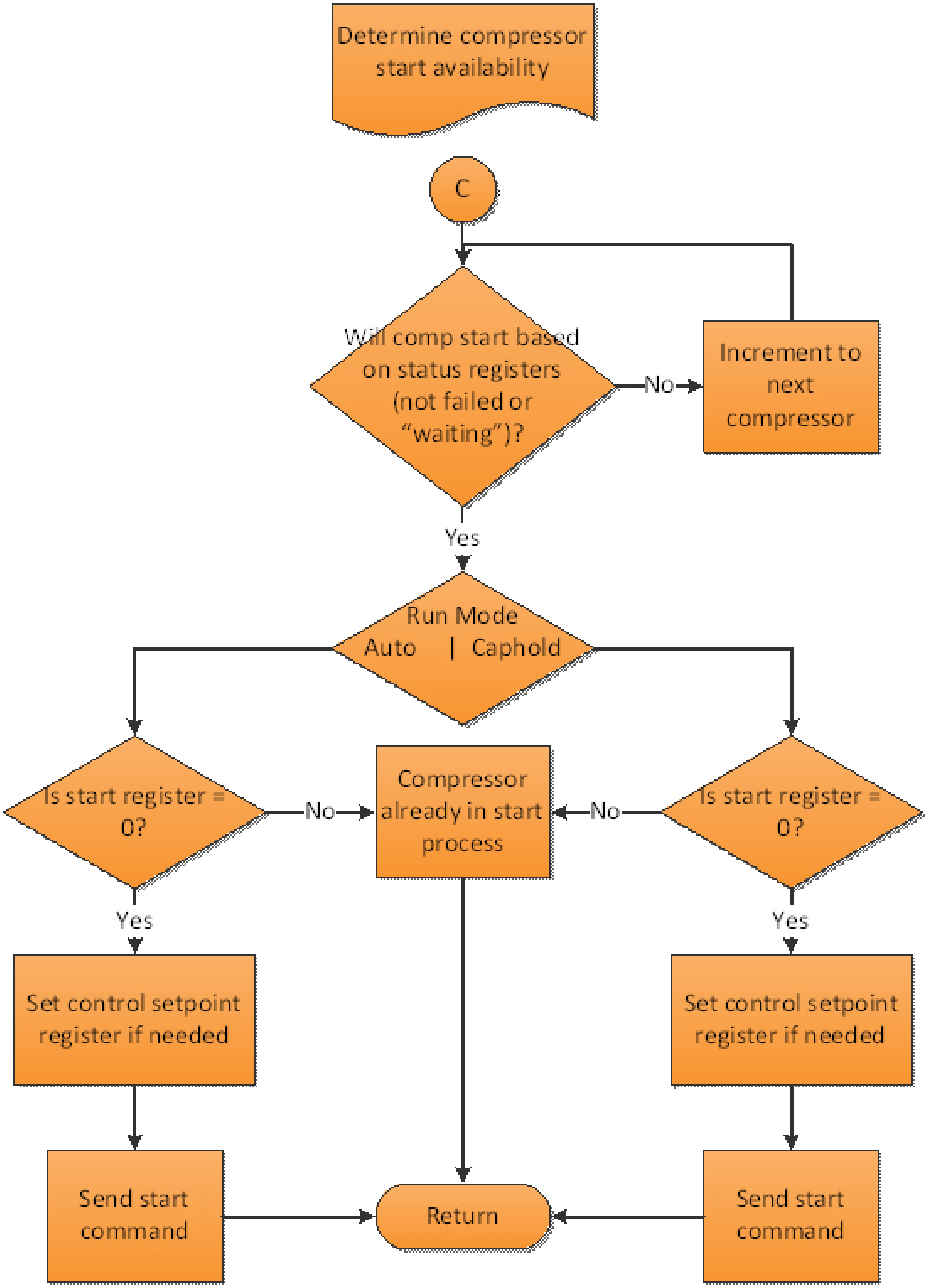


Figure C-13. Typical Block Diagram of a Multi-Compressor Control Scheme (4 of 4)

The actual control scheme that you use will depend upon the response of the process that you are trying to control.

CONFIGURATION SCREEN SETUP FOR REMOTE CONTROL THROUGH COMMUNICATIONS

(Reference the "Communication" section of Figure C-14)

For Ethernet control:

1. Configure "Active Remote Control" as Ethernet.
2. At the bottom of the column, check the "Ethernet" box.
3. Configure Ethernet I/P address.
4. Select Modbus TCP or Ethernet I/P protocol

For Serial Port Modbus RTU control:

1. Configure "Active Remote Control" as Serial.
2. Check the "Serial" box inside the "Communications" section.
3. Configure serial port settings (baud rate, # data bits, # stop bits, parity) and panel ID number (which is "node" number for Modbus RTU).

Once the port is setup properly, communication can be established. You will be able to read from and write (see note) to registers.

NOTE

In order to "write" to a register in the Control Block region of Modbus registers 40500 through 40513, the Vission 20/20 panel must be placed into "Remote" mode, by pressing the green "Unit Start" button, and then pressing "Remote". The panel will be placed into "Remote" mode, which will allow register "writes" in this region to occur. You can write to setpoints outside this region without placing the panel into "Remote" mode.

INTRODUCING THE REMOTE LOCK BUTTON AND RESTART ON POWER FAILURE SELECTION

Remote Lock

- The Remote Lock Button sets the Remote Lock condition (ON or OFF). This determines when communication "writes" for Compressor Command registers

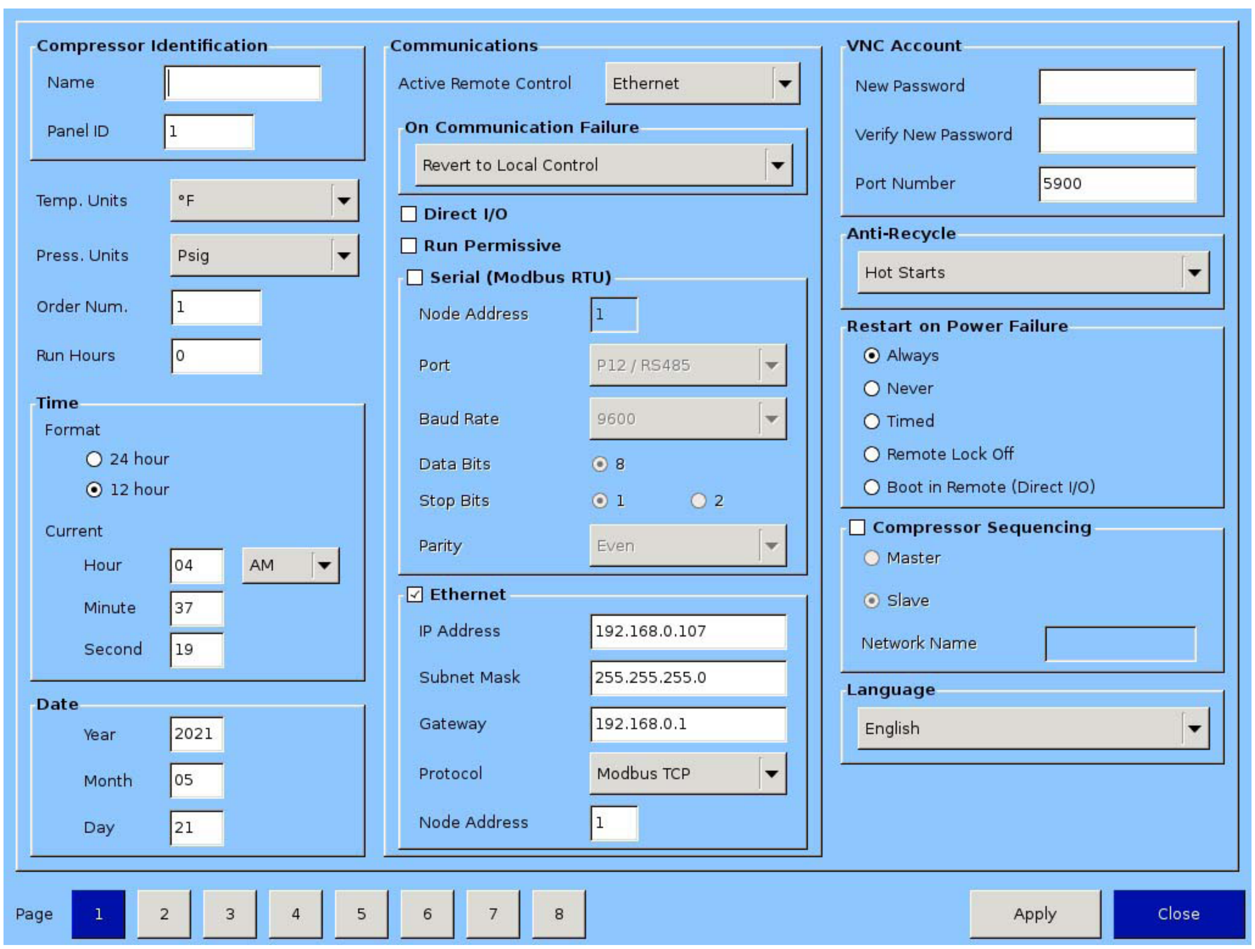


Figure C-14. Configuration screen - Page 1

within the Modbus range of 40500 through 40513 can occur. If Remote Lock is ON, then writes within this region cannot occur. These registers are the compressor control registers (Start, Stop, Caphold etc). Remote Lock is typically used to lock out a PLC or central computer while the operator is operating the compressor locally. The Remote Lock button is located directly below the Compressor STOP button. The status of Remote Lock is shown in the upper left corner of the Main Screen.

RESTART ON POWER FAILURE

- The Vission 20/20 allows for selection of different operations to occur after a power failure has occurred. The selections determine in which mode of operation the Vission 20/20 will be placed after the power is restored to the panel. This should decided upon and setup prior to communicating to the Vission 20/20 panel.
    1. Always
    2. Never
    3. Timed
    4. Remote Lock Off
    5. Boot in Remote (Direct I/O)

1. Always

- If the compressor was off prior to the power failure, it will stay off after the power is restored.
- If the compressor was running prior to the power failure, it will begin an Auto-restart sequence as soon as power is restored.
- In both cases, the Remote Lock will be ON after power is restored, which means it will not accept any “writes” via communication within the Compressor Command register region, until someone walks up to the panel and presses Unit Start-> Remote.

2. Never

- The compressor will not restart after power is restored. The Remote Lock will be ON after power is restored, which means it will not accept any “writes” via communication within the Compressor Command register region, until someone walks up to the panel and presses Unit Start-> Remote.

3. Timed

- The compressor WILL attempt a restart after power is restored and the Max Restart After Power Failure timer has timed out. The Remote Lock will be ON after power is restored, which means it will not accept any “writes” via communication within the Compressor Command register region, until someone walks up to the panel and presses Unit Start-> Remote.

4. Remote Lock Off

- The Vission 20/20 panel will boot up with the Remote Lock OFF which will allow the panel to accept all remote control commands, via communication, immediately after power is restored to the panel.

5. Boot in Remote (Direct I/O)

- The Vission 20/20 panel will boot up with the Remote Lock OFF and be placed into REMOTE mode, which will allow the panel to accept Direct I/O commands immediately after power is restored to the panel.

COMMON REGISTER SETUP TO CONTROL THE VISSION 20/20 (COMPRESSOR CONTROL) VIA COMMUNICATIONS

Register Setup and Control Scenario

- The Vission 20/20 panel first needs to be placed in REMOTE mode before the Compressor Control commands (Registers 40500 through 40513) can be sent. To do this, press the green UNIT START button, then REMOTE.

Modbus Register 40501 - Active Remote Control

Reading this register can be used to verify the Active Remote Control mode, which was previously setup from the Configuration screen. Writing to this register can change the Active Remote Control mode, however this is not common.

- 0 = None (internal local setpoints will be used to control the compressor).
- 1 = Direct I/O (hardwired control - via digital inputs. Refer to wiring diagram.)
- 2 = Serial (serial communications via RS485 Modbus RTU).
- 3 = Ethernet (Modbus TCP or Ethernet IP communications.)

Typically, the following registers are setup (written to) before a “Start” command is issued to the compressor:

Modbus Register 40502 - Remote Capacity Control Selection

- 0 = Auto Capacity Control. This selection defines that the Vission 20/20 will control compressor capacity from its internal Control Setpoints.
- 1 = Pulse Load/Unload. This selection defines that the Vission 20/20 will control compressor capacity from contents of Pulse Load register 40504 and Pulse Unload register 40505.
- For correlation between register content and pulse value, Refer to Appendix D, Vission 20/20 Communication Table, 2 = Hold Capacity %. This selection defines that the Vission 20/20 will control compressor capacity from contents of Capacity Hold % register 40506.

If Hold Capacity % is selected, then it is typical to write a Capacity Hold value to register 40506 before the compressor is started, typically 5%, to prevent the compressor from loading immediately.

Modbus Register 40506 - Capacity Hold %

Value = 0-100

Hold Capacity Operation

- Capacity Hold commands define a "target" capacity slide valve position/VFD speed for the compressor.
- When working with slides, the Vission 20/20 will position the capacity slide to the "target" position.
- When working in the No Slides mode, the Vission 20/20 will adjust the VFD speed to the "target" position. For example, when the Caphold register is remotely set to a value of 50%, then VFD speed will be set directly to 50%. Therefore Compressor Capacity would be 50%.
- The rules of this capacity hold algorithm are:

1. If the new target is < 0.4% (full scale) away from the current position – then don't do anything – this is the deadband region.
2. If new target is > deadband region but < 10% (full scale) away from the current position, then energize the capacity slide/VFD for a time that is proportional to the amount it is away from the new target position. To say it another way – the further you are away from the new target position – the longer the slide/VFD is energized in the proper direction. This control region is called the proportional band region.
3. If new target is > 10% (full scale) away from current position (greater than the proportional band region) – then energize continuously.

There are mechanical properties that limit the speed at which the capacity of the compressor can be changed. The capacity slide actuators can only turn so fast. The proportional change to the compressor capacity occurs at a fixed rate.

Caphold and Operation with VFD[1]

- Using a VFD with a compressor requires considering the VFD capacity as part of the entire capacity of the compressor. Typically, a VFD is operated from 50% to 100% speed, therefore the VFD is considered ½ the total capacity and the slide valve movement is considered the other ½ of total capacity. When a VFD is employed, the normal control method is to first move the capacity slide from 0-100% when additional refrigeration is required. When the capacity slide is at 100% and additional capacity is still required, then the VFD is ramped up in speed. It follows then that a Caphold value of 25% will move the capacity slide to 50% position. A Caphold value of 50% will move the capacity slide to 100% position. A Caphold value of 75% will move the capacity slide to 100% and the VFD to 50% speed and so on.

Consideration should also be given so that when moving the capacity slide valve from 0-100%, the actual corresponding capacity of the compressor is not changing in a linear relationship of 0-100%. The last 15% travel of the slide valve results in a greater change of capacity than 15%. Integrators should realize that the caphold value sent relates to slide valve "position" and not actual capacity of the compressor. For most purposes however, assuming a linear relationship is adequate.

The rate at which the capacity slide moves from 0-100%, and the rate at which the VFD increases speed from minimum to maximum is not the same. So there are two different capacity profiles that the integrator needs to consider.

1 This applies only to operation with both slide valves and VFD, where the total capacity is divided 50/50 between the two methods.

Modbus Register 40507 - Active Setpoint.

This register is used in conjunction with Register 40502 = 0, Auto Capacity Control mode.

1 = Setpoint #1 Active

2 = Setpoint #2 Active (note: you must enable two setpoints from configuration screen first).

Sometimes compressors are switched from Suction Pressure control mode to Process Temp control mode or vice versa. This can be done via communications using the following register.

NOTE

Both Process Temp Control and Suction Pressure Control must be enabled from the Configuration screen to do this.

Modbus Register 40503 - Auto Capacity Control Type

0 = Suction Pressure (if enabled from Configuration screen)

1 = Process Temp (if enabled from Configuration screen)

2 = Discharge Pressure (if enabled from Configuration screen)

Compressor Start and Stop Commands

Modbus Register 40508 - Start Command

1 = Start Compressor in Remote Auto Mode

2 = Start Compressor in Auto Sequencing Mode

Four (4) minute Remote mode time-out timer

- Once the compressor has been started in Remote Auto Mode using the Start Compressor Command, a 4 minute timer will start. If no further communication takes place to the Vission 20/20 within 4 minutes, the Vission 20/20 will be placed in Local Auto mode, a yellow banner will be displayed on the Vission 20/20 signifying that a “Remote Comm Time-out” occurred, and the Event List will get populated with a time-stamped “Remote Comm Time-out” event.

Modbus Register 40509 - Stop Command

1 = Stop Compressor Command

- Vission 20/20 panel will remain in Remote (Idle) mode after a Stop Compressor command has been issued.

Remote Control via Direct I/O (Hard-wired)

Remote Control of the compressor can also be accomplished using hard-wired inputs. These include Remote Start-Stop digital input, Remote Increase Capacity digital input, Remote Decrease Capacity digital input, and Remote Caphold Setpoint analog input.

(For communication register information, Refer to Appendix D, Vission 20/20 Communication Table).

Configuration Screen Setup:

(Reference the “Communication” section of Figure C-14).

For Direct I/O control:

- Configure the “Active Remote Control” drop-down box to “Direct I/O”. This selection activates the Remote Start-Stop digital input. This is the ONLY selection that activates the Remote Start-Stop digital input.
- Below the “Active Remote Control” selection box, check the “Direct I/O” box.

A popup “Direct I/O Control Type” box now appears, from which you can select the desired control method:

- Auto Capacity
- (Digital) Manual Capacity – comp. capacity controlled via digital increase and decrease inputs.
- (4-20mA) Capacity Hold – compressor capacity controlled via Remote Caphold analog input.

Auto Capacity

- The compressor is started and stopped from the Remote Start/Stop input, but the compressor capacity is controlled from the internal compressor control setpoints entered in the Vission 20/20. The Auto-cycle setpoints can be enabled or disabled as desired.

(Digital) Manual Capacity

- The compressor started and stopped from the Remote Start/Stop input, but the compressor capacity is controlled from the Remote Capacity Increase and Remote Capacity Decrease digital inputs.

(4-20mA) Capacity Hold

- The compressor started and stopped from the Remote Start/Stop input, but the compressor capacity is controlled from a 4-20mA analog signal run to Vission 20/20. The 4-20ma signal will be proportional to 0-100% capacity hold value. For instance, 4mA = 0 percent, 12mA = 50%, and 20mA = 100%.

Hold Capacity Operation

- Capacity Hold commands define a "target" capacity slide valve position/VFD speed for the compressor.
- When working with slides, the Vission 20/20 will position the capacity slide to the "target" position.
- When working in the No Slides mode, the Vission 20/20 will adjust the VFD speed to the "target" position. For example, when the Caphold register is remotely set to a value of 50%, then VFD speed will be set directly to 50%. Therefore Compressor Capacity would be 50%.
- The rules of this capacity hold algorithm are:

1. If the new target is < 0.4% (full scale) away from the current position – then don't do anything – this is the deadband region.
2. If new target is > deadband region but < 10% (full scale) away from the current position, then energize the capacity slide/VFD for a time that is proportional to the amount it is away from the new target position. To say it another way – the further you are away from the new target position – the longer the slide/VFD is energized in the proper direction. This control region is called the proportional band region.
3. If new target is > 10% (full scale) away from current position (greater than the proportional band region) – then energize continuously.

There are mechanical properties that limit the speed at which the capacity of the compressor can be changed. The capacity slide actuators can only turn so fast. The proportional change to the compressor capacity occurs at a fixed rate.

Caphold and Operation with VFD[2]

- Using a VFD with a compressor requires considering the VFD capacity as part of the entire capacity of the compressor. Typically, a VFD is operated from 50% to 100% speed, therefore the VFD is considered ½ the total capacity and the slide valve movement is considered the other ½ of total capacity. When a VFD is employed, the normal control method is to first move the capacity slide from 0-100% when additional refrigeration is required. When the capacity slide is at 100% and additional capacity is still required, then the VFD is ramped up in speed. It follows then that the 4-20ma Caphold signal is broken down into two parts:
  - 4-12 mA = 0 -100 slide valve position
  - 12-20ma = VFD minimum speed to VFD maximum speed.

Consideration should also be given so that when moving the capacity slide valve from 0-100%, the actual corresponding capacity of the compressor is not changing in a linear relationship of 0-100%. The last 15% travel of the slide valve results in a greater change of capacity than 15%. Integrators should realize that the caphold value sent relates to slide valve "position" and not actual capacity of the compressor. For most purposes however, assuming a linear relationship is adequate.

The rate at which the capacity slide moves from 0-100%, and the rate at which the VFD increases speed from minimum to maximum is not the same. So there are two different capacity profiles that the integrator needs to consider.

Remote Enable Output

- When the compressor is off and in Remote mode, an enable output will provide a signal to indicate that the Vission 20/20 is in a condition where it is ready to be started. No start inhibit conditions exists, the Vission 20/20 is not in anti-recycle mode, and there are no trips active. If the compressor is able to be started, then the Remote Enable output will go on. When the output is on, then closing the Remote Start/Stop input will initiate a compressor start.

NOTE

Once the compressor has started, the state of the Remote Enable Output is indeterminate, and has no meaning.

2 This applies only to operation with both slide valves and VFD, where the total capacity is divided 50/50 between the two methods.

CONTROL SCENARIO

Once the Configuration Screen has been configured for the desired type of Digital I/O control the Vission 20/20 needs to be placed in REMOTE mode. To do this, press the green UNIT START button, then REMOTE. The Remote Start-Stop input is now active. The state of the Remote Enable Output should be determined by the controlling device. When it is determined to be on, then the controlling device can energize the Remote Start-Stop input. After the compressor has started, then the compressor capacity is controlled by the selected option. Thought should also be given as to how the compressor will be restarted after a power failure occurs.

REMOTE MONITORING

- It should be noted that while the compressor is being controlled (starting, stopping and capacity control) via hard-wired inputs, monitoring of compressor operating parameters can still occur by using the communication ports available in the Vission 20/20. Remote monitoring can be accomplished by utilizing either the Ethernet communication port (via Ethernet I/P or Modbus TCP/IP) or the serial port (via RS485 Modbus RTU). For communication register information, Refer to Appendix D, Vission 20/20 Communication Table,

COMMUNICATION PORT SETUP

(Reference the "Communication" section of Figure C-14)

For Serial Port Modbus RTU Monitoring:

- Check the "Serial" box inside the "Communications" section.
- Configure serial port settings (baud rate, # data bits, # stop bits, parity) and panel ID number (which is "node" number for Modbus RTU.)

For Ethernet Monitoring:

- Check the "Ethernet" box inside the "Communications" section.
- Configure IP address and Subnet Mask.
- Select Protocol (Ethernet I/P or Modbus TCP/IP)

Once the port is setup properly, communication can be established. You will be able to read from and write to registers. In Direct I/O mode, you cannot write to registers in the Control Block region of Modbus registers 40500 through 40513.

Vission 20/20 Communication Table

Contents

Vission 20/20 Communication Table

- All ENUM variables are of INT type
- ALL F-INT data types represent floating point values as INT types multiplied by 10
- All Pressures are in Psig
- All Temperatures are in Fahrenheit
- Modbus TCP addressing is PLC-style (Base 1) addressing
- On Error, Modbus TCP server only returns an error code of “Illegal Data Address”
- All registers returned (INT and F-INT) are 2-bytes long
- For Ethernet/IP, use INT data type and PLC-5 Word Range Read/Write MSG instructions
- Remote commands can’t be issued if the panel is in “Remote Lock” mode
- Polling rates should not be less then 5 sec
- Writes to the Vission should only occur when a value needs to be changed
- Lower Range & Higher Range values mentioned are default values of Vission 20/20
- Users can modify Lower Range & Higher Range values from Vission 20/20 Panel and accordingly maintain their own table

Table D-1. Vission 20/20 Communication Table

Vilter Address	Ethernet IPAddress	Modbus Address	Command Name	Data Type	Value	Mode	Lower Range	Higher Range
Digital Inputs								
1	N50:0	40001	Compressor Interlock	INT	0 = OFF, 1 = ON	Read		
2	N50:1	40002	High Level Shutdown	INT	0 = OFF, 1 = ON	Read		
3	N50:2	40003	Oil Level Switch #1	INT	0 = OFF, 1 = ON	Read		
4	N50:3	40004	Oil Level Switch #2	INT	0 = OFF, 1 = ON	Read		
5	N50:4	40005	Remote Select #1/#2	INT	0 = OFF, 1 = ON	Read		
6	N50:5	40006	Remote Start	INT	0 = OFF, 1 = ON	Read		
7	N50:6	40007	Remote Increase	INT	0 = OFF, 1 = ON	Read		
8	N50:7	40008	Remote Decrease	INT	0 = OFF, 1 = ON	Read		
9	N50:8	40009	Auxiliary 1	INT	0 = OFF, 1 = ON	Read		
10	N50:9	40010	Auxiliary 2	INT	0 = OFF, 1 = ON	Read		
11	N50:10	40011	Auxiliary 3	INT	0 = OFF, 1 = ON	Read		
12	N50:11	40012	Auxiliary 4	INT	0 = OFF, 1 = ON	Read		
13	N50:12	40013	Auxiliary 5	INT	0 = OFF, 1 = ON	Read		
14	N50:13	40014	Auxiliary 6	INT	0 = OFF, 1 = ON	Read		
15	N50:14	40015	Auxiliary 7	INT	0 = OFF, 1 = ON	Read		
16	N50:15	40016	Auxiliary 8	INT	0 = OFF, 1 = ON	Read		
Digital Outputs								
17	N51:0	40051	Compressor Start	INT	0 = OFF, 1 = ON	Read		
18	N51:1	40052	Oil Pump	INT	0 = OFF, 1 = ON	Read		
19	N51:2	40053	Capacity Increase	ENUM		Read		
20	N51:3	40054	Capacity Decrease	ENUM		Read		
21	N51:4	40055	Volume Increase	INT	0 = OFF, 1 = ON	Read		

Vilter Address	Ethernet IPAddress	Modbus Address	Command Name	Data Type	Value	Mode	Lower Range	Higher Range
22	N51:5	40056	Volume Decrease	INT	0 = OFF, 1 = ON	Read		
23	N51:6	40057	Oil Separator Heater	INT	0 = OFF, 1 = ON	Read		
24	N51:7	40058	Trip	INT	0 = OFF, 1 = ON (ON when no Trip)	Read		
25	N51:8	40059	Slide Valve Setpoint #1	INT	0 = OFF, 1 = ON	Read		
26	N51:9	40060	Slide Valve Setpoint #2	INT	0 = OFF, 1 = ON	Read		
27	N51:10	40061	Alarm	INT	0 = OFF, 1 = ON (ON when no Alarm)	Read		
28	N51:11	40062	Economizer Port #2	INT	0 = OFF, 1 = ON	Read		
29	N51:12	40063	Liquid Injection Solenoid #1	INT	0 = OFF, 1 = ON	Read		
30	N51:13	40064	Liquid Injection Solenoid #2	INT	0 = OFF, 1 = ON	Read		
31	N51:14	40065	Remote Enabled	INT	0 = OFF, 1 = ON	Read		
32	N51:15	40066	Emergency Output	INT	0 = OFF, 1 = ON	Read		
33	N51:16	40067	Condenser Step #1	INT	0 = OFF, 1 = ON	Read		
34	N51:17	40068	Condenser Step #2	INT	0 = OFF, 1 = ON	Read		
35	N51:18	40069	Condenser Step #3	INT	0 = OFF, 1 = ON	Read		
36	N51:19	40070	Condenser Step #4	INT	0 = OFF, 1 = ON	Read		
37	N51:20	40071	Auxiliary Output #1	INT	0 = OFF, 1 = ON	Read		
38	N51:21	40072	Auxiliary Output #2	INT	0 = OFF, 1 = ON	Read		
39	N51:22	40073	Auxiliary Output #3	INT	0 = OFF, 1 = ON	Read		
40	N51:23	40074	Auxiliary Output #4	INT	0 = OFF, 1 = ON	Read		
Analog Inputs								
41	N52:0	40100	Motor Amps	F-INT		Read		
42	N52:1	40101	Suction Pressure	F-INT		Read		
43	N52:2	40102	Discharge Pressure	F-INT		Read		
44	N52:3	40103	Oil Filter Inlet Pressure	F-INT		Read		
45	N52:4	40104	Oil Manifold Pressure	F-INT		Read		
46	N52:5	40105	Economizer Pressure	F-INT		Read		
47	N52:6	40106	Capacity Slide %	F-INT		Read		
48	N52:7	40107	Volume Slide %	F-INT		Read		
49	N52:8	40108	Suction Temperature	F-INT		Read		
50	N52:9	40109	Discharge Temperature	F-INT		Read		
51	N52:10	40110	Oil Separator Temperature	F-INT		Read		
52	N52:11	40111	Oil Manifold Temperature	F-INT		Read		
53	N52:12	40112	Process Control	F-INT		Read		
54	N52:13	40113	Chiller Inlet Temperature	F-INT		Read		
55	N52:14	40114	Condenser Pressure	F-INT		Read		
56	N52:15	40115	Remote Setpoint	F-INT		Read		
57	N52:16	40116	Auxiliary 1	F-INT		Read		
58	N52:17	40117	Auxiliary 2	F-INT		Read		
59	N52:18	40118	Auxiliary 3	F-INT		Read		
60	N52:19	40119	Auxiliary 4	F-INT		Read		
61	N52:20	40120	Auxiliary 5	F-INT		Read		

Vilter Address	Ethernet IPAddress	Modbus Address	Command Name	Data Type	Value	Mode	Lower Range	Higher Range
62	N52:21	40121	Auxiliary 6	F-INT		Read		
63	N52:22	40122	Auxiliary 7	F-INT		Read		
64	N52:23	40123	Auxiliary 8	F-INT		Read		
65	N52:24	40124	Auxiliary 9	F-INT		Read		
66	N52:25	40125	Auxiliary 10	F-INT		Read		
67	N52:26	40126	Auxiliary 11	F-INT		Read		
68	N52:27	40127	Auxiliary 12	F-INT		Read		
69	N52:28	40128	Auxiliary 13	F-INT		Read		
70	N52:29	40129	Auxiliary 14	F-INT		Read		
71	N52:30	40130	Auxiliary 15	F-INT		Read		
72	N52:31	40131	Auxiliary 16	F-INT		Read		
Analog Outputs								
73	N53:0	40200	Compressor VFD (mA)	F-INT		Read		
74	N53:1	40201	Condenser VFD	F-INT		Read		
75	N53:2	40202	Slide Valve Output	F-INT		Read		
76	N53:3	40203	Liquid Injection Motorized Valve	F-INT		Read		
77	N53:4	40204	Auxiliary Output #1	F-INT		Read		
78	N53:5	40205	Auxiliary Output #2	F-INT		Read		
79	N53:6	40206	Auxiliary Output #3	F-INT		Read		
80	N53:7	40207	Auxiliary Output #4	F-INT		Read		
Calculated Values								
81	N54:0	40250	Filter Differential Pressure	F-INT		Read		
82	N54:1	40251	Start Oil Pressure	F-INT		Read		
83	N54:2	40252	Run Oil Pressure	F-INT		Read		
84	N54:3	40253	Pressure Ratio	F-INT		Read		
85	N54:4	40254	Volume Ratio	F-INT		Read		
86	N54:5	40255	Superheat Discharge Temp.	F-INT		Read		
87	N54:6	40256	Superheat Suction Temp.	F-INT		Read		
88	N54:7	40257	Superheat Oil Sep. Temp.	F-INT	(Currently Unused)	Read		
89	N54:8	40258	Compressor VFD RPM	INT		Read		
90	N54:9	40259	Compressor Run Capacity %	INT		Read		
91	N54:10	40260	Liquid Pressure	F-INT		Read		
92	N54:11	40261	Switch Pressure	F-INT		Read		
93	N54:12	40262	Orifice Loss	F-INT		Read		
Statuses								
94	N55:0	40400	Anti-Recycle Time (Minutes)	INT		Read		
95	N55:1	40401	Compressor Status	ENUM	0 = Stop 1 = Stop (Remote Ready) 2 = Running 3 = Starting 4 = Waiting	Read		
96	N55:2	40402	Alarm Status Word #1	WORD		Read (See notes after table)		

Vilter Address	Ethernet IPAddress	Modbus Address	Command Name	Data Type	Value	Mode	Lower Range	Higher Range
97	N55:3	40403	Alarm Status Word #2	WORD		Read (See notes after table)		
98	N55:4	40404	Warning Status Word #1	WORD		Read (See notes after table)		
99	N55:5	40405	Warning Status Word #2	WORD		Read (See notes after table)		
100	N55:6	40406	Trip Status Word #1	WORD		Read (See notes after table)		
101	N55:7	40407	Trip Status Word #2	WORD		Read (See notes after table)		
102	N55:8	40408	Trip Status Word #3	WORD		Read (See notes after table)		
103	N55:9	40409	Trip Status Word #4	WORD		Read (See notes after table)		
104	N55:10	40410	Current Run Mode	ENUM	0 = Idle 1 = Waiting 2 = Starting 3 = Manual 4 = Auto (Internal Capacity Control) 5 = Remote Auto (Internal Capacity Control) 6 = Remote Load/ Unload 7 = Remote Capacity Hold % 8 = Remote Ready (Idle) 9 = Direct I/O Auto Capacity 10 = Direct I/O Manual Capacity 11 = Direct I/O Capacity Hold % 12 = Auto Sequencing	Read		

Vilter Address	Ethernet IPAddress	Modbus Address	Command Name	Data Type	Value	Mode	Lower Range	Higher Range
105	N55:11	40411	Load Limiting Condition	WORD	Bit 0 = High Motor Amps Bit 1 = High Discharge Pressure Bit 2 = Low Suction Pressure Bit 3 = High Discharge Superheat Bit 4 = Cool Compression SOI Bit 5 = Low Compression Ratio	Read		
106	N55:12	40412	Oil Pump Status	INT	0 = OFF, 1 = ON	Read		
107	N55:13	40413	Oil Pump Operation	ENUM	0 = No Pump 1 = Stal 2 = Cycling 3 = Full Time 4 = Cool Compression 5 = Suction Oil Injection Solenoid	Read		
108	N55:14	40414	Compressor Model	ENUM	0 = VSR 1 = VSM 2 = VSS 3 = VRS 4 = VSM7 5 = VSH/VSG	Read		
109	N55:15	40415	Refrigerant	ENUM	0 = R12 1 = R22 2 = R134a 3 = R290 4 = R404a 5 = R502 6 = R507 7 = R717 8 = R744 9 = Natural Gas	Read		
110	N55:16	40416	Runtime Hours (x1000)	INT		Read		
111	N55:17	40417	Runtime Hours (1-999)	INT		Read		
112	N55:18	40418	Remote Lock Mode	INT	0 = OFF, 1 = ON	Read		
Commands								
113	N56:0	40500	Alarm Reset	INT	1 = Perform Reset	Read-Write		
114	N56:1	40501	Active Remote Control	ENUM	0 = None (Local) 1 = Direct I/O 2 = Serial 3 = Ethernet	Read-Write		
115	N56:2	40502	Remote Capacity Control Select	ENUM	0 = Auto Capacity Control 1 = Pulse Load / Unload 2 = Hold Capacity %	Read-Write		

Vilter Address	Ethernet IPAddress	Modbus Address	Command Name	Data Type	Value	Mode	Lower Range	Higher Range
116	N56:3	40503	Auto Capacity Control Type	ENUM	0 = Suction Pressure (if enabled) 1 = Process Temperature Cooling (if enabled) 2 = Process Pressure Cooling (if enabled) 3 = Discharge Pressure (if enabled) 4 = Process Temperature Heating (if enabled) 5 = Process Pressure Heating (if enabled)	Read-Write		
117	N56:4	40504	Remote Pulse Load	F-INT	0 = Stop Pulse or 0 RPM 10 = 1 Second Pulse or 14 RPM 15 = 1.5 Second Pulse or 15 RPM 20 = 2 Second Pulse or 16 RPM ... 145 = 14.5 Second Pulse or 41 RPM 150 = 15 Second Pulse or 42 RPM	Read-Write		
118	N56:5	40505	Remote Pulse Unload	F-INT	0 = Stop Pulse or 0 RPM 10 = 1 Second Pulse or 14 RPM 15 = 1.5 Second Pulse or 15 RPM 20 = 2 Second Pulse or 16 RPM ... 145 = 14.5 Second Pulse or 41 RPM 150 = 15 Second Pulse or 42 RPM	Read-Write		
119	N56:6	40506	Capacity Hold %	INT	0 – 100	Read-Write		
120	N56:7	40507	Active Setpoint	ENUM	1 = Setpoint 1 2 = Setpoint 2 (if enabled)	Read-Write		
121	N56:8	40508	Start Command	INT	1 = Remote Auto 2 = Auto Sequencing	Read-Write (See notes after table)		
122	N56:9	40509	Stop Command	INT	1 = Stop	Read-Write		
123	N56:10	40510	Auto-Cycle Enable/ Disable	INT	0 = Disable, 1 = Enable	Read-Write		
124	N56:11	40511	Pumpdown Enable/Disable	INT	0 = Disable, 1 = Enable	Read-Write		
125	N56:12	40512	Pulldown Enable/Disable	INT	0 = Disable, 1 = Enable	Read-Write		
126	N56:13	40513	Force to local control	INT	1 = To local	Read-Write		

Vilter Address	Ethernet IPAddress	Modbus Address	Command Name	Data Type	Value	Mode	Lower Range	Higher Range
Compressor Control Setpoints								
127	N57:0	40550	Setpoint #1 (Suct. Press, Proc Control Cooling, Disch. Press, Proc Control Heating)	F-INT		Read-Write	(-15.0, -100.0, -15.0)	(200.0, 150.0, 400.0)
128	N57:1	40551	Cap Inc Time Interval Setpoint #1	F-INT		Read-Write	0.5	5.5
129	N57:2	40552	Cap Inc Proportional Band Setpoint #1	F-INT		Read-Write	0.5	20.0
130	N57:3	40553	Cap Dec Time Interval Setpoint #1	F-INT		Read-Write	0.5	5.5
131	N57:4	40554	Cap Dec Proportional Band Setpoint #1	F-INT		Read-Write	0.5	20.0
132	N57:5	40555	Setpoint #2 (Suct. Press, Proc Control Cooling, Disch. Press, Proc Control Heating)	F-INT		Read-Write	(-15.0, -100.0, -15.0)	(200.0, 150.0, 400.0)
133	N57:6	40556	Cap Inc Time Interval Setpoint #2	F-INT		Read-Write	0.5	5.5
134	N57:7	40557	Cap Inc Proportional Band Setpoint #2	F-INT		Read-Write	0.5	20.0
135	N57:8	40558	Cap Dec Time Interval Setpoint #2	F-INT		Read-Write	0.5	5.5
136	N57:9	40559	Cap Dec Proportional Band Setpoint #2	F-INT		Read-Write	0.5	20.0
137	N57:10	40560	Cap Inc Pulse Time Setpoint #1	F-INT		Read-Write	0.5	5.5
138	N57:11	40561	Cap Inc Dead Band Setpoint #1	F-INT		Read-Write	1.0	50.0
139	N57:12	40562	Cap Dec Pulse Time Setpoint #1	F-INT		Read-Write	0.5	5.5
140	N57:13	40563	Cap Dec Dead Band Setpoint #1	F-INT		Read-Write	1.0	50.0
141	N57:14	40564	Cap Inc Pulse Time Setpoint #2	F-INT		Read-Write	0.5	5.5
142	N57:15	40565	Cap Inc Dead Band Setpoint #2	F-INT		Read-Write	1.0	50.0
143	N57:16	40566	Cap Dec Pulse Time Setpoint #2	F-INT		Read-Write	0.5	5.5
144	N57:17	40567	Cap Dec Dead Band Setpoint #2	F-INT		Read-Write	1.0	50.0
145	N57:18	40568	I/O Based Setpoint Control	INT	0 = Disable, 1 = Enable	Read		
Auto Cycle								
146	N58:0	40570	Start(Suct. Press , Proc Control Cooling, Disch. Press, Proc Control Heating) Setpoint #1	F-INT		Read-Write	(-15.0, -100.0, -15.0)	(200.0, 150.0, 400.0)
147	N58:1	40571	Start Delay Time Setpoint #1	INT		Read-Write	0	300
148	N58:2	40572	Stop(Suct. Press/Proc Control/Disch. Press) Setpoint #1	F-INT		Read-Write	(-15.0, -100.0, -15.0)	(200.0, 150.0, 400.0)

Vilter Address	Ethernet IPAddress	Modbus Address	Command Name	Data Type	Value	Mode	Lower Range	Higher Range
149	N58:3	40573	Stop Delay Time Setpoint #1	INT		Read-Write	0	300
150	N58:4	40574	Minimum Slide Position Setpoint #1	INT		Read-Write	0	100
151	N58:5	40575	Start(Suct. Press/Proc Control/Disch. Press) Setpoint #2	F-INT		Read-Write	(-15.0, -100.0, -15.0)	(200.0, 150.0, 400.0)
152	N58:6	40576	Start Delay Time Setpoint #2	INT		Read-Write	0	300
153	N58:7	40577	Stop(Suct. Press/Proc Control/Disch. Press) Setpoint #2	F-INT		Read-Write	(-15.0, -100.0, -15.0)	(200.0, 150.0, 400.0)
154	N58:8	40578	Stop Delay Time Setpoint #2	INT		Read-Write	0	300
155	N58:9	40579	Minimum Slide Position Setpoint #2	INT		Read-Write	0	100
Pumpdown								
156	N59:0	40590	Stop Pressure Setpoint #1	F-INT		Read-Write	-15.0	200.0
157	N59:1	40591	Stop Delay Time Setpoint #1 (seconds)	INT		Read-Write	0	60
158	N59:2	40592	Minimum Slide Position Setpoint #1	INT		Read-Write	0	50
159	N59:3	40593	Stop Pressure Setpoint #2	F-INT		Read-Write	-15.0	200.0
160	N59:4	40594	Stop Delay Time Setpoint #2 (seconds)	INT		Read-Write	0	60
161	N59:5	40595	Minimum Slide Position Setpoint #2	INT		Read-Write	0	50
162	N59:6	40596	Pumpdown Operation	INT	0 = Stop, 1 = Start	Read-Write		
Pulldown								
163	N60:0	40600	Step Value (Suct. Press / Proc Control)	F-INT		Read-Write	0.0	10.0
164	N60:1	40601	Delay Per Step (hours and minutes) (Suct. Press / Proc Control)	F-INT		Read-Write	0.1	20.0
165	N60:2	40602	Stop Value (Suct. Press / Proc Control)	F-INT		Read-Write	-15.0	200.0
166	N60:3	40603	Auto Cycle Start Offset (Suct. Press / Proc Control)	F-INT		Read-Write	1.0	20.0
167	N60:4	40604	Initiate Pulldown at Next Start	INT	0 = Disable, 1 = Enable	Read-Write		
168	N60:5	40605	Initiate Pulldown at Every Start	INT	0 = Disable, 1 = Enable	Read-Write		
169	N60:6	40606	Auto Cycle Stop Offset (Suct. Press / Proc Control)	F-INT		Read-Write	1.0	20.0
Stop Load & Force Unload / Liquid Injection								
170	N61:0	40610	High Motor Amps Stop Load Setpoint #1	F-INT		Read		
171	N61:1	40611	High Motor Amps Force Unload Setpoint #1	F-INT		Read		
172	N61:2	40612	High Disch Press Stop Load Setpoint #1	F-INT		Read		

Vilter Address	Ethernet IPAddress	Modbus Address	Command Name	Data Type	Value	Mode	Lower Range	Higher Range
173	N61:3	40613	High Disch Press Force Unload Setpoint #1	F-INT		Read		
174	N61:4	40614	Low Suct Press Stop Load Setpoint #1	F-INT		Read		
175	N61:5	40615	Low Suct Press Force Unload Setpoint #1	F-INT		Read		
176	N61:6	40616	High Motor Amps Stop Load Setpoint #2	F-INT		Read		
177	N61:7	40617	High Motor Amps Force Unload Setpoint #2	F-INT		Read		
178	N61:8	40618	High Disch Press Stop Load Setpoint #2	F-INT		Read		
179	N61:9	40619	High Disch Press Force Unload Setpoint #2	F-INT		Read		
180	N61:10	40620	Low Suct Press Stop Load Setpoint #2	F-INT		Read		
181	N61:11	40621	Low Suct Press Force Unload Setpoint #2	F-INT		Read		
182	N61:12	40622	Liquid Inj. Setpoint	F-INT		Read-Write	100.0	200.0
183	N61:13	40623	Dual Liquid Inj. Enabled	INT	0 = Disabled, 1 = Enabled	Read		
184	N61:14	40624	Liquid Inj. Open %	F-INT		Read		
185	N61:15	40625	Liquid Inj. Oil Sep. Temp. Override	F-INT		Read		
186	N61:16	40626	Liquid Inj. Motorized Valve Gain (P)	F-INT		Read		
187	N61:17	40627	Liquid Inj. Motorized Valve Reset (I)	F-INT		Read		
188	N61:18	40628	Liquid Inj. Motorized Valve Rate (D)	F-INT		Read		
189	N61:19	40629	Minimum Valve Open Enabled	INT	0 = Disabled, 1 = Enabled	Read		
190	N61:20	40630	Avg. With Oil Manifold Temperature	INT	0 = Disabled, 1 = Enabled	Read		
191	N61:21	40631	High Discharge Superheat Stop Load Setpoint #1	F-INT		Read		
192	N61:22	40632	High Discharge Superheat Force Unload Setpoint #1	F-INT		Read		
193	N61:23	40633	High Discharge Superheat Stop Load Setpoint #2	F-INT		Read		
194	N61:24	40634	High Discharge Superheat Force Unload Setpoint #2	F-INT		Read		
195	N61:25	40635	Dual Liquid Inj. Slide %	F-INT		Read		
196	N61:26	40636	Dual Liquid Inj. Valve Loss	F-INT		Read		
197	N61:27	40637	Dual Liquid Inj. Safety Loss	F-INT		Read		
198	N61:28	40638	Dual Liquid Inj. Port Selection	ENUM	0 = Low-Medium 1 = Low-High 2 = Medium-High	Read		

Vilter Address	Ethernet IPAddress	Modbus Address	Command Name	Data Type	Value	Mode	Lower Range	Higher Range
Slide Valve Control / Oil Control								
199	N62:0	40640	Slide Valve Setpoint #1	INT		Read		
200	N62:1	40641	Slide Valve Setpoint #2	INT		Read		
201	N62:2	40642	Slide Valve Setpoint #1 Enabled	INT	0 = Disabled, 1 = Enabled	Read		
202	N62:3	40643	Slide Valve Setpoint #2 Enabled	INT	0 = Disabled, 1 = Enabled	Read		
203	N62:4	40644	Oil Pump Press. Restart Ratio SP 1 (ON)	F-INT		Read		
204	N62:5	40645	Oil Pump Press. Restart Ratio SP 1 (OFF)	F-INT		Read		
205	N62:6	40646	Oil Sep. Heater Temp.	F-INT		Read		
206	N62:7	40647	Volume Slide Adjustment %	INT		Read		
207	N62:8	40648	Soft Load %	INT		Read		
208	N62:9	40649	Capacity Range Min %	F-INT		Read		
209	N62:10	40650	Capacity Range Max %	F-INT		Read		
210	N62:11	40651	Rate Deadband	F-INT		Read		
211	N62:12	40652	Enable Load Anticipating Algorithm	INT	0 = Disabled, 1 = Enabled	Read		
212	N62:13	40653	Economizer Port 2 Setpoint	INT		Read		
213	N62:14	40654	Oil Injection Temperature Override	F-INT		Read		
214	N62:15	40655	Slide Valve Setpoint #1 State Below Setpoint	INT	0 = N/O, 1 = N/C	Read		
215	N62:16	40656	Slide Valve Setpoint #2 State Below Setpoint	INT	0 = N/O, 1 = N/C	Read		
216	N62:17	40657	No Oil Pump Pressure Ratio	F-INT		Read		
217	N62:18	40658	No Oil Pump Load Limit %	F-INT		Read		
218	N62:19	40659	Oil Pump Press. Restart Ratio SP 2 (ON)	F-INT		Read		
219	N62:20	40660	Oil Pump Press. Restart Ratio SP 2 (OFF)	F-INT		Read		
220	N62:21	40661	Filter In and Filter Out Average	INT		Read		
221	N62:22	40662	Max Slide Position %	INT		Read	NA	NA
Compressor VFD								
222	N70:0	40670	VFD Gain (P)	F-INT		Read		
223	N70:1	40671	VFD Reset (I)	F-INT		Read		
224	N70:2	40672	VFD Rate (D)	F-INT		Read		
225	N70:3	40673	Step 1 VFD Minimum Slide Position	INT		Read		
226	N70:4	40674	Step 1 VFD Maximum Slide Position	INT		Read		
227	N70:5	40675	Step 1 VFD Minimum Speed (rpm)	INT		Read		
228	N70:6	40676	Step 1 VFD Maximum Speed (rpm)	INT		Read		

Vilter Address	Ethernet IPAddress	Modbus Address	Command Name	Data Type	Value	Mode	Lower Range	Higher Range
229	N70:7	40677	2 Step VFD Control Enabled	INT	0 = Disabled, 1 = Enabled	Read		
230	N70:8	40678	Step 2 VFD Minimum Slide Position	INT		Read		
231	N70:9	40679	Step 2 VFD Maximum Slide Position	INT		Read		
232	N70:10	40680	Step 2 VFD Minimum Speed (rpm)	INT		Read		
233	N70:11	40681	Step 2 VFD Maximum Speed (rpm)	INT		Read		
234	N70:12	40682	Rapid Cycling VFD Minimum Speed (rpm)	INT		Read		
235	N70:13	40683	Rapid Cycling VFD Maximum Speed (rpm)	INT		Read		
236	N70:14	40684	Warm up Timer	F-INT		Read		
237	N70:15	40685	Oil Restriction Setpoint (rpm)	INT		Read		
238	N70:16	40686	Oil Restriction Offset (rpm)	INT		Read		
239	N70:17	40687	Oil Restriction Solenoid State Below Setpoint	INT	0 = “N/O”, 1 = “N/C”	Read		
240	N70:18	40688	Start Settings	INT	0 = Disabled, 1 = Enabled	Read		
241	N70:19	40689	Min VFD Speed Timer	INT		Read		
242	N70:20	40690	Min VFD Speed	INT		Read		
Cool Compression								
243	N71:0	40700	Auto Load Enabled	INT	0 = Disabled, 1 = Enabled	Read		
244	N71:1	40701	Auto Load @ Start	INT		Read		
245	N71:2	40702	Auto Load Timer (mins)	F-INT		Read		
246	N71:3	40703	SOI Solenoid ON	F-INT		Read		
247	N71:4	40704	SOI Solenoid OFF	F-INT		Read		
248	N71:5	40705	SOI Load Limit	INT		Read		
249	N71:6	40706	High Press Ratio Solenoid ON	F-INT		Read		
250	N71:7	40707	High Press Ratio Solenoid OFF	F-INT		Read		
251	N71:8	40708	Start SP	F-INT		Read		
252	N71:9	40709	Linear SP	F-INT		Read		
253	N71:10	40710	Upper SP	F-INT		Read		
254	N71:11	40711	Max SP	F-INT		Read		
255	N71:12	40712	Start Level	INT		Read		
256	N71:13	40713	Leakage	INT		Read		
257	N71:14	40714	Overfill Leakage	INT		Read		
VI Control								
258	N74:0	40720	VI Control Method	ENUM	0 = Fixed VI 1 = Continuous VI 2 = Step VI	Read		
259	N74:1	40721	Time Interval	INT		Read		
260	N74:2	40722	Minimum VI	F-INT		Read		

Vilter Address	Ethernet IPAddress	Modbus Address	Command Name	Data Type	Value	Mode	Lower Range	Higher Range
261	N74:3	40723	Maximum VI	F-INT		Read		
262	N74:4	40724	Deadband	F-INT		Read		
263	N74:5	40725	Step 1	F-INT		Read		
264	N74:6	40726	Step 2	F-INT		Read		
265	N74:7	40727	Step 3	F-INT		Read		
Alarms/Trips (Page 1)								
266	N63:0	40750	Low Suction Press. Alarm Setpoint #1	F-INT		Read-Write	-15.0	300.0
267	N63:1	40751	Low Suction Press. Trip Set-point #1	F-INT		Read-Write	-15.0	300.0
268	N63:2	40752	High Disch. Press. Alarm Setpoint #1	F-INT		Read		
269	N63:3	40753	High Disch. Press. Trip Set-point #1	F-INT		Read		
270	N63:4	40754	High Proc. Temp. Alarm Setpoint #1	F-INT		Read-Write	-100.0	210.0
271	N63:5	40755	Low Proc. Temp. Alarm Set-point #1	F-INT		Read-Write	-100.0	210.0
272	N63:6	40756	Low Proc. Temp. Trip Setpoint #1	F-INT		Read-Write	-100.0	210.0
273	N63:7	40757	Low Suction Press. Alarm Setpoint #2	F-INT		Read-Write	-15.0	300.0
274	N63:8	40758	Low Suction Press. Trip Set-point #2	F-INT		Read-Write	-15.0	300.0
275	N63:9	40759	High Disch. Press. Alarm Setpoint #2	F-INT		Read		
276	N63:10	40760	High Disch. Press. Trip Set-point #2	F-INT		Read		
277	N63:11	40761	High Proc. Temp. Alarm Setpoint #2	F-INT		Read-Write	-100.0	210.0
278	N63:12	40762	Low Proc. Temp. Alarm Set-point #2	F-INT		Read-Write	-100.0	210.0
279	N63:13	40763	Low Proc. Temp. Trip Setpoint #2	F-INT		Read-Write	-100.0	210.0
280	N63:14	40764	Low Proc. Pressure Alarm Setpoint #1	F-INT		Read-Write	-15.0	300.0
281	N63:15	40765	Low Proc. Pressure Trip Set-point #1	F-INT		Read-Write	-15.0	300.0
282	N63:16	40766	High Proc. Pressure Alarm Setpoint #1	F-INT		Read-Write	-15.0	400.0
283	N63:17	40767	High Proc. Pressure Trip Setpoint #1	F-INT		Read-Write	-15.0	400.0
284	N63:18	40768	Low Proc. Pressure Alarm Setpoint #2	F-INT		Read-Write	-15.0	300.0
285	N63:19	40769	Low Proc. Pressure Trip Set-point #2	F-INT		Read-Write	-15.0	300.0
286	N63:20	40770	High Proc. Pressure Alarm Setpoint #2	F-INT		Read-Write	-15.0	400.0

Vilter Address	Ethernet IPAddress	Modbus Address	Command Name	Data Type	Value	Mode	Lower Range	Higher Range
287	N63:21	40771	High Proc. Pressure Trip Setpoint #2	F-INT		Read-Write	-15.0	400.0
288	N63:22	40772	High Proc. Temp. Trip Set-point #1	F-INT		Read-Write	-100.0	250.0
289	N63:23	40773	High Proc. Temp. Trip Set-point #2	F-INT		Read-Write	-100.0	250.0
Alarms/Trips (Page 2)								
290	N64:0	40800	Low Suction Temp. Alarm	F-INT		Read-Write	-100.0	210.0
291	N64:1	40801	Low Suction Temp. Trip	F-INT		Read-Write	-100.0	210.0
292	N64:2	40802	High Disch. Temp. Alarm	F-INT		Read		
293	N64:3	40803	High Disch. Temp. Trip	F-INT		Read		
294	N64:4	40804	Low Oil Sep. Start Temp. Alarm	F-INT		Read		
295	N64:5	40805	Low Oil Sep. Start Temp. Trip	F-INT		Read		
296	N64:6	40806	Low Oil Sep. Run Temp. Alarm	F-INT		Read		
297	N64:7	40807	Low Oil Sep. Run Temp. Trip	F-INT		Read		
298	N64:8	40808	Low Oil Inj. Temp Alarm	F-INT		Read		
299	N64:9	40809	Low Oil Inj. Temp Trip	F-INT		Read		
300	N64:10	40810	High Oil Inj. Temp Alarm	F-INT		Read		
301	N64:11	40811	High Oil Inj. Temp Trip	F-INT		Read		
302	N64:12	40812	High Oil Separator Temp Alarm	F-INT		Read		
303	N64:13	40813	High Oil Separator Temp Trip	F-INT		Read		
304	N64:14	40814	High Superheat Start Temp Trip	F-INT		Read-Write	0.0	100.0
305	N64:15	40815	High Superheat Run Temp Alarm	F-INT		Read-Write	21.0	23.0
306	N64:16	40816	High Superheat Run Temp Trip	F-INT		Read-Write	24.0	26.0
307	N64:17	40817	High Superheat Start Offset Temp	F-INT		Read-Write	4.0	6.0
308	N64:18	40818	Low Suction Superheat Temp Alarm	F-INT		Read-Write	0.0	40.0
309	N64:19	40819	Low Suction Superheat Temp Trip	F-INT		Read-Write	0.0	40.0
Alarms/Trips (Page 3)								
310	N65:0	40830	Prelube Oil Pressure Alarm	F-INT		Read		
311	N65:1	40831	Prelube Oil Pressure Trip	F-INT		Read		
312	N65:2	40832	Run Oil Pressure Alarm	F-INT		Read		
313	N65:3	40833	Run Oil Pressure Trip	F-INT		Read		
314	N65:4	40834	High Filter Diff. Start Press. Alarm	F-INT		Read		
315	N65:5	40835	High Filter Diff. Start Press. Trip	F-INT		Read		
316	N65:6	40836	High Filter Diff. Run Press. Alarm	F-INT		Read		
317	N65:7	40837	High Filter Diff. Run Press. Trip	F-INT		Read		

Vilter Address	Ethernet IPAddress	Modbus Address	Command Name	Data Type	Value	Mode	Lower Range	Higher Range
318	N65:8	40838	High Motor Amps Alarm	F-INT		Read		
319	N65:9	40839	High Motor Amps Trip	F-INT		Read		
320	N65:10	40840	Low Run Pressure Ratio Alarm	F-INT		Read-Write	1.4	4.9
321	N65:11	40841	Low Run Pressure Ratio Trip	F-INT		Read-Write	1.4	4.9
322	N65:12	40842	Start Oil Pressure Stage 1 Trip	F-INT		Read		
323	N65:13	40843	Start Oil Pressure Stage 2 Trip	F-INT		Read		
324	N65:14	40844	Oil Over Pressure Trip	F-INT		Read		
Timers								
325	N66:0	40900	Capacity Increase Start Delay (seconds)	INT		Read		
326	N66:1	40901	Minimum Comp. Prelube Time (seconds)	INT		Read		
327	N66:2	40902	Low Oil Pressure Bypass Timer (seconds)	INT		Read		
328	N66:3	40903	High Filter Diff. Pressure Changeover Timer (seconds)	INT		Read		
329	N66:4	40904	Compressor Interlock Bypass Timer (seconds)	INT		Read		
330	N66:5	40905	Low Oil Sep. Temp. Changeover Timer (minutes)	INT		Read		
331	N66:6	40906	Low Oil Injection Bypass Timer (minutes)	INT		Read		
332	N66:7	40907	High Motor Amps Safety Bypass (seconds)	INT		Read		
333	N66:8	40908	Restart After Power Failure Timer (minutes)	INT		Read-Write	1	120
334	N66:9	40909	Hot Starts Per Hour	INT		Read-Write	1	5
335	N66:10	40910	True Anti-Recycle Timer (minutes)	INT		Read-Write	12	480
336	N66:11	40911	Accumulative Anti-Recycle Timer (minutes)	INT		Read-Write	12	480
337	N66:12	40912	Oil Level #1 Trip Delay (seconds)	INT		Read		
338	N66:13	40913	Oil Level #2 Trip Delay (seconds)	INT		Read		
339	N66:14	40914	Low Pressure Ratio Bypass Timer (seconds)	INT		Read		
340	N66:15	40915	Emergency Stop Timer (minutes)	INT		Read		
341	N66:16	40916	Low Suction Pressure Safety Bypass (seconds)	INT		Read		
342	N66:17	40917	High Superheat Temp Changeover Timer (minutes)	INT		Read		
343	N66:18	40918	Prelube Oil Pressure Monitor Time (seconds)	INT		Read		
344	N66:19	40919	Prelube Oil Pressure Monitor Trials	INT		Read		

Vilter Address	Ethernet IPAddress	Modbus Address	Command Name	Data Type	Value	Mode	Lower Range	Higher Range
345	N66:20	40920	Prelube Oil Pressure Change-over Timer (seconds)	INT		Read		
346	N66:21	40921	Communication Failure Detect Timer (minutes)	INT		Read		
347	N66:22	40922	Start Oil Pressure Stage 1 Timer (seconds)	INT		Read		
348	N66:23	40923	Start Oil Pressure Stage 2 Timer (seconds)	INT		Read		
Compressor Scheduling (Military Time)								
349	N67:0	41000	Sunday Event #1 Control Mode	ENUM		Read-Write (See notes after table)	0	12
350	N67:1	41001	Sunday Event #1 Hour	INT		Read-Write (See notes after table)	0	23
351	N67:2	41002	Sunday Event #1 Minute	INT		Read-Write (See notes after table)	0	59
352	N67:3	41003	Sunday Event #2 Control Mode	ENUM		Read-Write (See notes after table)	0	12
353	N67:4	41004	Sunday Event #2 Hour	INT		Read-Write (See notes after table)	0	23
354	N67:5	41005	Sunday Event #2 Minute	INT		Read-Write (See notes after table)	0	59
355	N67:6	41006	Sunday Event #3 Control Mode	ENUM		Read-Write (See notes after table)	0	12
356	N67:7	41007	Sunday Event #3 Hour	INT		Read-Write (See notes after table)	0	23
357	N67:8	41008	Sunday Event #3 Minute	INT		Read-Write (See notes after table)	0	59
358	N67:9	41009	Sunday Event #4 Control Mode	ENUM		Read-Write (See notes after table)	0	12
359	N67:10	41010	Sunday Event #4 Hour	INT		Read-Write (See notes after table)	0	23
360	N67:11	41011	Sunday Event #4 Minute	INT		Read-Write (See notes after table)	0	59
361	N67:12	41012	Monday Event #1 Control Mode	ENUM		Read-Write (See notes after table)	0	12
362	N67:13	41013	Monday Event #1 Hour	INT		Read-Write (See notes after table)	0	23

Vilter Address	Ethernet IPAddress	Modbus Address	Command Name	Data Type	Value	Mode	Lower Range	Higher Range
363	N67:14	41014	Monday Event #1 Minute	INT		Read-Write (See notes after table)	0	59
364	N67:15	41015	Monday Event #2 Control Mode	ENUM		Read-Write (See notes after table)	0	12
365	N67:16	41016	Monday Event #2 Hour	INT		Read-Write (See notes after table)	0	23
366	N67:17	41017	Monday Event #2 Minute	INT		Read-Write (See notes after table)	0	59
367	N67:18	41018	Monday Event #3 Control Mode	ENUM		Read-Write (See notes after table)	0	12
368	N67:19	41019	Monday Event #3 Hour	INT		Read-Write (See notes after table)	0	23
369	N67:20	41020	Monday Event #3 Minute	INT		Read-Write (See notes after table)	0	59
370	N67:21	41021	Monday Event #4 Control Mode	ENUM		Read-Write (See notes after table)	0	12
371	N67:22	41022	Monday Event #4 Hour	INT		Read-Write (See notes after table)	0	23
372	N67:23	41023	Monday Event #4 Minute	INT		Read-Write (See notes after table)	0	59
373	N67:24	41024	Tuesday Event #1 Control Mode	ENUM		Read-Write (See notes after table)	0	12
374	N67:25	41025	Tuesday Event #1 Hour	INT		Read-Write (See notes after table)	0	23
375	N67:26	41026	Tuesday Event #1 Minute	INT		Read-Write (See notes after table)	0	59
376	N67:27	41027	Tuesday Event #2 Control Mode	ENUM		Read-Write (See notes after table)	0	12
377	N67:28	41028	Tuesday Event #2 Hour	INT		Read-Write (See notes after table)	0	23
378	N67:29	41029	Tuesday Event #2 Minute	INT		Read-Write (See notes after table)	0	59
379	N67:30	41030	Tuesday Event #3 Control Mode	ENUM		Read-Write (See notes after table)	0	12

Vilter Address	Ethernet IPAddress	Modbus Address	Command Name	Data Type	Value	Mode	Lower Range	Higher Range
380	N67:31	41031	Tuesday Event #3 Hour	INT		Read-Write (See notes after table)	0	23
381	N67:32	41032	Tuesday Event #3 Minute	INT		Read-Write (See notes after table)	0	59
382	N67:33	41033	Tuesday Event #4 Control Mode	ENUM		Read-Write (See notes after table)	0	12
383	N67:34	41034	Tuesday Event #4 Hour	INT		Read-Write (See notes after table)	0	23
384	N67:35	41035	Tuesday Event #4 Minute	INT		Read-Write (See notes after table)	0	59
385	N67:36	41036	Wednesday Event #1 Control Mode	ENUM		Read-Write (See notes after table)	0	12
386	N67:37	41037	Wednesday Event #1 Hour	INT		Read-Write (See notes after table)	0	23
387	N67:38	41038	Wednesday Event #1 Minute	INT		Read-Write (See notes after table)	0	59
388	N67:39	41039	Wednesday Event #2 Control Mode	ENUM		Read-Write (See notes after table)	0	12
389	N67:40	41040	Wednesday Event #2 Hour	INT		Read-Write (See notes after table)	0	23
390	N67:41	41041	Wednesday Event #2 Minute	INT		Read-Write (See notes after table)	0	59
391	N67:42	41042	Wednesday Event #3 Control Mode	ENUM		Read-Write (See notes after table)	0	12
392	N67:43	41043	Wednesday Event #3 Hour	INT		Read-Write (See notes after table)	0	23
393	N67:44	41044	Wednesday Event #3 Minute	INT		Read-Write (See notes after table)	0	59
394	N67:45	41045	Wednesday Event #4 Control Mode	ENUM		Read-Write (See notes after table)	0	12
395	N67:46	41046	Wednesday Event #4 Hour	INT		Read-Write (See notes after table)	0	23
396	N67:47	41047	Wednesday Event #4 Minute	INT		Read-Write (See notes after table)	0	59

Vilter Address	Ethernet IPAddress	Modbus Address	Command Name	Data Type	Value	Mode	Lower Range	Higher Range
397	N67:48	41048	Thursday Event #1 Control Mode	ENUM		Read-Write (See notes after table)	0	12
398	N67:49	41049	Thursday Event #1 Hour	INT		Read-Write (See notes after table)	0	23
399	N67:50	41050	Thursday Event #1 Minute	INT		Read-Write (See notes after table)	0	59
400	N67:51	41051	Thursday Event #2 Control Mode	ENUM		Read-Write (See notes after table)	0	12
401	N67:52	41052	Thursday Event #2 Hour	INT		Read-Write (See notes after table)	0	23
402	N67:53	41053	Thursday Event #2 Minute	INT		Read-Write (See notes after table)	0	59
403	N67:54	41054	Thursday Event #3 Control Mode	ENUM		Read-Write (See notes after table)	0	12
404	N67:55	41055	Thursday Event #3 Hour	INT		Read-Write (See notes after table)	0	23
405	N67:56	41056	Thursday Event #3 Minute	INT		Read-Write (See notes after table)	0	59
406	N67:57	41057	Thursday Event #4 Control Mode	ENUM		Read-Write (See notes after table)	0	12
407	N67:58	41058	Thursday Event #4 Hour	INT		Read-Write (See notes after table)	0	23
408	N67:59	41059	Thursday Event #4 Minute	INT		Read-Write (See notes after table)	0	59
409	N67:60	41060	Friday Event #1 Control Mode	ENUM		Read-Write (See notes after table)	0	12
410	N67:61	41061	Friday Event #1 Hour	INT		Read-Write (See notes after table)	0	23
411	N67:62	41062	Friday Event #1 Minute	INT		Read-Write (See notes after table)	0	59
412	N67:63	41063	Friday Event #2 Control Mode	ENUM		Read-Write (See notes after table)	0	12
413	N67:64	41064	Friday Event #2 Hour	INT		Read-Write (See notes after table)	0	23

Vilter Address	Ethernet IPAddress	Modbus Address	Command Name	Data Type	Value	Mode	Lower Range	Higher Range
414	N67:65	41065	Friday Event #2 Minute	INT		Read-Write (See notes after table)	0	59
415	N67:66	41066	Friday Event #3 Control Mode	ENUM		Read-Write (See notes after table)	0	12
416	N67:67	41067	Friday Event #3 Hour	INT		Read-Write (See notes after table)	0	23
417	N67:68	41068	Friday Event #3 Minute	INT		Read-Write (See notes after table)	0	59
418	N67:69	41069	Friday Event #4 Control Mode	ENUM		Read-Write (See notes after table)	0	12
419	N67:70	41070	Friday Event #4 Hour	INT		Read-Write (See notes after table)	0	23
420	N67:71	41071	Friday Event #4 Minute	INT		Read-Write (See notes after table)	0	59
421	N67:72	41072	Saturday Event #1 Control Mode	ENUM		Read-Write (See notes after table)	0	12
422	N67:73	41073	Saturday Event #1 Hour	INT		Read-Write (See notes after table)	0	23
423	N67:74	41074	Saturday Event #1 Minute	INT		Read-Write (See notes after table)	0	59
424	N67:75	41075	Saturday Event #2 Control Mode	ENUM		Read-Write (See notes after table)	0	12
425	N67:76	41076	Saturday Event #2 Hour	INT		Read-Write (See notes after table)	0	23
426	N67:77	41077	Saturday Event #2 Minute	INT		Read-Write (See notes after table)	0	59
427	N67:78	41078	Saturday Event #3 Control Mode	ENUM		Read-Write (See notes after table)	0	12
428	N67:79	41079	Saturday Event #3 Hour	INT		Read-Write (See notes after table)	0	23
429	N67:80	41080	Saturday Event #3 Minute	INT		Read-Write (See notes after table)	0	59
430	N67:81	41081	Saturday Event #4 Control Mode	ENUM		Read-Write (See notes after table)	0	12

Vilter Address	Ethernet IPAddress	Modbus Address	Command Name	Data Type	Value	Mode	Lower Range	Higher Range
431	N67:82	41082	Saturday Event #4 Hour	INT		Read-Write (See notes after table)	0	23
432	N67:83	41083	Saturday Event #4 Minute	INT		Read-Write (See notes after table)	0	59
433	N67:84	41084	Comp Schedule Enable/Dis-able	INT	0 = Disable, 1 = Enable	Read-Write (See notes after table)		
Compressor Sequencing								
434	N68:0	41100	Control Setpoint (Suct. Press,Process Control Cool-ing, Disch. Press, Process Control Heating)	F-INT		Read		
435	N68:1	41101	Start Offset (Suct. Press,Pro-cess Control Cooling, Disch. Press, Process Control Heating)	F-INT		Read-Write	0.0	100.0
436	N68:2	41102	Fast Load Offset (Suct. Press,Process Control Cool-ing, Disch. Press, Process Control Heating)	F-INT		Read-Write	0.0	100.0
437	N68:3	41103	Fast Unload Offset (Suct. Press,Process Control Cool-ing, Disch. Press, Process Control Heating)	F-INT		Read-Write	0.0	100.0
438	N68:4	41104	Slow Load Timer (Suct. Press,Process Control Cool-ing, Disch. Press, Process Control Heating) (sec)	INT		Read-Write	0	10000
439	N68:5	41105	Fast Load Timer ((Suct. Press,Process Control Cool-ing, Disch. Press, Process Control Heating)) (sec)	INT		Read-Write	0	10000
440	N68:6	41106	Slow Unload Timer (Suct. Press,Process Control Cool-ing, Disch. Press, Process Control Heating) (sec)	INT		Read-Write	0	10000
441	N68:7	41107	Fast Unload Timer (Suct. Press,Process Control Cool-ing, Disch. Press, Process Control Heating) (sec)	INT		Read-Write	0	10000
442	N68:8	41108	Min Trigger	INT		Read-Write	0	100
443	N68:9	41109	Max Trigger	INT		Read-Write	0	100
444	N68:10	41110	Machine Start Time (sec)	INT		Read-Write	0	1000
445	N68:11	41111	Machine Stop Time (sec)	INT		Read-Write	0	1000
446	N68:12	41112	Accelerated Shut Down Time (sec)	INT		Read-Write	0	1000

Vilter Address	Ethernet IPAddress	Modbus Address	Command Name	Data Type	Value	Mode	Lower Range	Higher Range
Condenser Control								
447	N69:0	41170	Run Mode	ENUM	0 = Run Never 1 = Run With Comp 2 = Run Always 3 = Manual	Read-Write		
448	N69:1	41171	Profile	ENUM	0 = Summer 1 = Winter	Read-Write		
449	N69:2	41172	High to Low Speed Fan Delay (seconds)	INT		Read-Write	5	30
450	N69:3	41173	Condenser Setpoint	F-INT		Read-Write	100.0	150.0
451	N69:4	41174	Upper Deadband	F-INT		Read-Write	0.5	20.0
452	N69:5	41175	Lower Deadband	F-INT		Read-Write	0.5	20.0
453	N69:6	41176	Wetbulb Offset	F-INT		Read-Write	0.5	20.0
454	N69:7	41177	Switch Temp	F-INT		Read-Write	25.0	45.0
455	N69:8	41178	Summer/Winter Auto Switch Enabled	INT	0 = Disabled, 1 = Enabled	Read-Write		
456	N69:9	41179	Wetbulb Override Enabled	INT	0 = Disabled, 1 = Enabled	Read-Write		
457	N69:10	41180	Step #1 Enabled (Summer, Winter)	INT	0 = Disabled, 1 = Enabled	Read-Write		
458	N69:11	41181	Step #2 Enabled (Summer, Winter)	INT	0 = Disabled, 1 = Enabled	Read-Write		
459	N69:12	41182	Step #3 Enabled (Summer, Winter)	INT	0 = Disabled, 1 = Enabled	Read-Write		
460	N69:13	41183	Step #4 Enabled (Summer, Winter)	INT	0 = Disabled, 1 = Enabled	Read-Write		
461	N69:14	41184	Step #5 Enabled (Summer, Winter)	INT	0 = Disabled, 1 = Enabled	Read-Write		
462	N69:15	41185	Step #1 Out#1 Enabled (Summer, Winter)	INT	0 = Disabled, 1 = Enabled	Read-Write		
463	N69:16	41186	Step #2 Out#1 Enabled (Summer, Winter)	INT	0 = Disabled, 1 = Enabled	Read-Write		
464	N69:17	41187	Step #3 Out#1 Enabled (Summer, Winter)	INT	0 = Disabled, 1 = Enabled	Read-Write		
465	N69:18	41188	Step #4 Out#1 Enabled (Summer, Winter)	INT	0 = Disabled, 1 = Enabled	Read-Write		
466	N69:19	41189	Step #5 Out#1 Enabled (Summer, Winter)	INT	0 = Disabled, 1 = Enabled	Read-Write		
467	N69:20	41190	Step #1 Out#2 Enabled (Summer, Winter)	INT	0 = Disabled, 1 = Enabled	Read-Write		
468	N69:21	41191	Step #2 Out#2 Enabled (Summer, Winter)	INT	0 = Disabled, 1 = Enabled	Read-Write		
469	N69:22	41192	Step #3 Out#2 Enabled (Summer, Winter)	INT	0 = Disabled, 1 = Enabled	Read-Write		
470	N69:23	41193	Step #4 Out#2 Enabled (Summer, Winter)	INT	0 = Disabled, 1 = Enabled	Read-Write		
471	N69:24	41194	Step #5 Out#2 Enabled (Summer, Winter)	INT	0 = Disabled, 1 = Enabled	Read-Write		

Vilter Address	Ethernet IPAddress	Modbus Address	Command Name	Data Type	Value	Mode	Lower Range	Higher Range
472	N69:25	41195	Step #1 Out#3 Enabled (Summer, Winter)	INT	0 = Disabled, 1 = Enabled	Read-Write		
473	N69:26	41196	Step #2 Out#3 Enabled (Summer, Winter)	INT	0 = Disabled, 1 = Enabled	Read-Write		
474	N69:27	41197	Step #3 Out#3 Enabled (Summer, Winter)	INT	0 = Disabled, 1 = Enabled	Read-Write		
475	N69:28	41198	Step #4 Out#3 Enabled (Summer, Winter)	INT	0 = Disabled, 1 = Enabled	Read-Write		
476	N69:29	41199	Step #5 Out#3 Enabled (Summer, Winter)	INT	0 = Disabled, 1 = Enabled	Read-Write		
477	N69:30	41200	Step #1 Out#4 Enabled (Summer, Winter)	INT	0 = Disabled, 1 = Enabled	Read-Write		
478	N69:31	41201	Step #2 Out#4 Enabled (Summer, Winter)	INT	0 = Disabled, 1 = Enabled	Read-Write		
479	N69:32	41202	Step #3 Out#4 Enabled (Summer, Winter)	INT	0 = Disabled, 1 = Enabled	Read-Write		
480	N69:33	41203	Step #4 Out#4 Enabled (Summer, Winter)	INT	0 = Disabled, 1 = Enabled	Read-Write		
481	N69:34	41204	Step #5 Out#4 Enabled (Summer, Winter)	INT	0 = Disabled, 1 = Enabled	Read-Write		
482	N69:35	41205	Step #1 VFD Enabled (Summer, Winter)	INT	0 = Disabled, 1 = Enabled	Read-Write		
483	N69:36	41206	Step #2 VFD Enabled (Summer, Winter)	INT	0 = Disabled, 1 = Enabled	Read-Write		
484	N69:37	41207	Step #3 VFD Enabled (Summer, Winter)	INT	0 = Disabled, 1 = Enabled	Read-Write		
485	N69:38	41208	Step #4 VFD Enabled (Summer, Winter)	INT	0 = Disabled, 1 = Enabled	Read-Write		
486	N69:39	41209	Step #5 VFD Enabled (Summer, Winter)	INT	0 = Disabled, 1 = Enabled	Read-Write		
487	N69:40	41210	Step#1 Step Delay (Summer, Winter) (seconds)	INT		Read-Write	5	60
488	N69:41	41211	Step#2 Step Delay (Summer, Winter) (seconds)	INT		Read-Write	5	60
489	N69:42	41212	Step#3 Step Delay (Summer, Winter) (seconds)	INT		Read-Write	5	60
490	N69:43	41213	Step#4 Step Delay (Summer, Winter) (seconds)	INT		Read-Write	5	60
491	N69:44	41214	Step#5 Step Delay (Summer, Winter) (seconds)	INT		Read-Write	5	60
492	N69:45	41215	Step #1 Low Speed Fan (Summer, Winter)	ENUM	0 = None 1 = Out # 1 2 = Out # 2 3 = Out # 3 4 = Out # 4	Read		
493	N69:46	41216	Step #2 Low Speed Fan (Summer, Winter)	ENUM	0 = None 1 = Out # 1 2 = Out # 2 3 = Out # 3 4 = Out # 4	Read		

Vilter Address	Ethernet IPAddress	Modbus Address	Command Name	Data Type	Value	Mode	Lower Range	Higher Range
494	N69:47	41217	Step #3 Low Speed Fan (Summer, Winter)	ENUM	0 = None 1 = Out # 1 2 = Out # 2 3 = Out # 3 4 = Out # 4	Read		
495	N69:48	41218	Step #4 Low Speed Fan (Summer, Winter)	ENUM	0 = None 1 = Out # 1 2 = Out # 2 3 = Out # 3 4 = Out # 4	Read		
496	N69:49	41219	Step #5 Low Speed Fan (Summer, Winter)	ENUM	0 = None 1 = Out # 1 2 = Out # 2 3 = Out # 3 4 = Out # 4	Read		
497	N69:50	41220	Condenser VFD Gain (P)	F-INT		Read-Write	0.0	10.0
498	N69:51	41221	Condenser VFD Reset (I)	F-INT		Read-Write	0.0	10.0
499	N69:52	41222	Condenser VFD Rate (D)	F-INT		Read-Write	0.0	10.0
500	N69:53	41223	Condenser VFD Minimum Speed (%)	INT		Read-Write	0	20
501	N69:54	41224	Condenser VFD Maximum Speed (%)	INT		Read-Write	80	100
Virtual Digitals and Analogs Inputs								
502	N75:0	41250	Virtual Analog Input #1	INT		Read-Write	0	1000
503	N75:1	41251	Virtual Analog Input #2	INT		Read-Write	0	1000
504	N75:2	41252	Virtual Analog Input #3	INT		Read-Write	0	1000
505	N75:3	41253	Virtual Analog Input #4	INT		Read-Write	0	1000
506	N75:4	41254	Virtual Analog Input #5	INT		Read-Write	0	1000
507	N75:5	41255	Virtual Analog Input #6	INT		Read-Write	0	1000
508	N75:6	41256	Virtual Digital Input #1	INT	0 = OFF, 1 = ON	Read-Write	NA	NA
509	N75:7	41257	Virtual Digital Input #2	INT	0 = OFF, 1 = ON	Read-Write	NA	NA
510	N75:8	41258	Virtual Digital Input #3	INT	0 = OFF, 1 = ON	Read-Write	NA	NA
511	N75:9	41259	Virtual Digital Input #4	INT	0 = OFF, 1 = ON	Read-Write	NA	NA
512	N75:10	41260	Virtual Digital Input #5	INT	0 = OFF, 1 = ON	Read-Write	NA	NA
513	N75:11	41261	Virtual Digital Input #6	INT	0 = OFF, 1 = ON	Read-Write	NA	NA
Remote Oil Cooler								
514	N72:0	41400	Run Mode	ENUM	0 = Run Never 1 = Run With Comp 2 = Run Always 3 = Manual	Read-Write		
515	N72:1	41401	High to Low Speed Fan Delay (seconds)	INT		Read-Write	5	30
516	N72:2	41402	Remote Oil Cooler Temp Setpoint	F-INT		Read-Write	100.0	150.0
517	N72:3	41403	Upper Deadband	F-INT		Read-Write	0.5	20.0
518	N72:4	41404	Lower Deadband	F-INT		Read-Write	0.5	20.0
519	N72:5	41405	Step #1 Enabled	INT	0 = Disabled, 1 = Enabled	Read-Write		

Vilter Address	Ethernet IPAddress	Modbus Address	Command Name	Data Type	Value	Mode	Lower Range	Higher Range
520	N72:6	41406	Step #2 Enabled	INT	0 = Disabled, 1 = Enabled	Read-Write		
521	N72:7	41407	Step #3 Enabled	INT	0 = Disabled, 1 = Enabled	Read-Write		
522	N72:8	41408	Step #4 Enabled	INT	0 = Disabled, 1 = Enabled	Read-Write		
523	N72:9	41409	Step #5 Enabled	INT	0 = Disabled, 1 = Enabled	Read-Write		
524	N72:10	41410	Step #1 Out#1 Enabled	INT	0 = Disabled, 1 = Enabled	Read-Write		
525	N72:11	41411	Step #2 Out#1 Enabled	INT	0 = Disabled, 1 = Enabled	Read-Write		
526	N72:12	41412	Step #3 Out#1 Enabled	INT	0 = Disabled, 1 = Enabled	Read-Write		
527	N72:13	41413	Step #4 Out#1 Enabled	INT	0 = Disabled, 1 = Enabled	Read-Write		
528	N72:14	41414	Step #5 Out#1 Enabled	INT	0 = Disabled, 1 = Enabled	Read-Write		
529	N72:15	41415	Step #1 Out#2 Enabled	INT	0 = Disabled, 1 = Enabled	Read-Write		
530	N72:16	41416	Step #2 Out#2 Enabled	INT	0 = Disabled, 1 = Enabled	Read-Write		
531	N72:17	41417	Step #3 Out#2 Enabled	INT	0 = Disabled, 1 = Enabled	Read-Write		
532	N72:18	41418	Step #4 Out#2 Enabled	INT	0 = Disabled, 1 = Enabled	Read-Write		
533	N72:19	41419	Step #5 Out#2 Enabled	INT	0 = Disabled, 1 = Enabled	Read-Write		
534	N72:20	41420	Step #1 Out#3 Enabled	INT	0 = Disabled, 1 = Enabled	Read-Write		
535	N72:21	41421	Step #2 Out#3 Enabled	INT	0 = Disabled, 1 = Enabled	Read-Write		
536	N72:22	41422	Step #3 Out#3 Enabled	INT	0 = Disabled, 1 = Enabled	Read-Write		
537	N72:23	41423	Step #4 Out#3 Enabled	INT	0 = Disabled, 1 = Enabled	Read-Write		
538	N72:24	41424	Step #5 Out#3 Enabled	INT	0 = Disabled, 1 = Enabled	Read-Write		
539	N72:25	41425	Step #1 Out#4 Enabled	INT	0 = Disabled, 1 = Enabled	Read-Write		
540	N72:26	41426	Step #2 Out#4 Enabled	INT	0 = Disabled, 1 = Enabled	Read-Write		
541	N72:27	41427	Step #3 Out#4 Enabled	INT	0 = Disabled, 1 = Enabled	Read-Write		
542	N72:28	41428	Step #4 Out#4 Enabled	INT	0 = Disabled, 1 = Enabled	Read-Write		
543	N72:29	41429	Step #5 Out#4 Enabled	INT	0 = Disabled, 1 = Enabled	Read-Write		
544	N72:30	41430	Step #1 VFD Enabled	INT	0 = Disabled, 1 = Enabled	Read-Write		

Vilter Address	Ethernet IPAddress	Modbus Address	Command Name	Data Type	Value	Mode	Lower Range	Higher Range
545	N72:31	41431	Step #2 VFD Enabled	INT	0 = Disabled, 1 = Enabled	Read-Write		
546	N72:32	41432	Step #3 VFD Enabled	INT	0 = Disabled, 1 = Enabled	Read-Write		
547	N72:33	41433	Step #4 VFD Enabled	INT	0 = Disabled, 1 = Enabled	Read-Write		
548	N72:34	41434	Step #5 VFD Enabled	INT	0 = Disabled, 1 = Enabled	Read-Write		
549	N72:35	41435	Step#1 Step Delay (seconds)	INT		Read-Write	5	60
550	N72:36	41436	Step#2 Step Delay (seconds)	INT		Read-Write	5	60
551	N72:37	41437	Step#3 Step Delay (seconds)	INT		Read-Write	5	60
552	N72:38	41438	Step#4 Step Delay (seconds)	INT		Read-Write	5	60
553	N72:39	41439	Step#5 Step Delay (seconds)	INT		Read-Write	5	60
554	N72:40	41440	Step #1 Low Speed Fan	ENUM	0 = None 1 = Out # 1 2 = Out # 2 3 = Out # 3 4 = Out # 4	Read		
555	N72:41	41441	Step #2 Low Speed Fan	ENUM	0 = None 1 = Out # 1 2 = Out # 2 3 = Out # 3 4 = Out # 4	Read		
556	N72:42	41442	Step #3 Low Speed Fan	ENUM	0 = None 1 = Out # 1 2 = Out # 2 3 = Out # 3 4 = Out # 4	Read		
557	N72:43	41443	Step #4 Low Speed Fan	ENUM	0 = None 1 = Out # 1 2 = Out # 2 3 = Out # 3 4 = Out # 4	Read		
558	N72:44	41444	Step #5 Low Speed Fan	ENUM	0 = None 1 = Out # 1 2 = Out # 2 3 = Out # 3 4 = Out # 4	Read		
559	N72:45	41445	VFD Gain (P)	F-INT		Read-Write	0.0	10.0
560	N72:46	41446	VFD Reset (I)	F-INT		Read-Write	0.0	10.0
561	N72:47	41447	VFD Rate (D)	F-INT		Read-Write	0.0	10.0
562	N72:48	41448	VFD Minimum Speed (%)	INT		Read-Write	0	20
563	N72:49	41449	VFD Maximum Speed (%)	INT		Read-Write	80	100
Trend Chart								
564	N73:0	41470	Motor Current Enabled	INT	0 = Disabled, 1 = Enabled	Read		
565	N73:1	41471	Suction Pressure Enabled	INT	0 = Disabled, 1 = Enabled	Read		
566	N73:2	41472	Discharge Pressure Enabled	INT	0 = Disabled, 1 = Enabled	Read		

Vilter Address	Ethernet IPAddress	Modbus Address	Command Name	Data Type	Value	Mode	Lower Range	Higher Range
567	N73:3	41473	Oil Filter Pressure Enabled	INT	0 = Disabled, 1 = Enabled	Read		
568	N73:4	41474	Oil Manifold Pressure Enabled	INT	0 = Disabled, 1 = Enabled	Read		
569	N73:5	41475	Economizer Pressure Enabled	INT	0 = Disabled, 1 = Enabled	Read		
570	N73:6	41476	Condenser Pressure Enabled	INT	0 = Disabled, 1 = Enabled	Read		
571	N73:7	41477	Suction Temperature Enabled	INT	0 = Disabled, 1 = Enabled	Read		
572	N73:8	41478	Discharge Temperature Enabled	INT	0 = Disabled, 1 = Enabled	Read		
573	N73:9	41479	Oil Seperator Temperature Enabled	INT	0 = Disabled, 1 = Enabled	Read		
574	N73:10	41480	Oil Manifold Temperature Enabled	INT	0 = Disabled, 1 = Enabled	Read		
575	N73:11	41481	Process Control Enabled	INT	0 = Disabled, 1 = Enabled	Read		
576	N73:12	41482	Chiller Temperature Enabled	INT	0 = Disabled, 1 = Enabled	Read		
577	N73:13	41483	Suction Superheat Tempera-ture Enabled	INT	0 = Disabled, 1 = Enabled	Read		
578	N73:14	41484	Capacity Slide Enabled	INT	0 = Disabled, 1 = Enabled	Read		
579	N73:15	41485	Volume Slide Enabled	INT	0 = Disabled, 1 = Enabled	Read		
580	N73:16	41486	Remote Capacity % Enabled	INT	0 = Disabled, 1 = Enabled	Read		
581	N73:17	41487	Auxiliary Input #1 Enabled	INT	0 = Disabled, 1 = Enabled	Read		
582	N73:18	41488	Auxiliary Input #2 Enabled	INT	0 = Disabled, 1 = Enabled	Read		
583	N73:19	41489	Auxiliary Input #3 Enabled	INT	0 = Disabled, 1 = Enabled	Read		
584	N73:20	41490	Auxiliary Input #4 Enabled	INT	0 = Disabled, 1 = Enabled	Read		
585	N73:21	41491	Auxiliary Input #5 Enabled	INT	0 = Disabled, 1 = Enabled	Read		
586	N73:22	41492	Auxiliary Input #6 Enabled	INT	0 = Disabled, 1 = Enabled	Read		
587	N73:23	41493	Auxiliary Input #7 Enabled	INT	0 = Disabled, 1 = Enabled	Read		
588	N73:24	41494	Auxiliary Input #8 Enabled	INT	0 = Disabled, 1 = Enabled	Read		
589	N73:25	41495	Auxiliary Input #9 Enabled	INT	0 = Disabled, 1 = Enabled	Read		
590	N73:26	41496	Auxiliary Input #10 Enabled	INT	0 = Disabled, 1 = Enabled	Read		

Vilter Address	Ethernet IPAddress	Modbus Address	Command Name	Data Type	Value	Mode	Lower Range	Higher Range
591	N73:27	41497	Auxiliary Input #11 Enabled	INT	0 = Disabled, 1 = Enabled	Read		
592	N73:28	41498	Auxiliary Input #12 Enabled	INT	0 = Disabled, 1 = Enabled	Read		
593	N73:29	41499	Auxiliary Input #13 Enabled	INT	0 = Disabled, 1 = Enabled	Read		
594	N73:30	41500	Auxiliary Input #14 Enabled	INT	0 = Disabled, 1 = Enabled	Read		
595	N73:31	41501	Auxiliary Input #15 Enabled	INT	0 = Disabled, 1 = Enabled	Read		
596	N73:32	41502	Auxiliary Input #16 Enabled	INT	0 = Disabled, 1 = Enabled	Read		
597	N73:33	41503	Compressor VFD Enabled	INT	0 = Disabled, 1 = Enabled	Read		
598	N73:34	41504	Condenser VFD Enabled	INT	0 = Disabled, 1 = Enabled	Read		
599	N73:35	41505	Slide Valve Position Enabled	INT	0 = Disabled, 1 = Enabled	Read		
600	N73:36	41506	Liquid Injection Enabled	INT	0 = Disabled, 1 = Enabled	Read		
601	N73:37	41507	Auxiliary Output #1 Enabled	INT	0 = Disabled, 1 = Enabled	Read		
602	N73:38	41508	Auxiliary Output #2 Enabled	INT	0 = Disabled, 1 = Enabled	Read		
603	N73:39	41509	Auxiliary Output #3 Enabled	INT	0 = Disabled, 1 = Enabled	Read		
604	N73:40	41510	Auxiliary Output #4 Enabled	INT	0 = Disabled, 1 = Enabled	Read		
605	N73:41	41511	Trend Files Location	ENUM	0 = Hard Disk 1 = USB Drive	Read		
606	N73:42	41512	Virtual Input #1 Enabled	INT	0 = Disabled, 1 = Enabled	Read		
607	N73:43	41513	Virtual Input #2 Enabled	INT	0 = Disabled, 1 = Enabled	Read		
608	N73:44	41514	Virtual Input #3 Enabled	INT	0 = Disabled, 1 = Enabled	Read		
609	N73:45	41515	Virtual Input #4 Enabled	INT	0 = Disabled, 1 = Enabled	Read		
610	N73:47	41516	Virtual Input #5 Enabled	INT	0 = Disabled, 1 = Enabled	Read		
611	N73:48	41517	Virtual Input #6 Enabled	INT	0 = Disabled, 1 = Enabled	Read		
Configuration (Time)								
612	N76:0	41330	Time – Hours	INT	(HH)	Read-Write	0	23
613	N76:1	41331	Time – Min	INT	(MM)	Read-Write	0	59
614	N76:2	41332	Time – Secs	INT	(SS)	Read-Write	0	59
615	N76:3	41333	Date – Year	INT	(YYYY)	Read-Write	1970	2037
616	N76:4	41334	Date – Month	INT	(1-12)	Read-Write	1	12

Vilter Address	Ethernet IPAddress	Modbus Address	Command Name	Data Type	Value	Mode	Lower Range	Higher Range
617	N76:5	41335	Date – Day	INT	(1-31)	Read-Write	1	31
Configuration (Other)								
618	N77:0	41340	Anti-Recycle	ENUM	0 = True Anti-Re-cycle 1 = Accumulative Anti-Recycle 2 = Hot Starts	Read		
619	N77:1	41341	Restart On Power Fail	ENUM	0 = Always 1 = Never 2 = Timed 3 = Remote Lock Off 4 = Boot in Remote (Direct I/O)	Read-Write		
620	N77:2	41342	Suction Pressure Control Available	INT	0 = No, 1 = Yes	Read		
621	N77:3	41343	Suction Pressure Control # of Setpoints	INT		Read		
622	N77:4	41344	Process Control Cooling Available	INT	0 = No, 1 = Yes	Read		
623	N77:5	41345	Process Control Cooling # of Setpoints	INT		Read		
624	N77:6	41346	% Slide Volume Position	INT	0 = No, 1 = Yes	Read		
625	N77:7	41347	Economizer Pressure	INT	0 = No, 1 = Yes	Read		
626	N77:8	41348	Compressor VFD	INT	0 = No, 1 = Yes	Read		
627	N77:9	41349	Compressor Sequencing	INT	0 = No, 1 = Yes	Read		
628	N77:10	41350	Superheat Monitor	INT	0 = No, 1 = Yes	Read		
629	N77:11	41351	Oil Pump Control Type	ENUM	0 = No Pump 1 = Stal 2 = Cycling 3 = Full Time 4 = Cool Compres-sion 5 = Suction Oil Injection Solenoid	Read		
630	N77:12	41352	# Oil Pumps	INT	(Currently Unused)	Read		
631	N77:13	41353	Condenser Control	INT	0 = No, 1 = Yes	Read		
632	N77:14	41354	Ambient Sensor	INT	0 = No, 1 = Yes	Read		
633	N77:15	41355	Wetbulb Sensor	INT	0 = No, 1 = Yes	Read		
634	N77:16	41356	Condenser VFD	INT	0 = No, 1 = Yes	Read		
635	N77:17	41357	Oil Cooling Type	ENUM	0 = Thermosyphon 1 = H2O Oil Cooler 2 = Liquid Injection 3 = Cool Compres-sion 4 = Remote Oil Cooler	Read		
636	N77:18	41358	Liquid Injection Type	ENUM	0 = Solenoids 1 = Motorized Valve	Read		
637	N77:19	41359	# Liquid Injection Solenoids	INT	(Currently Unused)	Read		
638	N77:20	41360	Discharge Pressure Control Available	INT	0 = No, 1 = Yes	Read		

Vilter Address	Ethernet IPAddress	Modbus Address	Command Name	Data Type	Value	Mode	Lower Range	Higher Range
639	N77:21	41361	Discharge Pressure Control # of Setpoints	INT		Read		
640	N77:22	41362	On Communication Failure	ENUM	0 = Revert to Local Control 1 = Stop Compressor with Trip	Read		
641	N77:23	41363	Suction Superheat Monitor	INT	0 = No, 1 = Yes	Read		
642	N77:24	41364	Oil Flow Control	INT	0 = No, 1 = Yes	Read		
643	N77:25	41365	Remote Oil Cooler VFD	INT	0 = No, 1 = Yes	Read		
644	N77:26	41366	Rapid Cycling VFD	INT	0 = No, 1 = Yes	Read		
645	N77:27	41367	Panel ID	INT		Read		
646	N77:28	41368	Process Control Cooling Type	ENUM	0 = Temperature 1 = Pressure	Read		
647	N77:29	41369	Motor Current Device	ENUM	0 = Current Transformer 1 = 4-20ma Transmitter	Read		
648	N77:30	41370	Idle Time Trip		0 = No, 1 = Yes	Read		
649	N77:31	41371	Oil Restriction Solenoid		0 = No, 1 = Yes	Read		
650	N77:32	41372	Database Backup Hours	INT	(HH)	Read		
651	N77:33	41373	Database Backup Minute	INT	(MM)	Read		
652	N77:34	41374	Run Oil Pressure Mode	ENUM	0 = Manifold - Discharge 1 = Manifold - Suction	Read		
653	N77:35	41375	Process Control Heating Available	INT	0 = No, 1 = Yes	Read		
654	N77:36	41376	Process Control Heating # of Setpoints	INT		Read		
655	N77:37	41377	Process Control Heating Type	ENUM	0 = Temperature 1 = Pressure	Read		

NOTES

- Statuses: Alarm Status Word(s) – currently 20 alarms, so both Alarm Status Word 1 and 2 are used, with each position indicating an alarm:

MSB	LSB
[Bit 15, Bit 14, Bit 13, ... Bit 3, Bit 2, Bit 1, Bit 0]	

Word 1	Word 2
Bit 0 = Low Oil Pressure Alarm	Bit 0 = High Oil Separator Temp. Alarm
Bit 1 = Add Oil to the Appropriate Level	Bit 1 = Low Suction Superheat Temp Alarm
Bit 2 = Low Oil Injection Temp. Alarm	Bit 2 = Low Process Pressure Alarm
Bit 3 = High Filter Differential Alarm	Bit 3 = High Process Pressure Alarm
Bit 4 = Low Suction Temp. Alarm	Bit 4 = Unused
Bit 5 = High Discharge Temp. Alarm	Bit 5 = Unused
Bit 6 = Low Suction Pressure Alarm	Bit 6 = Unused
Bit 7 = High Discharge Pressure Alarm	Bit 7 = Unused
Bit 8 = High Process Temp. Alarm	Bit 8 = Unused
Bit 9 = Low Process Temp. Alarm	Bit 9 = Unused
Bit 10 = Low Oil Separator Temp. Alarm	Bit 10 = Unused
Bit 11 = High Oil Injection Temp. Alarm	Bit 11 = Unused
Bit 12 = High Motor Current Alarm	Bit 12 = Unused
Bit 13 = Remote Comm Time-out	Bit 13 = Unused
Bit 14 = High Superheat Run Temp. Alarm	Bit 14 = Unused
Bit 15 = Low Run Pressure Ratio Alarm	Bit 15 = Unused

- Statuses: Warning Status Word(s) – currently 17 warnings, so both Warning Status Word 1 and 2 are used, with each position indicating an alarm:

MSB	LSB
[Bit 15, Bit 14, Bit 13, … Bit 3, Bit 2, Bit 1, Bit 0]	

Word 1	Word 2
Bit 0 = Low Suction Pressure Warning	Bit 0 = High Process Pressure Warning
Bit 1 = High Discharge Pressure Warning	Bit 1 = Unused
Bit 2 = Low Process Temp. Warning	Bit 2 = Unused
Bit 3 = High Process Temp. Warning	Bit 3 = Unused
Bit 4 = High Discharge Temp. Warning	Bit 4 = Unused
Bit 5 = Low Oil Separator Temp. Warning	Bit 5 = Unused
Bit 6 = High Oil Injection Temp. Warning	Bit 6 = Unused
Bit 7 = High Superheat Temp Warning	Bit 7 = Unused
Bit 8 = High Filter Differential Warning	Bit 8 = Unused
Bit 9 = High Level Shutdown Warning	Bit 9 = Unused
Bit 10 = Low Discharge Pressure Warning	Bit 10 = Unused
Bit 11 = Low Discharge Temp. Warning	Bit 11 = Unused
Bit 12 = Low Oil Injection Temp. Warning	Bit 12 = Unused
Bit 13 = Low Oil Filter In Pressure Warning	Bit 13 = Unused
Bit 14 = Low Oil Filter Out Pressure Warning	Bit 14 = Unused
Bit 15 = Low Process Pressure Warning	Bit 15 = Unused

- Statuses: Trip Status Word(s) – currently only 56 trips, so all Trip Status Words 1, 2, 3 and 4 are used, with each position indicating a trip:

MSB	LSB
[Bit 15, Bit 14, Bit 13, ... Bit 3, Bit 2, Bit 1, Bit 0]	

Word 1	Word 2	Word 3	Word 4
Bit 0 = High Level Shutdown Inhibit	Bit 0 = High Discharge Temp. Trip	Bit 0 = High Filter Differential Inhibit	Bit 0 = Low Process Pressure Inhibit
Bit 1 = Low Process Temp. Inhibit	Bit 1 = Low Suction Pressure Trip	Bit 1 = High Superheat Temp. Inhibit	Bit 1 = High Process Pressure Inhibit
Bit 2 = High Discharge Pressure Inhibit	Bit 2 = High Discharge Pressure Trip	Bit 2 = High Superheat Start Temp. Trip	Bit 2 = Low Process Pressure Trip
Bit 3 = High Discharge Temp. Inhibit	Bit 3 = Starter Shutdown Trip	Bit 3 = High Superheat Rise Temp. Trip	Bit 3 = High Process Pressure Trip
Bit 4 = Low Oil Separator Start Temp. Inhibit	Bit 4 = Low Process Temp. Trip	Bit 4 = High Superheat Run Temp. Trip	Bit 4 = Start Low Oil Pressure Trip
Bit 5 = Low Suction Pressure Inhibit	Bit 5 = Low Oil Separator Temp. Trip	Bit 5 = Low Run Pressure Ratio Trip	Bit 5 = Oil Over Pressure Trip
Bit 6 = High Process Temp. Inhibit	Bit 6 = High Oil Injection Temp. Trip	Bit 6 = High Oil Separator Temp. Trip	Bit 6 = Oil Over Pressure Inhibit
Bit 7 = High Oil Injection Temp. Inhibit	Bit 7 = High Motor Current Trip	Bit 7 = Prelube Oil Pressure Trip	Bit 7 = Suction Over Pressure Trip
Bit 8 = Prelube Oil Pump Inhibit	Bit 8 = Capacity Position Trip	Bit 8 = Low Suction Superheat Temp Trip	Bit 8 = High Process Temp Trip
Bit 9 = Compressor Interlock Inhibit	Bit 9 = Volume Position Trip	Bit 9 = Remote Comm Time-out	Bit 9 = Unused
Bit 10 = High Level Shutdown Trip	Bit 10 = False Start	Bit 10 = Low Discharge Pressure Inhibit	Bit 10 = Unused
Bit 11 = Compressor Interlock Trip	Bit 11 = Emergency Shutdown Activated	Bit 11 = Low Discharge Temp. Inhibit	Bit 11 = Unused
Bit 12 = Low Oil Pressure Trip	Bit 12 = Oil Level #1 Inhibit	Bit 12 = Low Discharge Pressure Trip	Bit 12 = Unused
Bit 13 = Low Oil Injection Temp. Trip	Bit 13 = Oil Level #1 Trip	Bit 13 = Low Discharge Temp. Trip	Bit 13 = Unused
Bit 14 = High Filter Differential Trip	Bit 14 = Oil Level #2 Trip	Bit 14 = Low Oil Filter In Pressure Trip	Bit 14 = Unused
Bit 15 = Low Suction Temp. Trip	Bit 15 = Low Oil Level Trip After Stop	Bit 15 = Low Oil Filter Out Pressure Trip	Bit 15 = Unused

- Commands: Start Command – starts the compressor in the currently active control mode / auto sequencing. When this command is read, 1 is returned if compressor is in starting mode or waiting mode
- Compressor Scheduling: Enable/Disable – if a valid schedule has not been defined (on screen or through comm), this command will fail.
- Compressor Scheduling: Control Mode ENUM – 0 = Unscheduled

When enabling the schedule, allow for a timeout of at least 3 seconds for the schedule to be verified as valid.

1 = Suction Pressure SP1

2 = Suction Pressure SP2

3 = Process Temp Cooling SP1

4 = Process Temp Cooling SP2

5 = Process Press Cooling SP1

6 = Process Press Cooling SP2

7 = Discharge Pressure SP1

8 = Discharge Pressure SP2

9 = Process Temp Heating SP1

10 = Process Temp Heating SP2

11 = Process Press Heating SP1

12 = Process Press Heating SP2

Note: If the control mode being set isn't active in the configuration, the command will result in error. This value is allowed to be changed only when the schedule is enabled

Compressor Scheduling: Hour INT – This value is allowed to be changed only when the schedule is disabled

Compressor Scheduling: Minute INT – This value is allowed to be changed only when the schedule is disabled

Abbreviations Used on the Vission 20/20 Panel Screen

As a result of the space limitations on the screen of the Vission 20/20 panel, at times it's necessary to use abbreviations to refer to parameters, variables, etc. This table details the meaning of the abbreviations used on screen.

Table E. Abbreviations Used

Abbreviation	Meaning
Max	Maximum
Min	Minimum
Admin	Administrator
Press	Pressure
Temp	Temperature
Diff	Differential
Inj	Injection
Sep	Separator
Disch.	Discharge
Aux	Auxiliary
In	Input
Out	Output
Auto	Automatic
Seq	Sequence
Vol	Volume
Cap	Capacity
Avg	Average
SP	Setpoint
VFD	Variable Frequency Drive
VI	Volume Index
CFM	Cubic Feet per minute
Sync	Synchronize
DI	Digital Input
I/O	Input/Output
SOI	Solenoid Oil Injection
N/O	Normally Open
N/C	Normally Closed
VNC	Virtual Network Computing
Pos.	Position
RTD	Resistance Temperature Detector
P	Proportional
I	Integral
D	Derivative

About Vilter

Vilter is a technology leader in energy-efficient, environmentally conscious solutions in its industry. The 150-year history of the Vilter brand tells a rich story of perseverance and drive to cultivate continuous innovation within the industrial refrigeration and gas compression industries. Vilter offers unprecedented efficiency, productivity and reliability in cooling, recovery, and compression. It combines best-in-class technology with proven engineering and design to create quality products and latest solutions for customers worldwide.

About Copeland

Vilter Manufacturing LLC is a business segment of Copeland, a global leader in providing sustainable climate solutions for customers in industrial, commercial and consumer markets around the world. Copeland combines category-leading brands in compression, controls, software and monitoring for heating, cooling and refrigeration. With best-in-class engineering and design and the broadest portfolio of modulated solutions, we're not just setting the standard for compressor leadership; we're pioneering its evolution. Combining our technology with our smart energy management solutions, we can regulate, track, and optimize conditions to help protect temperature-sensitive goods over land and sea, while delivering comfort in any space. Through energy-efficient products, regulation-ready solutions, and expertise, we're revolutionizing the next generation of climate technology for the better. For more information please visit

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