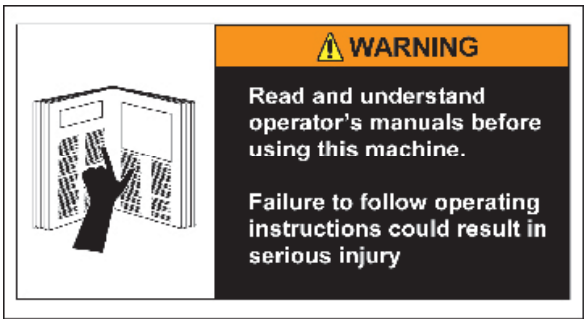
Twin Screw Compressor PLC

Operation manual

Vilter™

EMERSON™
Climate Technologies

Important Message



READ CAREFULLY BEFORE INSTALLING AND STARTING YOUR COMPRESSOR.

The following instructions have been prepared to assist in installation, operation and removal of Vilter Twin Screw Compressors. Following these instructions will result in a long life of the compressor with satisfactory operation.

The entire manual should be reviewed before attempting to install, operate, service or repair the compressor.

A compressor is a positive displacement machine. It is designed to compress gas. The compressor must not be subjected to liquid carry over. Care must be exercised in properly designing and maintaining the system to prevent conditions that could lead to liquid carry over. Vilter Manufacturing is not responsible for the system or the controls needed to prevent liquid carry over and as such Vilter Manufacturing cannot warrant equipment damaged by improperly protected or operating systems.

Vilter Twin Screw Compressor components 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 name plate on the compressor.

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

Vilter Manufacturing LLC
Customer Service Department
P.O. Box 8904
5555 South Packard Ave
Cudahy, WI 53110-8904 USA
Telephone: 1-414-744-0111
Fax:1-414-744-3483
E-mail: info.vilter@emerson.com

Equipment Identification Numbers:

Vilter Order Number: _____Compressor Serial Number: _____
Vilter Order Number: _____Compressor Serial Number: _____
Vilter Order Number: _____Compressor Serial Number: _____
Vilter Order Number: _____Compressor Serial Number: _____

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Section 1 • General Information

HOW TO USE THIS MANUAL

This manual contains instructions for the PLC. It has been divided into 12 sections:

Section 1: General Information
Section 2: Sequence of Operation
Section 3: Overview Screens
Section 4: HMI Navigation
Section 5: Configuration - Supervisor Level
Section 6: Instrument Calibration
Section 7: Compressor Control Setpoints
Section 8: Alarms and Trips Setpoints
Section 9: Step and PID Device Control Screens
Section 10: Diagnostics Screens
Section 11: Alarms, Trips, Status Information and Troubleshooting
Section 12: Communications with a Central Controller/DCS

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

Figures and tables are included to illustrate key concepts.

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

NOTICE - Notice statements are shown when there are important information that shall be followed. Not following such notices may result in void of warranty, serious fines, serious injury and/or death.

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

ADDITIONAL IMPORTANT NOTES

- Installation, operation and maintenance instructions can be found in the associated gas compressor unit manual.
- Due to continuing changes and unit updates, always refer to the Vilter.com website to make sure you have the latest manual.
- Any suggestions of manual improvements can be made to Vilter Manufacturing at the contact information on page i.

Glossary of Terms

2-Way Oil Mixing Valve

Motorized valve mounted on the compressor unit that directs hot oil to the oil cooler when needed.

Aftercooler Heat Exchanger

Used to cool discharge gas from the compressor.

Aftercooler Outlet Temperature

Temperature of gas measured at the outlet of the Aftercooler.

Alarm Warning

Annunciated by the compressor PLC that an operational or process condition is abnormal. When active, alarms will be displayed but will not shut down the compressor.

Bearing Temperature

Temperature of the bearings of the compressor main motor measured by an RTD.

Building Enclosure

Insulated enclosure or container the compressor and some ancillary equipment can be mounted in as a package.

Capacity Slide Valve

Internal mechanism in the compressor that controls compressor loading and unloading.

Capacity Hydraulic Slide Valve with Double Acting Solenoid Valve

Oil pressure with double acting solenoid valves is used to control the capacity slide valve.

Chiller

Heat Exchanger where liquid refrigerant boils off cooling a process fluid (liquid or gas, ex. natural gas, glycol, water)

Compressor Differential Calculated

Discharge Pressure minus Suction Pressure. Monitored to ensure compressor is equalized before starting.

Condenser

Heat exchanger that removes heat from superheated refrigerant vapor and converts it to a liquid.

Condensing Pressure:

Pressure of refrigerant vapor measured at the condenser.
Differential Pressure

The difference between two pressures.

Discharge Recycle Control Pressure

Pressure of discharge gas measured at the Discharge Recycle Valve. Used to control the Discharge Recycle Valve.

Discharge Recycle Valve

Motorized or Air Actuated Valve that recycles discharge gas back to the suction side of the compressor.

Discharge Pressure

Pressure of the refrigerant or gas measured at the outlet of the compressor.

Discharge Temperature

Temperature of the refrigerant or gas measured at the outlet of the compressor.

Economizer

Intermediate pressure between suction and discharge of the compressor, typically used to subcool liquid refrigerant to increase cooling capacity of the compressor. A solenoid valve controlled by the compressor PLC enables the economizer to function.

EPCS

EPCS stands for “Emergency Pressure Control System.” Used where required on refrigeration applications to relieve high discharge pressure back to suction to prevent activating a relief valve. Consists of a solenoid valve and two pressure transmitters, one on the discharge (high) side and one on the suction (low) side. When the discharge (high) side pressure reaches 90% of relief valve setting, the solenoid will open and relieve high pressure discharge gas back to suction (low) side. When either pressure transmitter reaches 90% of their respective high or low side relief valve settings, the compressor will shut down.

Ethernet IP

Communication protocol used to communicate to the compressor PLC.

Gas Equalizing Solenoid

Solenoid Valve that opens at compressor stop to equalize suction and discharge pressures.

HMI

HMI stands for “Human-Machine Interface.” The compressor HMI is a touchscreen terminal mounted in the door of the compressor control enclosure.

Hotgas Bypass

Self-regulated valve which provides a “false load” by recycling discharge gas to suction in refrigeration applications. Used to prevent the compressor from shutting down during low load conditions. A solenoid valve controlled by the compressor PLC enables the Hotgas Bypass valve to function.

Inlet Scrubber

Vessel located on the inlet side of gas compressor or gas chiller to remove moisture and contaminants.

Inlet Scrubber Inlet Pressure

Pressure of gas measured at the inlet of the inlet scrubber.

Inlet Scrubber Outlet Pressure

Pressure of gas measured at the outlet of the inlet scrubber.

Inlet Scrubber Pressure Drop

Pressure differential between inlet and outlet of the inlet scrubber. Calculated: Scrubber Inlet Pressure minus Scrubber Outlet Pressure.

Liquid Injection

Method of oil cooling where liquid refrigerant is metered into the compressor by a motorized or air actuated valve.

Liquid Refrigerant Temperature

Temperature of the liquid refrigerant measured in the chiller, also known as the evaporation temperature.

Main Motor

AC induction motor that is coupled to and drives the compressor.

Net Oil Pressure

Calculated: Oil Filter Out Pressure minus Discharge Pressure. Monitored while compressor is running to ensure adequate lubrication.

Oil Circuit Pressure Drop

Calculated: Discharge Pressure minus Oil Filter Outlet (Manifold) Pressure.

Oil Cooler

Heat Exchanger where hot oil from the compressor is cooled.

Oil Cooler Inlet Temperature

Temperature of compressor oil measured at the inlet of the oil cooler.

Oil Cooler Outlet Temperature

Temperature of compressor oil measured at the outlet of the oil cooler.

Oil Filter Differential Calculated

Oil Filter Outlet (Manifold) Pressure minus Oil Filter Inlet Pressure. Monitored while compressor is running to determine condition of oil filter(s).

Oil Filter Inlet Pressure

Pressure of the compressor oil measured at the inlet of the oil filter(s).

Oil Filter Outlet (Manifold) Pressure

Pressure of the compressor oil measured between the oil filter(s) and the compressor.

Oil Injection Temperature

Temperature of the compressor oil going into the compressor.

Oil Separator

Vessel the compressor discharges into that separates oil from gas or refrigerant.

Oil Separator Gas Outlet Temperature

Temperature of the gas or refrigerant measured at the outlet of the oil separator vessel.

Oil Separator Outlet Pressure

Pressure of discharge gas or refrigerant measured at the outlet of the oil separator.

Oil Separator Pressure Drop Calculated

Discharge Pressure minus Oil Separator Outlet Pressure. Monitored to determine condition of coalescing elements inside the oil separator vessel.

Outlet Scrubber

Vessel located on the outlet side of gas compressor or gas chiller to remove moisture, oil, and/or contaminants.

Outlet Scrubber Inlet Pressure

Pressure of gas measured at the inlet of the outlet scrubber.

Outlet Scrubber Outlet Pressure

Pressure of gas measured at the outlet of the outlet scrubber.

Outlet Scrubber Pressure Drop

Pressure differential between inlet and outlet of the outlet scrubber. Calculated: Scrubber Inlet Pressure minus Scrubber Outlet Pressure.

PID Controller

PID stands for "Proportional Integral Derivative." A PID controller manipulates a control variable (example: valve position or fan/pump speed) to maintain a process variable (example: process temperature or pressure) at a desired value (setpoint). The controller is driven by mathematical calculations that tell the control variable how to react to changes in the process variable.

PLC

PLC stands for "Programmable Logic Controller." The Compressor PLC is an industrial computer that controls the compressor unit or Package.

Prelube Oil Pressure

Calculated: Oil Filter Out Pressure minus Discharge Pressure. Monitored at compressor start to ensure adequate lubrication.

Pressure Ratio

The ratio of compressor discharge pressure to suction pressure.

Pressure Ratio Calculated

(Discharge Pressure) / (Suction Pressure)

Pressure Transducer or Transmitter

Device that measures pressure and transmits the pressure reading as a 4-20mA signal. This 4-20mA signal is read by the PLC and displayed as a pressure.

Process Temperature

Temperature of the process fluid (liquid or gas, ex. natural gas, glycol, water) measured at the process outlet of the chiller.

Rotor Feed Oil Pressure

Pressure of the Non-Pumped side of the oil circuit feeding oil to the screw (on machines that have an oil circuit with a non-pumped section).

RTD

RTD stands for "Resistance Temperature Detector." RTDs use electrical resistance to measure temperature. This resistance is read by the PLC and displayed as a temperature.

Separator Oil Temperature

Temperature of the compressor oil in the bottom of the oil separator vessel.

Suction Oil Injection

Method of providing additional lubrication to large frame compressors at compressor start.

Suction Pressure

Pressure of the refrigerant or gas measured at the inlet of the compressor.

Suction Temperature

Temperature of the refrigerant or gas measured at the inlet of the compressor.

Surge Drum or Suction Accumulator

Vessel where additional liquid refrigerant may accumulate to prevent liquid from getting into the compressor.

Temperature Transmitter

Device that measures temperature and transmits the temperature reading as a 4-20mA signal. This 4-20mA signal is read by the PLC and displayed as a temperature.

Trip

Compressor shutdown due to an abnormal process or operational condition.

Venturi Oil Recovery

Method of recovering compressor oil from the chiller using solenoid valves on a cycle timer.

VFD

VFD stands for "Variable Frequency Drive." A VFD is a motor control device that can vary the speed of an AC induction motor.

V-PLUS

V-PLUS stands for “Vilter Pumped Liquid Unitary System.” It is a method of oil cooling where liquid refrigerant is pumped into the discharge line or housing by a variable speed pump.

VPN

VPN stands for “Virtual Private Network.” A VPN connection allows remote access to the compressor PLC.

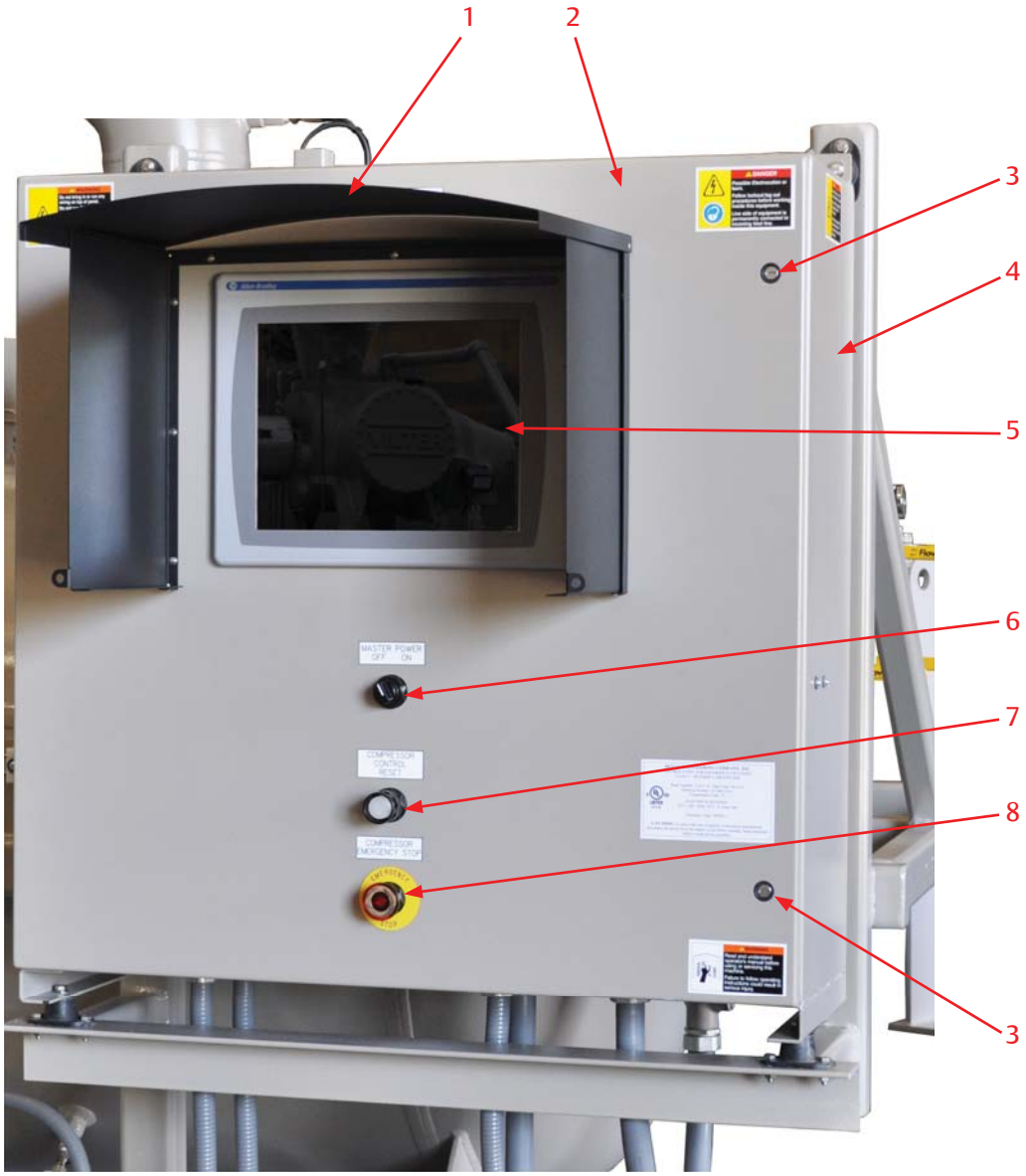
Winding Temperature

Internal winding temperature of the compressor main motor measured by an RTD.

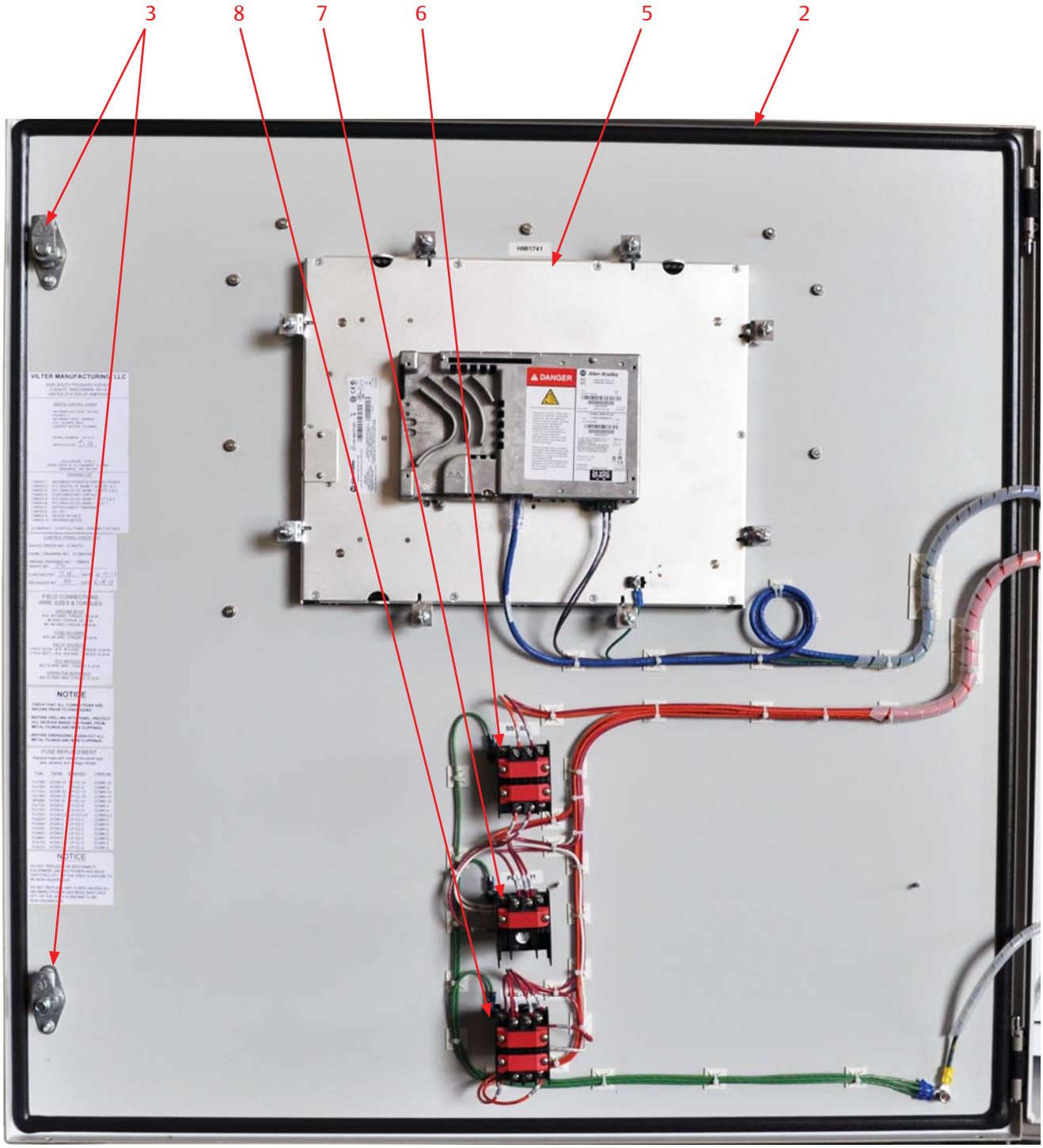
Hardware Components - PLC Exterior

Each Compact Logix PLC may differ, but below are typical components that can found in each PLC. For specific PLC layout, refer to supplied electrical drawings.

1 - HMI Cover
2 - Enclosure Door
3 - Door Latch
4 - Main Enclosure
5 - HMI (Panel View Plus 6)
6 - Master Power
7 - Compressor Control Reset Button
8 - Emergency Stop Button

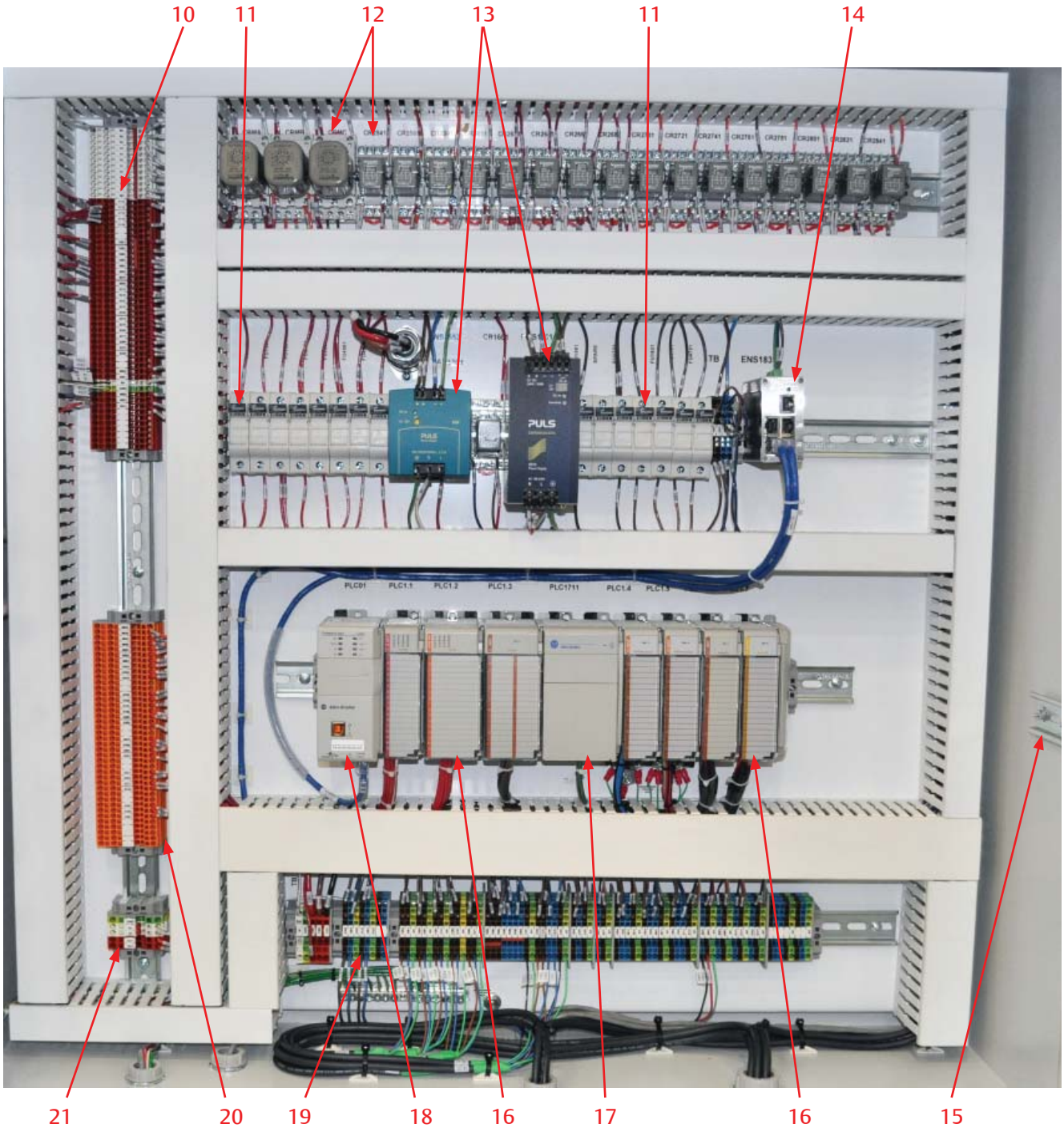


Hardware Components - Enclosure Door Interior



Hardware Components - Main Enclosure Interior

10 - Terminal Blocks (AC Connections)
11 - Fuses
12 - Relays
13 - DC Power Supplies
14 - Ethernet Switch, 5 Port RJ45
15 - Panel Heater & Mounting (Not Shown, Field Installed)
16 - Modules
17 - Compact Logix Power Supply
18 - Compact Logix Processor with Ethernet, and Memory Card
19 - Terminal Blocks (DC Low Voltage Connections)
20 - Terminal Blocks (Customer Connections)
21 - Terminal Blocks (Main Power Connections)



Wiring Requirements

- Incoming power enters on the left bottom wall of the PLC control enclosure. Route these conductors in the space between the sub-panel and inside wall of the enclosure.
- DC control, analog and communications or network wiring enters on the right bottom wall of the PLC control enclosure.
- Wiring external to the panel per NEC (NFPA 70), ANSI 12.12.01 and UL-598A.
- Panel construction and wiring per UL-508A for all panels and ANSI 12.12.01 and UL-698A for hazardous locations.
- Electrical transmission, control, and alarm wiring shall be stranded copper no smaller than #14 AWG. Use JIC color code, unless otherwise noted.
- All control circuits from a source outside of this panel are to be #14 AWG Orange.
- All control circuit neutrals from a source outside of this panel are to be no smaller than #14 AWG White/ Orange Tracer.
- All analog inputs are to be connected with shielded cable. Shield terminated at panel side and isolated at device side.
- All shielding is to be grounded at a single point on the chassis.
- Analog wiring must be run separate from AC wiring and kept separate within the enclosure.
- All analog signal wiring shall be grounded at one end only. Ground shield of signal cables.
- Use alpha P/N 2423C, 3 Cond, 18 AWG, shielded or approved equal.
- Only one customer network cable to switch.
- Unused defined as having a previous assignment. Spare defined as no previous assignment.
- Where applicable, remove jumper between connections if used.
- All power circuits from a source outside of this panel are to be no smaller than #12 AWG Orange.
- All power circuit neutrals from a source outside of this panel are to be no smaller than #12 AWG White/ Orange Tracer.
- All equipment grounds must be Green/Yellow. For ground conductors larger than #6 AWG, apply Green/ Yellow heat shrink or color conductor with marker at both ends.
- All power sources for heating devices shall be supplied by others.
- Designated for a trip function (i.e. limit trip, sequence shutdown, etc.). Recommended hard wire connection.
- Use alpha P/N 2422C, 2 Cond, 18 AWG, shielded or approved equal.
- Category 6 Ethernet cable is recommended for all of our equipment.

SEPARATION OF INTRINSICALLY SAFE CIRCUITS (IF USED)

The intrinsically safe wiring enters on the bottom-left wall of the PLC control enclosure.

To reduce the possibility of interconnection, additional requirements exist for the separation of intrinsically safe and non-intrinsically safe circuits. Exceptions to this rule may be found in NEC Section 504-30(A)(1) and (2).

Separation by distance:

- The distance between intrinsically safe field wiring terminals and non-intrinsically safe field wiring terminals shall be a minimum 8 inches.
- The distance between intrinsically safe field wiring terminals and non-intrinsically safe field circuits shall be a minimum 5 inches.
- The distance between intrinsically safe field wiring terminals and non-intrinsically safe field circuits and wiring shall be a minimum 5 inches.
- The distance between intrinsically safe field wiring terminals and non-intrinsically safe internal wiring shall be a minimum 2 inches.

VFD Installation Recommendations

- All wiring to and from the Variable Frequency Drive (VFD) starter shall conform to the National Fire Protetcion Association 70 (NFPA-70), local codes and the manufacturer's guidelines and specifications.
- Thoroughly read the manufacturer's VFD installation and instruction manuals.
- In the event of a code and manufacturer recommendation conflict, always use the more stringent standard.
- Only use an inverter duty rated motor built to NEMA MG1 PART 30 & 31.
- Always used copper conductors to feed the VFD starter and motor. Use cable with thermoset insulation such as XLPE or XHHW-2 from the VFD to motor.
- It is preferred to use VFD cable, service wire company or equal, between the VFD and the motor per manufacturer's instructions.
- It is preferred to use continuous metal conduit to the VFD starter to the motor.
- If non-metallic conduit is used, VFD cable must be used.
- If using VFD cable in metal conduit, the metal conduit must be insulated at the motor, so that the metal conduit is not a continuous run.
- Always use flexible metallic liquid-tight conduit to feed the motor from metallic conduit.
- Grounding conductor must run from the VFD ground terminals directly to the motor conduit box. Always use proper grounding techniques (Star Method) and sized according to the NFPA 70 NEC.
- Always use bonding bushings on all conduit ends,
- Always use bonding bushings on all conduit ends, with proper size braided copper cable bonded to the starter panel.
- All grounding and bonding conductors and lugs must terminate on bare metal and not to painted surfaces.
- Always use a minimum of 3% impedance line reactor such as MTE or equal.
- Where the cables to the motor are longer than 50', always use a load reactor (customer must provide Vilter with cable lengths from feeder to starter and from starter to motor).
- Where the cables to the motor are longer than 500', always use a DV/DT load filter (customer must provide Vilter with cable lengths from feeder to starter and from starter to motor).
- Where the cables to the motor are longer than 1000', always use a sine filter (customer must provide Vilter with cable lengths from feeder to starter and from starter to motor).
- Line and load conductors must be separated, as much as the starter cabinet will allow, and cannot be in the same conduit or cable chase.
- By no means shall power and control cables run in parallel - cables must be separated, as much as the starter cabinet will allow, and cannot be in the same conduit or cable chase.
- For analog signals, use twisted shielded control cable rated for 600V.
- When a generator is feeding a VFD starter, use a 5% line reactor.
- Some countries require RFI/EMI filters -- please consult country codes and standards.
- As an insurance policy against motor shaft currents, use a split ring bearing protection ring on the motor shaft with the non-load bearing insulated.

Overview

The following are standard equipment on all compressor units or packages that can be controlled or monitored:

- Suction Pressure – Pressure of the gas measured at the inlet of the compressor.
- Discharge Pressure – Pressure of the gas at the outlet of the compressor. Measured at the oil separator.
- Oil Filter Inlet Pressure – Pressure of oil measured at the inlet of the oil filter(s).
- Oil Manifold Pressure (Oil Filter Out) – Pressure of oil measured after the oil filter(s).
- Prelube Oil Pressure (at compressor start, Oil Filter Out Pressure minus Discharge Pressure)
- Net Oil Pressure (when compressor is running, Oil Filter Out Pressure minus Discharge Pressure)
- Suction Temperature – Temperature of the gas measured at the inlet of the compressor.
- Discharge Temperature – Temperature of the gas and oil mixture at the outlet of the compressor
- Separator Oil Temperature – Temperature of the oil in the oil separator vessel.
- Oil Injection Temperature – Temperature of the oil as it goes into the compressor.
- Capacity Slide Valve Position - % Travel of the capacity slide valves.
- Main Motor Amperage – Current draw by the main motor.
- Separator Oil Heaters
- Compressor Main Motor
- Oil Pump (Full Time)
- Selectable groups of setpoints for varying operating conditions

The following are additional software controls available that are native to all compressor units controlled by the compressor PLC:

- Monitoring of Instrument Data, Alarms, Trips, and Machine Status by DCS/Central Controller
- Compressor Capacity control setpoint from DCS/Central Controller
- Control of Compressor Loading/Unloading from DCS/Central Controller
- Capacity control on External Pressure Transducer data from DCS/Central Controller
- Auto Start/Stop based on process pressure or temperature
- Control of Local/Remote from DCS/Central Controller
- Setpoint Group Selectable from DCS/Central Controller
- Remote Starting and Stopping of the Compressor
- The following are optional compressor unit-specific items that can be controlled or monitored:
- Compressor Main Motor VFD Control
- Main Motor Winding Temperatures
- Main Motor Bearing Temperatures
- Motor Vibration (up to 2 sensors)
- Compressor Vibration (up to 2 sensors)
- Oil Separator Level Switch
- Suction Oil Injection Solenoid Valve
- Suction-Discharge Equalizing Solenoid Valve
- Oil Drain Solenoid Valve
- Oil Separator Outlet Pressure, to calculate pressure drop across coalescing elements of oil separator
- 2-Way Oil Mixing Valve
- Air Cooled Oil Cooler (Step or VFD Type)
- Oil Cooler Inlet/Outlet Temperatures
- Oil Cooler Standby Heater

The following are optional compressor unit and package items that can be controlled or monitored, specific to refrigeration applications:

- Air Cooled Condenser (Step Type or VFD Type)
- Evaporative Air Cooled Condenser
- Water Cooled Condenser
- Oil Injection Control Valve
- Liquid Injection Oil Cooling
- VPLUS Liquid Oil Cooling
- Economizer Port Solenoid Valves (single or dual)
- Hotgas Bypass Solenoid
- Venturi Oil Recovery
- Liquid Refrigerant Temperature – Temperature of the liquid refrigerant in the chiller.
- Process Temperature – Temperature of the process fluid leaving the chiller

The following are optional compressor unit and package items that can be controlled or monitored, specific to gas compression applications:

- Up to 2 Aftercoolers
  - Air Cooled Step Type
  - Air Cooled VFD Type
  - Water Cooled
- Inlet Scrubber
  - Pressure Drop across vessel
  - Condensate Drain
  - Low/High Level Safety Switches
- Outlet Scrubber
  - Pressure Drop across vessel
  - Condensate Drain
  - Low/High Level Safety Switches
- Discharge Recycle Valve
- Building Enclosure Devices
  - Space Heaters
  - Roof Exhaust Fans
  - Methane %LEL Detector
- Oil Separator Gas Outlet Temperature – Temperature of the gas measured at the discharge of the oil separator. Used to monitor the temperature of the gas relative to dew point. If the compressor is warm and this temperature is too low, the controller will generate an alarm.
- Oil Separator Gas Outlet Pressure – Pressure of the gas measured at the discharge of the oil separator. Used to monitor the pressure drop across the coalescing elements of the oil separator. When pressure drop is too high, the controller will generate an alarm.
- Reheater Vessel and shell/tube side Temperatures – Temperature of the gas measured at the discharge of both the shell and tube sides of the reheater vessel.
- Periodic Slide Valve Exercising

Operational Descriptions and Diagrams

STARTING OF THE COMPRESSOR/PERMISSIVES

To run the compressor, it must me started from the "Start Menu" screen on the control panel HMI. Pressing "Unit Start" in the "Start Menu" screen will initiate a start if all permissives to initiate a start are met. To initiate a start, the following conditions must be met:

- Control Power is ON (Emergency Stop button is not pressed, Master Control Relay is energized or activated by remote device, indicated by pilot light on front of panel)
- No Active Trips

When a start is initiated, the compressor will start if all permissives to run the compressor are met. If all permissives to run the compressor are not met, the control will wait in a "standby" mode until all conditions to run are satisfied. Any condition that the control is waiting on is annunciated on the overview and menu screens and logged in the Event List. To begin the compressor start-up sequence, the following conditions must be met:

- Control Power is ON (Emergency Stop button is not pressed and Master Control Relay is energized, indicated by pilot light on front of panel)
- No Active Trips
- Compressor start has been initiated by pressing "Unit Start" in the "Start Menu" screen.
- Remote Permissive input is ON
- Soft run permissive from the DCS/Central Controller is ON (if control by communications selected)
- Anti-Recycle Timer is not active
- Suction – Discharge is equalized to within a settable differential
- Auto Start control is calling for the compressor to start, if Auto Start/Stop is Enabled.

If a start is initiated at the compressor, the machine state indicator will indicate "Standby" and the condition the compressor is waiting on will be annunciated on the overview and menu screens.

COMPRESSOR STARTUP SEQUENCE

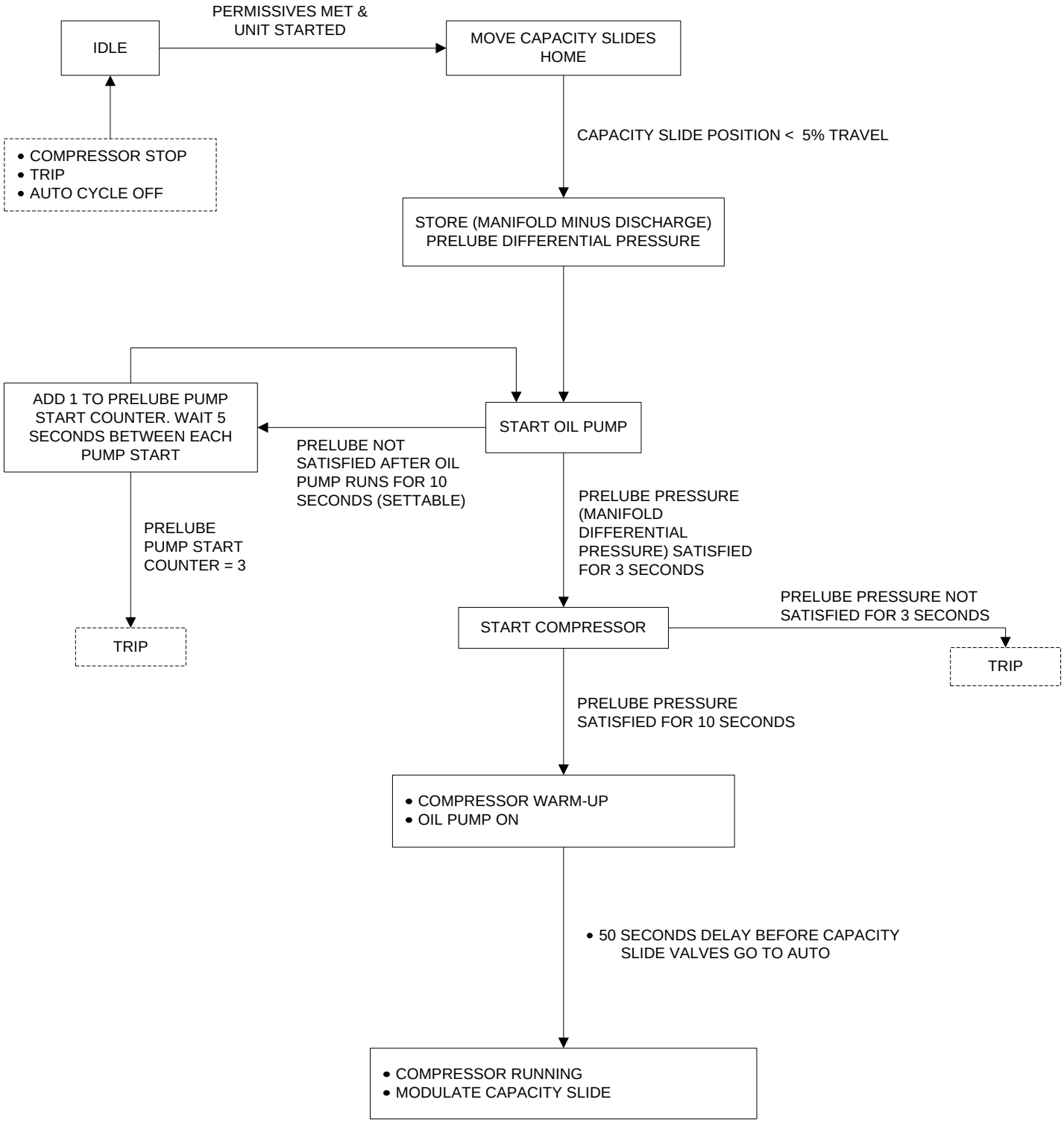


Figure 2-1. Compressor Startup Sequence Diagram

AUTO START-STOP

When enabled, the Auto Start-Stop feature will allow the compressor to cycle on and off based on the controlled pressure or temperature. The Anti-Recycle timer still applies when Auto Start-Stop is enabled. Additional variables that factor in to Auto Start-Stop are described below:

- Auto Start Pressure/Temperature: Pressure or Temperature at which the control will start the compressor.
- Auto Start Delay: Amount of time that the Auto Start Pressure/Temperature must be met before the compressor is commanded to start.
- Auto Stop Pressure/Temperature: Pressure or Temperature at which the control will stop the compressor.
- Auto Stop Delay: Amount of time that the Auto Stop Pressure/Temperature must be met with the capacity slide at or below "Minimum Slide Position" before the compressor is commanded to stop.
- Minimum Slide Position: Position the capacity slide must be at or below before the compressor is commanded to stop.

When Auto Start-Stop control is enabled, it will function as follows:

- When Auto Start Pressure/Temperature is met for the Auto Start Delay Time, the compressor will be commanded to start.
- When the Auto Stop Pressure/Temperature is met and the capacity slide has decreased to the Minimum Slide Position for the Auto Stop Delay time, the compressor will be commanded to stop.

ANTI-RECYCLE

After the compressor main motor stops, it is not allowed to re-start again for a settable time. This is to protect the compressor from damage by allowing oil to drain from it before the next start. If the Anti-Recycle timer is active, a banner will appear on the overview and menu screens that shows the remaining time. If a start is initiated, the compressor state indicator will indicate "Standby" until the Anti-Recycle timer is done. If all other permissives are met, the compressor will re-start.

CAPACITY SLIDE CONTROL

Reference examples, Figures 2-2, 2-3 and 2-4

While the compressor is running, the controller will automatically adjust the position of the compressor capacity slide valve to hold the desired pressure or temperature. Three control methods are available:

- Discharge Pressure Control: Compressor loads to increase discharge Pressure to desired setpoint
- Suction Pressure Control: Compressor loads to lower suction pressure to desired setpoint
- Process Temperature Control: Compressor Loads to lower process temp to desired setpoint. An instrument to monitor the Process Temperature is required.

The capacity slide control of the PLC operates by periodically calculating an adjustment to the capacity slide position based on where the selected process variable is in relation to the target setpoint. When the process pressure or temperature is far away from the setpoint, capacity slide position is adjusted by the defined maximum. As the control pressure or temperature gets closer to setpoint, smaller adjustments are made to the capacity slide position. All of the variables that factor in to this calculation are described below:

- Target pressure or Temperature – the desired suction pressure, discharge pressure, or process temperature that the machine will try to maintain.
- Upper Proportional Deadband – Range above Target pressure or Temperature where no capacity slide adjustment will be made.
- Lower Proportional Deadband – Range below Target pressure or Temperature where no capacity slide adjustment will be made.
- Upper Proportional Band – Range above Target pressure or Temperature where adjustments to capacity slide position are made proportional to the difference between Target pressure or Temperature and Actual. Outside this range, the adjustment made will be the set maximum.
- Lower Proportional Band - Range below Target pressure or Temperature where adjustments to capacity slide position are made proportional to the difference between Target pressure or Temperature and Actual. Outside this range, the adjustment made will be the set maximum.
- Load Interval Time – Cycle time for calculating capacity slide position adjustment when the controller is calling for the machine to increase capacity slide position. Where the Load Interval Time is T1, the control will make an adjustment calculation every T1 seconds.

- Unload Interval Time – Cycle time for calculating capacity slide position adjustment when the controller is calling for the machine to decrease capacity slide position. Where the Load Interval Time is T2, the control will make an adjustment calculation every T2 seconds.
- Max Load Adjustment per Interval – Maximum position adjustment that can be made when the control is calling for the machine to increase capacity slide position. Where the Maximum Load Adjustment is A1, the capacity slide position will increase by A1% every cycle of the Load Interval Timer when outside the bandwidth range. When inside the bandwidth range, the capacity slide position adjustment will be a percentage of A1.
- Max Unload Adjustment per Interval – Maximum position adjustment that can be made when the control is calling for the machine to decrease capacity slide position. Where the Maximum Unload Adjustment is A2, the capacity slide position will increase by A2% every cycle of the Unload Interval Timer when outside the bandwidth range. When inside the bandwidth range, the capacity slide position adjustment will be a percentage of A2.

When the compressor is stopped, the capacity slide will return to its minimum position.

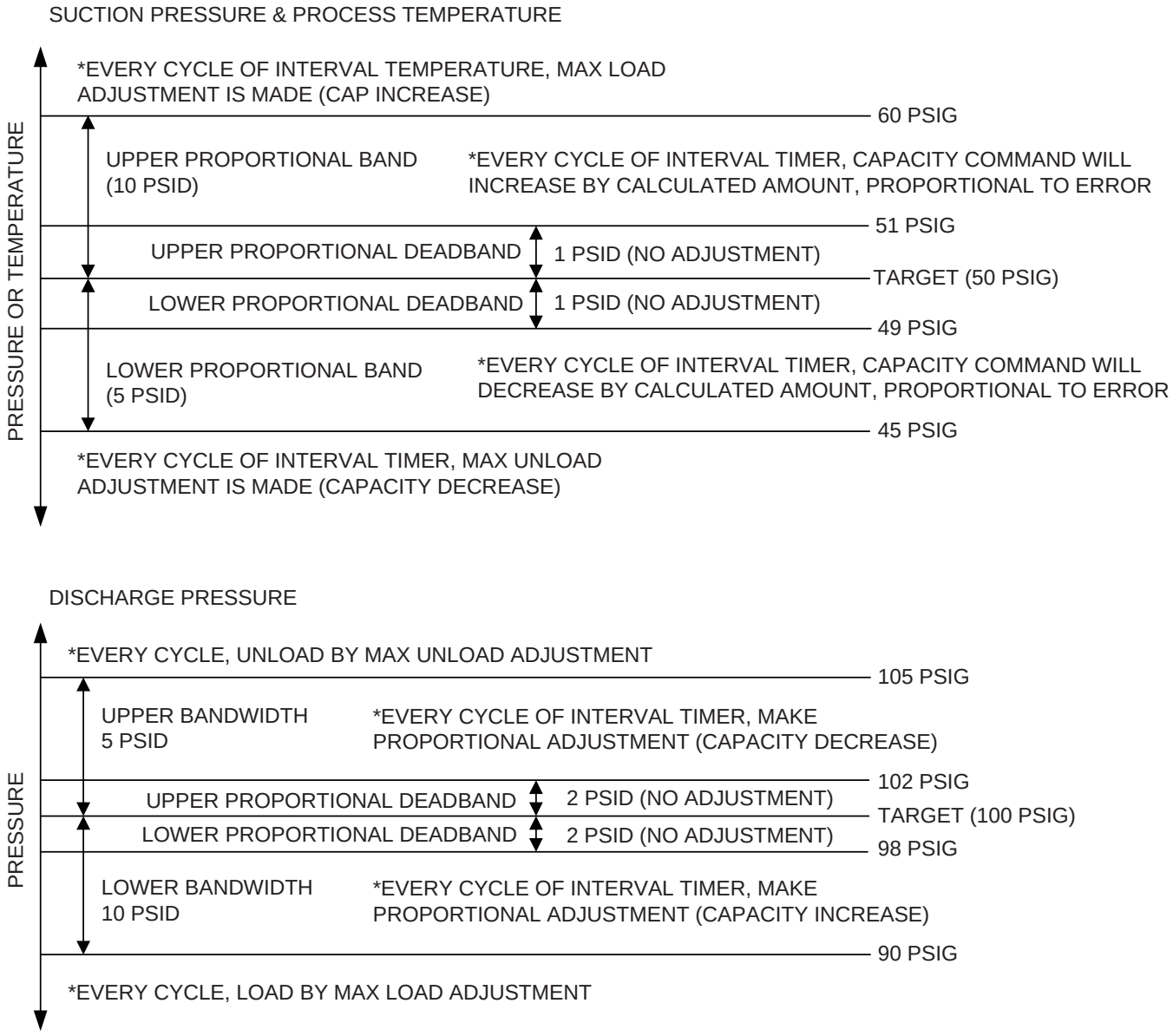


Figure 2-2. Capacity Slide Control Diagram (Example)

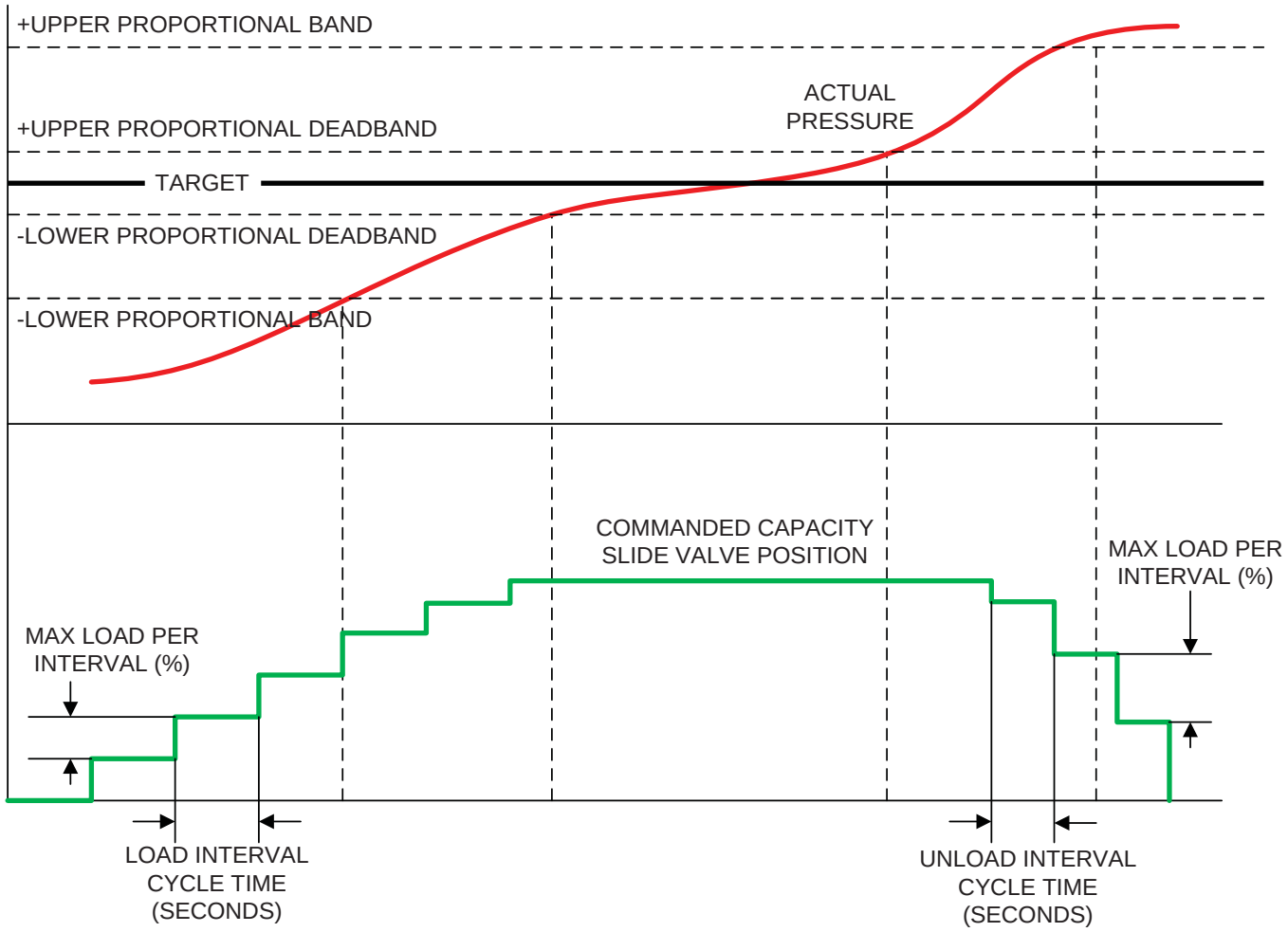


Figure 2-3. Operational Diagram - Capacity Slide, Discharge Pressure (Example)

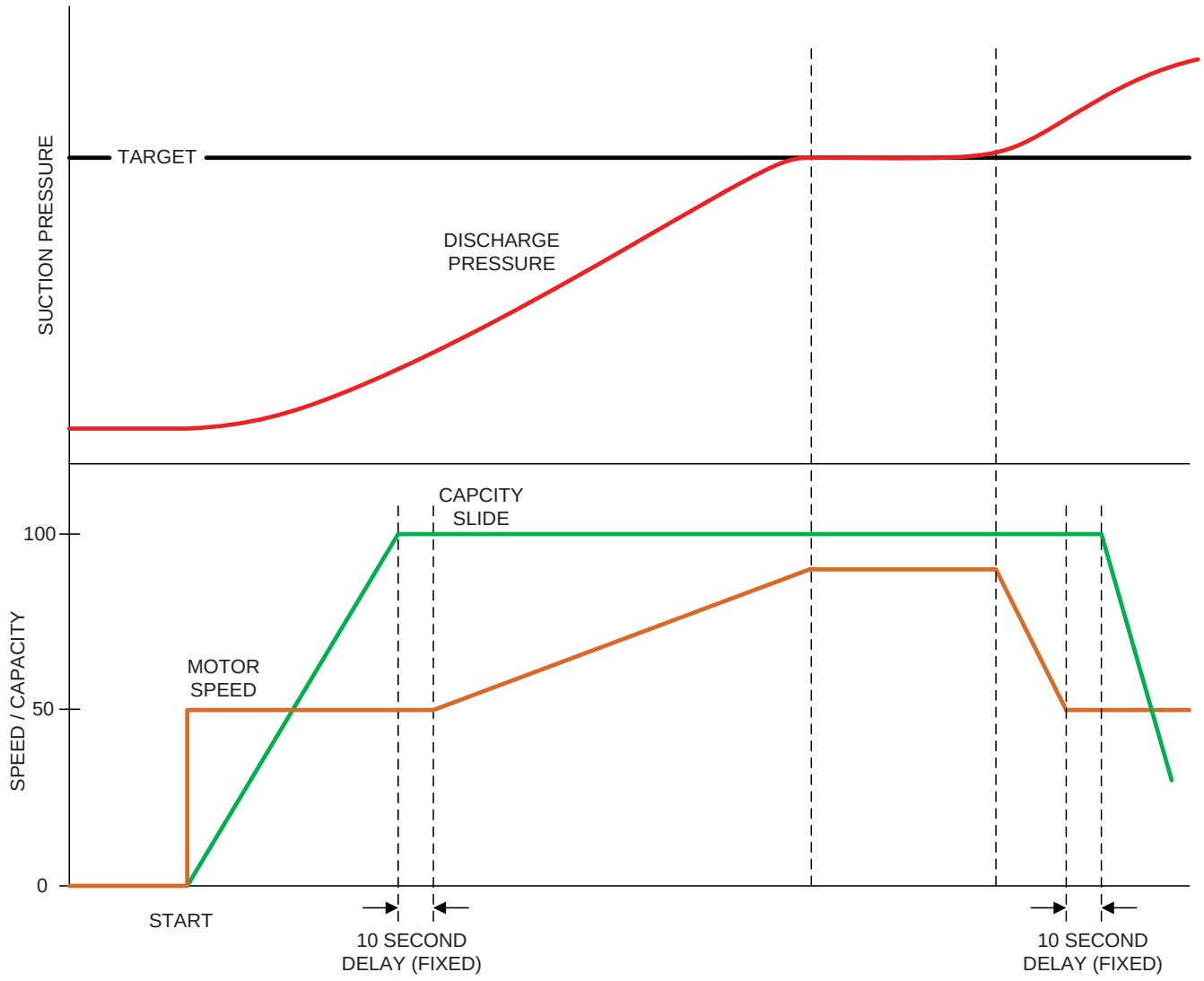


Figure 2-4. Operational Diagram - Capacity Slide, Suction Pressure per Process Temperature (Example)

OPERATING MODES

The loading and unloading of the compressor can be configured to operate in several ways, depending on the needs of the site. This mode selection is made at the "Start Menu" screen. There are four basic modes, described below:

- Local-Auto: The compressor will adjust the position of the capacity slide automatically using the control's capacity control algorithm. The target pressure or temperature setpoint is set on the compressor's local HMI.
- Local-Manual: The operator is in control of the capacity slide from the local HMI. When in Local-Manual mode, the operator controls the capacity slide position using increase/decrease pushbuttons on the compressor overview screen.
- Remote-Auto: The compressor will adjust the position of the capacity slide automatically using the control's capacity control algorithm. The target pressure or temperature setpoint is defined by the DCS/Central Controller via communications. (NOTE: Control by Communications must be enabled to use this mode.)
- Remote-Manual: The capacity slide position is controlled by a DCS or Central Controller. There are four selectable methods of using Remote-Manual Control, settable from the HMI's configuration screen.
  - Caphold-Ethernet: Capacity slide valve position commands are given by the central controller/DCS via communications. (NOTE: Control by Communications must be enabled to use this method.)
  - Caphold-4-20mA Hardwired: Capacity slide valve position commands are given by the central controller/DCS via a 4-20mA analog signal. The scaling is 4mA = 0% Capacity Slide Position, 20mA = 100% capacity slide position. Control by Communications does not need to be enabled to use this method.
  - Discrete Load/Unload – Ethernet: Capacity slide valve increase and decrease commands are given by the central controller/DCS via communications. (NOTE: Control by Communications must be enabled to use this method.)
  - Discrete Load/Unload – Hardwired: Capacity slide valve increase and decrease commands are given by the central controller/DCS via discrete hardwired inputs. Control by communications does not need to be enabled to use this method.

In any of the above modes, all local safeties and load limits still apply and will override external commands.

For safety reasons, remote mode is only enabled under certain conditions. If these conditions are not met, the machine will revert to local mode. To be able to enter remote mode, the one of the following must be true:

- Auto Mode Selected, Control By Communications Enabled.
- Manual Mode Selected, Remote Manual Control Source is Hardwired
- Manual Mode Selected, Control by Communications Enabled

In the event that the communications link between the compressor PLC and the central controller/DCS is lost, the action taken is selectable from the Configuration screen. The machine will Trip or revert to Local mode and continue to run depending on the selection.

The compressor PLC can be remotely commanded to Local or Remote Mode if Control by Communications is enabled.

NOTE

If a main motor VFD is being used for capacity control, only discrete commands may be used in Remote-Manual Control.

LOAD LIMITS AND FORCED UNLOADING

Reference example, Figure 2-5

To protect the compressor and process, the controller will inhibit the compressor from loading or force it to unload if certain variables get outside of set ranges. Three load limiting variables are continuously monitored:

- Low Suction Pressure
- High Discharge Pressure
- High Main Motor Amps

There are independent Load Limit Setpoints specific to "Setpoint 1" and "Setpoint 2" setpoint groups, allowing load limits to be specific to unique operating conditions. For each of the three variables, three setpoints are active:

- Inhibit Loading: when this setpoint is reached, the compressor will not be allowed to continue loading.
- Unload at: when this setpoint is reached, the capacity slide will move in the decrease direction continuously (forced unload) until the "Unload To" setpoint is reached.
- Unload To: this is the setpoint at which the capacity slide will stop unloading from a forced unload condition.

When a load limit or forced unload condition is active it will be annunciated in the status banner on the overview and menu HMI screens, and will also be logged in the event list.

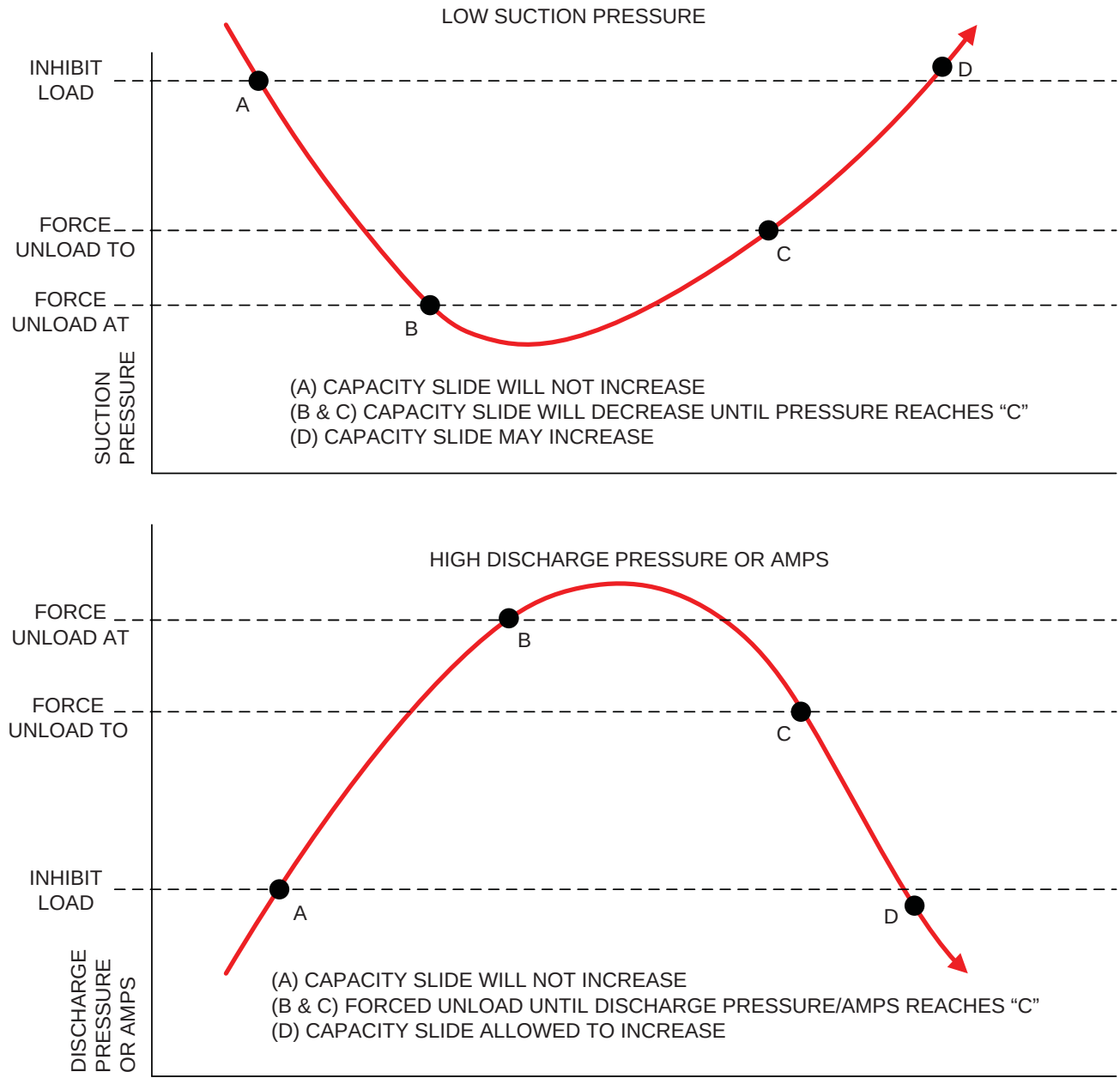


Figure 2-5. Operational Diagram - Load Limits / Forced Unloading (Example)

VFD CAPACITY CONTROL

When a VFD is used on the compressor main motor to control capacity, it works in conjunction with the capacity slide valve to maintain the Target pressure or Temperature. At start, the compressor main motor will run at 50% speed until the capacity slide reaches its maximum position. At this point, the VFD will begin adjusting the speed of the main motor to maintain the target pressure or temperature. The speed adjustments made by the controller follow the same algorithm as the capacity slide. Additional variables that factor into the operation of a main motor VFD are described below:

- Max Speed Increase per Interval – Maximum motor speed adjustment that can be made when the control is calling for the machine to increase motor speed. Where the Maximum Speed Increase is S_1, the main motor will speed up by S_1% every cycle of the Load Interval Timer when outside the bandwidth range. When inside the bandwidth range, the motor speed adjustment will be a percentage of S_1.
- Max Speed Decrease per Interval – Maximum motor speed adjustment that can be made when the control is calling for the machine to decrease motor speed. Where the Maximum Speed Decrease is S_2, the main motor will slow down by S_2% every cycle of the Unload Interval Timer when outside the bandwidth range. When inside the bandwidth range, motor speed adjustment will be a percentage of S_2.

SAFETIES

The compressor controller continuously monitors operational and process data and annunciates an alarm and/or stops the machine if any condition becomes abnormal. Two levels of safeties exist when an abnormal condition is detected.

- Alarm: If active, alarms are annunciated on the compressor HMI. When activated, a popup screen showing the date and time of the alarm and alarm message will appear. Alarms are also logged in the Event List. An alarm serves only as a warning to the operator; if an alarm is active the machine is still allowed to run.
- Trip: If active, trips will shut the machine down or not allow the compressor to start. Trips are annunciated on the compressor HMI. When activated, a popup screen showing the date and time of the trip and trip message will appear. Trips are also logged in the Event List.

The “Alarm Reset” pushbutton on the overview screen will reset any active alarms or trips if the abnormal condition has been removed.

For a comprehensive list of alarms and trips and possible causes, see the troubleshooting guide in this manual.

EMERGENCY STOP

Reference Figure 2-6

The Emergency Stop circuit in the compressor control panel energizes the Master Control Relay, which provides power to PLC outputs that control heaters, motor starters, valves, etc. The Master Control Relay may be energized by pressing the “Control Power On” illuminated pushbutton on the door of the compressor control panel. When the Master Control Relay is energized, the “Control Power On” pushbutton will illuminate. The following conditions must be satisfied to energize the Master Control Relay:

- Emergency Stop pushbutton on the door of the compressor control panel must be pulled out.
- Any additional Emergency stops or safety devices tied in to the Emergency Stop circuit must be reset.
- The compressor PLC must be booted up and operational.
- The 24-volt DC power supplies in the compressor control panel must be powered up and OK.

OIL HEATERS

Immersion Heaters in the oil separator are controlled by the compressor PLC to maintain warm oil. The heaters cycle on and off to maintain a desired separator oil temperature range.

SUCTION-DISCHARGE EQUALIZING SOLENOID

If installed, the equalizing solenoid opens for a settable time on compressor stop to equalize pressure between suction and discharge of the compressor.

OIL DRAIN SOLENOID

If installed, the oil drain solenoid valve opens for a settable time on compressor stop to allow oil to drain from the compressor. It also opens during the prelube retry wait periods in the prelube sequence.

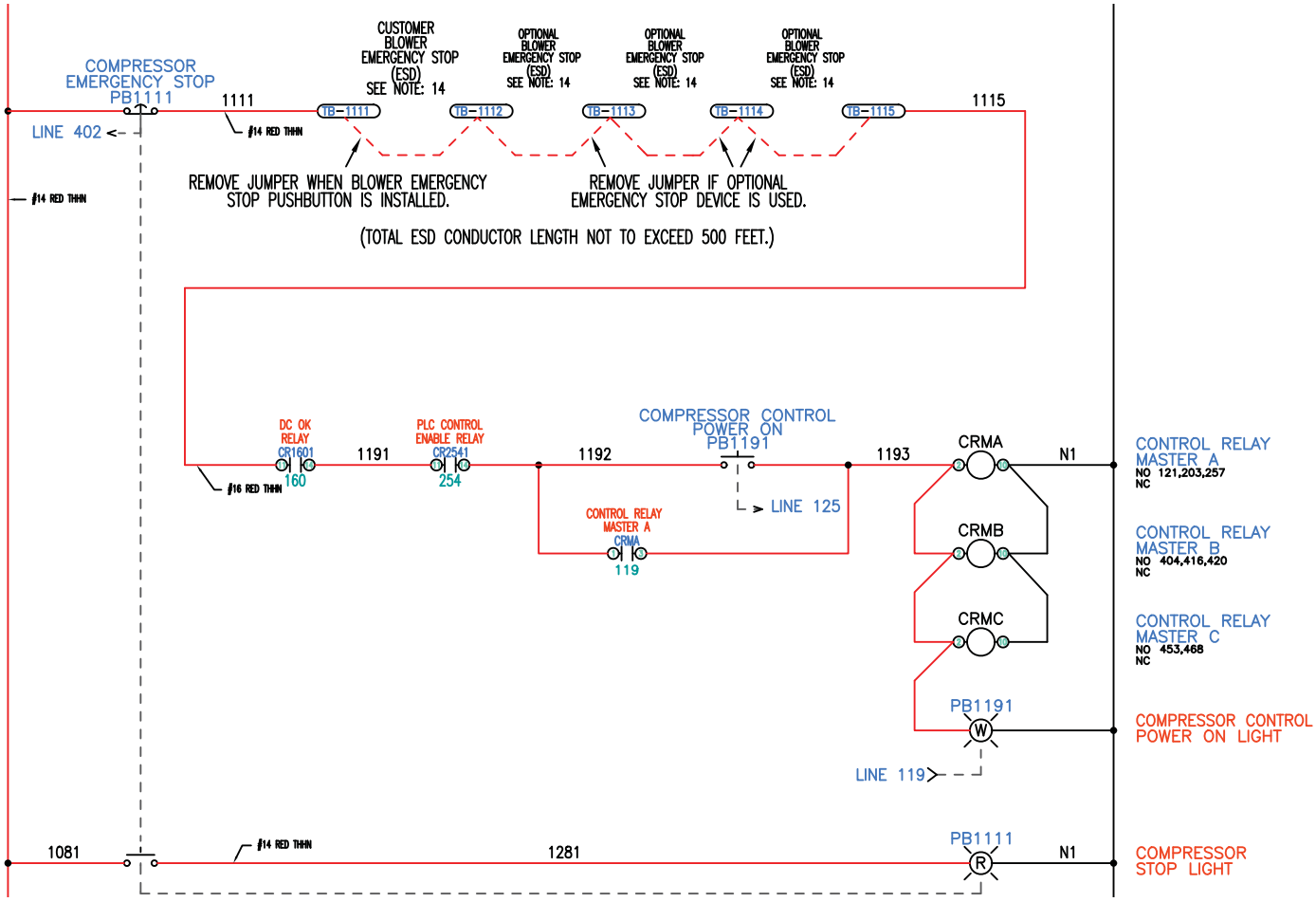


Figure 2-6. Control Panel Master Power and Emergency Stop Electrical Circuit

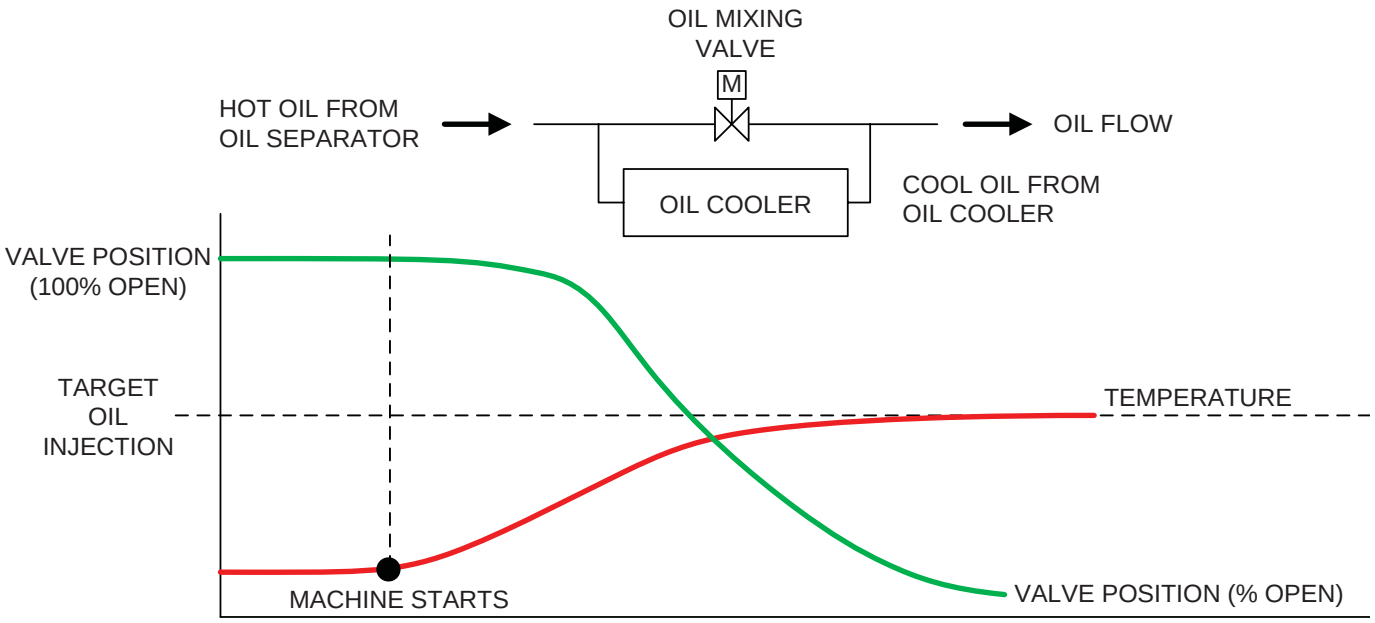


Figure 2-7. Operational Diagram - 2-Way Oil Mixing Valve

2-WAY OIL MIXING VALVE

Reference Figure 2-7

If installed, the 2-way oil mixing valve modulates to control compressor Oil Injection Temperature. The valve is installed in the compressor oil circuit such that when it closes, it forces more oil through the cooler. The valve position is adjusted to mix the correct amount of hot oil from the oil separator and cool oil coming back from the oil cooler.

A PID controller determines the valve position command to maintain Oil Injection Temperature. On rising temperature the controller will command the valve to close; on falling temperature the controller will command the valve to open.

- When the compressor is stopped, the 2-way mixing valve is commanded to 100% open.
- When running, the valve will remain open until Oil Injection Temperature begins to rise, and then begin to close.

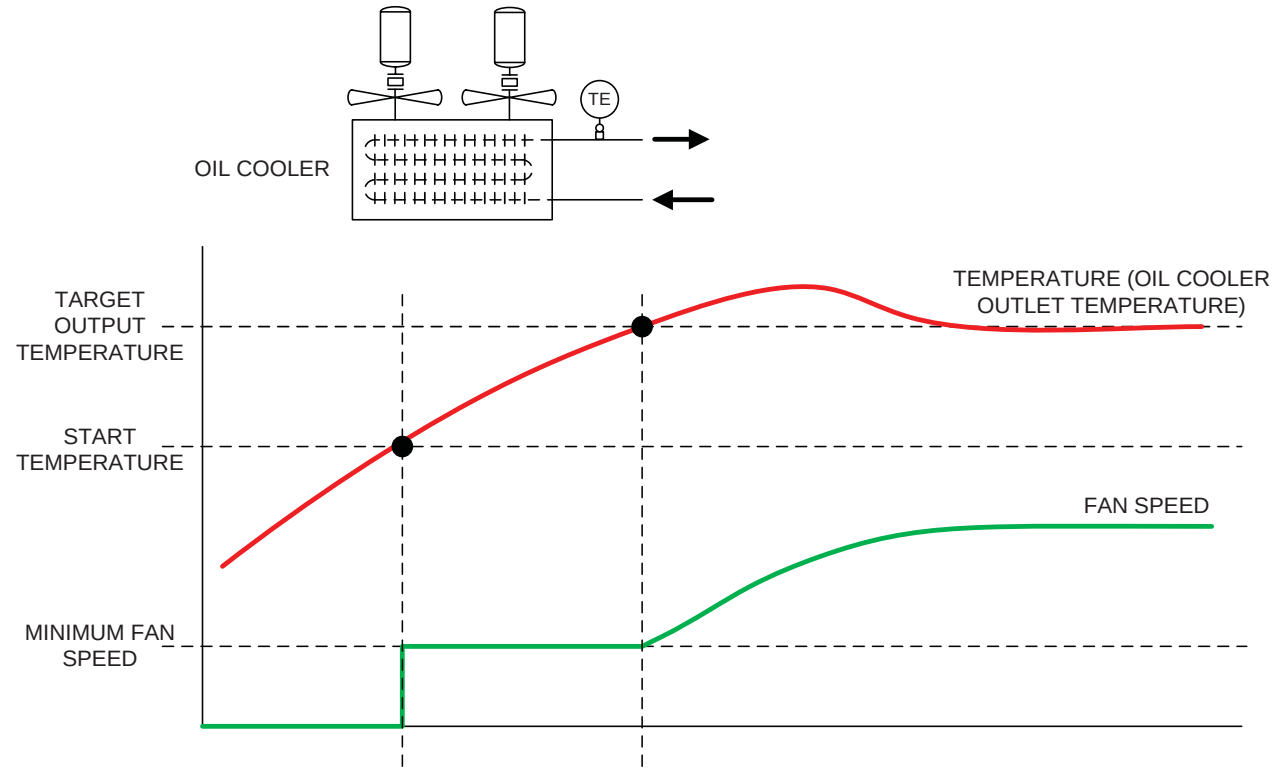


Figure 2-8. Operational Diagram - Air Cooled Oil Cooler (VFD Type)

AIR COOLED OIL COOLER (VFD TYPE)

Reference Figure 2-8

If installed, the VFD type air cooled oil cooler is a heat exchanger that uses one or more fans running on a VFD to control the oil temperature at its outlet.

A PID controller adjusts the speed of the fan(s) to control the temperature at the outlet of the oil cooler. When the temperature of the oil at the outlet of the cooler exceeds the desired temperature plus a deadband, the fan(s) will increase speed to add more cooling. When outlet temperature drops below the desired temperature minus a deadband, the fan(s) will decrease speed.

- When the compressor is stopped, the oil cooler fan(s) will stop.
- When the compressor is running and the oil cooler outlet temperature rises above the “Oil Cooler Start” temperature set in the “VFD Type Oil Cooler Setpoints” screen, the fan(s) will start at a settable minimum speed.
- When the compressor is running and the oil cooler outlet temperature is above the deadband, the PID controller will increase fan speed.
- When the compressor is running and the oil cooler outlet temperature is below the deadband, the PID controller will decrease fan speed.

OIL COOLER TEMPERATURES

It is possible to monitor Oil Cooler Inlet Temperature, and monitor Oil Cooler Outlet Temperature if an oil cooler is not being controlled.

OIL COOLER STANDBY HEATER

If installed, a heater within the remote oil cooler is controlled by the compressor PLC to maintain warm oil. The heater cycles on and off to maintain a desired oil cooler outlet temperature range. Setpoints to control the Oil Cooler Standby Heater are on the “Oil Cooler Control Setpoints (Step or VFD Type)” Screen.

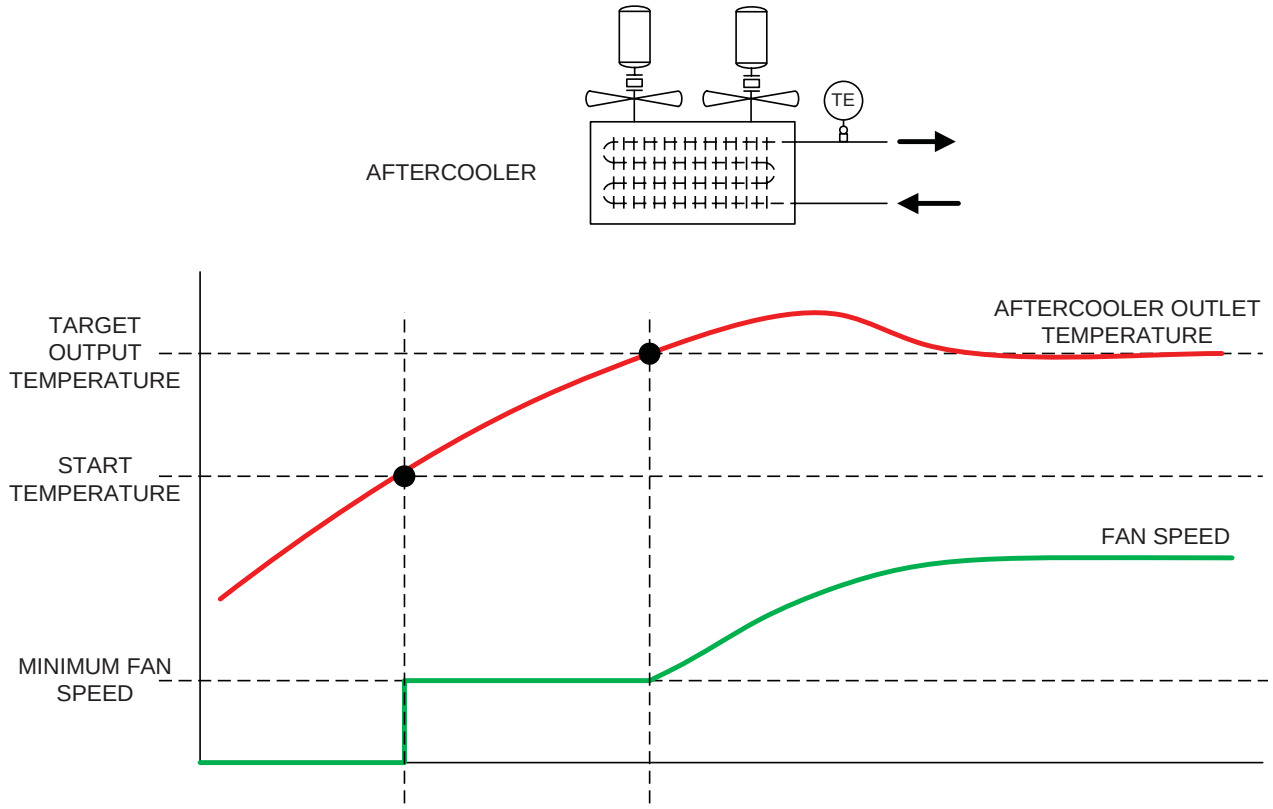


Figure 2-9. Operational Diagram - Air Cooled Aftercooler (VFD Type)

AIR COOLED AFTERCOOLER (VFD TYPE)

Reference Figure 2-9

If installed, the VFD type air cooled aftercooler is a heat exchanger that uses one or more fans running on a VFD to remove heat from the gas discharged from the compressor. The VFD speeds up or slows down the fan motor to control the amount of cooling done by the aftercooler.

A PID controller adjusts the speed of the fan(s) to maintain the outlet gas temperature of the aftercooler. When the aftercooler outlet temperature exceeds the desired temperature plus a deadband, the fan(s) will increase speed to add more cooling. When aftercooler outlet temperature drops below the desired temperature minus a deadband, the fan(s) will decrease speed.

- When the compressor is stopped, the aftercooler fan(s) will stop.
- When the compressor is running and the gas aftercooler outlet temperature rises above the "Start Aftercooler At" set in the "VFD Type Aftercooler Setpoints" screen, the fan(s) will start at a settable minimum speed.
- When the compressor is running and the aftercooler outlet temperature is above the deadband, the PID controller will increase fan speed.
- When the compressor is running and the aftercooler outlet temperature is below the deadband, the PID controller will decrease fan speed.

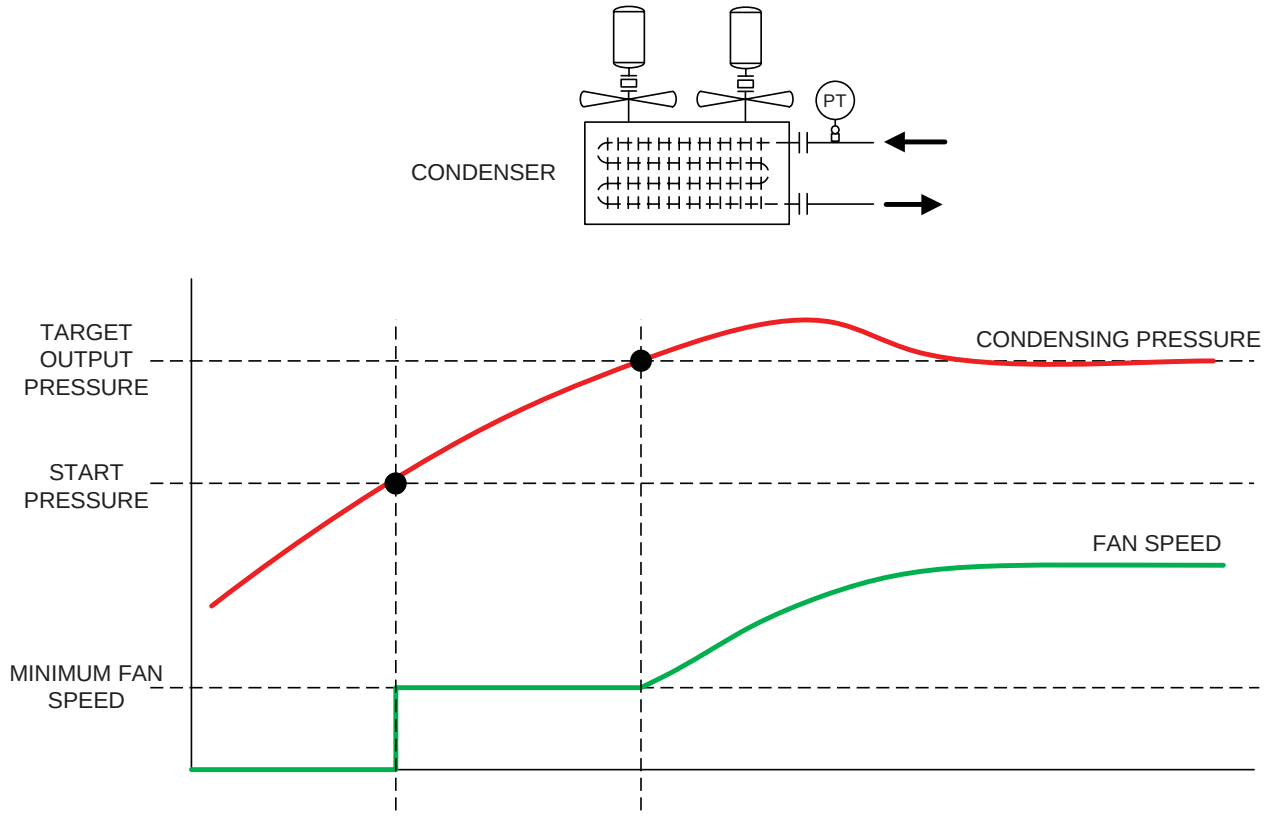


Figure 2-10. Operational Diagram - Air Cooled Condenser (VFD Type)

AIR COOLED CONDENSER (VFD TYPE)

Reference Figure 2-10

If installed, the VFD type air cooled condenser is a heat exchanger that uses one or more fans running on a VFD to condense refrigerant vapor into a liquid. The VFD speeds up or slows down the fan motor to control the amount of cooling done by the condenser.

A PID controller adjusts the speed of the fan(s) to control condensing pressure. When the condensing pressure exceeds the desired pressure plus a deadband, the fan(s) will increase speed to add more cooling. When condensing pressure drops below the desired temperature minus a deadband, the fan(s) will decrease speed.

- When the compressor is stopped, the condenser fan(s) will stop.
- When the compressor is running and the oil cooler outlet temperature rises above the “Condenser Start Pressure” set in the “VFD Type Condenser Setpoints” screen, the fan(s) will start at a settable minimum speed.
- When the compressor is running and the condensing pressure is above the deadband, the PID controller will increase fan speed.
- When the compressor is running and the condensing pressure is below the deadband, the PID controller will decrease fan speed.

EVAPORATIVE CONDENSER

If installed, an evaporative condenser incorporates a water circulating pump that mists water over the condenser to provide additional cooling.

- When using with step-type condensers, the pump can be added or removed from the step sequence as if it were another fan. The pump will start when the steps that it is enabled are active.
- When using with VFD-type condensers, the pump can be enabled or disabled by a selection on the condenser control setpoints screen. When enabled, the pump starts at the same time as the fan.

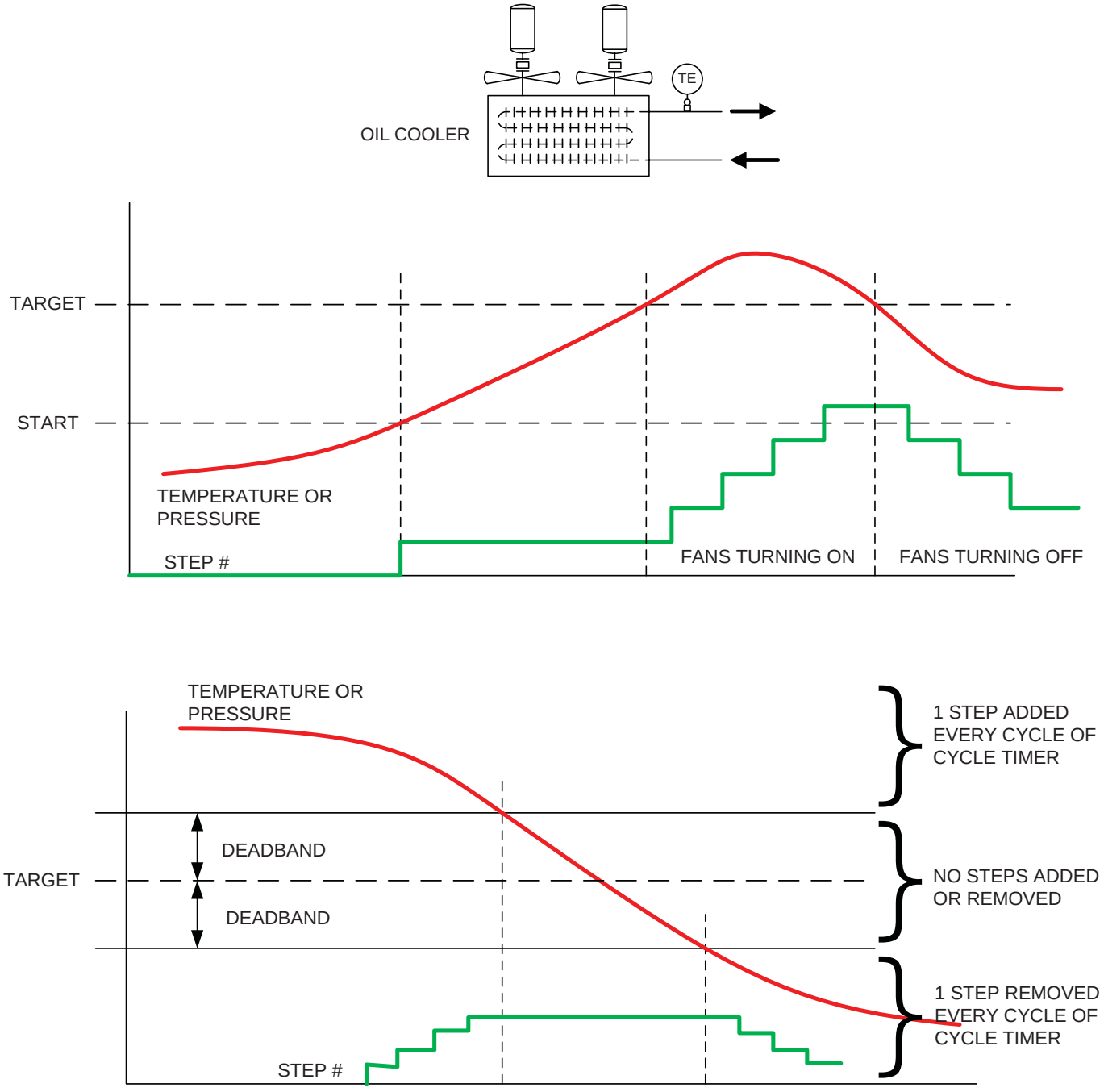


Figure 2-11. Operational Diagram - All Air Cooled Oil Coolers (Step Type)

AIR COOLED OIL COOLER (STEP TYPE)

Reference Figure 2-11

If installed, the step type air cooled oil cooler is a heat exchanger that uses multiple fans to control the oil temperature at its outlet.

The controller starts and stops fans in a sequence to control the temperature at the outlet of the oil cooler. When the temperature of the oil at the outlet of the cooler exceeds the desired temperature plus a deadband, fans will be turned on after a time delay to add more cooling. When outlet temperature drops below the desired temperature minus a deadband, fans will be turned off after a time delay.

- When the compressor is stopped, all oil cooler fans are turned off.
- When the compressor is running and the oil cooler

outlet temperature rises above the "Oil Cooler Start" temperature set in the "Step Type Oil Cooler Setpoints" screen, the first fan (or group of fans) will start.

- When the compressor is running and the oil cooler outlet temperature is above the deadband, a fan (or group of fans) will start each time through the "Step Dwell Time."
- When the compressor is running and the oil cooler outlet temperature is below the deadband, a fan (or group of fans) will stop each time through the "Step Dwell Time."
- Once started, the first fan or group of fans will remain running until the compressor stops.

AIR COOLED AFTERCOOLER (STEP TYPE)

Reference Figure 2-11

If installed, the step type air cooled aftercooler is a heat exchanger that uses multiple fans to remove heat from the gas discharged from the compressor. The number of fans that run is determined by the gas temperature at the outlet of the aftercooler.

The controller starts and stops fans in a sequence to control the gas temperature at the outlet of the aftercooler. When the aftercooler outlet temperature exceeds the desired temperature plus a deadband, fans will be turned on after a time delay to add more cooling. When aftercooler outlet temperature drops below the desired temperature minus a deadband, fans will be turned off after a time delay.

- When the compressor is stopped, all aftercooler fans are turned off.
- When the compressor is running and the aftercooler outlet temperature rises above the "Start Aftercooler At" temperature set in the "Step Type Aftercooler Setpoints" screen, the first fan (or group of fans) will start.
- When the compressor is running and the aftercooler outlet temperature is above the deadband, a fan (or group of fans) will start each time through the "Step Dwell Time."
- When the compressor is running and the aftercooler outlet temperature is below the deadband, a fan (or group of fans) will stop each time through the "Step Dwell Time."
- Once started, the first fan or group of fans will remain running until the compressor stops.

AIR COOLED CONDENSER (STEP TYPE)

Reference Figure 2-12 and 2-11 for curves

If installed, the step type air cooled condenser is a heat exchanger that uses multiple fans to condense refrigerant vapor to a liquid. The number of fans that run is determined by the refrigerant pressure at the condenser.

The controller starts and stops fans in a sequence to control the condensing pressure. When the condensing pressure exceeds the desired pressure plus a deadband, fans will be turned on after a time delay to add more cooling. When condensing pressure drops below the desired pressure minus a deadband, fans will be turned off after a time delay.

- When the compressor is stopped, all condenser fans are turned off.
- When the compressor is running and the oil cooler outlet temperature rises above the "Condenser Start" pressure set in the "Step Type Condenser Setpoints" screen, the first fan (or group of fans) will start.
- When the compressor is running and the condensing pressure is above the deadband, a fan (or group of fans) will start each time through the "Step Dwell Time."
- When the compressor is running and the condensing pressure is below the deadband, a fan (or group of fans) will stop each time through the "Step Dwell Time."
- Once started, the first fan or group of fans will remain running until the compressor stops.

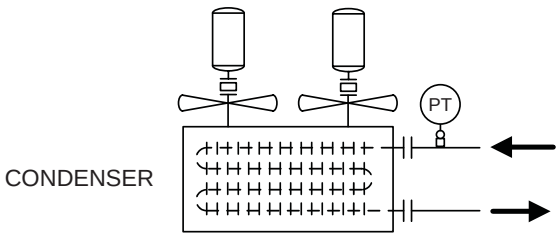


Figure 2-12. Operational Diagram - Air Cooled Condenser

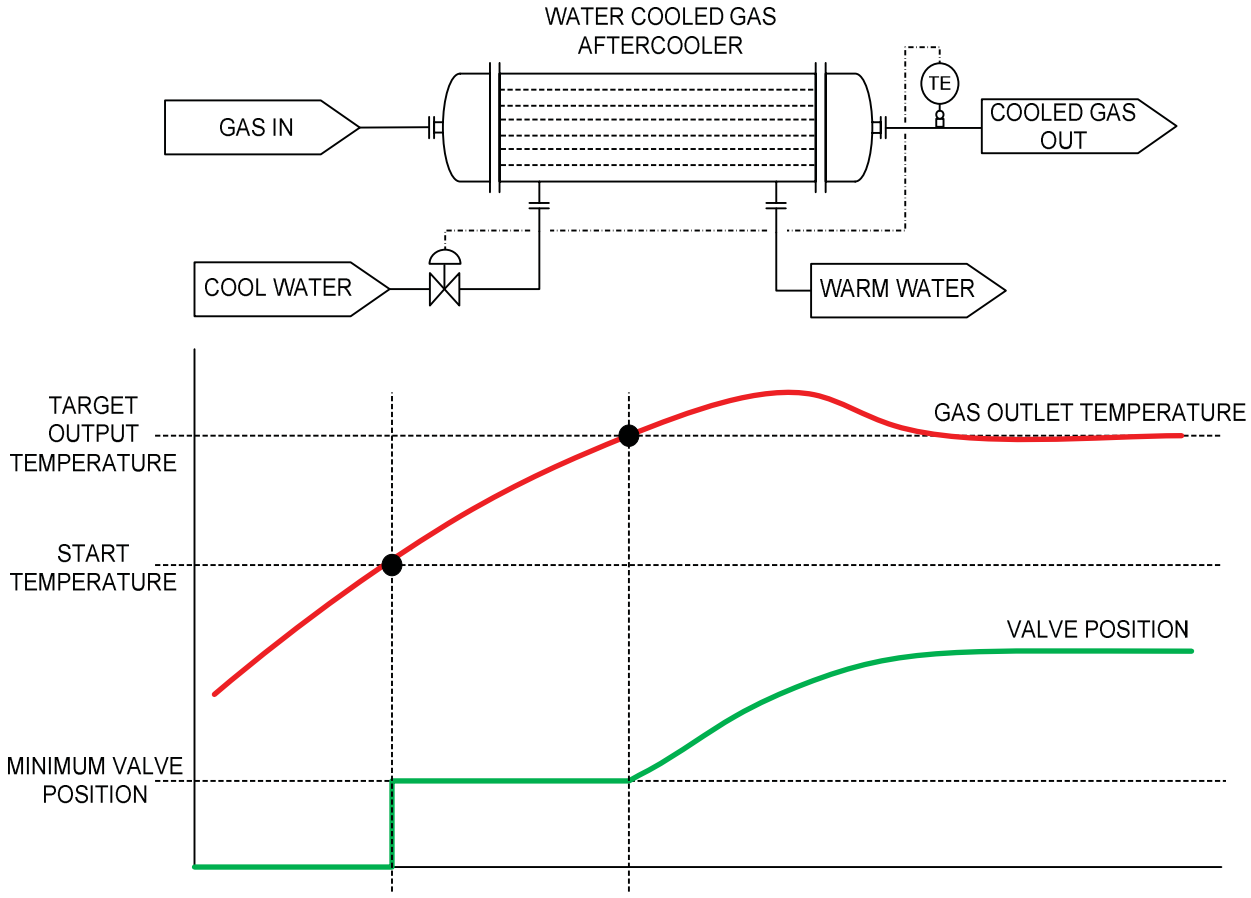


Figure 2-13. Operational Diagram - Water Cooled Gas Aftercooler

WATER COOLED GAS AFTERCOOLER

Reference Figure 2-13

If installed, the water-cooled gas aftercooler is a heat exchanger that uses a modulating valve to control cooling water flow to remove heat from the gas discharged by the compressor. The valve position is adjusted to control the amount of cooling done by the aftercooler.

A PID controller adjusts the opening degree of the modulating valve to maintain a desired temperature at the outlet of the gas aftercooler. When the aftercooler outlet temperature exceeds the desired pressure plus a deadband, the valve will open further to add more cooling. When aftercooler outlet temperature drops below the desired temperature minus a deadband, the valve will begin to close.

- When the compressor is stopped, the valve will be commanded to 0% open (full close).
- When the compressor is running and the condensing pressure rises above the “Open Valve At” setpoint in the “Water Cooled Aftercooler Setpoints” screen, the valve will open to a settable minimum position.
- When the compressor is running and the aftercooler outlet temperature is above the deadband, the PID controller will increase the valve opening degree.
- When the compressor is running and the aftercooler outlet temperature is below the deadband, the PID controller will decrease the valve opening degree.

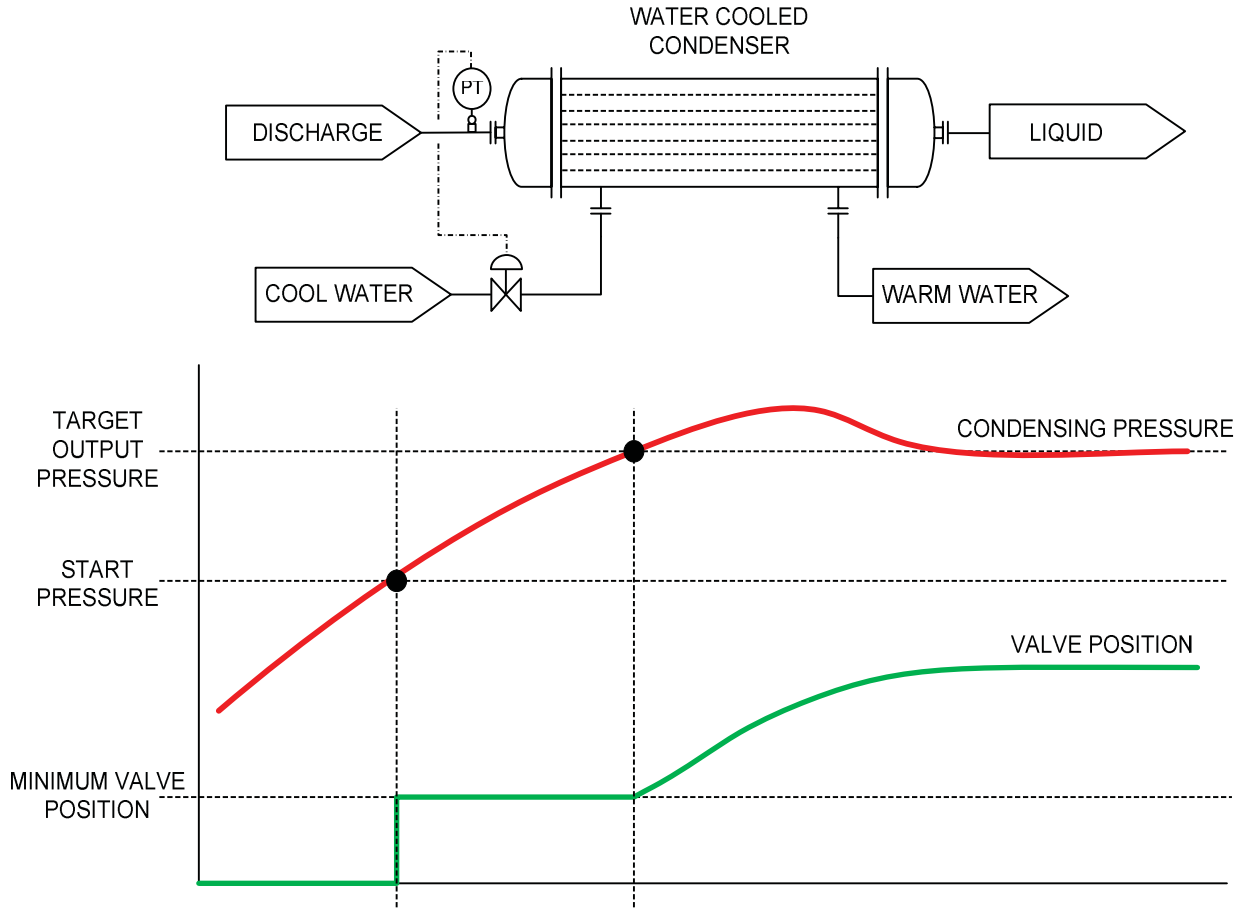


Figure 2-14. Operational Diagram - Water Cooled Condenser

WATER COOLED CONDENSER

Reference Figure 2-14

If installed, the water-cooled condenser is a heat exchanger that uses a modulating valve to control cooling water flow to condense refrigerant vapor into a liquid. The valve position is adjusted to control the amount of cooling done by the condenser.

A PID controller adjusts the opening degree of the modulating valve to control condensing pressure. When the condensing pressure exceeds the desired pressure plus a deadband, the valve will open further to add more cooling. When condensing pressure drops below the desired temperature minus a deadband, the valve will begin to close.

- When the compressor is stopped, the valve will be commanded to 0% open (full close).
- When the compressor is running and the condensing pressure rises above the “Condenser Start Pressure” set in the “Water Cooled Condenser Setpoints” screen, the valve will open to a settable minimum position.
- When the compressor is running and the condensing pressure is above the deadband, the PID controller will increase the valve opening degree.
- When the compressor is running and the condensing pressure is below the deadband, the PID controller will decrease valve opening degree.

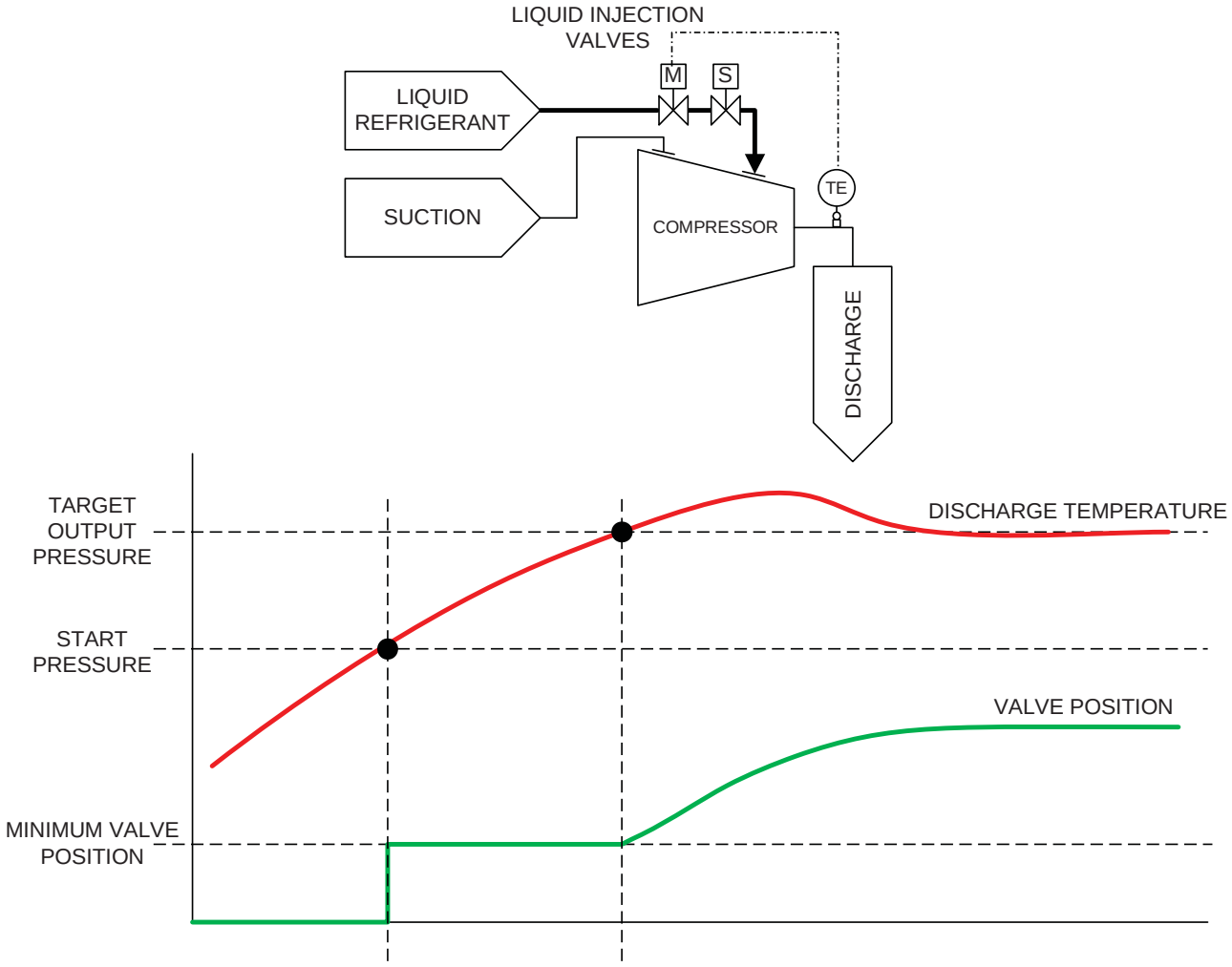


Figure 2-15. Operational Diagram - Liquid Injection Valve

LIQUID INJECTION VALVE

Reference Figure 2-15

If installed, liquid injection is a method of oil cooling where liquid refrigerant is injected into a port on the compressor. A modulating valve regulates the amount of liquid allowed into the compressor to control the amount of cooling done by liquid injection.

A PID controller adjusts the opening degree of the modulating valve to control compressor discharge temperature (temperature of the gas and oil mixture leaving the compressor). When the discharge temperature exceeds the desired temperature plus a deadband, the valve will open further to add more cooling. When discharge temperature drops below the desired temperature minus a deadband, the valve will begin to close.

- When the compressor is stopped, the valve will be commanded to 0% open (full closed).
- When the compressor is running, the discharge temperature rises above the "Open Valve Above" setpoint and Separator Oil Temperature rises above "Oil Separator Override Temp" in the "Liquid Injection Valve Setpoints" screen, the valve will open to a settable minimum position.
- When the compressor is running and the discharge temperature is above the deadband, the PID controller will increase the valve opening degree.
- When the compressor is running and the discharge temperature is below the deadband, the PID controller will decrease valve opening degree.

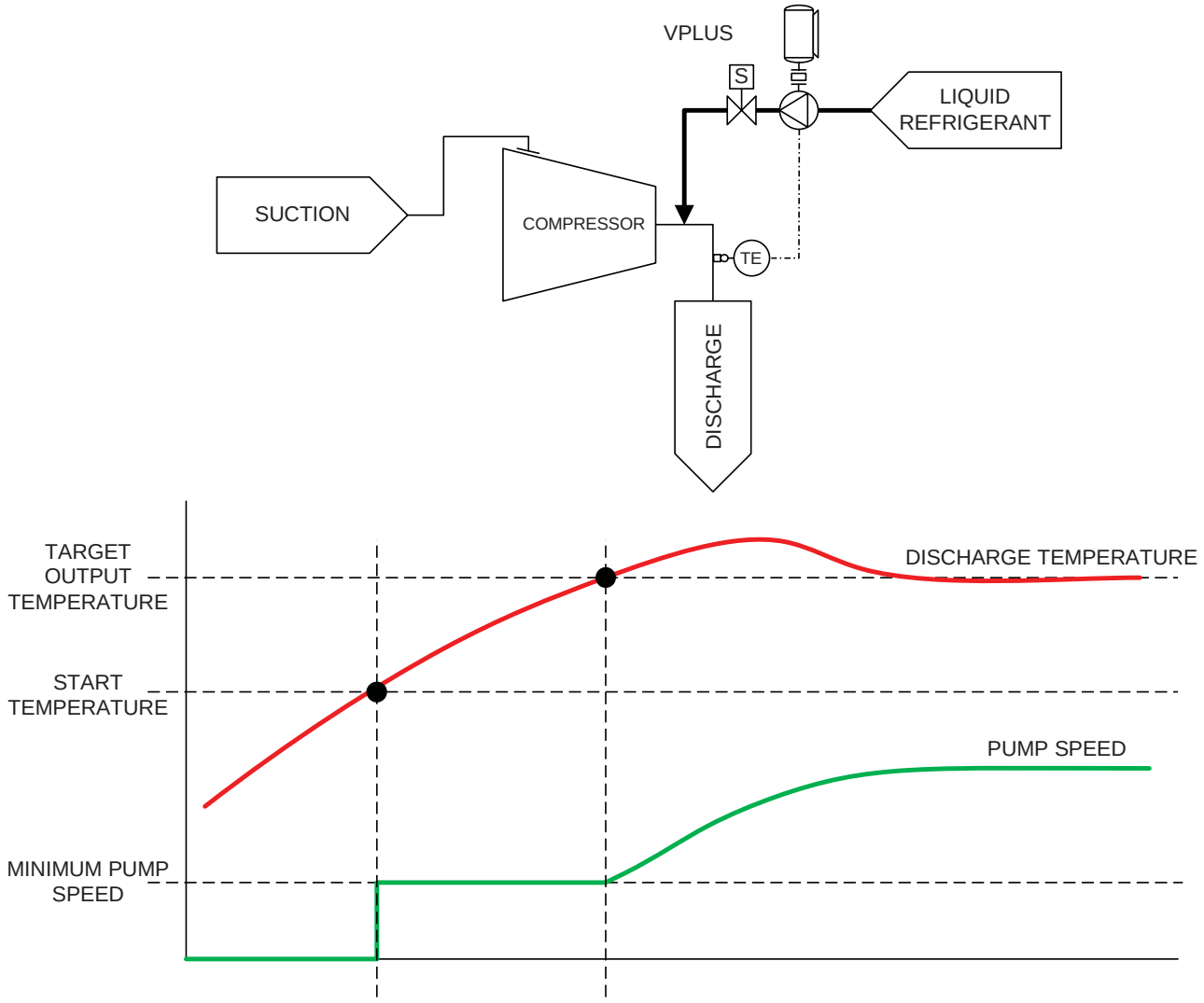


Figure 2-16. Operational Diagram - VPLUS

VPLUS LIQUID INJECTION PUMP

Reference Figure 2-16

If installed, VPLUS liquid injection is a method of oil cooling where liquid refrigerant is pumped through a nozzle in the discharge housing of the compressor. A variable speed pump regulates the amount of liquid pumped into the compressor to control the amount of cooling.

A PID controller adjusts the speed of the VPLUS pump to control compressor discharge temperature (temperature of the gas and oil mixture leaving the compressor). When the discharge temperature exceeds the desired temperature plus a deadband, the pump will increase speed to add more cooling. When discharge temperature drops below the desired temperature minus a deadband, the pump will decrease speed.

- When the compressor is stopped, the pump is stopped.
- When the compressor is running, the discharge temperature rises above the “Start Pump At” setpoint and Separator Oil Temperature rises above “Oil Separator Override Temp” in the “VPLUS Pump Setpoints” screen, the pump will start at a settable minimum speed.
- When the compressor is running and the discharge temperature is above the deadband, the PID controller will increase the pump speed.
- When the compressor is running and the discharge temperature is below the deadband, the PID controller will decrease the pump speed.

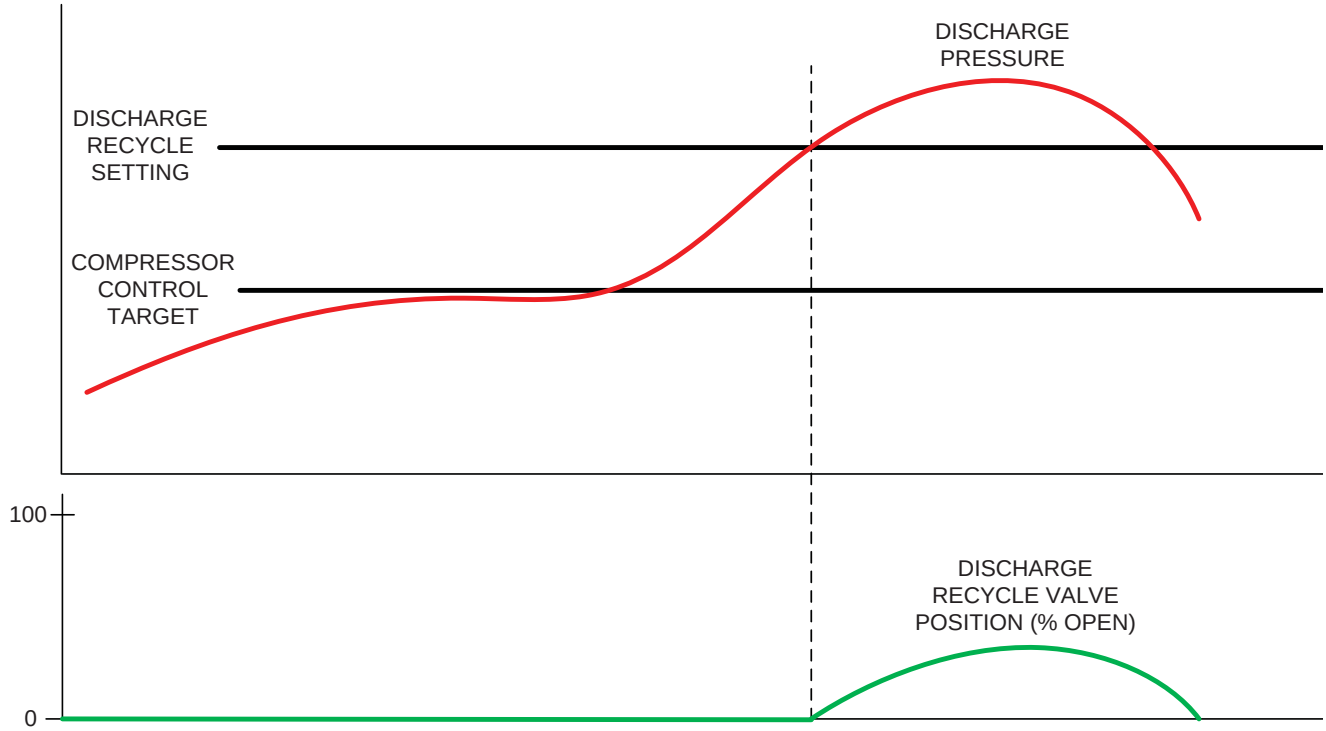


Figure 2-17. Operational Diagram - Discharge Recycle Valve

DISCHARGE RECYCLE VALVE

Reference Figure 2-17

NOTE

Discharge recycle valve must be controlled by others when multiple compressors are connected to a common header.

If installed, the discharge recycle valve is a motorized or air actuated valve that recycles discharge gas back to the suction of the compressor. The valve acts as a regulator, opening to maintain the set pressure in the discharge line.

A PID controller adjusts the opening degree of the valve to maintain a desired pressure on the high pressure side of the valve. When the recycle control pressure exceeds the desired pressure plus a deadband, the valve will start to open to recycle high pressure gas back to suction.

ECONOMIZER SOLENOID(S)

If installed, an economizer is a heat exchanger that operates at an intermediate pressure, above suction pressure but below discharge pressure. Up to two solenoids control when the economizer becomes part of the refrigeration process.

The compressor controller opens and closes the economizer port solenoid valves based on ON and OFF capacity slide position setpoints. The economizer solenoid is typically energized when capacity slide valve position is above a settable value.

- When the compressor is stopped, economizer solenoid valves are closed.
- When the compressor is running, the economizer port solenoid will open when capacity slide position is greater than the "ON Above" Setpoint in the Compressor Control Setpoints Screens.
- When the compressor is running, the economizer port solenoid will close when capacity slide position is less than the "OFF Below" Setpoint in the Compressor Control Setpoints Screens.

HOTGAS BYPASS SOLENOID

If installed, the hotgas bypass solenoid valve enables a regulator that circulates discharge "hotgas" back to suction to simulate a load on the compressor by raising the suction pressure. It is typically enabled on low load conditions to prevent the compressor from shutting down on low suction pressure.

The compressor controller opens and closes the hotgas bypass solenoid valve based on ON and OFF capacity slide position setpoints. The hotgas bypass solenoid is typically energized when capacity slide position is below a settable value.

- When the compressor is stopped, the hotgas bypass solenoid is closed.
- When the compressor is running, the hotgas bypass solenoid will open when capacity slide position is less than the "ON Below" Setpoint in the Compressor Control Setpoints Screens.
- When the compressor is running, the economizer port solenoid will close when capacity slide position is less than the "OFF Below" Setpoint in the Compressor Control Setpoints Screens.

VENTURI OIL RECOVERY

If installed, the venturi oil recovery system uses a group of solenoid valves that function together to return any oil that has accumulated in the chiller back to the compressor. When the solenoid valves are energized, discharge hotgas passes through a venturi to draw out any oil that may have accumulated in the chiller. Venturi Oil Recovery is typically used in Freon or Propane applications where the oil is less dense than the liquid refrigerant and tends to float on top.

Oil recovery is activated by a level switch that senses low oil level in the oil separator. When activated, the venturi oil recovery solenoids will cycle on and off by a settable cycle timer. ON time and OFF time are settable in the "Compressor Control Setpoints" screens.

GAS SCRUBBERS

A gas scrubber (or knockout drum) is a vessel with a demister pad or coalescing elements installed to remove moisture and other contaminants from the gas stream. Gas scrubbers may be installed on the suction side or discharge side of a gas compressor (if an aftercooler is used, the scrubber is installed downstream of the aftercooler), or on the inlet or outlet side of a gas chiller. A condensate pump or solenoid valve drains accumulated moisture from the vessel.

Gas scrubbers include the following devices:

- Pressure transducers on the inlet and outlet of the vessel – used to measure pressure drop across the demister pad or coalescing elements to help determine when to clean or replace.
- Level switches to monitor the condensate level:
  - LSH (High Level) – when liquid level reaches the LSH level switch, an alarm is annunciated on the compressor HMI.
  - LSHH (High High Level) – when liquid level reaches the LSHH level switch, an alarm or trip is annunciated on the compressor HMI. The alarm or trip action is configurable depending on the site and location of the vessel. If trip action is selected, the compressor will shut down if the LSHH is activated. Typically the purpose of the LSHH is to alarm or shut down the compressor to prevent bringing liquid into the compressor suction.
  - LSLL (Low Low Level) – when liquid level drops below the LSLL level switch, an alarm or trip is annunciated on the compressor HMI. The alarm or trip action is configurable depending on the site and location of the vessel. If trip action is selected, the compressor will shut down if the LSLL is activated. Typically the purpose of the LSLL is to detect if the liquid seal is lost to prevent introducing gas into the condensate drain system.
- Condensate Drain System:
  - A drain pump or solenoid valve will turn on when the liquid level in the scrubber reaches the "Cutin"

level switch.

- The drain pump or solenoid valve will turn off when the liquid level in the scrubber drops to the "Cutout" level switch.
- Dual pumps may be used. Selection of Pump A or B is made in the Configuration screen.

BUILDING ENCLOSURE DEVICES

If the compressor unit is mounted inside a building enclosure, the following are monitored/controlled:

- Space Heater – maintains a desired temperature range inside the enclosure. Space Heater ON and OFF setpoints are in the compressor control setpoint screens.
- Exhaust Fans – maintains a desired temperature range inside the enclosure. Exhaust Fan ON and OFF setpoints are in the compressor control setpoint screens. If the methane detector %LEL reaches alarm level, the exhaust fans will also turn on until the alarm is cleared.
- Methane Detector – monitors the %LEL of the air inside the enclosure. Generates an alarm and trip. Alarm and trip setpoints are settable in the Alarm and Trip Setpoints screen.
- Smoke Detector – If triggered by smoke within the enclosure, will shut down the compressor and trip the compressor emergency stop.

Compressor and System Overview Screens

The Compressor and system overview screens shows compressor status, configuration, any active alarms or trips, and live process data. The compressor and/or process are displayed in a format similar to a P&I Diagram with live process data shown on the screen.

From the compressor and system overview screens, all other screens are accessed by pressing the “Main Menu” go to screen button in the lower right of the screen. The system overview display is accessed from the compressor overview screen and vice-versa, if a system overview screen is displayed.

The following are some examples of different compressor and package configurations and how they are displayed on the HMI.

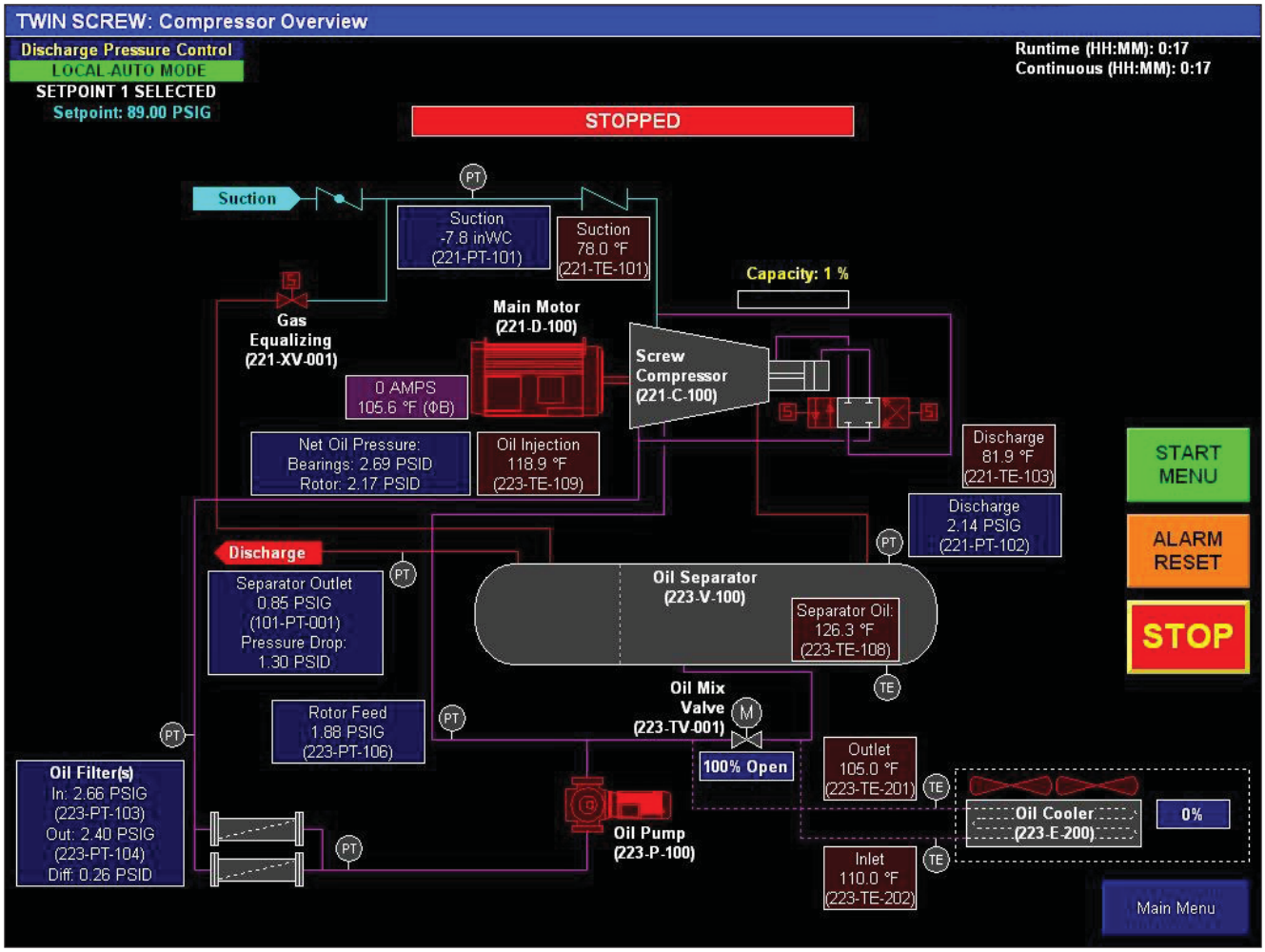


Figure 3-1. Basic Compressor Unit Screen

Example 1 - Gas Compressor Unit Overview Screen

VRSG-3700 Compressor Unit for Natural Gas with Air Cooled VFD Type Oil Cooler

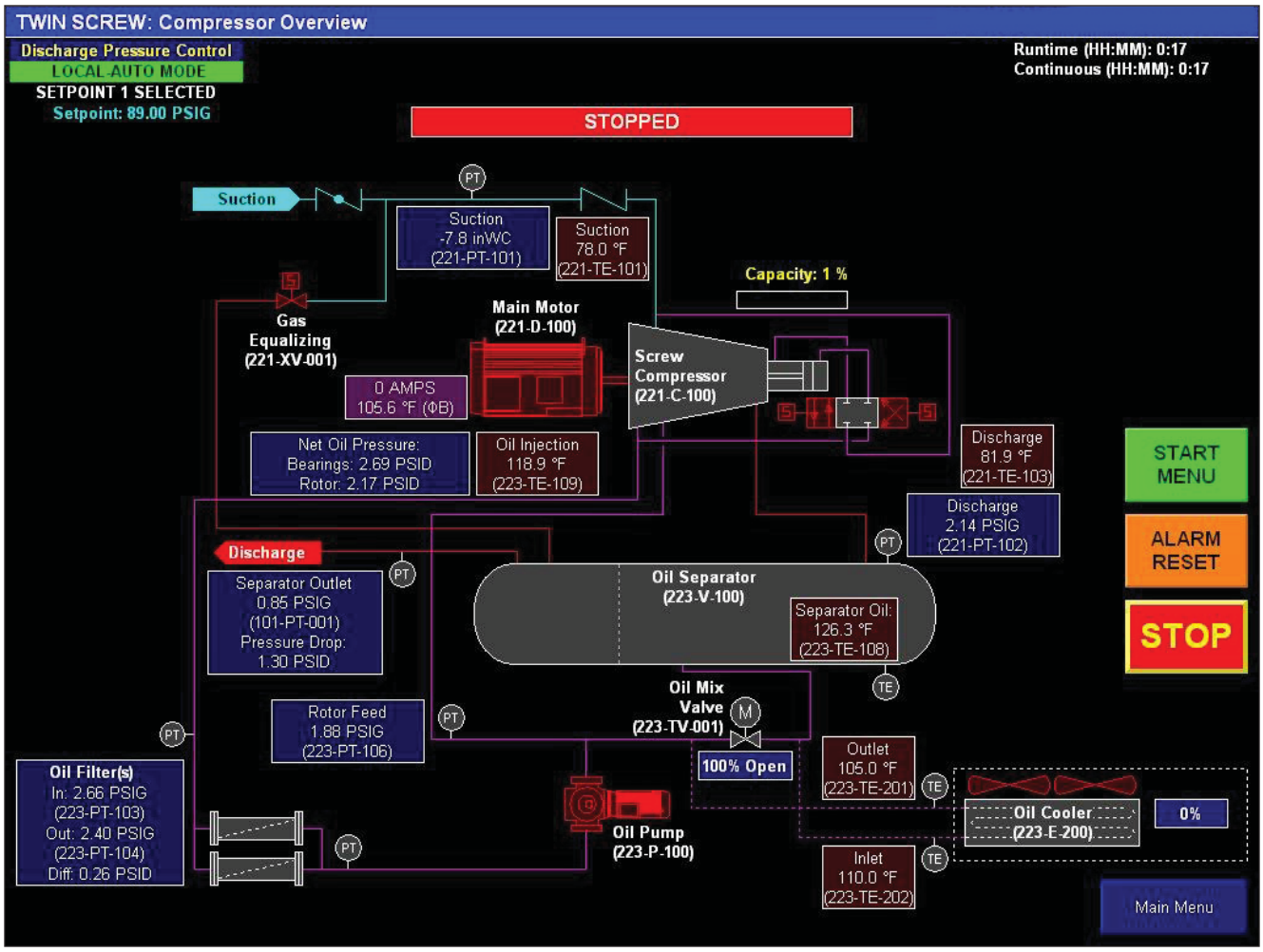


Figure 3-2. Example 1 - Gas Compressor Unit Overview Screen,
VRSG-3700 Compressor Unit for Natural Gas with Air Cooled VFD Type Oil Cooler

Example 2 - Refrigeration Compressor Unit Overview Screen

VRSH-2700 Compressor Unit for Ammonia with Liquid Injection Oil Cooling and Economizer

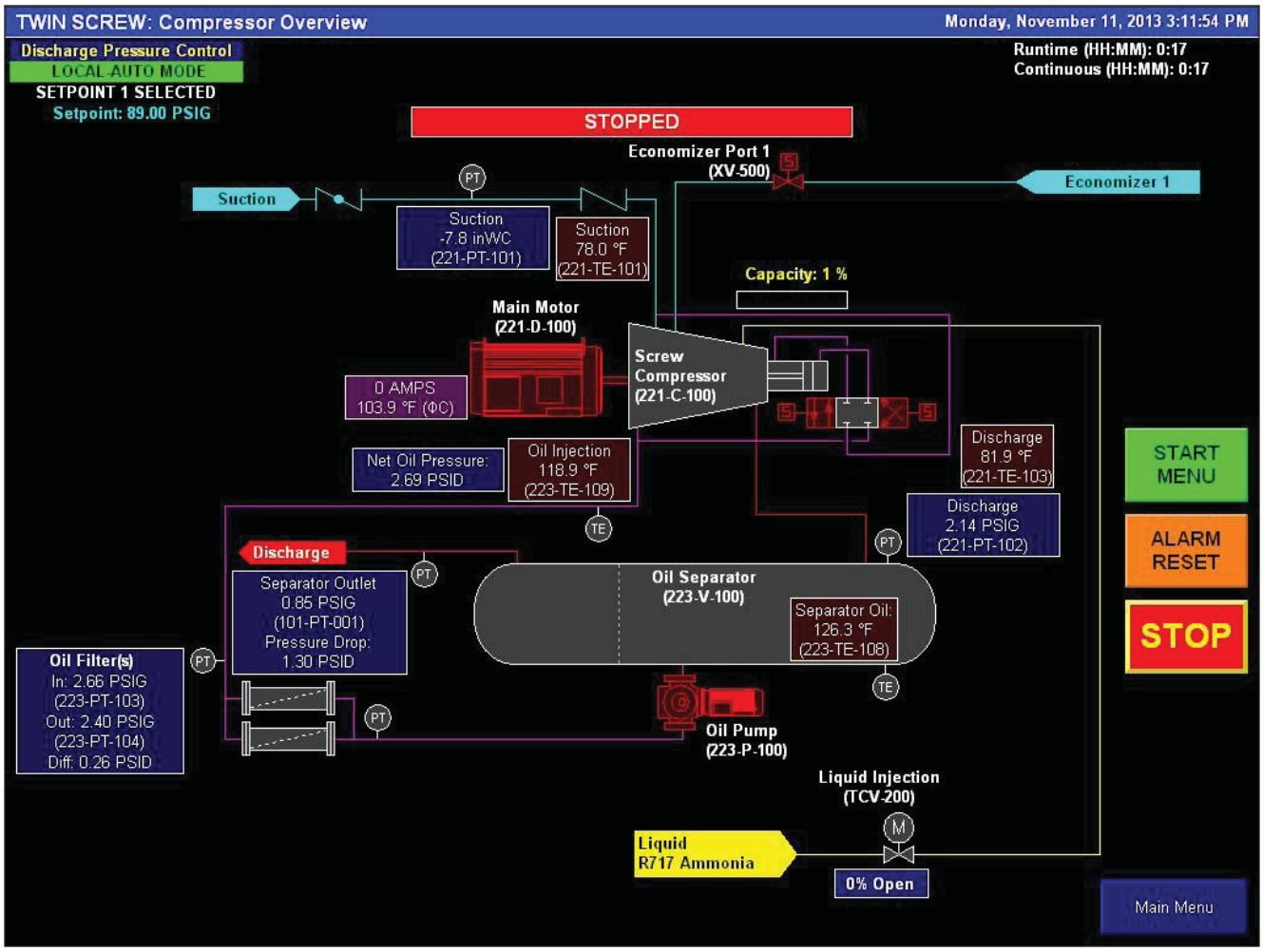


Figure 3-3. Example 2 - Refrigeration Compressor Unit Overview Screen,
VRSH-2700 Compressor Unit for Ammonia with Liquid Injection Oil Cooling and Economizer

HMI Navigation

HMI screens are accessed by using the navigation buttons on each screen. When the HMI boots up, the compressor overview screen is displayed by default. The HMI Screens are divided into groups, all of which are accessible from the Menu Screen.

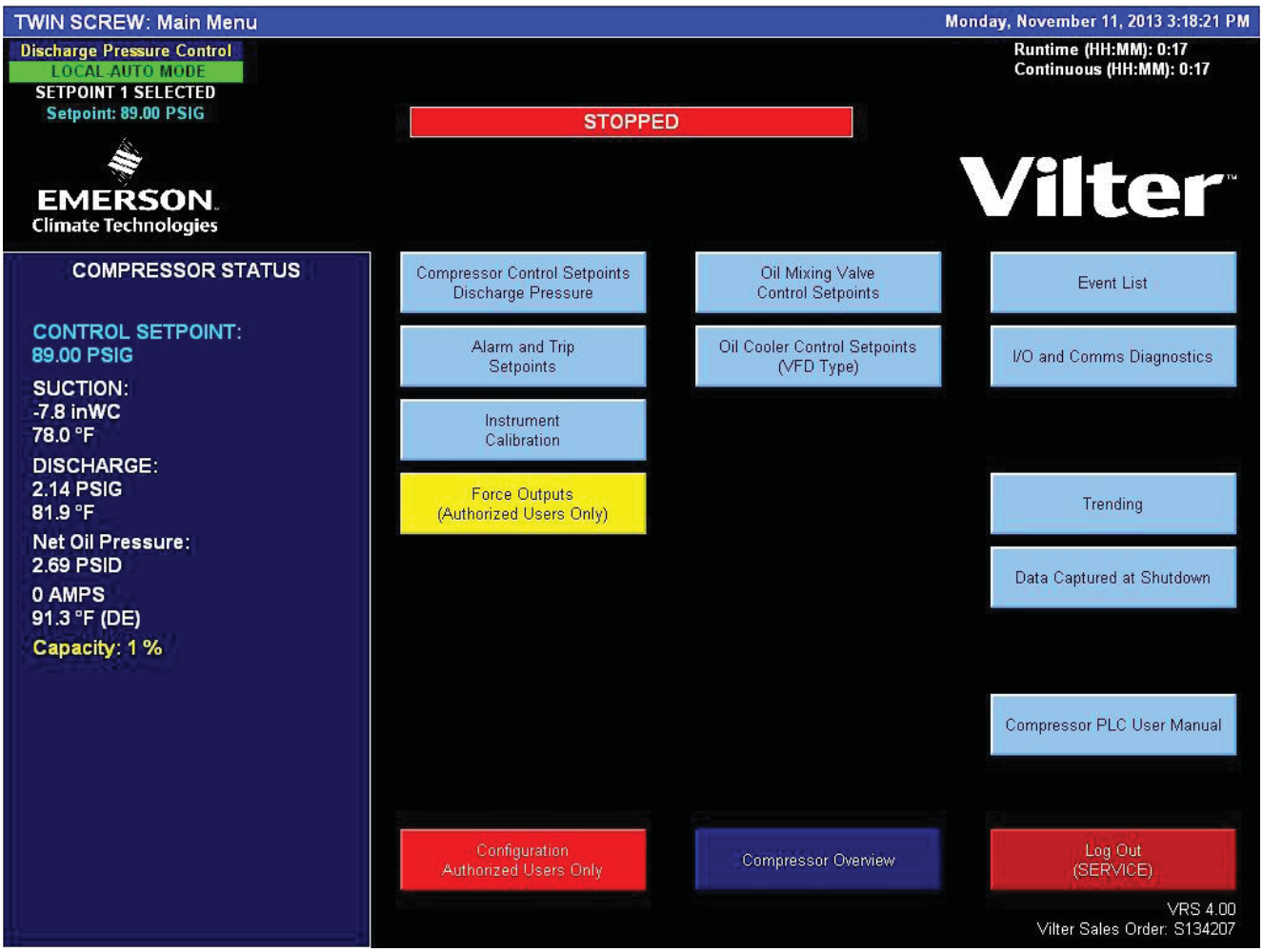
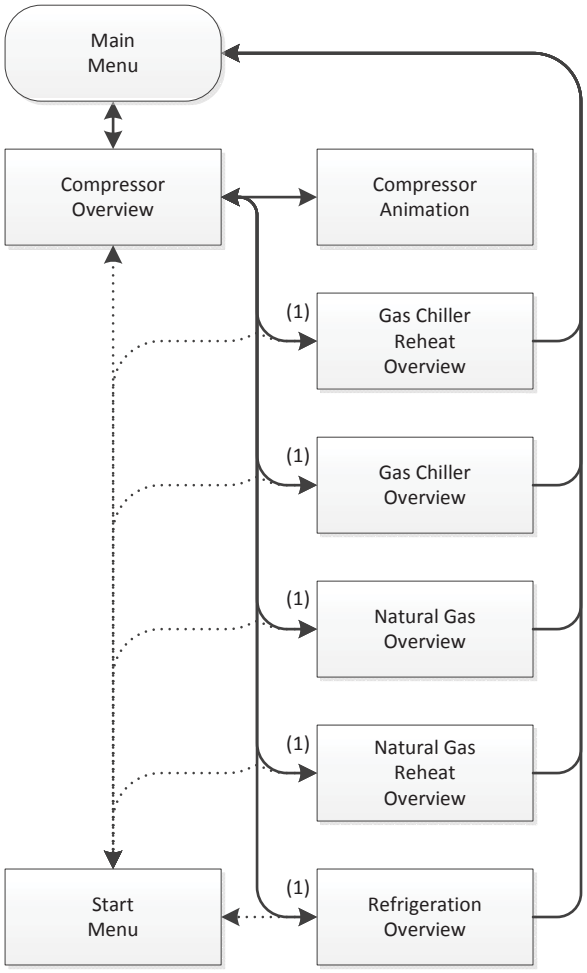


Figure 4-1. Main Menu Screen

The Menu Screen allows the user to view basic compressor configuration, status, active alarms and trips, as well as navigate to configuration, control, calibration, and diagnostics screens.

An electronic copy of the compressor PLC manual is accessed from the Menu Screen.



(1) Overview Screen is selected in "Configuration - Authorized Users ONLY". Only the selected overview screen is visible.

Figure 4-2. Screen Navigation Map - Main Screens (1 of 7)

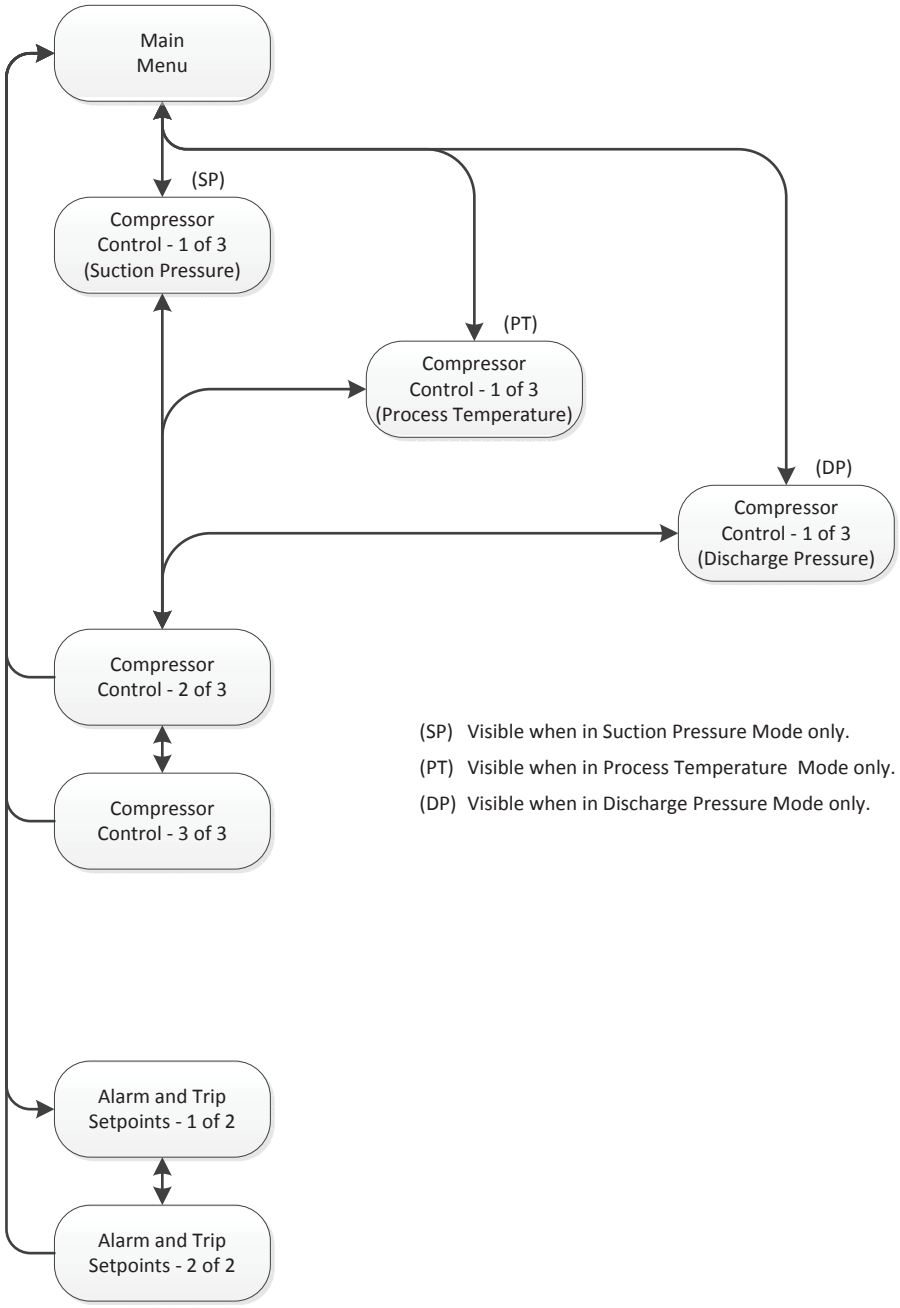


Figure 4-2. Screen Navigation Map - Compressor Control, Alarm and Trip (2 of 7)

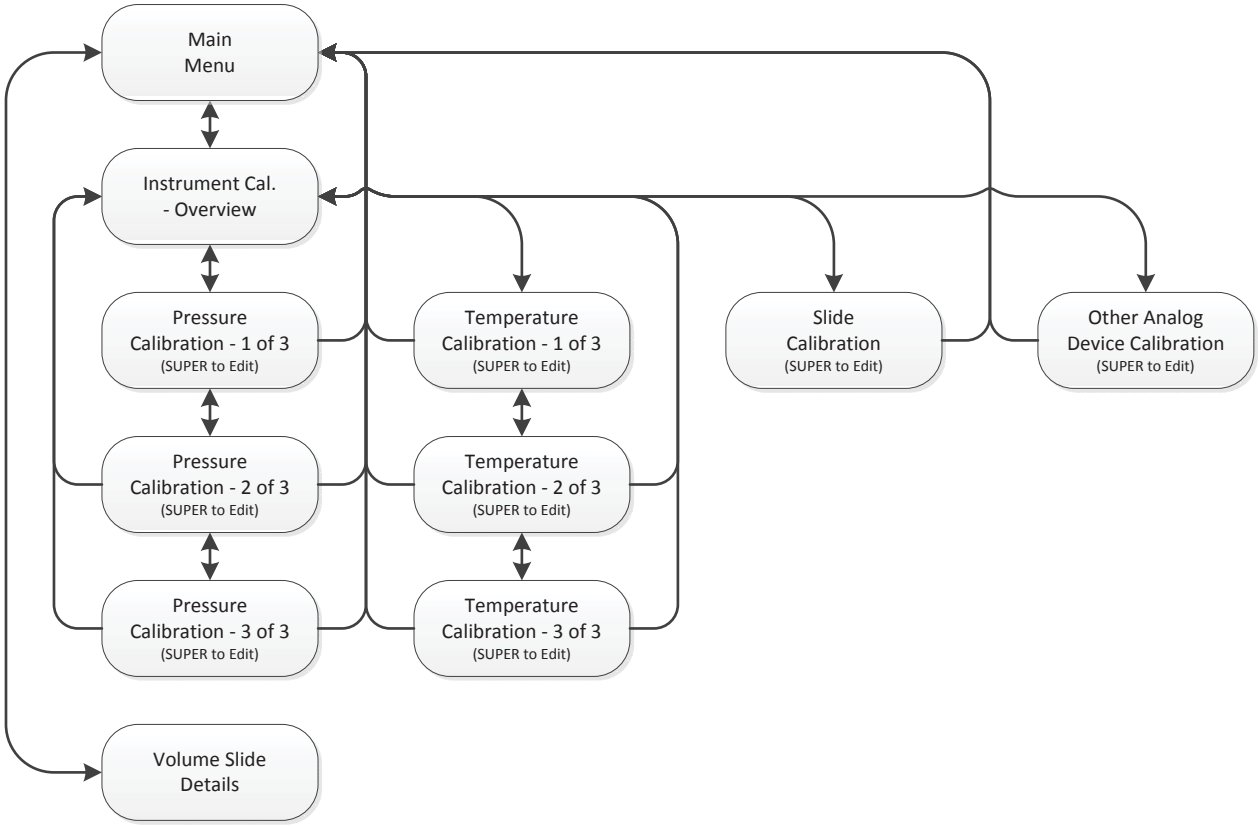


Figure 4-2. Screen Navigation Map - Instrument Calibration (3 of 7)

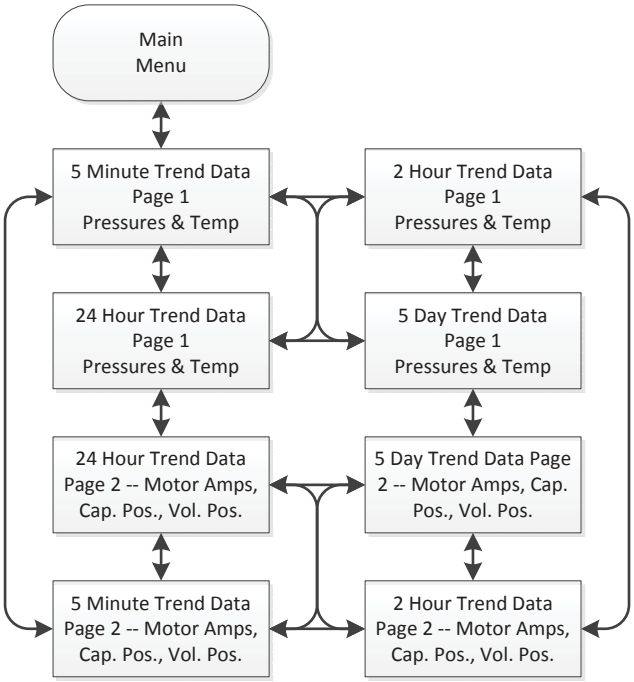
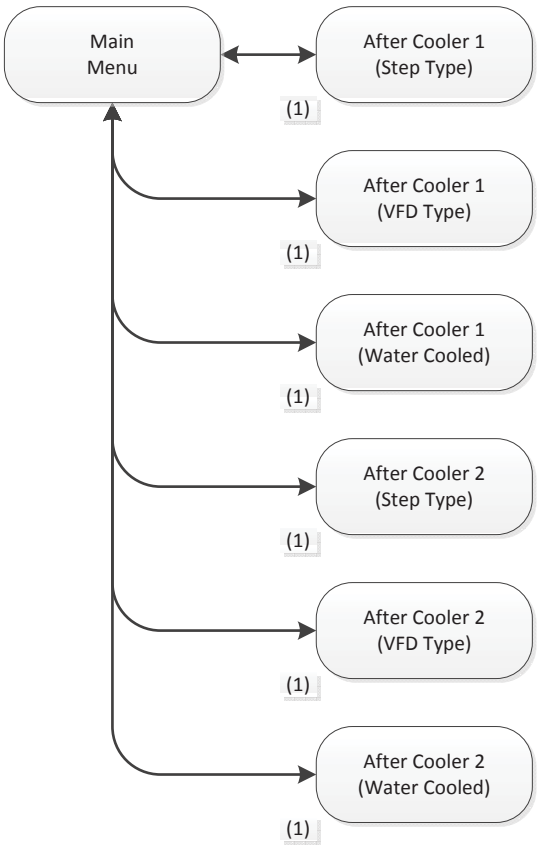


Figure 4-2. Screen Navigation Map - Trending (4 of 7)



(1) Visibility dependant on After Cooler Selections

Figure 4-2. Screen Navigation Map - Aftercoolers (5 of 7)

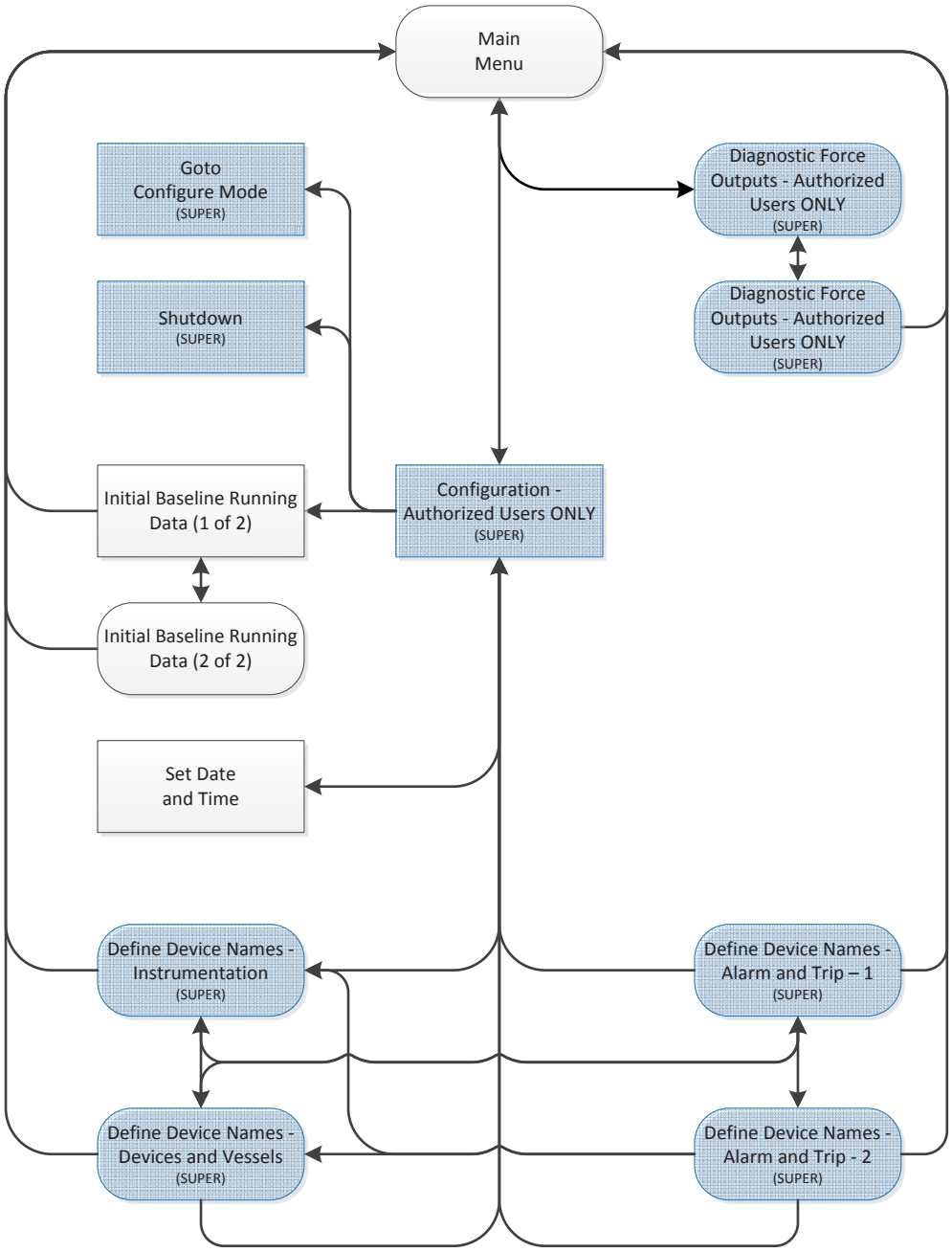


Figure 4-2. Screen Navigation Map - Configuration, Device Names and Initial Baseline (6 of 7)

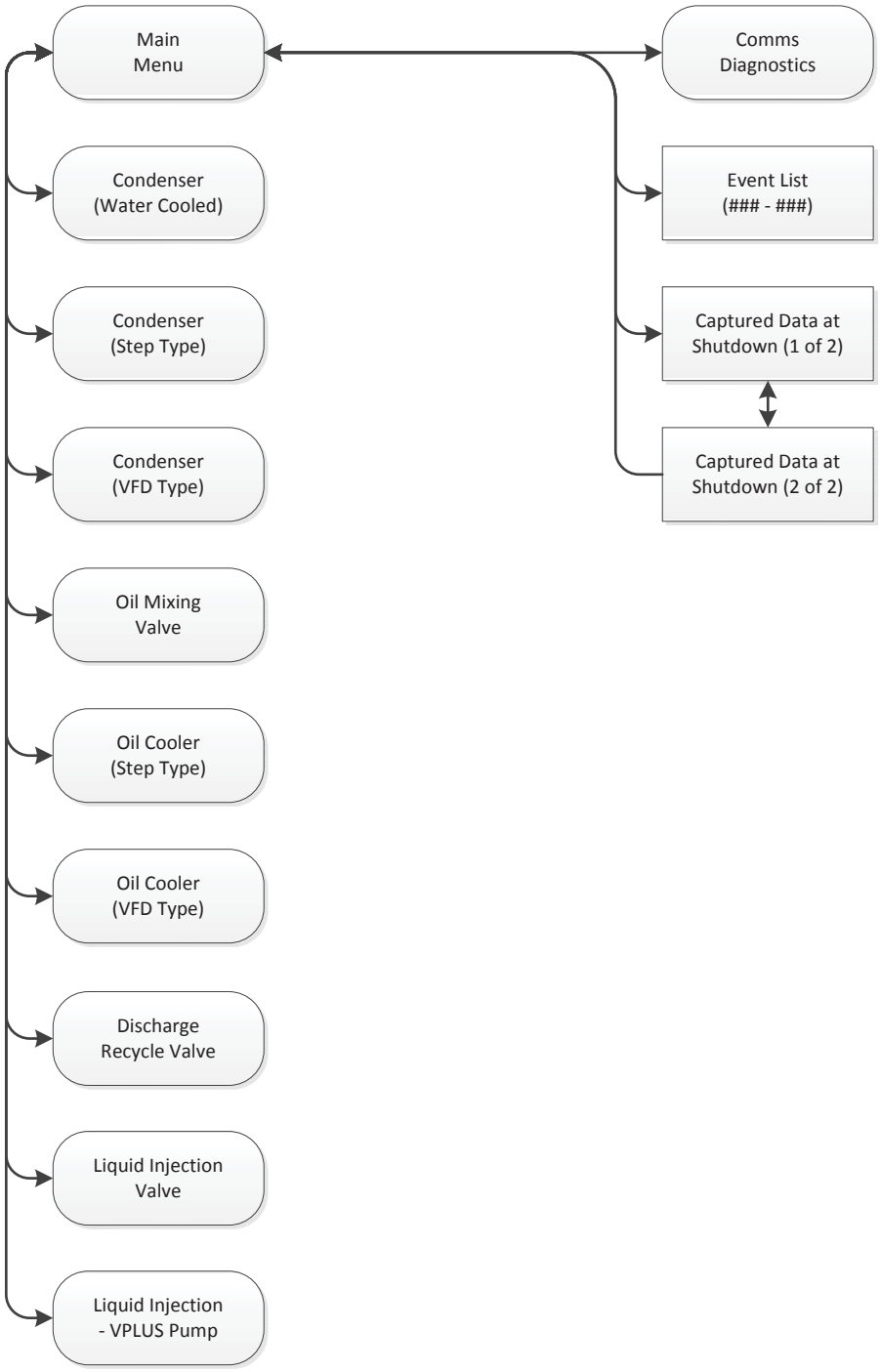


Figure 4-2. Screen Navigation Map - Condenser, Oil Mixing or Cooler, Liquid Injection, Misc.

HMI Security

Some items and screens on the HMI require a login to be viewed or changed.

Login accounts are described below, each with its default password and level of access.

DEFAULT

- This is the user account that is active when the HMI boots up or the user logs out of another user account.
- Permissions:
  - May start and stop the machine
  - May change Remote-Local and Auto-Manual modes
  - May view setpoints, calibration data, and diagnostics

OP1, OP2, OP3, OP4, OP5

- These user accounts are intended for operators.
- Default Password: 1
- Permissions
  - May start and stop the machine
  - May change Remote-Local and Auto-Manual modes
  - May Operate the machine in Manual mode
  - May view setpoints, calibration data, and diagnostics
  - May change setpoints

SUPER

- This user account is intended for site supervisors, managers, and superintendents.
- Default Password: 1
- Permissions
  - May start and stop the machine
  - May change Remote-Local and Auto-Manual modes
  - May Operate the machine in Manual mode
  - May view setpoints, calibration data, and diagnostics
  - May change setpoints
  - May force Discrete and Analog outputs on the PLC
  - May make changes to machine configuration selections

LOGGING IN

To log on, press the “Log On” button. The “Log On” button is located in the Upper-Right corner of most screens, and in the lower right corner of the menu screen. The login pop-up screen will appear, see Figure 4-3.

Enter User Name and password using the pop-up keyboard, see Figure 4-4.

It is recommended to log out when finished. Every login is recorded in the compressor control’s event list. After 10 minutes of inactivity, the HMI will automatically log out the current user.

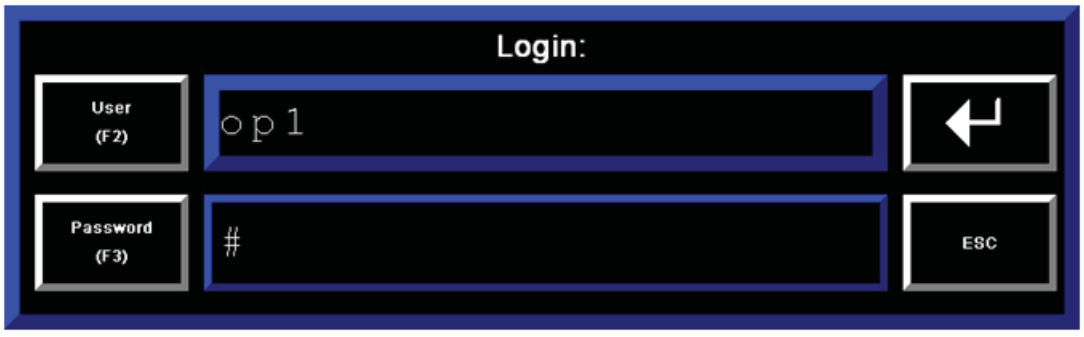


Figure 4-3. Login Pop-up Screen

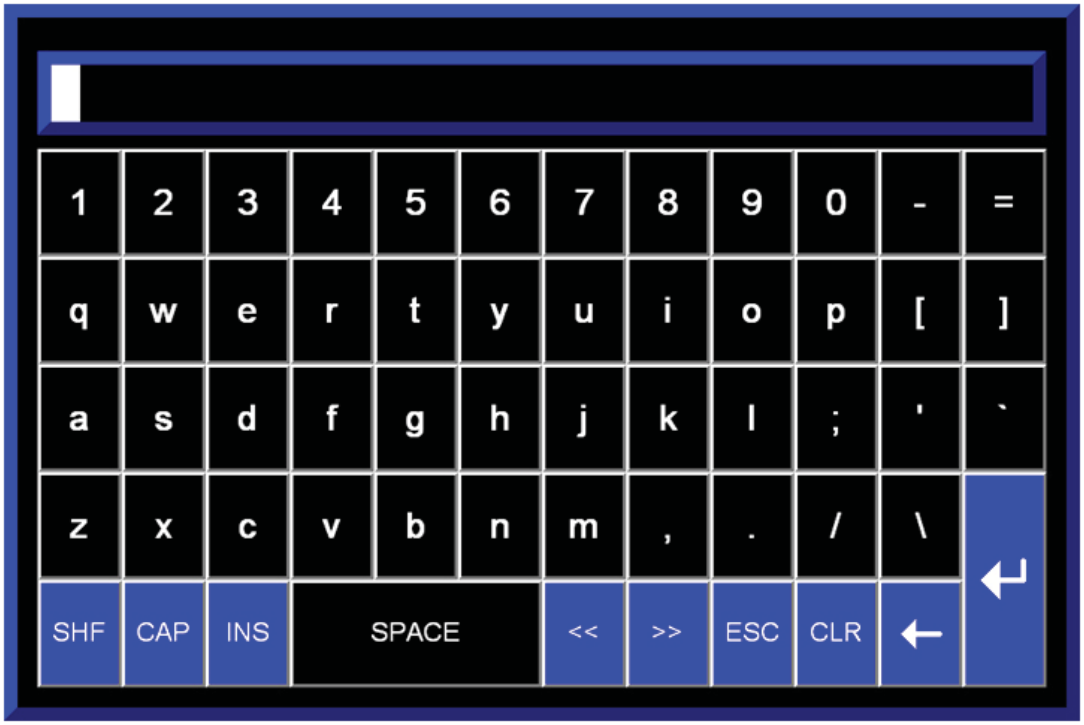


Figure 4-4. Login Screen Keyboard

Configuration Screen - Supervisor Level

NOTE

Some screens may have inverted colors for ease of readability.

Most of the configuration that is specific to the compressor or package is completed at the factory and not accessible to the user. The options that may be configured by the user are included on this screen. To change option selections, press on the list selector and use the up, down, and enter buttons on the lower side of the screen.

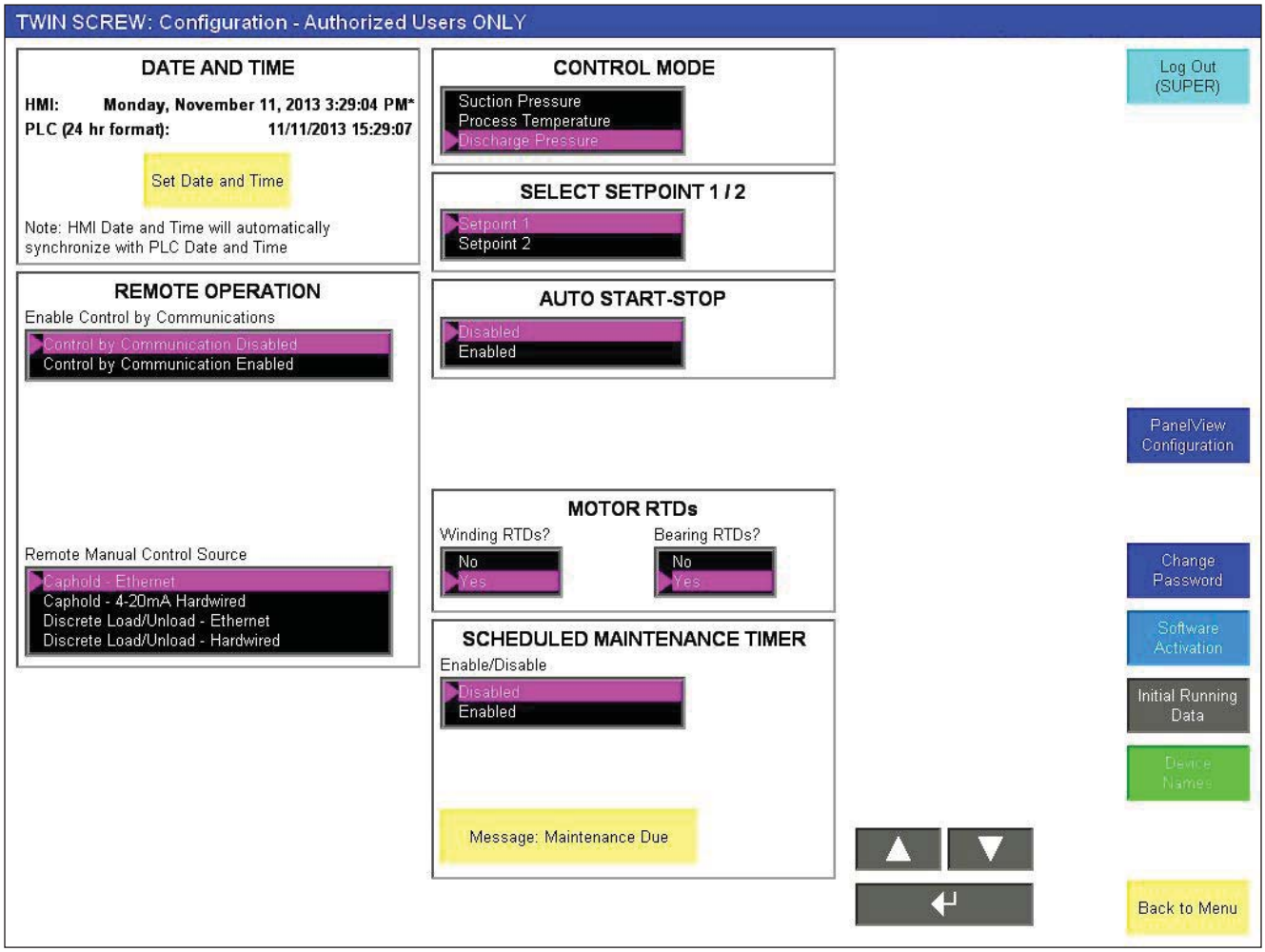


Figure 5-1. Configuration Screen - All Options Shown (Supervisor Level)

DATE AND TIME

Allows the Real Time Clock in the PLC to be set. Pressing "Set Date and Time" will bring up the "Set Date and Time" pop-up screen.

- Date and Time must be set in 24-hour format.
- Pressing "Set Date and Time" will set the PLC time clock.
- The HMI time clock will automatically synchronize to the PLC time clock.

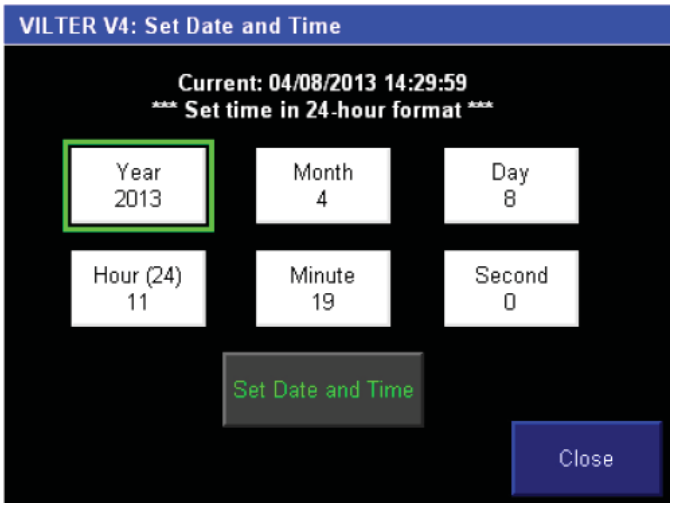


Figure 5-2. Set Date/Time Pop-Up Screen - Supervisor Level

REMOTE OPERATION

For the compressor control to accept commands from a DCS or Central Controller, Control by Communications must be enabled. For more details on remote operation, see Section 8, Communication with DCS/Central Controller.

- Control by Communications
  - If enabled, allows a central controller/DCS to send commands to the compressor PLC
  - If disabled, allows a central controller/DCS to read data only.
- Communications Watchdog and Communication Fault Action
  - The settable watchdog time defines the amount of time a loss in communications can be detected before triggering a communication fault
  - Action Taken on Communication Fault is selectable:
    - Alarm and Revert to local mode – The compressor controller will generate an alarm, and change the mode to local-auto. The machine will continue to run (if running) in local mode.
    - Trip Machine – Communication Fault will shut the machine down.
- Remote Manual Control Source – Defines how the capacity slide will be operated in remote Manual mode.
  - Caphold-Ethernet: Caphold values are sent to compressor via Ethernet IP. The capacity slide will go to the desired value. (Control By Communications must be enabled)
  - Caphold-4-20mA hardwired: command signal sent to compressor via 4-20mA input, scaled 0-100%.
  - Discrete Load/Unload - Ethernet. Turning on a bit will cause the compressor to increase or decrease Capacity. (Control By Communications must be enabled)
  - Discrete Load/Unload – Hardwired: Discrete Increase and Decrease commands via Physical Inputs.
  - If a VFD is selected, only discrete increase and decrease commands are supported. The compressor program will handle the transitioning of increasing/decreasing capacity slide to increasing/decreasing drive speed.

PROCESS VARIABLE SOURCE

Defines the pressure data used to control the capacity slide.

- Local Hard-Wired Transducer – capacity slide and auto start/stop is controlled by the suction/discharge pressure transducer mounted on the compressor unit or package.
- Common/Remote – capacity slide and auto start/stop is controlled by suction/discharge header pressure data from a DCS/Central Controller. On loss of communications, the compressor control will either shut down the compressor or revert to the local transducer based on the "Communication Fault Action" setting.

CONTROL MODE

Defines the pressure or temperature the compressor will try to maintain. See Section 2 "Operational Descriptions" for more information on the functionality of each control mode.

SELECT SETPOINT 1 / 2

Determines which group of setpoints is active – used when a machine could be run in 2 unique sets of operating conditions, ex. High/low stage swing compressor.

AUTO START-STOP

Enables or Disables the auto start-stop function. See Section 2 "Operational Descriptions" for more information on the functionality of the auto start-stop function.

MOTOR RTDs

Selects if Motor Winding and Bearing Temperatures are being monitored by the controller.

SCHEDULED MAINTENANCE TIMER

Optional function that can be set up to display maintenance reminders after a settable amount of runtime. When the accumulated runtime reaches the set "Maintenance Interval" time, a status message will appear on the overview and menu screens indicating the text entered in the "Message" field.

INLET / OUTLET SCRUBBER PUMP A / B

If the inlet and/or outlet scrubbers include dual condensate pumps, this selection determines which pump is active.

CHANGE PASSWORD

Pressing the "Change Password" button opens the "Change Password" pop-up screen, see Figure 5-3 To change a password on an account, the user must be logged in under that account.

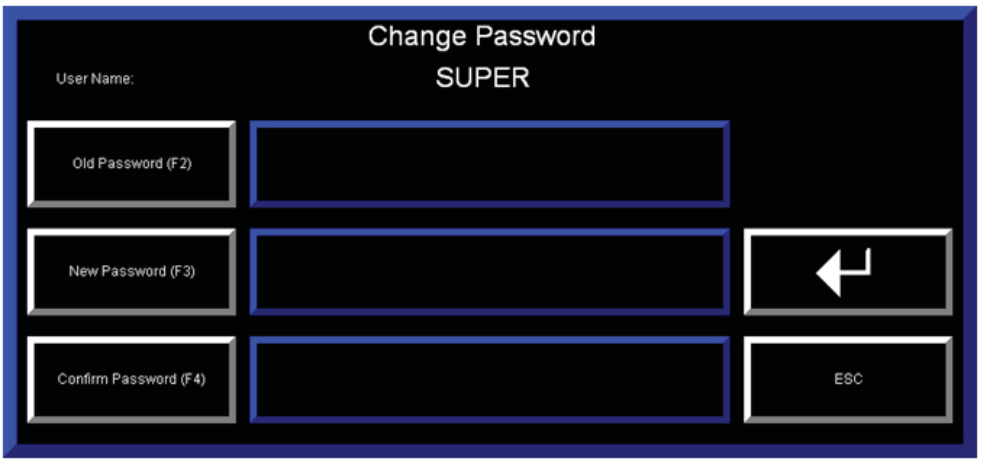


Figure 5-3. Change Password Pop-Up Screen - Supervisor Level

PANELVIEW CONFIGURATION

Pressing the “Panelview Configuration” button closes the compressor control application running on the HMI and opens the Factory Talk View ME Station configuration screens.

INITIAL RUNNING DATA

Pressing the “Initial Running Data” Button opens the Initial Running Data Screen which shows baseline data logged when the compressor was new. See Section 10 “Diagnostics Screens” for more information.

DEVICE NAMES

Pressing the “Device Names” button navigates to the Define Device Names screens. See “Define Device Names” later in this section for more information.

BACK TO MENU

Pressing the “Back to Menu” button navigates back to the main menu screen.

Editing Device Names

The “Device Names” group of screens allows a user logged in as “SUPER” to edit names shown on the screen identifying compressor unit and package equipment, instrumentation, and alarm and trip designations. To edit the text fields in this group of screens, press on the string input button and use the popup keyboard to edit the text.

Typically, the device names entered in this group of screens are the designations for each device, instrument, or alarm that relate it back to the P&ID diagram.

The “Device Names” group of screens is divided into three sections, see Figure 5-3.

DEVICES AND VESSELS

In Figure 5-4, this screen allows the user to edit device names shown on the screen for devices, vessels, and equipment installed on the compressor unit or package.

The user may navigate to other screens within the “Define Device Names” group by using the navigation buttons on the right side of the screen.

Figure 5-4. Define Device Names - Devices and Vessels (Supervisor Level)

INSTRUMENTATION

In Figure 5-5, this screen allows the user to edit device names shown on the screen for instrumentation installed on the compressor unit or package.

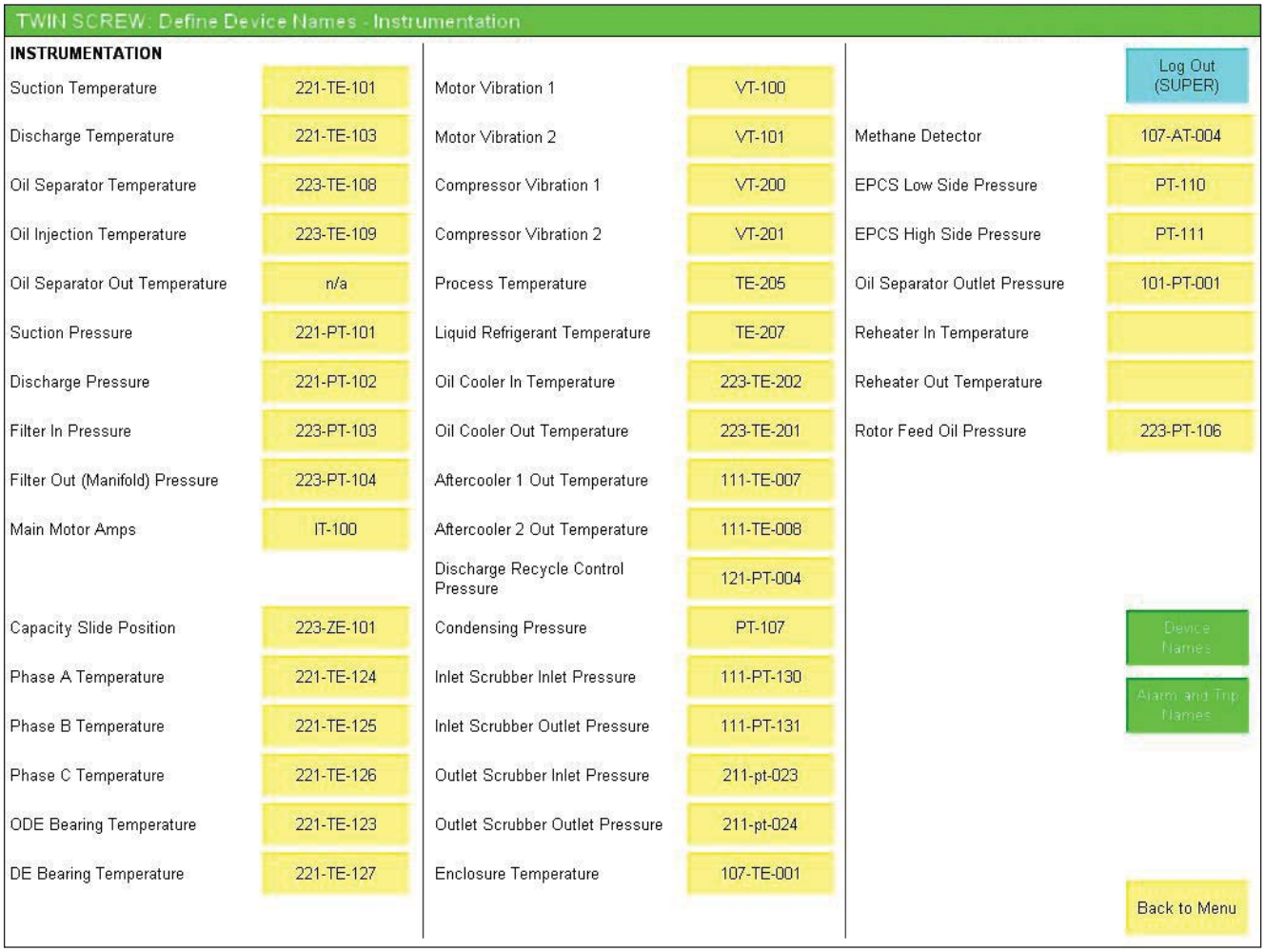


Figure 5-5. Define Device Names - Instrumentation (Supervisor Level)

ALARM AND TRIP

In Figure 5-6, this screen allows the user to edit the alarm and trip designation text that appears in the alarm and trip banners, alarm pop-up screen, and event list.

In addition, messages for 5 user-defined alarms and trips may be defined on this screen.

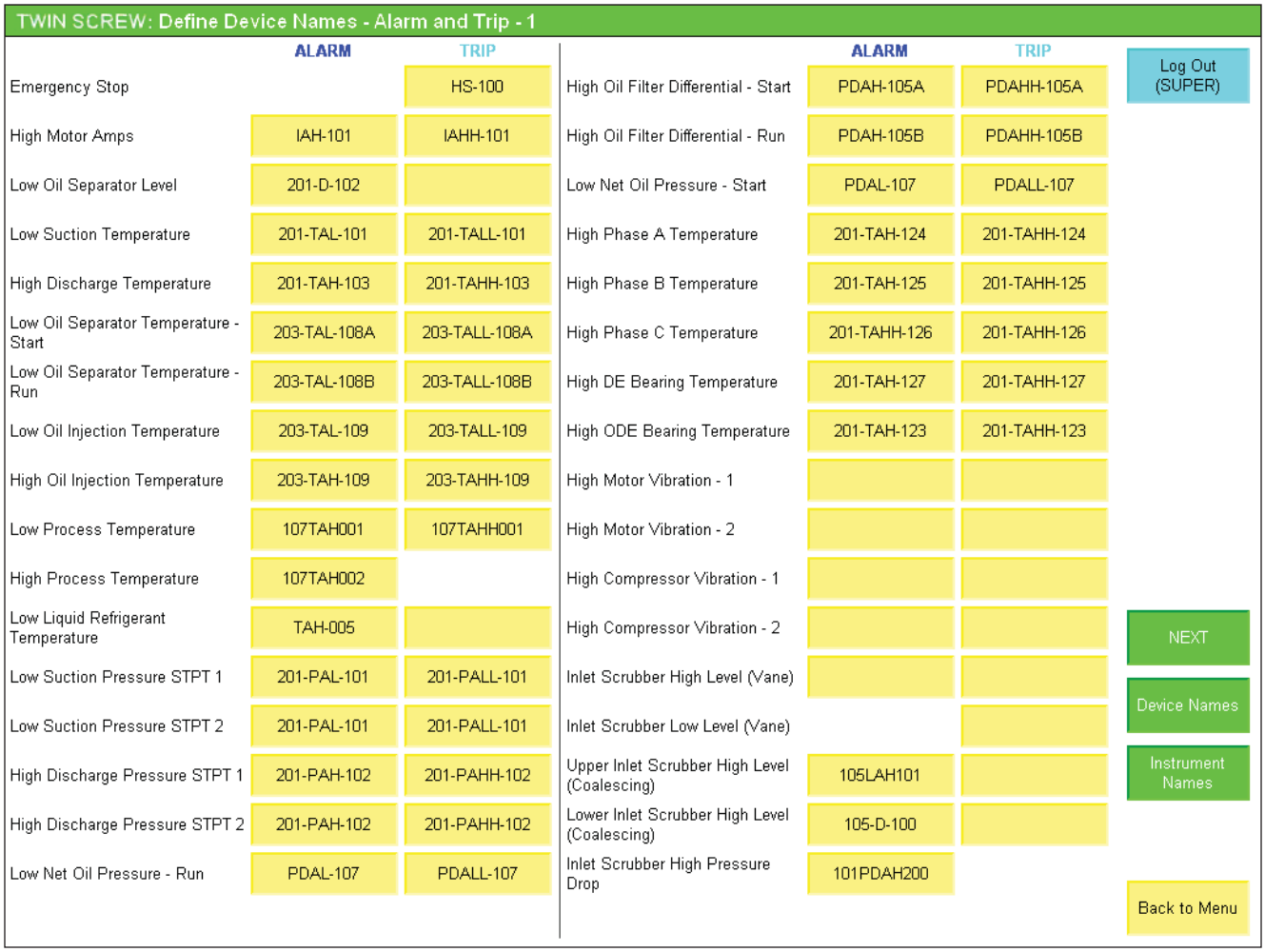


Figure 5-6. Define Device Names - Alarm and Trip 1 (Supervisor Level) (1 of 2)

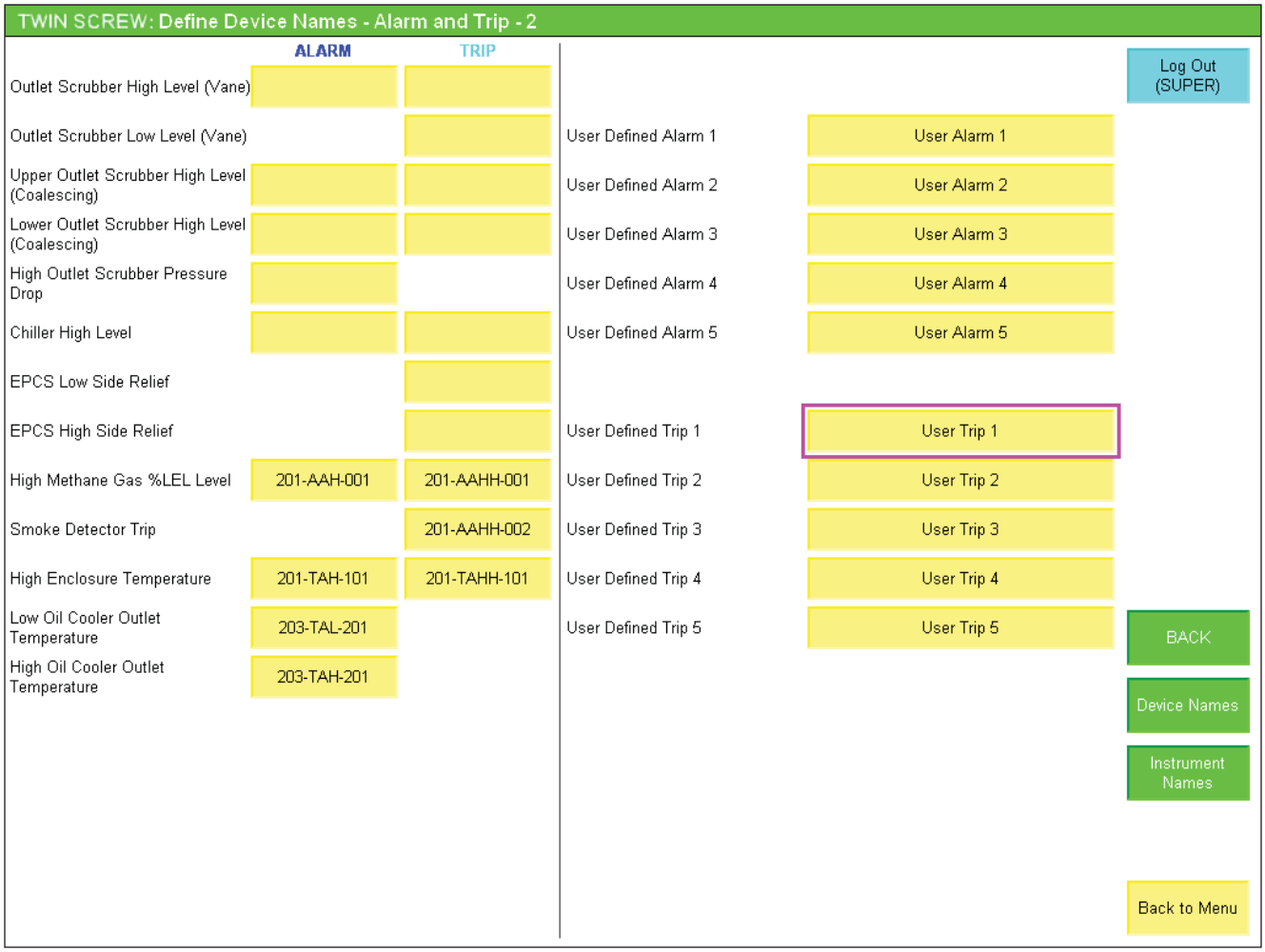


Figure 5-6. Define Device Names - Alarm and Trip 2 (Supervisor Level) (2 of 2)

Calibration Main Screen

NOTE

Some screens may have inverted colors for ease of readability.

Pressing the "Instrument Calibration" navigation button on the menu screen opens the instrument calibration group of screens. This group of screens allows the user to view and edit calibration data for specific instruments installed on the compressor unit or package.

From the main menu, pressing the "Instrument Calibration" button navigates to the calibration overview screen, see Figure 6-1. The calibration overview screen shows information related to all instruments installed on the compressor unit or package, including their raw values, base units (used internally in the program) and as displayed. Calibration of specific instruments is accessed using the navigation buttons on the right side of the screen.

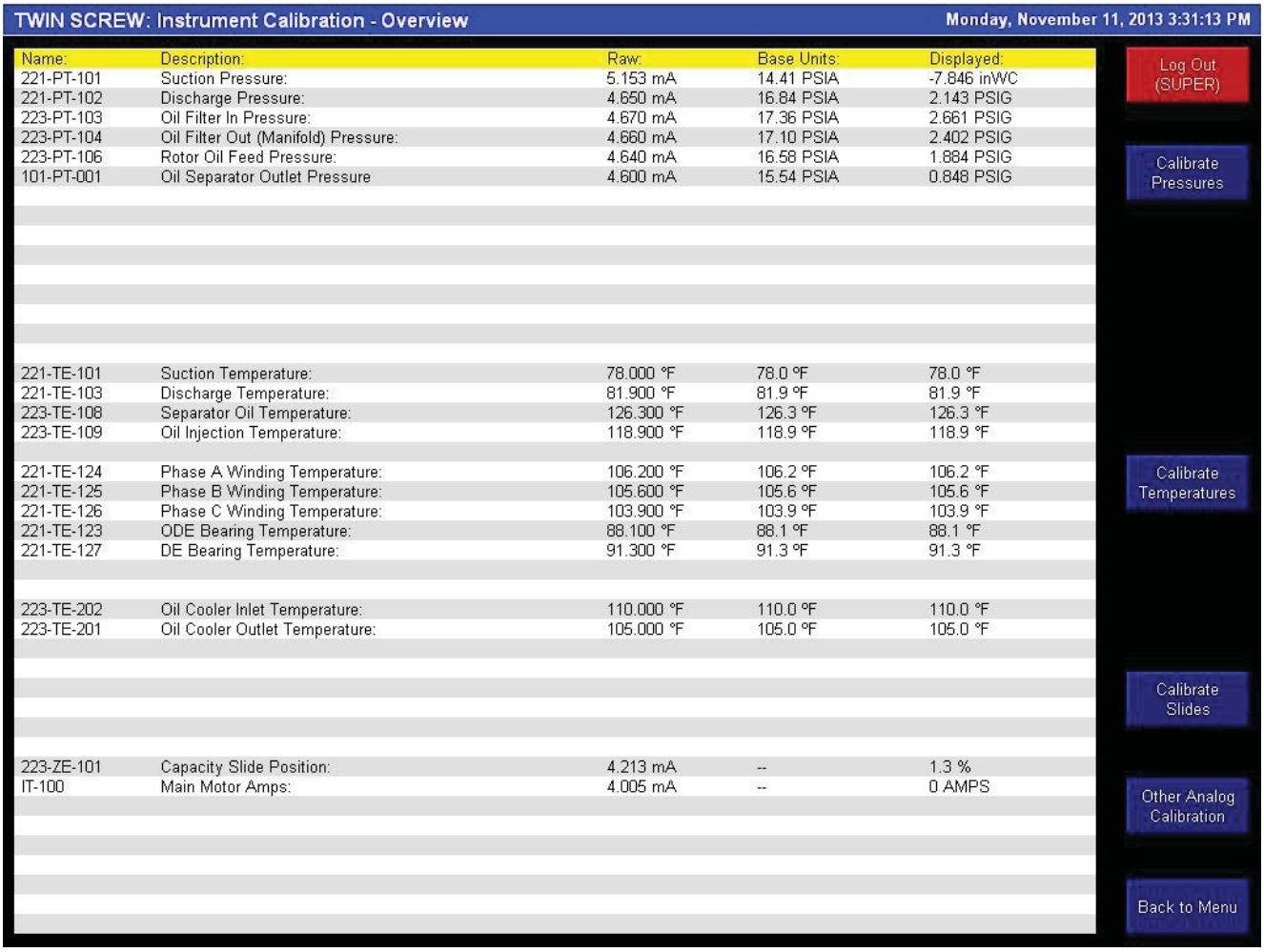


Figure 6-1. Instrument Calibration Overview Screen

Pressure Calibration Screen

In Figure 6-2, the temperature calibration group of screens allows the user to change the pressure units displayed on the screen as well as calibrate pressure instruments.

Pressure units are specific to individual pressure instruments. Changing the pressure display units for a transducer also converts all pressure setpoints related to that transducer to the new selected units.

The following pressure units are available for display:

- PSIG (Pounds/square inch gage)
- PSIA (Pounds/square inch absolute)
- kPa[A] (Kilopascals absolute)
- kPa[G] (Kilopascals gage)
- kg/cm2[A] (Kilograms/square centimeter absolute)
- kg/cm2[G] (Kilograms/square centimeter gage)
- inHg (inches of mercury) – Vacuum is shown in inHg, positive pressure is shown in PSIG
- inWC (gage)
- Bar[A] (absolute)
- Bar[G] (gage)
- Torr[A] (absolute)
- Torr[G] (gage)

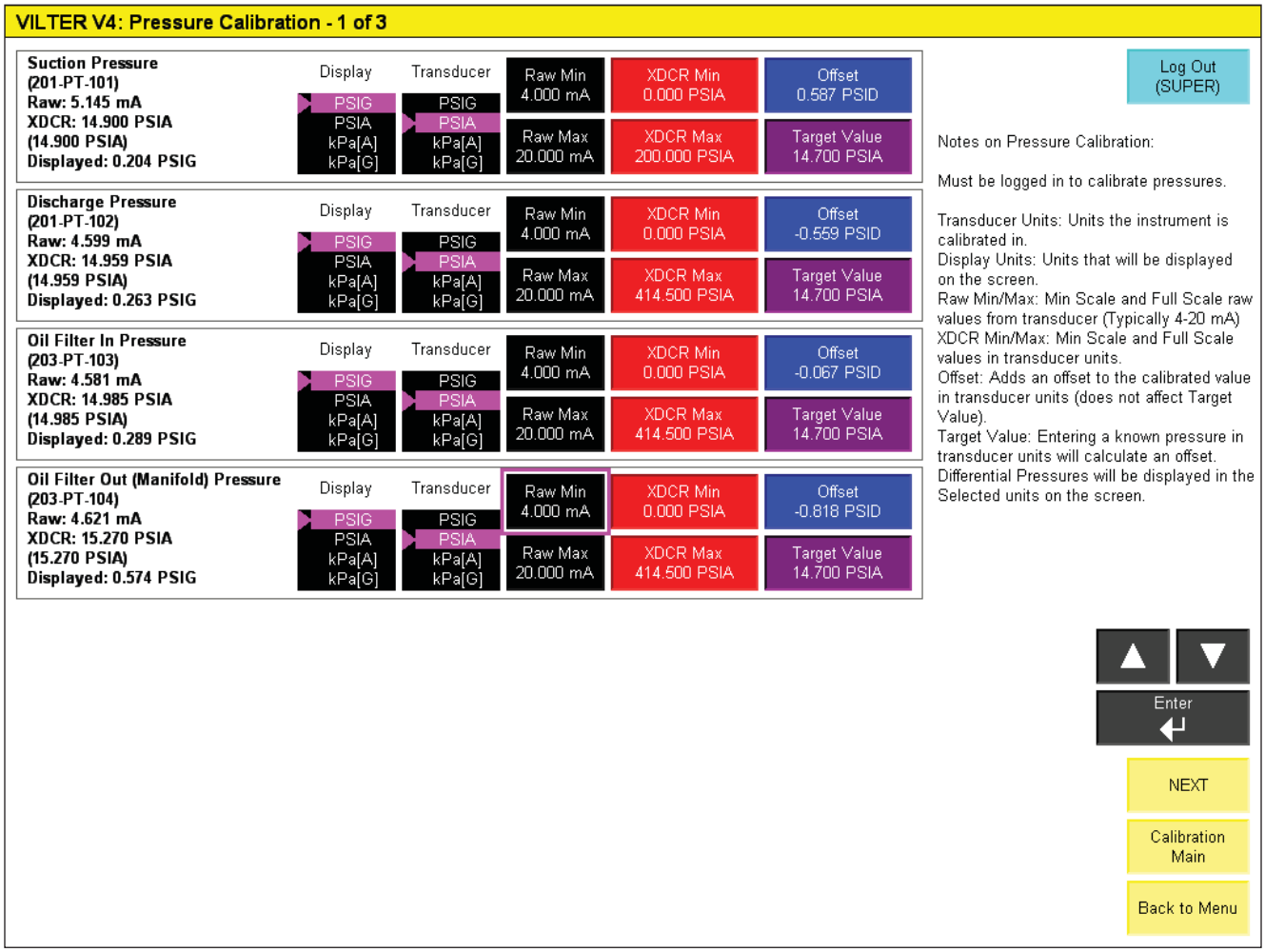


Figure 6-2. Pressure Calibration Screen - 1 of 3

CALIBRATE PRESSURE INSTRUMENT

To calibrate a pressure instrument, proceed with the following steps:

1. Select the units that the transducer is calibrated in. For example, for a transducer calibrated 0-200 PSIA, the transducer units selected shall be 'PSIA.' For a transducer calibrated -30inHg to 30PSIG, the transducer units selected shall be "inHg."
2. Select the units that the pressure will be displayed in on the HMI.
3. Enter the raw mA range (typically 4-20mA)
4. Enter the Span of the instrument. For a 0-200 PSIA transducer, Enter "0" for XDCR Min and "200" for XDCR Max.

CALIBRATE TRANSDUCER TO A KNOWN PRESSURE

There are two options when calibrating a transducer to a known pressure.

NOTE

Differential pressures does not require calibration, but the differential pressure display units can be selected.

OPTION 1

1. Open the pressure transducer to a known pressure.
2. Adjust the Offset value until the "Displayed" value is equal to the known pressure.

OPTION 2

1. Open the pressure transducer to a known pressure.
2. Enter the known pressure (in transducer units) into "Target Value." The controller will calculate an offset based on the known pressure that was entered.

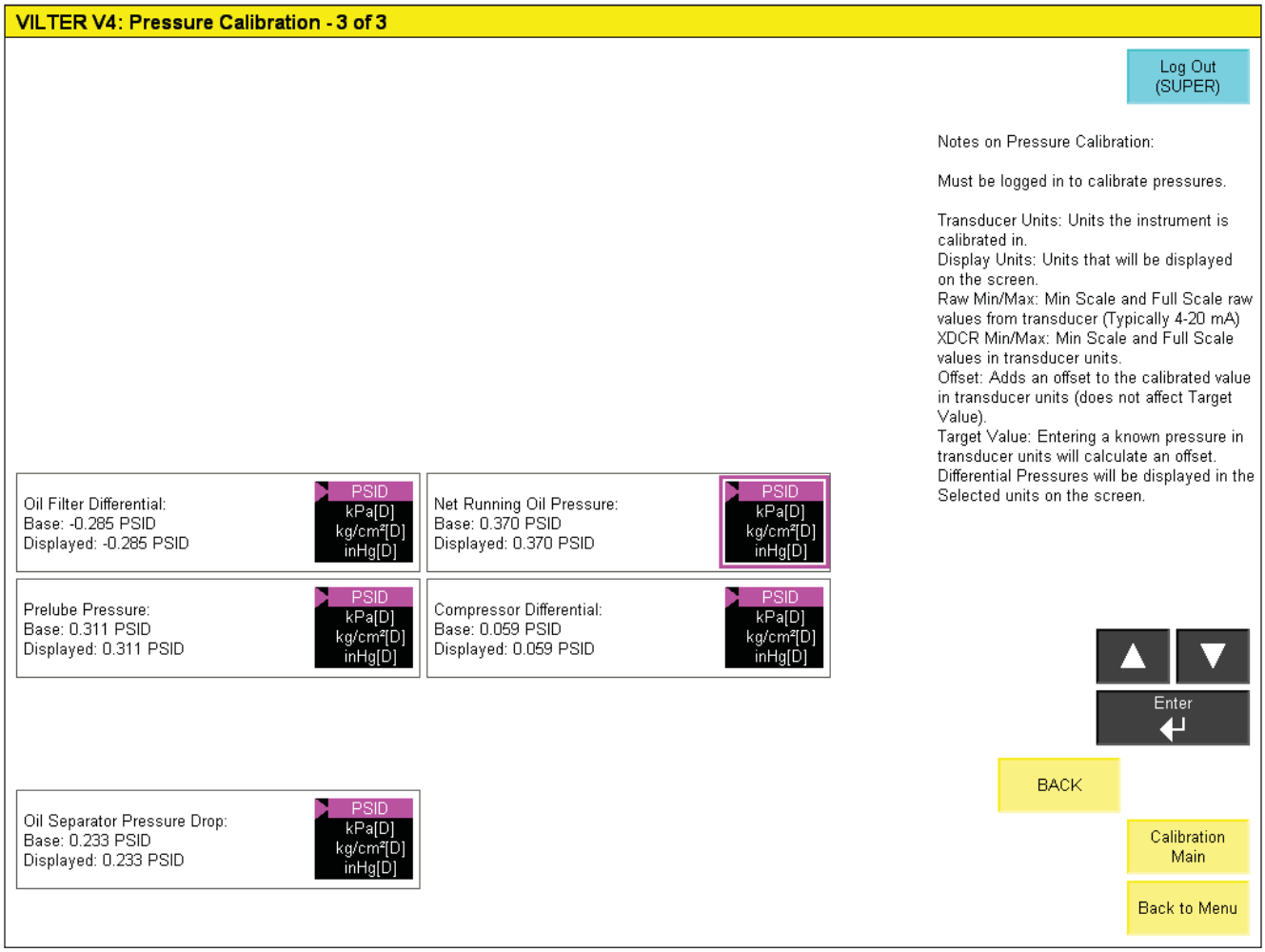


Figure 6-3. Pressure Calibration Screen - 3 of 3

Temperature Calibration Screen

The temperature calibration group of screens allows the user to change the temperature units displayed on the screen as well as calibrate temperature instruments.

Four Temperature units are available for display:

- Fahrenheit
- Celsius or Centigrade
- Kelvin (Absolute Celsius temperature scale)
- Rankine (Absolute Fahrenheit temperature scale)

Temperature units can be changed by touching on the list selector in any temperature calibration screen and using the up, down, and enter buttons. Changing the temperature display units also converts all temperature setpoints to the new selected units.

CALIBRATE TEMPERATURE INSTRUMENTS

There two types of temperature instruments that can be calibrated, RTDs and temperature transmitters.

To calibrate an RTD, proceed with the following steps.

NOTE

Typically, RTDs are very accurate and do not require calibration.

1. Expose the RTD to a known temperature (such as a slurry of crushed ice and water).
2. Enter an offset so the displayed temperature is equal to the known temperature.

To calibrate a temperature transmitter, proceed with the following steps.

1. Enter the raw mA range (typically 4-20mA).
2. Enter the span of the transmitter in degrees Fahrenheit. For a 32-392 Fahrenheit transmitter, Enter "32" for XDCR Min and "392" for XDCR Max.

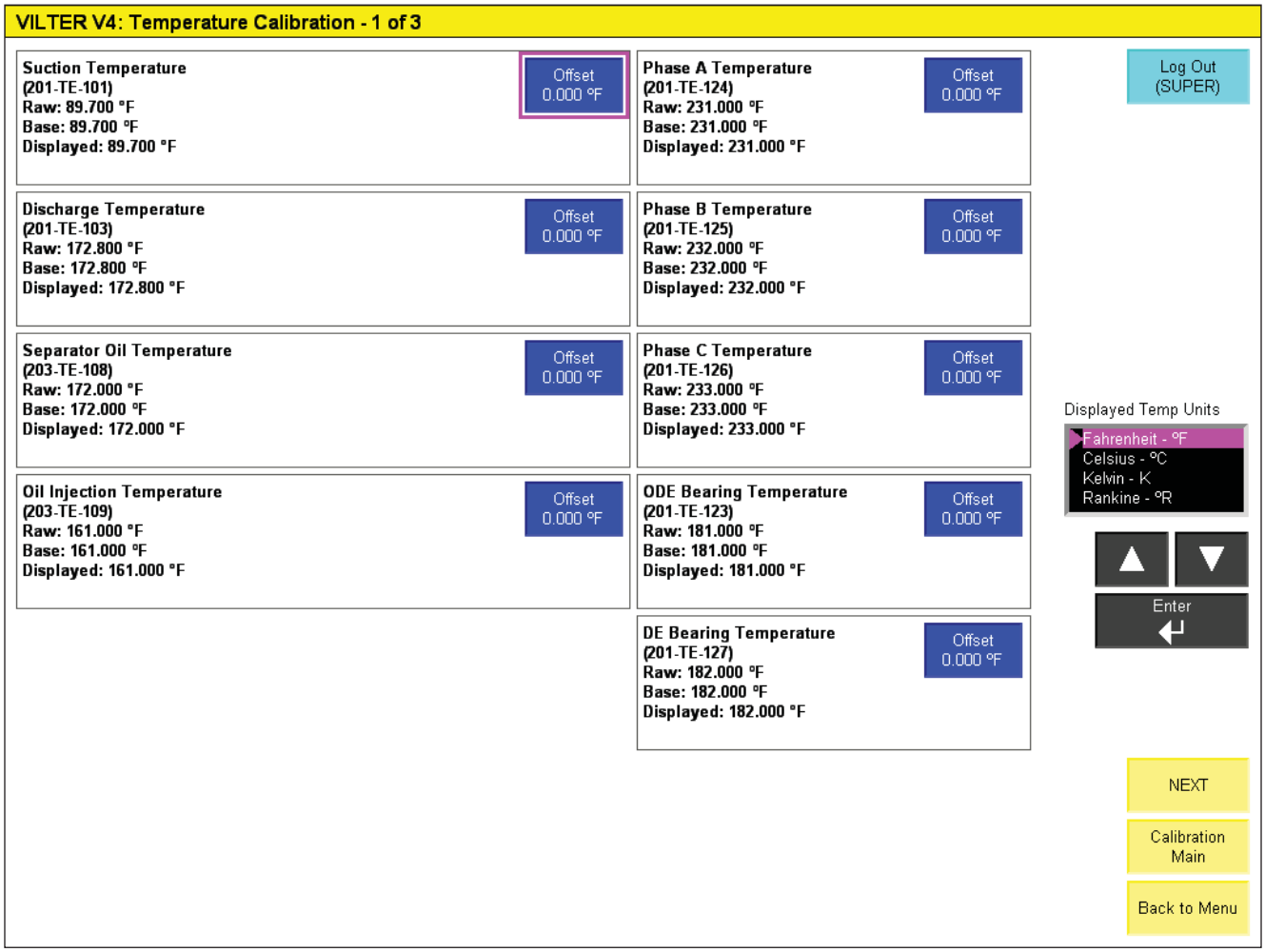


Figure 6-4. Temperature Calibration Screen

Other Analog Device Calibration

The Other Analog Device Calibration Screen allows the user to calibrate additional 4-20mA input devices.

4-20mA devices that can be calibrated:

- Main Motor Amperage
- Main Motor VFD Speed
- Compressor and Motor Vibration Sensors
- Methane Detector

CALIBRATE AN ADDITIONAL INSTRUMENT

To calibrate an additional instrument, proceed with the following steps.

1. Enter the raw mA range (typically 4-20mA).
2. Enter the Span of the transmitter.
3. Enter minimum scale value in “XDCR Min” and full scale value for “XDCR Max.”

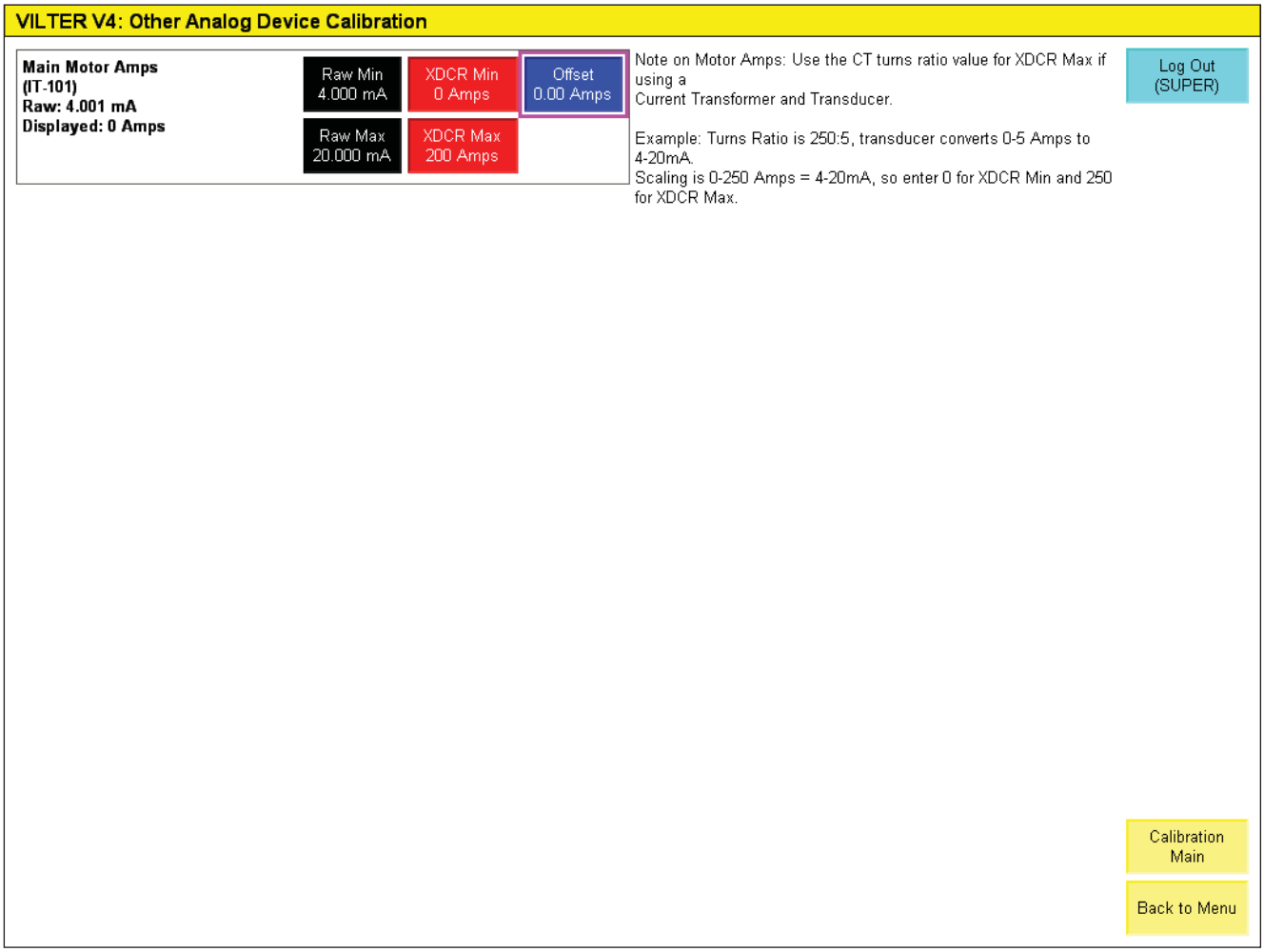


Figure 6-5. Other Analog Calibration Screen

Slide Calibration Screen

The slide calibration screen allows the user to calibrate the capacity slide valve.

Slide Calibration Overview:

- Must be logged in as “SUPER” to calibrate slides.
- Press “Enter Slide Calibration” To Activate Slide Calibration Mode, see Figure 6-7. (Machine MUST be stopped to enter slide calibration mode. Machine will not be allowed to start if slide calibration is active.)
- Use up/down pushbuttons to move the capacity slide valve.
- Enter minimum and maximum raw values in numerical entry fields.

The capacity slide valve should be calibrated when one or more of these have occurred:

- Compressor unit starting up for the first time.
- Slide valve does not unload below 5% or doesn’t move.

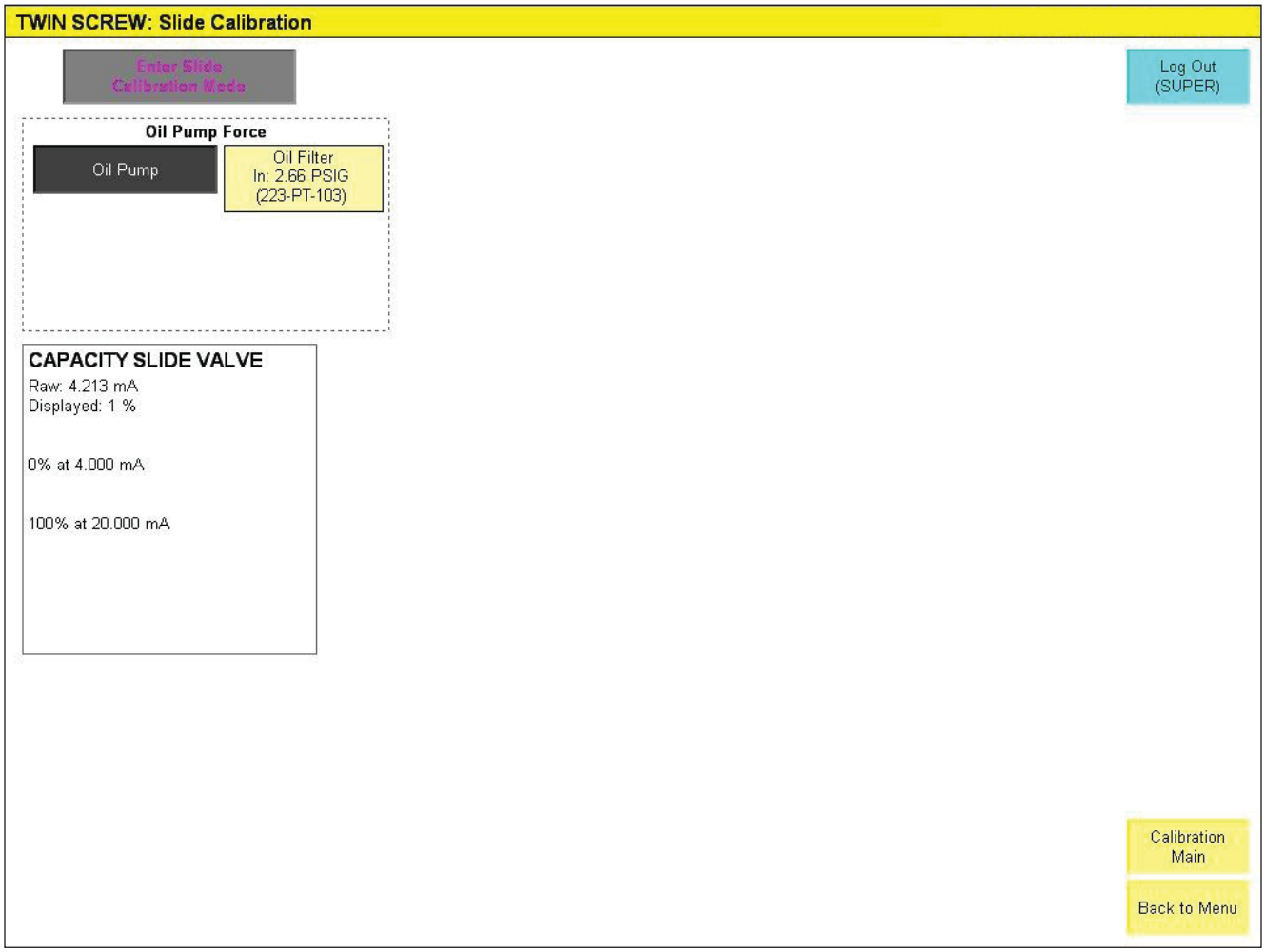


Figure 6-6. Slide Calibration Screen (Not in Calibration Mode)

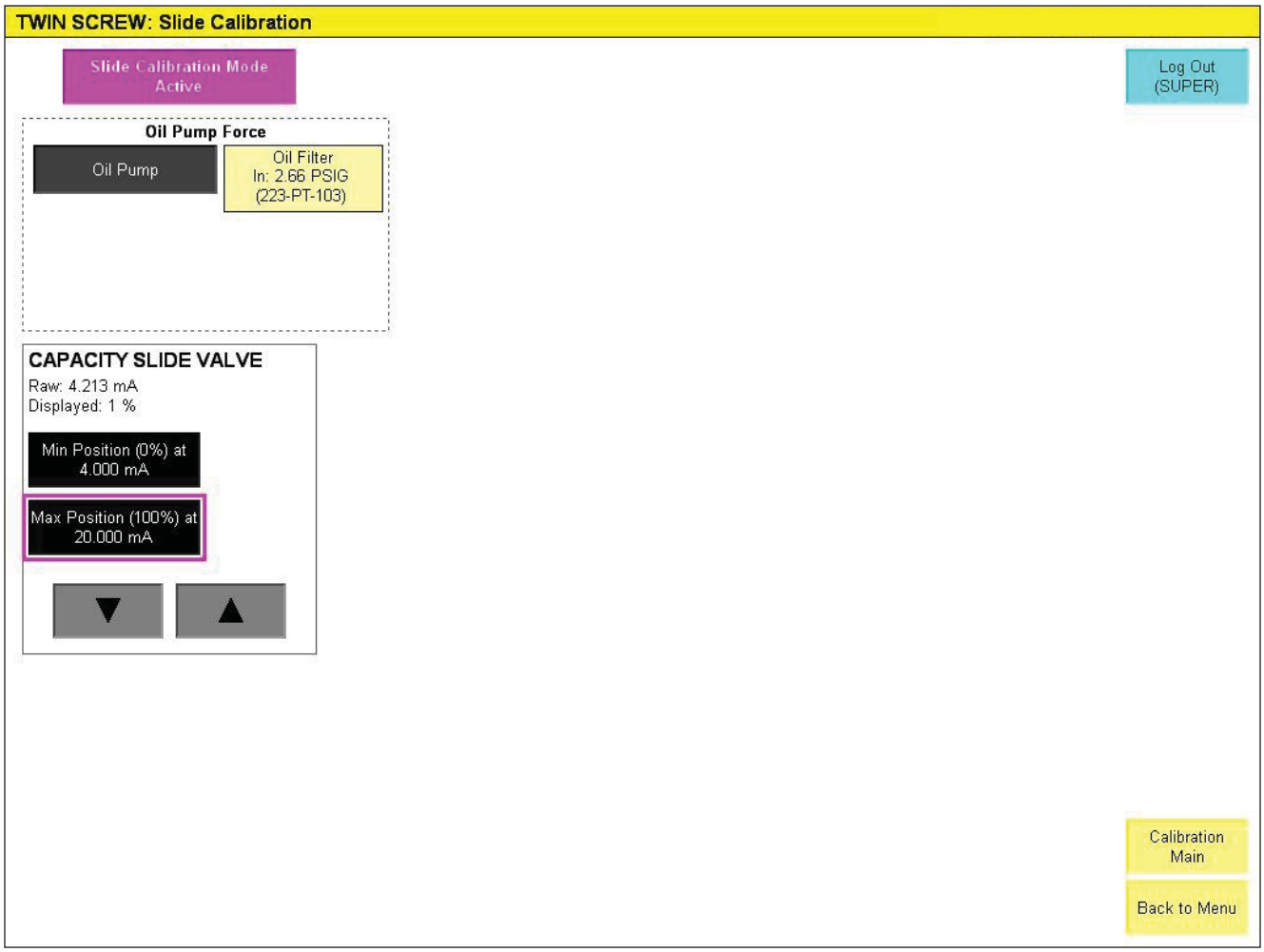


Figure 6-7. Slide Calibration Screen (In Calibration Mode)

CALIBRATE CAPACITY SLIDE VALVE - LINEAR POSITION INDICATOR (LPI)

General:

An electronic device called a Linear Potentiometer gives an indication of the position of the slide valve which can be used by the compressor control system.

The Linear Position Indicator (LPI) is an electronic contact-less displacement sensor inserted into a sensor well which allows the LPI to be removed from compressor without loss of oil or gas from the compressor.

The LPI has several usable options built into one device.

The slide valve position can be indicated in three different ways:

- Visual Light emitting diodes (LED)
- Visual and by an analogue output 4-20mA
- Visual and by a digital 24 V DC signal output on minimum and maximum slide valve position

Visual:

It is always possible to see the position of the slide valve, see Figure 6-8.

At minimum load a yellow LED is illuminated at the lowest light on the left of the LPI.

At maximum load a blue LED is illuminated at the lowest light on the right of the LPI.

At part load only some of the LED are illuminated, eg, At 50% load only half of the LED will be illuminated.

NOTE

The compressor can only be allowed to start with the slide valve in the minimum load position. Therefore a signal from the minimum load electronic position switch is always required or if the 4 – 20 mA signal is being used, then a 4 mA signal is required

Visual and by an Analogue Output (4-20mA):

Reference Table 6-1

The minimum load position is given by the 4 mA output and the maximum load position is given by the 20 mA output. (White Wire)

Part load positions are indicated by intermediate values between 4 and 20 mA.

The LED's on the indicator also give a visual indication of part load operation. It should be noted that part load slide valve position is not a direct indication of actual compressor capacity at part load. Use of the 4 – 20 mA signal is common for many control systems and may be used on its own, if required, for all control functions for single and multiple compressor installations, subject to a suitable control system.

Figure 6-8. Linear Position Indicator (LPI)

Table 6-1. Connections - Visual and by Analogue Output (4-20mA)

Wiring Plug Connections	Function
1 = Brown	Supply Voltage + 24V DC
2 = White	Output Signal 4-20 mA
3 = Blue	Common – 0 VDC

Visual and by a Digital 24V Output on Minimum and Maximum Load:

Reference Table 6-2

There is also another option that can be used to control and get the minimum signal for start-up.

This option works the same as the mechanical micro-switches but instead uses the electronic switches incorporated in the LPI unit. These electronic switches give a 24 V DC output.

A digital output is given on the Minimum and Maximum position of the slide valve and an interposing relay, which must be incorporated in the control panel in place of each mechanical micro-switch, is activated by the digital signal completing the control circuit signal. This interposing relay must have contacts with suitable ratings. The interposing relay replaces the original switch function.

The LED's only give a visual indication of the slide valve position.

If the slide valve is in the minimum position and the LED for minimum is illuminated, there will be a digital output on the green/yellow wire.

If the slide valve is in the maximum position and all the LED's are illuminated, there will be a digital output on the black wire.

Existing installations equipped with the mechanical micro-switches can use this option.

Choose the best way for giving a start signal and connect the wires according to the table.

LINEAR POSITION INDICATOR OPERATION & CALIBRATION

All compressors with variable Vi are despatched from Howden Compressors facility with Vi set at 2.2 and the LPI calibrated to suit Vi 2.2.

When the Slide Valve is in the unloaded position, the 10% minimum load LED should be illuminated.

To check that the LPI indicates maximum load when the slide valve is in the fully loaded position, ie all LED's are illuminated, the following checks should be made.

Move the slide valve to 100% (by using the oil pump or if the system is shut down, use a manual oil pump or air pressure). By pressurizing the outboard side of the actuator piston the slide valve will be moved to the fully loaded position. The LPI should indicate 100% by illuminating all LED's. If this is not the case repeat the calibration procedure.

Table 6-2. Connections - Visual and by Digital 24V Output on Min & Max Load

Wiring Plug Connections	Function
1 = Brown	Supply Voltage + 24V DC
3 = Blue	Common - 0 VDC
4 = Black	Digital Output Max. Load
5 = Green/Yellow	Digital Output Min. Load

Linear Position Indicator (LPI) Calibration Procedure

NOTE

If Vi is changed, LPI must be re-calibrated.

The Minimum Load position gives a 4mA output and the Maximum Load gives a 20mA output.

1. Move slide valve to Minimum Load position.
2. Remove calibration button cover.
3. Connect power supply to LPI, 24v DC max.
4. With slide valve in Minimum Load position, push calibration button once. Red LED will light, after 15-20 seconds light will turn to “Flashing Red”.
5. Move slide valve to Full/Maximum Load position.
6. With slide valve in Full/Maximum Load position, push calibration button once, Red LED will light for 15 seconds and then go off. Green LED will now light.
7. Calibration is now complete and sensor should now red maximum or 100% capacity.
8. Refit button cover.

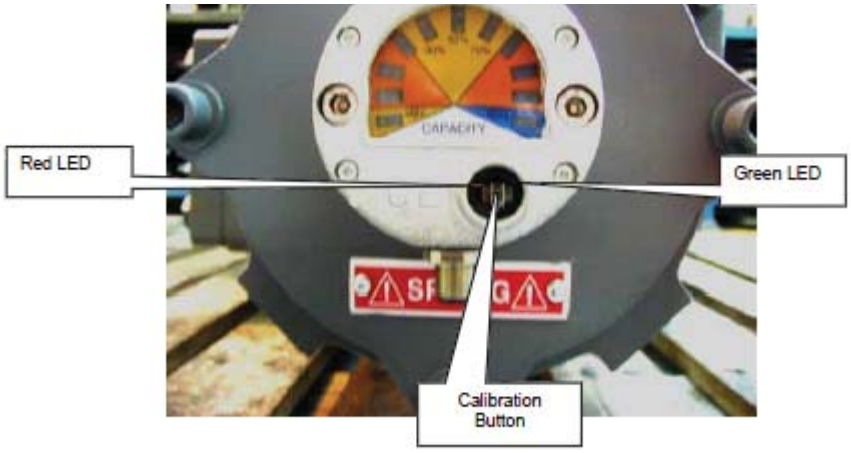


Figure 6-9. Linear Position Indicator (LPI) with Cover Removed

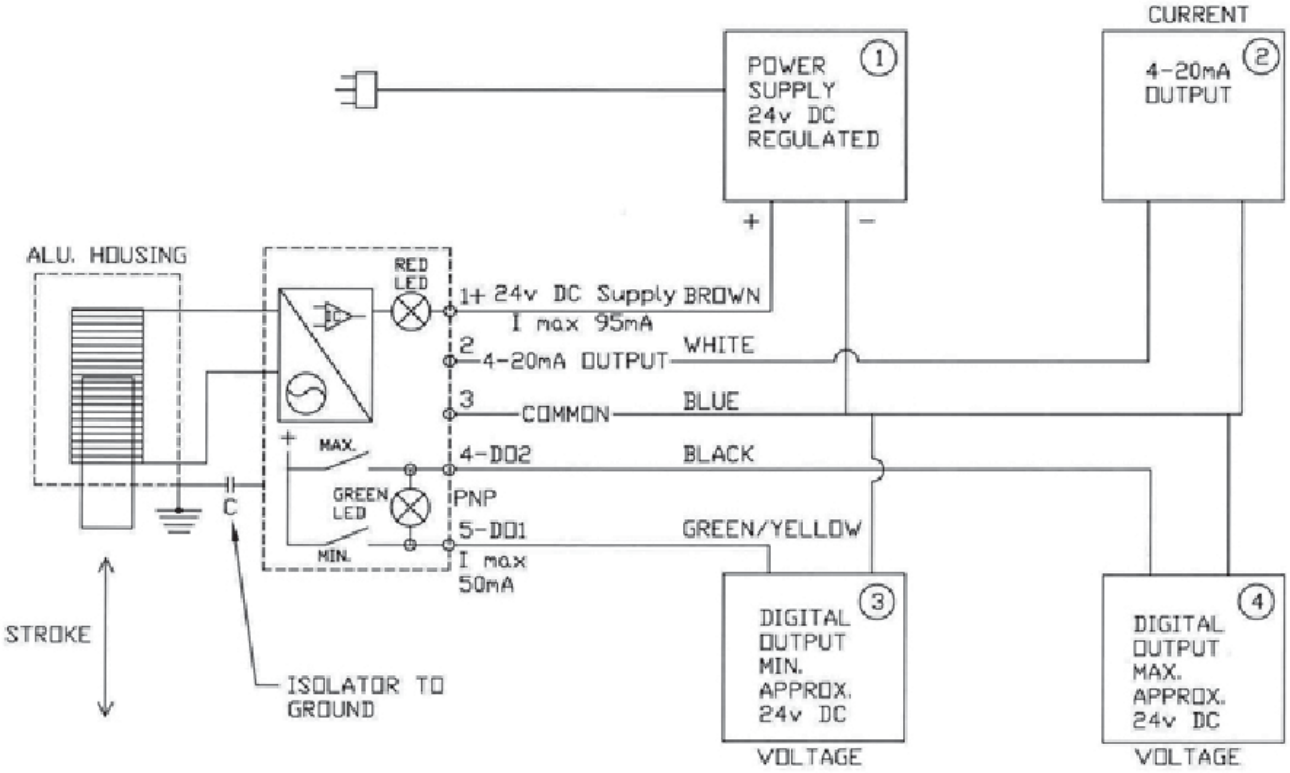


Figure 6-10. Linear Position Indicator (LPI) Wiring Diagram

Setpoints and Control Screens

The setpoint and control screens relate to the operation and control of the compressor. Process and operational setpoints for the compressor and other equipment are adjustable within this group of screens.

CHANGING SETPOINTS

To change setpoints within the setpoint and control screens, the user must be logged in. Setpoints that may be adjusted by the logged in user appear as a white button that shows the current value of the setpoint. Setpoints that may not be adjusted by the logged in user (or if no user is logged in) appear as text only and cannot be changed.

Pressing on a numeric entry opens the numeric entry pop-up screen, see Figure 7-1.

- In Figure 7-1, the Suction Pressure Control screen, the current value of the setpoint is highlighted by a green box.
- In Figure 7-1, the numeric entry pop-up screen, the range of values above the numerical buttons is the acceptable range that can be entered. If a value outside this range is entered the HMI will not accept it.
- To enter a new setpoint, use the numerical keypad and enter key.
- To close the numerical input pop-up screen without changing the setpoint, push the "ESC" key.

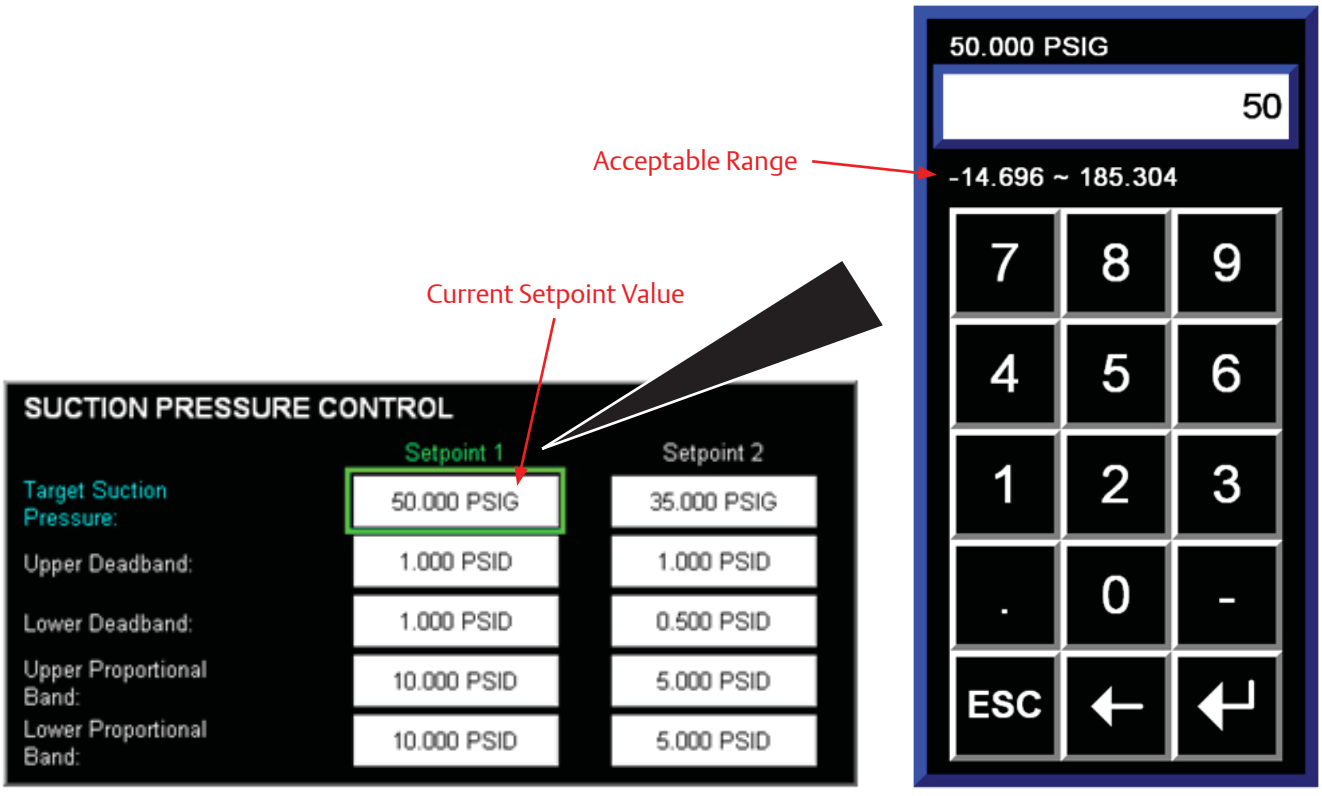


Figure 7-1. Numeric Entry Pop-up Screen

Compressor Control Setpoints

NOTE

Screens may have inverted colors for ease of readability.

Compressor control setpoints can be controlled by suction pressure, process temperature or discharge pressure. Depending on which control scheme is chosen, compressor control screen 1 of 3 will display that chosen option.

Compressor Control Setpoints Screen 1 - Suction Pressure

The Compressor Control Setpoints page 1 (Suction Pressure) screen appears when navigating to "Compressor Control Setpoints" from the menu screen when Suction Pressure control is selected. Setpoints for desired suction pressure, capacity slide valve control, auto start-stop, and main motor VFD are settable within this screen. For more information and operational descriptions, see section 2 "Operational Descriptions."

The following groups of setpoints are settable. If multiple groups of setpoints are being used, the active group of setpoints is designated by the "Setpoint 1" or "Setpoint 2" text being shown in green. Auto Start/Stop and Main Motor VFD Setpoints will appear if selected.

SUCTION PRESSURE CONTROL

- Target Suction Pressure: This is the desired suction pressure the compressor will try to maintain.
- Upper and Lower Deadband: This is a range of pressures above and below the Target Suction Pressure. Within this range, no capacity slide position adjustments will be made.
- Upper and Lower Proportional Band: This is a range of pressures above and below the Target Suction Pressure. Within this range, the controller will make proportionally smaller adjustments to capacity slide position.

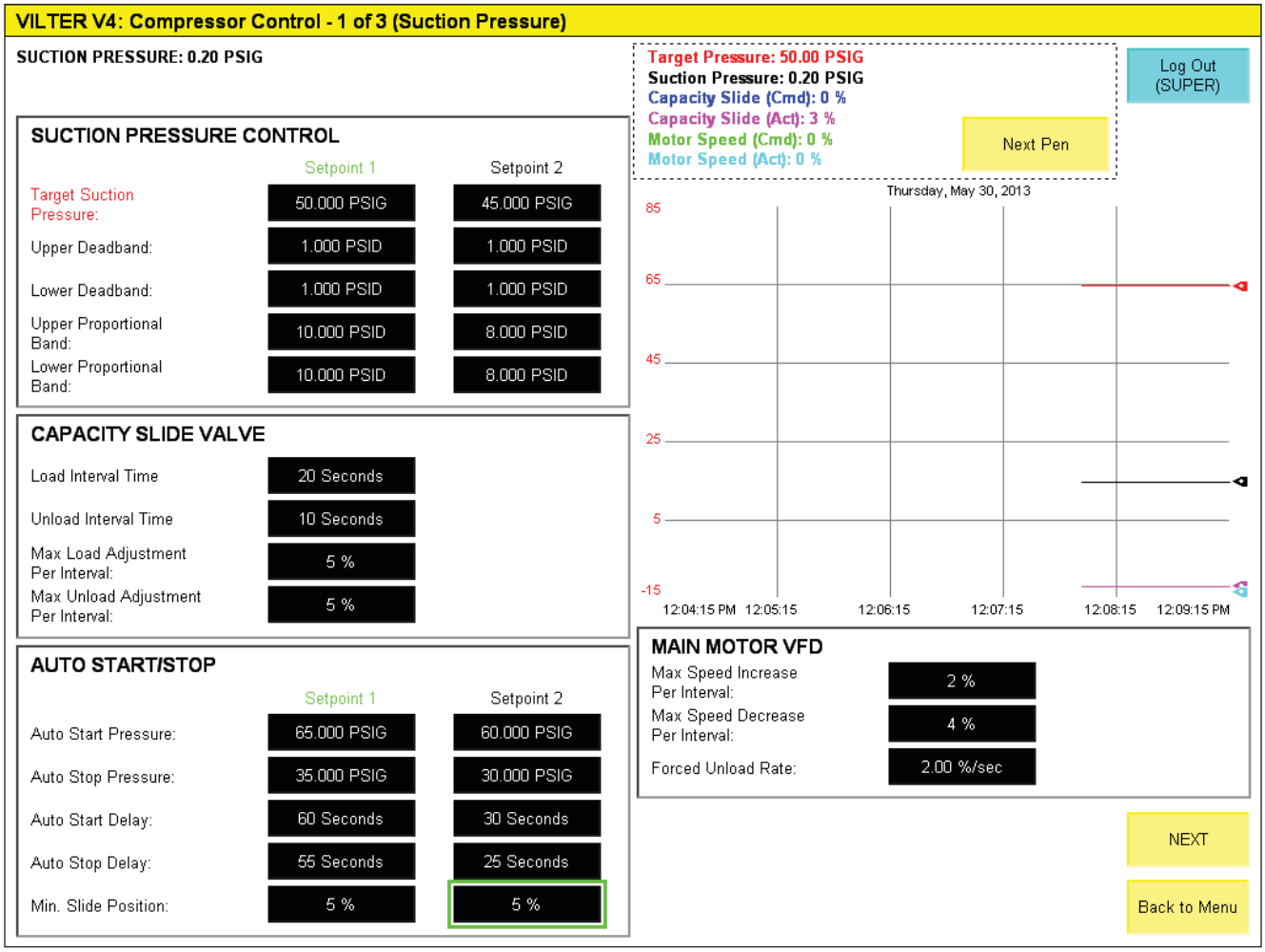


Figure 7-2. Compressor Control Screen - 1 of 3 (Suction Pressure)

CAPACITY SLIDE VALVE

- Load/Unload Interval time: This is the cycle time between making capacity slide position adjustments.
- Max Load/Unload Adjustment per interval: This is the maximum amount the capacity position command may be adjusted by every time through the Load/Unload Cycle timer.

AUTO START/STOP

- Auto Start Pressure: When suction pressure is above this setpoint for the Auto Start Delay Time, the compressor will be commanded to start.
- Auto Stop Pressure: When suction pressure is below this setpoint and capacity slide position is below Minimum Slide Position for the Auto Stop Delay time, the compressor will be commanded to stop.
- Auto Start Delay: Amount of time Auto Start pressure must be met before the compressor will be commanded to start.
- Auto Stop Delay: Amount of time Auto Stop pressure must be met before the compressor will be commanded to stop.
- Minimum Slide Position: Slide position must be below this setpoint (indicating the compressor is fully unloaded) before the compressor will be commanded to stop.

MAIN MOTOR VFD

- Max Speed Increase/Decrease per interval: This is the maximum amount the main motor speed command may be adjusted by every time through the Load/Unload Cycle timer.
- Forced Unload Rate: If a forced unload condition exists and the main motor is running above 50% speed, this is the rate it will decelerate until it reaches 50% speed and the capacity slide begins unloading.

Compressor Control Setpoints Screen 1 - Process Temperature

The Compressor Control Setpoints page 1 (Process Temperature) screen appears when navigating to "Compressor Control Setpoints" from the menu screen when Process Temperature control is selected. Setpoints for desired process temperature, capacity slide valve control, auto start-stop, and main motor VFD are settable within this screen. For more information and operational descriptions, see section 2 "Operational Descriptions."

The following groups of setpoints are settable. If multiple groups of setpoints are being used, the active group of setpoints is designated by the "Setpoint 1" or "Setpoint 2" text being shown in green. Auto Start/Stop and Main Motor VFD Setpoints will appear if selected.

PROCESS TEMPERATURE CONTROL

- Target Process Temperature: This is the desired process temperature the compressor will try to maintain.
- Upper and Lower Deadband: This is a range of temperatures above and below the Target Process Temperature. Within this range, no capacity slide position adjustments will be made.
- Upper and Lower Proportional Band: This is a range of temperatures above and below the Target Process Temperature. Within this range, the controller will make proportionally smaller adjustments to capacity slide position.

CAPACITY SLIDE VALVE

- Load/Unload Interval time: This is the cycle time between making capacity slide position adjustments.
- Max Load/Unload Adjustment per interval: This is the maximum amount the capacity position command may be adjusted by every time through the Load/Unload Cycle timer.

AUTO START/STOP

- Auto Start Temperature: When process temperature is above this setpoint for the Auto Start Delay Time, the compressor will be commanded to start.
- Auto Stop Temperature: When process temperature is below this setpoint and capacity slide position is below Minimum Slide Position for the Auto Stop Delay time, the compressor will be commanded to stop.
- Auto Start Delay: Amount of time Auto Start temperature must be met before the compressor will be commanded to start.
- Auto Stop Delay: Amount of time Auto Stop temperature must be met before the compressor will be commanded to stop.
- Minimum Slide Position: Slide position must be below this setpoint (indicating the compressor is fully unloaded) before the compressor will be commanded to stop.

MAIN MOTOR VFD

- Max Speed Increase/Decrease per interval: This is the maximum amount the main motor speed command may be adjusted by every time through the Load/Unload Cycle timer.

Forced Unload Rate: If a forced unload condition exists and the main motor is running above 50% speed, this is the rate it will decelerate until it reaches 50% speed and the capacity slide begins unloading.

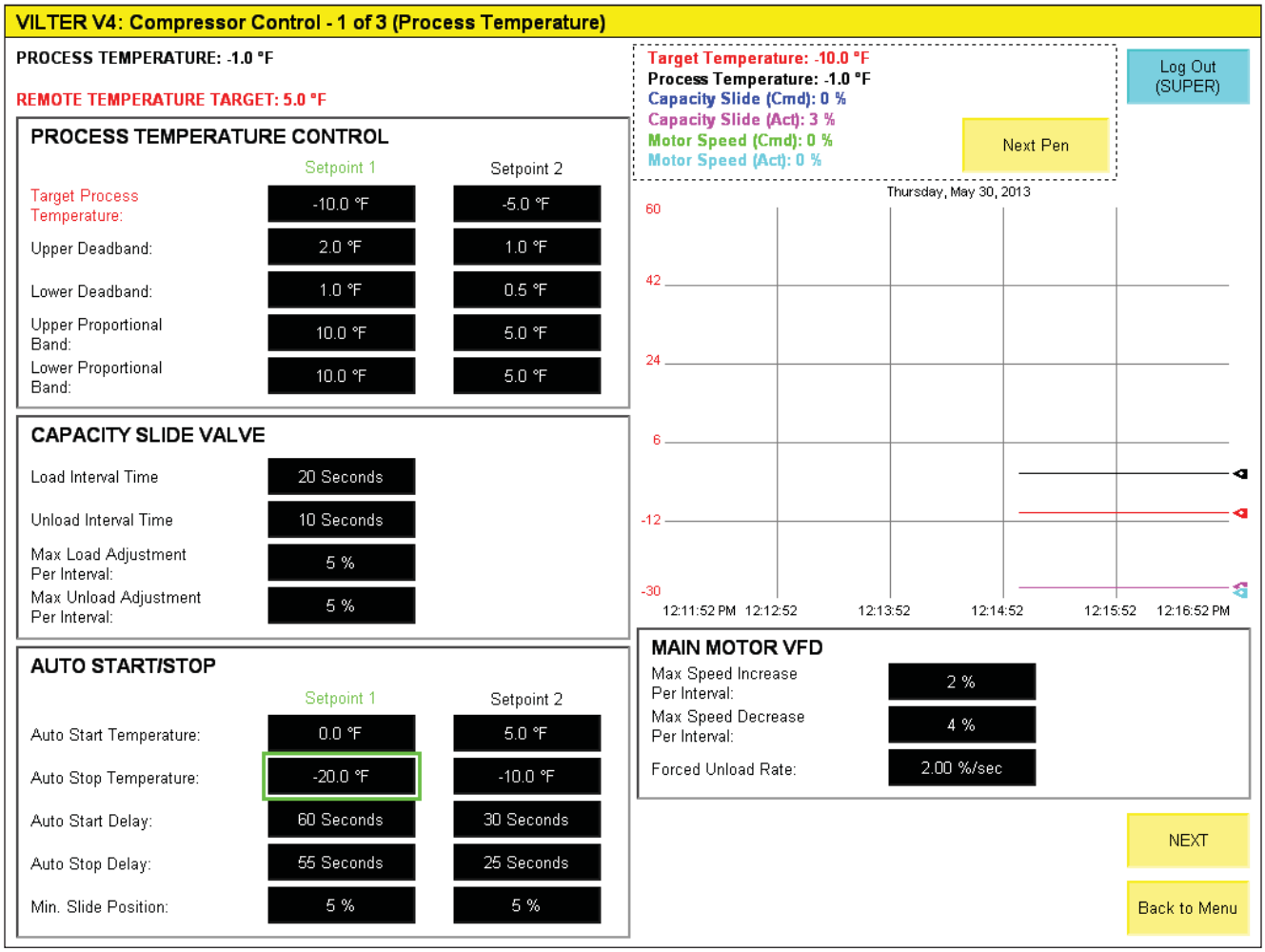


Figure 7-3. Compressor Control Screen - 1 of 3 (Process Temperature)

Compressor Control Setpoints Screen 1 - Discharge Pressure

The Compressor Control Setpoints page 1 (Discharge Pressure) screen appears when navigating to "Compressor Control Setpoints" from the menu screen when Discharge Pressure control is selected. Setpoints for desired discharge pressure, capacity slide valve control, auto start-stop, and main motor VFD are settable within this screen. For more information and operational descriptions, see section 2 "Operational Descriptions."

The following groups of setpoints are settable. If multiple groups of setpoints are being used, the active group of setpoints is designated by the "Setpoint 1" or "Setpoint 2" text being shown in green. Auto Start/Stop and Main Motor VFD Setpoints will appear if selected.

DISCHARGE PRESSURE CONTROL

- Target Discharge Pressure: This is the desired discharge pressure the compressor will try to maintain.
- Upper and Lower Deadband: This is a range of pressures above and below the Target Discharge Pressure. Within this range, no capacity slide position adjustments will be made.
- Upper and Lower Proportional Band: This is a range of pressures above and below the Target Discharge Pressure. Within this range, the controller will make proportionally smaller adjustments to capacity slide position.

CAPACITY SLIDE VALVE

- Load/Unload Interval time: This is the cycle time between making capacity slide position adjustments.
- Max Load/Unload Adjustment per interval: This is the maximum amount the capacity position command may be adjusted by every time through the Load/Unload Cycle timer.

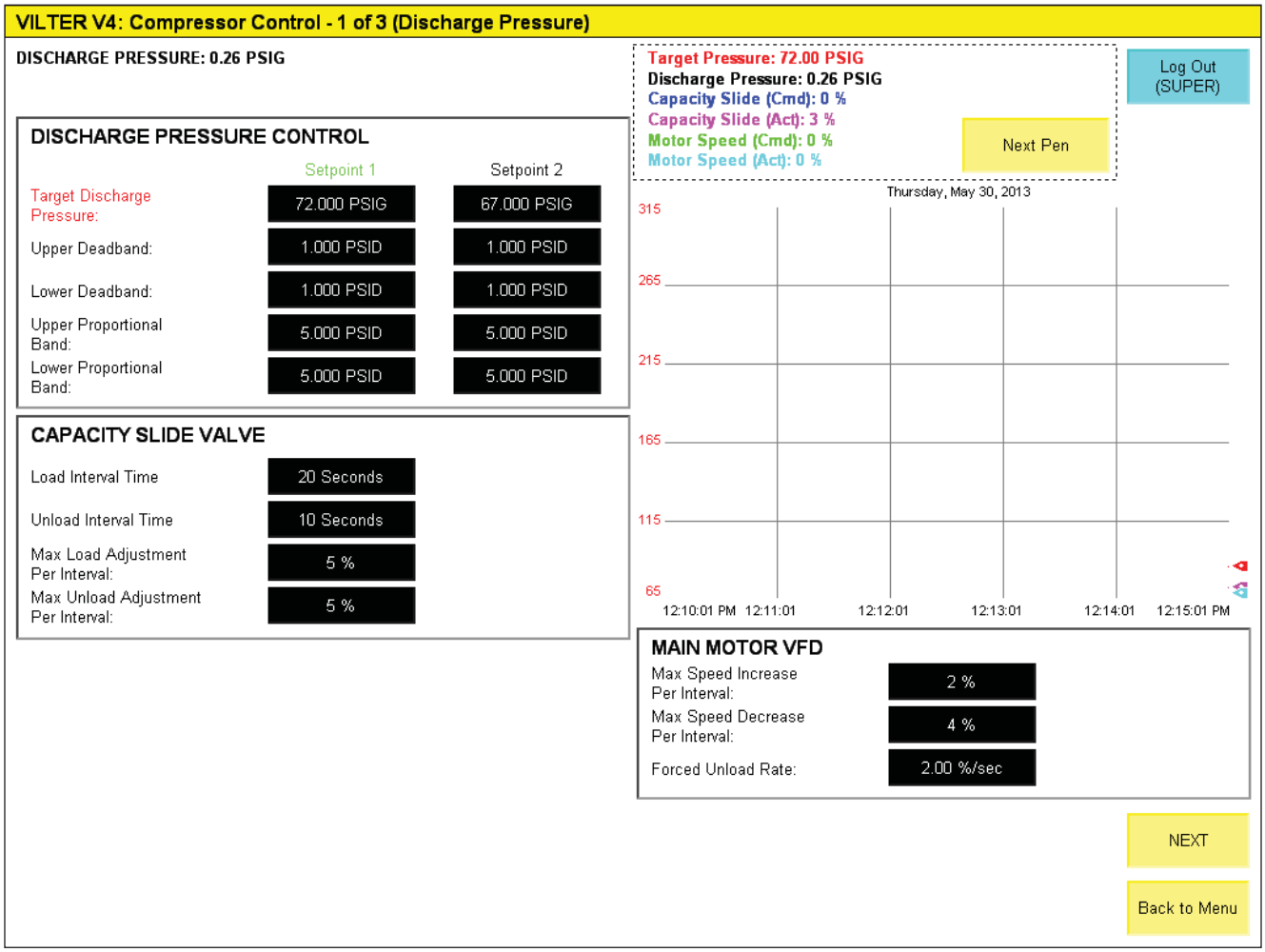


Figure 7-4. Compressor Control Screen - 1 of 3 (Discharge Pressure)

AUTO START/STOP

- Auto Start Pressure: When discharge pressure is above this setpoint for the Auto Start Delay Time, the compressor will be commanded to start.
- Auto Stop Pressure: When discharge pressure is below this setpoint and capacity slide position is below Minimum Slide Position for the Auto Stop Delay time, the compressor will be commanded to stop.
- Auto Start Delay: Amount of time Auto Start pressure must be met before the compressor will be commanded to start.
- Auto Stop Delay: Amount of time Auto Stop pressure must be met before the compressor will be commanded to stop.
- Minimum Slide Position: Slide position must be below this setpoint (indicating the compressor is fully unloaded) before the compressor will be commanded to stop.

MAIN MOTOR VFD

- Max Speed Increase/Decrease per interval: This is the maximum amount the main motor speed command may be adjusted by every time through the Load/Unload Cycle timer.
- Forced Unload Rate: If a forced unload condition exists and the main motor is running above 50% speed, this is the rate it will decelerate until it reaches 50% speed and the capacity slide begins unloading.

Compressor Control Setpoints Screen 2

ANTI-RECYCLE

- Anti-Recycle Time: Defines the minimum amount of time after the compressor stops before it is allowed to start again.

START UP

- The “Start Up” Group of setpoints defines parameters for the compressor start sequence. For more information on the compressor start sequence, see Section 2 Operational Descriptions.
- Maximum Comp. Differential to Start: Compressor Discharge-Suction Pressures must be equalized to within this setpoint to start the compressor.
- Minimum Prelube Pressure: Prelube pressure that must be achieved by the oil pump before the compressor is allowed to start.
- Prelube Time Before Motor Start: Amount of time that minimum prelube pressure must be maintained before compressor is allowed to start.
- Prelube Retry Wait Time: Amount of wait time before oil pump restarts if prelube oil pressure is not achieved.
- Prelube Time After Motor Start: Amount of time that minimum prelube pressure must be maintained after compressor main motor starts.
- Warmup Time: Amount of warmup time the compressor will run with the oil pump on and capacity slide valve at minimum position before it will start loading.
- Suction Oil Injection ON time at start: Amount of time the suction oil injection solenoid will be energized after the start of the main motor, if installed.

SHUT DOWN

- Suction-Discharge Equalizing Solenoid ON Time (at Stop): Amount of time the equalizing line solenoid

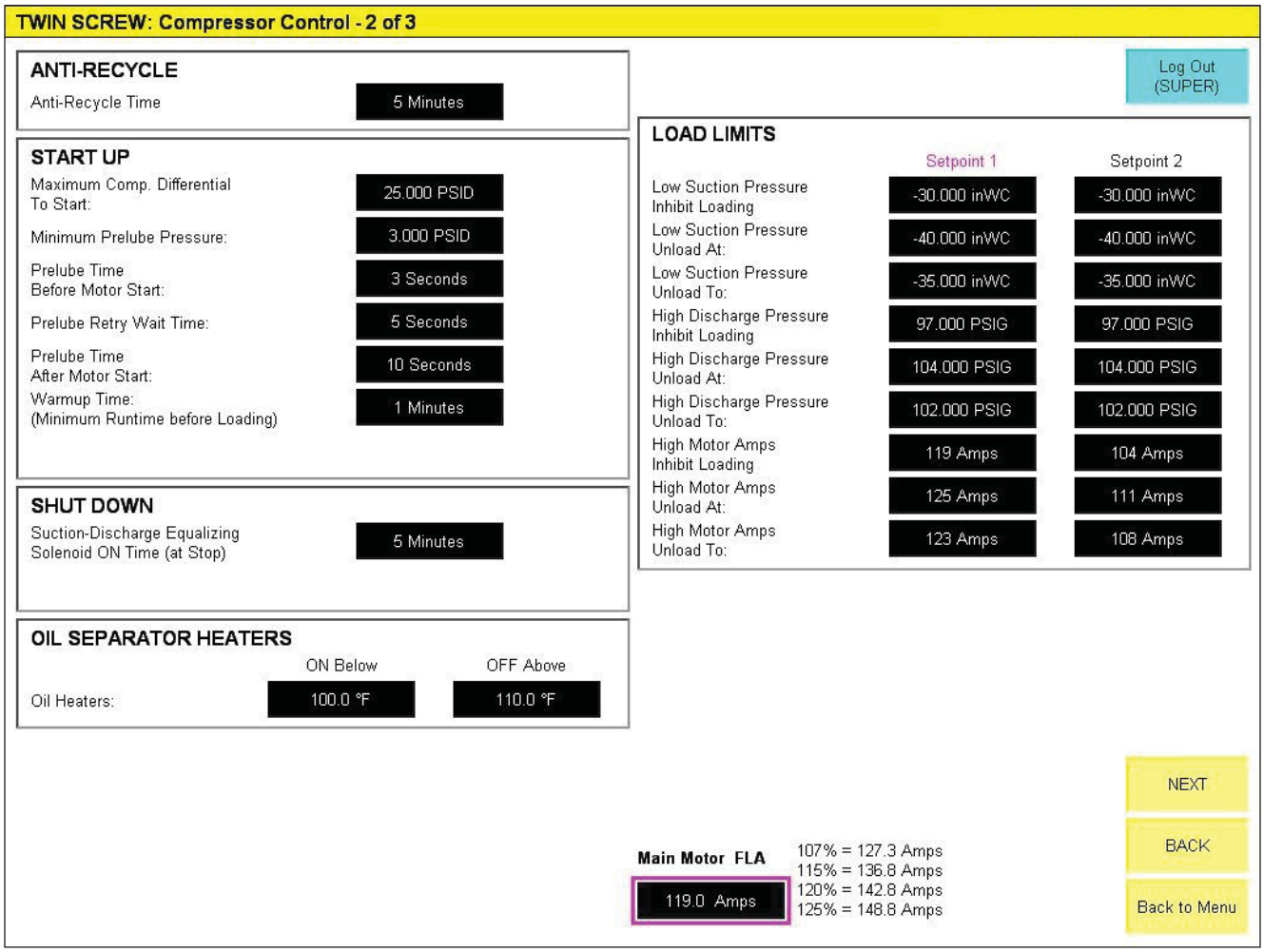


Figure 7-5. Compressor Control Screen - 2 of 3

will be energized after the compressor main motor stops, if installed.

- Oil Drain Solenoid ON Time (at Stop): Amount of time the oil drain solenoid will be energized after the compressor main motor stops, if installed.

OIL SEPARATOR HEATERS

- Defines separator oil temperature setpoints to control the oil separator heaters.

LOAD LIMITS

For more information on load limits and forced unloading, see Section 2 Operational Descriptions.

- Low Suction Pressure Inhibit Loading: compressor will not be allowed to load if Suction Pressure falls below this setpoint.
- Low Suction Pressure Unload At: Compressor will begin continuously unloading if Suction Pressure falls below this setpoint.
- Low Suction Pressure Unload To: If forced unloading is active, the compressor will unload continuously until Suction Pressure reaches this setpoint.
- High Discharge Pressure Inhibit Loading: compressor will not be allowed to load if Discharge Pressure rises above this setpoint.
- High Discharge Pressure Unload At: Compressor will begin continuously unloading if Discharge Pressure rises above this setpoint.
- High Discharge Pressure Unload To: If forced unloading is active, the compressor will unload continuously until Discharge Pressure reaches this setpoint.
- High Motor Amps Inhibit Loading: compressor will not be allowed to load if Main Motor Amperage rises above this setpoint.
- High Motor Amps Unload At: Compressor will begin continuously unloading if Main Motor Amperage rises above this setpoint.
- High Motor Amps Unload To: If forced unloading is active, the compressor will unload continuously until Main Motor Amperage reaches this setpoint.

MAIN MOTOR FLA

- This is a convenience calculation to aid in setting motor amps load limit setpoints.

Compressor Control Setpoints Screen 3

SUPPLEMENTAL FALSE START PROTECTION

- Provided to operate a safety device to de-energize power to the main motor in the event of a False Start of the Main Motor

VENTURI OIL RECOVERY

- Cycle Time: Defines the ON and OFF time for the venturi oil recovery solenoids, if installed.

HOTGAS BYPASS

- ON/OFF Capacity Slide Position: Defines the capacity slide valve positions the hotgas bypass solenoid will turn ON below and OFF above, if installed.

ECONOMIZER

- Port 1: Defines the capacity slide valve positions the economizer port 1 solenoid(s) will turn ON above and OFF below, if installed.
- Port 2: Defines the capacity slide valve positions the economizer solenoid(s) will turn ON above and OFF below, if installed.

ENCLOSURE SETPOINTS

- Enclosure Heater: Defines Enclosure Temperature setpoints to control the enclosure space heaters.
- Enclosure Roof Vents: Defines Enclosure Temperature setpoints to control the enclosure roof vents/exhaust fans.

OIL FLOW CONTROL

- Oil Flow Control Start Temp (Oil Injection): Defines the oil injection temperature at which the oil flow control valve will modulate. Below this temperature the valve will remain 100% open.

PERIODIC SLIDE VALVE EXERCISE

Cycle Time: Defines the amount of time of slide valve non-movement to activate the periodic slide valve exercise function, if enabled.

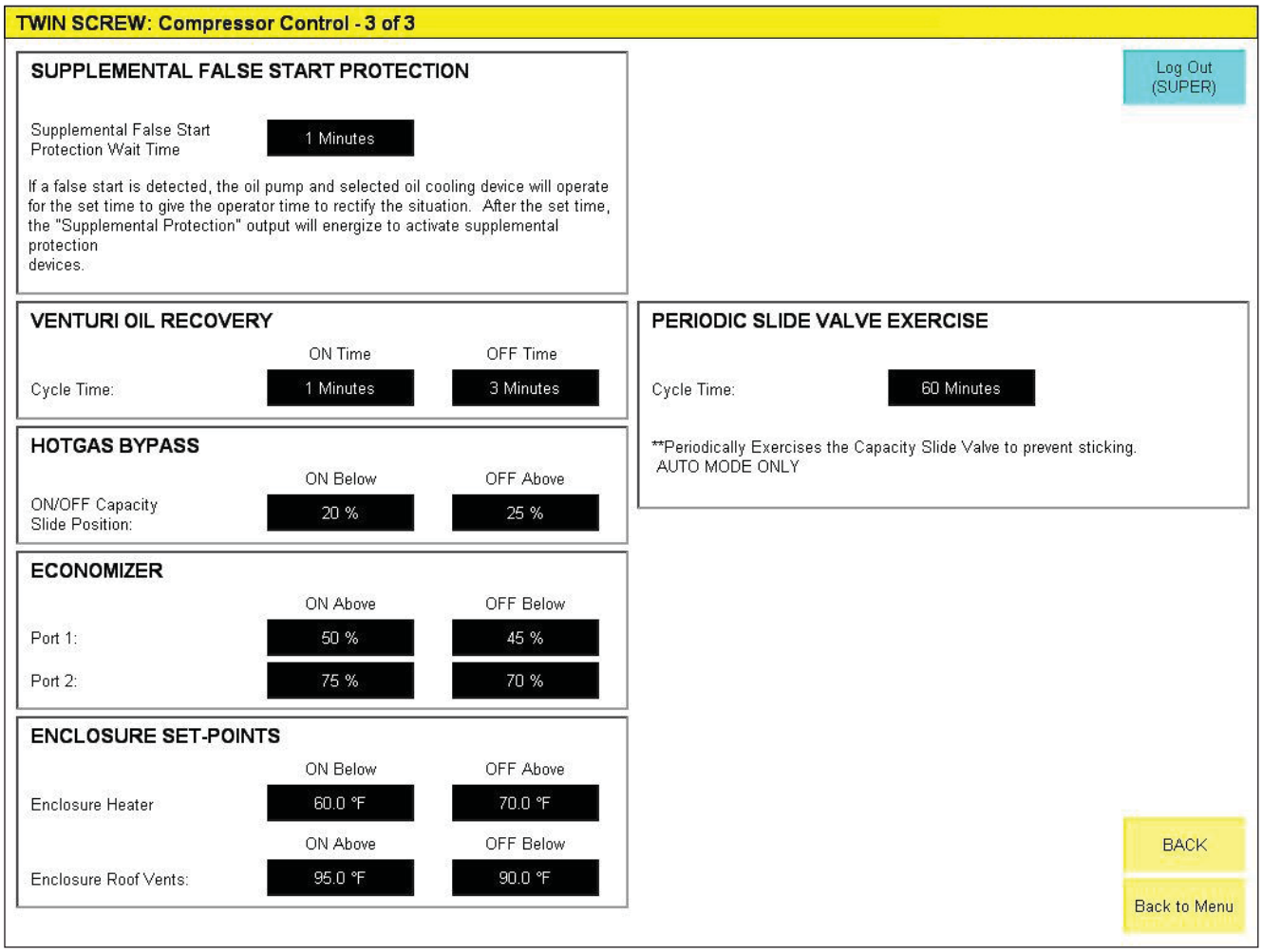


Figure 7-6. Compressor Control Screen - 3 of 3 (All Options Shown)

Alarm and Trip Setpoints

NOTE

Screens may have inverted colors for ease of readability.

The compressor controller continuously monitors operational and process data and annunciates an alarm and/or shuts the compressor down if any condition becomes abnormal. The alarm and trip points for some of the operational and process data are adjustable by the user in the alarm and trip setpoints screens. The alarm and trip setpoints are interlocked such that a low alarm may not be set lower than a low trip, and a high trip may not be set below a high alarm.

Actual values of the specific operational and process data is shown in the column in the middle of the screen. Setpoints are only shown for applicable alarm and trip points. When alarms or trips are specific to "Setpoint 1" or "Setpoint 2" setpoint groups, the alarm or trip point will only be active when the associated setpoint group is active.

Alarm and Trip Setpoints Screen 1

- Suction Pressure Setpoint 1 and 2: Low Alarm and Low Trip setpoints for compressor suction pressure.
- Discharge Pressure Setpoint 1 and 2: High Alarm and High Trip setpoints for compressor discharge pressure.
- Net Oil Pressure - Start: Low Alarm and Low Trip setpoints for net oil pressure (oil manifold pressure – suction pressure) during compressor warmup.
- Net Oil Pressure – Run: Low Alarm and Low Trip setpoints for net oil pressure (oil manifold pressure – suction pressure) after compressor warmup.
- Oil Filter Differential Pressure – Start: High Alarm and High Trip setpoints for pressure drop across the oil filter(s) at compressor start.
- Oil Filter Differential Pressure – Run: High Alarm and High Trip setpoints for pressure drop across the oil filter(s) after oil filter differential changeover timer expires

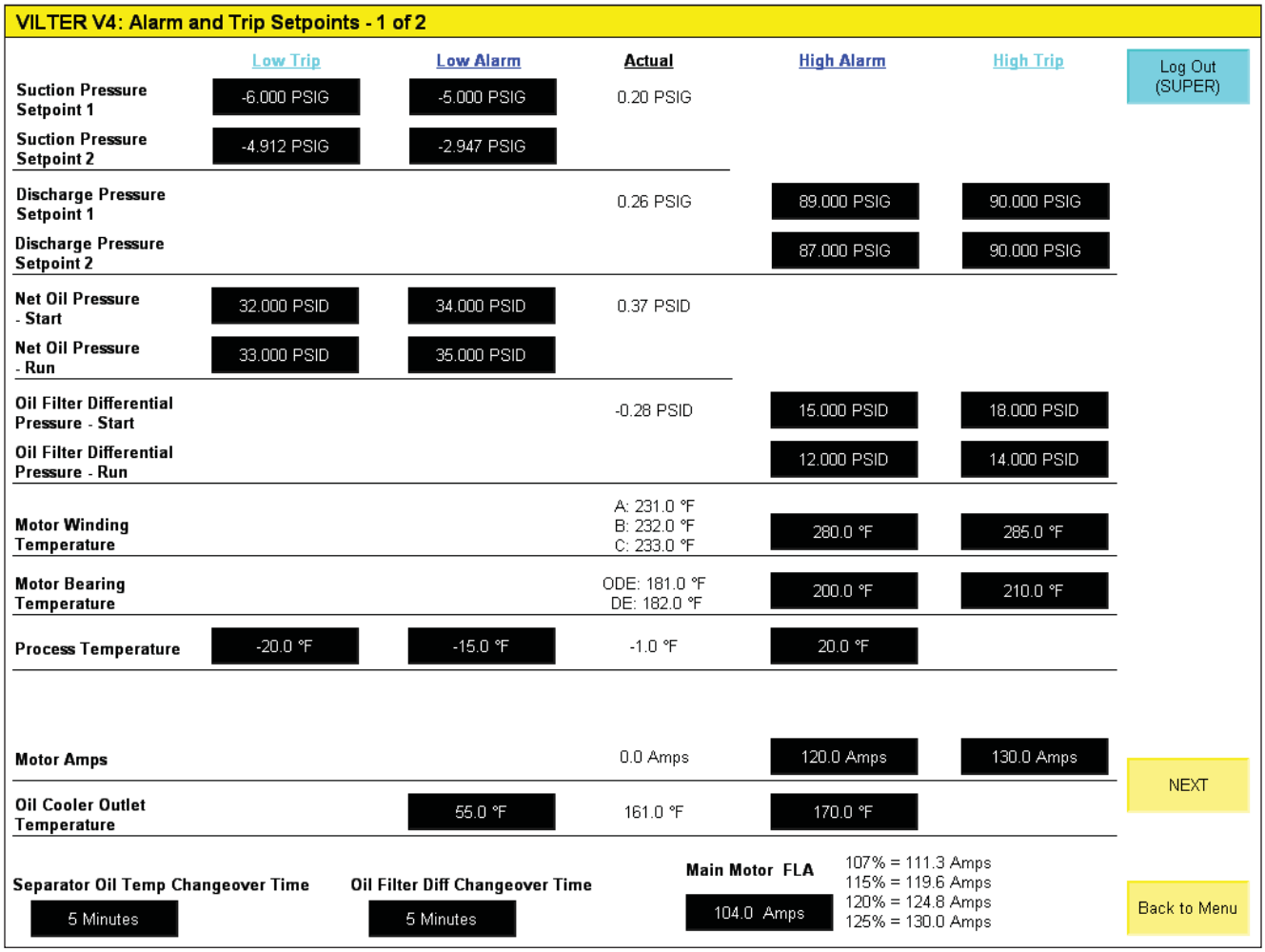


Figure 8-1. Alarm and Trip Setpoints Screen - 1 of 2

- Motor Winding Temperature: High Alarm and High Trip setpoints for temperature of the main motor windings, if motor winding RTDs are installed.
- Motor Bearing Temperature: High Alarm and High Trip setpoints for temperature of the main motor bearings, if motor bearing RTDs are installed.
- Process Temperature: Low Alarm, Low Trip, and High Alarm setpoints for process temperature, if it is being controlled or monitored.
- Liquid Refrigerant Temperature: Low Alarm and Low Trip for temperature of the liquid refrigerant in the chiller, if it is being monitored.
- Motor Amps: High Alarm and High Trip for main motor current.
- Oil Cooler Outlet Temperature: Low and High Alarms for temperature of the oil at the outlet of the oil cooler, if it is being controlled or monitored.
- Separator Oil Temp Changeover Time: Time after compressor starts when separator oil temperature alarm and trip transitions from start setpoints to run setpoints.
- Oil Filter Differential Changeover Time: Time after compressor starts when oil filter differential alarm and trip transitions from start setpoints to run setpoints.
- Main Motor FLA: Convenience calculation for setting main motor amperage alarms and trips.

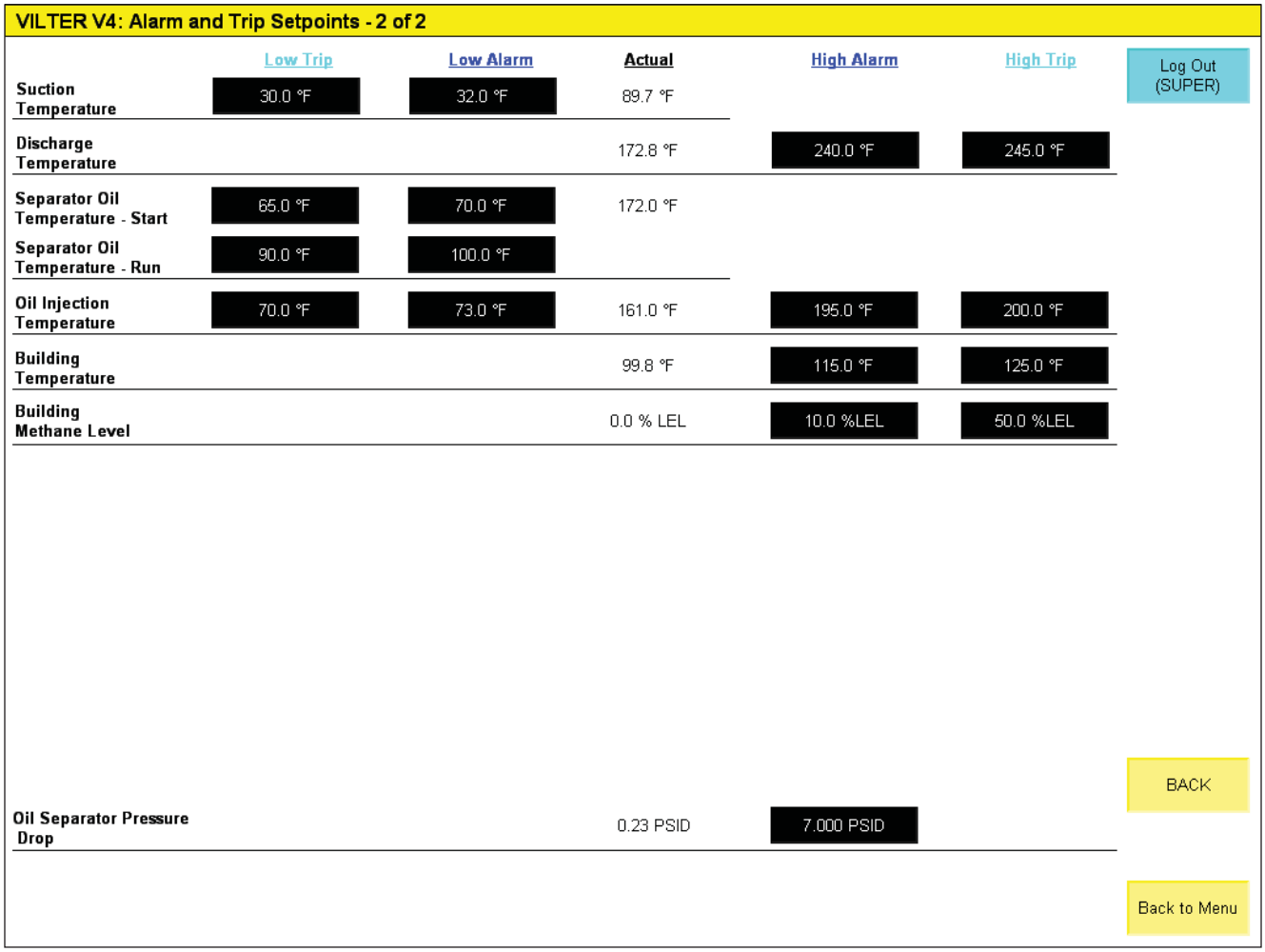


Figure 8-2. Alarm and Trip Setpoints Screen - 2 of 2

Oil Mixing Valve Screen

OIL MIXING VALVE SETPOINTS

- Target Oil Injection Temp: Defines the desired temperature of oil entering the compressor. The mixing valve will adjust to maintain this temperature.
- Deadband: Range above and below setpoint where the controller will not make adjustments to valve position.
- PID Tuning: PID Calculations displayed to aid in tuning the PID loop.
- Loop Update Time: Defines the PID controller loop time. The PID calculation will update every cycle of the loop update timer.
- Proportional Gain (Kp): Defines the Proportional Constant of the PID calculation.
- Integral Gain (Ki): Defines the Integral Constant of the PID calculation.
- Derivative Gain (Kd): Defines the Derivative Constant of the PID Calculation.
- Oil Mixing Valve Force: Allows the user to manually force the oil mixing valve to a settable position. Activating the Oil Mixing Valve Force pushbutton will command the oil mixing valve to go to the set position, and will override calculations from the PID Controller.

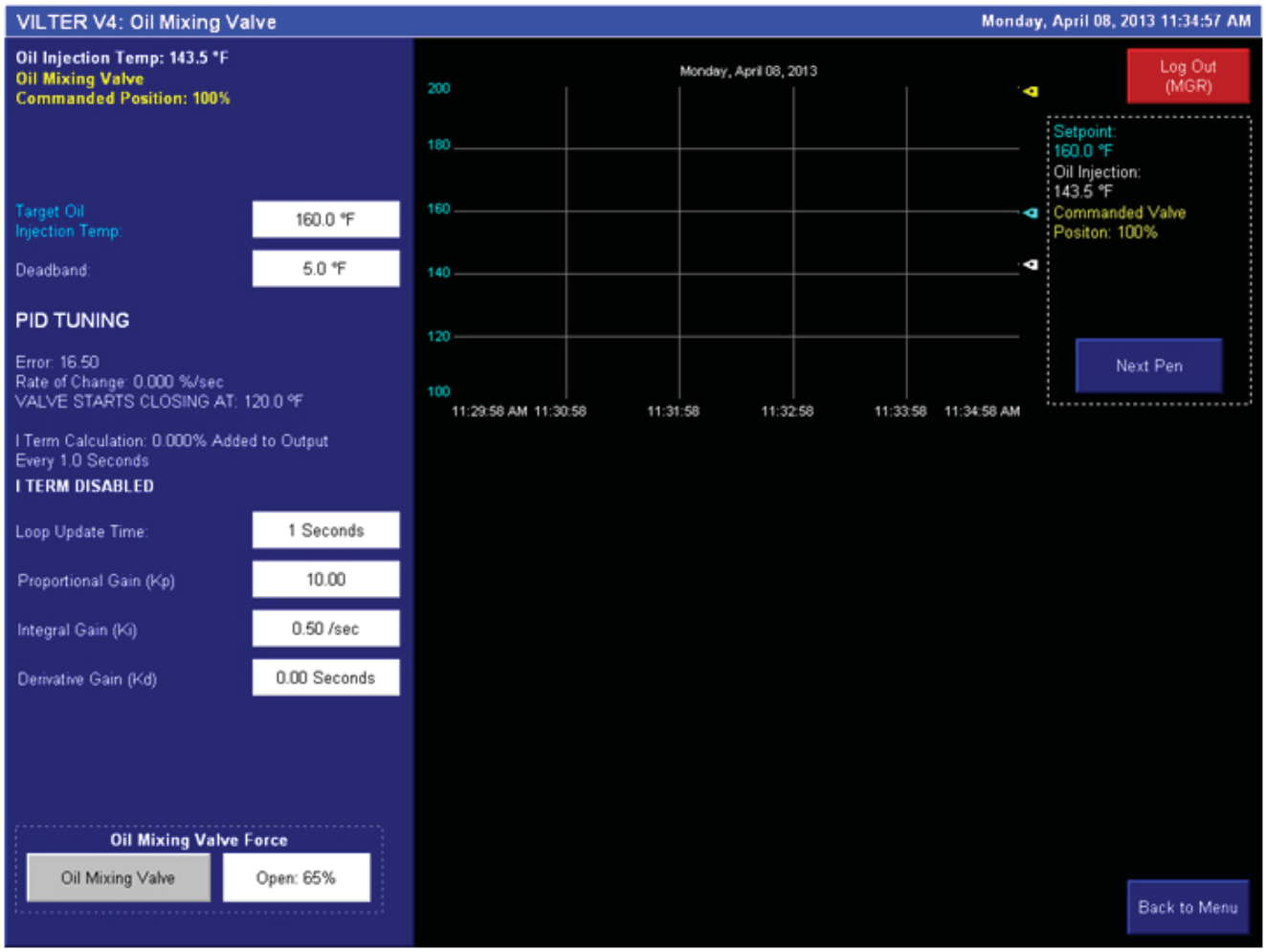


Figure 9-1. Oil Mixing Valve Screen

OIL COOLER (VFD TYPE) SETPOINTS

- Start Oil Cooler Above: Defines the temperature the oil cooler fans will come on at minimum speed.
- Target Oil Cooler Outlet Temperature: Defines the desired temperature of oil at the outlet of the oil cooler. The oil cooler fan speed will adjust to maintain this temperature.
- Deadband: Range above and below setpoint where the controller will not make adjustments to fan speed.
- PID Tuning: PID Calculations displayed to aid in tuning the PID loop.
- Loop Update Time: Defines the PID controller loop time. The PID calculation will update every cycle of the loop update timer.
- Proportional Gain (Kp): Defines the Proportional Constant of the PID calculation.
- Integral Gain (Ki): Defines the Integral Constant of the PID calculation.
- Derivative Gain (Kd): Defines the Derivative Constant of the PID Calculation.
- Minimum Speed: Defines the minimum oil cooler fan speed.
- Plenum Heater ON Temp: Defines the oil cooler outlet temperature at which the oil cooler plenum heater turns ON (if used).
- Plenum Heater OFF Temp: Defines the oil cooler outlet temperature at which the oil cooler plenum heater turns OFF (if used).
- Oil Cooler Fan VFD Force: Allows the user to manually force the oil cooler fan(s) to a settable speed. Activating the Oil Cooler Fan VFD Force pushbutton will command the oil cooler fan(s) to go to the set speed, and will override calculations from the PID Controller.

Figure 9-2. Oil Cooler (VFD Type) Screen

OIL COOLER (STEP TYPE) SETPOINTS

- Start Oil Cooler Above: Defines the temperature the first oil cooler step will come on.
- Target Oil Cooler Outlet Temperature: Defines the desired temperature of oil at the outlet of the oil cooler. The controller will cycle fans on and off to maintain this temperature.
- Deadband: Range above and below setpoint where the controller will not add or remove any steps.
- Step Dwell Time: Amount of time Oil Cooler Outlet Temperature must be outside the deadband to add or remove a step.
- Plenum Heater ON Temp: Defines the oil cooler outlet temperature at which the oil cooler plenum heater turns ON (if used).
- Plenum Heater OFF Temp: Defines the oil cooler outlet temperature at which the oil cooler plenum heater turns OFF (if used).
- Oil Cooler Fan Configuration: Truth table that defines which fan outputs are turned on in each step.

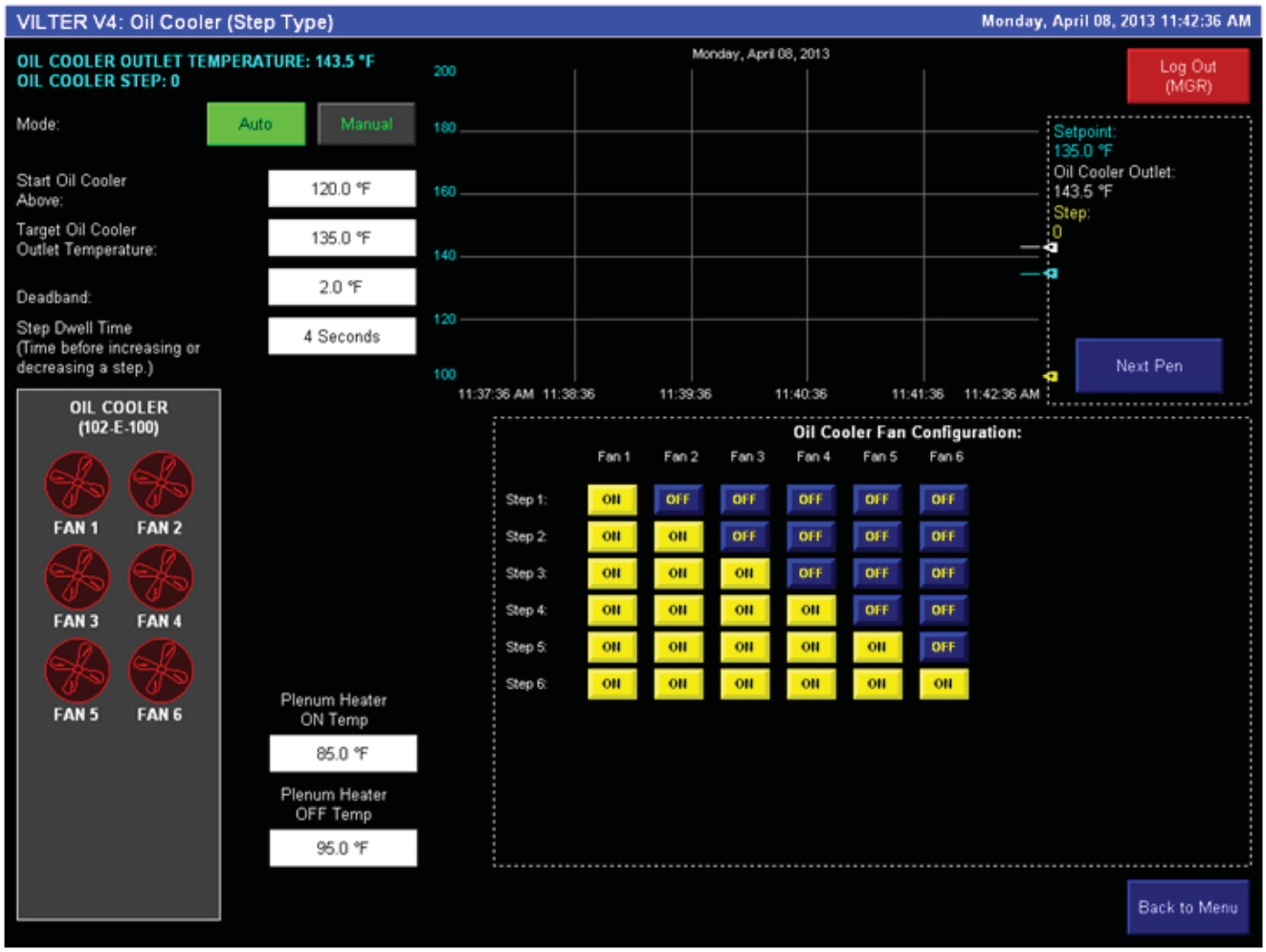


Figure 9-3. Oil Cooler (Step Type) Screen

Aftercooler Screens

AFTERCOOLER (VFD TYPE) SETPOINTS

- Start Aftercooler Above: Defines the temperature the aftercooler fans will come on at minimum speed.
- Target Aftercooler Outlet Temperature: Defines the desired temperature of gas at the outlet of the aftercooler. The aftercooler fan speed will adjust to maintain this temperature.
- Deadband: Range above and below setpoint where the controller will not make adjustments to fan speed.
- PID Tuning: PID Calculations displayed to aid in tuning the PID loop.
- Loop Update Time: Defines the PID controller loop time. The PID calculation will update every cycle of the loop update timer.
- Proportional Gain (Kp): Defines the Proportional Constant of the PID calculation.
- Integral Gain (Ki): Defines the Integral Constant of the PID calculation.
- Derivative Gain (Kd): Defines the Derivative Constant of the PID Calculation.
- Minimum Speed: Defines the minimum aftercooler fan speed.
- Aftercooler VFD Force: Allows the user to manually force the aftercooler fan(s) to a settable speed. Activating the Aftercooler VFD Force pushbutton will command the aftercooler fan(s) to go to the set speed, and will override calculations from the PID Controller

Figure 9-4. Aftercooler (VFD Type) Screen

AFTERCOOLER (STEP TYPE) SETPOINTS

- Start Aftercooler Above: Defines the temperature the first aftercooler step will come on.
- Target Aftercooler Outlet Temperature: Defines the desired temperature of gas at the outlet of the aftercooler. The controller will cycle fans on and off to maintain this temperature.
- Deadband: Range above and below setpoint where the controller will not add or remove any steps.
- Step Dwell Time: Amount of time Aftercooler Outlet Temperature must be outside the deadband to add or remove a step.
- Aftercooler Fan Configuration: Truth table that defines which fan outputs are turned on in each step.

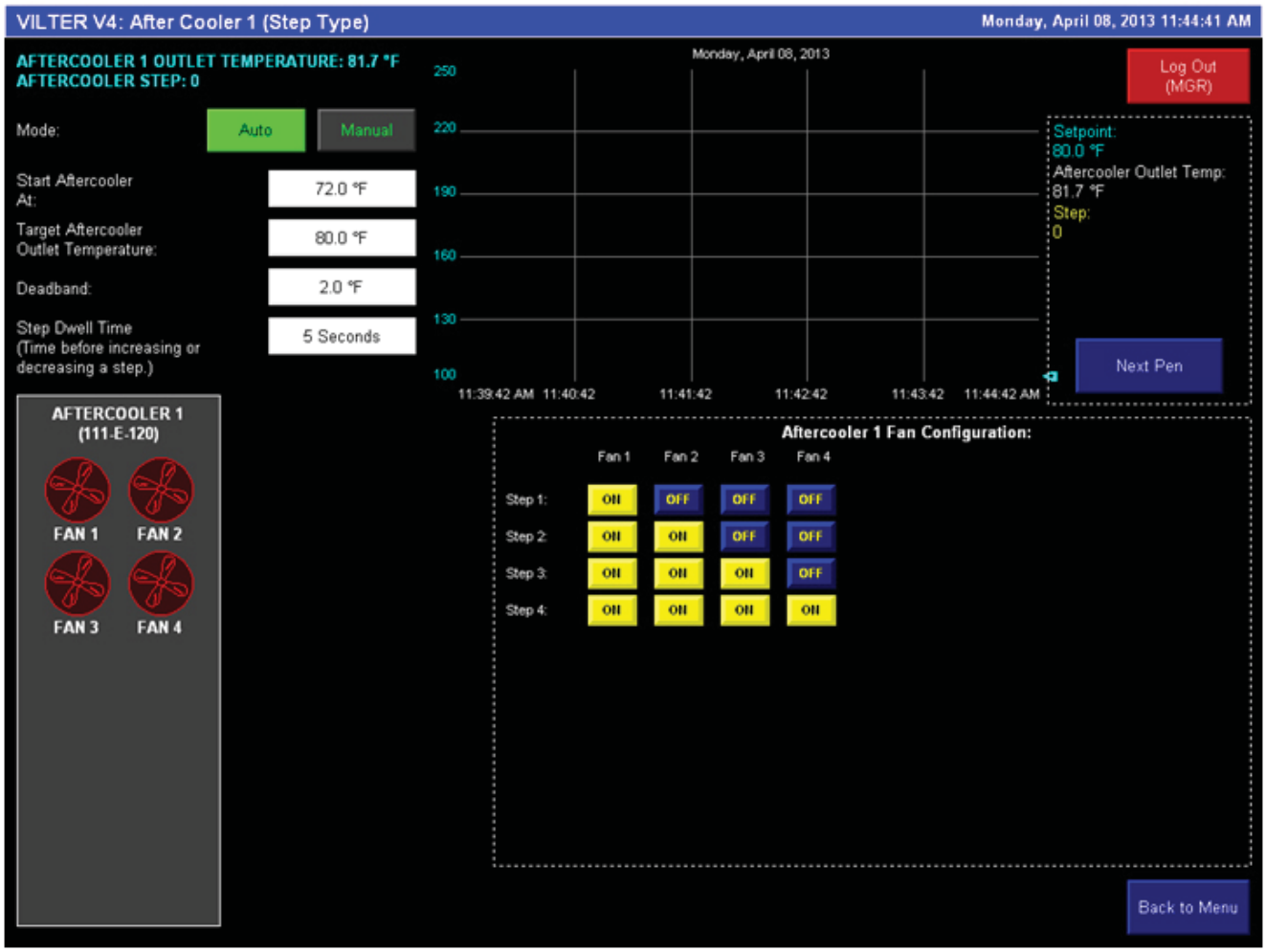


Figure 9-5. Aftercooler (Step Type) Screen

WATER COOLED AFTERCOOLER SETPOINTS

- Open Valve Above: Defines the temperature the aftercooler water supply valve will open to minimum position.
- Target Aftercooler Outlet Temperature: Defines the desired temperature of gas at the outlet of the aftercooler. The aftercooler water supply valve position will adjust to maintain this temperature.
- Deadband: Range above and below setpoint where the controller will not make adjustments to water supply valve position.
- PID Tuning: PID Calculations displayed to aid in tuning the PID loop.
- Loop Update Time: Defines the PID controller loop time. The PID calculation will update every cycle of the loop update timer.
- Proportional Gain (Kp): Defines the Proportional Constant of the PID calculation.
- Integral Gain (Ki): Defines the Integral Constant of the PID calculation.
- Derivative Gain (Kd): Defines the Derivative Constant of the PID Calculation.
- Minimum Valve Open: Defines the minimum water supply valve position.
- Aftercooler Valve Force: Allows the user to manually force the aftercooler water supply valve to a settable position. Activating the Aftercooler Valve Force pushbutton will command the aftercooler water supply valve to go to the set position, and will override calculations from the PID Controller.

Figure 9-6. Water Cooled Aftercooler Screen

Condenser Screens

CONDENSER (STEP TYPE) SETPOINTS

- Start Condenser Above: Defines the pressure the first condenser step will come on.
- Target Condensing Pressure: Defines the desired pressure of gas at the condenser. The controller will cycle fans on and off to maintain this temperature.
- Deadband: Range above and below setpoint where the controller will not add or remove any steps.
- Step Dwell Time: Amount of time Condensing pressure must be outside the deadband to add or remove a step.
- Condenser Fan Configuration: Truth table that defines which fan outputs are turned on in each step. If a condenser pump is installed, the truth table also defines which steps the pump output is turned on.

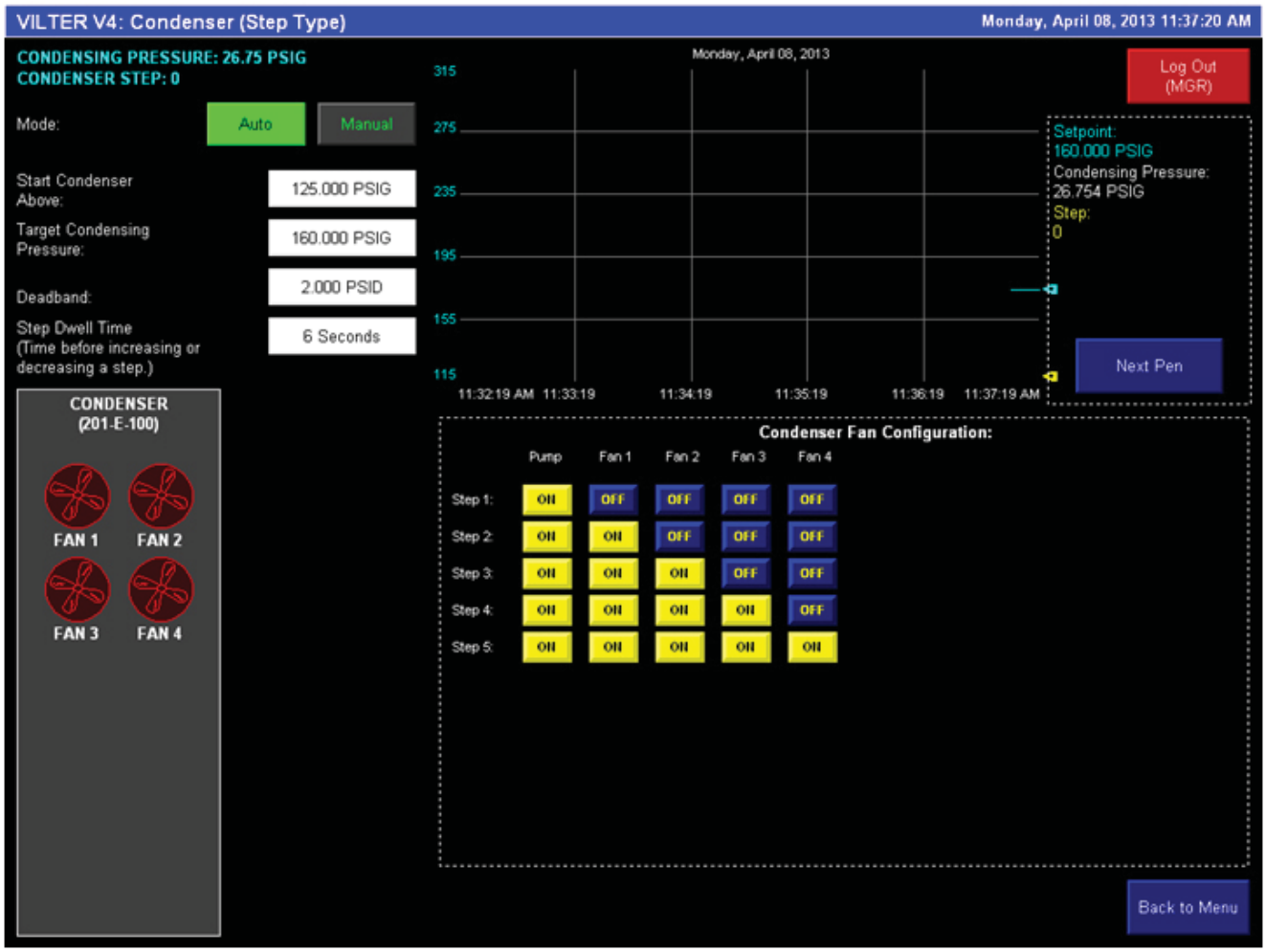


Figure 9-7. Condenser (Step Type) Screen

CONDENSER (VFD TYPE) SETPOINTS

- Start Condenser Above: Defines the temperature the condenser fans will come on at minimum speed.
- Target Condensing Pressure: Defines the desired pressure of gas at the condenser. The condenser fan speed will adjust to maintain this pressure.
- Deadband: Range above and below setpoint where the controller will not make adjustments to fan speed.
- PID Tuning: PID Calculations displayed to aid in tuning the PID loop.
- Loop Update Time: Defines the PID controller loop time. The PID calculation will update every cycle of the loop update timer.
- Proportional Gain (Kp): Defines the Proportional Constant of the PID calculation.
- Integral Gain (Ki): Defines the Integral Constant of the PID calculation.
- Derivative Gain (Kd): Defines the Derivative Constant of the PID Calculation.
- Minimum Speed: Defines the minimum condenser fan speed.
- Condenser VFD Force: Allows the user to manually force the condenser fan(s) to a settable speed. Activating the Condenser VFD Force pushbutton will command the condenser fan(s) to go to the set speed, and will override calculations from the PID Controller.
- Condenser Pump Enable: If installed, this selector defines if the condenser pump will be commanded to run when the condenser fan VFD starts.

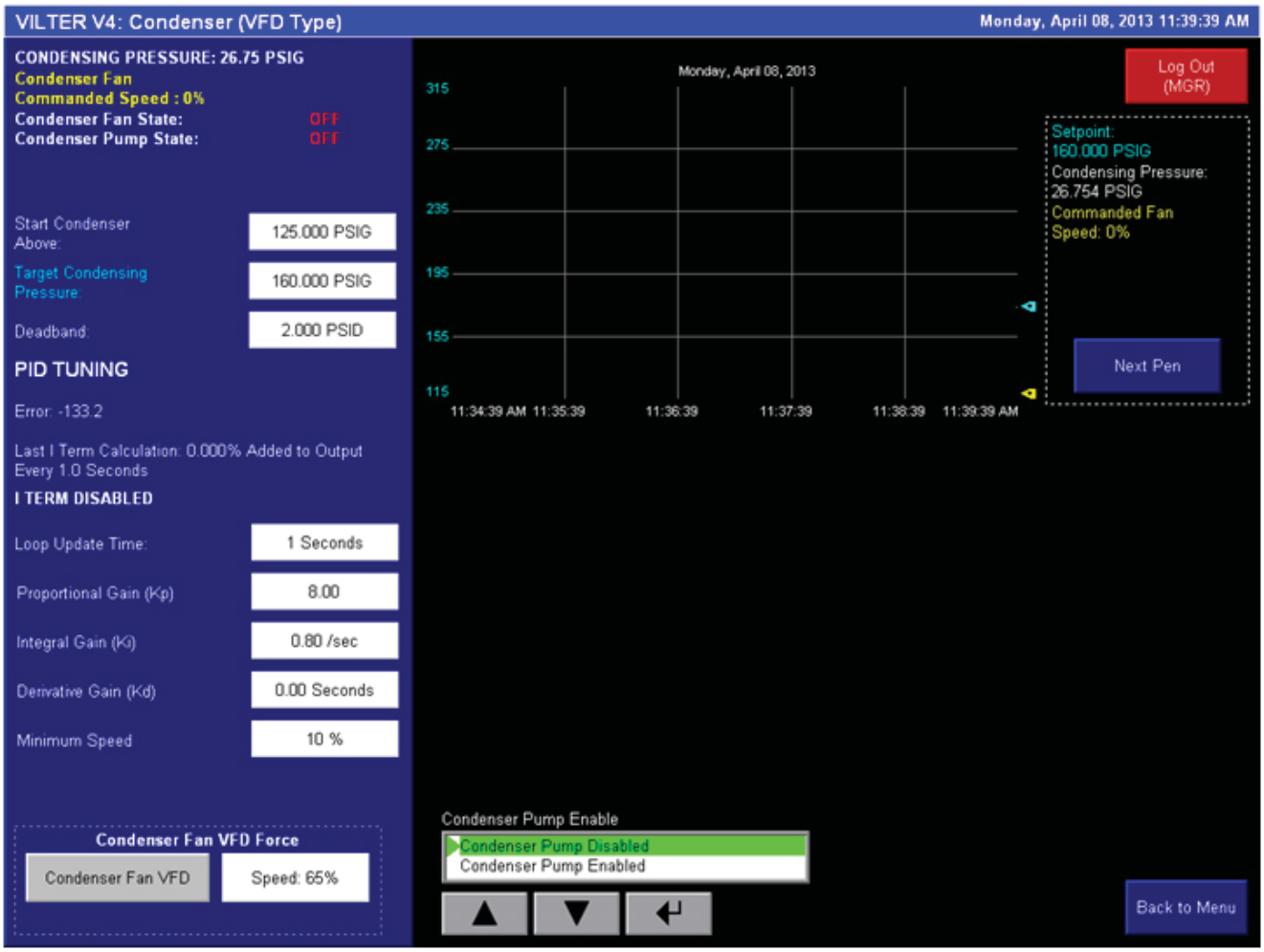


Figure 9-8. Condenser (VFD Type) Screen

WATER COOLED CONDENSER SETPOINTS

- Open Valve Above: Defines the pressure at which the aftercooler water supply valve will open to minimum position.
- Target Condensing Pressure: Defines the desired pressure of gas at the condenser. The condenser water supply valve position will adjust to maintain this pressure.
- Deadband: Range above and below setpoint where the controller will not make adjustments to water supply valve positon.
- PID Tuning: PID Calculations displayed to aid in tuning the PID loop.
- Loop Update Time: Defines the PID controller loop time. The PID calculation will update every cycle of the loop update timer.
- Proportional Gain (Kp): Defines the Proportional Constant of the PID calculation.
- Integral Gain (Ki): Defines the Integral Constant of the PID calculation.
- Derivative Gain (Kd): Defines the Derivative Constant of the PID Calculation.
- Minimum Valve Open: Defines the minimum water supply valve position.
- Condenser Valve Force: Allows the user to manually force the condenser water supply valve to a settable position. Activating the Condenser Valve Force pushbutton will command the condenser water supply valve to go to the set position, and will override calculations from the PID Controller.

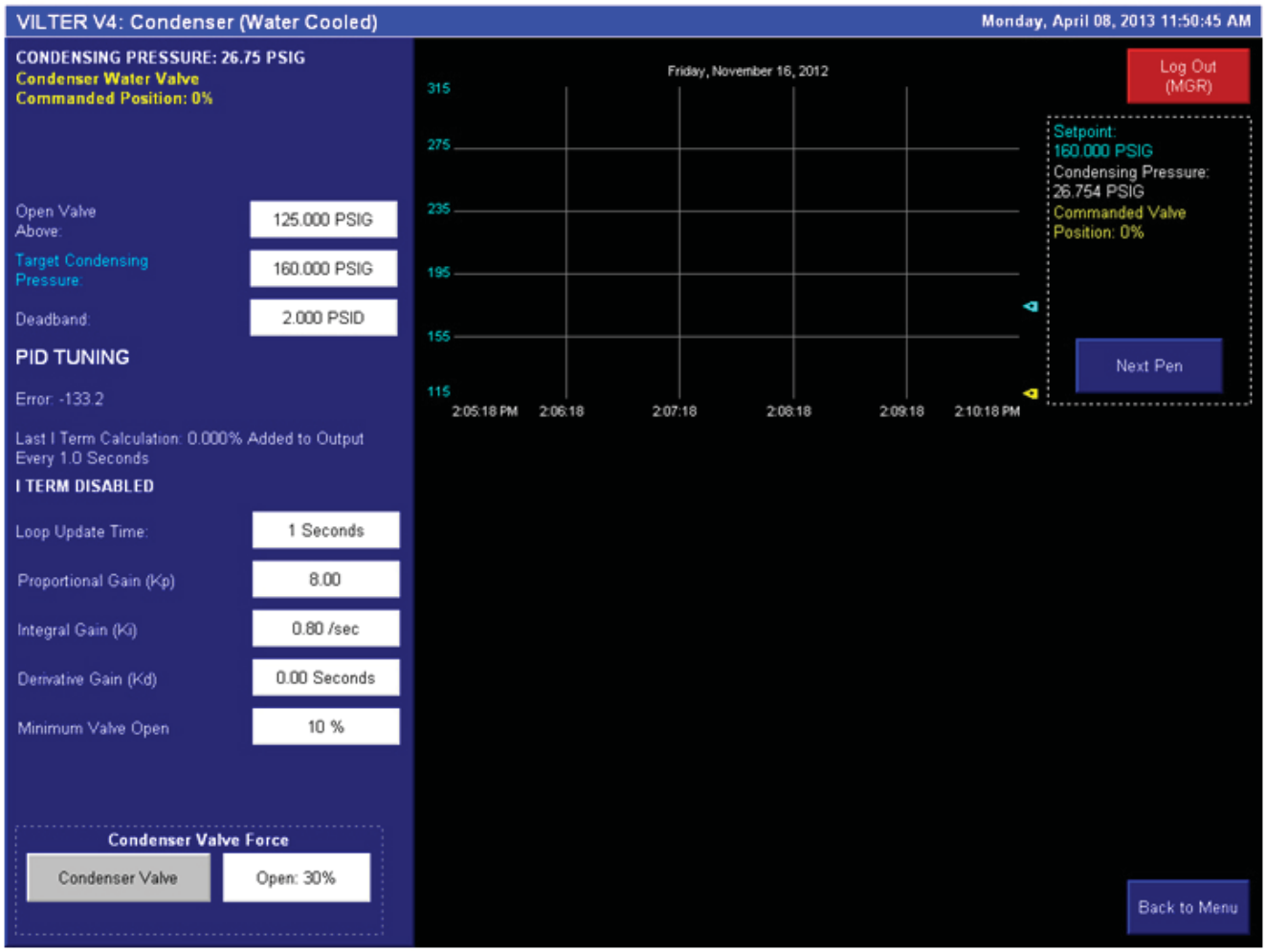


Figure 9-9. Water Cooled Condenser Screen

Liquid Injection Valve Screens

LIQUID INJECTION VALVE SETPOINTS

- Open Valve Above: Defines the temperature at which the liquid injection valve will open to minimum position.
- Target Discharge Temperature: Defines the desired temperature of gas and oil discharging from the compressor. The liquid injection valve position will adjust to maintain this temperature.
- Deadband: Range above and below setpoint where the controller will not make adjustments to the liquid injection valve position.
- Oil Separator Override Temperature: Separator Oil Temperature must be above this temperature for the liquid injection to operate.
- PID Tuning: PID Calculations displayed to aid in tuning the PID loop.
- Loop Update Time: Defines the PID controller loop time. The PID calculation will update every cycle of the loop update timer.
- Proportional Gain (Kp): Defines the Proportional Constant of the PID calculation.
- Integral Gain (Ki): Defines the Integral Constant of the PID calculation.
- Derivative Gain (Kd): Defines the Derivative Constant of the PID Calculation.
- Minimum Valve Open: Defines the minimum liquid injection valve position.
- Liquid Injection Valve Force: Allows the user to manually force the liquid injection valve to a settable position. Activating the Liquid Injection Valve Force pushbutton will command the liquid injection valve to go to the set position, and will override calculations from the PID Controller.

Figure 9-10. Liquid Injection Valve Screen

LIQUID INJECTION (VPLUS PUMP) SETPOINTS

- Start Pump At: Defines the temperature at which the VPLUS pump will start at its minimum speed.
- Target Discharge Temperature: Defines the desired temperature of gas and oil discharging from the compressor. The VPLUS pump will adjust speed to maintain this temperature.
- Deadband: Range above and below setpoint where the controller will not make adjustments to the VPLUS pump speed.
- Oil Separator Override Temperature: Separator Oil Temperature must be above this temperature for the VPLUS pump to operate.
- PID Tuning: PID Calculations displayed to aid in tuning the PID loop.
- Loop Update Time: Defines the PID controller loop time. The PID calculation will update every cycle of the loop update timer.
- Proportional Gain (Kp): Defines the Proportional Constant of the PID calculation.
- Integral Gain (Ki): Defines the Integral Constant of the PID calculation.
- Derivative Gain (Kd): Defines the Derivative Constant of the PID Calculation.
- Minimum Pump Speed: Defines the minimum speed of the VPLUS pump.
- VPLUS Pump Force: Allows the user to manually force the VPLUS pump to a settable speed. Activating the VPLUS Pump Force pushbutton will command the VPLUS pump to go to the set speed, and will override calculations from the PID Controller.

Figure 9-11. Liquid Injection (VPLUS Pump) Screen

Discharge Recycle Valve Screen

DISCHARGE RECYCLE VALVE SETPOINTS

- Target Recycle Control Pressure: Defines the pressure at which the discharge recycle valve will begin to open.
- Deadband: Range above and below setpoint where the controller will not make adjustments to the recycle valve position.
- PID Tuning: PID Calculations displayed to aid in tuning the PID loop.
- Loop Update Time: Defines the PID controller loop time. The PID calculation will update every cycle of the loop update timer.
- Proportional Gain (Kp): Defines the Proportional Constant of the PID calculation.
- Integral Gain (Ki): Defines the Integral Constant of the PID calculation.
- Derivative Gain (Kd): Defines the Derivative Constant of the PID Calculation.
- Discharge Recycle Valve Force: Allows the user to manually force the discharge recycle valve to a settable position. Activating the Discharge Recycle Valve Force pushbutton will command the discharge recycle valve to go to the set position, and will override calculations from the PID Controller.

Figure 9-12. Discharge Recycle Valve Screen

Start Menu Popup Screen

Pressing “Start Menu” on the compressor or system overview screen will open the “Start Menu” popup screen. The “Start Menu” screen allows the user to change operating modes and start the compressor.

- Remote: Pressing the remote pushbutton puts the compressor loading control in remote mode. The remote mode pushbutton will only be visible if the configuration is correct
- Local: Pressing the Local pushbutton puts the compressor loading control in local mode.
- Auto: Pressing the Auto pushbutton puts the compressor loading control in Auto mode.
- Manual: Pressing the Manual pushbutton puts the compressor loading control in Manual mode.
- Unit Start: Pressing the Unit Start pushbutton initiates a compressor start.

For more information on operating modes, see Section 2 Operational Descriptions.

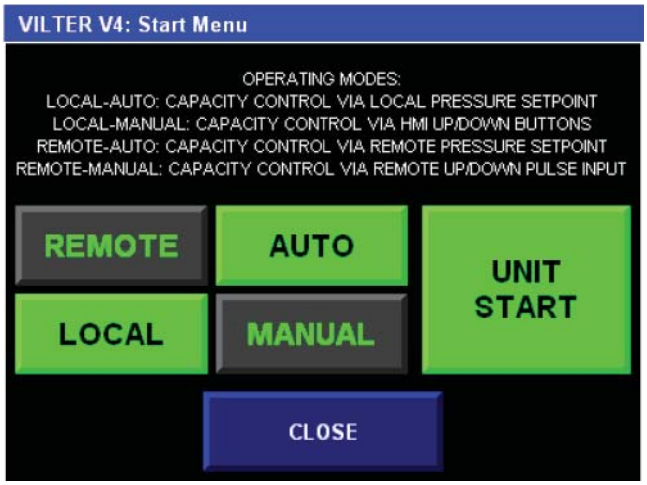


Figure 9-13. Start Menu Popup Screen

IO/Comms Diagnostics Screen

COMMS DIAGNOSTICS AND I/O STATUS

NOTE

Some screens may have inverted colors for ease of readability.

The IO/Comms Diagnostics Screen is divided into 3 sections.

- SYSTEM INFORMATION
  - Shows basic information about the Compressor PLC panel: Vilter sales order number, Software revision, IP addresses, hardware information, and firmware revisions of compressor PLC and HMI.

- BITS/REALS FROM DCS:
  - Shows commands from a central controller or DCS to verify communications setup with a central controller or DCS.

- LOCAL I/O STATUS
  - Shows a graphic representation of the compressor PLC's local I/O modules and the raw data specific to each channel.
  - Use the following rules to interpret the data:
  - Discrete inputs and outputs: Green = ON
    - Analog Inputs (voltage): The number shown for a specific channel represents the voltage signal being read in millivolts. Ex: a value of 2500 indicates 2500 millivolts or 2.5 volts.
    - Analog Inputs and outputs (4-20mA): The number shown for a specific channel represents the signal in .001 mA. Ex: a value of 4000 indicates 4.000 mA.
    - RTD Inputs: The number shown for a specific channel represents the temperature reading in Fahrenheit times 10. Ex: a value of 730 indicates 73.0 degrees Fahrenheit.

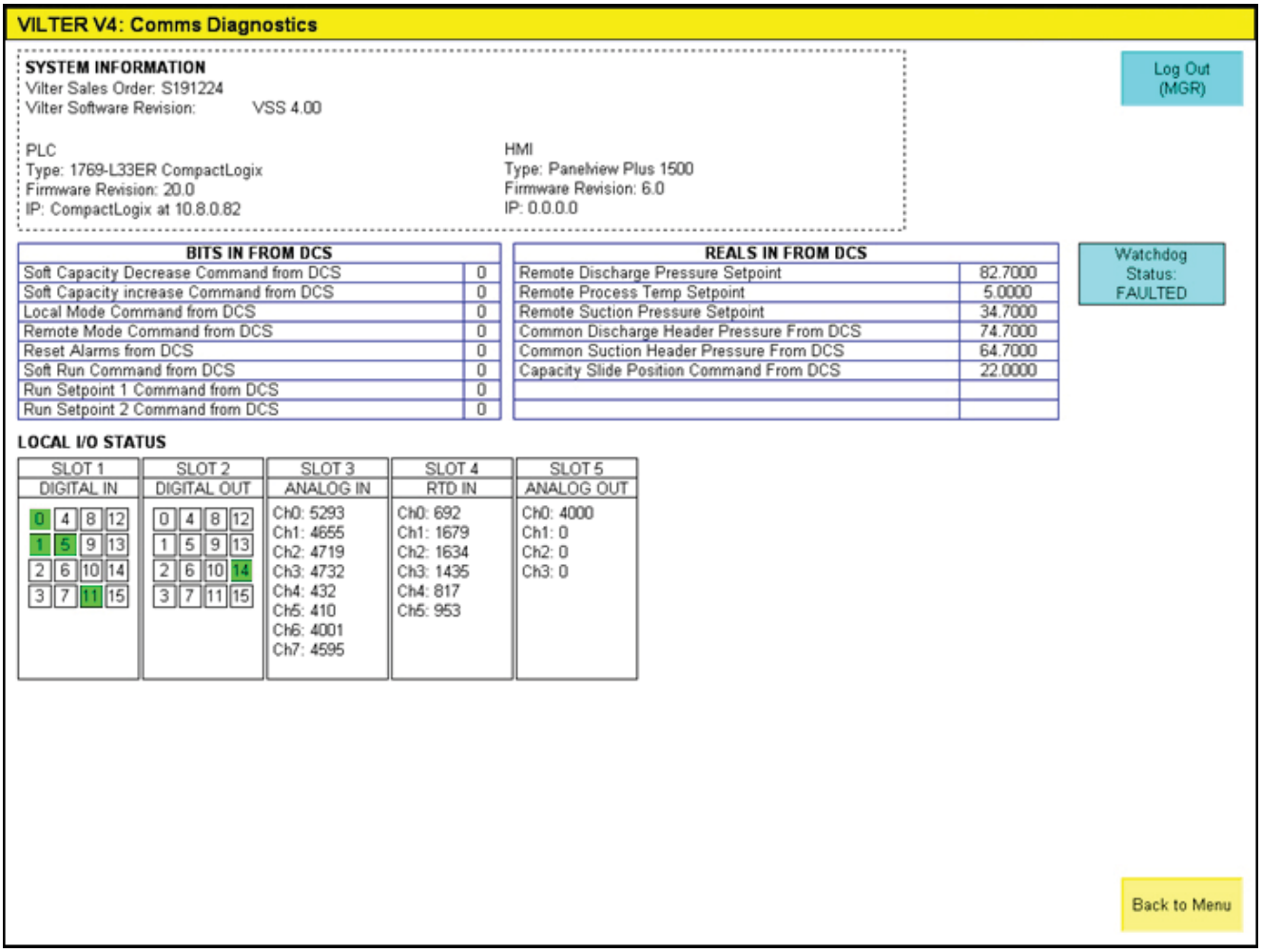


Figure 10-1. IO/Comms Diagnostics Screen

Event List Screen

The event list is a running log of alarm, trip, and status information. The event list shows the last 400 events logged by the compressor PLC, most recent is at the top of the screen. Each event is logged with a time and date stamp.

To scroll through past events, use the navigation buttons at the bottom of the screen.

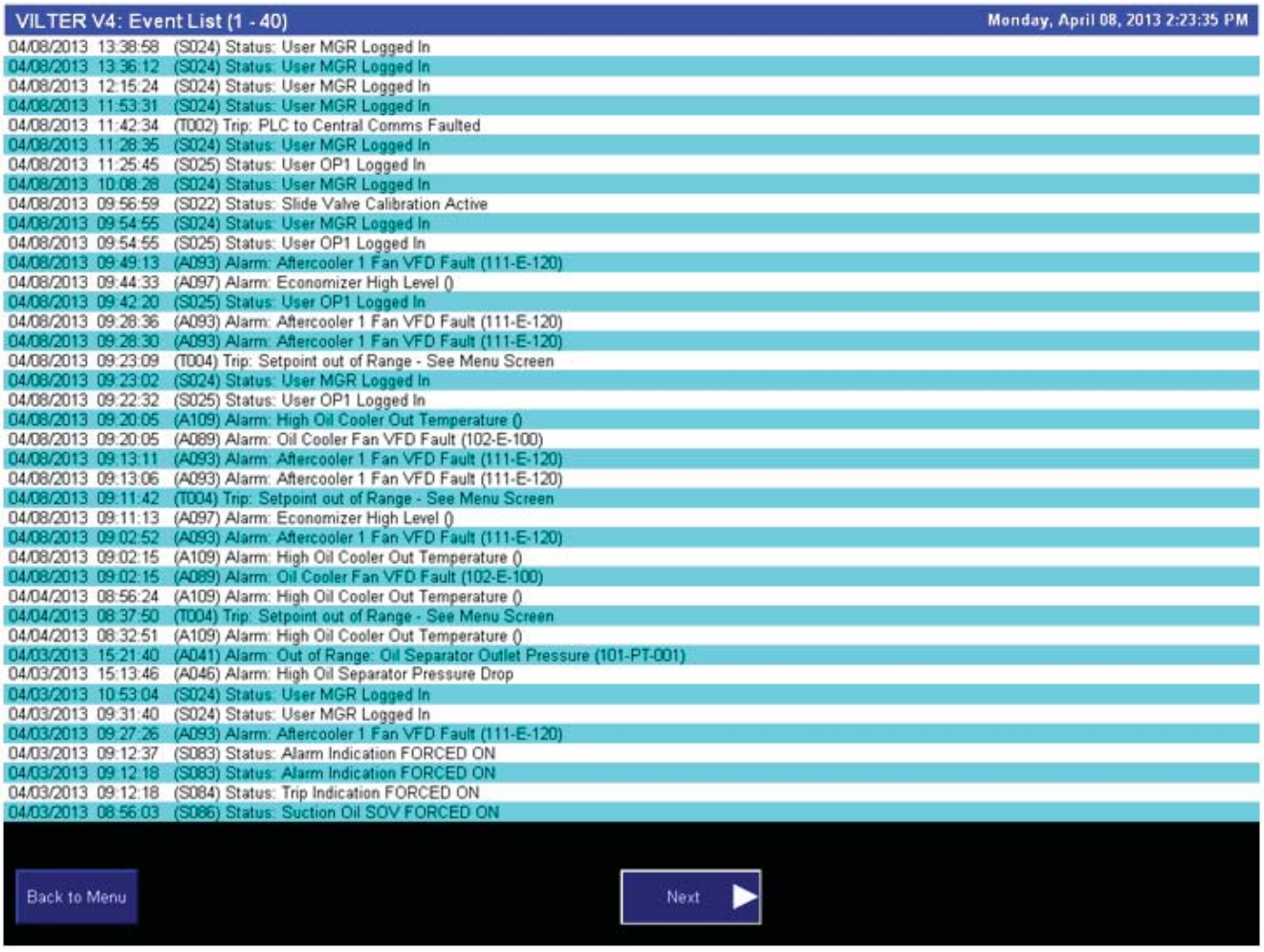


Figure 10-2. Event List Screen

Diagnostics Forced Outputs Screen

The force outputs screen allows a user logged in as "SUPER" to force discrete and analog outputs to verify operation of devices on the compressor unit or package. Outputs that are available to force depend on the configuration for a specific compressor machine or package.

- Pressing a force button forces ON the PLC output for that particular device. If there is an associated analog output (speed or position command) the keyed in value will be applied to that output. Pressing the force button again removes the force.
- Pressing "Clear all Forces" removes all active forces.

CAUTION

Do not overfill oil separator and suction header with oil. Wait at least 30 minutes prior to starting compressor. Failure to comply may result in damage to equipment.

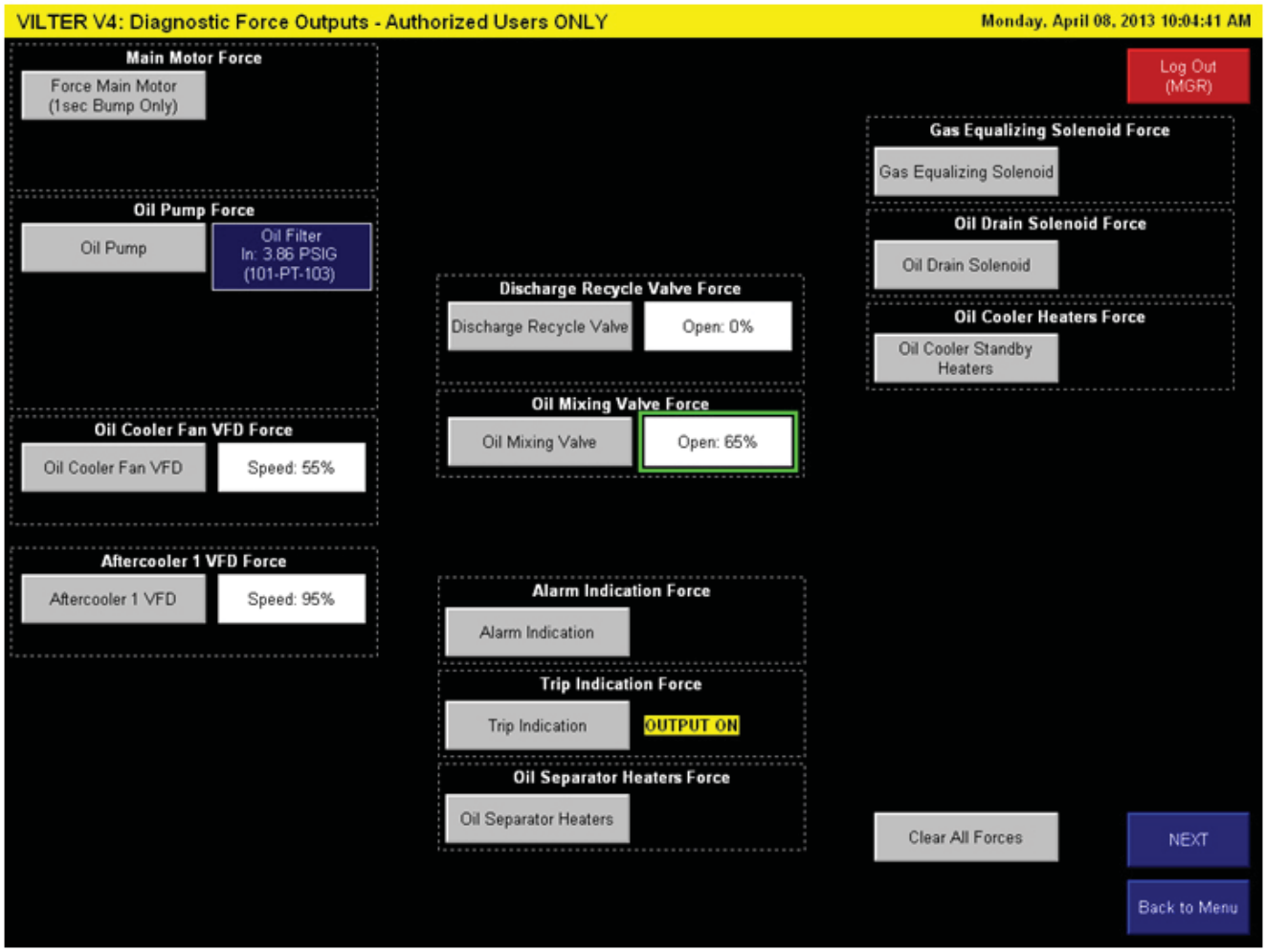
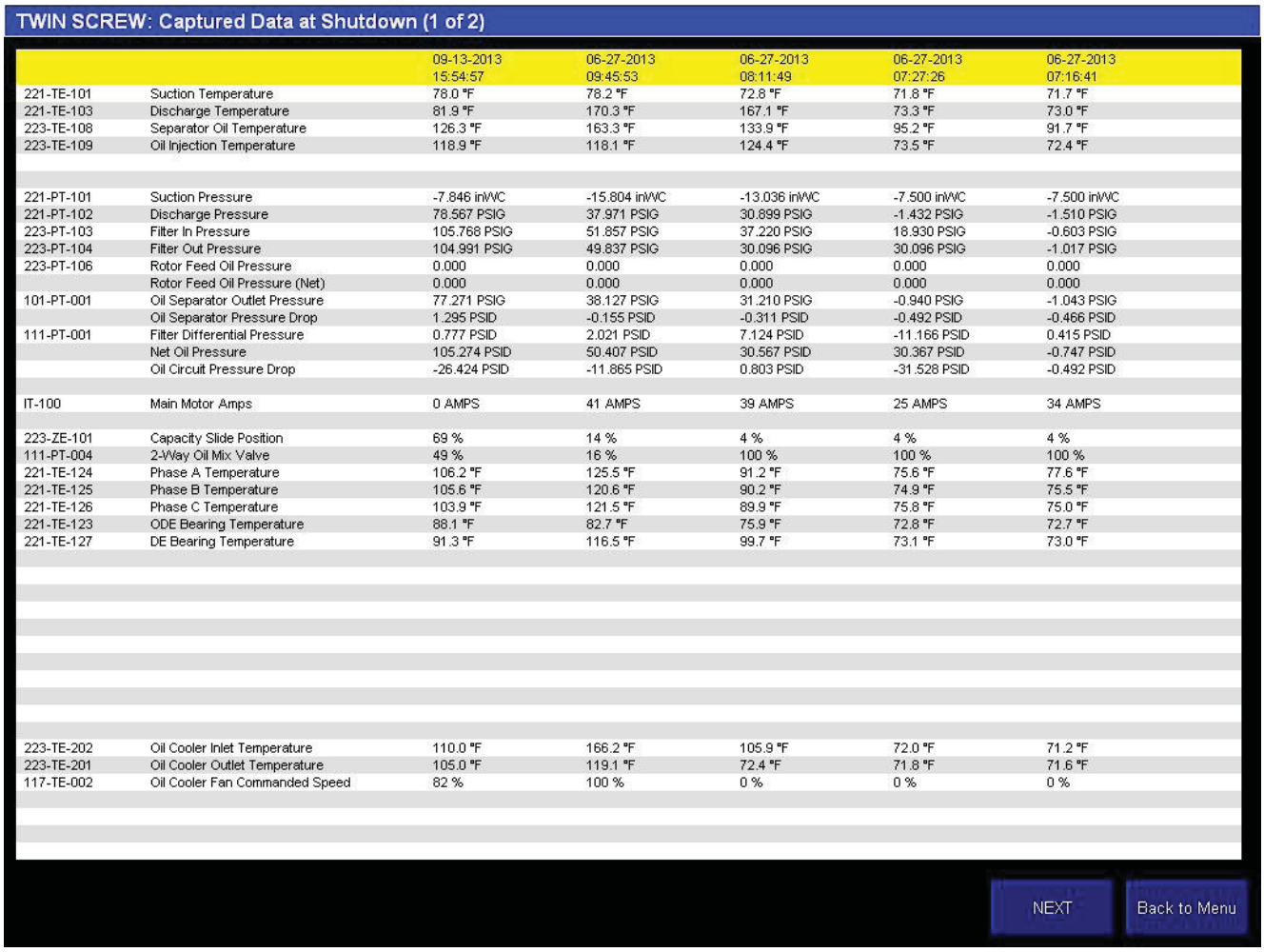


Figure 10-3. Diagnostics Forced Output Screen

Captured Data at Shutdown Screen

The captured data at shutdown screen shows process and operational data at the time the compressor shuts down. Data from the last 5 shutdowns are logged. Each shutdown is given a time and date stamp. The most recent shutdown is on the left.

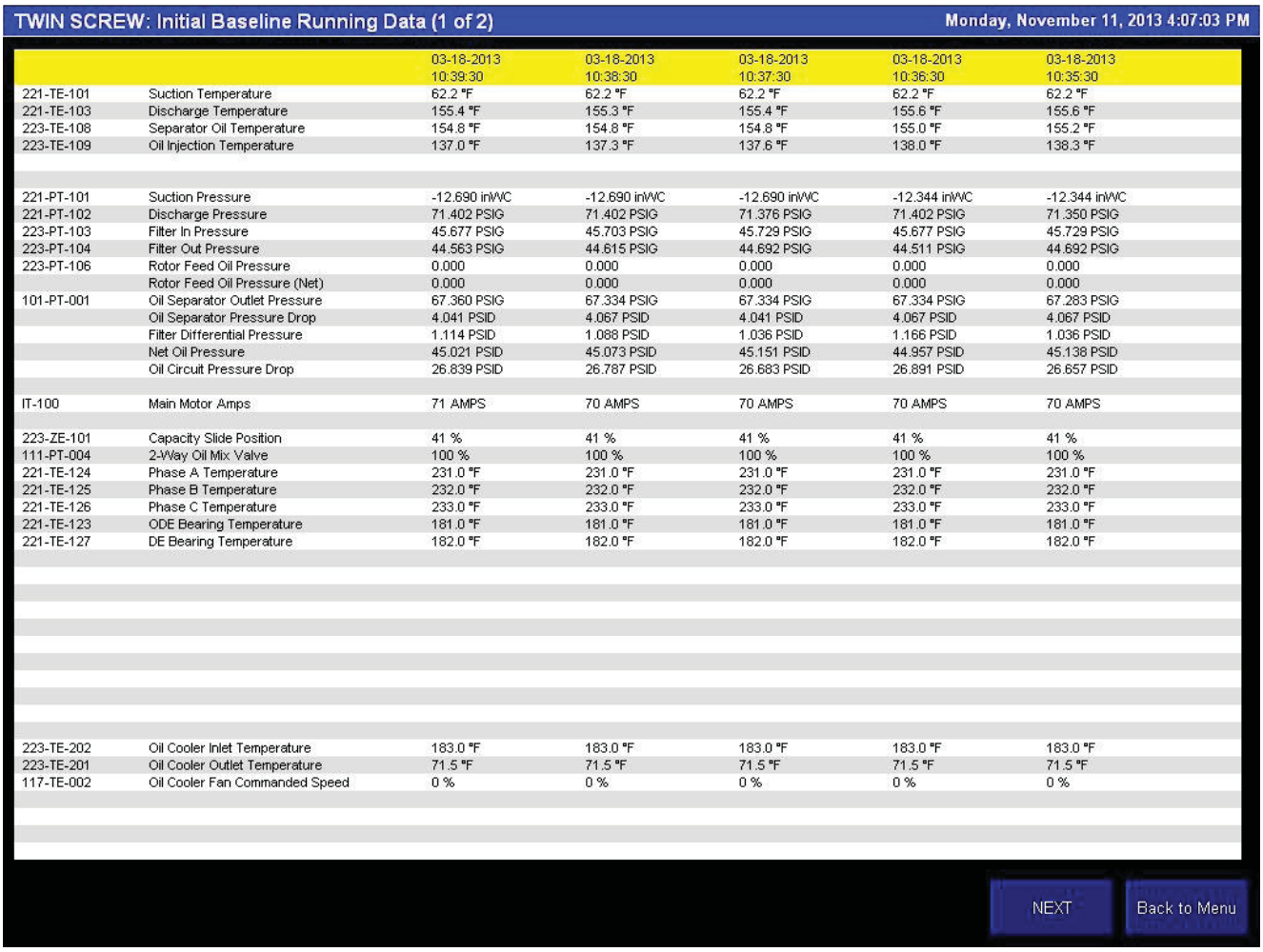


		09-13-2013 15:54:57	06-27-2013 09:45:53	06-27-2013 08:11:49	06-27-2013 07:27:26	06-27-2013 07:16:41
221-TE-101	Suction Temperature	78.0 °F	78.2 °F	72.8 °F	71.8 °F	71.7 °F
221-TE-103	Discharge Temperature	81.9 °F	170.3 °F	167.1 °F	73.3 °F	73.0 °F
223-TE-108	Separator Oil Temperature	126.3 °F	163.3 °F	133.9 °F	95.2 °F	91.7 °F
223-TE-109	Oil Injection Temperature	118.9 °F	118.1 °F	124.4 °F	73.5 °F	72.4 °F
221-PT-101	Suction Pressure	-7.846 inWC	-15.804 inWC	-13.036 inWC	-7.500 inWC	-7.500 inWC
221-PT-102	Discharge Pressure	78.567 PSIG	37.971 PSIG	30.899 PSIG	-1.432 PSIG	-1.510 PSIG
223-PT-103	Filter In Pressure	105.768 PSIG	51.857 PSIG	37.220 PSIG	18.930 PSIG	-0.603 PSIG
223-PT-104	Filter Out Pressure	104.991 PSIG	49.837 PSIG	30.096 PSIG	30.096 PSIG	-1.017 PSIG
223-PT-106	Rotor Feed Oil Pressure	0.000	0.000	0.000	0.000	0.000
	Rotor Feed Oil Pressure (Net)	0.000	0.000	0.000	0.000	0.000
101-PT-001	Oil Separator Outlet Pressure	77.271 PSIG	38.127 PSIG	31.210 PSIG	-0.940 PSIG	-1.043 PSIG
	Oil Separator Pressure Drop	1.295 PSID	-0.155 PSID	-0.311 PSID	-0.492 PSID	-0.466 PSID
111-PT-001	Filter Differential Pressure	0.777 PSID	2.021 PSID	7.124 PSID	-11.166 PSID	0.415 PSID
	Net Oil Pressure	105.274 PSID	50.407 PSID	30.567 PSID	30.367 PSID	-0.747 PSID
	Oil Circuit Pressure Drop	-26.424 PSID	-11.865 PSID	0.803 PSID	-31.528 PSID	-0.492 PSID
IT-100	Main Motor Amps	0 AMPS	41 AMPS	39 AMPS	25 AMPS	34 AMPS
223-ZE-101	Capacity Slide Position	69 %	14 %	4 %	4 %	4 %
111-PT-004	2-Way Oil Mix Valve	49 %	16 %	100 %	100 %	100 %
221-TE-124	Phase A Temperature	106.2 °F	125.5 °F	91.2 °F	75.6 °F	77.6 °F
221-TE-125	Phase B Temperature	105.6 °F	120.6 °F	90.2 °F	74.9 °F	75.5 °F
221-TE-126	Phase C Temperature	103.9 °F	121.5 °F	89.9 °F	75.8 °F	75.0 °F
221-TE-123	ODE Bearing Temperature	88.1 °F	82.7 °F	75.9 °F	72.8 °F	72.7 °F
221-TE-127	DE Bearing Temperature	91.3 °F	116.5 °F	99.7 °F	73.1 °F	73.0 °F
223-TE-202	Oil Cooler Inlet Temperature	110.0 °F	166.2 °F	105.9 °F	72.0 °F	71.2 °F
223-TE-201	Oil Cooler Outlet Temperature	105.0 °F	119.1 °F	72.4 °F	71.8 °F	71.6 °F
117-TE-002	Oil Cooler Fan Commanded Speed	82 %	100 %	0 %	0 %	0 %

Figure 10-4. Captured Data at Shutdown Screen

Initial Baseline Running Data Screen

The Initial Baseline Running Data screen shows data collected when the compressor is first started up. Vilter Service Technicians or Engineers only may log this data. This is to give a reference point for comparing operational and process data to a baseline set of data collected when the compressor or package was new.



		03-18-2013 10:39:30	03-18-2013 10:38:30	03-18-2013 10:37:30	03-18-2013 10:36:30	03-18-2013 10:35:30
221-TE-101	Suction Temperature	62.2 °F	62.2 °F	62.2 °F	62.2 °F	62.2 °F
221-TE-103	Discharge Temperature	155.4 °F	155.3 °F	155.4 °F	155.6 °F	155.6 °F
223-TE-108	Separator Oil Temperature	154.8 °F	154.8 °F	154.8 °F	155.0 °F	155.2 °F
223-TE-109	Oil Injection Temperature	137.0 °F	137.3 °F	137.6 °F	138.0 °F	138.3 °F
221-PT-101	Suction Pressure	-12.690 inWC	-12.690 inWC	-12.690 inWC	-12.344 inWC	-12.344 inWC
221-PT-102	Discharge Pressure	71.402 PSIG	71.402 PSIG	71.376 PSIG	71.402 PSIG	71.350 PSIG
223-PT-103	Filter In Pressure	45.677 PSIG	45.703 PSIG	45.729 PSIG	45.677 PSIG	45.729 PSIG
223-PT-104	Filter Out Pressure	44.563 PSIG	44.615 PSIG	44.692 PSIG	44.511 PSIG	44.692 PSIG
223-PT-106	Rotor Feed Oil Pressure	0.000	0.000	0.000	0.000	0.000
	Rotor Feed Oil Pressure (Net)	0.000	0.000	0.000	0.000	0.000
101-PT-001	Oil Separator Outlet Pressure	67.360 PSIG	67.334 PSIG	67.334 PSIG	67.334 PSIG	67.283 PSIG
	Oil Separator Pressure Drop	4.041 PSID	4.067 PSID	4.041 PSID	4.067 PSID	4.067 PSID
	Filter Differential Pressure	1.114 PSID	1.088 PSID	1.036 PSID	1.166 PSID	1.036 PSID
	Net Oil Pressure	45.021 PSID	45.073 PSID	45.151 PSID	44.957 PSID	45.138 PSID
	Oil Circuit Pressure Drop	26.839 PSID	26.787 PSID	26.683 PSID	26.891 PSID	26.657 PSID
IT-100	Main Motor Amps	71 AMPS	70 AMPS	70 AMPS	70 AMPS	70 AMPS
223-ZE-101	Capacity Slide Position	41 %	41 %	41 %	41 %	41 %
111-PT-004	2-Way Oil Mix Valve	100 %	100 %	100 %	100 %	100 %
221-TE-124	Phase A Temperature	231.0 °F	231.0 °F	231.0 °F	231.0 °F	231.0 °F
221-TE-125	Phase B Temperature	232.0 °F	232.0 °F	232.0 °F	232.0 °F	232.0 °F
221-TE-126	Phase C Temperature	233.0 °F	233.0 °F	233.0 °F	233.0 °F	233.0 °F
221-TE-123	ODE Bearing Temperature	181.0 °F	181.0 °F	181.0 °F	181.0 °F	181.0 °F
221-TE-127	DE Bearing Temperature	182.0 °F	182.0 °F	182.0 °F	182.0 °F	182.0 °F
223-TE-202	Oil Cooler Inlet Temperature	183.0 °F	183.0 °F	183.0 °F	183.0 °F	183.0 °F
223-TE-201	Oil Cooler Outlet Temperature	71.5 °F	71.5 °F	71.5 °F	71.5 °F	71.5 °F
117-TE-002	Oil Cooler Fan Commanded Speed	0 %	0 %	0 %	0 %	0 %

Figure 10-5. Initial Baseline Running Data Screen

Alarms & Trips

Process and Operational data of the compressor unit is continuously monitored by the compressor PLC. If an abnormal condition is detected, an alarm or trip will be annunciated.

- Alarms
  - Warns of an abnormal condition. Compressor may continue to run.
- Trips
  - Compressor will shut down if active.

A scrolling display at the top of the overview and menu screens shows all active alarms and trips, see Figure 11-1.

Trips are shown in the red banner, alarms are shown in the yellow banner.

When a new alarm or trip is triggered, the alarm popup screen will appear showing the most recent alarm or trip, see Figure 11-2.

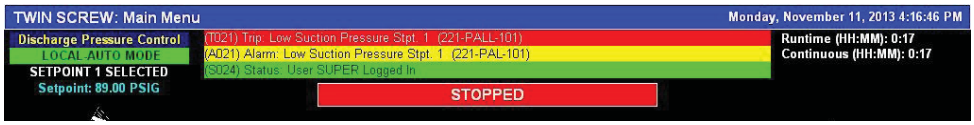


Figure 11-1. Alarm/Trip/Status Bars (Main Menu Screen)

Figure 11-2. Alarm/Trip Popup Screen

Alarm Listing

The following table shows all possible alarms and trips and possible causes. Some alarms and trips are application specific, and do not apply unless a specific option is selected.

To reset alarms or trips press the “Alarm Reset” Button on the overview screen. If the condition is cleared, the alarm will reset. If the condition is not cleared, the alarm will remain active.

Table 11-1. Alarm Listing

Alarm Message	Cause(s)	Notes
(A001) Alarm: (Unassigned)		
(A002) Alarm: PLC to Central Comms Faulted	Loss of Communication with DCS/ Central - Settable Communications Watchdog Timer Expired. (Alarm and Revert to Local Selected on Communication Failure.)	Watchdog Active if Control by Communications is selected
(A003) Alarm: High Main Motor Amps	Main Motor Amps exceeds Motor Amps High Alarm setpoint.	
(A004) Alarm: (Unassigned)		
(A005) Alarm: (Unassigned)		
(A006) Alarm: Low Separator Oil Level	Oil Separator Level Switch has opened indicating drop in Separator Oil Level. (Alarm action Selected)	Active if Oil Separator Level Switch Selected.
(A007) Alarm: Not Assigned		
(A008) Alarm: Not Assigned		
(A009) Alarm: Not Assigned		
(A010) Alarm: Not Assigned		
(A011) Alarm: Low Suction Temperature	Suction Temperature falls below "Suction Temperature" Low Alarm Setpoint.	
(A012) Alarm: High Discharge Temperature	Discharge Temperature exceeds "Discharge Temperature" High Alarm Setpoint.	
(A013) Alarm: Low Oil Separator Temperature - Start	Separator Oil Temperature is Below "Separator Oil Temperature - Start" Low Alarm Setpoint when compressor is off or Oil Separator Start-Run Timer has not expired.	
(A014) Alarm: Low Oil Separator Temperature - Run	Separator Oil Temperature is Below "Separator Oil Temperature - Run" Low Alarm Setpoint After Oil Separator Start-Run Timer has expired.	
(A015) Alarm: Low Oil Injection Temperature	Oil Injection Temperature is Below "Oil Injection Temperature" Low Alarm Setpoint after compressor has completed pre-lube and warm up stages.	
(A016) Alarm: High Oil Injection Temperature	Oil Injection Temperature exceeds "Oil Injection Temperature" High Alarm Setpoint	

Alarm Message	Cause(s)	Notes
(A017) Alarm: Low Process Temperature	Process Temperature falls below Process Temperature Low Alarm Setpoint in Process Temperature control or if displaying Process Temperature.	Active if controlling or displaying Process Temperature
(A018) Alarm: High Process Temperature	Process Temperature exceeds Process Temperature High Alarm Setpoint in Process Temperature control or if displaying Process Temperature.	Active if controlling or displaying Process Temperature
(A019) Alarm: (Unassigned)		
(A020) Alarm: Low Liquid Refrigerant Temperature	Liquid Refrigerant Temperature falls below Liquid Refrigerant Temperature Low Alarm Setpoint if displaying Liquid Refrigerant Temperature	Active if displaying Liquid Refrigerant Temperature
(A021) Alarm: Low Suction Pressure Stpt. 1	Setpoint 1 is selected and Suction Pressure falls below Suction Pressure Low Alarm.	
(A022) Alarm: Low Suction Pressure Stpt. 2	Setpoint 2 is selected and Suction Pressure falls below Suction Pressure Low Alarm.	
(A023) Alarm: High Discharge Pressure Stpt. 1	Setpoint 1 is selected and Discharge Pressure falls below Discharge Pressure High Alarm.	
(A024) Alarm: High Discharge Pressure Stpt. 2	Setpoint 2 is selected and Discharge Pressure falls below Discharge Pressure High Alarm.	
(A025) Alarm: Low Net Oil Pressure - Run	Net Oil Pressure (Oil Manifold Pressure - Suction Pressure) falls below Net Oil Pressure Low Alarm Setpoint after prelube and warmup are complete.	
(A026) Alarm: Unassigned		
(A027) Alarm: High Oil Filter Differential - Start	Oil Filter Differential (Filter In Pressure - Oil Manifold Pressure) exceeds Oil Filter Differential - Start High Alarm Setpoint when compressor is running and before Oil Filter Differential Start-Run Changeover Timer expires.	
(A028) Alarm: High Oil Filter Differential - Run	Oil Filter Differential (Filter In Pressure - Oil Manifold Pressure) exceeds Oil Filter Differential - Run High Alarm Setpoint when compressor is running and after Oil Filter Differential Start-Run Changeover Timer expires.	

Alarm Message	Cause(s)	Notes
(A029) Alarm: Low Oil Pressure - Start	Net Oil Pressure (Oil Manifold Pressure - Suction Pressure) falls below Net Oil Pressure Low Alarm Setpoint after before Warmup is complete	
(A030) Alarm: Low Rotor Feed Oil Pressure	Rotor Feed Oil Pressure falls below Low Alarm Setpoint.	On Twin Screw Applications with Partially Pumped Oil Circuit.
(A031) Alarm: Out of Range: Oil Cooler Inlet Temp	Oil Cooler Inlet Temperature Instrument is Disconnected or Raw value is less than 3.5 mA or Greater than 20.5 mA (if using a 4-20mA Temperature Transmitter).	Active if Displaying Oil Cooler Inlet Temperature
(A032) Alarm: Out of Range: Oil Cooler Outlet Temp	Oil Cooler Outlet Temperature Instrument is Disconnected or Raw value is less than 3.5 mA or Greater than 20.5 mA (if using a 4-20mA Temperature Transmitter).	Active if Controlling an Oil Cooler or Displaying Oil Cooler Outlet Temperature
(A033) Alarm: Out of Range: Condensing Pressure	Condensing Pressure Instrument is Disconnected or Raw value is less than 3.5 mA or Greater than 20.5 mA.	Active if Controlling a Condenser
(A034) Alarm: Out of Range: Aftercooler 1 Outlet Temp	Aftercooler 1 Out Temperature Instrument is Disconnected or Raw value is less than 3.5 mA or Greater than 20.5 mA (if using a 4-20mA Temperature Transmitter).	Active if Controlling Aftercooler 1
(A035) Alarm: Out of Range: Aftercooler 2 Outlet Temp	Aftercooler 2 Out Temperature Instrument is Disconnected or Raw value is less than 3.5 mA or Greater than 20.5 mA (if using a 4-20mA Temperature Transmitter).	Active if Controlling Aftercooler 2
(A036) Alarm: Out of Range: Inlet Scrubber Inlet Pressure	Inlet Scrubber Inlet Pressure Instrument is Disconnected or Raw value is less than 3.5 mA or Greater than 20.5 mA.	Active if Inlet Scrubber is Present
(A037) Alarm: Out of Range: Inlet Scrubber Outlet Pressure	Inlet Scrubber Outlet Pressure Instrument is Disconnected or Raw value is less than 3.5 mA or Greater than 20.5 mA.	Active if Inlet Scrubber is Present
(A038) Alarm: Out of Range: Outlet Scrubber Inlet Pressure	Outlet Scrubber Inlet Pressure Instrument is Disconnected or Raw value is less than 3.5 mA or Greater than 20.5 mA.	Active if Outlet Scrubber is Present
(A039) Alarm: Out of Range: Outlet Scrubber Outlet Pressure	Outlet Scrubber Outlet Pressure Instrument is Disconnected or Raw value is less than 3.5 mA or Greater than 20.5 mA.	Active if Outlet Scrubber is Present

Alarm Message	Cause(s)	Notes
(A040) Alarm: Out of Range: Discharge Recycle Control Pressure	Discharge Recycle Control Pressure Instrument is Disconnected or Raw value is less than 3.5 mA or Greater than 20.5 mA.	Active if Controlling Discharge Recycle Valve
(A041) Alarm: Out of Range: Oil Separator Outlet Pressure	Oil Separator Outlet Pressure Instrument is Disconnected or Raw value is less than 3.5 mA or Greater than 20.5 mA.	Active if Displaying Oil Separator Outlet Pressure
(A042) Alarm: Unassigned		
(A043) Alarm: Unassigned		
(A044) Alarm: (Unassigned)		
(A045) Alarm: (Unassigned)		
(A046) Alarm: High Oil Separator Pressure Drop	Pressure Drop Across Oil Separator Coalescing Elements is greater than High Alarm Setpoint.	When Monitoring Oil Separator Outlet Pressure.
(A047) Alarm: Low Oil Separator Outlet Temp (Dew Point)	Temperature At Outlet of Oil Separator is less than Low Alarm Setpoint.	When Monitoring Oil Separator Outlet Temperature.
(A048) Alarm: High Motor Phase A Temperature	Phase A Motor Winding Temperature exceeds Motor Winding Temperature High Alarm Setpoint	Active if Displaying Motor Winding Temperatures
(A049) Alarm: High Motor Phase B Temperature	Phase B Motor Winding Temperature exceeds Motor Winding Temperature High Alarm Setpoint	Active if Displaying Motor Winding Temperatures
(A050) Alarm: High Motor Phase C Temperature	Phase C Motor Winding Temperature exceeds Motor Winding Temperature High Alarm Setpoint	Active if Displaying Motor Winding Temperatures
(A051) Alarm: Motor DE Bearing Temperature	Drive End Motor Bearing Temperature exceeds Motor Bearing Temperature High Alarm Setpoint	Active if Displaying Motor Bearing Temperatures
(A052) Alarm: Motor ODE Bearing Temperature	Opposite Drive End Motor Bearing Temperature exceeds Motor Bearing Temperature High Alarm Setpoint	Active if Displaying Motor Bearing Temperatures
(A053) Alarm: High Motor Vibration - Sensor 1	Motor Vibration exceeds Motor Vibration High Alarm Setpoint (Sensor 1)	Active if Displaying Motor Vibration Sensor 1
(A054) Alarm: High Motor Vibration - Sensor 2	Motor Vibration exceeds Motor Vibration High Alarm Setpoint (Sensor 2)	Active if Displaying Motor Vibration Sensor 2
(A055) Alarm: High Compressor Vibration - Sensor 1	Compressor Vibration exceeds Compressor Vibration High Alarm Setpoint (Sensor 1)	Active if Displaying Compressor Vibration Sensor 1
(A056) Alarm: High Compressor Vibration - Sensor 2	Compressor Vibration exceeds Compressor Vibration High Alarm Setpoint (Sensor 2)	Active if Displaying Compressor Vibration Sensor 2
(A057) Alarm: Inlet Scrubber High Level	Inlet Scrubber High Liquid Level Switch Activated	Active if Vane Type Inlet Scrubber is Present

Alarm Message	Cause(s)	Notes
(A058) Alarm: Inlet Scrubber High High Level	Inlet Scrubber High High Liquid Level Switch Activated (Selected Action = ALARM)	Active if Vane Type Inlet Scrubber is Present
(A059) Alarm: Inlet Scrubber Low Low Level	Inlet Scribber Low Low Level Switch Activated (Selected Action = ALARM)	Active if Vane Type Inlet Scrubber is Present
(A060) Alarm: Upper Inlet Scrubber High Level	Inlet Scrubber Upper Section High Level Switch Activated	Active if Coalescing Type Inlet Scrubber is Present
(A061) Alarm: Upper Inlet Scrubber High High Level	Inlet Scrubber Upper Section High High Level Switch Activated (Selected Action = ALARM)	Active if Coalescing Type Inlet Scrubber is Present
(A062) Alarm: (Unassigned)		
(A063) Alarm: Lower Inlet Scrubber High Level	Inlet Scrubber Lower Section High Level Switch Activated	Active if Coalescing Type Inlet Scrubber is Present
(A064) Alarm: Lower Inlet Scrubber High High Level	Inlet Scrubber Lower Section High High Level Switch Activated	Active if Coalescing Type Inlet Scrubber is Present
(A065) Alarm: Inlet Scrubber High Pressure Drop	Pressure Drop across Inlet Scrubber is greater than High Alarm Setpoint.	Active if Inlet Scrubber is Selected.
(A066) Alarm: Inlet Scrubber Condensate Pump Starter Fault	Inlet Scrubber Condensate Pump Commanded to run, run confirmation not received.	Active if Controlling a condensate Pump on Inlet Scrubber
(A067) Alarm: Outlet Scrubber High Level	Outlet Scrubber High Liquid Level Switch Activated	Active if Vane Type Outlet Scrubber is Present
(A068) Alarm: Outlet Scrubber High High Level	Outlet Scrubber High High Liquid Level Switch Activated (Selected Action = ALARM)	Active if Vane Type Outlet Scrubber is Present
(A069) Alarm: Outlet Scrubber Low Low Level	Outlet Scribber Low Low Level Switch Activated (Selected Action = ALARM)	Active if Vane Type Outlet Scrubber is Present
(A070) Alarm: Upper Outlet Scrubber High Level	Outlet Scrubber Upper Section High Level Switch Activated	Active if Coalescing Type Outlet Scrubber is Present
(A071) Alarm: Upper Outlet Scrubber High High Level	Outlet Scrubber Upper Section High High Level Switch Activated (Selected Action = ALARM)	Active if Coalescing Type Outlet Scrubber is Present
(A072) Alarm: (Unassigned)		
(A073) Alarm: Lower Outlet Scrubber High Level	Outlet Scrubber Lower Section High Level Switch Activated	Active if Coalescing Type Outlet Scrubber is Present
(A074) Alarm: Lower Outlet Scrubber High High Level	Outlet Scrubber Lower Section High High Level Switch Activated	Active if Coalescing Type Outlet Scrubber is Present
(A075) Alarm: Outlet Scrubber High Pressure Drop	Pressure Drop Across Outlet Scrubber is greater than High Alarm Setpoint.	Active if Outlet Scrubber is selected.
(A076) Alarm: Outlet Scrubber Condensate Pump Starter Fault	Outlet Scrubber Condensate Pump Commanded to run, running confirmation not received.	Active if Controlling a Condensate Pump on Outlet Scrubber
(A077) Alarm: (Unassigned)		
(A078) Alarm: (Unassigned)		

Alarm Message	Cause(s)	Notes
(A079) Alarm:	User defined Alarm 1	Message Defined in "Device Names" Screens
(A080) Alarm:	User Defined Alarm 2	Message Defined in "Device Names" Screens
(A081) Alarm:	User Defined Alarm 3	Message Defined in "Device Names" Screens
(A082) Alarm:	User defined Alarm 4	Message Defined in "Device Names" Screens
(A083) Alarm:	User defined Alarm 5	Message Defined in "Device Names" Screens
(A084) Alarm: (Unassigned)		
(A085) Alarm: (Unassigned)		
(A086) Alarm: (Unassigned)		
(A087) Alarm: (Unassigned)		
(A088) Alarm: (Unassigned)		
(A089) Alarm: Oil Cooler Fan VFD Fault	Fault Contact open on Oil Cooler VFD	If controlling a VFD Type Oil Cooler
(A090) Alarm: Oil Cooler Fan (Step Type) Starter Fault	Oil Cooler Fan commanded to start, running confirmation not received.	If controlling a Step Type Oil Cooler
(A091) Alarm: (Unassigned)		
(A092) Alarm: (Unassigned)		
(A093) Alarm: Aftercooler 1 Fan VFD Fault	Fault Contact open on Aftercooler 1 VFD	If controlling a VFD Type Aftercooler 1
(A094) Alarm: Aftercooler 1 Fan (Step Type) Starter Fault	Aftercooler 1 Fan commanded to start, running confirmation not received.	If controlling a Step Type Aftercooler 1
(A095) Alarm: Aftercooler 2 Fan VFD Fault	Fault Contact open on Aftercooler 2 VFD	If controlling a VFD Type Aftercooler 2
(A096) Alarm: Aftercooler 2 Fan (Step Type) Starter Fault	Aftercooler 2 Fan commanded to start, running confirmation not received.	If controlling a Step Type Aftercooler 2
(A097) Alarm: Economizer High Level	Economizer High Liquid Level Switch Activated	If monitoring the liquid level in economizer vessel
(A098) Alarm: Chiller High Level	Chiller High Liquid Level Switch Activated	If monitoring the liquid level in chiller vessel
(A099) Alarm: Air Cooled Condenser Fan VFD Fault	Fault Contact open on Condenser VFD	If controlling a VFD Type Condenser
(A100) Alarm: Air Cooled Condenser (Step Type) Starter Fault	Condenser Fan commanded to start, run confirmation not received.	If controlling a Step Type Condenser
(A101) Alarm: Unassigned		
(A102) Alarm: Unassigned		
(A103) Alarm: (Unassigned)		
(A104) Alarm: (Unassigned)		
(A105) Alarm: (Unassigned)		

Alarm Message	Cause(s)	Notes
(A106) Alarm: High Methane Gas %LEL	Methane Concentration in Building Exceeds Methane Gas %LEL High Alarm Setpoint.	If compressor is in an enclosure
(A107) Alarm: (Unassigned)		
(A108) Alarm: Low Oil Cooler Out Temperature	Oil Cooler Outlet Temperature falls below Oil Cooler Outlet Temperature - Low Alarm Setpoint	If controlling an oil cooler or displaying Oil Cooler Outlet Temperature
(A109) Alarm: High Oil Cooler Out Temperature	Oil Cooler Outlet Temperature exceeds Oil Cooler Outlet Temperature - High Alarm Setpoint	If controlling an oil cooler or displaying Oil Cooler Outlet Temperature
(A110) Alarm: High Enclosure Temperature	Temperature inside Enclosure exceeds Enclosure Temperature - High Setpoint	If compressor is in an enclosure
(A111) Alarm: (Unassigned)		
(A112) Alarm: (Unassigned)		
(A113) Alarm: (Unassigned)		
(A114) Alarm: (Unassigned)		
(A115) Alarm: (Unassigned)		
(A116) Alarm: (Unassigned)		
(A117) Alarm: (Unassigned)		
(A118) Alarm: (Unassigned)		
(A119) Alarm: (Unassigned)		
(A120) Alarm: (Unassigned)		
(A121) Alarm: (Unassigned)		
(A122) Alarm: (Unassigned)		
(A123) Alarm: (Unassigned)		
(A124) Alarm: (Unassigned)		
(A125) Alarm: (Unassigned)		
(A126) Alarm: (Unassigned)		
(A127) Alarm: (Unassigned)		

Trip Listing

Table 11-2. Trip Listing

Trip Message	Cause(s)	Notes
(T001) Trip: MCR Not Energized/E-Stop Active	Emergency Stop Button on PLC panel Pressed, Loss of Power	
(T002) Trip: PLC to Central Comms Faulted	Loss of Communication with DCS/ Central - Settable Communications Watchdog Timer Expired. (Action on Comm Failure = Trip)	Watchdog Active if Control by Communications is selected
(T003) Trip: High Main Motor Amps	Main Motor Amps exceeds Motor Amps High Trip setpoint.	
(T004) Setpoint out of Range - See Menu Screen		
(T005) Trip: False Start Detected	Controller detected main motor running when not commanded. Check main motor starter.	
(T006) Trip: Low Separator Oil Level	Oil Separator Level Switch has opened indicating drop in Separator Oil Level. (Trip action Selected)	Active if Oil Separator Level Switch Selected.
(T007) Trip: Faulted I/O Module Connection or Module Type		
(T008) Trip: Main Motor Starter Fault		
(T009) Trip: Main Motor Feedback Fault/Overload		
(T010) Trip: Supplemental Shutdown Active	Supplemental Shutdown output is turned on and Emergency Stop is activated by the controller.	
(T011) Trip: Low Suction Temperature	Suction Temperature falls below "Suction Temperature" Low Trip Setpoint.	
(T012) Trip: High Discharge Temperature	Discharge Temperature exceeds "Discharge Temperature" High Trip Setpoint.	
(T013) Trip: Low Oil Separator Temperature - Start	Separator Oil Temperature is Below "Separator Oil Temperature - Start" Low Trip Setpoint when compressor is off or Oil Separator Start-Run Timer has not expired.	
(T014) Trip: Low Oil Separator Temperature - Run	Separator Oil Temperature is Below "Separator Oil Temperature - Run" Low Trip Setpoint After Oil Separator Start-Run Timer has expired.	

Trip Message	Cause(s)	Notes
(T015) Trip: Low Oil Injection Temperature	Oil Injection Temperature is Below "Oil Injection Temperature" Low Trip Setpoint after compressor has completed pre-lube and warm up stages.	
(T016) Trip: High Oil Injection Temperature	Oil Injection Temperature exceeds "Oil Injection Temperature" High Trip Setpoint	
(T017) Trip: Low Process Temperature	Process Temperature falls below Process Temperature Low Trip Setpoint in Process Temperature control or if displaying Process Temperature.	Active if controlling or displaying Process Temperature
(T018) Trip: (Unassigned)		
(T019) Trip: (Unassigned)		
(T020) Trip: Low Liquid Refrigerant Temperature	Liquid Refrigerant Temperature falls below Liquid Refrigerant Temperature Low Trip Setpoint if displaying Liquid Refrigerant Temperature	Active if displaying Liquid Refrigerant Temperature
(T021) Trip: Low Suction Pressure Stpt. 1	Setpoint 1 is selected and Suction Pressure falls below Suction Pressure Low Trip Setpoint.	
(T022) Trip: Low Suction Pressure Stpt. 2	Setpoint 2 is selected and Suction Pressure falls below Suction Pressure Low Trip Setpoint.	
(T023) Trip: High Discharge Pressure Stpt. 1	Setpoint 1 is selected and Discharge Pressure falls below Discharge Pressure High Trip Setpoint.	
(T024) Trip: High Discharge Pressure Stpt. 2	Setpoint 2 is selected and Discharge Pressure falls below Discharge Pressure High Trip Setpoint.	
(T025) Trip: Low Net Oil Pressure - Run	Net Oil Pressure (Oil Manifold Pressure - Suction Pressure) falls below Net Oil Pressure Low Trip Setpoint after prelube and warmup are complete.	
(T026) Trip: Failed To Reach Prelube Pressure - Start Sequence Aborted	Failed to maintain required prelube pressure for required time during start-up.	
(T027) Trip: High Oil Filter Differential - Start	Oil Filter Differential (Filter In Pressure - Oil Manifold Pressure) exceeds Oil Filter Differential - Start High Trip Setpoint when compressor is running and before Oil Filter Differential Start-Run Changeover Timer expires.	

Trip Message	Cause(s)	Notes
(T028) Trip: High Oil Filter Differential - Run	Oil Filter Differential (Filter In Pressure - Oil Manifold Pressure) exceeds Oil Filter Differential - Run High Trip Setpoint when compressor is running and after Oil Filter Differential Start-Run Changeover Timer expires.	
(T029) Trip: Low Oil Pressure - Start	Net Oil Pressure (Oil Manifold Pressure - Suction Pressure) falls below Net Oil Pressure Low Trip Setpoint after before Warmup is complete	
(T030) Trip: Low Rotor Feed Oil Pressure	Rotor Feed Oil Pressure is below Low Trip Setpoint.	Used on Twin Screw Machines with Partially Pumped Oil Circuit.
(T031) Trip: Out of Range: Suction Pr	Suction Pressure Instrument is Disconnected or Raw value is less than 3.5 mA or Greater than 20.5 mA	
(T032) Trip: Out of Range: Discharge Pr	Discharge Pressure Instrument is Disconnected or Raw value is less than 3.5 mA or Greater than 20.5 mA	
(T033) Trip: Out of Range: Manifold Pr	Oil Manifold Pressure Instrument is Disconnected or Raw value is less than 3.5 mA or Greater than 20.5 mA.	
(T034) Trip: Out of Range: Filter Inlet Pr	Oil Filter Inlet Pressure Instrument is Disconnected or Raw value is less than 3.5 mA or Greater than 20.5 mA	
(T035) Trip: Out of Range: Suction Temp	Suction Temperature Instrument is Disconnected or Raw value is less than 3.5 mA or Greater than 20.5 mA (if using a 4-20mA Temperature Transmitter).	
(T036) Trip: Out of Range: Discharge Temp	Discharge Temperature Instrument is Disconnected or Raw value is less than 3.5 mA or Greater than 20.5 mA (if using a 4-20mA Temperature Transmitter).	
(T037) Trip: Out of Range: Oil Sep Temp	Separator Oil Temperature Instrument is Disconnected or Raw value is less than 3.5 mA or Greater than 20.5 mA (if using a 4-20mA Temperature Transmitter).	
(T038) Trip: Out of Range: Oil Injection Temp	Oil Injection Temperature Instrument is Disconnected or Raw value is less than 3.5 mA or Greater than 20.5 mA (if using a 4-20mA Temperature Transmitter).	

Trip Message	Cause(s)	Notes
(T039) Trip: Out of Range: Main Motor Amps	Main Motor Current Transmitter is Disconnected or Raw value is less than 3.5 mA or Greater than 20.5 mA.	
(T040) Trip: Out of Range: Capacity Slide Position	Capacity Slide Cable is Disconnected or Raw value is less than 0 mV or Greater than 5200 mV.	
(T041) Unassigned		
(T042) Trip: Out of Range: Process Temp	Process Temperature Instrument is Disconnected or Raw value is less than 3.5 mA or Greater than 20.5 mA (if using a 4-20mA Temperature Transmitter).	
(T043) Trip: Out of Range: Motor RTD Phase A	Winding RTD is disconnected or faulty	
(T044) Trip: Out of Range: Motor RTD Phase B	Winding RTD is disconnected or faulty	
(T045) Trip: Out of Range: Motor RTD Phase C	Winding RTD is disconnected or faulty	
(T046) Trip: Out of Range: Motor RTD ODE	Bearing RTD is disconnected or faulty	
(T047) Trip: Out of Range: Motor RTD DE	Bearing RTD is disconnected or faulty	
(T048) Trip: High Motor Phase A Temperature	Phase A Motor Winding Temperature exceeds Motor Winding Temperature High Trip Setpoint	Active if Displaying Motor Winding Temperatures
(T049) Trip: High Motor Phase B Temperature	Phase B Motor Winding Temperature exceeds Motor Winding Temperature High Trip Setpoint	Active if Displaying Motor Winding Temperatures
(T050) Trip: High Motor Phase C Temperature	Phase C Motor Winding Temperature exceeds Motor Winding Temperature High Trip Setpoint	Active if Displaying Motor Winding Temperatures
(T051) Trip: High Motor DE Bearing Temperature	Drive End Motor Bearing Temperature exceeds Motor Bearing Temperature High Trip Setpoint	Active if Displaying Motor Bearing Temperatures
(T052) Trip: High Motor ODE Bearing Temperature	Opposite Drive End Motor Bearing Temperature exceeds Motor Bearing Temperature High Trip Setpoint	Active if Displaying Motor Bearing Temperatures
(T053) Trip: High Motor Vibration - Sensor 1	Motor Vibration exceeds Motor Vibration High Trip Setpoint (Sensor 1)	Active if Displaying Motor Vibration Sensor 1

Trip Message	Cause(s)	Notes
(T054) Trip: High Motor Vibration - Sensor 2	Motor Vibration exceeds Motor Vibration High Trip Setpoint (Sensor 2)	Active if Displaying Motor Vibration Sensor 2
(T055) Trip: High Compressor Vibration - Sensor 1	Compressor Vibration exceeds Compressor Vibration High Trip Setpoint (Sensor 1)	Active if Displaying Compressor Vibration Sensor 1
(T056) Trip: High Compressor Vibration - Sensor 2	Compressor Vibration exceeds Compressor Vibration High Trip Setpoint (Sensor 2)	Active if Displaying Compressor Vibration Sensor 2
(T057) Trip: (Unassigned)		
(T058) Trip: Inlet Scrubber High High Level	Inlet Scrubber High High Liquid Level Switch Activated (Selected Action = TRIP)	Active if Vane Type Inlet Scrubber is Present
(T059) Trip: Inlet Scrubber Low Low Level	Inlet Scrubber Low Low Level Switch Activated (Selected Action = TRIP)	Active if Vane Type Inlet Scrubber is Present
(T060) Trip: (Unassigned)		
(T061) Trip: Upper Inlet Scrubber High High Level	Inlet Scrubber Upper Section High High Level Switch Activated (Selected Action = TRIP)	Active if Coalescing Type Inlet Scrubber is Present
(T062) Trip: (Unassigned)		
(T063) Trip: (Unassigned)		
(T064) Trip: Lower Inlet Scrubber High High Level	Inlet Scrubber Lower Section High High Level Switch Activated (Selected Action = Trip)	Active if Coalescing Type Inlet Scrubber is Present
(T065) Trip: (Unassigned)		
(T066) Trip: (Unassigned)		
(T067) Trip: (Unassigned)		
(T068) Trip: Outlet Scrubber High High Level	Outlet Scrubber High High Liquid Level Switch Activated (Selected Action = TRIP)	Active if Vane Type Outlet Scrubber is Present
(T069) Trip: Outlet Scrubber Low Low Level	Outlet Scribber Low Low Level Switch Activated (Selected Action = TRIP)	Active if Vane Type Outlet Scrubber is Present
(T070) Trip: (Unassigned)		
(T071) Trip: Upper Outlet Scrubber High High Level	Outlet Scrubber Upper Section High High Level Switch Activated (Selected Action = TRIP)	Active if Coalescing Type Outlet Scrubber is Present
(T072) Trip: (Unassigned)		
(T073) Trip: (Unassigned)		
(T074) Trip: Lower Outlet Scrubber High High Level	Outlet Scrubber Lower Section High High Level Switch Activated (Seelcted Action = TRIP)	Active if Coalescing Type Outlet Scrubber is Present
(T075) Trip: (Unassigned)		
(T076) Trip: (Unassigned)		
(T077) Trip: (Unassigned)		

Trip Message	Cause(s)	Notes
(T078) Trip: (Unassigned)		
(T079) Trip:	User defined Trip 1	Message Defined in "Device Names" Screens
(T080) Trip:	User Defined Trip 2	Message Defined in "Device Names" Screens
(T081) Trip:	User Defined Trip 3	Message Defined in "Device Names" Screens
(T082) Trip:	User defined Trip 4	Message Defined in "Device Names" Screens
(T083) Trip:	User defined Trip 5	Message Defined in "Device Names" Screens
(T084) Trip: (Unassigned)		
(T085) Trip: (Unassigned)		
(T086) Trip: (Unassigned)		
(T087) Trip: (Unassigned)		
(T088) Trip: (Unassigned)		
(T089) Trip: (Unassigned)		
(T090) Trip: (Unassigned)		
(T091) Trip: (Unassigned)		
(T092) Trip: (Unassigned)		
(T093) Trip: (Unassigned)		
(T094) Trip: (Unassigned)		
(T095) Trip: (Unassigned)		
(T096) Trip: (Unassigned)		
(T097) Trip: (Unassigned)		
(T098) Trip: Chiller High Level	Liquid Level in Chiller Vessel has tripped the high level switch.	
(T099) Trip: (Unassigned)		
(T100) Trip: (Unassigned)		
(T101) Trip: EPCS Safety Active - Low/Suction	Low Side/Suction Pressure Exceeds EPCS Low Side Relief Setpoint	Active if EPCS Safety Selected.
(T102) Trip: EPCS Safety Active - High/Discharge	High Side/Discharge Pressure Exceeds EPCS High Side Relief Setpoint	Active if EPCS Safety Selected.
(T103) Trip: (Unassigned)		
(T104) Trip: (Unassigned)		
(T105) Trip: (Unassigned)		
(T106) Trip: High Methane Gas %LEL	Methane Concentration in Building Exceeds Methane Gas %LEL High Trip Setpoint.	If compressor is in an enclosure
(T107) Trip: (Unassigned)		

Trip Message	Cause(s)	Notes
(T108) Trip: Smoke Detector Tripped	Smoke Detector Trip Contact opened, detected smoke in compressor enclosure	If compressor is in an enclosure
(T109) Trip: (Unassigned)		
(T110) Trip: High Enclosure Temperature	Temperature inside Enclosure exceeds Enclosure Temperature - High Trip Setpoint	If compressor is in an enclosure
(T111) Trip: Out of Range: 4-20 mA Caphold Target	4-20mA Caphold Input is Disconnected or Raw Value is less than 3.5 mA or greater than 20 mA	If remote manual mode active and 4-20mA caphold selected as Remote Manual Source
(T112) Trip: Out of Range: Building Temperature	Building Temperature RTD Input is Disconnected or Raw Value is less than 3.5 mA or greater than 20 mA (If using 4-20mA Transmitter)	If compressor is in an enclosure
(T113) Trip: Out of Range: Methane Detector	Methane Detector is Disconnected or Raw Value is less than 3.5 mA or greater than 20 mA	If compressor is in an enclosure
(T114) Trip: Out of Range: EPCS Low Pressure	Low Side EPCS Relief Instrument is Disconnected or Raw Value is less than 3.5 mA or greater than 20 mA	Active if EPCS Safety Selected.
(T115) Trip: Out of Range: EPCS High Pressure	High Side EPCS Relief Instrument is Disconnected or Raw Value is less than 3.5 mA or greater than 20 mA	Active if EPCS Safety Selected.
(T116) Trip: Out of Range: Motor Vibration 1	Motor Vibration 1 Instrument is Disconnected or Raw Value is less than 3.5 mA or greater than 20 mA	If Motor Vibration Sensor 1 is installed
(T117) Trip: Out of Range: Motor Vibration 2	Motor Vibration 2 Instrument is Disconnected or Raw Value is less than 3.5 mA or greater than 20 mA	If Motor Vibration Sensor 2 is installed
(T118) Trip: Out of Range: Compressor Vibration 1	Compressor Vibration 1 Instrument is Disconnected or Raw Value is less than 3.5 mA or greater than 20 mA	If Compressor Vibration Sensor 1 is installed
(T119) Trip: Out of Range: Compressor Vibration 2	Compressor Vibration 2 Instrument is Disconnected or Raw Value is less than 3.5 mA or greater than 20 mA	If Compressor Vibration Sensor 2 is installed
(T120) Trip: Out of Range: Rotor Feed Oil Pressure	Rotor Feed Oil Pressure Instrument is Disconnected or Raw Value is less than 3.5 mA or greater than 20 mA	On Twin Screw Machines with Partially Pumped Oil Circuit.
(T121) Trip: (Unassigned)		
(T122) Trip: (Unassigned)		
(T123) Trip: (Unassigned)		
(T124) Trip: (Unassigned)		
(T125) Trip: (Unassigned)		
(T126) Trip: (Unassigned)		
(T127) Trip: (Unassigned)		
(T128) Trip: (Unassigned)		

Status Messages and Compressor State Indicator

Status messages are used to indicate compressor status information to the user. Status messages are used to inform the user of any of the following conditions.

- Anti-Recycle Timer is active
- Compressor is in standby mode and is waiting for one or more conditions to be met
- State of the Compressor Startup Sequence
- Load Limits and Forced Unloading
- Slide Calibration is active
- Compressor PLC has automatically reverted to Local-Auto mode on loss of communications with central controller or DCS (if this function is enabled)
- A user is logged in
- An output is forced
- Scheduled Maintenance is due (if this function is enabled)
- Slide valve exercising is active (if this function is enabled)

Status messages are shown in a green scrolling banner at the top of the overview and menu screens.

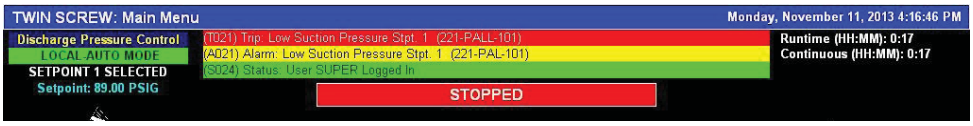


Figure 11-3. Alarm/Trip/Status Bars (Main Menu Screen)

Table 11-3. Status Listing

Status Message	Notes
(S001) Status: Compressor Stopped	Displayed in the Event List only
(S002) Status: Compressor Started	Displayed in the Event List only
(S003) Status: NOT USED	
(S004) Status: True Anti-Recycle Active: Remaining: XX:XX	Shows remaining anti-recycle time
(S005) Status: NOT USED	
(S006) Status: Waiting to Start: Discharge-Suction Not Equalized	Compressor PLC is waiting for compressor Discharge-Suction to be equalized to within a settable differential before the compressor will start.
(S007) Status: Waiting to Start: Remote Run Permissive Input	Compressor PLC is waiting for a contact closure on the remote run permissive input before the compressor will start
(S008) Status: Waiting to Start: Soft Run Permissive from DCS/Central	Compressor PLC is waiting for a run command from the central controller or DCS (if control by communications is enabled)
(S009) Status: Auto Cycle Stop - Suction Pressure	Auto Start-Stop function is enabled and "Stop" Pressure has been reached.
(S010) Status: Auto Cycle Stop - Process Temperature	Auto Start-Stop function is enabled and "Stop" Temperature has been reached.

Status Message	Notes
(S011) Status: Auto Cycle Stop - Discharge Pressure	Auto Start-Stop function is enabled and "Stop" Pressure has been reached.
(S012) Status: Compressor Prelube	
(S013) Status: Compressor Prelube Failed, Retry in XX Seconds	Shows remaining time until the compressor prelube cycle will re-start
(S014) Status: Oil Pump Transition	
(S015) Status: Compressor Warmup - Hold at Minimum Capacity Slide Position	Shows remaining warmup time until compressor will begin loading.
(S016) Status: Loading Inhibited: Low Suction Pressure	
(S017) Status: Loading Inhibited: High Discharge Pressure	
(S018) Status: Loading Inhibited: High Motor Amps	
(S019) Status: Forced Unload: Low Suction Pressure	
(S020) Status: Forced Unload: High Discharge Pressure	
(S021) Status: Forced Unload: High Motor Amps	
(S022) Status: Slide Valve Calibration Active	
(S023) Status: Comms Faulted, Reverted to Local Mode	If "Control by Communications" is enabled and "Alarm and Revert to Local" is selected as the communications fault action.
(S024) Status: User SUPER Logged In	
(S025) Status: User OP1 Logged In	
(S025) Status: User OP2 Logged In	
(S025) Status: User OP3 Logged In	
(S025) Status: User OP4 Logged In	
(S025) Status: User OP5 Logged In	
(S030) Status: Main Motor FORCED ON	
(S031) Status: NOT USED	
(S032) Status: Oil Pump FORCED ON	
(S033) Status: Oil Cooler VFD FORCED ON	
(S034) Status: Oil Cooler Fan 1 FORCED ON	
(S035) Status: Oil Cooler Fan 2 FORCED ON	
(S036) Status: Oil Cooler Fan 3 FORCED ON	
(S037) Status: Oil Cooler Fan 4 FORCED ON	
(S038) Status: Oil Cooler Fan 5 FORCED ON	
(S039) Status: Oil Cooler Fan 6 FORCED ON	
(S040) Status: Oil Cooler Fan 7 FORCED ON	
(S041) Status: Oil Cooler Fan 8 FORCED ON	
(S042) Status: Oil Cooler Fan 9 FORCED ON	
(S043) Status: Oil Cooler Fan 10 FORCED ON	
(S044) Status: Aftercooler 1 VFD FORCED ON	
(S045) Status: Aftercooler 1 Fan 1 FORCED ON	
(S046) Status: Aftercooler 1 Fan 2 FORCED ON	
(S047) Status: Aftercooler 1 Fan 3 FORCED ON	

Status Message	Notes
(S048) Status: Aftercooler 1 Fan 4 FORCED ON	
(S049) Status: Aftercooler 1 Fan 5 FORCED ON	
(S050) Status: Aftercooler 1 Fan 6 FORCED ON	
(S051) Status: Aftercooler 1 Fan 7 FORCED ON	
(S052) Status: Aftercooler 1 Fan 8 FORCED ON	
(S053) Status: Aftercooler 1 Fan 9 FORCED ON	
(S054) Status: Aftercooler 1 Fan 10 FORCED ON	
(S055) Status: Aftercooler 2 VFD FORCED ON	
(S056) Status: Aftercooler 2 Fan 1 FORCED ON	
(S057) Status: Aftercooler 2 Fan 2 FORCED ON	
(S058) Status: Aftercooler 2 Fan 3 FORCED ON	
(S059) Status: Aftercooler 2 Fan 4 FORCED ON	
(S060) Status: Aftercooler 2 Fan 5 FORCED ON	
(S061) Status: Aftercooler 2 Fan 6 FORCED ON	
(S062) Status: Aftercooler 2 Fan 7 FORCED ON	
(S063) Status: Aftercooler 2 Fan 8 FORCED ON	
(S064) Status: Aftercooler 2 Fan 9 FORCED ON	
(S065) Status: Aftercooler 2 Fan 10 FORCED ON	
(S066) Status: Condenser Fan VFD FORCED ON	
(S067) Status: Condenser Fan 1 FORCED ON	
(S068) Status: Condenser Fan 2 FORCED ON	
(S069) Status: Condenser Fan 3 FORCED ON	
(S070) Status: Condenser Fan 4 FORCED ON	
(S071) Status: Condenser Fan 5 FORCED ON	
(S072) Status: Condenser Fan 6 FORCED ON	
(S073) Status: Condenser Fan 7 FORCED ON	
(S074) Status: Condenser Fan 8 FORCED ON	
(S075) Status: Condenser Fan 9 FORCED ON	
(S076) Status: Condenser Fan 10 FORCED ON	
(S077) Status: Condenser Water Valve FORCED ON	
(S078) Status: VPLUS Pump FORCED ON	
(S079) Status: Liquid Injection Valve Air SOV FORCED ON	
(S080) Status: Discharge Recycle Air SOV FORCED ON	
(S081) Status: Oil Mixing Valve FORCED ON	
(S082) Status: Oil Injection Valve FORCED ON	
(S083) Status: Alarm Indication FORCED ON	
(S084) Status: Trip Indication FORCED ON	
(S085) Status: Oil Separator Heaters FORCED ON	
(S086) Status: Suction Oil SOV FORCED ON	
(S087) Status: Gas EQ SOV FORCED ON	
(S088) Status: Economizer SOV FORCED ON	

Status Message	Notes
(S089) Status: Hotgas SOV FORCED ON	
(S090) Status: Venturi Oil Recovery SOVs FORCED ON	
(S091) Status: Inlet Scrubber Drain Pump/SOV FORCED ON	
(S092) Status: Inlet Scrubber Backup SOV FORCED ON	
(S093) Status: Outlet Scrubber Drain Pump/SOV FORCED ON	
(S094) Status: Outlet Scrubber Backup SOV FORCED ON	
(S095) Status: Enclosure Vent Fans FORCED ON	
(S096) Status: Enclosure Heaters FORCED ON	
(S097) Status: Evap Condenser Pump FORCED ON	
(S098) Status: EPCS Low Side SOV FORCED ON	
(S099) Status: EPCS High Side SOV FORCED ON	
(S100) Status: Oil Cooler STBY Heaters FORCED ON	
(S101) Status: Alarm Horn FORCED ON	
(S102) Status: Stacklight - Amber FORCED ON	
(S103) Status: Stacklight - Red FORCED ON	
(S104) Status: INLET SCRUBBER - PUMP 2 FORCED ON	
(S105) Status: OUTLET SCRUBBER - PUMP 2 FORCED ON	
(S106) Status: OIL DRAIN SV FORCED ON	
(S107) Status: Economizer Port 2 FORCED ON	
(S108) Status: Shunt Trip FORCED ON	
(S109) Status: User MGR Logged In	
(S110) Status: Setpoint 1 Active	Displayed in the Event List only
(S111) Status: Setpoint 2 Active	Displayed in the Event List only
(S112) Status: Scheduled Maintenance Due	The message entered in the settable maintenance timer dialog will appear in the status banner and event list
(S113) Status: Aftercooler 1 Valve Forced	
(S114) Status: Aftercooler 2 Valve Forced	
(S115) Status: Capacity Slide Exercise Active	

Troubleshooting

IF THE COMPRESSOR WILL NOT START

In order to initiate a start at the compressor, make sure all permissives to initiate a start are met.

To initiate a start, the following conditions must be met:

- Control Power is ON (Emergency Stop button is not pressed and Master Control Relay is energized, indicated by pilot light on front of panel)
- No Active Trips

If a start has been initiated and the compressor has not started, it is in standby mode. When in standby mode, the status banner will indicate the condition that is preventing the compressor from starting.

IF CONTROL POWER WILL NOT TURN ON

If unable to turn on control power/reset an emergency stop, check the following conditions:

To energize the Master Control Relay, the following conditions must be met:

- Compressor PLC Panel must be supplied with 120VAC power.
- “Master Power” Selector Switch must be ON
- Local Emergency Stop pushbutton (mounted on PLC enclosure door) must be pulled out.
- DC power supplies must be powered up and functional, “DC OK” Relay must be energized.
- Compact logix processor must be powered up and functional, “PLC OK” Output must be ON.
- Optional/External Emergency Stop Devices are not tripped.

Communication with a Central Controller/DCS

It is possible for a central controller/DCS to read live data and other information from the compressor PLC as well as send commands to the compressor PLC. The following section outlines the PLC addresses that are used for interface between the Compressor PLC and central controller/DCS.

VPN ACCESS

VPN access allows Vilter engineers and technicians connect remotely to the compressor PLC for greater ease of support and troubleshooting. If possible, it is recommended that VPN access be provided.

To allow VPN access to a compressor PLC, the following are required:

- A physical Ethernet Connection from the compressor PLC to the site control network
- IP address, Subnet Mask, and Gateway address must be defined for each compressor PLC and HMI on the site control network
- A VPN server linked to the site control network
- VPN server login information

SETTING UP COMMUNICATIONS

The compressor PLC communicates using the Ethernet IP protocol. Communication to other devices compatible with Ehternet IP is as simple as setting up CIP message instructions and does not require any additional hardware other than that required for the physical connection.

Interface Data in the compressor PLC is organized into arrays for simple access of data. For example, all live instrument data is arranged into a single block 200 elements long. To get all of the data, only one message would need to be configured to read an array of registers, Data type REAL, Length of 200. See the communication tables below for specifics.

NOTE

Setting up communications using a protocol other than Ethernet IP is possible (Example Modbus RTU or Modbus TCP), but additional hardware, software, programming, and setup are required.

WATCHDOG TIMER

A watchdog timer is used to monitor the status of the communication link between the compressor PLC and Central Controller/DCS. It is only necessary to write watchdog logic when the Central Controller/DCS is sending commands to the compressor PLC. If reading data only, the Watchdog timer is not used.

The watchdog timer works by "passing a bit" back and forth between the Compressor PLC and central controller/DCS. If the compressor PLC sees the bit in the same state for a settable watchdog time, the communications are faulted. The Communication fault action is selectable between "Alarm and Revert to Local Mode" or "Trip Machine." If "Alarm and Revert to Local Mode" is selected, the compressor will continue to run if running. If "Trip Machine" is selected, the compressor will trip and shut down. The settable watchdog time and communications fault action are selected on the Configuration Screen.

The watchdog bits that are used are:

- Compressor to Central/DCS: BOOL_OUT[0].0
- Central/DCS to Compressor: BOOL_IN[0].0

When the Compressor PLC sees BOOL_IN[0].0 OFF it will turn BOOL_OUT[0].0 ON. To maintain the handshake, the Central Controller/DCS shall Turn BOOL_IN[0].0 ON when it sees BOOL_OUT[0].0 ON.

Data that can be Read from the Compressor PLC

LIVE INSTRUMENT DATA

Tags "REAL_OUT[0]" through "REAL_OUT[99]" present the live data values as they appear on the HMI screen in the selected engineering units. The Tags "REAL_OUT[100]" through "REAL_OUT[199]" present all live data values in base units, which are PSIA for pressures and Degrees Fahrenheit for Temperatures. For data other than Pressures and Temperatures, the engineering units are fixed and not selectable, and will appear the same in "REAL_OUT[0]" through "REAL_OUT[99]" as they will in "REAL_OUT[100]" through "REAL_OUT[199]." The engineering units selected are presented in the tags "INT_OUT[0]" through "INT_OUT[99]."

Table 12-1. Engineered Units Value Interpretation (INT_OUT[x])

Pressure Units	INT_OUT[x] Value
PSIG	0
PSIA (PSID)	1
kPa[A] (kPa[D])	2
kPa[G]	12
kg/cm^2[A] (kg/cm^2[D])	3
kg/cm^2[G]	13
inHg (vac) PSIG (pressure)	4
inWC	15
Bar[A] (Bar[D])	6
Bar[G]	16
Torr[A] (Torr[D])	7
Torr[G]	17

Temperature Units	INT_OUT[x] Value
Degrees Fahrenheit	0
Degrees Celsius	1
Kelvin	2
Degrees Rankine	3

Table 12-2. Live Instrument Data

Live Instrument Data: "REAL_OUT" (Data Type = REAL, Length = 200)		
Interface Tag	Description	Units
REAL_OUT[0]	Suction Temperature	INT_OUT[0]
REAL_OUT[1]	Discharge Temperature	INT_OUT[1]
REAL_OUT[2]	Oil Separator Temp	INT_OUT[2]
REAL_OUT[3]	Oil Injection Temp	INT_OUT[3]
REAL_OUT[4]	Oil Separator Outlet Temp	INT_OUT[4]
REAL_OUT[5]		INT_OUT[5]
REAL_OUT[6]	Suction Pressure	INT_OUT[6]
REAL_OUT[7]	Discharge Pressure	INT_OUT[7]
REAL_OUT[8]	Filter In Pressure	INT_OUT[8]
REAL_OUT[9]	Filter Out Pressure	INT_OUT[9]
REAL_OUT[10]	Oil Separator Out Pressure	INT_OUT[10]
REAL_OUT[11]	Oil Separator Pressure Drop	INT_OUT[11]
REAL_OUT[12]	Filter Differential Pressure	INT_OUT[12]
REAL_OUT[13]	Net Oil Pressure	INT_OUT[13]
REAL_OUT[14]	Oil Circuit Pressure Drop	INT_OUT[14]
REAL_OUT[15]		INT_OUT[15]
REAL_OUT[16]	Main Motor Amps	Amps
REAL_OUT[17]		
REAL_OUT[18]	Capacity Slide Position	% Position
REAL_OUT[19]	Oil Mixing Valve Commanded Postion	% Position

Interface Tag	Description	Units
REAL_OUT[20]	Phase A Winding Temp	INT_OUT[20]
REAL_OUT[21]	Phase B Winding Temp	INT_OUT[21]
REAL_OUT[22]	Phase C Winding Temp	INT_OUT[22]
REAL_OUT[23]	ODE Bearing Temp	INT_OUT[23]
REAL_OUT[24]	DE Bearing Temp	INT_OUT[24]
REAL_OUT[25]	Motor Vibration 1	in/sec
REAL_OUT[26]	Motor Vibration 2	in/sec
REAL_OUT[27]	Compressor Vibration 1	in/sec
REAL_OUT[28]	Compressor Vibration 2	in/sec
REAL_OUT[29]	Compressor VFD Commanded Speed	% Speed
REAL_OUT[30]	Compressor VFD Actual Speed	% Speed
REAL_OUT[31]		INT_OUT[31]
REAL_OUT[32]	Process Temp	INT_OUT[32]
REAL_OUT[33]	Liquid Refrigerant Temp	INT_OUT[33]
REAL_OUT[34]	Liquid Injection Commanded Postion	% Position
REAL_OUT[35]	VPLUS Commanded Speed	% Speed
REAL_OUT[36]	Oil Cooler Inlet Temp	INT_OUT[36]
REAL_OUT[37]	Oil Cooler Outlet Temp	INT_OUT[37]
REAL_OUT[38]		INT_OUT[38]
REAL_OUT[39]	Oil Cooler Fan Commanded Speed	% Speed
REAL_OUT[40]		INT_OUT[40]
REAL_OUT[41]	Aftercooler 1 Outlet Temp	INT_OUT[41]
REAL_OUT[42]	Aftercooler 2 Outlet Temp	INT_OUT[42]
REAL_OUT[43]	Aftercooler 1 VFD Speed	% Speed
REAL_OUT[44]	Aftercooler 2 VFD Speed	% Speed
REAL_OUT[45]		INT_OUT[45]
REAL_OUT[46]	Discharge Recycle Control Pressure	INT_OUT[46]
REAL_OUT[47]	Discharge Recycle Commanded Postion	% Position
REAL_OUT[48]		INT_OUT[48]
REAL_OUT[49]		INT_OUT[49]
REAL_OUT[50]	Condensing Pressure	INT_OUT[50]
REAL_OUT[51]	Condenser VFD Speed	% Speed
REAL_OUT[52]		INT_OUT[52]
REAL_OUT[53]	Inlet Scrubber Inlet Pressure	INT_OUT[53]
REAL_OUT[54]	Inlet Scrubber Outlet Pressure	INT_OUT[54]
REAL_OUT[55]	Inlet Scrubber Pressure Drop	INT_OUT[55]
REAL_OUT[56]	Outlet Scrubber Inlet Pressure	INT_OUT[56]
REAL_OUT[57]	Outlet Scrubber Outlet Pressure	INT_OUT[57]
REAL_OUT[58]	Outlet Scrubber Pressure Drop	INT_OUT[58]
REAL_OUT[59]		INT_OUT[59]
REAL_OUT[60]	Building Temperature	INT_OUT[60]

Interface Tag	Description	Units
REAL_OUT[61]	Methane Detector LEL	% LEL
REAL_OUT[62]		INT_OUT[62]
REAL_OUT[63]		INT_OUT[63]
REAL_OUT[64]		INT_OUT[64]
REAL_OUT[65]	EPCS Low Side Pressure	INT_OUT[65]
REAL_OUT[66]	EPCS High Side Pressure	INT_OUT[66]
REAL_OUT[67]		INT_OUT[67]
REAL_OUT[68]		INT_OUT[68]
REAL_OUT[69]		INT_OUT[69]
REAL_OUT[70]	Runtime Hours	Hours
REAL_OUT[71]	Runtime Mins	Minutes
REAL_OUT[72]	Resettable Runtime Hours	Hours
REAL_OUT[73]	Resettable Runtime Min	Minutes
REAL_OUT[74]	Current/Last Runtime Hours	Hours
REAL_OUT[75]	Current/Last Runtime Min	Minutes
REAL_OUT[76]		INT_OUT[76]
REAL_OUT[77]		INT_OUT[77]
REAL_OUT[78]		INT_OUT[78]
REAL_OUT[79]		INT_OUT[79]
REAL_OUT[80]	Rotor Feed Oil Pressure	INT_OUT[80]
REAL_OUT[81]	Rotor Feed Net Oil Pressure	INT_OUT[81]
REAL_OUT[82]		INT_OUT[82]
REAL_OUT[83]		INT_OUT[83]
REAL_OUT[84]		INT_OUT[84]
REAL_OUT[85]		INT_OUT[85]
REAL_OUT[86]		INT_OUT[86]
REAL_OUT[87]		INT_OUT[87]
REAL_OUT[88]		INT_OUT[88]
REAL_OUT[89]		INT_OUT[89]
REAL_OUT[90]		INT_OUT[90]
REAL_OUT[91]		INT_OUT[91]
REAL_OUT[92]		INT_OUT[92]
REAL_OUT[93]		INT_OUT[93]
REAL_OUT[94]		INT_OUT[94]
REAL_OUT[95]		INT_OUT[95]
REAL_OUT[96]		INT_OUT[96]
REAL_OUT[97]		INT_OUT[97]
REAL_OUT[98]		INT_OUT[98]
REAL_OUT[99]		INT_OUT[99]
REAL_OUT[100]	Suction Temperature	DEGF
REAL_OUT[101]	Discharge Temperature	DEGF

Interface Tag	Description	Units
REAL_OUT[102]	Oil Separator Temp	DEGF
REAL_OUT[103]	Oil Injection Temp	DEGF
REAL_OUT[104]	Oil Separator Outlet Temp	DEGF
REAL_OUT[105]		
REAL_OUT[106]	Suction Pressure	PSIA
REAL_OUT[107]	Discharge Pressure	PSIA
REAL_OUT[108]	Filter In Pressure	PSIA
REAL_OUT[109]	Filter Out Pressure	PSIA
REAL_OUT[110]	Oil Separator Out Pressure	PSIA
REAL_OUT[111]	Oil Separator Pressure Drop	PSID
REAL_OUT[112]	Filter Differential Pressure	PSID
REAL_OUT[113]	Net Oil Pressure	PSID
REAL_OUT[114]	Oil Circuit Pressure Drop	PSID
REAL_OUT[115]		
REAL_OUT[116]	Main Motor Amps	Amps
REAL_OUT[117]		
REAL_OUT[118]	Capacity Slide Position	% Position
REAL_OUT[119]	Oil Mixing Valve Commanded Postion	% Position
REAL_OUT[120]	Phase A Winding Temp	DEGF
REAL_OUT[121]	Phase B Winding Temp	DEGF
REAL_OUT[122]	Phase C Winding Temp	DEGF
REAL_OUT[123]	ODE Bearing Temp	DEGF
REAL_OUT[124]	DE Bearing Temp	DEGF
REAL_OUT[125]	Motor Vibration 1	in/sec
REAL_OUT[126]	Motor Vibration 2	in/sec
REAL_OUT[127]	Compressor Vibration 1	in/sec
REAL_OUT[128]	Compressor Vibration 2	in/sec
REAL_OUT[129]	Compressor VFD Commanded Speed	% Speed (100%=60Hz)
REAL_OUT[130]	Compressor VFD Actual Speed	% Speed (100%=60Hz)
REAL_OUT[131]		
REAL_OUT[132]	Process Temp	DEGF
REAL_OUT[133]	Liquid Refrigerant Temp	DEGF
REAL_OUT[134]	Liquid Injection Commanded Postion	% Position
REAL_OUT[135]	VPLUS Commanded Speed	% Speed
REAL_OUT[136]	Oil Cooler Inlet Temp	DEGF
REAL_OUT[137]	Oil Cooler Outlet Temp	DEGF
REAL_OUT[138]		
REAL_OUT[139]	Oil Cooler Fan Commanded Speed	% Speed (100%=60Hz)
REAL_OUT[140]		
REAL_OUT[141]	Aftercooler 1 Outlet Temp	DEGF
REAL_OUT[142]	Aftercooler 2 Outlet Temp	DEGF

Interface Tag	Description	Units
REAL_OUT[143]	Aftercooler 1 VFD Speed	% Speed (100%=60Hz)
REAL_OUT[144]	Aftercooler 2 VFD Speed	% Speed (100%=60Hz)
REAL_OUT[145]		
REAL_OUT[146]	Discharge Recycle Control Pressure	PSIA
REAL_OUT[147]	Discharge Recycle Commanded Postion	% Position
REAL_OUT[148]		
REAL_OUT[149]		
REAL_OUT[150]	Condensing Pressure	PSIA
REAL_OUT[151]	Condenser VFD Speed	% Speed (100%=60Hz)
REAL_OUT[152]		
REAL_OUT[153]	Inlet Scrubber Inlet Pressure	PSIA
REAL_OUT[154]	Inlet Scrubber Outlet Pressure	PSIA
REAL_OUT[155]	Inlet Scrubber Pressure Drop	PSIA
REAL_OUT[156]	Outlet Scrubber Inlet Pressure	PSIA
REAL_OUT[157]	Outlet Scrubber Outlet Pressure	PSIA
REAL_OUT[158]	Outlet Scrubber Pressure Drop	PSIA
REAL_OUT[159]		
REAL_OUT[160]	Building Temperature	DEGF
REAL_OUT[161]	Methane Detector LEL	% LEL
REAL_OUT[162]		
REAL_OUT[163]		
REAL_OUT[164]		
REAL_OUT[165]	EPCS Low Side Pressure	PSID
REAL_OUT[166]	EPCS High Side Pressure	PSID
REAL_OUT[167]		
REAL_OUT[168]		
REAL_OUT[169]		
REAL_OUT[170]	Runtime Hours	Hours
REAL_OUT[171]	Runtime Mins	Minutes
REAL_OUT[172]	Resettable Runtime Hours	Hours
REAL_OUT[173]	Resettable Runtime Min	Minutes
REAL_OUT[174]	Current/Last Runtime Hours	Hours
REAL_OUT[175]	Current/Last Runtime Min	Minutes
REAL_OUT[176]		
REAL_OUT[177]		
REAL_OUT[178]		
REAL_OUT[179]		
REAL_OUT[180]	**Rotor Feed Oil Pressure**	**PSIA**
REAL_OUT[181]	**Rotor Feed Net Oil Pressure**	**PSID**
REAL_OUT[182]		

Interface Tag	Description	Units
REAL_OUT[183]		
REAL_OUT[184]		
REAL_OUT[185]		
REAL_OUT[186]		
REAL_OUT[187]		
REAL_OUT[188]		
REAL_OUT[189]		
REAL_OUT[190]		
REAL_OUT[191]		
REAL_OUT[192]		
REAL_OUT[193]		
REAL_OUT[194]		
REAL_OUT[195]		
REAL_OUT[196]		
REAL_OUT[197]		
REAL_OUT[198]		
REAL_OUT[199]		

Alarm and Trip Data

Alarm and Trip Data is presented in Double Integer Format. To interpret the Alarm and Trip data, it is necessary to address the specific bits of the Double Integer.

Table 12-3. Alarm Data

ALARMS AND TRIPS (Data Type = DINT)	
Interface Tag	**Description**
BOOL_OUT[1].0	(A001) Alarm: (Unassigned)
BOOL_OUT[1].1	(A002) Alarm: PLC to Central Comms Faulted
BOOL_OUT[1].2	(A003) Alarm: High Main Motor Amps
BOOL_OUT[1].3	(A004) Alarm: (Unassigned)
BOOL_OUT[1].4	(A005) Alarm: (Unassigned)
BOOL_OUT[1].5	(A006) Alarm: Low Separator Oil Level
BOOL_OUT[1].6	(A007) Alarm: Not Assigned
BOOL_OUT[1].7	(A008) Alarm: Not Assigned
BOOL_OUT[1].8	(A009) Alarm: Not Assigned
BOOL_OUT[1].9	(A010) Alarm: Not Assigned
BOOL_OUT[1].10	(A011) Alarm: Low Suction Temperature
BOOL_OUT[1].11	(A012) Alarm: High Discharge Temperature
BOOL_OUT[1].12	(A013) Alarm: Low Oil Separator Temperature - Start
BOOL_OUT[1].13	(A014) Alarm: Low Oil Separator Temperature - Run
BOOL_OUT[1].14	(A015) Alarm: Low Oil Injection Temperature
BOOL_OUT[1].15	(A016) Alarm: High Oil Injection Temperature
BOOL_OUT[1].16	(A017) Alarm: Low Process Temperature
BOOL_OUT[1].17	(A018) Alarm: High Process Temperature
BOOL_OUT[1].18	(A019) Alarm: High Suction Temperature
BOOL_OUT[1].19	(A020) Alarm: Low Liquid Refrigerant Temperature
BOOL_OUT[1].20	(A021) Alarm: Low Suction Pressure Stpt. 1
BOOL_OUT[1].21	(A022) Alarm: Low Suction Pressure Stpt. 2
BOOL_OUT[1].22	(A023) Alarm: High Discharge Pressure Stpt. 1
BOOL_OUT[1].23	(A024) Alarm: High Discharge Pressure Stpt. 2
BOOL_OUT[1].24	(A025) Alarm: Low Net Oil Pressure - Run
BOOL_OUT[1].25	(A026) Alarm: Unassigned
BOOL_OUT[1].26	(A027) Alarm: High Oil Filter Differential - Start
BOOL_OUT[1].27	(A028) Alarm: High Oil Filter Differential - Run
BOOL_OUT[1].28	(A029) Alarm: Low Oil Pressure - Start
BOOL_OUT[1].29	(A030) Alarm: (Unassigned)
BOOL_OUT[1].30	(A031) Alarm: Out of Range: Oil Cooler Inlet Temp
BOOL_OUT[1].31	(A032) Alarm: Out of Range: Oil Cooler Outlet Temp
BOOL_OUT[2].0	(A033) Alarm: Out of Range: Condensing Pressure

Interface Tag	Description
BOOL_OUT[2].1	(A034) Alarm: Out of Range: Aftercooler 1 Outlet Temp
BOOL_OUT[2].2	(A035) Alarm: Out of Range: Aftercooler 2 Outlet Temp
BOOL_OUT[2].3	(A036) Alarm: Out of Range: Inlet Scrubber Inlet Pressure
BOOL_OUT[2].4	(A037) Alarm: Out of Range: Inlet Scrubber Outlet Pressure
BOOL_OUT[2].5	(A038) Alarm: Out of Range: Outlet Scrubber Inlet Pressure
BOOL_OUT[2].6	(A039) Alarm: Out of Range: Outlet Scrubber Outlet Pressure
BOOL_OUT[2].7	(A040) Alarm: Out of Range: Discharge Recycle Control Pressure
BOOL_OUT[2].8	(A041) Alarm: Out of Range: Oil Separator Outlet Pressure
BOOL_OUT[2].9	(A042) Alarm: Unassigned
BOOL_OUT[2].10	(A043) Alarm: Unassigned
BOOL_OUT[2].11	(A044) Alarm: (Unassigned)
BOOL_OUT[2].12	(A045) Alarm: (Unassigned)
BOOL_OUT[2].13	(A046) Alarm: High Oil Separator Pressure Drop
BOOL_OUT[2].14	(A047) Alarm: Low Oil Separator Outlet Temp (Dew Point)
BOOL_OUT[2].15	(A048) Alarm: High Motor Phase A Temperature
BOOL_OUT[2].16	(A049) Alarm: High Motor Phase B Temperature
BOOL_OUT[2].17	(A050) Alarm: High Motor Phase C Temperature
BOOL_OUT[2].18	(A051) Alarm: Motor DE Bearing Temperature
BOOL_OUT[2].19	(A052) Alarm: Motor ODE Bearing Temperature
BOOL_OUT[2].20	(A053) Alarm: High Motor Vibration - Sensor 1
BOOL_OUT[2].21	(A054) Alarm: High Motor Vibration - Sensor 2
BOOL_OUT[2].22	(A055) Alarm: High Compressor Vibration - Sensor 1
BOOL_OUT[2].23	(A056) Alarm: High Compressor Vibration - Sensor 2
BOOL_OUT[2].24	(A057) Alarm: Inlet Scrubber High Level
BOOL_OUT[2].25	(A058) Alarm: Inlet Scrubber High High Level
BOOL_OUT[2].26	(A059) Alarm: Inlet Scrubber Low Low Level
BOOL_OUT[2].27	(A060) Alarm: Upper Inlet Scrubber High Level
BOOL_OUT[2].28	(A061) Alarm: Upper Inlet Scrubber High High Level
BOOL_OUT[2].29	(A062) Alarm: (Unassigned)
BOOL_OUT[2].30	(A063) Alarm: Lower Inlet Scrubber High Level
BOOL_OUT[2].31	(A064) Alarm: Lower Inlet Scrubber High High Level
BOOL_OUT[3].0	(A065) Alarm: Inlet Scrubber High Pressure Drop
BOOL_OUT[3].1	(A066) Alarm: Inlet Scrubber Condensate Pump Starter Fault
BOOL_OUT[3].2	(A067) Alarm: Outlet Scrubber High Level
BOOL_OUT[3].3	(A068) Alarm: Outlet Scrubber High High Level
BOOL_OUT[3].4	(A069) Alarm: Outlet Scrubber Low Low Level
BOOL_OUT[3].5	(A070) Alarm: Upper Outlet Scrubber High Level
BOOL_OUT[3].6	(A071) Alarm: Upper Outlet Scrubber High High Level
BOOL_OUT[3].7	(A072) Alarm: (Unassigned)
BOOL_OUT[3].8	(A073) Alarm: Lower Outlet Scrubber High Level
BOOL_OUT[3].9	(A074) Alarm: Lower Outlet Scrubber High High Level

Interface Tag	Description
BOOL_OUT[3].10	(A075) Alarm: Outlet Scrubber High Pressure Drop
BOOL_OUT[3].11	(A076) Alarm: Outlet Scrubber Condensate Pump Starter Fault
BOOL_OUT[3].12	(A077) Alarm: (Unassigned)
BOOL_OUT[3].13	(A078) Alarm: (Unassigned)
BOOL_OUT[3].14	(A079) Alarm:
BOOL_OUT[3].15	(A080) Alarm:
BOOL_OUT[3].16	(A081) Alarm:
BOOL_OUT[3].17	(A082) Alarm:
BOOL_OUT[3].18	(A083) Alarm:
BOOL_OUT[3].19	(A084) Alarm: (Unassigned)
BOOL_OUT[3].20	(A085) Alarm: (Unassigned)
BOOL_OUT[3].21	(A086) Alarm: (Unassigned)
BOOL_OUT[3].22	(A087) Alarm: (Unassigned)
BOOL_OUT[3].23	(A088) Alarm: (Unassigned)
BOOL_OUT[3].24	(A089) Alarm: Oil Cooler Fan VFD Fault
BOOL_OUT[3].25	(A090) Alarm: Oil Cooler Fan (Step Type) Starter Fault
BOOL_OUT[3].26	(A091) Alarm: (Unassigned)
BOOL_OUT[3].27	(A092) Alarm: (Unassigned)
BOOL_OUT[3].28	(A093) Alarm: Aftercooler 1 Fan VFD Fault
BOOL_OUT[3].29	(A094) Alarm: Aftercooler 1 Fan (Step Type) Starter Fault
BOOL_OUT[3].30	(A095) Alarm: Aftercooler 2 Fan VFD Fault
BOOL_OUT[3].31	(A096) Alarm: Aftercooler 2 Fan (Step Type) Starter Fault
BOOL_OUT[4].0	(A097) Alarm: Economizer High Level
BOOL_OUT[4].1	(A098) Alarm: Chiller High Level
BOOL_OUT[4].2	(A099) Alarm: Air Cooled Condenser Fan VFD Fault
BOOL_OUT[4].3	(A100) Alarm: Air Cooled Condenser (Step Type) Starter Fault
BOOL_OUT[4].4	(A101) Alarm: Unassigned
BOOL_OUT[4].5	(A102) Alarm: Unassigned
BOOL_OUT[4].6	(A103) Alarm: (Unassigned)
BOOL_OUT[4].7	(A104) Alarm: (Unassigned)
BOOL_OUT[4].8	(A105) Alarm: (Unassigned)
BOOL_OUT[4].9	(A106) Alarm: High Methane Gas %LEL
BOOL_OUT[4].10	(A107) Alarm: (Unassigned)
BOOL_OUT[4].11	(A108) Alarm: Low Oil Cooler Out Temperature
BOOL_OUT[4].12	(A109) Alarm: High Oil Cooler Out Temperature
BOOL_OUT[4].13	(A110) Alarm: High Enclosure Temperature
BOOL_OUT[4].14	(A111) Alarm: (Unassigned)
BOOL_OUT[4].15	(A112) Alarm: (Unassigned)
BOOL_OUT[4].16	(A113) Alarm: (Unassigned)
BOOL_OUT[4].17	(A114) Alarm: (Unassigned)
BOOL_OUT[4].18	(A115) Alarm: (Unassigned)

Interface Tag	Description
BOOL_OUT[4].19	(A116) Alarm: (Unassigned)
BOOL_OUT[4].20	(A117) Alarm: (Unassigned)
BOOL_OUT[4].21	(A118) Alarm: (Unassigned)
BOOL_OUT[4].22	(A119) Alarm: (Unassigned)
BOOL_OUT[4].23	(A120) Alarm: (Unassigned)
BOOL_OUT[4].24	(A121) Alarm: (Unassigned)
BOOL_OUT[4].25	(A122) Alarm: (Unassigned)
BOOL_OUT[4].26	(A123) Alarm: (Unassigned)
BOOL_OUT[4].27	(A124) Alarm: (Unassigned)
BOOL_OUT[4].28	(A125) Alarm: (Unassigned)
BOOL_OUT[4].29	(A126) Alarm: (Unassigned)
BOOL_OUT[4].30	(A127) Alarm: (Unassigned)
BOOL_OUT[4].31	

Table 12-4. Trip Data

TRIPS (Data Type = Double Integer)	
Interface Tag	Description
BOOL_OUT[11].0	(T001) Trip: MCR Not Energized/E-Stop Active
BOOL_OUT[11].1	(T002) Trip: PLC to Central Comms Faulted
BOOL_OUT[11].2	(T003) Trip: High Main Motor Amps
BOOL_OUT[11].3	(T004) Setpoint out of Range - See Menu Screen
BOOL_OUT[11].4	(T005) Trip: False Start Detected
BOOL_OUT[11].5	(T006) Trip: Low Separator Oil Level
BOOL_OUT[11].6	(T007) Trip: Faulted I/O Module Connection or Module Type
BOOL_OUT[11].7	(T008) Trip: Main Motor Starter Fault
BOOL_OUT[11].8	(T009) Trip: Main Motor Feedback Fault/Overload
BOOL_OUT[11].9	(T010) Trip: Supplemental Shutdown Active
BOOL_OUT[11].10	(T011) Trip: Low Suction Temperature
BOOL_OUT[11].11	(T012) Trip: High Discharge Temperature
BOOL_OUT[11].12	(T013) Trip: Low Oil Separator Temperature - Start
BOOL_OUT[11].13	(T014) Trip: Low Oil Separator Temperature - Run
BOOL_OUT[11].14	(T015) Trip: Low Oil Injection Temperature
BOOL_OUT[11].15	(T016) Trip: High Oil Injection Temperature
BOOL_OUT[11].16	(T017) Trip: Low Process Temperature
BOOL_OUT[11].17	(T018) Trip: (Unassigned)
BOOL_OUT[11].18	(T019) Trip: High Suction Temperature
BOOL_OUT[11].19	(T020) Trip: Low Liquid Refrigerant Temperature
BOOL_OUT[11].20	(T021) Trip: Low Suction Pressure Stpt. 1
BOOL_OUT[11].21	(T022) Trip: Low Suction Pressure Stpt. 2
BOOL_OUT[11].22	(T023) Trip: High Discharge Pressure Stpt. 1
BOOL_OUT[11].23	(T024) Trip: High Discharge Pressure Stpt. 2
BOOL_OUT[11].24	(T025) Trip: Low Net Oil Pressure - Run
BOOL_OUT[11].25	(T026) Trip: Failed To Reach Prelube Pressure - Start Sequence Aborted
BOOL_OUT[11].26	(T027) Trip: High Oil Filter Differential - Start
BOOL_OUT[11].27	(T028) Trip: High Oil Filter Differential - Run
BOOL_OUT[11].28	(T029) Trip: Low Oil Pressure - Start
BOOL_OUT[11].29	(T030) Trip: (Unassigned)
BOOL_OUT[11].30	(T031) Trip: Out of Range: Suction Pr
BOOL_OUT[11].31	(T032) Trip: Out of Range: Discharge Pr
BOOL_OUT[12].0	(T033) Trip: Out of Range: Manifold Pr
BOOL_OUT[12].1	(T034) Trip: Out of Range: Filter Inlet Pr
BOOL_OUT[12].2	(T035) Trip: Out of Range: Suction Temp
BOOL_OUT[12].3	(T036) Trip: Out of Range: Discharge Temp
BOOL_OUT[12].4	(T037) Trip: Out of Range: Oil Sep Temp
BOOL_OUT[12].5	(T038) Trip: Out of Range: Oil Injection Temp

Interface Tag	Description
BOOL_OUT[12].6	(T039) Trip: Out of Range: Main Motor Amps
BOOL_OUT[12].7	(T040) Trip: Out of Range: Capacity Slide Position
BOOL_OUT[12].8	(T041) Trip: Out of Range: Volume Slide Position
BOOL_OUT[12].9	(T042) Trip: Out of Range: Process Temp
BOOL_OUT[12].10	(T043) Trip: Out of Range: Motor RTD Phase A
BOOL_OUT[12].11	(T044) Trip: Out of Range: Motor RTD Phase B
BOOL_OUT[12].12	(T045) Trip: Out of Range: Motor RTD Phase C
BOOL_OUT[12].13	(T046) Trip: Out of Range: Motor RTD ODE
BOOL_OUT[12].14	(T047) Trip: Out of Range: Motor RTD DE
BOOL_OUT[12].15	(T048) Trip: High Motor Phase A Temperature
BOOL_OUT[12].16	(T049) Trip: High Motor Phase B Temperature
BOOL_OUT[12].17	(T050) Trip: High Motor Phase C Temperature
BOOL_OUT[12].18	(T051) Trip: High Motor DE Bearing Temperature
BOOL_OUT[12].19	(T052) Trip: High Motor ODE Bearing Temperature
BOOL_OUT[12].20	(T053) Trip: High Motor Vibration - Sensor 1
BOOL_OUT[12].21	(T054) Trip: High Motor Vibration - Sensor 2
BOOL_OUT[12].22	(T055) Trip: High Compressor Vibration - Sensor 1
BOOL_OUT[12].23	(T056) Trip: High Compressor Vibration - Sensor 2
BOOL_OUT[12].24	(T057) Trip: (Unassigned)
BOOL_OUT[12].25	(T058) Trip: Inlet Scrubber High High Level
BOOL_OUT[12].26	(T059) Trip: Inlet Scrubber Low Low Level
BOOL_OUT[12].27	(T060) Trip: (Unassigned)
BOOL_OUT[12].28	(T061) Trip: Upper Inlet Scrubber High High Level
BOOL_OUT[12].29	(T062) Trip: (Unassigned)
BOOL_OUT[12].30	(T063) Trip: (Unassigned)
BOOL_OUT[12].31	(T064) Trip: Lower Inlet Scrubber High High Level
BOOL_OUT[13].0	(T065) Trip: (Unassigned)
BOOL_OUT[13].1	(T066) Trip: (Unassigned)
BOOL_OUT[13].2	(T067) Trip: (Unassigned)
BOOL_OUT[13].3	(T068) Trip: Outlet Scrubber High High Level
BOOL_OUT[13].4	(T069) Trip: Outlet Scrubber Low Low Level
BOOL_OUT[13].5	(T070) Trip: (Unassigned)
BOOL_OUT[13].6	(T071) Trip: Upper Outlet Scrubber High High Level
BOOL_OUT[13].7	(T072) Trip: (Unassigned)
BOOL_OUT[13].8	(T073) Trip: (Unassigned)
BOOL_OUT[13].9	(T074) Trip: Lower Outlet Scrubber High High Level
BOOL_OUT[13].10	(T075) Trip: (Unassigned)
BOOL_OUT[13].11	(T076) Trip: (Unassigned)
BOOL_OUT[13].12	(T077) Trip: (Unassigned)
BOOL_OUT[13].13	(T078) Trip: (Unassigned)
BOOL_OUT[13].14	(T079) Trip: User Defined Trip 1

Interface Tag	Description
BOOL_OUT[13].15	(T080) Trip: User Defined Trip 2
BOOL_OUT[13].16	(T081) Trip: User Defined Trip 3
BOOL_OUT[13].17	(T082) Trip: User Defined Trip 4
BOOL_OUT[13].18	(T083) Trip: User Defined Trip 5
BOOL_OUT[13].19	(T084) Trip: (Unassigned)
BOOL_OUT[13].20	(T085) Trip: (Unassigned)
BOOL_OUT[13].21	(T086) Trip: (Unassigned)
BOOL_OUT[13].22	(T087) Trip: (Unassigned)
BOOL_OUT[13].23	(T088) Trip: (Unassigned)
BOOL_OUT[13].24	(T089) Trip: (Unassigned)
BOOL_OUT[13].25	(T090) Trip: (Unassigned)
BOOL_OUT[13].26	(T091) Trip: (Unassigned)
BOOL_OUT[13].27	(T092) Trip: (Unassigned)
BOOL_OUT[13].28	(T093) Trip: (Unassigned)
BOOL_OUT[13].29	(T094) Trip: (Unassigned)
BOOL_OUT[13].30	(T095) Trip: (Unassigned)
BOOL_OUT[13].31	(T096) Trip: (Unassigned)
BOOL_OUT[14].0	(T097) Trip: (Unassigned)
BOOL_OUT[14].1	(T098) Trip: Chiller High Level
BOOL_OUT[14].2	(T099) Trip: (Unassigned)
BOOL_OUT[14].3	(T100) Trip: (Unassigned)
BOOL_OUT[14].4	(T101) Trip: EPCS Safety Active - Low/Suction
BOOL_OUT[14].5	(T102) Trip: EPCS Safety Active - High/Discharge
BOOL_OUT[14].6	(T103) Trip: (Unassigned)
BOOL_OUT[14].7	(T104) Trip: (Unassigned)
BOOL_OUT[14].8	(T105) Trip: (Unassigned)
BOOL_OUT[14].9	(T106) Trip: High Methane Gas %LEL
BOOL_OUT[14].10	(T107) Trip: (Unassigned)
BOOL_OUT[14].11	(T108) Trip: Smoke Detector Tripped
BOOL_OUT[14].12	(T109) Trip: (Unassigned)
BOOL_OUT[14].13	(T110) Trip: High Enclosure Temperature
BOOL_OUT[14].14	(T111) Trip: Out of Range: 4-20 mA Caphold Target
BOOL_OUT[14].15	(T112) Trip: Out of Range: Building Temperature
BOOL_OUT[14].16	(T113) Trip: Out of Range: Methane Detector
BOOL_OUT[14].17	(T114) Trip: Out of Range: EPCS Low Pressure
BOOL_OUT[14].18	(T115) Trip: Out of Range: EPCS High Pressure
BOOL_OUT[14].19	(T116) Trip: Out of Range: Motor Vibration 1
BOOL_OUT[14].20	(T117) Trip: Out of Range: Motor Vibration 2
BOOL_OUT[14].21	(T118) Trip: Out of Range: Compressor Vibration 1
BOOL_OUT[14].22	(T119) Trip: Out of Range: Compressor Vibration 2
BOOL_OUT[14].23	(T120) Trip: (Unassigned)

Interface Tag	Description
BOOL_OUT[14].24	(T121) Trip: (Unassigned)
BOOL_OUT[14].25	(T122) Trip: (Unassigned)
BOOL_OUT[14].26	(T123) Trip: (Unassigned)
BOOL_OUT[14].27	(T124) Trip: (Unassigned)
BOOL_OUT[14].28	(T125) Trip: (Unassigned)
BOOL_OUT[14].29	(T126) Trip: (Unassigned)
BOOL_OUT[14].30	(T127) Trip: (Unassigned)
BOOL_OUT[14].31	(T128) Trip: (Unassigned)

Status Data

Compressor Status Data is presented in Double Integer Format. To interpret the compressor status data, it is necessary to address the specific bits of the Double Integer.

Table 12-5. Status Data

STATUS (Data Type = DINT, Length = 10)	
Interface Tag	**Description**
BOOL_OUT[21].0	(S001) Status: Compressor Stopped
BOOL_OUT[21].1	(S002) Status: Compressor Started
BOOL_OUT[21].2	(S003) Status: NOT USED
BOOL_OUT[21].3	(S004) Status: True Anti-Recycle Active
BOOL_OUT[21].4	(S005) Status: NOT USED
BOOL_OUT[21].5	(S006) Status: Waiting to Start: Discharge-Suction Not Equalized
BOOL_OUT[21].6	(S007) Status: Waiting to Start: Remote Run Permissive Input
BOOL_OUT[21].7	(S008) Status: Waiting to Start: Soft Run Permissive from DCS/Central
BOOL_OUT[21].8	(S009) Status: Auto Cycle Stop - Suction Pressure
BOOL_OUT[21].9	(S010) Status: Auto Cycle Stop - Process Temperature
BOOL_OUT[21].10	(S011) Status: Auto Cycle Stop - Discharge Pressure
BOOL_OUT[21].11	(S012) Status: Compressor Prelube
BOOL_OUT[21].12	(S013) Status: Compressor Prelube Failed
BOOL_OUT[21].13	(S014) Status: Oil Pump Transition
BOOL_OUT[21].14	(S015) Status: Compressor Warmup - Hold at Minimum Capacity Slide Position
BOOL_OUT[21].15	(S016) Status: Loading Inhibited: Low Suction Pressure
BOOL_OUT[21].16	(S017) Status: Loading Inhibited: High Discharge Pressure
BOOL_OUT[21].17	(S018) Status: Loading Inhibited: High Motor Amps
BOOL_OUT[21].18	(S019) Status: Forced Unload: Low Suction Pressure
BOOL_OUT[21].19	(S020) Status: Forced Unload: High Discharge Pressure
BOOL_OUT[21].20	(S021) Status: Forced Unload: High Motor Amps
BOOL_OUT[21].21	(S022) Status: Slide Valve Calibration Active
BOOL_OUT[21].22	(S023) Status: Comms Faulted, Reverted to Local Mode
BOOL_OUT[21].23	(S024) Status: User SUPER Logged In
BOOL_OUT[21].24	(S025) Status: User OP1 Logged In
BOOL_OUT[21].25	(S026) Status: User OP2 Logged In
BOOL_OUT[21].26	(S027) Status: User OP3 Logged In
BOOL_OUT[21].27	(S028) Status: User OP4 Logged In
BOOL_OUT[21].28	(S029) Status: User OP5 Logged In
BOOL_OUT[21].29	(S030) Status: Main Motor FORCED ON
BOOL_OUT[21].30	(S031) Status: NOT USED
BOOL_OUT[21].31	(S032) Status: Oil Pump FORCED ON
BOOL_OUT[22].0	(S033) Status: Oil Cooler VFD FORCED ON

Interface Tag	Description
BOOL_OUT[22].1	(S034) Status: Oil Cooler Fan 1 FORCED ON
BOOL_OUT[22].2	(S035) Status: Oil Cooler Fan 2 FORCED ON
BOOL_OUT[22].3	(S036) Status: Oil Cooler Fan 3 FORCED ON
BOOL_OUT[22].4	(S037) Status: Oil Cooler Fan 4 FORCED ON
BOOL_OUT[22].5	(S038) Status: Oil Cooler Fan 5 FORCED ON
BOOL_OUT[22].6	(S039) Status: Oil Cooler Fan 6 FORCED ON
BOOL_OUT[22].7	(S040) Status: Oil Cooler Fan 7 FORCED ON
BOOL_OUT[22].8	(S041) Status: Oil Cooler Fan 8 FORCED ON
BOOL_OUT[22].9	(S042) Status: Oil Cooler Fan 9 FORCED ON
BOOL_OUT[22].10	(S043) Status: Oil Cooler Fan 10 FORCED ON
BOOL_OUT[22].11	(S044) Status: Aftercooler 1 VFD FORCED ON
BOOL_OUT[22].12	(S045) Status: Aftercooler 1 Fan 1 FORCED ON
BOOL_OUT[22].13	(S046) Status: Aftercooler 1 Fan 2 FORCED ON
BOOL_OUT[22].14	(S047) Status: Aftercooler 1 Fan 3 FORCED ON
BOOL_OUT[22].15	(S048) Status: Aftercooler 1 Fan 4 FORCED ON
BOOL_OUT[22].16	(S049) Status: Aftercooler 1 Fan 5 FORCED ON
BOOL_OUT[22].17	(S050) Status: Aftercooler 1 Fan 6 FORCED ON
BOOL_OUT[22].18	(S051) Status: Aftercooler 1 Fan 7 FORCED ON
BOOL_OUT[22].19	(S052) Status: Aftercooler 1 Fan 8 FORCED ON
BOOL_OUT[22].20	(S053) Status: Aftercooler 1 Fan 9 FORCED ON
BOOL_OUT[22].21	(S054) Status: Aftercooler 1 Fan 10 FORCED ON
BOOL_OUT[22].22	(S055) Status: Aftercooler 2 VFD FORCED ON
BOOL_OUT[22].23	(S056) Status: Aftercooler 2 Fan 1 FORCED ON
BOOL_OUT[22].24	(S057) Status: Aftercooler 2 Fan 2 FORCED ON
BOOL_OUT[22].25	(S058) Status: Aftercooler 2 Fan 3 FORCED ON
BOOL_OUT[22].26	(S059) Status: Aftercooler 2 Fan 4 FORCED ON
BOOL_OUT[22].27	(S060) Status: Aftercooler 2 Fan 5 FORCED ON
BOOL_OUT[22].28	(S061) Status: Aftercooler 2 Fan 6 FORCED ON
BOOL_OUT[22].29	(S062) Status: Aftercooler 2 Fan 7 FORCED ON
BOOL_OUT[22].30	(S063) Status: Aftercooler 2 Fan 8 FORCED ON
BOOL_OUT[22].31	(S064) Status: Aftercooler 2 Fan 9 FORCED ON
BOOL_OUT[23].0	(S065) Status: Aftercooler 2 Fan 10 FORCED ON
BOOL_OUT[23].1	(S066) Status: Condenser Fan VFD FORCED ON
BOOL_OUT[23].2	(S067) Status: Condenser Fan 1 FORCED ON
BOOL_OUT[23].3	(S068) Status: Condenser Fan 2 FORCED ON
BOOL_OUT[23].4	(S069) Status: Condenser Fan 3 FORCED ON
BOOL_OUT[23].5	(S070) Status: Condenser Fan 4 FORCED ON
BOOL_OUT[23].6	(S071) Status: Condenser Fan 5 FORCED ON
BOOL_OUT[23].7	(S072) Status: Condenser Fan 6 FORCED ON
BOOL_OUT[23].8	(S073) Status: Condenser Fan 7 FORCED ON
BOOL_OUT[23].9	(S074) Status: Condenser Fan 8 FORCED ON

Interface Tag	Description
BOOL_OUT[23].10	(S075) Status: Condenser Fan 9 FORCED ON
BOOL_OUT[23].11	(S076) Status: Condenser Fan 10 FORCED ON
BOOL_OUT[23].12	(S077) Status: Condenser Water Valve FORCED ON
BOOL_OUT[23].13	(S078) Status: VPLUS Pump FORCED ON
BOOL_OUT[23].14	(S079) Status: Liquid Injection Valve Air SOV FORCED ON
BOOL_OUT[23].15	(S080) Status: Discharge Recycle Air SOV FORCED ON
BOOL_OUT[23].16	(S081) Status: Oil Mixing Valve FORCED ON
BOOL_OUT[23].17	(S082) Status: Oil Injection Valve FORCED ON
BOOL_OUT[23].18	(S083) Status: Alarm Indication FORCED ON
BOOL_OUT[23].19	(S084) Status: Trip Indication FORCED ON
BOOL_OUT[23].20	(S085) Status: Oil Separator Heaters FORCED ON
BOOL_OUT[23].21	(S086) Status: Suction Oil SOV FORCED ON
BOOL_OUT[23].22	(S087) Status: Gas EQ SOV FORCED ON
BOOL_OUT[23].23	(S088) Status: Economizer SOV FORCED ON
BOOL_OUT[23].24	(S089) Status: Hotgas SOV FORCED ON
BOOL_OUT[23].25	(S090) Status: Venturi Oil Recovery SOVs FORCED ON
BOOL_OUT[23].26	(S091) Status: Inlet Scrubber Drain Pump/SOV FORCED ON
BOOL_OUT[23].27	(S092) Status: Inlet Scrubber Backup SOV FORCED ON
BOOL_OUT[23].28	(S093) Status: Outlet Scrubber Drain Pump/SOV FORCED ON
BOOL_OUT[23].29	(S094) Status: Outlet Scrubber Backup SOV FORCED ON
BOOL_OUT[23].30	(S095) Status: Enclosure Vent Fans FORCED ON
BOOL_OUT[23].31	(S096) Status: Enclosure Heaters FORCED ON
BOOL_OUT[24].0	(S097) Status: Evap Condenser Pump FORCED ON
BOOL_OUT[24].1	(S098) Status: NOT USED
BOOL_OUT[24].2	(S099) Status: EPCS SOV FORCED ON
BOOL_OUT[24].3	(S100) Status: Oil Cooler STBY Heaters FORCED ON
BOOL_OUT[24].4	(S101) Status: Alarm Horn FORCED ON
BOOL_OUT[24].5	(S102) Status: Stacklight - Amber FORCED ON
BOOL_OUT[24].6	(S103) Status: Stacklight - Red FORCED ON
BOOL_OUT[24].7	(S104) Status: INLET SCRUBBER - PUMP 2 FORCED ON
BOOL_OUT[24].8	(S105) Status: OUTLET SCRUBBER - PUMP 2 FORCED ON
BOOL_OUT[24].9	(S106) Status: OIL DRAIN SV FORCED ON
BOOL_OUT[24].10	(S107) Status: Economizer Port 2 FORCED ON
BOOL_OUT[24].11	(S108) Status: Supplemental Shutdown FORCED ON
BOOL_OUT[24].12	(S109) Status: User MGR Logged In
BOOL_OUT[24].13	(S110) Status: Setpoint 1 Active
BOOL_OUT[24].14	(S111) Status: Setpoint 2 Active
BOOL_OUT[24].15	(S112) Status: Maintenance Due
BOOL_OUT[24].16	(S113) Status: Aftercooler 1 Valve Forced
BOOL_OUT[24].17	(S114) Status: Aftercooler 2 Valve Forced
BOOL_OUT[24].18	(S115) Status: Capacity Slide Exercise Active

Interface Tag	Description
BOOL_OUT[24].19	(S116) Status: Volume Slide Exercise Active
BOOL_OUT[24].20	(S117) Status: Volume Slide In Manual Mode
BOOL_OUT[24].21	NOT USED
BOOL_OUT[24].22	(S119) Status: Compressor Ready
BOOL_OUT[24].23	(S120) Status: NOT USED
BOOL_OUT[24].24	(S121) Status: NOT USED
BOOL_OUT[24].25	(S122) Status: NOT USED

States of Discrete I/O

States of the Discrete Inputs and Outputs is presented in Double Integer Format. To interpret the IO State data, it is necessary to address the specific bits of the Double Integer.

Table 12-6. Discrete Input

Discrete Input States (Data Type = DINT)	
Interface Tag	Description
BOOL_OUT[31].0	Aftercooler 1 Fan Aux Contact (Step Type)
BOOL_OUT[31].1	Aftercooler 1 Fan Aux Contact (Step Type)
BOOL_OUT[31].2	Aftercooler 1 Fan Aux Contact (Step Type)
BOOL_OUT[31].3	Aftercooler 1 Fan Aux Contact (Step Type)
BOOL_OUT[31].4	Aftercooler 1 Fan Aux Contact (Step Type)
BOOL_OUT[31].5	Aftercooler 1 Fan Aux Contact (Step Type)
BOOL_OUT[31].6	Aftercooler 1 Fan Aux Contact (Step Type)
BOOL_OUT[31].7	Aftercooler 1 Fan Aux Contact (Step Type)
BOOL_OUT[31].8	Aftercooler 1 Fan Aux Contact (Step Type)
BOOL_OUT[31].9	Aftercooler 1 Fan Aux Contact (Step Type)
BOOL_OUT[31].10	Aftercooler 1 VFD Faulted (VFD Type)
BOOL_OUT[31].11	Aftercooler 1 VFD Running
BOOL_OUT[31].12	Aftercooler 2 Fan Aux Contact (Step Type)
BOOL_OUT[31].13	Aftercooler 2 Fan Aux Contact (Step Type)
BOOL_OUT[31].14	Aftercooler 2 Fan Aux Contact (Step Type)
BOOL_OUT[31].15	Aftercooler 2 Fan Aux Contact (Step Type)
BOOL_OUT[31].16	Aftercooler 2 Fan Aux Contact (Step Type)
BOOL_OUT[31].17	Aftercooler 2 Fan Aux Contact (Step Type)
BOOL_OUT[31].18	Aftercooler 2 Fan Aux Contact (Step Type)
BOOL_OUT[31].19	Aftercooler 2 Fan Aux Contact (Step Type)
BOOL_OUT[31].20	Aftercooler 2 Fan Aux Contact (Step Type)
BOOL_OUT[31].21	Aftercooler 2 Fan Aux Contact (Step Type)
BOOL_OUT[31].22	Aftercooler 2 VFD Faulted (VFD Type)
BOOL_OUT[31].23	Aftercooler 2 VFD Running
BOOL_OUT[31].24	Chiller/Surge Drum High Level Alarm
BOOL_OUT[31].25	Chiller/Surge Drum High Level Trip
BOOL_OUT[31].26	Condenser Fan Aux Contact (Step Type)
BOOL_OUT[31].27	Condenser Fan Aux Contact (Step Type)
BOOL_OUT[31].28	Condenser Fan Aux Contact (Step Type)
BOOL_OUT[31].29	Condenser Fan Aux Contact (Step Type)
BOOL_OUT[31].30	Condenser Fan Aux Contact (Step Type)
BOOL_OUT[31].31	Condenser Fan Aux Contact (Step Type)
BOOL_OUT[32].0	Condenser Fan Aux Contact (Step Type)

Interface Tag	Description
BOOL_OUT[32].1	Condenser Fan Aux Contact (Step Type)
BOOL_OUT[32].2	Condenser Fan Aux Contact (Step Type)
BOOL_OUT[32].3	Condenser Fan Aux Contact (Step Type)
BOOL_OUT[32].4	Evap Condenser Pump Running
BOOL_OUT[32].5	Condenser VFD Faulted (VFD Type)
BOOL_OUT[32].6	Condenser VFD Running
BOOL_OUT[32].7	E-stop OK and MCR energized
BOOL_OUT[32].8	NOT USED
BOOL_OUT[32].9	NOT USED
BOOL_OUT[32].10	Inlet Scrubber Condensate Pump Aux Contact
BOOL_OUT[32].11	Inlet Scrubber Condensate Pump Aux Contact
BOOL_OUT[32].12	Lower Inlet Scrubber High Alarm (Coalescing)
BOOL_OUT[32].13	Lower Inlet Scrubber High Trip (Coalescing)
BOOL_OUT[32].14	Upper Inlet Scrubber High Alarm (Coalescing)
BOOL_OUT[32].15	Upper Inlet Scrubber High Trip (Coalescing)
BOOL_OUT[32].16	Inlet Scrubber Condensate Drain Cutin Switch
BOOL_OUT[32].17	Inlet Scrubber Condensate Drain Cutout Switch
BOOL_OUT[32].18	Inlet Scrubber High Alarm (Vane type)
BOOL_OUT[32].19	Inlet Scrubber High Trip (Vane Type)
BOOL_OUT[32].20	Inlet Scrubber Low Level (Vane Type)
BOOL_OUT[32].21	Compressor Main Motor Aux Contact
BOOL_OUT[32].22	Compressor Main Motor Fault
BOOL_OUT[32].23	Main Motor Cooling Blower Running
BOOL_OUT[32].24	Oil Cooler Fan Aux Contact (Step Type)
BOOL_OUT[32].25	Oil Cooler Fan Aux Contact (Step Type)
BOOL_OUT[32].26	Oil Cooler Fan Aux Contact (Step Type)
BOOL_OUT[32].27	Oil Cooler Fan Aux Contact (Step Type)
BOOL_OUT[32].28	Oil Cooler Fan Aux Contact (Step Type)
BOOL_OUT[32].29	Oil Cooler Fan Aux Contact (Step Type)
BOOL_OUT[32].30	Oil Cooler Fan Aux Contact (Step Type)
BOOL_OUT[32].31	Oil Cooler Fan Aux Contact (Step Type)
BOOL_OUT[33].0	Oil Cooler Fan Aux Contact (Step Type)
BOOL_OUT[33].1	Oil Cooler Fan Aux Contact (Step Type)
BOOL_OUT[33].2	Oil Cooler VFD Faulted (VFD Type)
BOOL_OUT[33].3	Oil Cooler VFD Running
BOOL_OUT[33].4	Oil Recovery Enable Switch
BOOL_OUT[33].5	Oil Separator Low Level Switch
BOOL_OUT[33].6	Outlet Scrubber Condensate Pump Aux Contact
BOOL_OUT[33].7	Outlet Scrubber Condensate Pump Aux Contact
BOOL_OUT[33].8	Lower Outlet Scrubber High Alarm (Coalescing)
BOOL_OUT[33].9	Lower Outlet Scrubber High Trip (Coalescing)

Interface Tag	Description
BOOL_OUT[33].10	Upper Outlet Scrubber High Alarm (Coalescing)
BOOL_OUT[33].11	Upper Outlet Scrubber High Trip (Coalescing)
BOOL_OUT[33].12	Outlet Scrubber Condensate Drain Cutin Switch
BOOL_OUT[33].13	Outlet Scrubber Condensate Drain Cutout Switch
BOOL_OUT[33].14	Outlet Scrubber High Alarm (Vane type)
BOOL_OUT[33].15	Outlet Scrubber High Trip (Vane Type)
BOOL_OUT[33].16	Outlet Scrubber Low Level (Vane Type)
BOOL_OUT[33].17	User Defined Alarm Input 1
BOOL_OUT[33].18	User Defined Alarm Input 2
BOOL_OUT[33].19	User Defined Alarm Input 3
BOOL_OUT[33].20	User Defined Alarm Input 4
BOOL_OUT[33].21	User Defined Alarm Input 5
BOOL_OUT[33].22	Remote Manual Capacity Decrease Input
BOOL_OUT[33].23	Remote Manual Capacity Increase Input
BOOL_OUT[33].24	Remote Permissive hardwired input
BOOL_OUT[33].25	User Defined Trip Input 1
BOOL_OUT[33].26	User Defined Trip Input 2
BOOL_OUT[33].27	User Defined Trip Input 3
BOOL_OUT[33].28	User Defined Trip Input 4
BOOL_OUT[33].29	User Defined Trip Input 5
BOOL_OUT[33].30	Smoke Detector Input
BOOL_OUT[33].31	

Table 12-7. Discrete Output

Discrete Output States (Data Type = DINT)	
Interface Tag	Description
BOOL_OUT[36].0	Aftercooler 1 Fan Starter (Step Type)
BOOL_OUT[36].1	Aftercooler 1 Fan Starter (Step Type)
BOOL_OUT[36].2	Aftercooler 1 Fan Starter (Step Type)
BOOL_OUT[36].3	Aftercooler 1 Fan Starter (Step Type)
BOOL_OUT[36].4	Aftercooler 1 Fan Starter (Step Type)
BOOL_OUT[36].5	Aftercooler 1 Fan Starter (Step Type)
BOOL_OUT[36].6	Aftercooler 1 Fan Starter (Step Type)
BOOL_OUT[36].7	Aftercooler 1 Fan Starter (Step Type)
BOOL_OUT[36].8	Aftercooler 1 Fan Starter (Step Type)
BOOL_OUT[36].9	Aftercooler 1 Fan Starter (Step Type)
BOOL_OUT[36].10	Aftercooler 1 VFD Start Command
BOOL_OUT[36].11	Aftercooler 2 Fan Starter (Step Type)
BOOL_OUT[36].12	Aftercooler 2 Fan Starter (Step Type)
BOOL_OUT[36].13	Aftercooler 2 Fan Starter (Step Type)

Interface Tag	Description
BOOL_OUT[36].14	Aftercooler 2 Fan Starter (Step Type)
BOOL_OUT[36].15	Aftercooler 2 Fan Starter (Step Type)
BOOL_OUT[36].16	Aftercooler 2 Fan Starter (Step Type)
BOOL_OUT[36].17	Aftercooler 2 Fan Starter (Step Type)
BOOL_OUT[36].18	Aftercooler 2 Fan Starter (Step Type)
BOOL_OUT[36].19	Aftercooler 2 Fan Starter (Step Type)
BOOL_OUT[36].20	Aftercooler 2 Fan Starter (Step Type)
BOOL_OUT[36].21	Aftercooler VFD Start Command
BOOL_OUT[36].22	Alarm Indication (0=ALARM)
BOOL_OUT[36].23	Enclosure Alarm Horn
BOOL_OUT[36].24	Capacity Decrease Output
BOOL_OUT[36].25	Capacity Increase Output
BOOL_OUT[36].26	Water Cooled Condenser Air Solenoid
BOOL_OUT[36].27	Condenser Fan Starter (Step Type)
BOOL_OUT[36].28	Condenser Fan Starter (Step Type)
BOOL_OUT[36].29	Condenser Fan Starter (Step Type)
BOOL_OUT[36].30	Condenser Fan Starter (Step Type)
BOOL_OUT[36].31	Condenser Fan Starter (Step Type)
BOOL_OUT[37].0	Condenser Fan Starter (Step Type)
BOOL_OUT[37].1	Condenser Fan Starter (Step Type)
BOOL_OUT[37].2	Condenser Fan Starter (Step Type)
BOOL_OUT[37].3	Condenser Fan Starter (Step Type)
BOOL_OUT[37].4	Condenser Fan Starter (Step Type)
BOOL_OUT[37].5	Condenser Pump Starter (If Step Type)
BOOL_OUT[37].6	Condenser Pump Starter (If VFD Type)
BOOL_OUT[37].7	Condenser VFD Start Command
BOOL_OUT[37].8	Discharge Recycle Air Supply Solenoid
BOOL_OUT[37].9	Economizer Port 1
BOOL_OUT[37].10	Economizer Port 2
BOOL_OUT[37].11	Enclosure Roof Vent Fans
BOOL_OUT[37].12	Enclosure Heaters
BOOL_OUT[37].13	EPCS High Side Relief Solenoid
BOOL_OUT[37].14	N/A
BOOL_OUT[37].15	Suction-Discharge Equalizing Solenoid
BOOL_OUT[37].16	Hotgas Bypass Valve
BOOL_OUT[37].17	Inlet Scrubber Backup Drain Solenoid
BOOL_OUT[37].18	Inlet Scrubber Condensate Pump Starter
BOOL_OUT[37].19	Inlet Scrubber Condensate Pump Starter (or SV)
BOOL_OUT[37].20	Liquid Injection Air Supply Solenoid
BOOL_OUT[37].21	NOT USED
BOOL_OUT[37].22	NOT USED

Interface Tag	Description
BOOL_OUT[37].23	Main Motor Start Command
BOOL_OUT[37].24	Oil Cooler Fan Starter (Step Type)
BOOL_OUT[37].25	Oil Cooler Fan Starter (Step Type)
BOOL_OUT[37].26	Oil Cooler Fan Starter (Step Type)
BOOL_OUT[37].27	Oil Cooler Fan Starter (Step Type)
BOOL_OUT[37].28	Oil Cooler Fan Starter (Step Type)
BOOL_OUT[37].29	Oil Cooler Fan Starter (Step Type)
BOOL_OUT[37].30	Oil Cooler Fan Starter (Step Type)
BOOL_OUT[37].31	Oil Cooler Fan Starter (Step Type)
BOOL_OUT[38].0	Oil Cooler Fan Starter (Step Type)
BOOL_OUT[38].1	Oil Cooler Fan Starter (Step Type)
BOOL_OUT[38].2	Oil Cooler Standby Heater
BOOL_OUT[38].3	Oil Cooler VFD Start Command
BOOL_OUT[38].4	Oil Drain Solenoid
BOOL_OUT[38].5	Oil Mix Valve Air Supply Solenoid
BOOL_OUT[38].6	Oil Pump Starter
BOOL_OUT[38].7	Oil Separator Heaters
BOOL_OUT[38].8	Outlet Scrubber Backup Drain Solenoid
BOOL_OUT[38].9	Outlet Scrubber Condensate Pump Starter
BOOL_OUT[38].10	Outlet Scrubber Condensate Pump Starter (or SV)
BOOL_OUT[38].11	N/A
BOOL_OUT[38].12	Amber Stacklight
BOOL_OUT[38].13	Red Stacklight
BOOL_OUT[38].14	Suction Oil Injection Solenoid
BOOL_OUT[38].15	Trip Indication (0=TRIP)
BOOL_OUT[38].16	Venturi Oil Recovery Output
BOOL_OUT[38].17	
BOOL_OUT[38].18	
BOOL_OUT[38].19	VPLUS Pump Start Command
BOOL_OUT[38].20	PLC OK Relay (0=PLC triggered E-Stop)
BOOL_OUT[38].21	Supplemental Shutdown Output
BOOL_OUT[38].22	
BOOL_OUT[38].23	
BOOL_OUT[38].24	
BOOL_OUT[38].25	
BOOL_OUT[38].26	
BOOL_OUT[38].27	
BOOL_OUT[38].28	
BOOL_OUT[38].29	
BOOL_OUT[38].30	
BOOL_OUT[38].31	

Compressor State and Mode Indicator

The state of the compressor state indicator shown on the compressor and system overview screens can be monitored.

Table 12-8. State Indicator

State Indicator (Data Type = DINT, Length = 1)	
Tag	**Description**
COMP_STATE_IND	Compressor State Indicator
State	**Description**
0	Stopped
1	Standby
2	Moving Slides to Minimum Position
3	Pre-lube
4	Pre-lube - Compressor Starting
5	Compressor Warm-up
6	Running

Table 12-9. Mode Indicator

Mode Indicator (Data Type = DINT, Length = 1)	
Tag	**Description**
MODE_IND	Compressor State Indicator
State	**Description**
1	Local-Auto
2	Local-Manual
3	Remote-Auto
4	Remote-Manual

Sending Commands to Compressor PLC (Ethernet IP Version)

To send commands to the Compressor PLC, Control by Communications must be enabled from the Configuration screen and the watchdog must show that communications between the Compressor PLC and Central Controller/DCS are not faulted. On a communication fault, the commands from the Central controller will stay in their last state/value in the compressor PLC.

WATCHDOG BITS

NOTE

When PLC Sees BOOL_IN[0].0 OFF it will turn BOOL_OUT[0].0 ON. DCS Shall Turn BOOL_IN[0].0 ON when it sees BOOL_OUT[0].0 ON to maintain the handshake.

TO DCS: BOOL_OUT[0].0

FROM: BOOL_IN[0].0

Table 12-10. Compressor Command (Real)

Compressor Commands: "REAL_IN" (Data Type = REAL)		
Interface Tag	Description	Units
REAL_IN[0]	Remote Discharge Pressure Setpoint	PSIA
REAL_IN[1]	Remote Process Temp Setpoint	PSIA
REAL_IN[2]	Remote Suction Pressure Setpoint	PSIA
REAL_IN[3]	Common Discharge Header Pressure From DCS	PSIA
REAL_IN[4]	Common Suction Header Pressure From DCS	PSIA
REAL_IN[5]	Capacity Slide Position Command From DCS	% Position

DISCRETE COMPRESSOR COMMANDS

Discrete Compressor commands are presented in Double Integer Format. To send discrete commands, it is necessary to address the specific bits of the Double Integer.

If Control by communications is enabled from the Configuration Screen, the soft run command (BOOL_IN[1].5) must be held HIGH in addition to the remote permissive physical input.

Table 12-11. Compressor Command (Double Integer)

Write Data: "BOOL_IN" (Data Type = DINT)	
Interface Tag	Description
BOOL_IN[1].0	Soft Capacity Decrease Command from DCS
BOOL_IN[1].1	Soft Capacity increase Command from DCS
BOOL_IN[1].2	Local Mode Command from DCS
BOOL_IN[1].3	Remote Mode Command from DCS
BOOL_IN[1].4	Reset Alarms from DCS
BOOL_IN[1].5	Soft Run Command from DCS
BOOL_IN[1].6	Command to Switch to Setpoint 1
BOOL_IN[1].7	Command to Switch to Setpoint 2
BOOL_IN[1].8	
BOOL_IN[1].9	
BOOL_IN[1].10	
BOOL_IN[1].11	
BOOL_IN[1].12	
BOOL_IN[1].13	
BOOL_IN[1].14	
BOOL_IN[1].15	