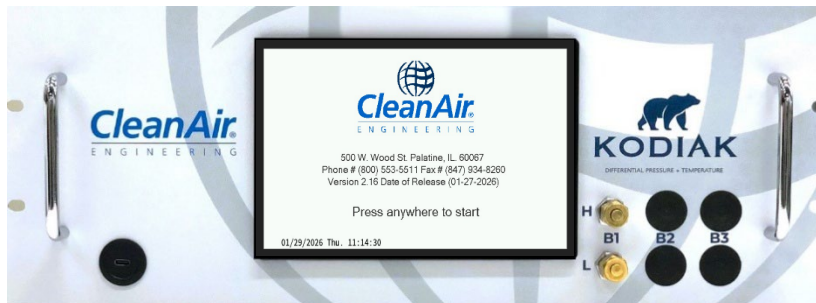




CleanAir Engineering

KODIAK

Differential Pressure and Temperature Monitor



Operations Manual

Blank

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Specifications and Special Features

Power Requirements	120 VAC, 0.65 A, 60 Hz, 78 W
Dimensions	4U, 19" Rack Mount, 19" (W) x 7.125" (H) x 26.5" (L)
Weight	Approximately 72 lbs. (3 Bank Model)
Operating Temperature Range	-4° F to 140° F
Communications	Ethernet LAN (TCP/IP)
Communications Ports	1-RJ45 Ethernet / 1-USB C
File Transfer	FTP using Third-Party FTP File Transfer Software
Digital Input/Output	MODBUS TCP/IP
External Control	MODBUS TCP/IP
Data Logging	All Channels Logged Separately / 8GB (Standard) Internal Memory - Upgradable to 32GB (Channels are Logged separately and are saved to separate files. The files are downloadable through USB C Flash Drive Port or FTP File Transfer over Ethernet.)
Analog Outputs	0-10VDC per Channel or 4-20ma per Channel
5 x 7 HMI Color Touchscreen	Web Enabled for Remote Operation through standard Web Browser
Trend Graph	Display DP and Temperature on a Trend Graph with programmable scale
Data Logged Parameters	Date, Time, DP, Temperature, Chassis Temperature, Velocity, Volumetric Flow in SCFM, Dry Volumetric Flow in DSCFM
Units of Measure	Change from Imperial to Metric units at the push of a button.
Thermocouple Inputs	Standard K-Type
Lockout	Limit Access with a programable Code
Internal Pressure Switch (Cal Set Point)	Internal Pressure Switch used to set a Calibration Drift Check point. Three Options, .1" to .5" / .1" to 1.0" / .1" to 5.0"
Line Purge	Manual, Interval Timed or External Modbus Digital Actuated Purge Sequence
Zero and Span Calibration	Manually or Automatic, Zero and Span calibration
Auto-Cal (Option)	Automatically adjust for daily drift

Specifications and Special Features (continued)

Daily Drift Check (Programmable)	Automatically records the last Zero and Span result for drift determination
Differential Pressure Transducer Range	0.000 to 3.000"WC
DP Transducer MAX Pressure	50psi
Compression Fittings	H (High) and L (Low) 3/8" Compression for each Bank, Instrument Air 3/8" Compression Fitting, H (High) and L (Low) 1/4" Compression Fitting for Calibration Device (Mounted on front panel)
Instrument Air Pressure	20 psi to 90 psi
Input Temperature Range	0.0 to 1,260 Celsius
Static IP Address PLC	192.168.1.5
Static IP Address HMI	192.168.1.150

Important Technical Note:

The **KODIAK Differential Pressure and Temperature Monitor** measures differential pressure and temperature to support gas velocity and flow determinations in stacks, ducts, and process piping. Differential pressure measurements are obtained using precision pressure transducers, while temperature measurements are obtained through Type-K thermocouple inputs. Although these sensors are manufactured to high accuracy standards, their performance can be influenced by local ambient conditions such as temperature changes, barometric pressure variations, and mechanical stresses that may occur during transportation, installation, or field operation. For this reason, the differential pressure measurement system must be verified in the field against a **traceable primary differential pressure standard** to confirm measurement accuracy under operating conditions. In accordance with **U.S. Environmental Protection Agency stack testing requirements specified in 40 CFR Part 60, Appendix A, Method 2**, differential pressure measuring devices used for velocity pressure measurements must be checked against a reference pressure measurement device with equal or greater accuracy, and a **post-test verification against a primary standard** is required to confirm that the measurement system remained within acceptable accuracy limits during the test program.

Temperature measurements used in velocity and flow determinations must also be verified to ensure measurement accuracy. As part of the **CleanAir Factory Acceptance Test (FAT)** procedure, the KODIAK temperature measurement channel is checked against a **reference temperature measurement device that is calibrated annually and traceable to a recognized standard**. This verification confirms proper temperature measurement performance prior to shipment and installation. The KODIAK system also provides **front-panel calibration access ports** that allow convenient connection of a primary differential pressure calibration standard, enabling field verification of the pressure measurement system without removing the instrument from service.

Introduction



Welcome to the KODIAK Differential Pressure and Temperature Monitor manufactured by CleanAir Express. Before using the monitor, please familiarize yourself with its operation by reading this manual. If you have any questions, do not hesitate to call CleanAir Technical Support for assistance. We want you to be among our thousands of satisfied customers. ([1-800-553-5511](tel:1-800-553-5511))

Description

The **KODIAK Differential Pressure and Temperature Monitor** is a precision instrument designed to measure and record the key parameters required for accurate gas flow determination in industrial stacks, ducts, and process piping. The system utilizes high-accuracy **GP:50 differential pressure transducers** to measure velocity pressure and static pressure, combined with temperature measurement to support standardized flow calculations. Data acquisition and system control are managed through a robust **IDEC programmable logic controller (PLC)** integrated with an **IDEC human-machine interface (HMI)**, providing reliable operation, intuitive user interaction, and secure data handling. The KODIAK monitor is engineered to support environmental monitoring, emissions testing, and process verification applications where accurate and dependable flow measurement is essential.

The KODIAK system is available in configurations supporting **one, two, or three independent differential pressure and temperature channels**, allowing the instrument to accommodate single-point measurements or multi-bank pitot array installations. Each channel independently measures differential pressure and temperature, enabling simultaneous monitoring of multiple probe banks or measurement locations within a stack or duct. This flexible architecture makes the KODIAK well suited for applications such as **EPA Method 2 velocity determinations, continuous flow monitoring, and validation of stack testing instrumentation**, while maintaining a compact, reliable, and easy-to-operate platform.

To support reliable field operation and quality assurance, the KODIAK monitor includes built-in **configuration validation, alarm monitoring, and data recording capabilities**. The system provides operators with clear status indications and configurable alarm limits to help ensure measurement integrity during operation. Factory validation procedures verify proper instrument configuration and functionality

prior to deployment. These features, combined with the durability of industrial-grade components and an intuitive HMI interface, make the KODIAK monitor a dependable solution for demanding stack testing and industrial flow measurement applications.

Principle of Operation

Gas flow within stacks and ducts is commonly determined by measuring **velocity pressure** using a pitot tube or multi-point pitot array. The velocity pressure is measured as the difference between the **impact pressure** and the **static pressure** of the flowing gas stream.

The relationship between velocity pressure and gas velocity is defined by the following equation:

$$V = C_p \sqrt{\frac{2\Delta P}{\rho}}$$

Where:

- **V** = Gas velocity
- **C_p** = Pitot tube calibration coefficient
- **ΔP** = Measured differential (velocity) pressure
- **ρ** = Gas density

The KODIAK monitor measures the required parameters using its differential pressure and temperature channels. These measurements may be used directly by the operator or incorporated into external calculations to determine gas velocity and volumetric flow rates.

By supporting **multiple measurement banks**, the system allows operators to monitor multiple pitot probe locations simultaneously, improving measurement coverage and enabling more representative flow determination across large stacks or ducts.

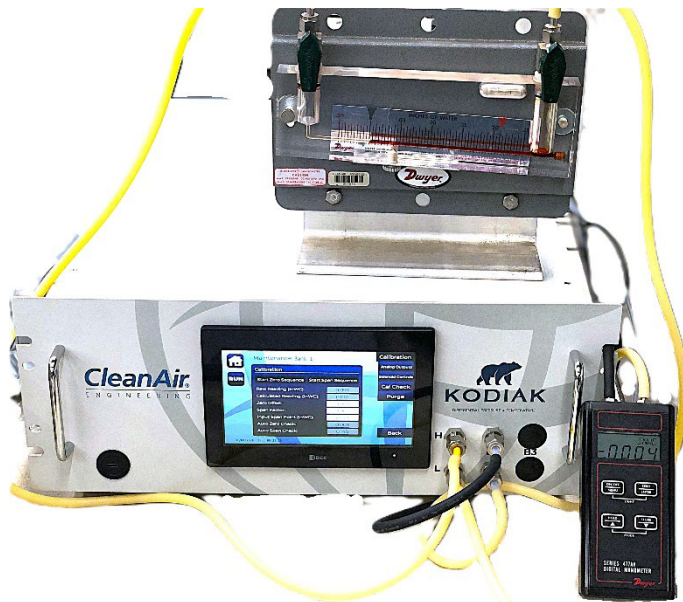
Front Panel Overview



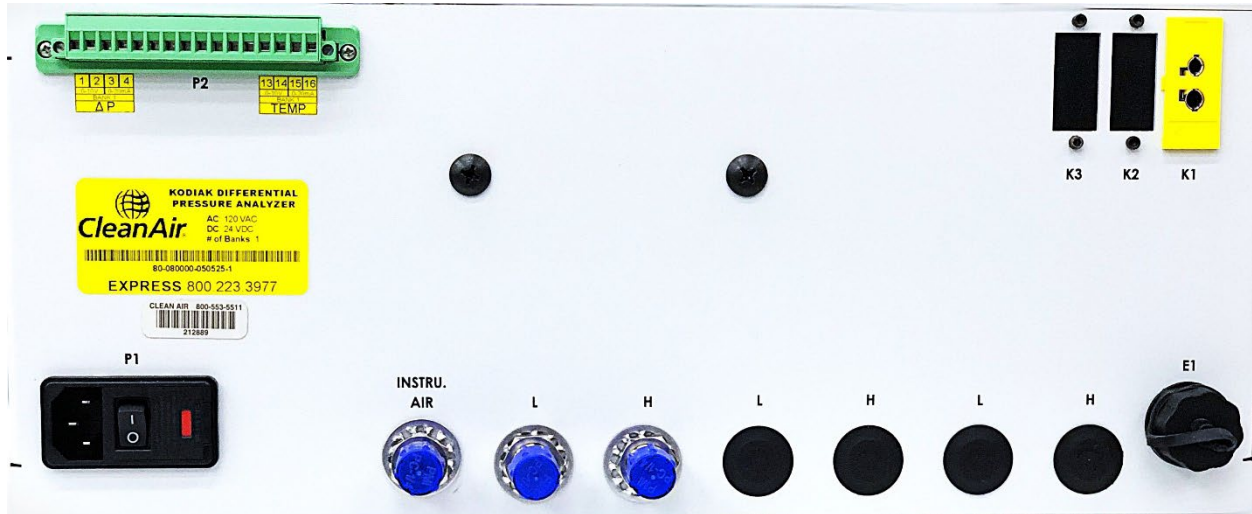
USB-C Port
Flash Drive Data
Download

HMI Touchscreen

Front Access
Ports for Primary
Standard Device



Back Panel Overview (Single Bank)



Instrument Air – 3/8” Swagelok (20 psi MIN / 90psi MAX Clean, Dry, Compressed Air or Nitrogen)

L (Low Side) – 3/8” Swagelok

H (High Side) – 3/8” Swagelok

E1 – RJ45 Ethernet Comm Port

P1 – 120VAC / .65 A / 78 W / 60Hz

P2 - Analog Output (0-10vdc or 0-20ma)

K1 – K Type Thermocouple Input

System Overview

The **KODIAK Differential Pressure and Temperature Monitor** is an industrial instrumentation system designed to measure the parameters required for determining gas flow within stacks, ducts, and process piping. The system continuously measures differential pressure and temperature from installed sensors and provides real-time monitoring through an integrated touchscreen interface. These measurements are commonly used in environmental monitoring, emissions testing, and industrial process verification applications.

The KODIAK system is built around a modular architecture that supports **one, two, or three independent measurement channels**, referred to as **Banks**. Each bank consists of a differential pressure measurement channel and a temperature measurement channel, allowing the instrument to monitor multiple pitot probe banks or measurement locations simultaneously. This flexible configuration allows the instrument to be used for single-point measurements or multi-bank pitot array installations in larger stacks and ducts.

High-accuracy **GP:50 differential pressure transducers** are used to measure velocity pressure and static pressure signals from installed pitot probes or pressure taps. Temperature measurements are obtained through **Type-K thermocouple inputs**, allowing the system to monitor process gas temperature and support flow correction calculations when required.

Signal acquisition, system logic, and communications are managed by an industrial **IDEC programmable logic controller (PLC)**. The PLC processes incoming sensor signals, manages system timing functions, and performs monitoring and alarm functions. An integrated **IDEC touchscreen human-machine interface (HMI)** provides operators with an intuitive interface for viewing real-time measurements, configuring system parameters, performing system validation, and retrieving logged data.

To support reliable long-term operation in stack environments, the KODIAK system includes an **optional automatic pitot line purge system**. This feature allows the instrument to periodically purge the pitot tubing using instrument air to prevent particulate buildup, condensation, or blockage within the pressure lines. Purge intervals and timing can be programmed through the HMI, allowing the system to maintain measurement reliability during extended operation in challenging process environments.

The KODIAK system also supports **automatic calibration and verification functions**, allowing the instrument to perform scheduled calibration checks using an external differential pressure standard. These automated calibration routines help ensure measurement accuracy and simplify routine maintenance procedures. Front panel calibration access ports allow convenient connection of a primary pressure calibration standard without opening the instrument enclosure.

The system includes built-in **data logging and network communication capabilities**, allowing measurement data to be stored internally and transferred through Ethernet or USB interfaces. External systems can also access measurement data through **MODBUS TCP/IP communication**, enabling integration with plant control systems or remote monitoring platforms.

The rugged industrial design of the KODIAK monitor provides reliable operation in demanding field environments while offering convenient access to calibration ports, data interfaces, and configuration tools. This combination of precision measurement, automated maintenance features, and flexible architecture makes the KODIAK system well suited for stack testing and industrial gas flow monitoring.

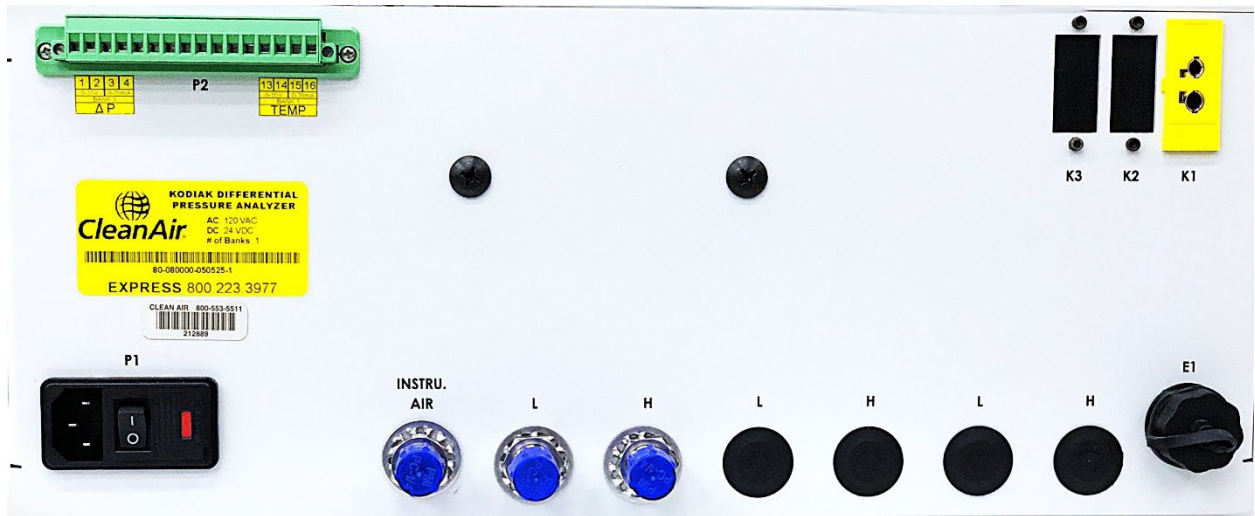
Installation

Note: The version of the KODIAK used in this manual may be a Single Bank or a Two Bank. Ports on the front are for calibration purposes. The L and H ports on the back are to connect the Pitot umbilical. The L is for the Low Side of the Pitot and the H is for the High Side of the Pitot.

The KODIAK must be located in an environmentally controlled area. Variability in ambient temperature or pressure will cause drift in the KODIAK response. Exposure to excessive vibration will cause an unstable response.



Front



Back

Power Up

Plug the power cord into a 120 VAC / 1 A / 60Hz power source.

Place the power switch into the ON position.

Allow the Kodiak to warm up for 60 minutes before taking readings or calibrating.



On Power Up, the “Start Page” will be displayed.



Pitot Umbilical Connections

Connect the low side of the Pitot umbilical to the L bulkhead on the back of the KODIAK and connect the high side of the Pitot to the H bulkhead on the back panel.

Plug the umbilical K-Type thermocouple to K1 on the back panel.



Instrument Air (INSTU. AIR)

Connect a clean, dry, compressed air or nitrogen source to the INSTU. AIR bulkhead on the back panel.

Note: The instrument air will be used during the Calibration and the Purge Sequences.

Caution: 90psi Maximum Pressure / 20psi Minimum Pressure



Ethernet Connection

The KODIAK is equipped with an Ethernet port “E1” on the back panel. The IP address of this port is Static.

HMI Touchscreen IP Address = 192.168.1.150 (HMI Virtual Display is accessible through a standard Web Browser)

PLC IP Address = 192.168.1.5

Note: The HMI is Web Enabled. This means that a virtual HMI can be accessed using a standard web browser. This gives the user complete control of the KODIAK as if they were sitting in front of it. This is useful for Remote Control applications. The KODIAK also supports MODBUS over TCP/IP. Instructions are covered later in this manual. **These IP Addresses are Static and cannot be changed by the user. Contact CleanAir for assistance.**

Analog Output Connections (1 Bank KODIAK Pictured)

The KODIAK has analog outputs for the Pressure and Temperature. There are connections on the green “P2” Phoenix connector for ΔP and TEMP.

ΔP 0-10vdc / Pin 1 = Negative, Pin 2 = Positive (Range = 0 - 3.000in.wc, 0 - .75Kpa)

ΔP 0-20ma / Pin 3 = Negative, Pin 4 = Positive (Range = 0 - 3.000in.wc, 0 - .75Kpa)

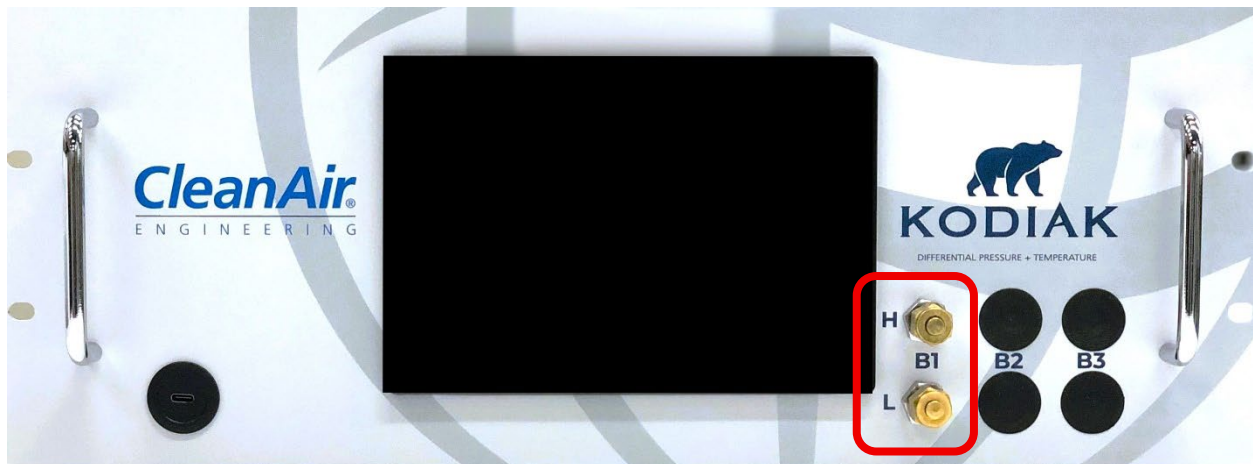
TEMP 0-10vdc / Pin 13 = Negative, Pin 14 = Positive (Range 32 - 2300degF, 0-1260degC)

TEMP 0-20ms / Pin 15 = Negative, Pin 16 = Positive (Range 32 - 2300degF, 0-1260degC)

Calibration Connections

The KODIAK has an L and H port on the front panel. These are connected directly to the low and high sides of the pressure transducer. These ports can be used to connect to a primary standard calibration device which will allow the user to verify the accuracy of the pressure transducer and assist setting up the Cal-Point.

Note: These ports should remain securely capped when not connected to a Primary Standard Differential Pressure Manometer or Inclinometer.

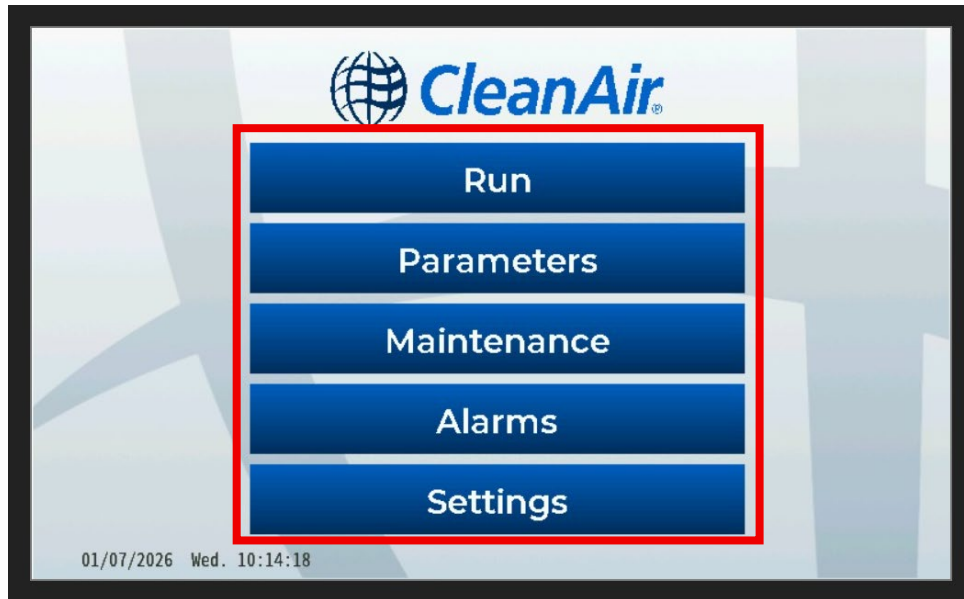


Single Bank KODIAK

KODIAK Menus Explained

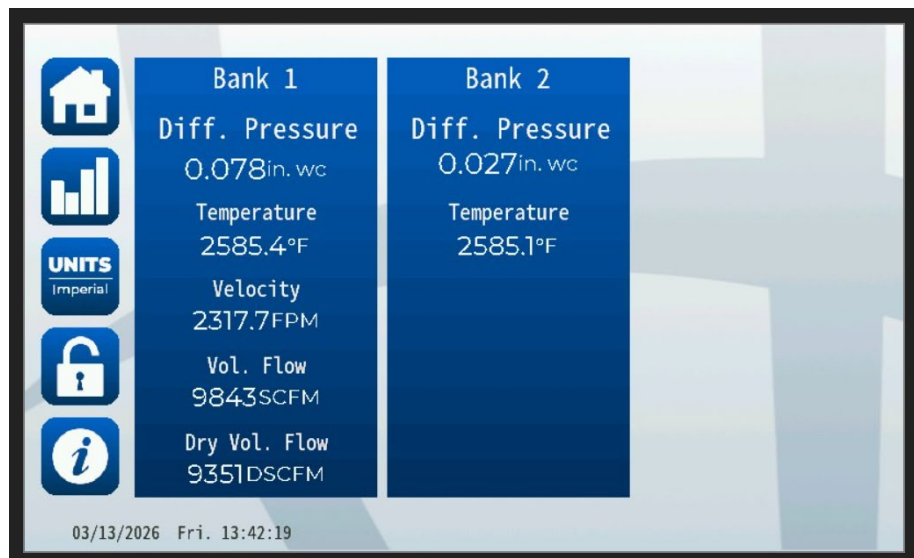
Main Menu

The KODIAK has five Primary Menus in the Main Menu.



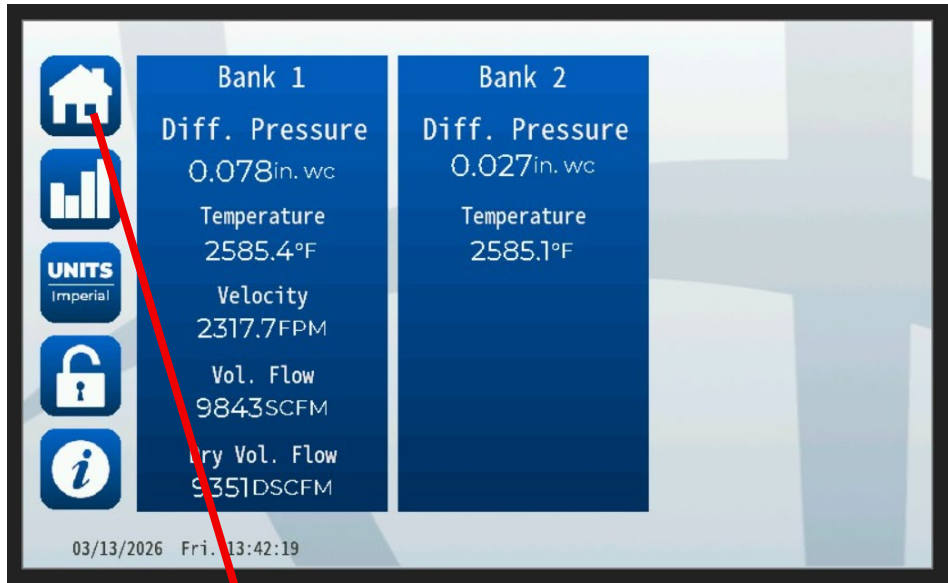
Run Menu

Run Menu brings you out to the basic data screen. (The KODIAK in this example is a Dual Bank KODIAK.)



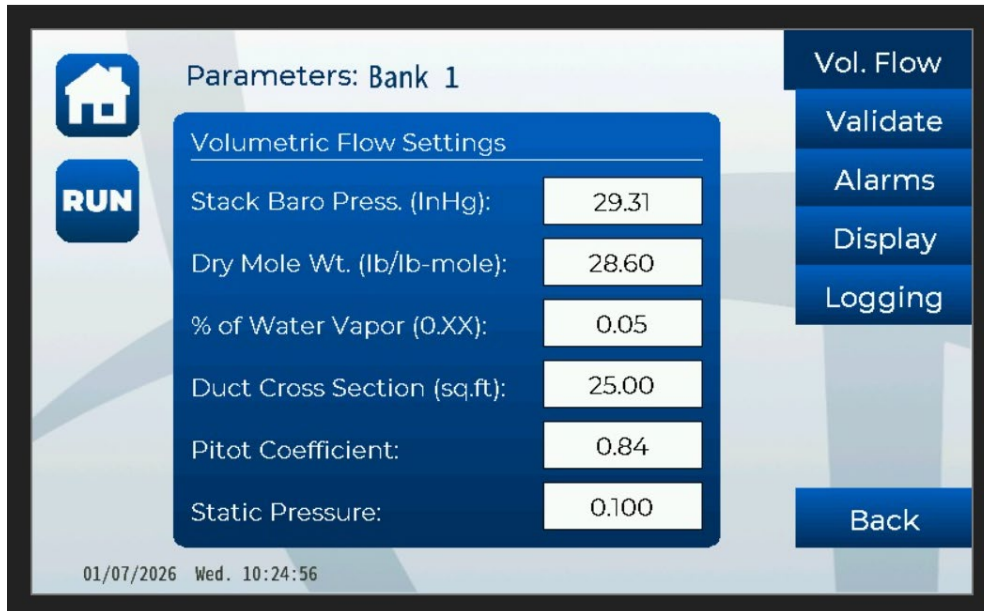
Note: The Explanation of the Run Menu is continued on Page 44

The House Icon brings you back to the Main Menu.



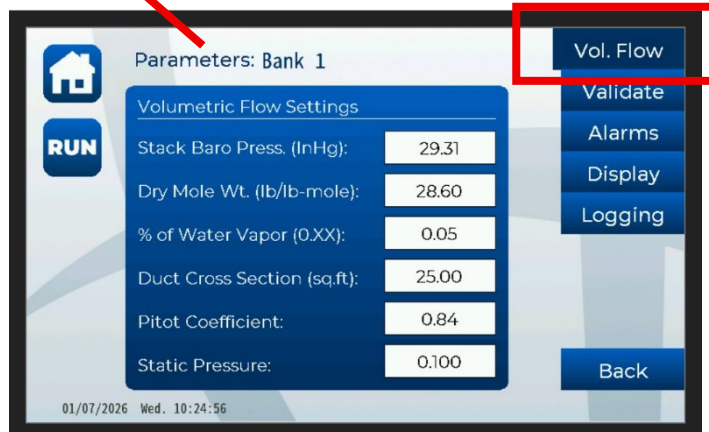
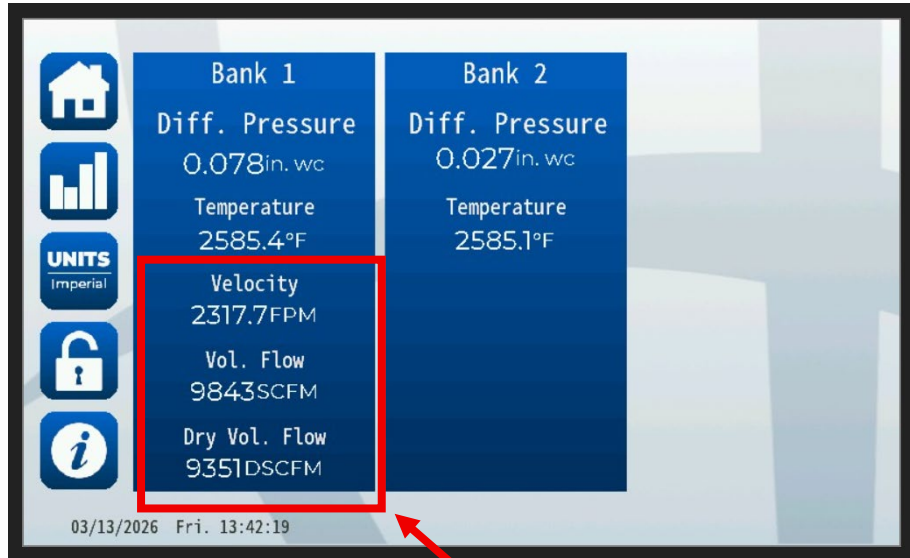
Parameters Menu

The Parameters Menu gives the user access to other menus that set the KODIAK Parameters.



Vol. Flow Menu

“Vol. Flow” is where the user programs in the required settings to get the Velocity data on the Run screen. (This is optional.)

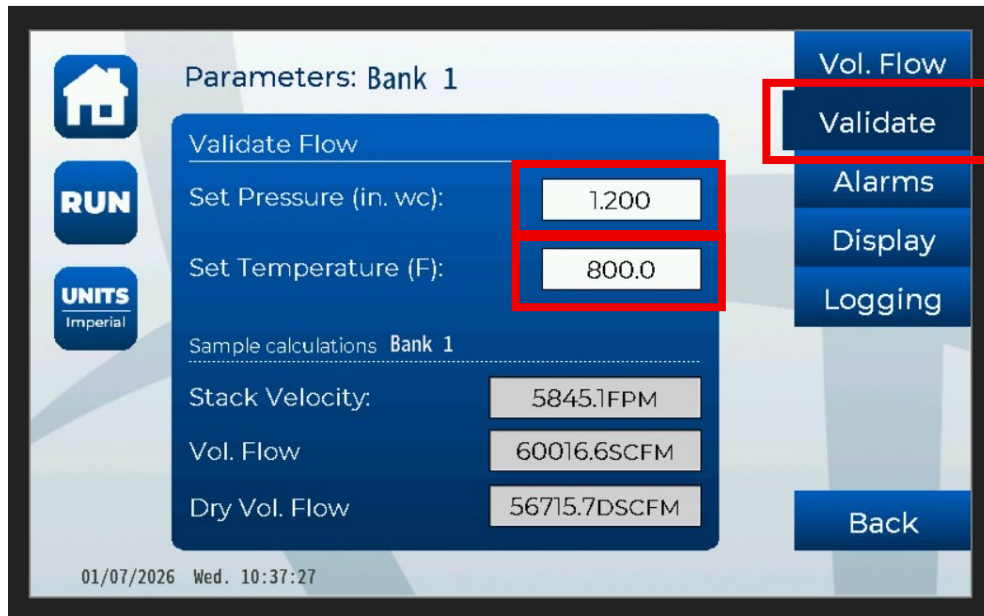


Stack Baro Press, Dry Mole Wt, % Water Vapor, Duct Cross Section, Pitot Coefficient, and Static pressure are all programmable fields the KODIAK uses to calculate Velocity, Vol. Flow, and Dry Vol Flow.

Note: The values in these fields are Default settings.

Validate Menu

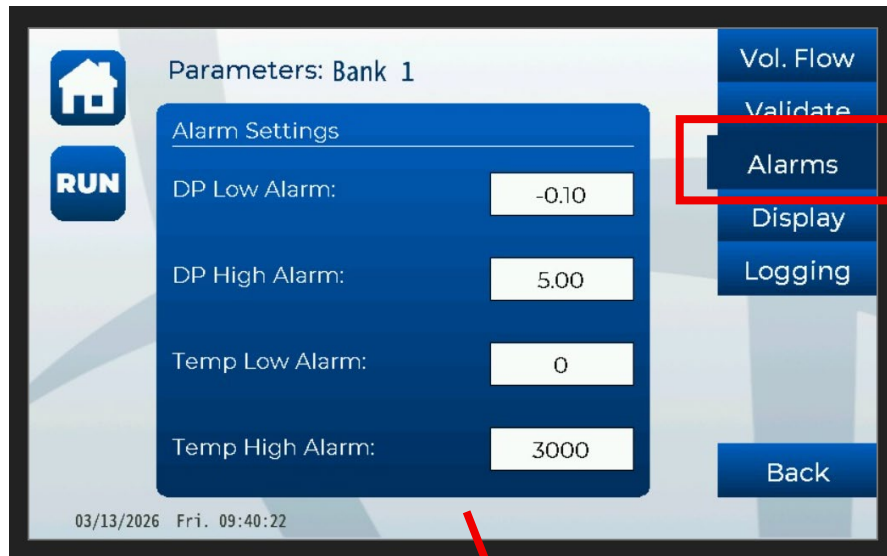
“Validate” is where the user can type in values for Pressure and Temperature to simulate real operating conditions and test the Stack Velocity, Vol. Flow, and Dry Vol. response against their own equations worked out in their Velocity Flow spreadsheets. The user types in values for Set Pressure and Set Temperature. The KODIAK will use these values and the Vol. Flow Menu settings to calculate and populate the Velocity and Flow fields. This is used only as a check.



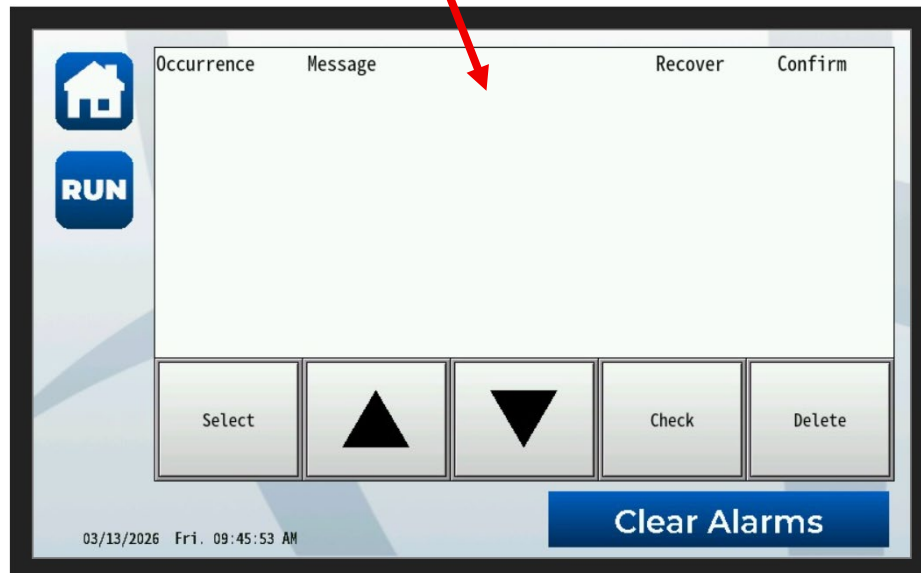
Alarms (sub-menu)

“Alarms” is where the user sets up Low and High Alarm Set Points for Temp and DP. The values shown in this picture are the Default Values. The user can set up their own values by selecting the desired field and programming in a new value.

The Alarms Menu is accessible through the Main Menu.

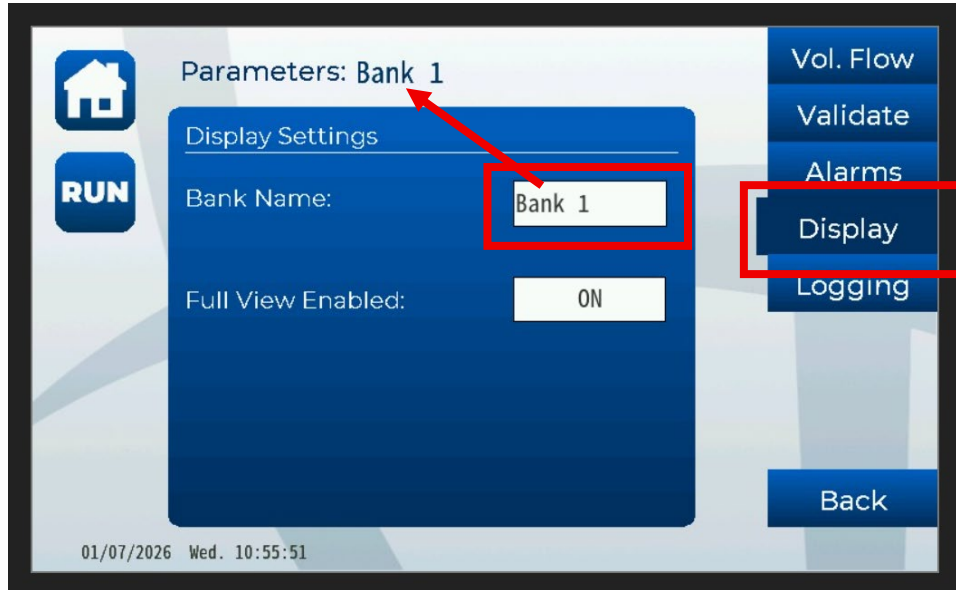


Any Alarms generated will populate the Alarms Menu that is accessible through the Main Menu.

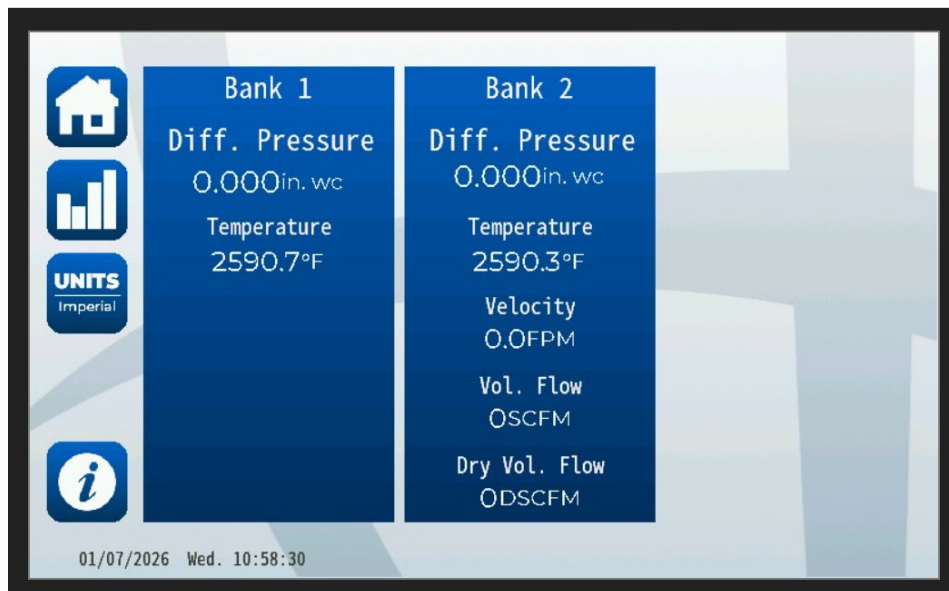


Displays Menu

“Display” is where the user can set the Name of the Bank (“Bank” is a Default channel name) and one of the two views. When Full View Enabled is ON, the Velocity data is displayed. When the Full View is OFF, only the Temp and DP are displayed.



Example of the two different Views. Bank 1 = OFF and Bank 2 = ON.

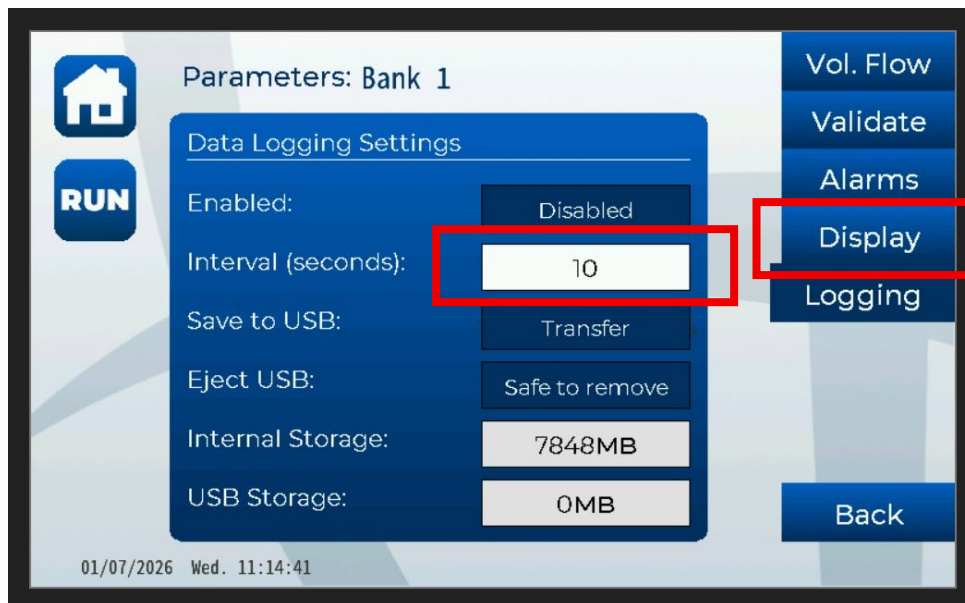


Logging Menu (Datalogging)

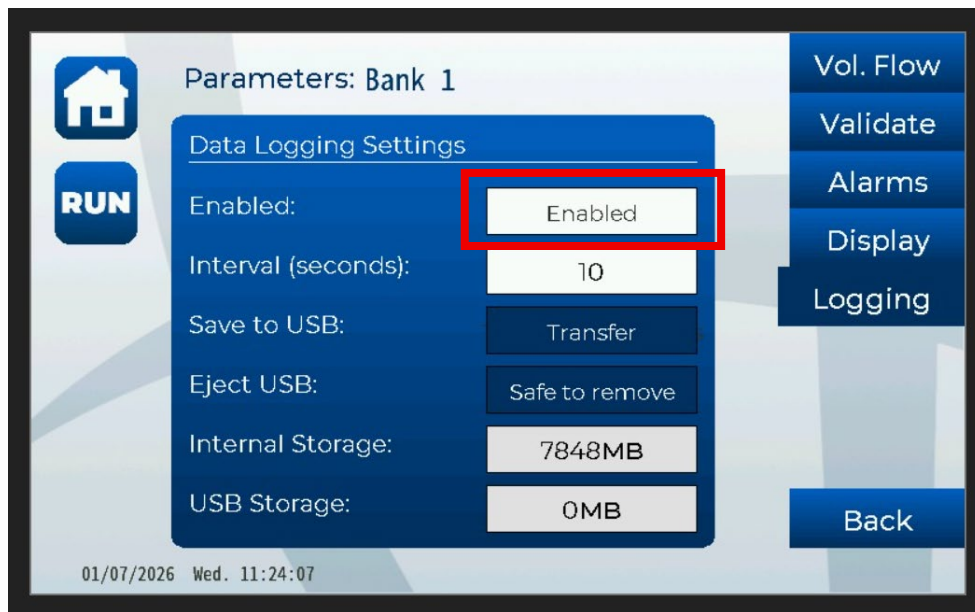
“Logging” is where the user can set the Parameters for logging the data. (Logging is Bank independent. Each Bank has an Enable/Disable button. In the dual Bank, each Bank will produce a separate CSV file.)

How to Enable Datalogging

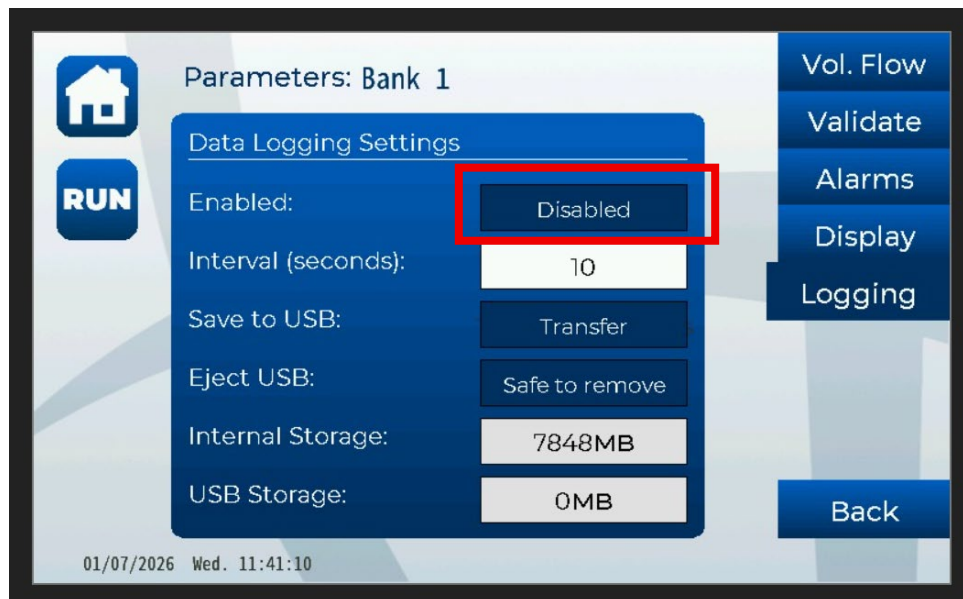
- 1) Press the Interval (seconds) field to program in the save interval. This will take a snapshot of data every 10 seconds.



- 2) Press the Enabled/Disabled button to start the logging for Bank 1.

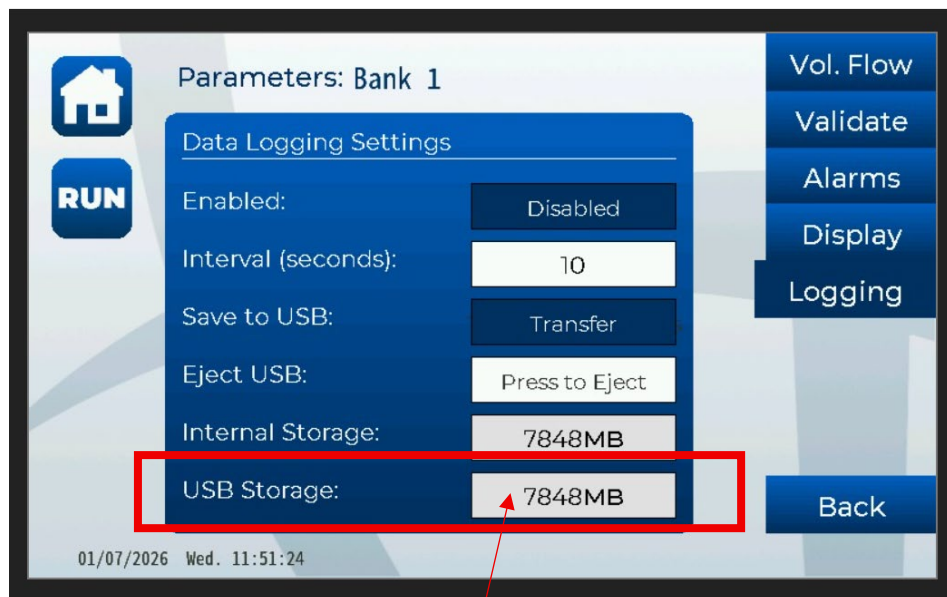


- 3) When your test run is finished, press Enable/Disable button to stop logging.



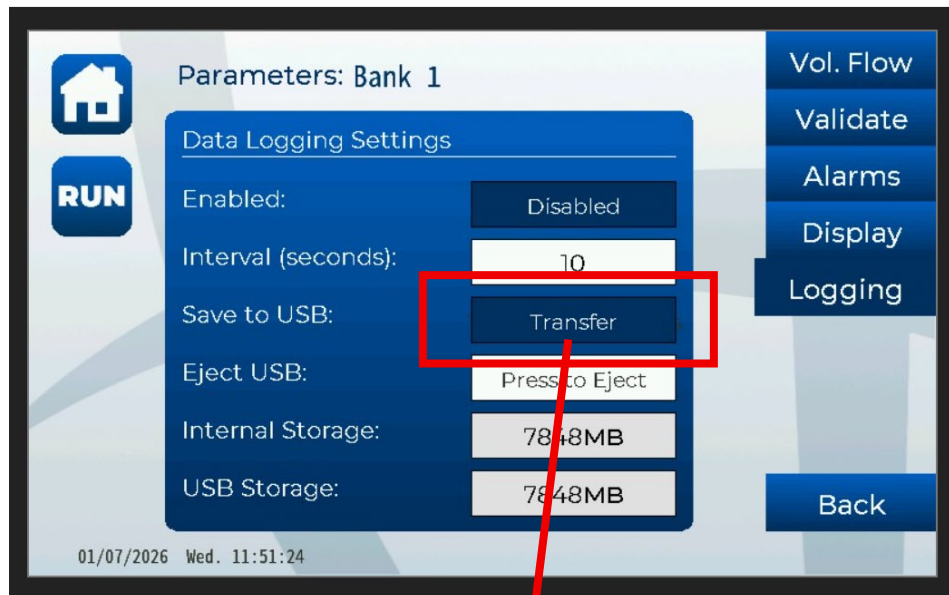
Downloading Data

- 4) Insert a USB C Flash Drive into the USB C port on the front panel of the Kodiak. Wait for the USB Storage field to populate with the USB storage capacity. It will take a few seconds.

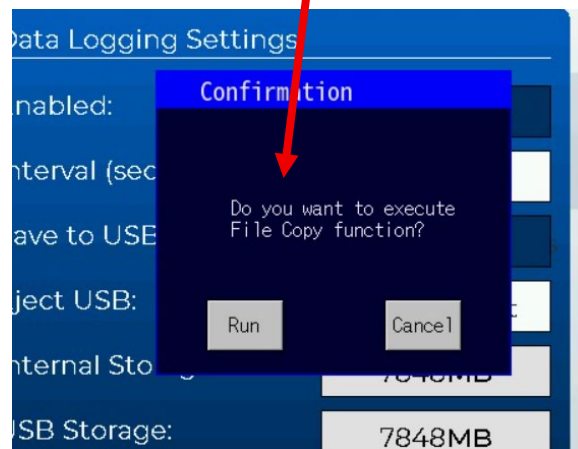


This will change from 0MB to the capacity of the USB storage device you inserted. Be patient, it takes a few seconds to populate.

- 5) Press the Transfer button.

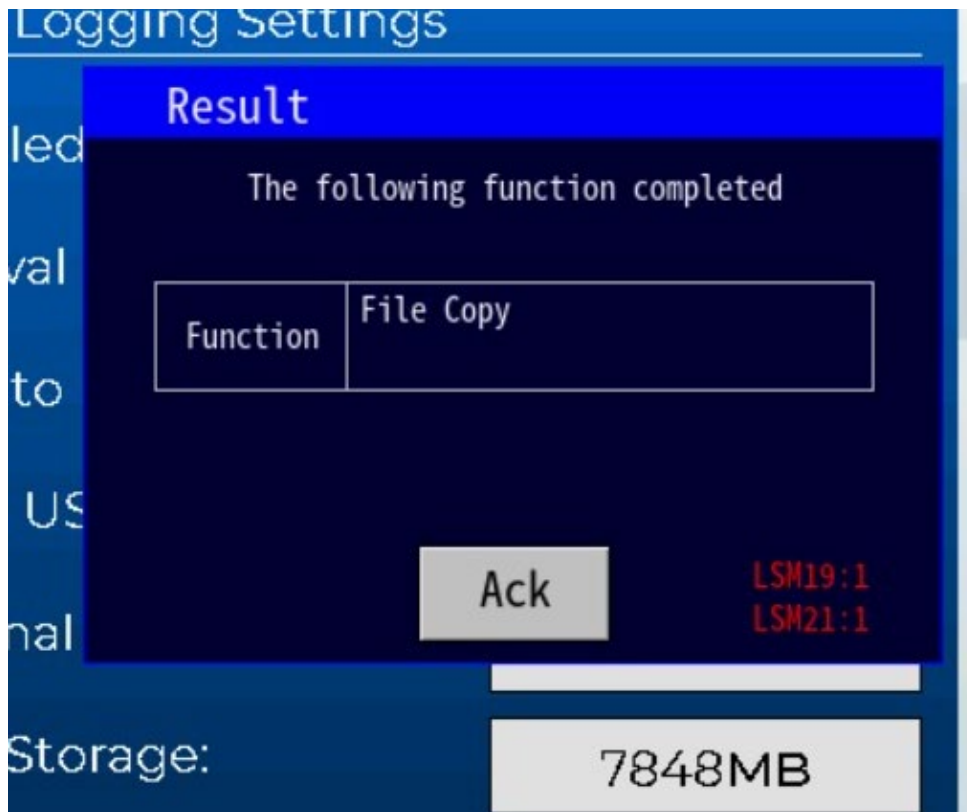


This menu will appear after the user presses the Transfer button.

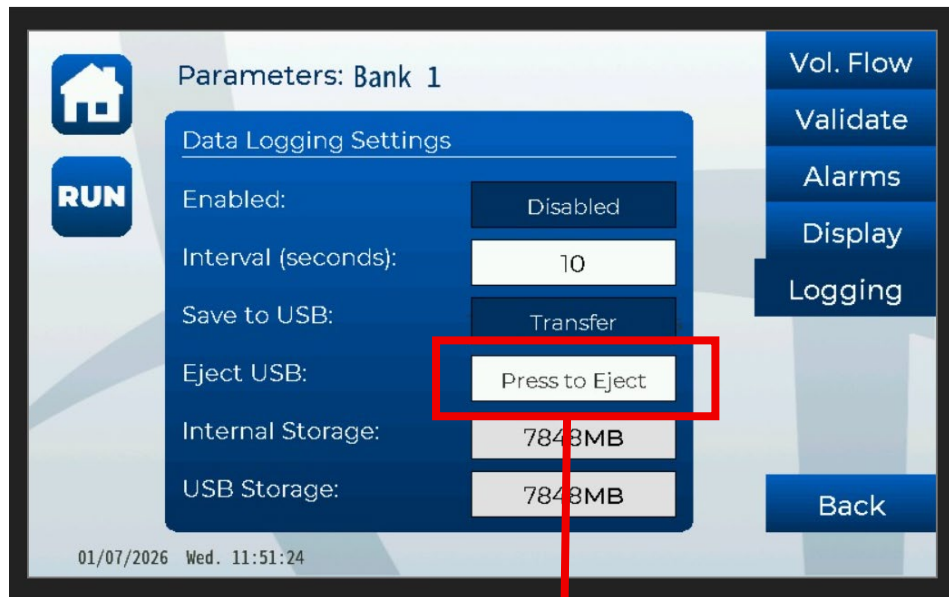


- 6) Press the Run button to execute the File Copy function.

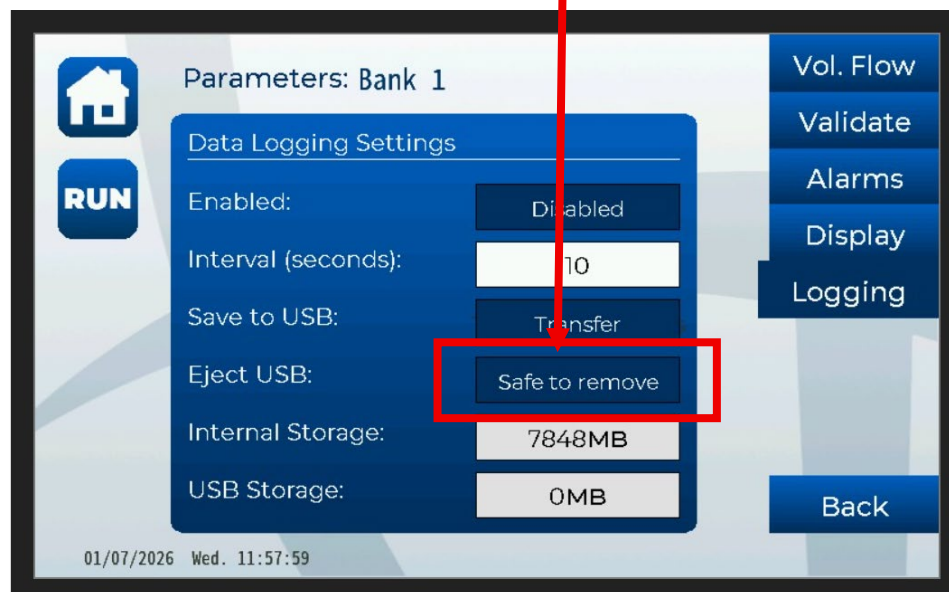
- 7) Press the Ack button. This will complete the transfer function.



- 8) Press the Press to Eject button. The button will change to Safe to Remove.

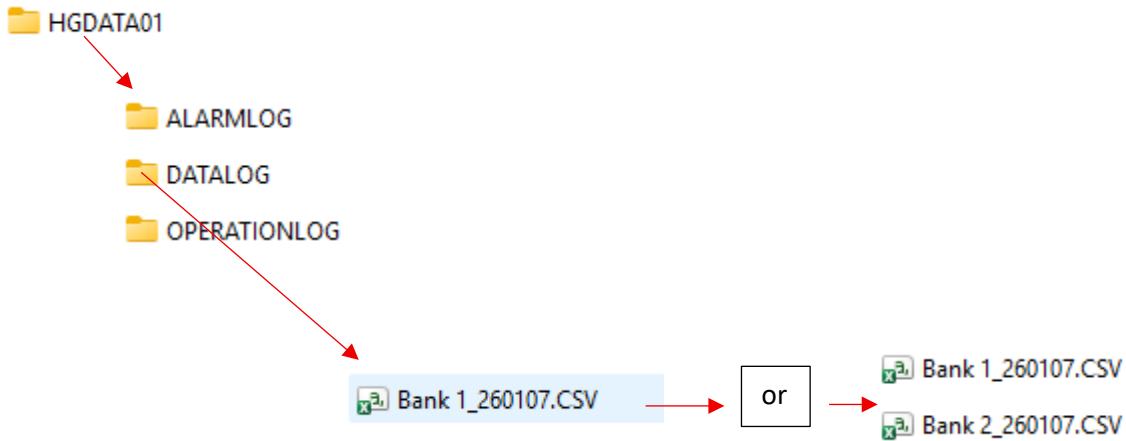


After the Press to Eject button is pressed, that field will change back to Safe to remove. At this point it's safe to remove the USB flash drive from the KODIAK.



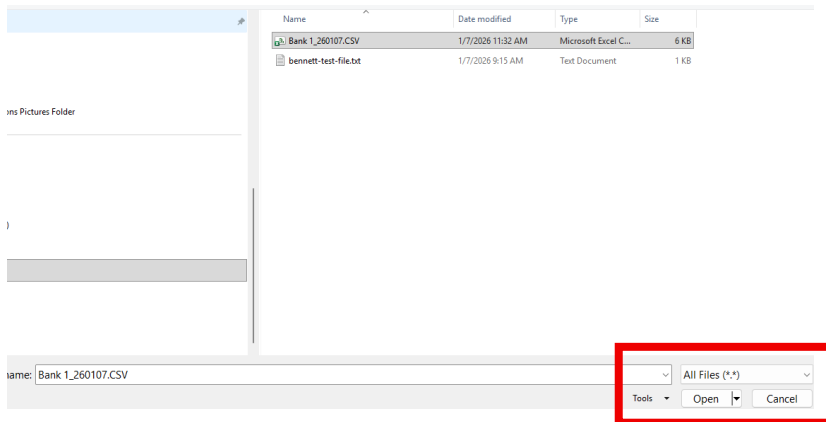
Datalogging File Structure

File Structure:

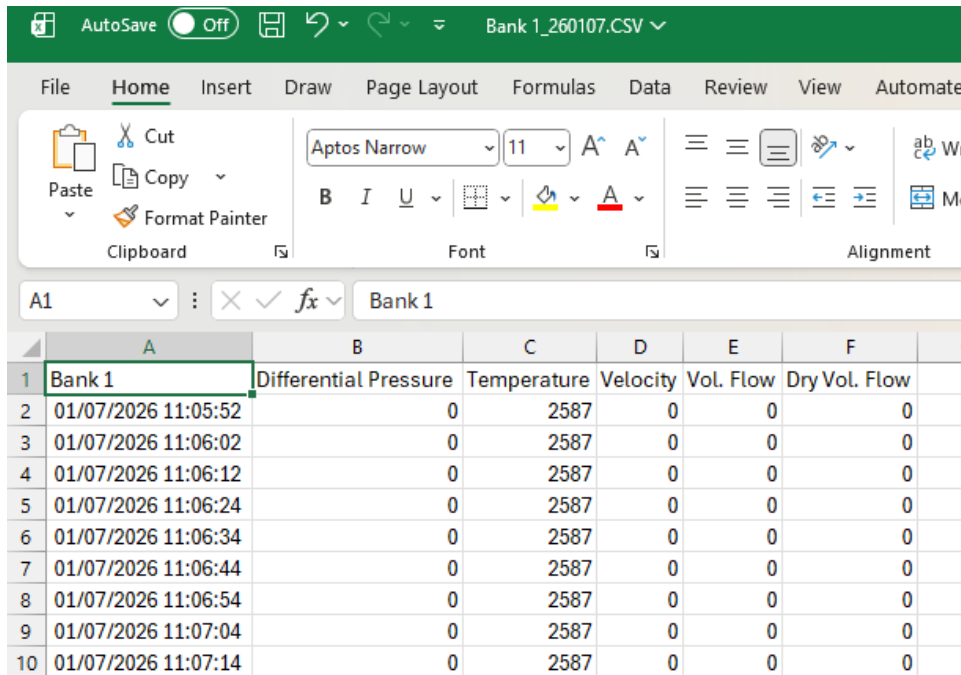


Note: If you have a two-Bank system, and have both Banks datalogging, you will see two different .CSV files.

9) Open Excel. Open All Files.



Example Excel Results



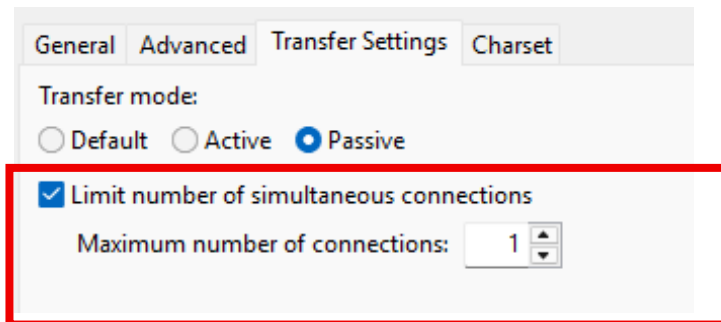
	A	B	C	D	E	F
1	Bank 1	Differential Pressure	Temperature	Velocity	Vol. Flow	Dry Vol. Flow
2	01/07/2026 11:05:52	0	2587	0	0	0
3	01/07/2026 11:06:02	0	2587	0	0	0
4	01/07/2026 11:06:12	0	2587	0	0	0
5	01/07/2026 11:06:24	0	2587	0	0	0
6	01/07/2026 11:06:34	0	2587	0	0	0
7	01/07/2026 11:06:44	0	2587	0	0	0
8	01/07/2026 11:06:54	0	2587	0	0	0
9	01/07/2026 11:07:04	0	2587	0	0	0
10	01/07/2026 11:07:14	0	2587	0	0	0

Note: The folder name will change each day. When you start and stop and then start the datalogger again, it will append the same file and continue. This data is a snapshot, not an average.

FTP File Transfer

The KODIAK allows FTP file transfer using third party FTP File Transfer software. The IP Address used for file transfer is the 192.168.1.150. Do not use MS Windows FTP transfer. It opens multiple connections and will lockout the FTP function after one transfer. Third Party FTP file transfer software will allow you to establish 1 connection. The Data is retrieved through the E1 Ethernet port on the back of the instrument. IP Address = 192.168.1.150.

Caution:



General Advanced **Transfer Settings** Charset

Transfer mode:
 Default Active Passive

Limit number of simultaneous connections
 Maximum number of connections:

Example using FileZilla

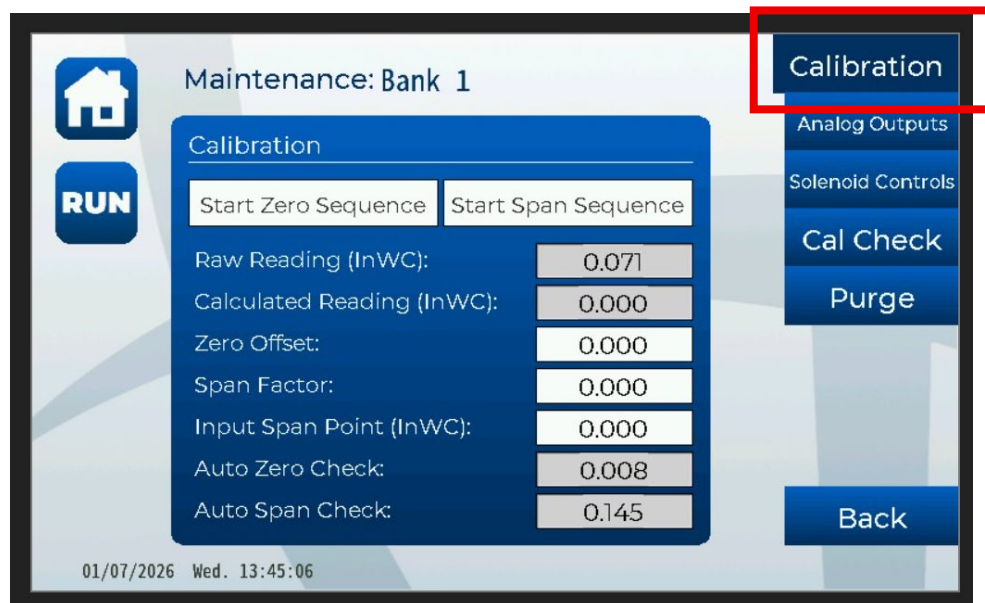
Maintenance Menu

The Maintenance Menu allows the user to calibrate the Bank, setup the analog outputs, manually control the solenoid valves, set the time for Daily DP Drift Check, manually start a Purge, and set the time to run the Purge on an interval.

Calibration Menu

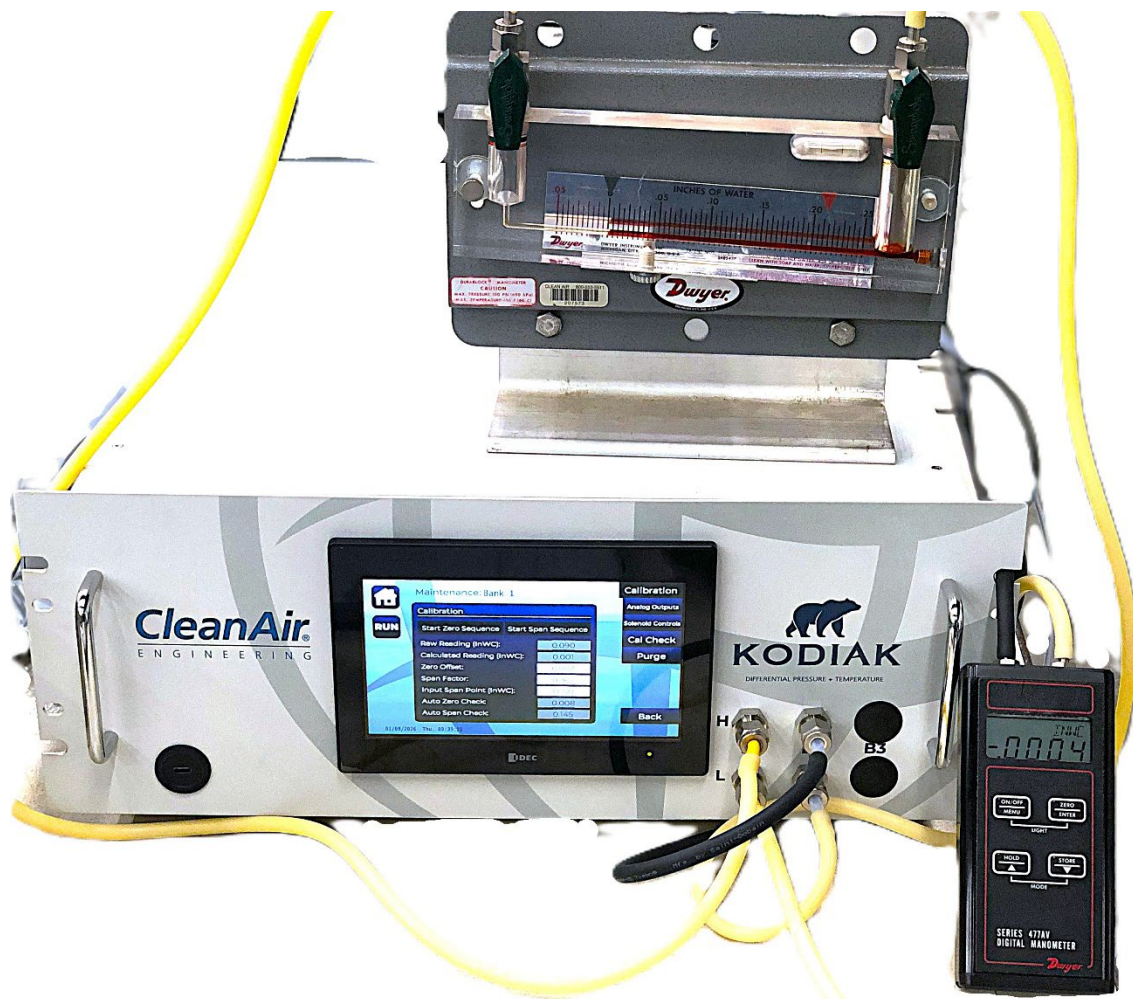
Note: The KODIAK uses the Instrument Air connected to the back panel for calibrations and purge. Make sure you have CLEAN compressed air connected to the KODIAK to perform the calibration.

Caution: 90psi Maximum Pressure / 20psi Minimum Pressure



How to Perform a Manual Zero Calibration

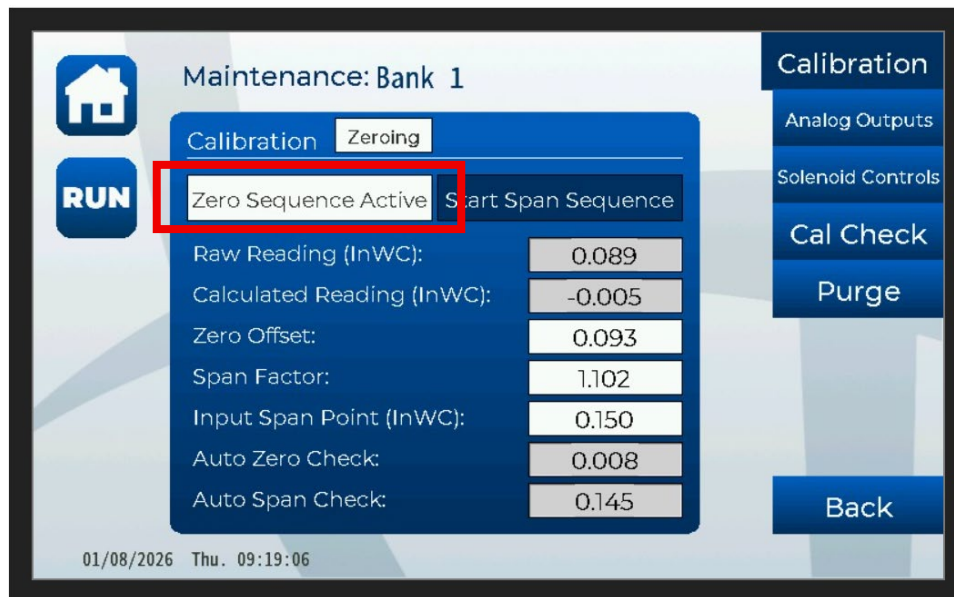
Note: If you are performing the **Initial Calibration**, Primary Standards (like these in the photo) for measuring differential pressure should be connected to the H and L bulkheads on the front panel of the KODIAK. Adjusting the internal pressure switch to establish the span calibration point is covered later in this document (Page 56). This calibration can be performed with the Pitot Probe and Pitot Lines connected and functioning. The KODIAK isolates the H and L ports on the front panel from the H and L ports on the back panel during the calibration sequence. Only the Front Panel ports are active during a calibration sequence.



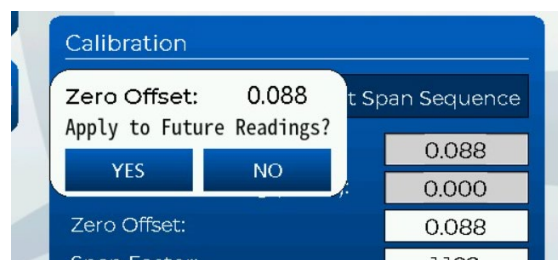
1. Press the Start Zero Sequence button.

Note: This will open the H and L sides of the Pressure Transducer to atmosphere inside the KODIAK chassis.

The word “Zeroing” will appear in a white box and start flashing. It will continue flashing until the Zero Sequence is finished. This is a timed sequence.



2. When the Zeroing sequence is done running, a menu will ask if you want to Apply to Future Readings. Press Yes.



After pressing Yes, the correction factor will be applied to the Calculated Reading (InWC) field. The Zero Offset field will automatically populate with the offset.

Note: The Zero Offset field can be manually programmed at any point simply by pressing that field and programming a custom value for the Zero Offset.

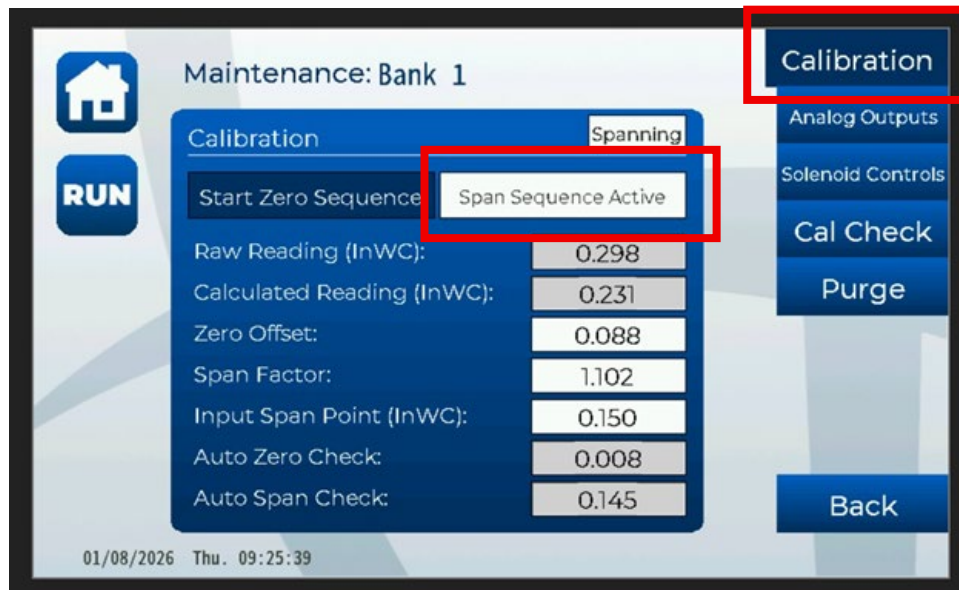
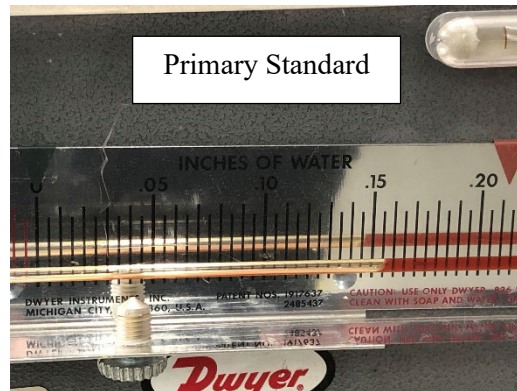
Caution: The KODIAK is orientation sensitive. Do not move the instrument once calibration is completed.

Starting a Manual Span Calibration

Technical Note: The KODIAK has an internal pressure switch that is adjustable. For example, the pressure switch in this KODIAK is a 0.1”WC to 0.5”WC pressure switch. When the pressure supplied by the Instrument Air reaches the pressure the switch was set to, it sends a signal to the PLC to shut off the Instrument Air and hold the system leak tight for the duration of the Span sequence. It takes a few moments for the response of the KODIAK to become stable. Setting the Cal Point Pressure of the switch is covered later in this manual (Page 56). This calibration can be performed with the Pitot Probe and Pitot Lines connected and functioning. The KODIAK isolates the H and L ports on the front panel from the H and L ports on the back panel during the calibration sequence. Only the Front Panel ports are active during a calibration sequence.

1. Press the Start Span Sequence button. The word Spanning will flash in a white box until the Spanning Sequence is completed.

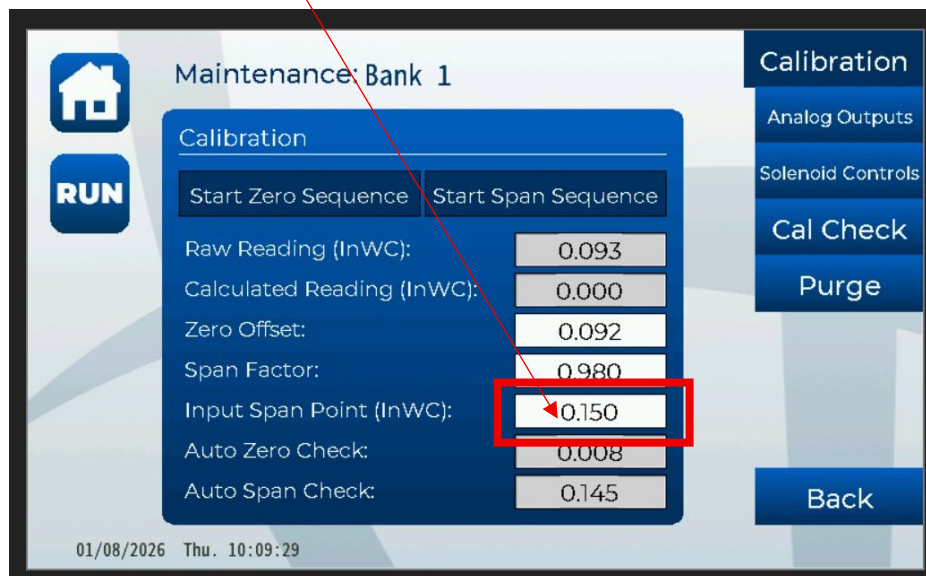
Note: If this is the first calibration, the “Input Span Point (InWC):” field will need to be programmed with the Calibration Set Point value. While the Spanning Sequence is active, **record the final calibration result** from the Primary Standard you connected to the H and L ports on the front of the KODIAK. You will need to program this value into the “Input Span Point (InCH:) box. **Also, if you have multiple Banks, each Input Span Point may be slightly different for each Bank.**



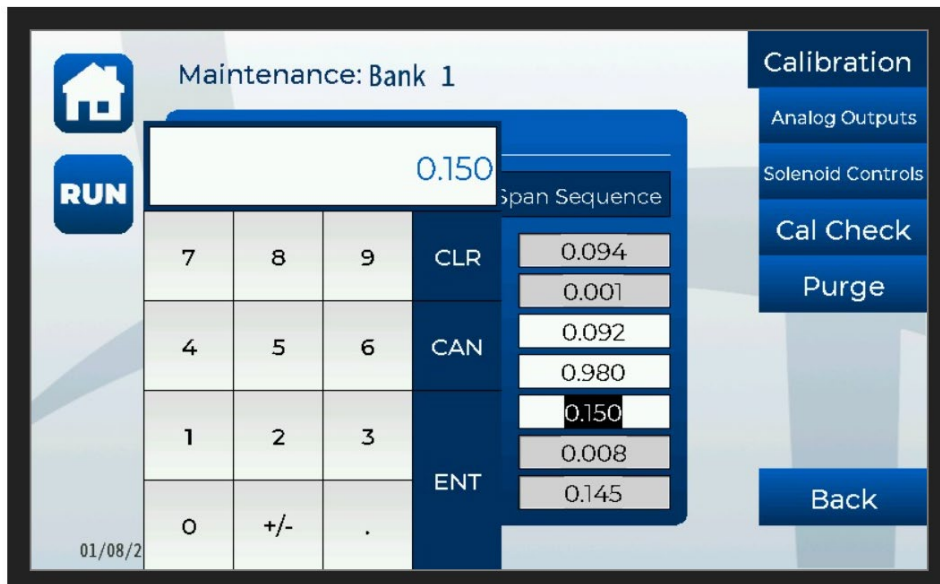
- When the Span sequence is done running a menu will ask if you want to Apply to Future Readings. If this is the Initial Calibration, or if you are attempting to establish a new calibration point using the Primary Standard, select NO.



- Press the button for Input Span Point InWC.



- Type in the result for the Span that you recorded in the previous step from the Primary Standard.



- Run the Span Sequence a second time. When the “Span Factor:” box appears, select YES. The Span Factor will automatically populate the “Span Factor:” field.

Note: The Span Factor can be manually input by pressing the Span Factor box if desired.



The Manual Span is complete.

Analog Output Explained

The Kodiak has analog outputs for the Pressure and Temperature. There are 0-10vdc and 0-20ma connections on the green “P2” Phoenix connector for ΔP and TEMP. (The milliamp output is a “Sourcing” output. It provides its own power.)

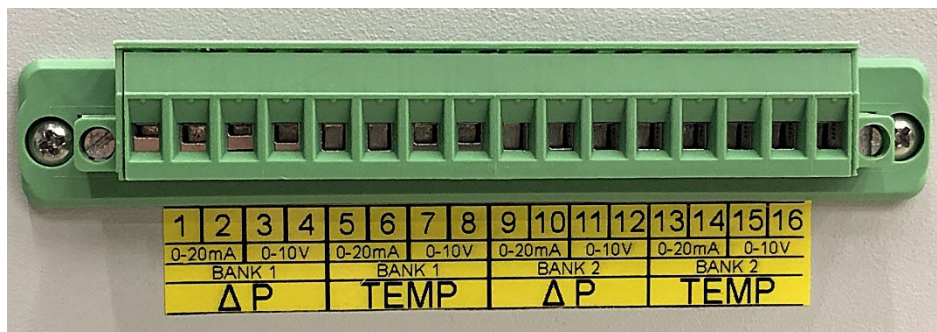
Analog Output Pinout for Single Bank Kodiak

- ΔP 0-10vdc / Pin 1 = Negative, Pin 2 = Positive (Range = 0 - 3.000in.wc, 0 - .75Kpa)
- ΔP 0-20ma / Pin 3 = Negative, Pin 4 = Positive (Range = 0 - 3.000in.wc, 0 - .75Kpa)
- TEMP 0-10vdc / Pin 13 = Negative, Pin 14 = Positive (Range 32 - 2300degF, 0-1260degC)
- TEMP 0-20ma / Pin 15 = Negative, Pin 16 = Positive (Range 32 - 2300degF, 0-1260degC)



Analog Output Pinout for Dual Bank Kodiak

- ΔP 0-20ma / Pin 1 = Negative, Pin 2 = Positive (Range = 0 - 3.000in.wc, 0 - .75Kpa)
- ΔP 0-10vdc / Pin 3 = Negative, Pin 4 = Positive (Range = 0 - 3.000in.wc, 0 - .75Kpa)
- TEMP 0-20ma / Pin 5 = Negative, Pin 6 = Positive (Range 32 - 2300degF, 0-1260degC)
- TEMP 0-10vdc / Pin 7 = Negative, Pin 8 = Positive (Range 32 - 2300degF, 0-1260degC)
- ΔP 0-20ma / Pin 9 = Negative, Pin 10 = Positive (Range = 0 - 3.000in.wc, 0 - .75Kpa)
- ΔP 0-10vdc / Pin 11 = Negative, Pin 12 = Positive (Range = 0 - 3.000in.wc, 0 - .75Kpa)
- TEMP 0-20ma / Pin 13 = Negative, Pin 14 = Positive (Range 32 - 2300degF, 0-1260degC)
- TEMP 0-10vdc / Pin 15 = Negative, Pin 16 = Positive (Range 32 - 2300degF, 0-1260degC)



Analog Outputs Menu

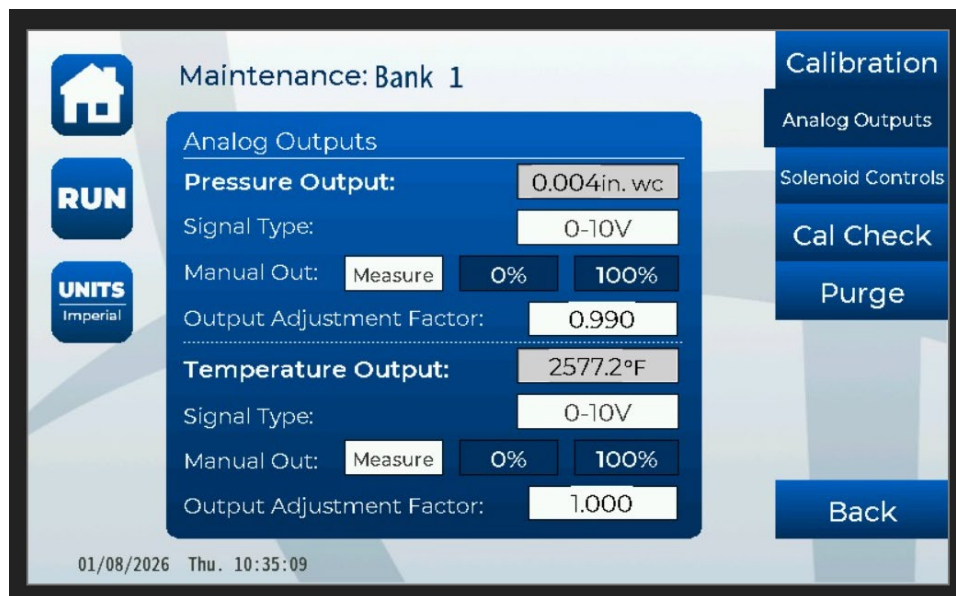
Pressure Output = Real time pressure reading.

Signal Type = Select 0-10V (DC-Voltage) or 0-20mA by pressing the Signal Type button.

Note: There are separate outputs for DC-Voltage and Milliamp. When the 0-10V signal type is selected, the 0-20mA analog signal will be inaccurate. Conversely, when the 0-20mA type is selected, the 0-10V will be inaccurate. Only one analog Signal Type can be selected at a time.

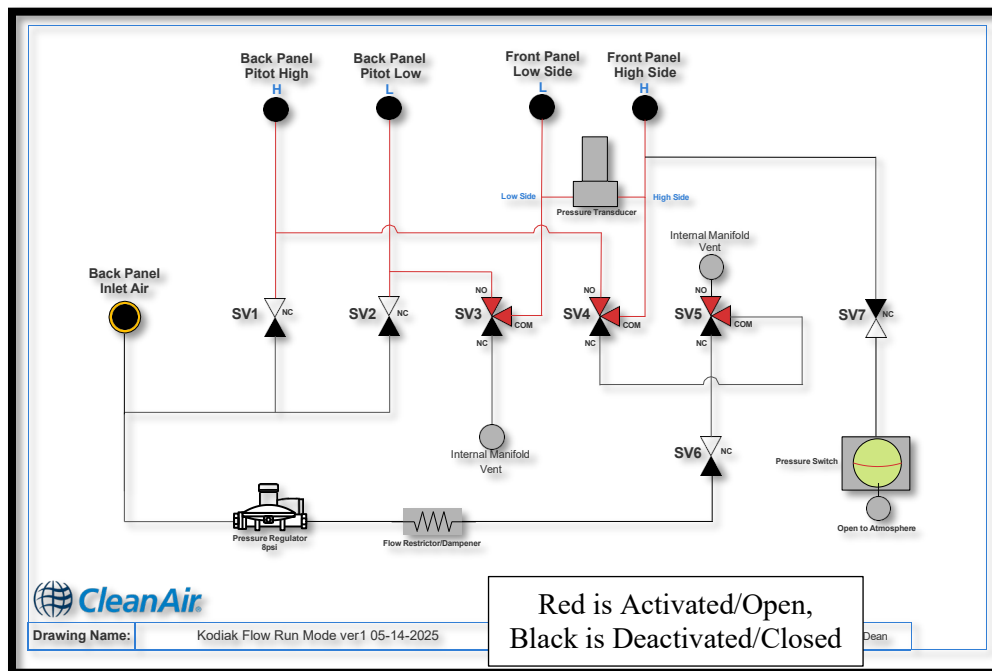
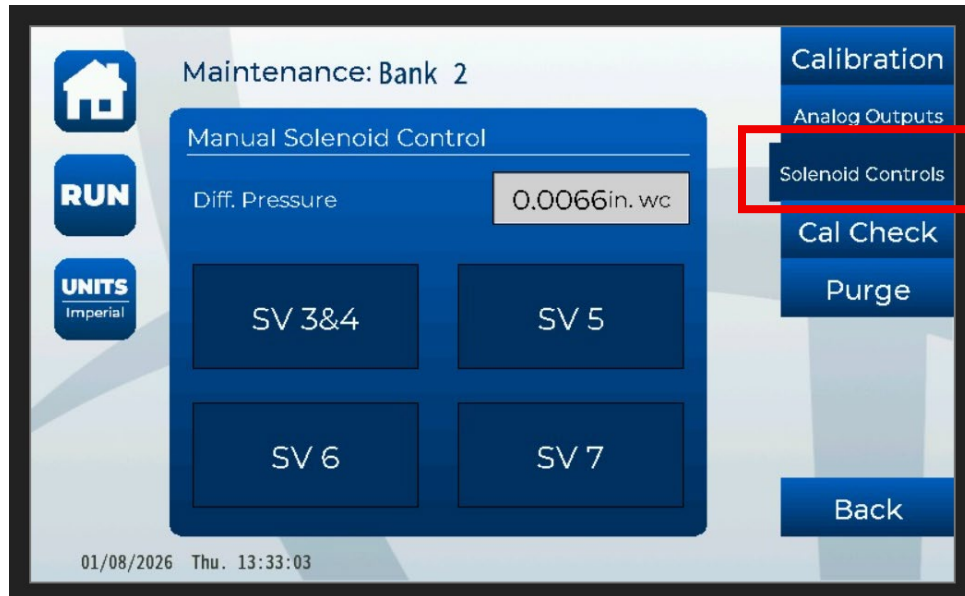
Manual Out = This will force the analog output for the channel to 0vdc/0.0mA or 10vdc/20mA.

Adjustment Factor = The user can apply an adjustment factor to account for slight discrepancies between the analog output of the KODIAK and whatever datalogger the signal cable is connected to.



Manual Solenoid Controls Menu

This menu allows the user manual control of solenoids 3 & 4, 5, 6, and 7. This is useful for troubleshooting. (See Run Mode flow diagram below. Other diagrams start on page 60.)



Caution: SV6 opens the Instrument Air path to the system. Do Not leave SV6 open for more than a few moments. While SV6 is open, you will see the Diff. Pressure starts to rise.

Cal Check Menu

Note: Perform a Manual Zero and Span before Enabling the Daily DP Drift Check.

This menu allows the user to set a time each day to perform a drift check against the Cal Set Point. There is also an option to have the KODIAK automatically apply the new factors. This is essentially an Auto Calibration option. However, this is normally not recommended. If the calibration drifts, there is normally a reason. If it drifts by a great deal, an investigation should be conducted and a reason for the drift found.

Start Time: The user can set a time to start a Daily DP Drift Check sequence. The Drift Check will run each day at the programmed time. (Military Time.)

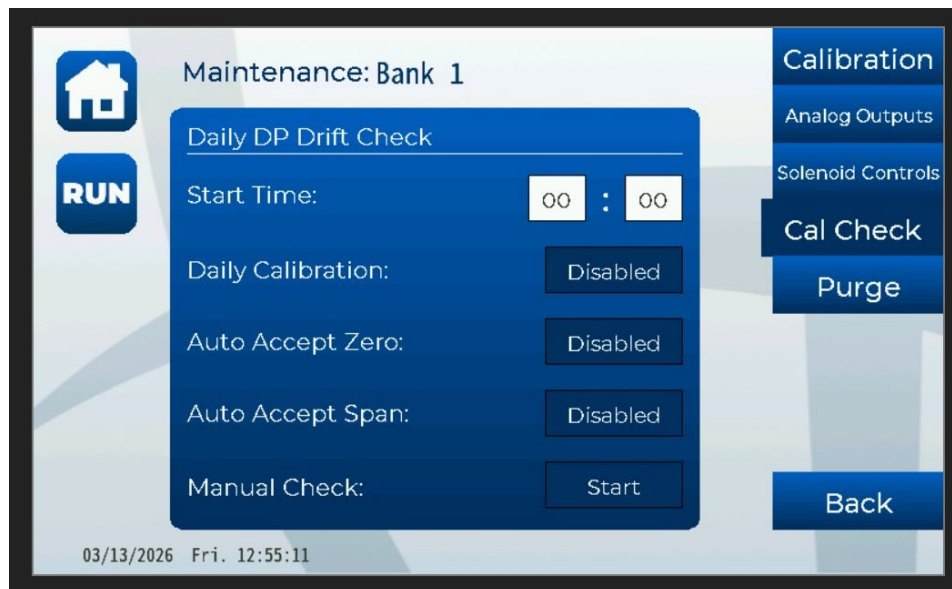
Daily Calibration: = Disable/Enable the Daily Drift Check.

Auto Accept Zero: = Enabling this feature will cause the KODIAK to automatically adjust the Zero Offset value after each Daily Drift Check sequence. This is essentially an AutoCal.

Auto Accept Span: = Enabling this feature will cause the KODIAK to automatically adjust the Span Factor value after each Daily Drift Check sequence. This is essentially an AutoCal.

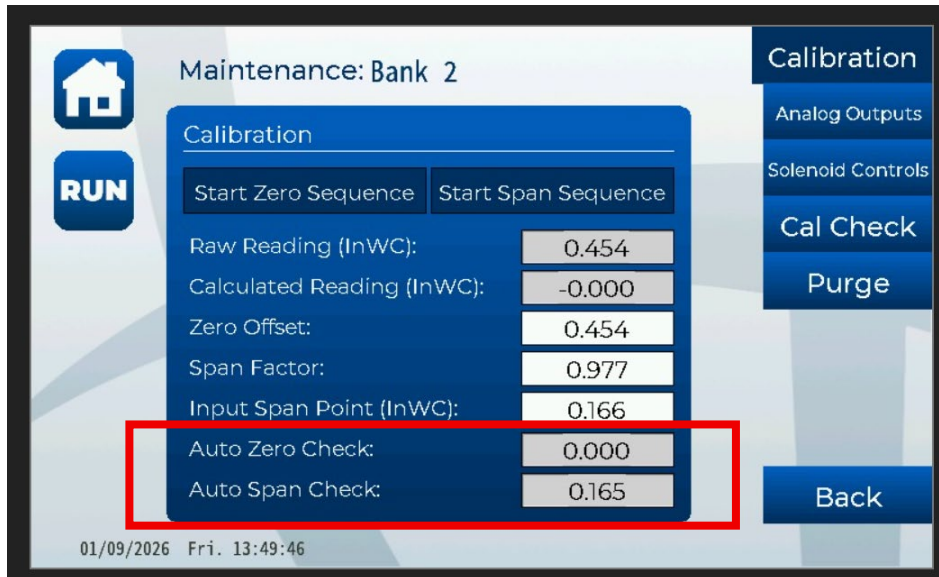
Manual Check: Pressing this button will start Daily Drift Check immediately.

Note: Only one Bank can calibrate or purge at a time. If you set a time that is already taken, it will warn you. Make sure the Cal Check and Purge times are offset for each Bank.



When the Daily Drift Check sequence has completed, the Drift Result will be recorded in the Auto Zero Check and Auto Span Check fields. The result is equal to the reading captured during the drift check routine.

This example shows a difference between the Input Span Point (InWC): and the Auto Span Check: of .001. When the KODIAK Span sequence was initially run, the result was .166(InWC). When the Daily Drift Check sequence ran, the resulting drift was recorded as .165 (InWC).



Purge Menu

The KODIAK will send the Instrument Air to the H and L ports on the back panel, to purge the Pitot lines and Probe.

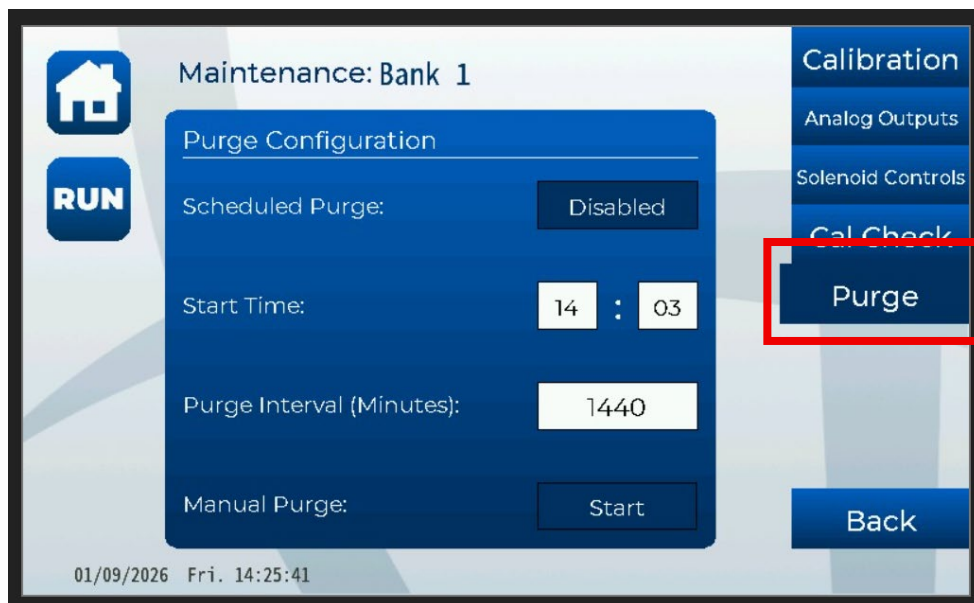
Purge Sequence = 5 seconds on, 5 seconds off, 5 seconds on, stop purge.

Scheduled Purge = Disable or Enable the auto purge.

Start Time = Set the Hour and Minute the Purge will start.

Purge Interval Minutes = Set the number of minutes until the next Purge sequence runs. (Once a day would = 1440)

Manual Purge = Start a manual Purge sequence immediately.



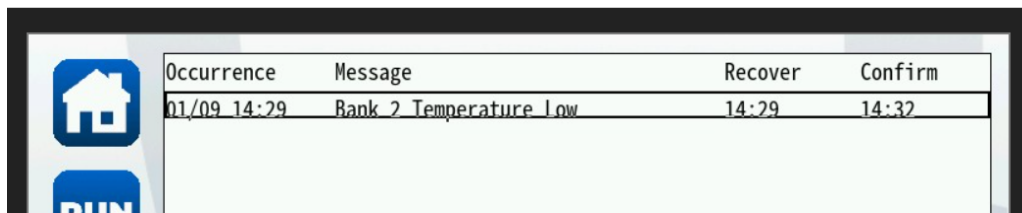
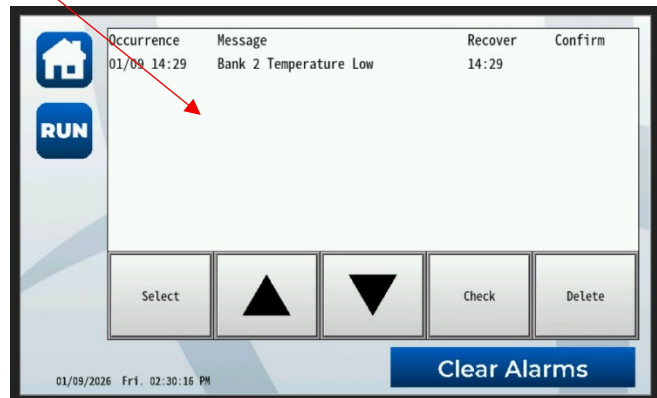
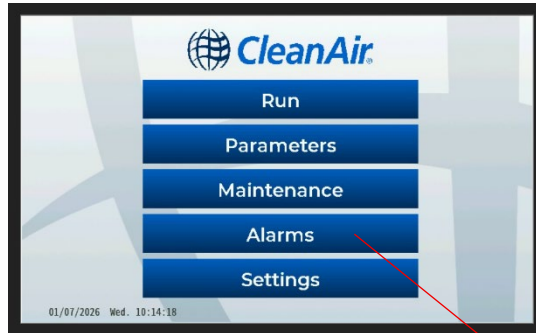
Alarms Menu

This menu is where any alarms are logged. The alarms will remain until they are cleared individually or collectively.

Select = A black box will appear around the alarm. Use the arrow buttons to select the particular alarm.

Check = With the black box around the alarm instance, the user can select Check, which will check the current status of the alarm. When Check is selected, the time will populate in the Confirm column.

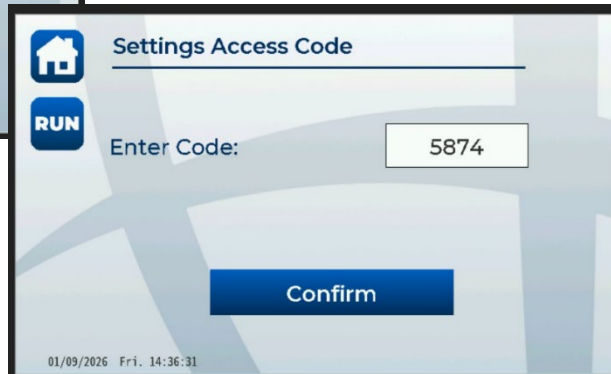
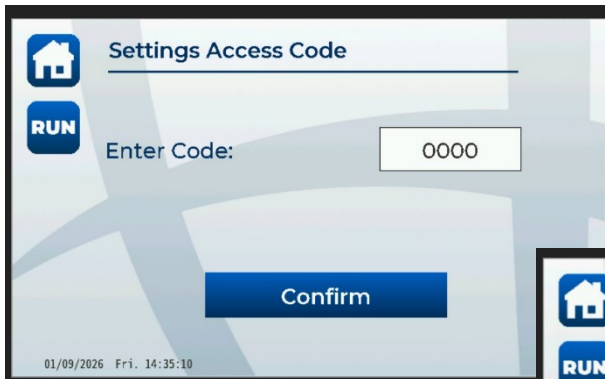
Clear Alarms = It will clear all the alarms that are not in an active state.



Alarm Confirmed.

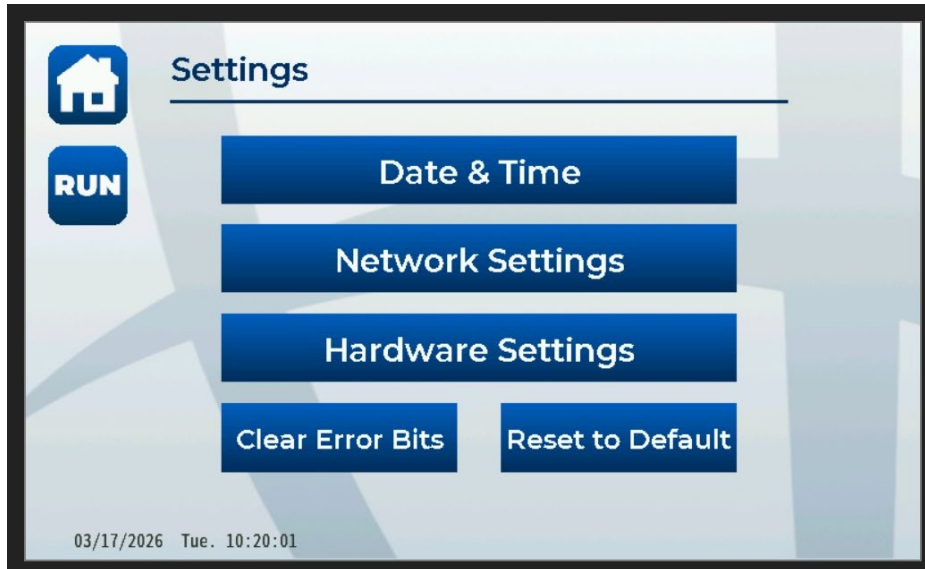
Settings Menu

The Settings Menu restricts access to other critical operational Menus. Access to the sub-menus is passcode protected. The code is 5874 – Confirm.



Settings (Set Date and Time)

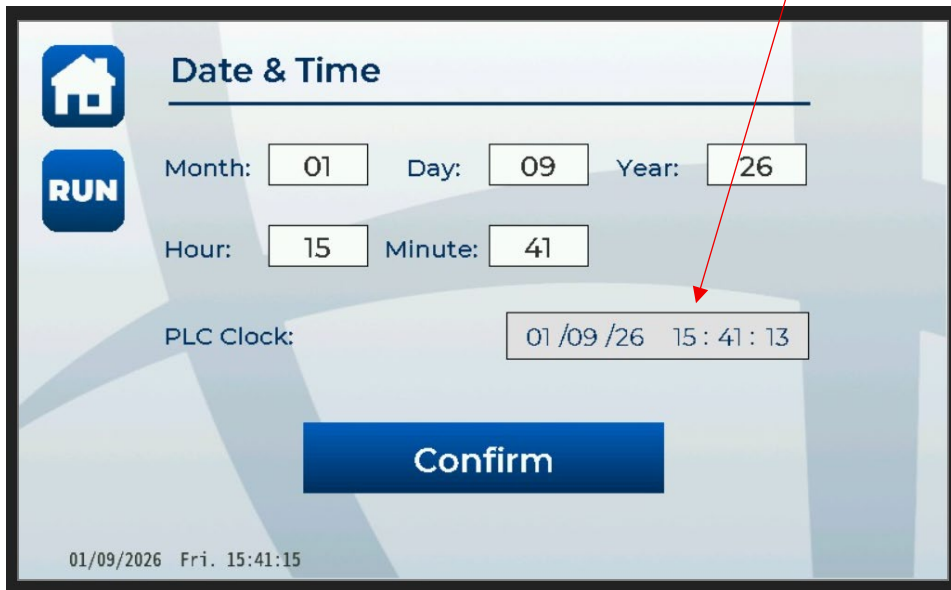
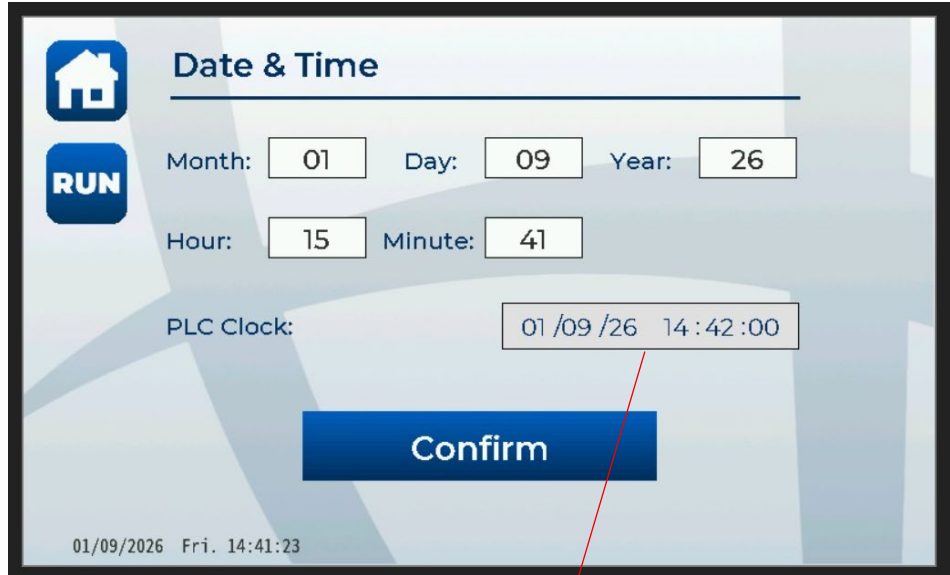
Date & Time = Allows the user to set and Sync the Date and Time settings between the PLC and HMI.



All fields in the Date and Time menu must be populated for the changes to take effect!



Changed Time from 14:42 to 15:42 once all fields were populated and Confirm is pressed.



Settings

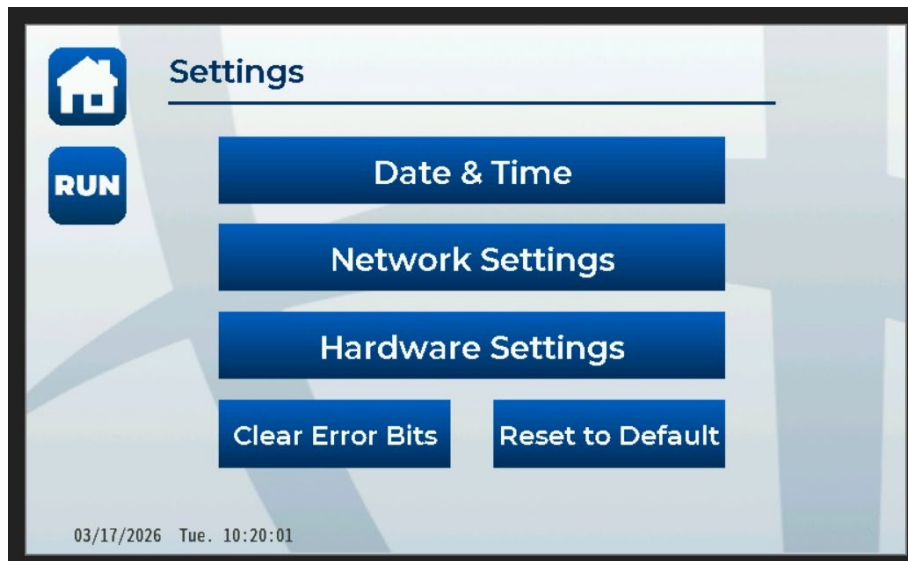
Network Setting = DO NOT TOUCH!

Hardware Settings = Set the Number of Banks and Enable or Disable Analog Outputs.

Clear Error Bits = Clearing the Bits that are set with a failed cal drift check. If the Drift Check is run with no Air Pressure, it will set an error Bit that needs to be cleared.

Note: The DP reading in the Run Menu will change color depending on what instruction is being carried out, Cal or Purge. If there is a failed Cal, the DP numeric display will change from White to a different color. Pressing “Clear Error Bits” will restore the DP display to normal operation.

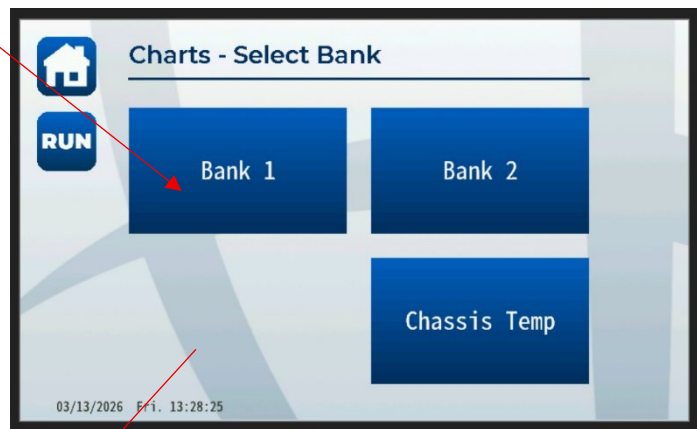
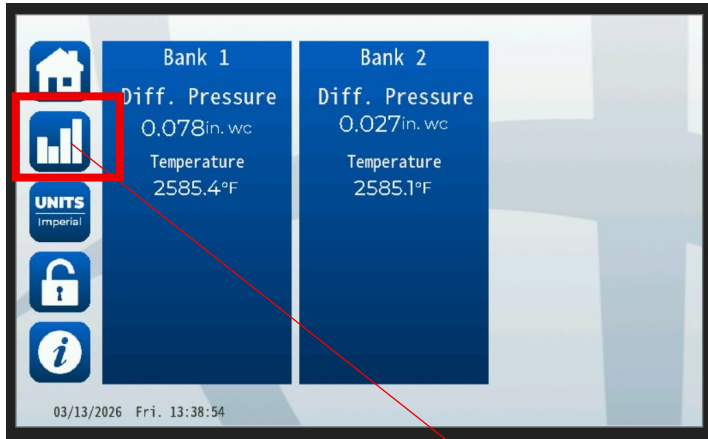
Reset to Defaults = This will reset the Kodiak to factory defaults.



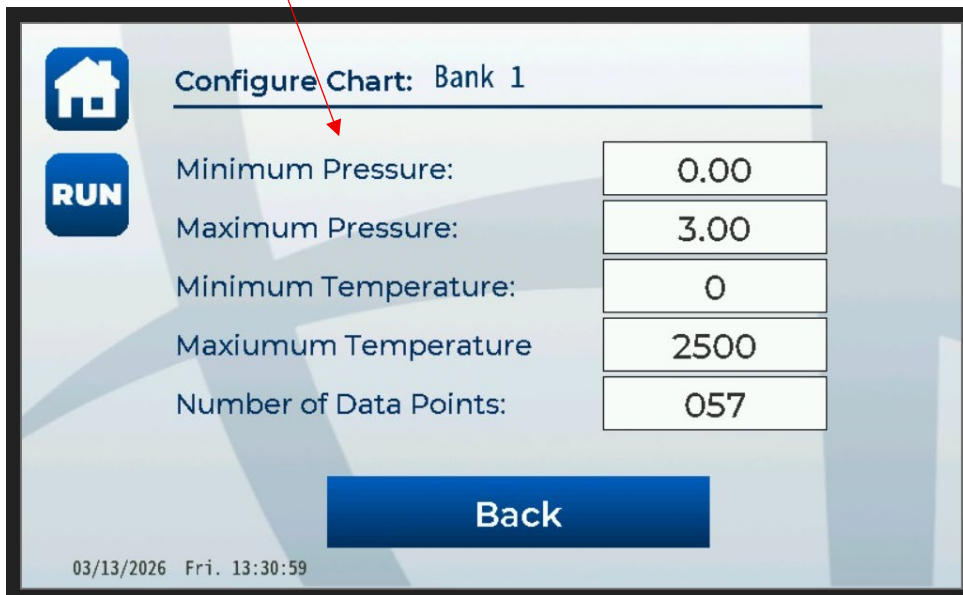
Run Menu (Continued)

The Bar Graph icon will display a Trend Graph for each individual Bank.

Note: The Datalogging feature needs to be enabled for the trend graph to update.



The Gear icon will allow the user to program custom scaling for the trend graph.



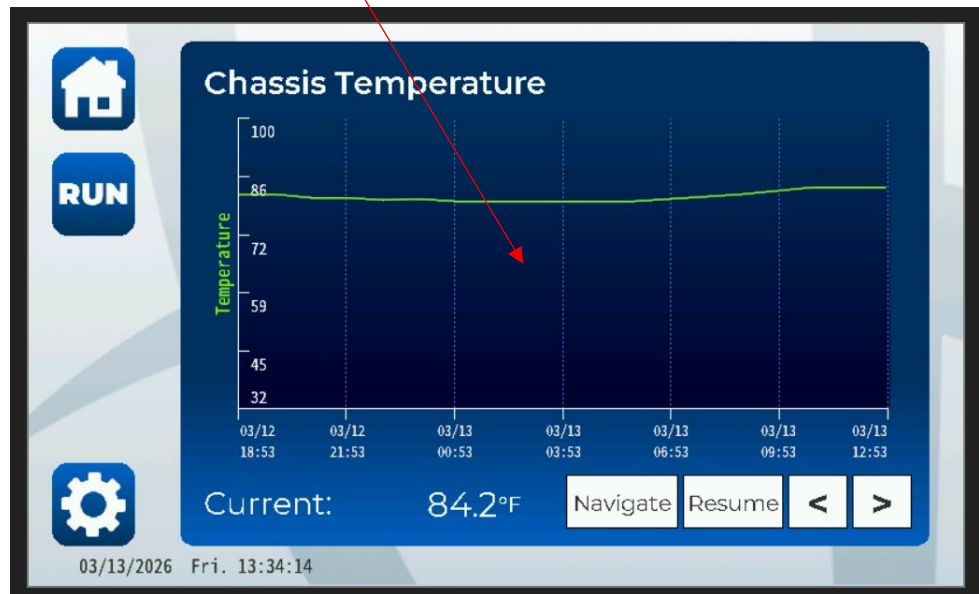
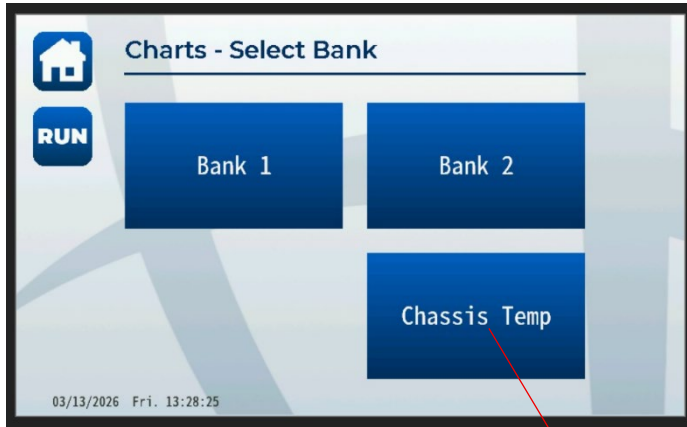
Configure Chart: Bank 1	
Minimum Pressure:	0.00
Maximum Pressure:	3.00
Minimum Temperature:	0
Maximum Temperature:	2500
Number of Data Points:	057

Back

03/13/2026 Fri. 13:30:59

Internal Chassis Temp

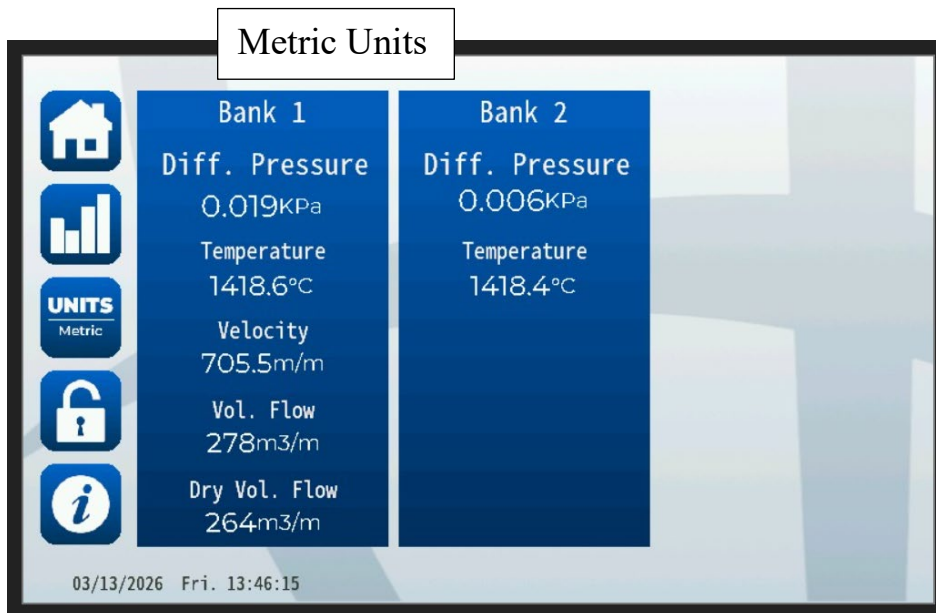
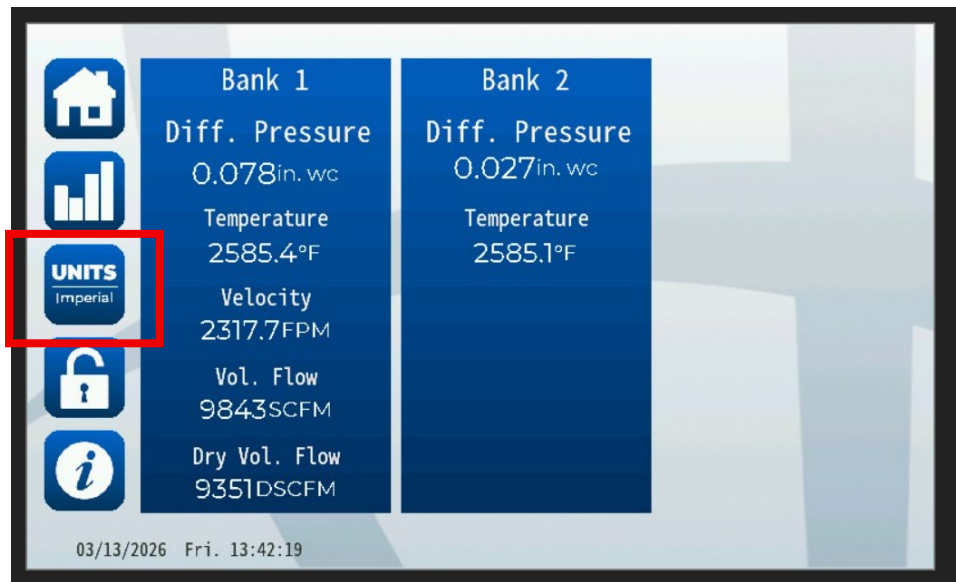
The Chassis Temp logs the internal temperature of the KODIAK. It is permanently set to record a reading once per hour and it is always running. It will appear as a column in the logged data CSV. file.



Run Menu (Continued)

Units

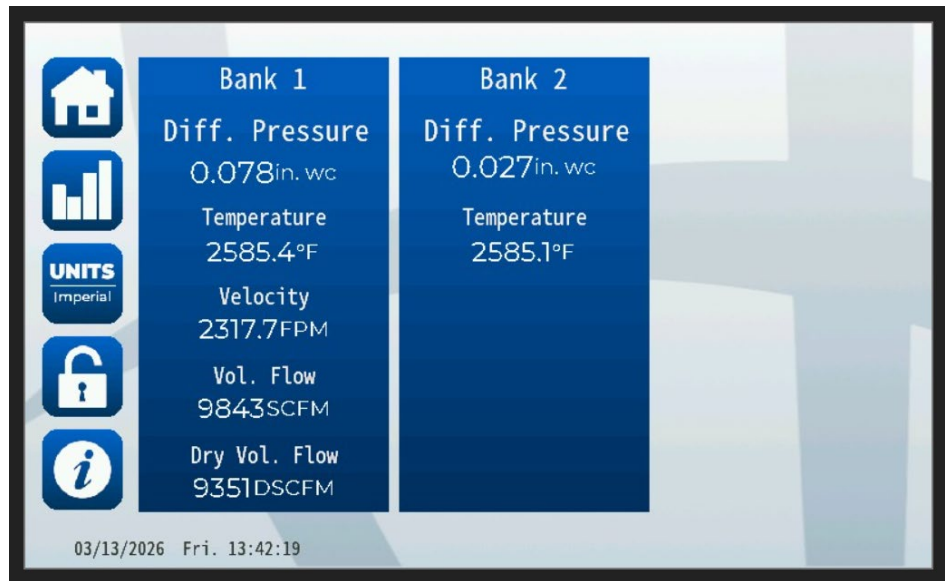
The Units button will change the Run Menu units between Imperial and Metric.



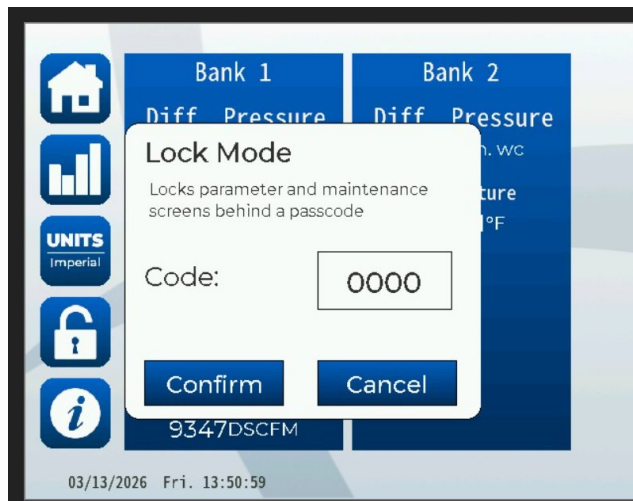
Run Menu (Continued)

Lock Icon (Restricted Menus)

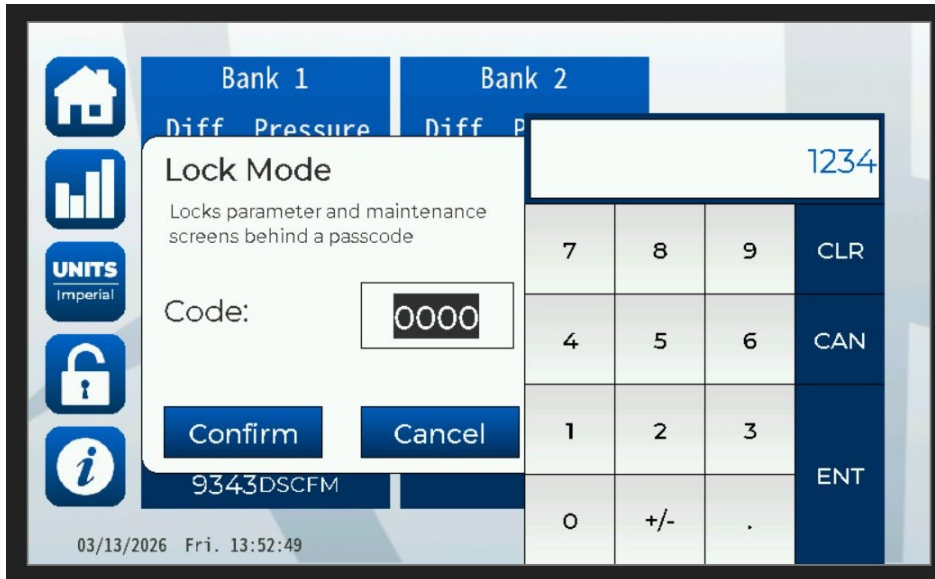
The Lock Icon will allow the user to restrict access to just the Run Menu. The code is programmable.



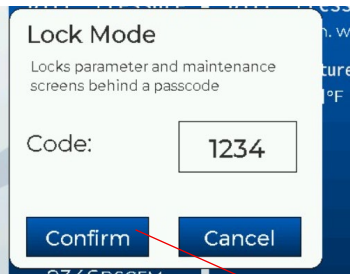
Select the Code field and type in a 4-digit code. Remember it!



For this example, a code of 1234 was used.

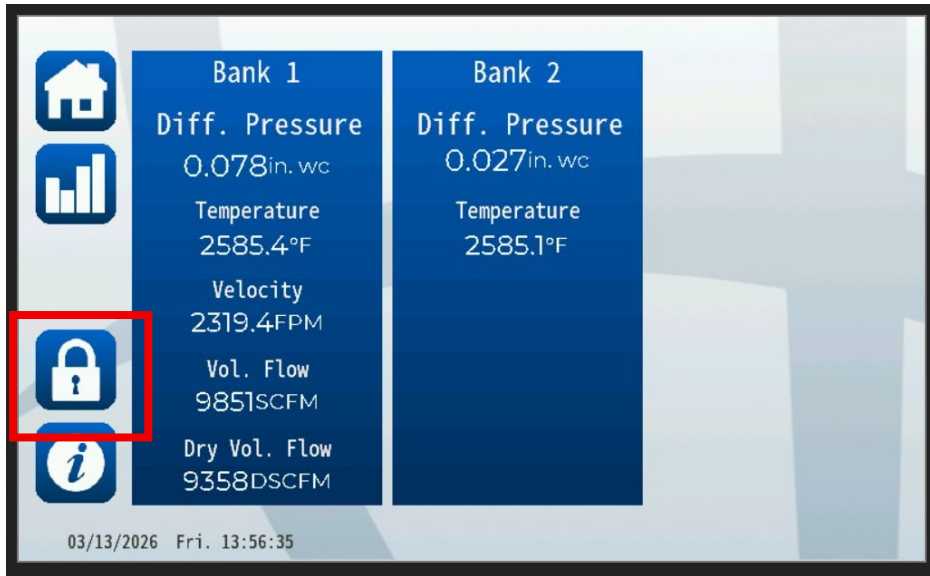


Select Confirm.

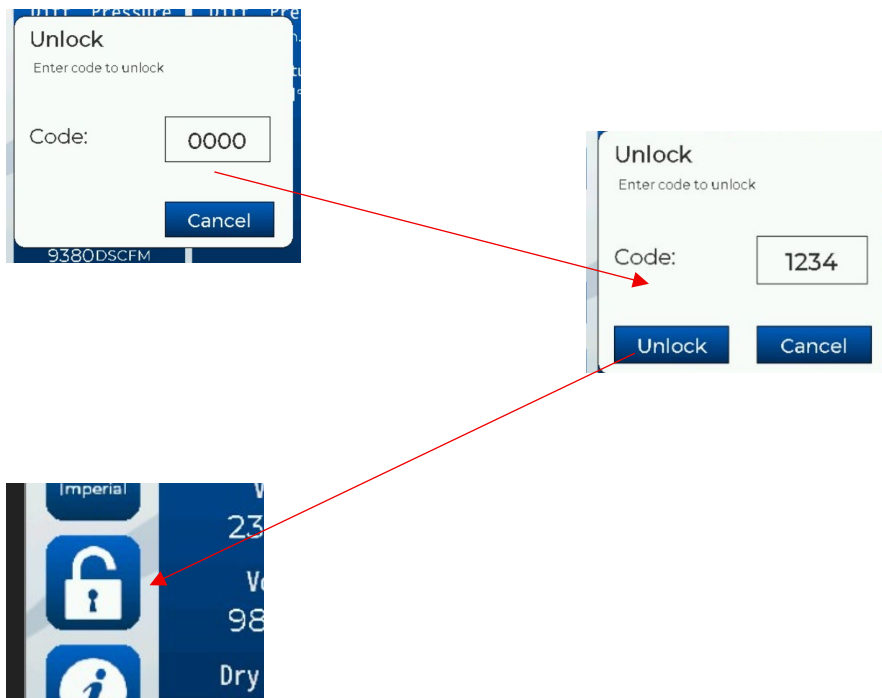


Now the Main Menu has only one option instead of five.

The Lock Icon now appears as locked.



To Unlock, Press the Lock Icon again. Type in the code you programmed.

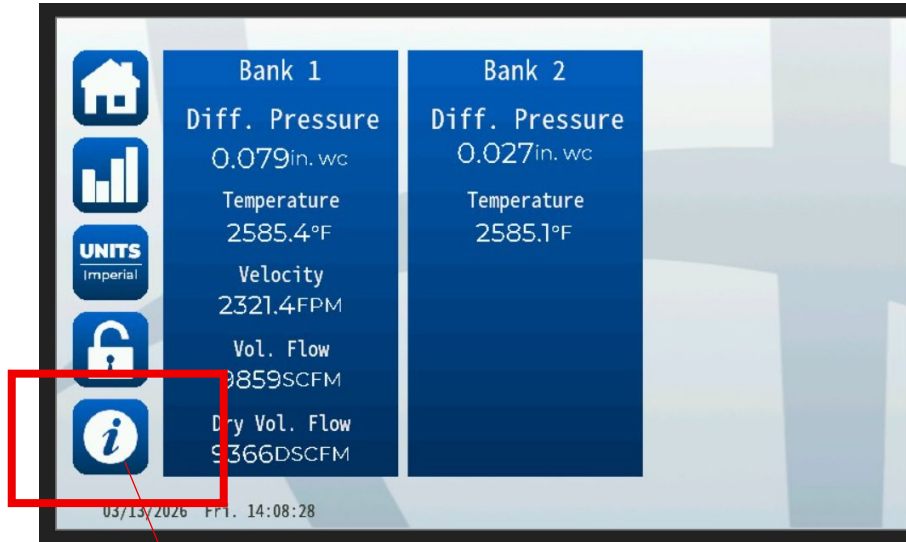


The Lock Icon now appears Unlocked, and full access is restored.

Run Menu (Continued)

Information Icon

The Information Icon brings you back to the Information Menu.



Modbus Register Map

The Kodiak supports Modbus TCP/IP.

Connect an Ethernet cable to the E1 communication port on the back panel.

The IP Address for the Kodiak PLC = 192.168.1.5 (This is a static IP and cannot be changed!)



MODBUS Holding Registers (4xxxx)

32Bit Float / Big-endian

Holding Registers (32Bit Float):		Function 03	
Name	Unit	Modbus Register	PLC Address
Bank 1 Δ P	inch WC	20	D20
Bank 2 Δ P	inch WC	22	D22
Bank 3 Δ P	inch WC	24	D24
Bank 1 Temperature	Deg F	26	D26
Bank 2 Temperature	Deg F	28	D28
Bank 3 Temperature	Deg F	30	D30
Bank 1 SCFM	SCFM	32	D32
Bank 2 SCFM	SCFM	34	D34
Bank 3 SCFM	SCFM	36	D36
Bank 1 DSCFM	DSCFM	38	D38
Bank 2 DSCFM	DSCFM	40	D40
Bank 3 DSCFM	DSCFM	42	D42
Bank 1 Auto Zero Value		44	D44
Bank 2 Auto Zero Value		46	D46
Bank 3 Auto Zero Value		48	D48
Bank 1 Auto Span Value		50	D50
Bank 2 Auto Span Value		52	D52
Bank 3 Auto Span Value		54	D54
Internal Temperature		56	D56

MODBUS Coils (R/Wr) (0xxxx)

Writing coils is a momentary action. Writing a 1 to a Span instruction should only be held at 1 for a second.

(Send 1 to activate, 0 to deactivate.)

Input/Control Coils:	Function 01/15	
Name	Modbus Register	PLC Address
Bank 1 Zero	1800	M1000
Bank 2 Zero	1801	M1001
Bank 3 Zero	1802	M1002
Bank 1 Span	1803	M1003
Bank 2 Span	1804	M1004
Bank 3 Span	1805	M1005
Bank 1 Purge	1806	M1006
Bank 2 Purge	1807	M1007
Bank 3 Purge	1808	M1010
Bank 1 AutoCal	1809	M1011
Bank 2 AutoCal	1810	M1012
Bank 3 AutoCal	1811	M1013
Bank 1 Accept Zero	1812	M1014
Bank 2 Accept Zero	1813	M1015
Bank 3 Accept Zero	1814	M1016
Bank 1 Accept Span	1815	M1017
Bank 2 Accept Span	1816	M1020
Bank 3 Accept Span	1817	M1021

MODBUS Coils (R) (0xxxx)

(Read the Status of the KODIAK functions. 1 = On, 0 = Off)

Status Bits/Coils (Read):	Function 01	
Name	Modbus Register	PLC Address
Bank 1 Normal Mode	40	Q50
Bank 1 Purge	41	Q51
Bank 1 Zero	42	Q52
Bank 1 Span	43	Q53
Bank 1 AutoCal	44	Q54
Bank 2 Normal Mode	45	Q55
Bank 2 Purge	46	Q56
Bank 2 Zero	47	Q57
Bank 2 Span	48	Q60
Bank 2 AutoCal	49	Q61
Bank 3 Normal Mode	50	Q62
Bank 3 Purge	51	Q63
Bank 3 Zero	52	Q64
Bank 3 Span	53	Q65
Bank 3 AutoCal	54	Q66

Setting the Calibration Point

The KODIAK system is equipped with an internal **Dwyer differential pressure switch** used to establish the calibration span point during the calibration sequence. During the **Calibration Span Sequence**, instrument air regulated to approximately **8 psi** is introduced through a calibrated orifice. This air slowly fills the internal tubing volume within the KODIAK until the pressure reaches the preset value of the pressure switch.

When the pressure switch reaches its configured set point, it sends a signal to the PLC to stop the instrument air flow. The internal pressure is then allowed to stabilize for approximately **one minute**. Once a stable pressure condition is achieved, the system reconnects the differential pressure transducer to the **H (High)** and **L (Low)** pressure ports located on the rear panel, and the instrument returns to **Run Mode**.

Prior to starting the calibration sequence, the user must connect a **traceable primary differential pressure standard** to the **H and L calibration ports on the front panel** of the KODIAK. The user then initiates the **Span Sequence** and observes the pressure reading displayed on the primary standard. Once the pressure stabilizes, the observed value should be recorded.

The user then evaluates whether the internal pressure switch set point requires adjustment. The internal pressure switch used in many KODIAK units has an adjustable range of approximately **0.125 in. WC to 0.5 in. WC**. The set point is adjusted by turning the **brass adjustment screw** located on the front of the pressure switch.

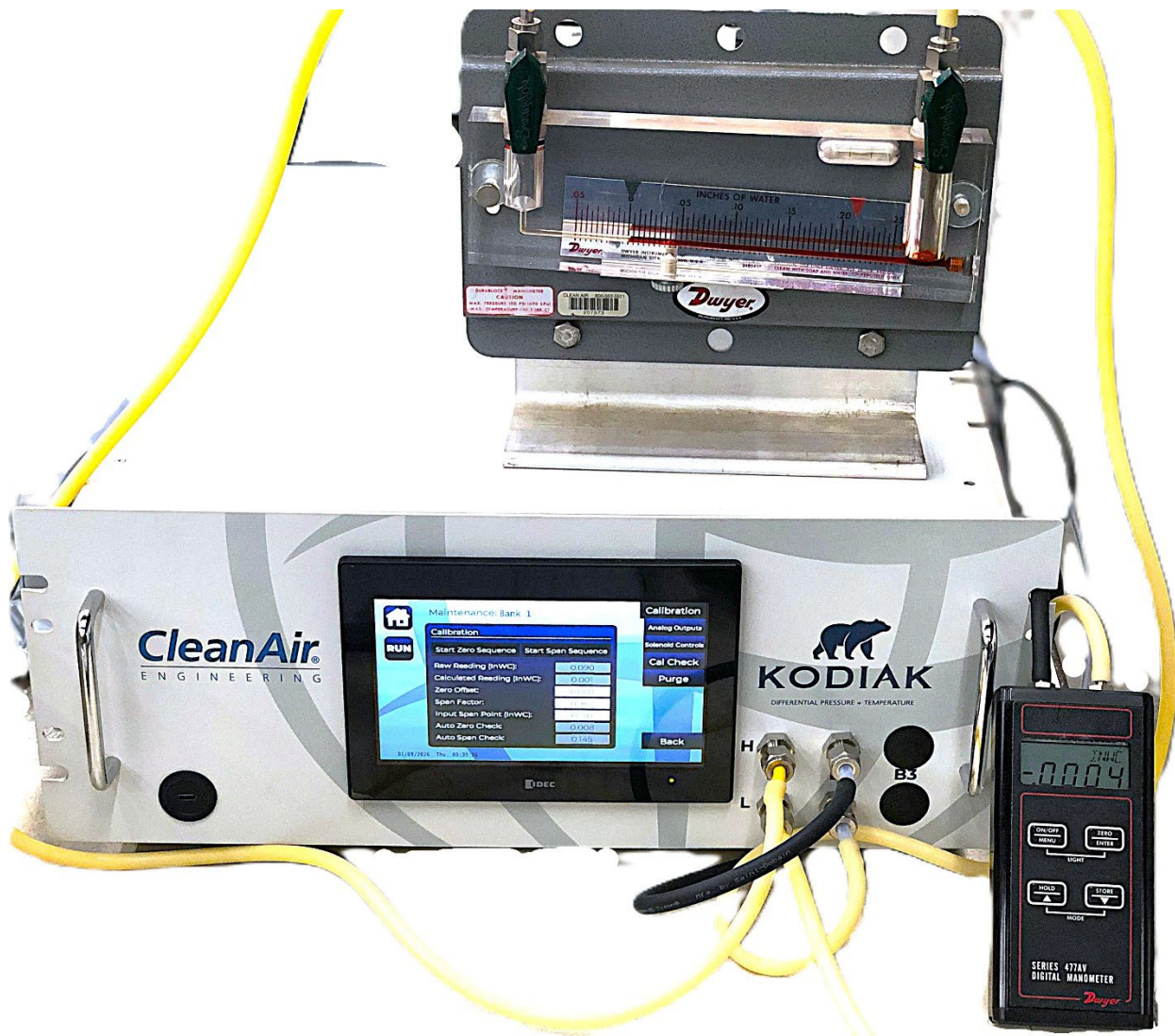
To achieve the desired calibration pressure, the user should repeat the calibration sequence multiple times while making incremental adjustments to the pressure switch. This process continues until the primary standard indicates the desired calibration set point during the span sequence. Once set, the result has been verified to be extremely repeatable.



Connect a Primary Standard to measure the “WC. (Sold separately.)



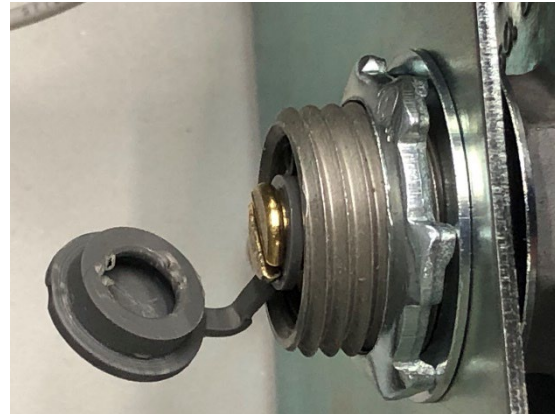
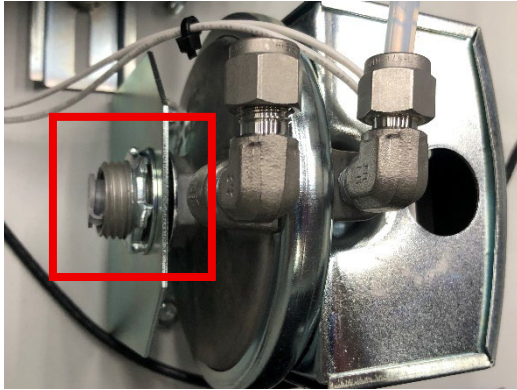
Example of a Primary NIST Tracible Standard connected to the KODIAK.



Example of Multiple Primary NIST Tracible Standards connected to the KODIAK.

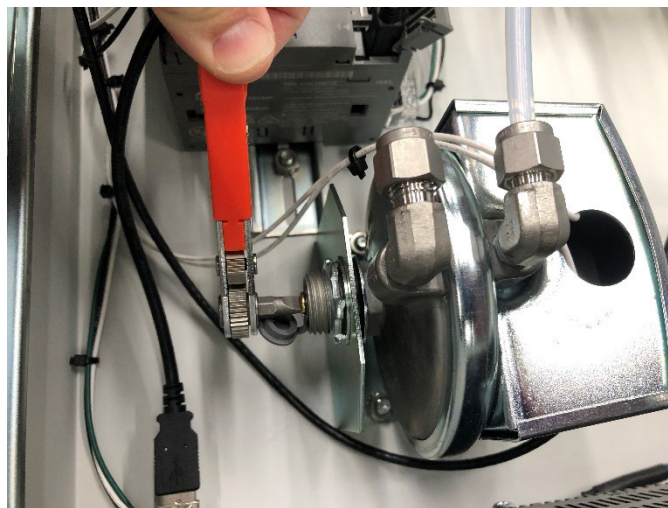
Remove the top of the KODIAK.

Remove the rubber cap from the Pressure Switch.



Turn the brass screw fully counterclockwise. This will be the lowest pressure setting.

Note: The screw turns approximately 15 times from lowest to highest.



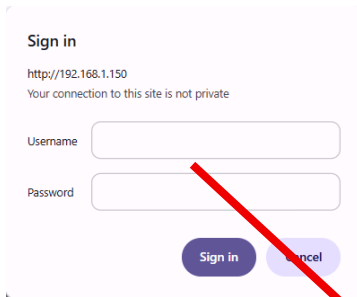
Run a Span sequence. Wait for a stable reading on the primary standard and document it. When the Span sequence ends, rotate the brass screw in the desired direction to increase or decrease the set point. You may need to go through several iterations before you get the proper set point. The Dwyer pressure switch has proven to be dependable and repeatable. Once set, it will stay. Now the user can run a full calibration sequence.

HMI Web Access

The KODIAK HMI Touchscreen is Web Enabled. The user can access a virtual display using a standard web browser.

Type the HMI IP Address into the address bar of a web browser.

The HMI IP Address = 192.168.1.150.

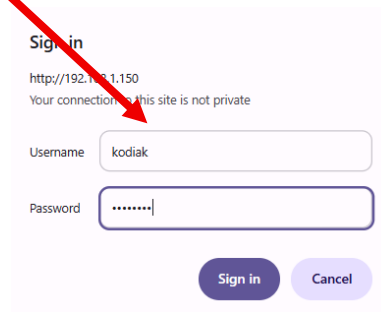


Sign in
http://192.168.1.150
Your connection to this site is not private

Username

Password

Login = kodiak
Password = cleanair



Sign in
http://192.168.1.150
Your connection to this site is not private

Username

Password

The System Detail menu will appear.

Click on the hyperlink for “Control”.

- [System Detailed Information](#)
- [Remote Access](#)
- [Monitor](#)
- [Control](#)
- [Custom Web Page](#)

[Home](#)

System Detailed Information

Mode : Run Mode
Error : None

System	
Type Number	HG2J-7UT22TF-*
System Version	3.4.0
OS Version	1.4.0
HG System Time(m/d/y h:m:s)	03/16/2026 11:27:25
Project Information	
Project Name	Kodiak_HMI_5.1-2.25
Author	Unknown
Date Modified(m/d/y h:m:s)	02/27/2026 16:14:53 GMT
External Device Communication 1	
Interface	Ethernet
Manufacturer	ITDFC

This is a virtual display. You can click on the menus as you would if you were in front of the instrument.

- [System Detailed Information](#)
- [Remote Access](#)
- [Monitor](#)
- [Control](#)
- [Custom Web Page](#)

[Home](#)

Remote Control

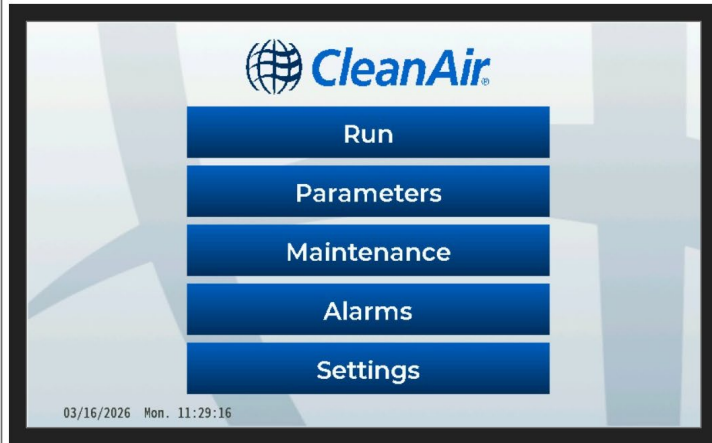
[\[Maximize\]](#)

Picture Format

- JPEG Format(Slow)
- Bitmap Format(Fast)

Control Options

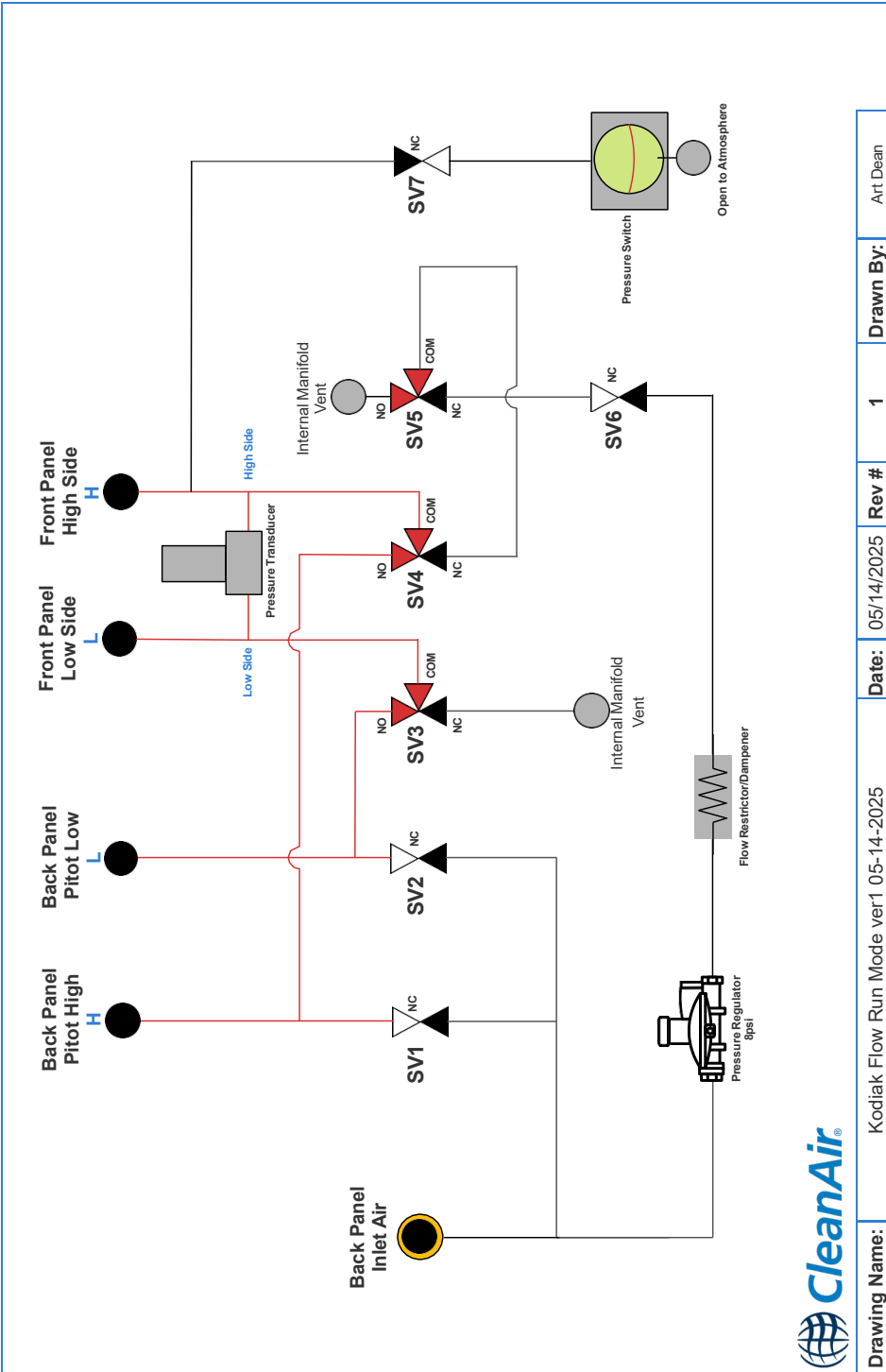
- Disable Control From Other Clients
- Time-out min
- Disable Control From Touch Panel
- Time-out min



Flow Diagrams

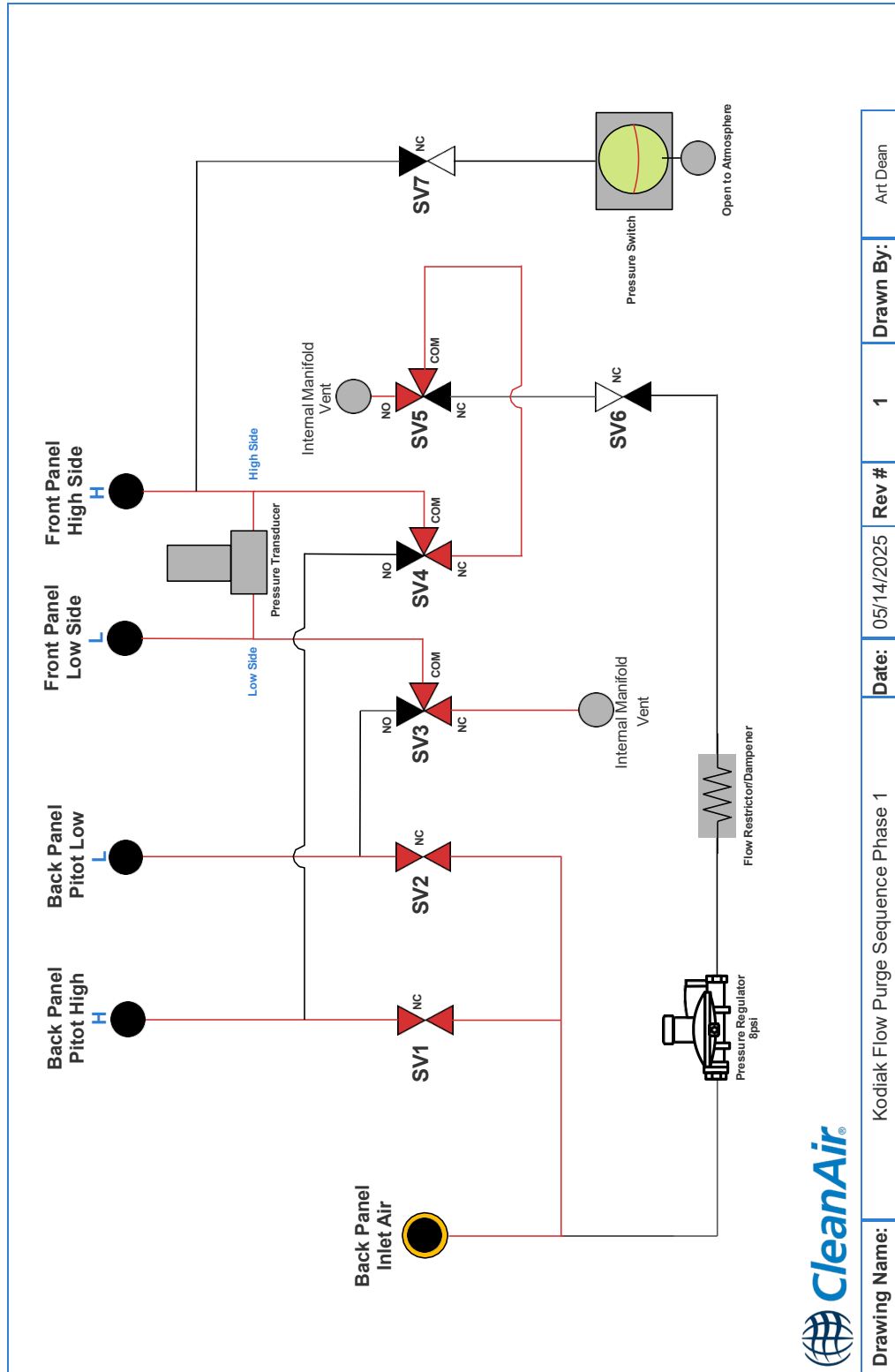
Run Mode

The red lines and solenoids represent “active flow path”. Black or White represents closed flow path.



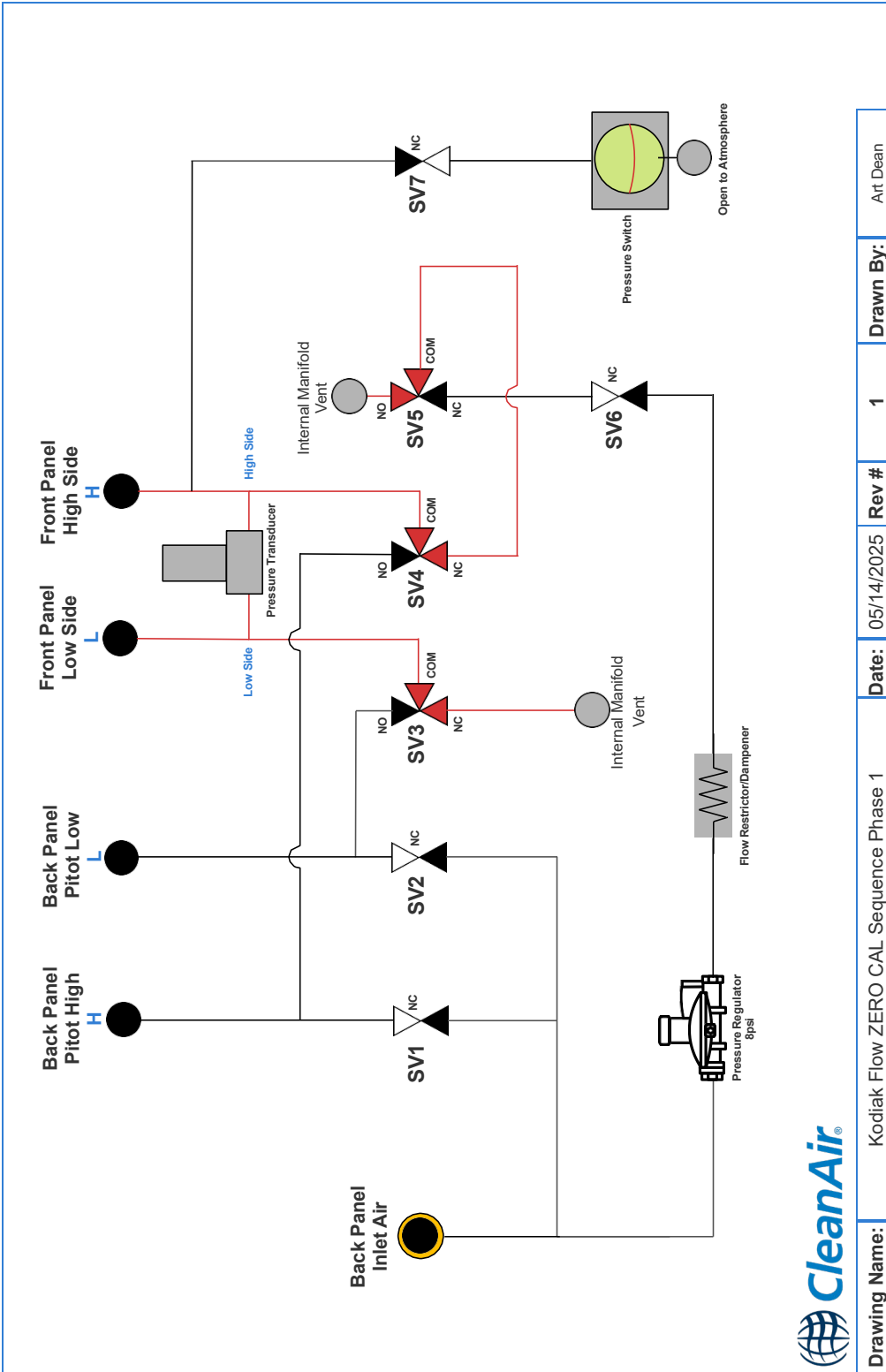
Drawing Name:	Kodiak Flow Run Mode ver1 05-14-2025	Date:	05/14/2025	Rev #	1	Drawn By:	Art Dean
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Purge Sequence Phase 1

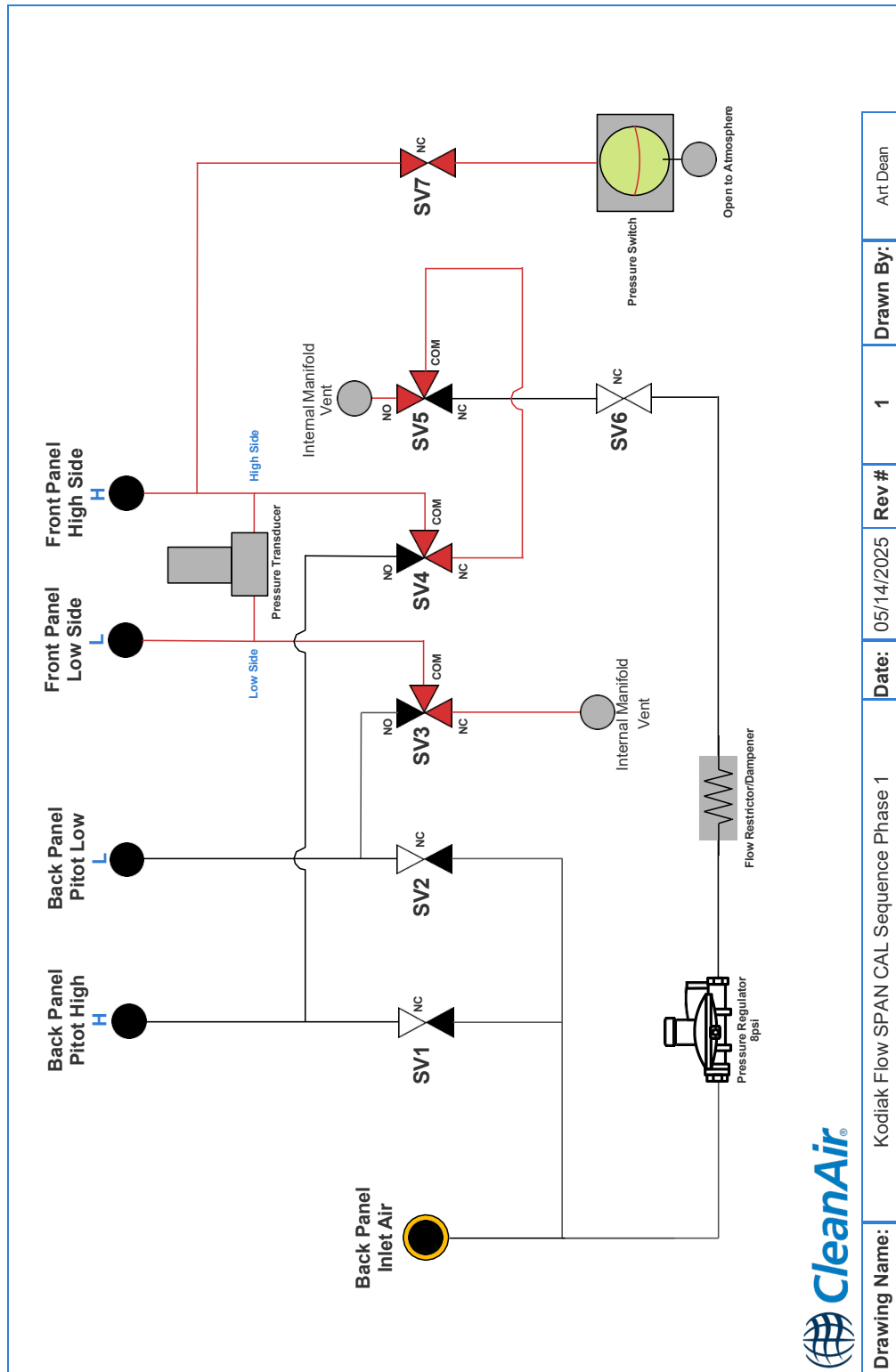


Drawing Name: Kodiak Flow Purge Sequence Phase 1	Date: 05/14/2025	Rev #: 1	Drawn By: Art Dean
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Zero Cal Phase 1

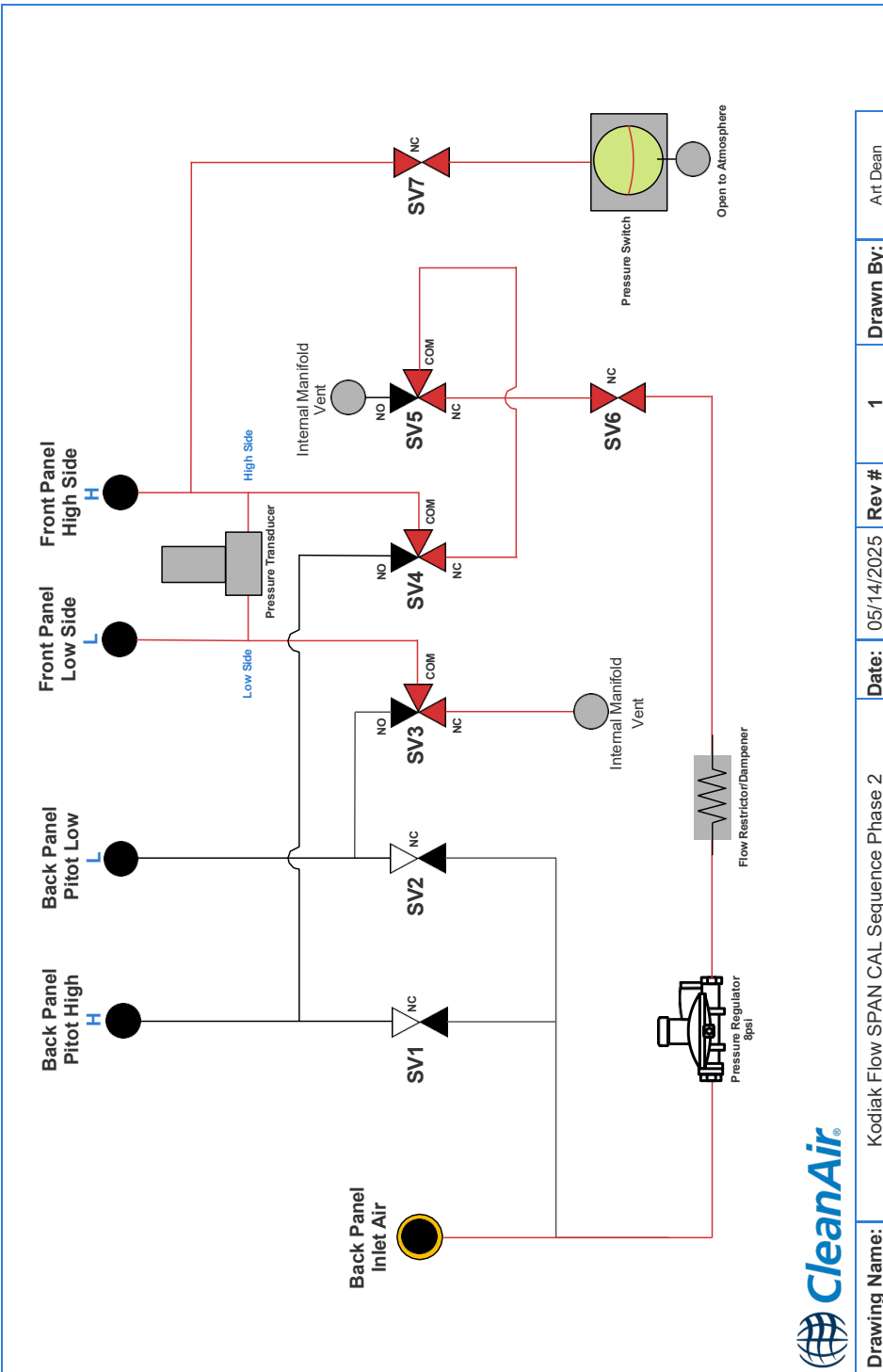


Span Cal Phase 1



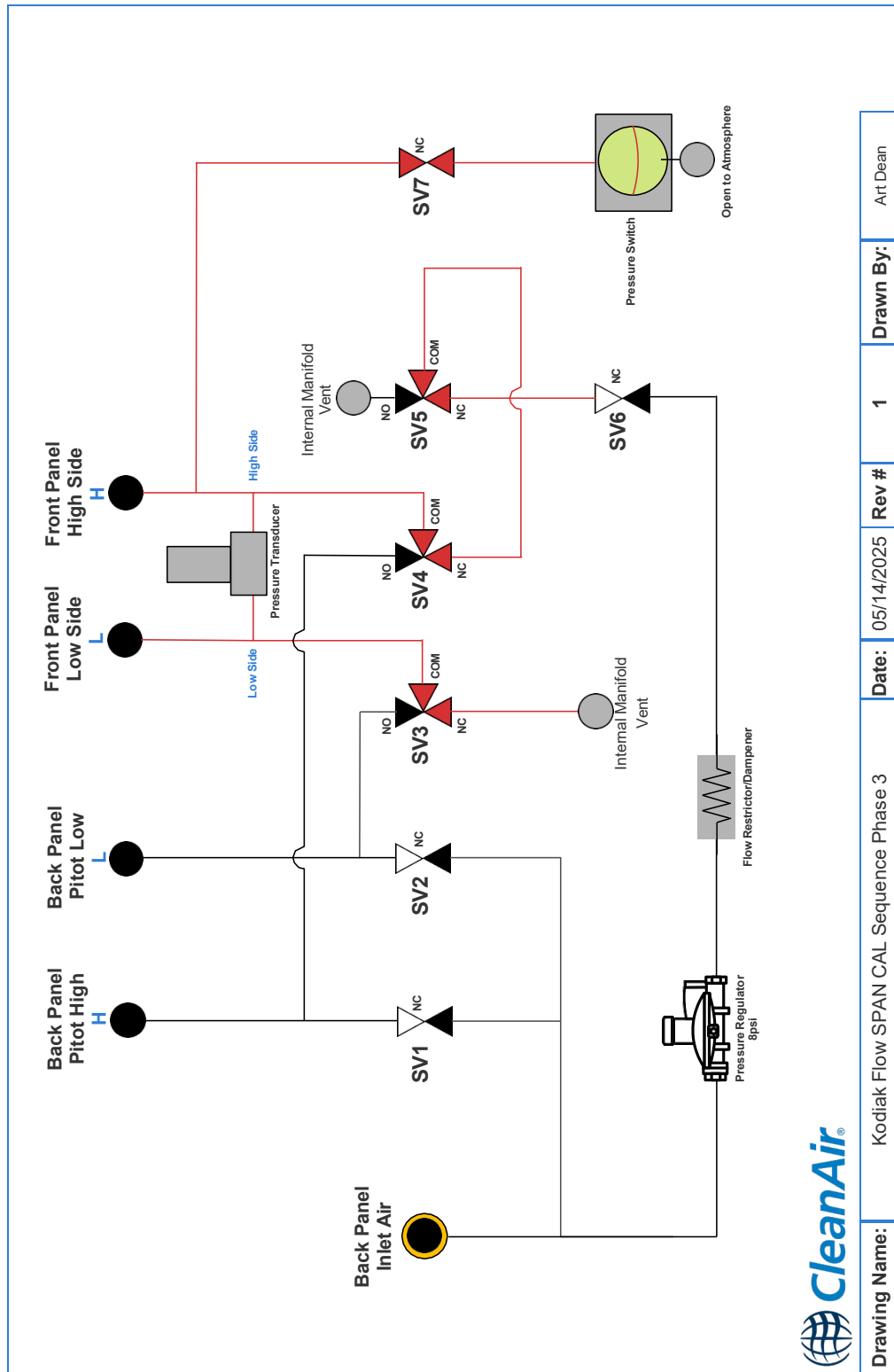
Drawing Name: Kodiak Flow SPAN CAL Sequence Phase 1	Date: 05/14/2025	Rev # 1	Drawn By: Art Dean
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Span Cal Phase 2



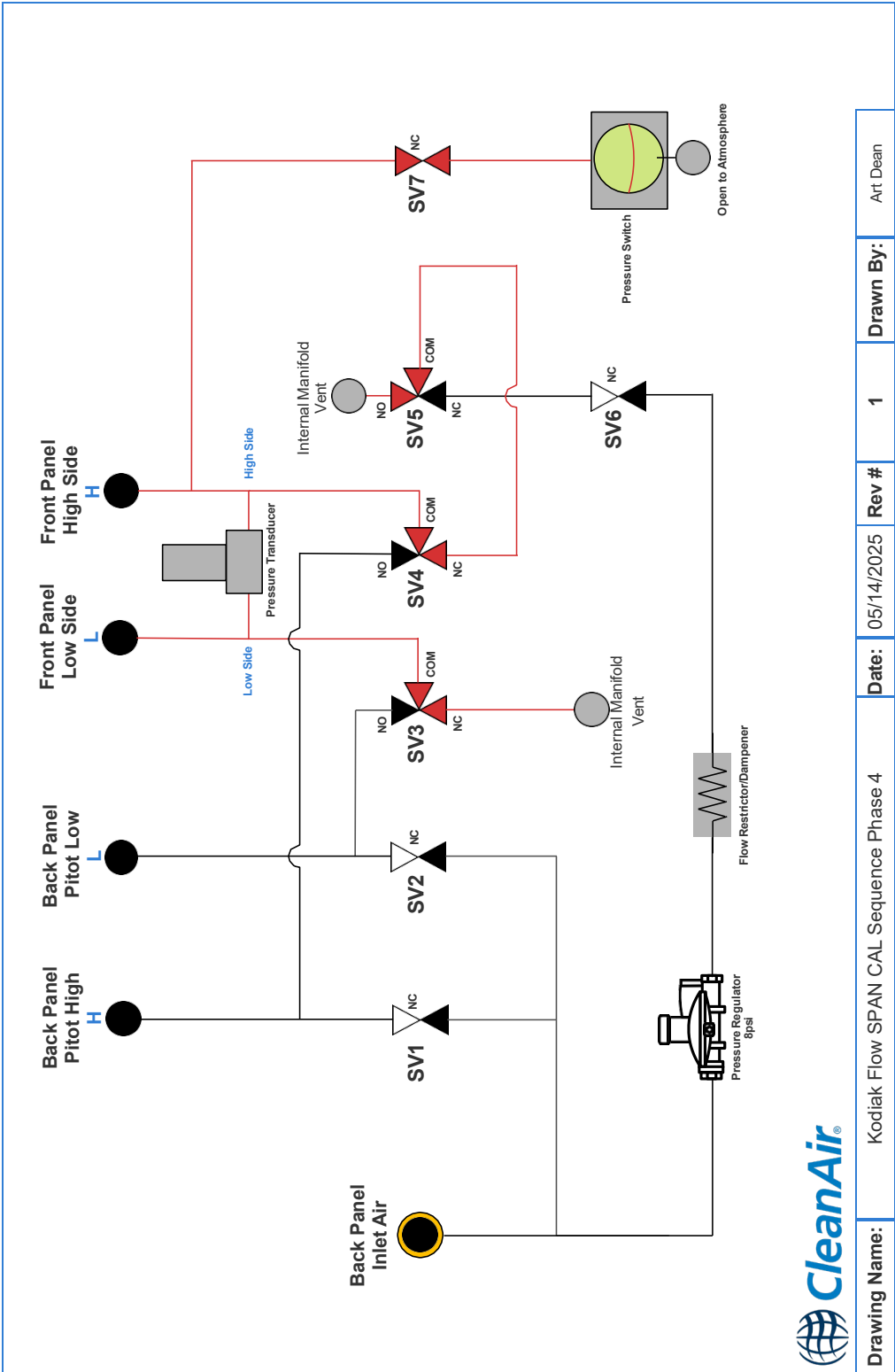
Drawing Name: Kodiak Flow SPAN CAL Sequence Phase 2	Date: 05/14/2025	Rev #: 1	Drawn By: Art Dean
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Span Cal Phase 3



Drawing Name:	Kodiak Flow SPAN CAL Sequence Phase 3	Date:	05/14/2025	Rev #	1	Drawn By:	Art Dean
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Span Cal Phase 4



Drawing Name:	Kodiak Flow SPAN CAL Sequence Phase 4	Date:	05/14/2025	Rev #	1	Drawn By:	Art Dean
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