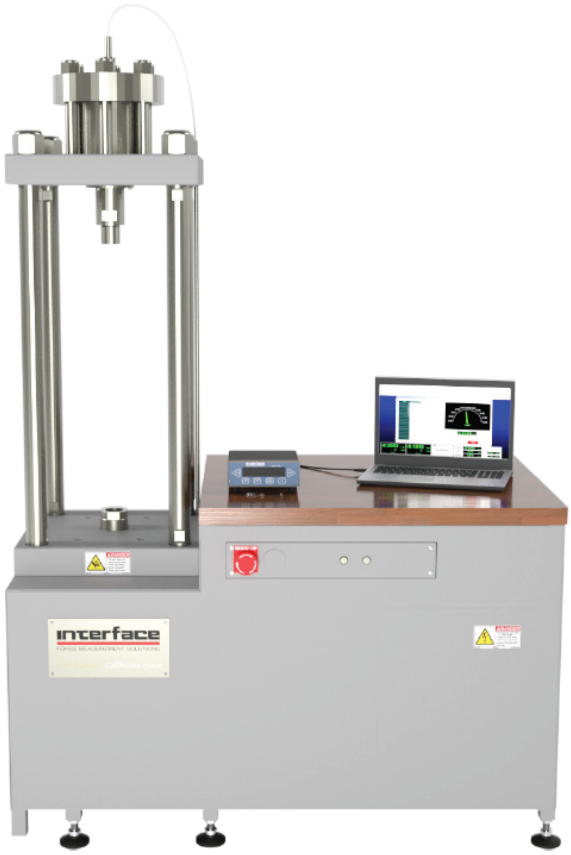
interface
FORCE MEASUREMENT SOLUTIONS

GOLD STANDARD®
CALIBRATION SYSTEM
Next Generation Force Measurement Solutions



Load Calibration Frame
Software and Configuration Manual 15-330
Rev. A

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Interface Inc. Gold Standard Software

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Cautions and Warnings

Document Conventions

The following international symbols will be used in this document with the appropriate meanings:

WARNING

This icon accompanies text dealing with hazards to personnel. When present, it indicates that a potential hazard to your personal safety exists if information stated within the “WARNING” paragraph is not adhered to or procedures are executed incorrectly.

CAUTION

This icon accompanies text dealing with potential damage to equipment. When present, it indicates that there is a potential danger of equipment damage, software program failure or that a loss of data may occur if information stated within the “CAUTION” paragraph is not adhered to or procedures are executed incorrectly.

NOTE

This identifier accompanies text dealing with potential situations which might cause inaccurate data to be gathered or it makes the system easier to operate.

User Responsibilities

The user of this equipment is required to supply proper electrical power and ground to the system in order for it to function properly. Isolated and stable electrical ground is required; a copper pipe buried 2 m into the ground near the lab can be used as the ground.

WARNING

Read the safety practices and operating safety considerations before operating the hydraulic power supply. Failure to read and understand the operations manual and/or follow the recommended safety practices can result in serious personal injuries and/or damage to the equipment!

CAUTION

Never exceed the maximum equipment rating and capabilities!

Safety Practices

Review these guidelines to ensure that your current operating procedures do not result in hazardous situations. Although all hazards may not be able to be eliminated, the following guidelines can be used to identify hazards so that the proper training, operating procedures, and safety equipment can be implemented.

System operators should fully review the documentation supplied to gain an understanding of the system functions. Figures will be placed throughout the manual and should be reviewed.

To ensure smooth system operation during the first execution of the control software, the user should be very familiar with this section and the specific test module to be used.

Operating Safety Procedures

The following operating safety procedures are applicable to most testing systems. The user is required to read each item below and determine if it is applicable to the testing system for which this hydraulic power supply will be used. The user is also required to obtain and review all safety instructions on specific testing equipment used in the system.

Emergency stops

Determine the location of system emergency stop buttons to allow for quick emergency stops.

Interlock devices

WARNING

Interlock devices, such as the Emergency Stops, should always be used and properly adjusted. Test all interlock devices immediately before each test. Because of the possibility of operator error, system maladjustment, or component failure, interlock devices cannot be relied on to protect personnel, unit under test, or test equipment. Thus, standard precautions about staying clear of the ram should always be followed.

Stay clear of loading piston

WARNING

When system power is on, stay clear of each end of the actuator piston rod. The area on the base plate used for component installation should be worked around with caution. Never place any part of your body between the actuator piston rod and base plate when the hydraulic pressure is on. Due to unit under test failure, operator error, or other factors, the actuator could unexpectedly react and cause personal injury.

Dangers due to sudden system movements

WARNING

High forces and rapid motions are usually present in testing systems. Unexpected actuator responses can be very dangerous. Likely causes of dangerous actuator reactions are operator error and equipment failure due to damaged or abused equipment. An actuator piston rod that reacts suddenly can strike an operator installing a unit under test or damage the load cell or expensive components. For the above reasons, anyone who operates, maintains, or modifies a system should read all provided manuals to acquire a thorough knowledge of the system's operating characteristics.

Stay clear of testing system

WARNING

Never allow bystanders to touch unit under test or equipment while the system is operating.

Pressing down button with load string connected

CAUTION

If pressing down button with load string connected, the load cells may be overloaded.

Effects of control adjustments

CAUTION

Do not make mechanical, or software adjustments to system components unless you know exactly how the adjustment will affect system operation. In many cases a slight adjustment can throw the system out of calibration and cause divergence between the command and feedback. Consult an experience user when in doubt about any adjustment procedure.

Loss of control feedback signal

CAUTION

If the control feedback signal is interrupted during operation, the controller senses an error. The actuator will attempt to correct the error by stroking at maximum force until it reaches an internal or external mechanical limit. The external mechanical limit may be any type of obstruction that is in the path of a stroking actuator (such as tools, specimens, or hands). Be aware that the full force of the actuator will be applied to an external mechanical limit or obstruction. The only effective way to minimize the static force capability of a system is to reduce the system hydraulic/pneumatic pressure. The error detectors in the controller minimize the potential for device under test or equipment damage caused by loss of feedback or larger than normal feedback errors.

Avoid servo valve silting

CAUTION

Due to servo valve silting, an actuator can develop random instability or erratic operation at unusually low hydraulic pressures, especially if the system uses large servo valves or the hydraulic fluid is dirty.

Electrical power failures

WARNING

The failure or shutoff of electrical power to the testing system when pressure is being applied can cause considerable and unpredictable actuator reaction. Under these conditions, loss of electrical power on servo controlled systems will generally cause the actuator to stroke at maximum velocity in either direction or, if a device under test is attached, to apply full tensile or compressive force. Many systems contain hydraulic/pneumatic accumulators that store enough energy to temporarily operate the actuator at full force capacity even when the hydraulic/pneumatic pressure is shut off. For this reason, the usual interlock devices will not prevent hazardous actuator stroking. If a power failure does occur, please make sure that Gold Standard Software has been reset before powering on the Load Frame. This will protect stop the continuation of the previous load selection.

Disconnect power before servicing

WARNING

If servicing the interior components of the hydraulic power supply, power to the unit must be turned off. Servicing the hydraulic power supply without turning the power off is very dangerous due to the high voltages present!

Introduction

The Interface Gold Standard Force Calibration System provides an integrated force calibration solution, making possible high accuracy calibrations. The system consists of a hydraulic load frame, feedback control system, high accuracy load cell measurement and software tuned to automatically operate the load frame. When used in conjunction with the Interface 1600 or 1800 Series load cell standards, the system provides the user with an accurate tool for easy and quick calibration of load cells in tension or compression.

The system is the result of over two decades of experience to develop the hardware and software for high precision force calibration. The load cell measurement includes signal conditioning circuitry for the transducer bridge, analog-to-digital converter, and logic circuitry to interface with the PC. With an extremely high sensitivity of 0.1 microvolt per increment, extra low noise, and superior stability, the circuitry provides state-of-the-art measurement of strain gage transducer signals.

GS-SYS
Basic System Specifications

General

4 column loading frame
150mm (6 inch) stroke
Alignment swivel coupler/slack adapter
Static calibration in tension or compression
Top swivel coupler thread – 2”-12 male
Bottom actuator thread – 2”-12 female
21MPa (3000 psi) hydraulic power unit

Capacities

25,000 lbf. load capacity/24.4 to 30.4 inches working length
55,000 lbf. load capacity/24.4 to 30.4 inches working length
55,000 lbf. load capacity/38.4 to 44.4 inches working length
100,000 lbf. load capacity/38.4 to 44.4 inches working length

Power

208/230 VAC, single phase, 50/60 hertz
Power – 3.5 kVA
Amps (continuous) – 16
Minimum protection circuit current – 30 Amps (L6-30R Connector on system)

Hydraulic System

Normal operation 2600 psi
Maximum pressure 3000 psi
10 gal ISO 32 hydraulic oil.

Servo Valve

Moog Direct Drive Valve D633-303B-R02K01M0NSM2
Flow Rating: 6 lpm (1.6 gpm)
Seal Material: NBR
Minimum Supply Pressure: 15 bar (220 psi)
Maximum Supply Pressure: 350 bar (5000 psi)
Filtration for Normal Operation: 10 micron absolute
Fluid Cleanliness Level: ISO 4406 15/13/10 or NAS 1638 Class 4
Coil Resistance: 25 Ω
Command Signal: ± 600mA
Power Consumption: 9 W (at I = 600 mA and R = 25 Ω)

Controller

Delta Computer: RMC75E-AA2 with AP2 and D8 expansion modules
Primary Communication Type: Ethernet
Monitor Port: USB
Control Loop Time: User selectable from 0.5 to 4 ms
Voltage: +24 VDC ± 20%
Current: Typical for base model 200 mA at 24 VDC
DC-DC Converter Isolation: 500 VAC input to controller
Operating Temperature: +32 to +140 °F

LVDT

Omega LD620-7.5 with LD-tip Output +/- 5 VDC
Measuring Range: +/-7.5mm (+/-0.3 inches) Excitation Voltage – 10-30 VDC
Non-Linearity - <+/-0.2% FSO

Feedback Sensor

Control Load Cell bridge

CAUTION

DO NOT OPERATE the system with the Control Load Cell bridge cable disconnected, as the system will immediately seek maximum load.

Feedback Amplifier

SGA
Excitation = 10 VDC
Bandwidth = 1kHz

Slack Adapter

Built into crosshead. Spherical washers for tension and compression load.
All surfaces hardened steel.

Position Sensing

LVDT senses slack position. Natural position is off-contact, midway between compression and tension contacts. With command signal of zero, system will always seek the off-contact position.

Ram Down Switch

Momentary. Useful for lowering the ram to install or remove test articles.

CAUTION

DO NOT USE the Ram Down Switch unless load string is uncoupled, as a tension force would result.

Emergency Stop Button Activate/De-activate Button Down Button

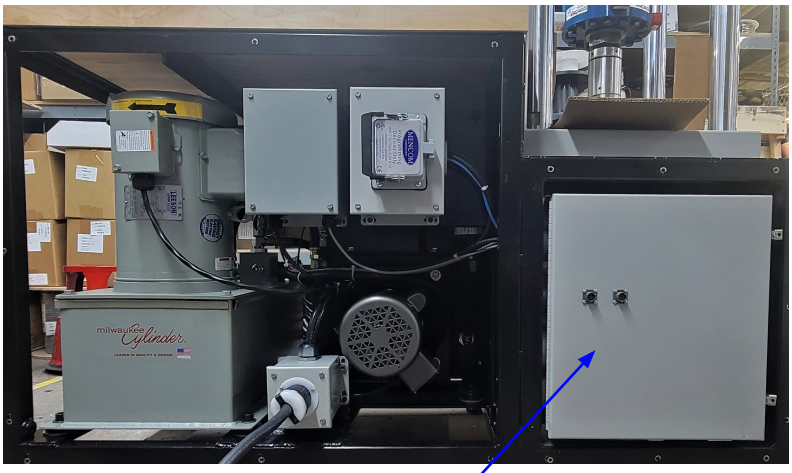
Description	Action	Results
E-Stop (Left Hand of Panel)	Pushed In	All power shut-off to system. At end of day, use to shut-off system.
	Pulled Out	Cooling fan operates Hydraulic Unit is off.
Activate/Deactivate Button (middle of panel)	Momentary pushed in	The light around this button will initially flash. While flashing, the system starts the HPU, floats the slack adapter, and zeros out the control load channel; this sequence does not take much time. Once these steps are complete, the light will go solid to indicate the system is ready to start the actual calibration process. (Load limit of 5% of load cell capacity.
	Momentary pushed in (again)	De-activates system in between calibration runs.
	Push/Hold	Holding the "Activate" button for longer than 2 seconds simply toggles the HPU on/off but leaves the rest of the system idle.
Down Button (Right hand of Panel)	Push to move piston down	Active while pushing button. No illumination. Hydraulic Power Unit powers on. When button is released, Hydraulic Power Unit continues to run for approx. 10 seconds and then shuts off.

GS-SYS Load Frame SYSTEM INSTALLATION CHECKLIST

UNCRATING AND LOCATING EQUIPMENT

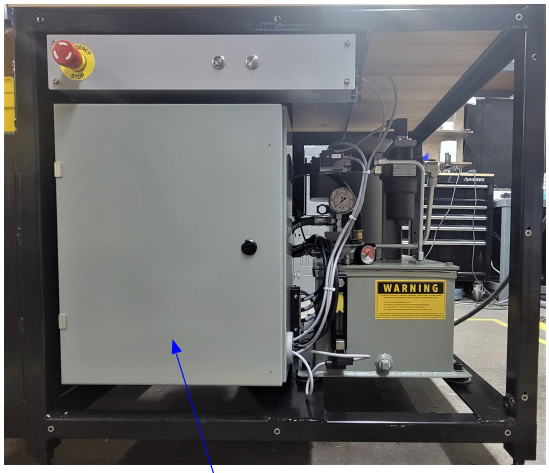
- ☐ Inspect all crates and boxes for damage, including the state of any shock and/or tilt sensors. Photograph any damage and save for possible insurance claim.
- ☐ Using a forklift, lift the crate and the load frame from the HEAVY END (actuator end and it is also marked on the crate) to prevent tipping.
- ☐ Remove the load frame from the crate. Set the load frame in place and leave at least one (1) meter (~40 inches) of space on all sides for maintenance access.
- ☐ Adjust the (4) leveling feet to evenly distribute the load and prevent the load frame from rocking. The load frame should be approximately level. Tighten the jam nut on each foot.

ELECTRICAL POWER



Rear of Cabinet (cover removed)

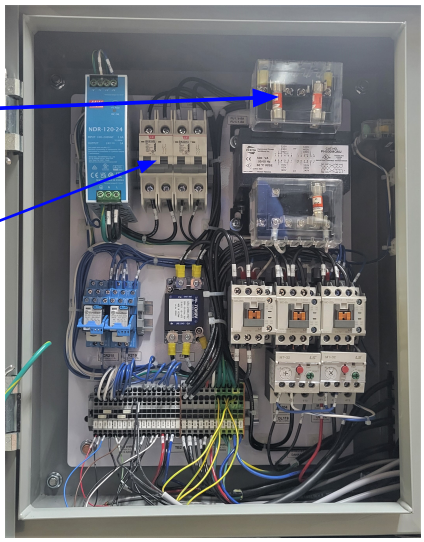
Delta Controller Enclosure



Front of Cabinet (cover removed)

HPU Electronics Enclosure

Delta Controller Enclosure



Fuses

Circuit Breakers

HPU Electronics Enclosure

☐ One 208-240 VAC, 30 amp, single phase circuit is needed for the hydraulic power supply. The plug supplied with the system is NEMA 6-20.

☐ Install the LVDT position sensor on top of the load cap using (2) cap screws (see Figure 3).

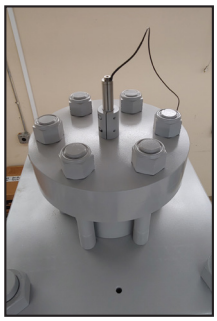


Figure 3

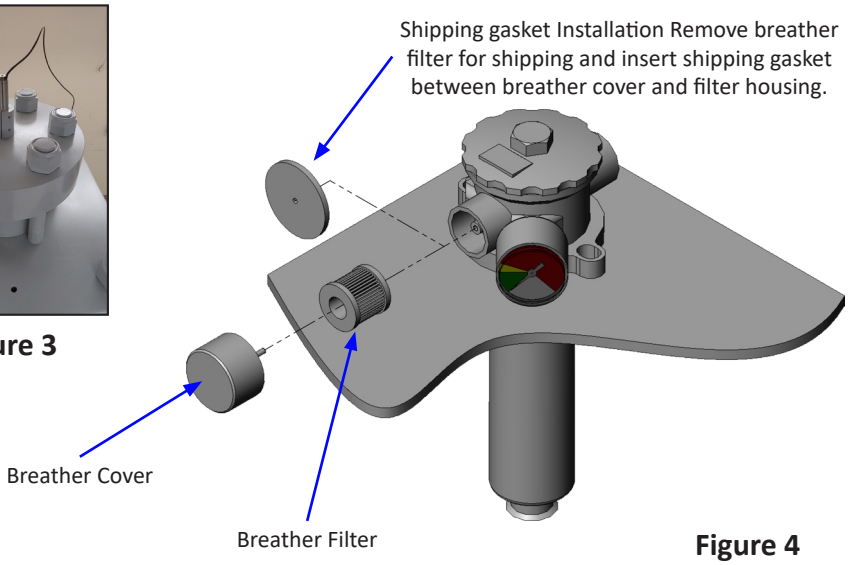
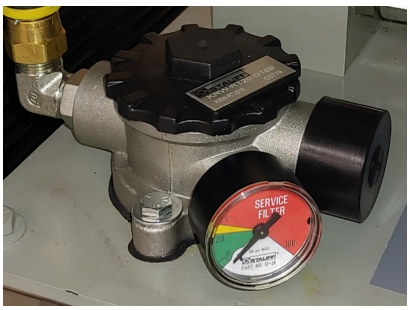


Figure 4

NOTE: Shipping gasket must be removed before putting hydraulic unit into service.



CAUTION

Do not change the location of the LVDT in the bracket.

Hydraulic FLUID

☐ The shipping gasket must be removed and replaced with the breather filter before operating system. The gasket can be accessed by removing the breather cover on filter housing (Figure 4).

CAUTION

Failure to replace shipping gasket could result in excess pressure or vacuum inside the tank and damage to the pump.

☐ Check the system oil level (Figure 5).

☐ Remove the piston retainer if installed (Figure 6).

Figure 5

(Piston) (Piston Retainer)

Figure 6

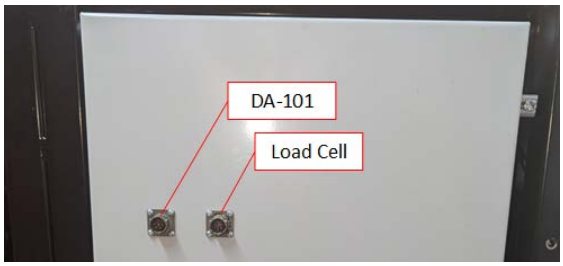
Test Set-up

CAUTION
Do not complete the threaded adapter string until the system has been tested to ensure the LVDT will control the piston height. This can be done by turning the pump on when the load frame is empty and manually lifting the swivel adapter. The piston should retract to the lowest position.

1. Read the "Operating Safety Procedures".
2. Install the Standard load cell on the piston.
3. If the Standard load cell does not have an integral Control Load Cell bridge, install a Control Load Cell on the Standard load cell. Control Load Cell bridge may be part of the 1600 or 1800 series load cell or may be a separate load cell. The Control Load Cell bridge must be trimmed to 2 mV/V for proper control. Any Load Cell trimmed to 4 mV/V and with twice the capacity of the Load Cell Standard may be used as a Control Load Cell. For example: a 50 klbf Load Cell trimmed to 4 mV/V may be used to control the frame with a 25 klbf Load Cell Standard. The goal is to have a 2 mV/V control signal at the rated load.
4. Install the DUT load cell using a standard or custom threaded adapter. Custom adapters are available from Interface Inc.
5. Attach the Control Load Cell cable (15700) from the Control Cell Bridge to the connector shown as "Control Load Cell" on the back of the load frame (see Figures 7 and 10). Do not disconnect this cable while the hydraulic pump is running or damage may occur.
6. Attach the DA-101-USB cable (15936) from the "Set Point Command" connector on the back of the load frame to the DA-101-USB Analog Output connector (see Figures 7 and 10).
7. Attach the Reference Standard cable (CT-177) to the Load A connector on the 9840 indicator. Attach the Device Under Test (DUT) cable (CT-338) to the Load B connector on the 9840 indicator (See Figure 9). Please consult Interface Inc. if the connection on your cable does not match your load cell. In most cases, Interface Inc. can supply you with the one you need. Attach the 208/240 VAC 1 PH system power using the supplied mating connector (see Figure 7).
8. Set up the computer. The computer and monitor may be plugged into the power outlet on the back of the load frame (see Figure 7). Connect DA-101-USB power cord to DA-101-USB power input connector and AC outlet. Connect the USB cable from DA-101-USB to computer. Turn on the pump at the Start/Stop switch. As the piston raises, carefully raise the slack adapter swivel stem by hand to the top position. The piston should immediately begin to lower. If not, the control cables to the Control Load Cell or the LVDT must be checked for proper connection.

CAUTION
Do not attempt to complete the threaded adapter string until the LVDT control is working properly.

Figure 7



9. Lower the piston to the bottom by pressing the down button and turn the pump off (See figure 8).

10. Install the threaded adapters to come within 5” of the slack adapter. Make the last connection between two threaded adapters and not the swivel stem (See figure 9).

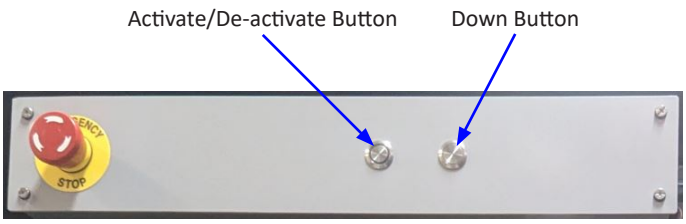
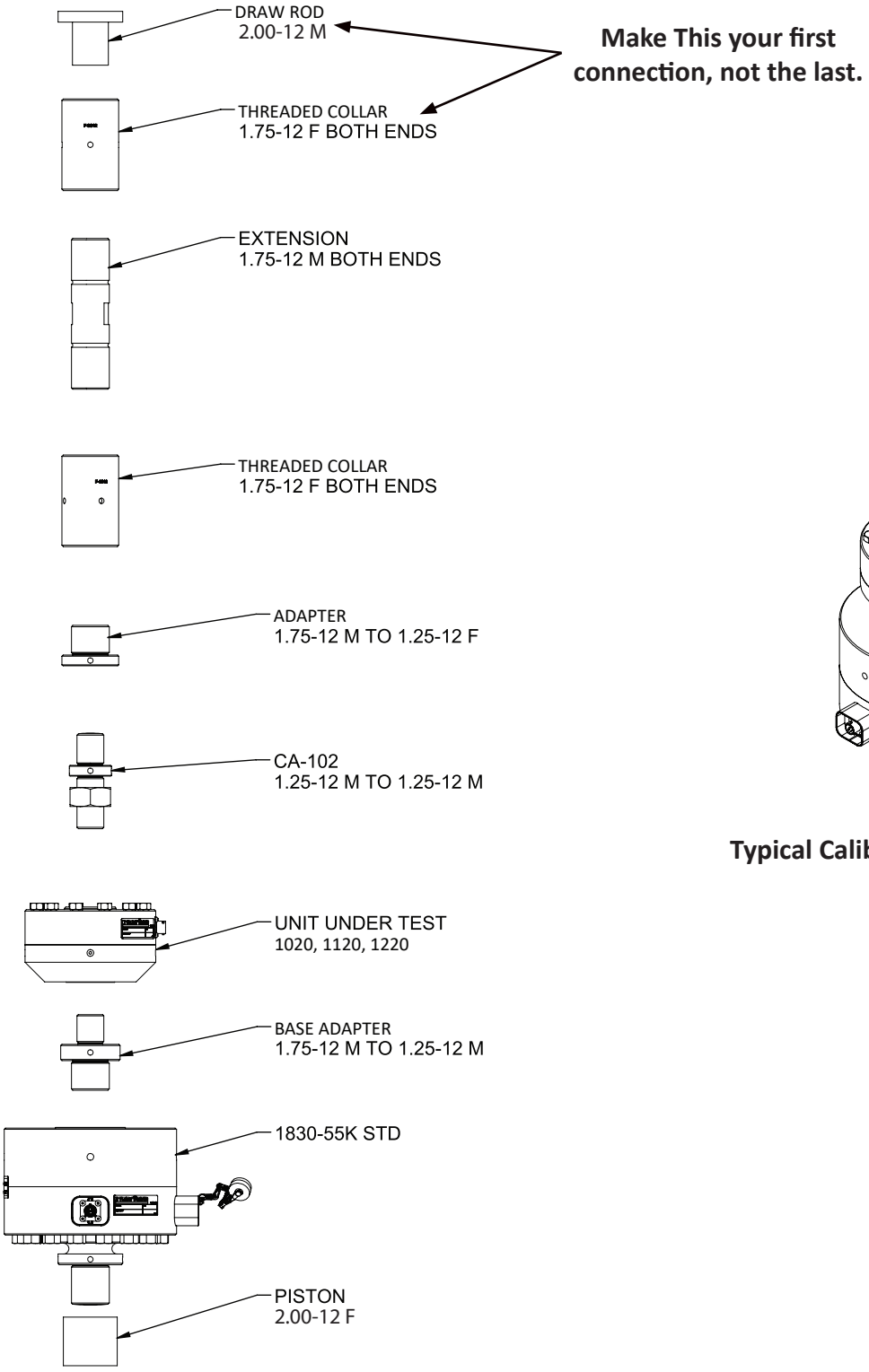
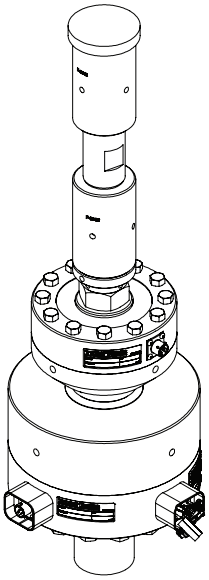


Figure 8





Typical Calibration Configuration

Figure 9

CAUTION
Ensure all threaded connections are engaged at least one (1) diameter length of the threads.

CAUTION
Threaded connections that bottom out must be backed off one full turn to avoid binding.

11. Turn on the pump and carefully guide the last threaded connection between the adapters. As the threads make initial contact, the slack adapter will raise the LVDT and stop when it is in the center of travel.

WARNING
Never position any bodily part between threaded connection adaptors.

12. Carefully begin to make the final thread connection. As the threads are engaged, the piston will follow the engagement to keep the LVDT centered. Stop when at least 1 diameter of threads are engaged on all threaded connections.
13. Turn on the pump and carefully guide the last threaded connection between the adapters. As the threads make initial contact, the slack adapter will raise the LVDT and stop when it is in the center of travel.
14. Carefully begin to make the final thread connection. As the threads are engaged, the piston will follow the engagement to keep the LVDT centered. Stop when at least 1 diameter of threads are engaged on all threaded connections. Threaded connections that bottom out must be backed off one full turn to avoid binding.
15. Through the front access door, check the oil level in the sight glass (See figure 10).
16. Check the floor of the Calibration Rig for indications of oil leaks, if no leaks are visible, close the front access door.

Figure 10

GOLD STANDARD SOFTWARE, WCGOLD

Overview

The Interface Inc. Gold Standard Software product, WCGold, consists of 3 separate executable programs as follows:

- **WGoldCfg** is used to configure all WCGold program parameters.
- **WCalGold** is used to calibrate the 9840 instrument using a transducer simulator such as the Interface Inc. Model CX-0610 or CX-0440.
- **WCGold** is the main transducer calibration program.

Pressing the F1 function key while program is running will display context sensitive help for the current screen being viewed.

Menu Commands
- **Main**
- **Analysis**
- **Tools**

Button Bar Commands
- **Perform Calibration**
- **Identify Standard**
- **Record Zero**
- **Fitted Curve Data**
- **Performance Data**
- **Compare Runs**
- **Creep Data**
- **Zero History Data**
- **Fitted Curve Plot**
- **Load vs. Error Plot**
- **New File**

Setup & Calibration
- **WGoldCFG**
- **WCalGold**

Main Menu
- **Perform Calibration**
- **Perform Creep**
- **Identify Standard**
- **Auto Hydraulic Adjust**
- **Load Set Points**
- **Delete Runs**
- **Record Zero**

Analysis Menu
- **New File**
- **Fitted Curve Data**
- **Performance Data**
- **Compare Runs**
- **Fitted Curve Plot**
- **Load vs. Error Plot**
- **EN10002 Data**
- **Zero History Data**

Tools Menu

- Report Designer *(Creates any of the following user generated custom printable reports. Any number of each type of report can be created. After a report is created and saved, it can then be printed from the corresponding Analysis Menu item.)*

- **Performance Report**
- **Fitted Curve Report**
- **Standard Curve Report**
- **Combined Curve Report**
- **Compared Curve Report**
- **EN10002 Report**
- **ISO 376 Report**
- **Zero Balance History Report**
- **Creep Report**

See online help from within the Report Designer for further information. Designer.pdf found in the installed program directory is a complete written manual for the Report Designer.

Edit Field Definitions *(Creates user definable field titles for items not currently defined elsewhere. Useful for entries such as accounting/asset tag numbers, work order etc. Field definitions made here will appear as entries when filling out the DUT Cell Information window.)*

PERFORM CALIBRATION

Step 1:
Select Perform Calibration button on toolbar or from pull down Main Menu.

Step 2:
Enter all DUT information.

Step 3:
Select DUT mode (Tension or Compression)

Step 4:
Enter Set Point Information. (See Calibration Set Point File Creation)

Step 5:
Select Standard Mode (Tension or Compression). Normally this is the same as the DUT Mode.

Step 6:
Select the Continue Button. If the set points were newly entered, or an existing set point file has been edited, a screen will be displayed asking to Save? Selecting Yes will then display a Select File window where an existing file can be selected to overwrite or a new file name entered.

Step 7:
Determine Offset.

The system will determine the offset voltage prior to exercising or calibrating the DUT. This is the voltage required to move a load frames actuator from zero position to start of load being applied. Refer to the AUTO.CFG file parameters found in the WGoldCfg program.

Step 8:
Exercise DUT.

Selecting Yes checks the zero reading of the DUT and provides a set point for proper exercise loading based on the Exercise Load parameter found in the GOLDINT.LMT or GOLDUSR.LMT files. Note that the system does not record the exercise readings.

The system will exercise the cell based on the number of cycles indicated by the ExerciseCycle parameter set in the AUTO.CFG parameter section of the WgoldCfg program. The system will first apply a load approximating the percent load indicated by the InitialLoad parameter. The output of the standard is compared against a nominal output based on the set point file settings. The output of the DUT is compared against a nominal output based on the values found in the GOLDINT.LMT or GOLDUSR.LMT files. If either reading is found to be out of tolerance, a FAIL SAFE prompt will be displayed and the calibration cycle aborted. Refer to the AUTO.CFG file parameters in the WGoldCfg program.

Step 9:

Calibrate DUT.

The set point box located in the lower left corner should now read 0. When ready for the initial zero to be taken, select the START button. The set point number will change to a highlighted color and after a few seconds a beep will be heard indicating the reading has been taken. The next desired set point will then be displayed in the set point box.

Increase the load until the STANDARD meter is within the limits defined in the ADC.CFG file. (Automated systems will automatically increase the load as needed) The set point number will change to a highlighted color. Continue holding steady until a beep is heard and the next set point is displayed. The final set point number is for zero load will equal initial zero reading taken on the standard. All load should be removed and the system will record the return zero.

The gauge display can be used as a reference. When the set point meter display matches the reference standard meter display, the gauge indicator will be centered.

Pressing the ESC key at any time during the calibration will abort the calibration and return to step to the beginning of step 10.

Step 10:

Performance Analysis.

The system will now display the performance results. Output, Nonlinearity, Hysteresis and SEB parameters are compared against limits found in the GOLDINT.LMT or GOLDUSR.LMT files. A High Or Low displayed to the right of these parameters indicates this parameter exceeds the limits found.

The following buttons are displayed in the lower right corner.

NEXT BRIDGE

Displays results for a multiple bridge transducer.

SHUNT CAL

Select if shunt cal reading(s) are desired.

The program defaults to a value to provide Auto shuntcal output of about 70% of calibrated full scale on a 350 ohm bridge if possible. If an external resistor is to be used, select Manual and enter its value in the edit field.

PRINTER

Generates a hard copy of the performance results.

A menu will be displayed to select the desired report to print. These reports are created using the Report Designer found on the Tools menu from the main screen.

LOAD VS ERROR PLOT

This will produce a load vs. error plot. Before printing, it is recommended that the color be changed to black and white.

FITTED DATA

This will display the fitted curve output and error as well as the curve coefficients and standard deviation. A Printer button allows a hard copy report to be printed. These reports are created using the Report Designer found on the Tools menu from the main screen.

FITTED PLOT

This will produce a load vs. fitted curve error plot. Before printing, it is recommended that the color be changed to black and white.

REPEAT

Repeats the calibration cycle beginning with step 10.

INFO SCREEN

Returns to step 2.

PERFORM CREEP

Step 1:

Select Perform Creep button on toolbar or from pull down Main Menu.

Step 2:

Enter all DUT information.

Step 3:

Select DUT mode (Tension or Compression)

Step 4:

Enter Set Point Information. Creep test only uses the full scale value entered.

Step 5:

Select Standard Mode (Tension or Compression). Normally this is the same as the DUT Mode.

Step 6:

Select the Continue Button. If the set points were newly entered, or an existing set point file has been edited, a screen will be displayed asking to Save? Selecting Yes will then display a Select File window where an existing file can be selected to overwrite or a new file name entered.

Step 7:

Enter desired Creep Delays in seconds. Selecting the Default button will use default creep settings. The Select button allows loading of previously entered and saved Creep delay settings.

Step 8:

Select the Continue Button.

Step 9:

The set point box located in the lower left corner should now read 0. When ready for the initial zero to be taken, select the START button. The set point number will change to a highlighted color and after a few seconds a beep will be heard indicating the zero reading has been taken. Increase the load until the STANDARD meter is within the limits defined in the ADC.CFG file.

(Automated systems will automatically increase the load as needed) All load should be removed and the system will record the return zero. A timer will begin counting down from the maximum delay entered in Step 8. When the timer reaches zero the system will prompt to remove load and click Continue Button. The timer will begin counting down as readings are recorded per the delays entered in Step 8. Once all readings are recorded the Creep results are displayed.

AUTO HYDRAULIC ADJUST

Allows manual control of command voltage for controlling hydraulic frame.

Step 1:

A set point file must be loaded before using Auto Hydraulic Adjust. Select Load Set Points button and select desired set point file.

Step 2:

Select desired voltage increment/decrement buttons to adjust command voltage as desired. Maximum voltage limits in set point file are applied.

LOAD SET POINTS

Allows editing of set point files without performing calibration. See *Calibration Set point file creation.*

DELETE RUNS

Allows deletion of undesired calibration runs from selected file.

RECORD ZERO

Records the Zero Balance for all meters and saves results in the folder as defined by ZeroPath in the WGoldCFG program.

FITTED CURVE DATA

If displayed from the Analysis menu:

Select the desired file.

Select the desired calibration run(s).

If displayed from either Analysis menu or during calibration cycle:

The system will now display a fitted curve output and error as well as the curve coefficients and standard deviation.

The following buttons are displayed in the lower right corner.

SCREEN

Switches the display to 1 of 3 screens.

PRINTER

Generates a hard copy of all 3 display screens.

A menu will be displayed to select the desired report to print. These reports are created using the Report Designer found on the Tools menu from the main screen.

FITTED CURVE PLOT

Displays a best fit polynomial curve plot of up to 8 runs.

PERFORMANCE DATA

If displayed from the Analysis menu:

Select the desired .ZB zero file.

Select the desired calibration run(s).

If displayed from either Analysis menu or during calibration cycle:

The system will now display the performance results. Output, Nonlinearity, Hysteresis and SEB parameters are compared against limits found in the GOLDINT.LMT or GOLDUSR.LMT files. A High Or Low displayed to the right of these parameters indicates this parameter exceeds the limits found.

The following buttons are displayed in the lower right corner.

NEXT BRIDGE (Not available if displayed from Analysis menu)

Displays results for a multiple bridge transducer.

SHUNT CAL

If displayed during a calibration cycle:

Select if shunt cal reading(s) are desired.

The program defaults to a value to provide Auto shuntcal output of about 70% of calibrated full scale on a 350 ohm bridge if possible. If an external resistor is to be used, select Manual and enter its value in the edit field.

If displayed from Analysis menu:

Displays all shunt calibration results computed during calibration for the currently viewed calibration run. On the far right is a column labeled SELECTED. For each shunt cal run to be included on a hard copy report, click on the run in the SELECTED column. These run(s) up to a maximum of 10 will be included in any report printed using the PRINTER button as described below.

PRINTER

Generates a hard copy of the performance results.

A menu will be displayed to select the desired report to print. These reports are created using the Report Designer found on the Tools Menu from the main screen.

LOAD VS ERROR PLOT

This will produce a load vs. error plot. Before printing, it is recommended that the color be changed to black and white.

FITTED DATA

This will display the fitted curve output and error as well as the curve coefficients and standard deviation. A Printer button allows a hard copy report to be printed. These reports are created using the Report Designer found on the Tools menu from the main screen.

FITTED PLOT

This will produce a load vs. fitted curve error plot. Before printing, it is recommended that the color be changed to black and white.

COMPARE RUNS

Compares the fitted curve of up to 3 prior runs with up to 3 current runs.

Step 1:

Select the desired curve type (Ascending, Descending or Combined).

Step 2:

Select the desired file.

Step 3:

Select the desired calibration run(s) for the previous calibration.

Step 4:

Select the desired calibration run(s) for the current calibration.

The system will now display a comparison of the fitted data and error between previous calibration run(s) and current calibration run(s). Use the PRINTER button to generate a hard copy of the performance results. A menu will be displayed to select the desired report to print. These reports are created using the Report Designer found on the Tools menu from the main screen.

CREEP DATA

Displays results of Creep Test

Step 1:

Select the desired file.

Step 2:

Select the desired Creep test.

The system will now display the results of the selected Creep test. Use the PRINTER button to generate a hard copy of the Creep results. A menu will be displayed to select the desired report to print. These reports are created using the Report Designer found on the Tools menu from the main screen.

ZERO HISTORY DATA

Select the desired .ZB zero file.

The system will display a Zero Balance history report showing all Zero Balance readings recorded for the selected file.

The following button is displayed.

PRINTER

Generates a hard copy of the report.

A menu will be displayed to select the desired report to print. These reports are created using the Report Designer found on the Tools menu from the main screen.

LOAD VS. ERROR PLOT

Displays a load vs. error plot of up to 4 runs.

The plots can use a common 0 to full scale line or each run uses its individual 0 to full scale line.

NEW FILE

The first time a data report or plot is selected a list of all calibration files is presented to select from. Subsequent data reports or plots will continue to use the same file. Enabling New File will cause the calibration file selection to be presented again.

WGOLDCFG

The WGoldCfg program is used to configure all Interface Inc. software products.

Along the top of the window, are tabs to select which configuration file to edit as follows:

Paths

Allows editing of program, data and report file storage locations.

ADC Configure

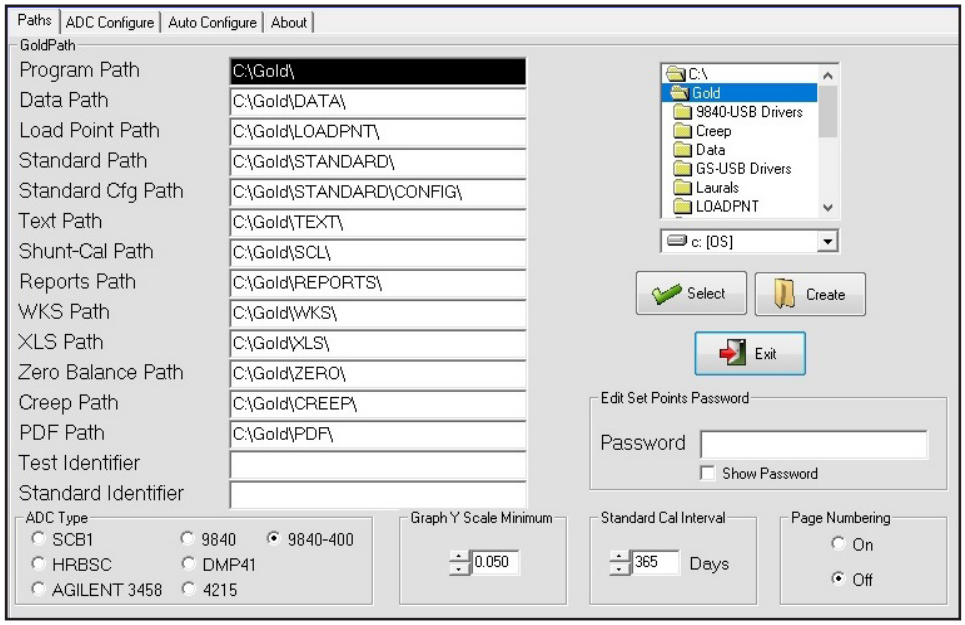
Allows editing of A/D convertor settings.

Auto Configure

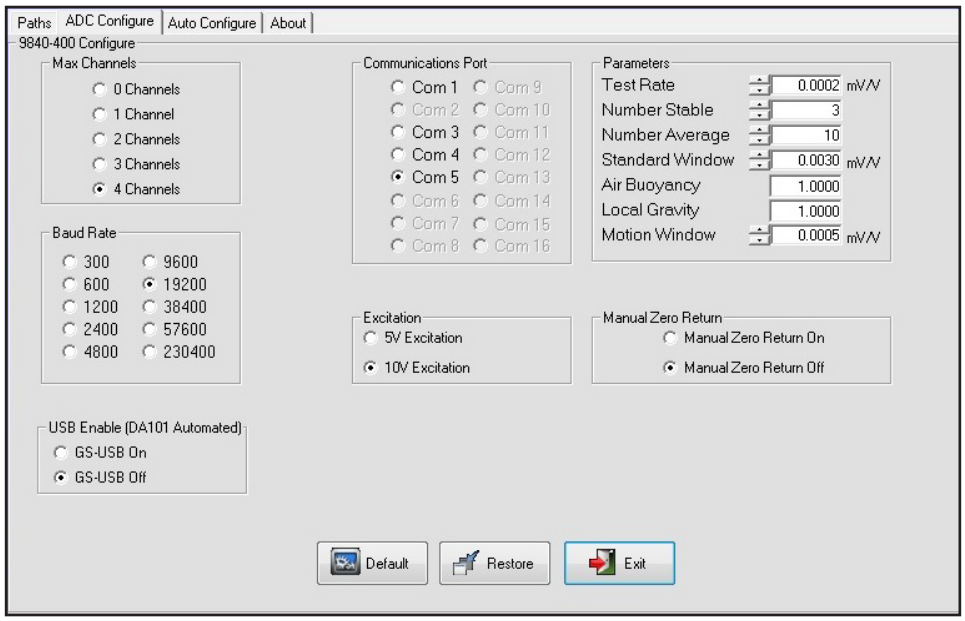
Allows editing of automated test frame settings.

WGOLDCFG FACTORY SETTINGS

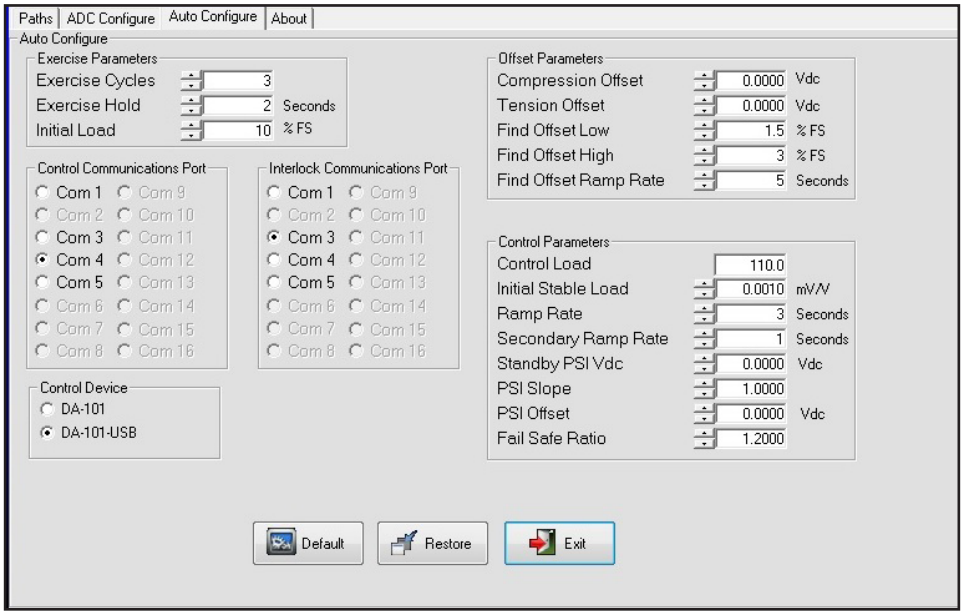
Paths -



ADC Configure -



Auto Configure -



CALIBRATION SET POINT FILE CREATION

When a new calibration sequence is desired or a calibration standard is recalibrated, a new calibration set point file is required. Following is the instruction for creating a file. When all of the required data has been entered in the Device Under Test information screen, select either TENSION or COMPRESSION for the mode of calibration. The set point selection screen will now be displayed (See figure 9). There are 3 different methods of file creation. Each is explained.

Method 1. Using mV/V values from the standard calibration certificate.

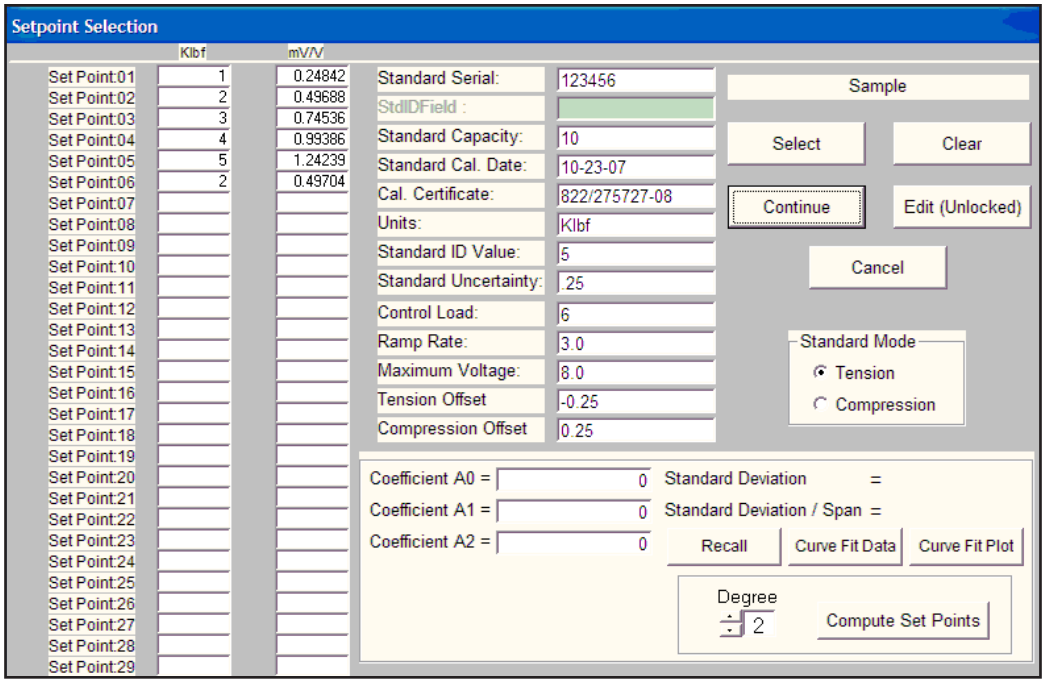
Follow these steps. (A typical 5 point, 5Klbf calibration file is illustrated as an example).

1. Enter into the load column each of the five (5) ascending and one (1) descending load points as they are taken from the calibration sheet of the standard. Make certain to use the same units as the standard calibration sheet (Klbf in the example).
2. Press the Enter key to get to the top of the next column. Enter the mV/V value for each set point from the standard calibration sheet. Make certain the entered values are for the desired mode, tension or compression, and that the polarity of each value as listed is preserved.
3. When all of the values have been entered, click the Curve Fit Plot button. The graph should show a smooth curve with all points falling on the curve. If not, a keying error has been made and must be corrected. If the graph is OK, click the Exit button and then the Continue button. The file can then be saved under the desired file name.

Figure 9: Calibration Set Point Data Screen

Method 2. Using coefficients from the standard calibration certificate.

1. This method is especially useful for creating set points that are not listed on the standard calibration certificate. Enter the desired loads in the load column. Make certain they are in the same units as the standard calibration certificate.
2. Select the polynomial degree of fit.
3. Enter the coefficient values from the calibration certificate for the appropriate mode.
4. Click the “Compute Set Points” button. The mV/V column will be completed automatically.



IMPORTANT! The above is valid for ascending points. Descending points created by this method will have ignored the hysteresis in the standard. It is recommended that desired descending points be included in the load column but then the automatic mV/V values be manually replaced by editing to the values from the calibration certificate. Valid descending values can only be obtained from the certificate. Note also that descending values are only valid for the FS value of the standard from which they descended.

5. Click the Exit button and then the Continue button. The file can then be saved under the desired file name.

C. Method 3. Using coefficients derived from known points.

1. This method is especially useful for creating set points that are between known points. Complete the load and mV/V columns for the known points. Click on the Curve Fit Plot button. This will generate coefficients for ascending points. Now clear the load and mV/V columns. Enter the desired points in the load column. Make certain they are in the same units as the known points were.
2. Select the polynomial degree of fit.
3. Click the “Compute Set Points” button. The mV/V column will be completed automatically.

   IMPORTANT! The above is valid for ascending points. Descending points created by this method will have ignored the hysteresis in the standard. It is recommended that desired descending points be included in the load column but then the automatic mV/V values be manually replaced by editing to the values from the calibration certificate. Valid descending values can only be obtained from a calibration certificate. Note also that descending values are only valid for the FS value of the standard from which they descended.
4. Click the Exit button and then the Continue button. The file can then be saved under the desired file name.

CALIBRATION SET POINT SCREEN BUTTON FUNCTION

- **Select:** Displays list of all previously saved set point files from which to select.
- **Clear:** Will clear all of the set point fields from the screen
- **Continue:** Accepts this file for the current calibration
- **Curve fit Data:** Displays fitted curve data table and computes polynomial coefficients.
- **Curve fit Plot:** Displays fitted curve plot and computes polynomial coefficients.
- **Compute Setpoints:** Uses coefficients to compute mV/V values for loads in the load column
- **Edit:** Allows the current file to be edited.
- **Cancel:** Will return to the Device Under Test information screen.

CALIBRATION SET POINT SCREEN FIELD ENTRY

- Standard Serial Number: Identification number of the standard being used.
- **ID:** User identifiable field as defined in WGoldCfg program.
- **Standard Capacity:** Located on the label of the standard.
- **Standard Cal. Date:** Date that the standard was calibrated. Located at the top center of the calibration data sheet. (NIST Test Date or Interface Test)
- **Cal Certificate:** The traceability number for an individual standard. Located at the top center of the calibration data sheet. (NIST Test Number or NIST Traceable)
- **Units:** The units that the calibration will be performed in. (lbf, Klbf, N, kN, kgf)
- **Control Load:** The sensitivity factor of the rig servo system stated as the force magnitude corresponding to a command signal input to the servo amplifier of 10 V. Control Load must be expressed in the same force units as the set point files to be used.
- Make sure that that you have connected to the correct standard and that the related control load matches the one that you are using.
- **Ramp Rate:** Controls how fast the load is applied. (Larger number = slower load application) Can be used to prevent overshooting the first calibration point.
- **Maximum Voltage:** Limits the amount of force that the load frame can apply. Reference the appropriate hydraulic load frame specifications. Used as a safety feature. For example, if a 12Klbf capacity load cell were being calibrated with a rig having a 22K standard with Control Load = 26 Klbf, Max Voltage might be set for 6 which provides enough command signal for capacity plus 20% over range for exercising plus nominal offset while preventing a load greater than 15.6 Klbf from being applied.
- **Tension & Compression Offset:** Control voltage required to move the actuator from zero load to the point of initial contact. The values as shipped are -0.13 for Tension and +0.12 for Compression. This is the same for both load cell standards.

$$\text{Max VDC} = \left(\frac{\text{FSL (FullScale Load)} * \text{Exercise Load}/95}{\text{Control Load}} \right) * 10 + \text{ABS (Offset Voltage)}$$

Components

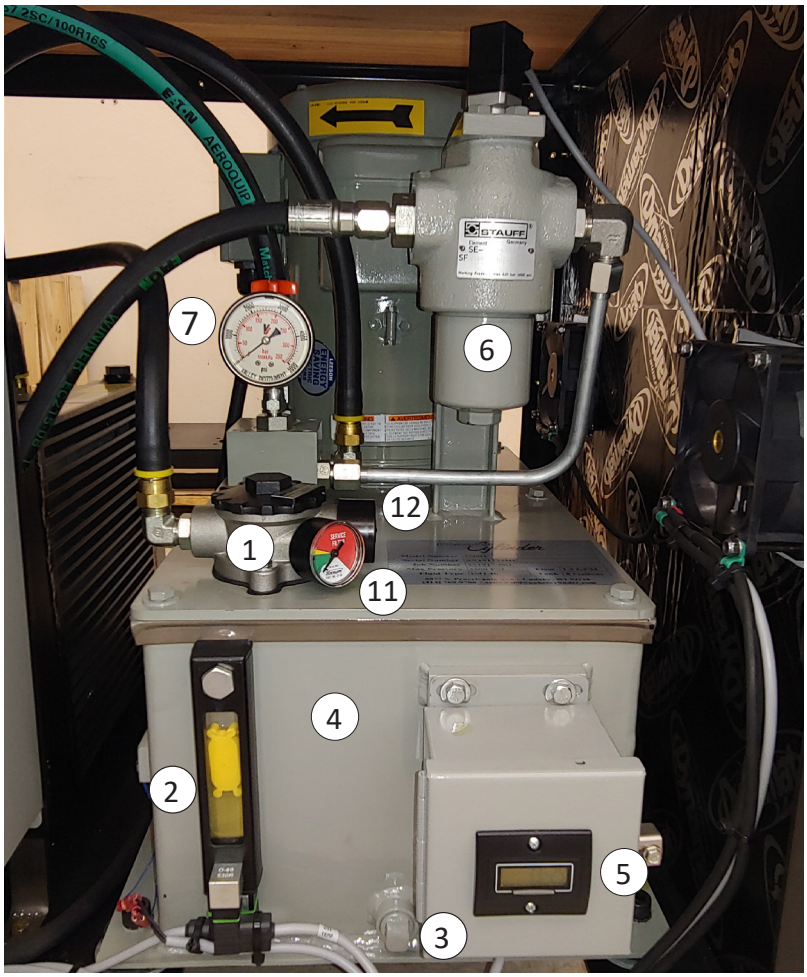


Figure 11

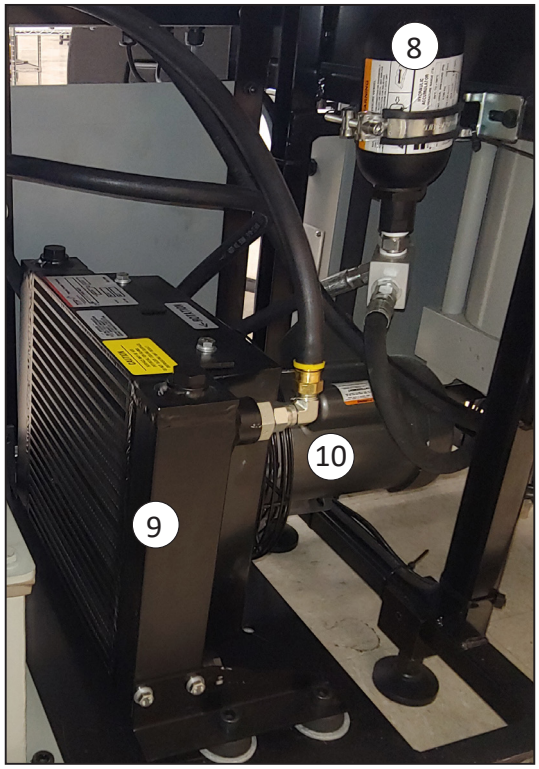


Figure 12

Component	Control / Function
1	Low Pressure Filter
2	Fluid Level
3	Drain Plug
4	Reservoir
5	Hour Meter
6	High Pressure Filter
7	Hydraulic Pressure Gage
8	Accumulator
9	Heat Exchanger
10	Motor
11	Temperature Gage
12	Oil Fill

Protection Features

The hydraulic power unit has three methods of protection. The thermal overload relay on the motor starter protects the motor from damage due to overheating or overcurrent. To reset this error push the blue reset button. The tank level indicator has a switch that will shut off the unit if the oil level gets too low. The level must be restored before the unit will start again. At the bottom of the tank level indicator is a thermometer with a switch that will shut off the unit if the oil temperature gets too high. The temperature must drop down to normal before the unit will start again.

Maintenance

Filter Maintenance

The HPS (Hydraulic Power Supply) unit has three levels of filtration. The suction strainer is located inside the reservoir and should be cleaned and replaced every time the tank is drained for any reason. The strainer is made of non-rusting Stainless steel wire mesh and may be re-cleaned with solvent for reuse if desired.

The high pressure filter and return medium pressure filter elements must be thrown away and replaced with new ones. Both of these last two filters are equipped with "Element-condition" indicators. When the indicator reaches the red zone the element should be replaced. This is with the power unit running at maximum flow; NOT when unloaded. The cycle rate or speed of operation needs to be at maximum to read the filter's condition. When changing out the filters, make sure that the HPS pressure has been reduced to zero.

The hydraulic power supply uses the following filters:

Return Filter: KRW-RT20-G10B (KR West)
High Pressure Filter: SF-014-H-10-B-T-UIZ-0-V (Stauff)

Accumulator Charging

Your hydraulic power supply is equipped with a bladder style hydraulic accumulator to damp out shocks and to minimize pressure spikes and sags. The accumulator has been pre-charged with nitrogen gas to a pressure of 2100 – 2400 psi and will function properly at start-up. No additional adjustments are necessary.

Checking and Replacing Hydraulic Oil

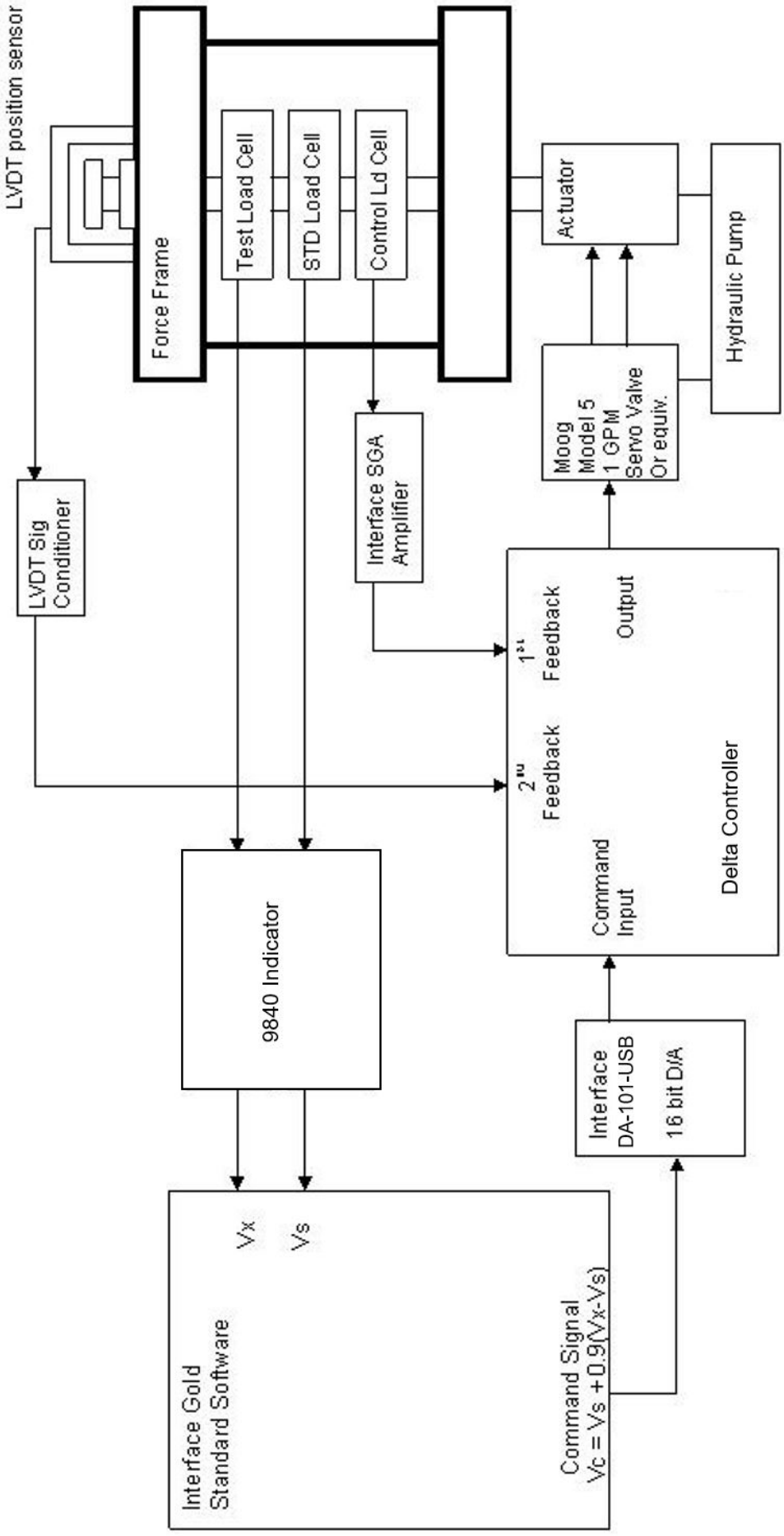
The hydraulic power supply is pre-filled with high quality/premium anti-wear, anti-foam hydraulic oil like Chevron Rando (ISO 32) or equivalent. This oil should be checked every 500 hours of usage. At these 500 hour intervals, there are visual observations and test that can be conducted to determine if the hydraulic oil is still useable or if it should be changed.

- Water ingress – if the hydraulic oil has a milky appearance, then water may have been introduced into the hydraulic circuit or reservoir. Try to determine the source of the water ingress and eliminate it, then replace the oil.
- Heat – Replace the oil if the color has become darker or if it has a burnt odor.
- Contamination – Fluid analysis can be conducted on an oil sample to see if the particle contamination level has increased beyond acceptable limits. If so, replace the oil and filter elements.
- Oxidative Degradation & Additive Depletion – Fluid analysis can determine if these conditions have started to occur. If so, replace the oil and filter elements.

When it is time to replace the hydraulic oil, it is best to start by using a hydraulic transfer pump. To do this, remove the filter cap assembly and insert the suction line of the pump and remove as much oil as possible. The residual oil can then be drained through the drain plug. Make visual observations inside of the reservoir to see if there is any residue on the bottom. If residue is present, flush out with a small volume of oil and discard.

Replace the drain plug and refill the reservoir with equivalent ISO 32 hydraulic oil using the filter assembly port. About 10 gallons will be required to fill the reservoir and actuator. It will be necessary to cycle the piston actuator up and down at least 5 times to remove air from the hydraulic lines and fill the actuator. Top off the oil level in the reservoir and then replace the filter element. The hydraulic system is now ready for use.

Appendix


LVDT position sensor
Force Frame
Test Load Cell
STD Load Cell
Control Ld Cell
Actuator
Hydraulic Pump
LVDT Sig Conditioner
Interface SGA Amplifier
Moog Model 5 1 GPM Servo Valve Or equiv.
1st Feedback
Output
2nd Feedback
Command Input
Delta Controller
9840 Indicator
Interface DA-101-USB 16 bit D/A
Interface Gold Standard Software
Vx
Vs
Command Signal Vc = Vs +0.9(Vx-Vs)

4 CHANNEL 9840-400-1-T INTELLIGENT INDICATOR

FEATURES & BENEFITS

- TEDS Plug & Play Ready! IEE1451.4 compliant
- 4 channel
- Remote sense excitation
- 5 & 6 point linearization
- Bipolar
- ±999,999 display counts
- Nonlinearity < ±0.005%
- Auto setup for multiple load cells
- Fast, direct analog output
- ±10 VDC scalable analog output – 16 bit
- USB 2.0 serial communication
- Peak/valley hold with front panel reset
- Front panel and remote tare
- 8 selectable digital filters
- Auto zero
- Front panel shunt calibration with two selectable resistors
- Display units conversion: Lb, Kg, N, Psi, Mpa, Klb, KN, t, mV/V, lb-in, oz-in, Nm
- (2) Interactive 7" graphical touch screen displays
- Quadrature encoder channel available
- mV/V calibration
- Compatible with Gold Standard® Calibration Systems

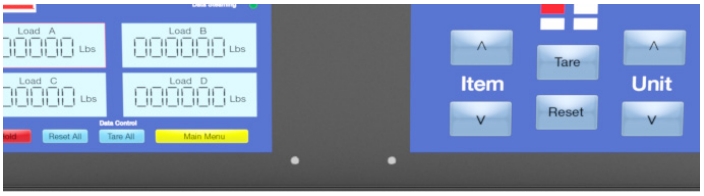
POWER OPTIONS

- 9840-400-1-T 115 VAC
- 9840-400-2-T 230 VAC

OPTIONS

- Up to three additional 16-bit scalable analog outputs
- Display Freeze/Remote Display Freeze
- 4-20 mA analog output
- Quad Limits
- RS485
- Multi-drop RS232
- 7-pin circular load cell connector
- Encoder Channel
- Keylock
- High level input channel

STANDARD CONFIGURATION



MODEL 9840-400-1-T (Shown)

SPECIFICATIONS

EXCITATION		
Voltage – VDC		5 or 10
Current – MAX – mA		180
OUTPUTS		
Serial Interface		USB 2.0
Output – Analog, 16 bit – VDC		Scalable, ±10
Output – Analog, Direct – Hz		1.5K BW
Output – Analog – mA		4–20 (optional)
Limits		Quad-programmable
PERFORMANCE		
Maximum Display Counts		±999,999
Display Update / sec.		15 Hz
Internal Resolution – bits		24
Signal Input Range – mV/V		±4.5
Programmable Count – by		1, 2, 5, 10, and 20
Conversion Rate / sec.		60
Maximum Error – %FS		0.01 ±1 count
CMRR – dB		115
ENVIRONMENTAL		
Operating Temperature	°F	+32 to +122
	°C	0 to +50
Storage Temperature	°F	+14 to +140
	°C	-10 to +60
Relative Humidity – % MAX	°F	95 (104) non-condensing
	°C	95 (40) non-condensing
POWER		
AC Power – VAC, Hz		115 or 230, 50–60
DC Power (option)		Available as a special
Power Consumption – watts		120VAC, 2A; 230VAC, 1A
MECHANICAL		
Dimensions – W x H x D	in	17 x 5.25 x 10 (19 w/L-Brackets)
	mm	431.8 x 133.35 x 254 (482.6 w/L-Brackets)
Weight	lbs	9
	kg	4.08233
Display		(2) Interactive 7" graphical touch screen displays
Unit Annunciator		Lb, Kg, Klb, kN, N, mV/V, lbf-in, oz-in, Nm

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9840 INTELLIGENT INDICATOR

FEATURES & BENEFITS

- TEDS Plug & Play Ready IEEE 1451.4 compliant
- 1 or 2 channel
- Remote sense excitation
- 5 & 6 point linearization
- Bipolar
- ±999,999 display counts
- Nonlinearlity < ±0.005%
- Auto setup for multiple load cells
- Fast, direct analog output
- ±10 VDC scalable analog output – 16 bit
- Full duplex RS232C communication
- Peak/valley hold with front panel reset
- Front panel and remote tare
- 8 selectable digital filters
- Auto zero
- Front panel shunt calibration with two selectable resistors
- Display units conversion: Lb, Kg, N, Psi, Mpa, Klb, kN, t, mV/V, lbf-in, oz-in, Nm
- Two-line display
- Quadrature encoder channel available
- mV/V calibration
- USB port

OPTIONS

- 2nd channel
- 2nd 16-bit scalable analog output
- Display Freeze/Remote Display Freeze
- 4-20 mA analog output
- Quad Limits
- RS485
- Multi-drop RS232
- Print Button
- 7-pin circular load cell connector
- Encoder Channel
- Second Line Enable on 1-channel unit
- Keylock
- TEDS 40
- TEDS 41
- Read/Write

STANDARD CONFIGURATION

MODEL 9840-100-1-T (Shown)

SPECIFICATIONS

EXCITATION		
Voltage – VDC		5 or 10
Current – MAX – mA		180
OUTPUTS		
Serial Interface		RS232 duplex
Output – Analog, 16 bit – VDC		Scalable, ±10
Output – Analog, Direct – Hz		1.5K
Output – Analog – mA		4–20 (optional)
Limits		Quad-programmable
PERFORMANCE		
Maximum Display Counts		±999,999
Display Update / sec.		4
Internal Resolution – bits		24
Signal Input Range – mV/V		±4.5
Programmable Count - by		1, 2, 5, 10, and 20
Conversion Rate / sec.		60
Maximum Error – %FS		0.01 ±1 count
CMRR – dB		115
ENVIRONMENTAL		
Operating Temperature	°F	+32 to +122
	°C	0 to +50
Storage Temperature	°F	+14 to +140
	°C	-10 to +60
Relative Humidity – % MAX	°F	95 (104) non-condensing
	°C	95 (40) non-condensing
POWER		
AC Power – VAC, Hz		115 or 230, 50–60
DC Power (option)		Available as a special
Power Consumption – watts		12
MECHANICAL		
Dimensions - W x H x D	in	7.5 x 2.5 x 9.5
	mm	190. 50 x 63.50 x 241.30
Weight	lbs	5
	kg	2.26796
Display		Vacuum Fluorescent
Unit Annunciator		Lb, Kg, Klb, kN, N, mV/V, lbf-in, oz-in, Nm

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MODEL SGA AC/DC POWERED SIGNAL CONDITIONER

FEATURES & BENEFITS

- User selectable analog output ±10V, ±5V, 0-10V, 0-5V, 0-20 mA, 4-20 mA
- 110 VAC, 220 VAC OR 18-24 VDC power
- Switch selectable filtering 1 Hz to 5 kHz
- Single channel powers up to 4 transducers
- Selectable full scale input range 0.06 to 30 mV/V
- Switch selectable offset ±70% FS
- Sealed ABS enclosure

SPECIFICATIONS

POWER	
AC	110 VAC 60 Hz or 220 VAC 50 Hz
DC	18-24 VDC
EXCITATION	
Voltage	10 VDC ±5%
Current	118 mA
PERFORMANCE	
Output	± 10V, ±5V Bipolar 0-5V, 0-10V Unipolar 0-20 mA, 4-20 mA Unipolar or Bipolar
Input Range	±0.06 to ±30 mVN
Max Bandwidth	6 kHz
Filter	1 Hz to 5 kHz
Offset	±70% FS
Nonlinearity	0.03% FS
Span Temperature Coefficient	0.004%/° F Max
Zero Temperature Coefficient	0.5 µV/° F Max
ENVIRONMENTAL	
Operating Temperature	+32°F to+ 122° F
Dimensions	6.3 in X 3.1 in X 2.2 in
Enclosure	Sealed ABS case, Compression cable seals

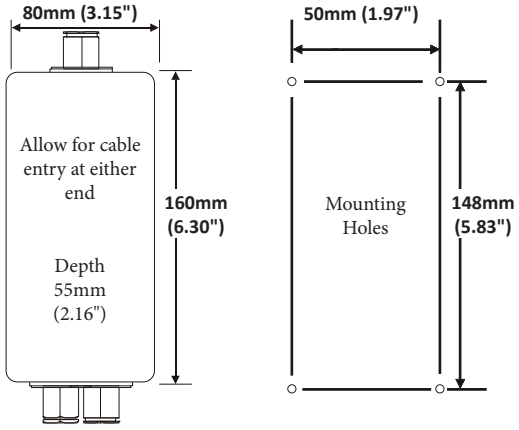
ACCESSORIES

- AC Power Cord (PWRCRD-SGA-110)

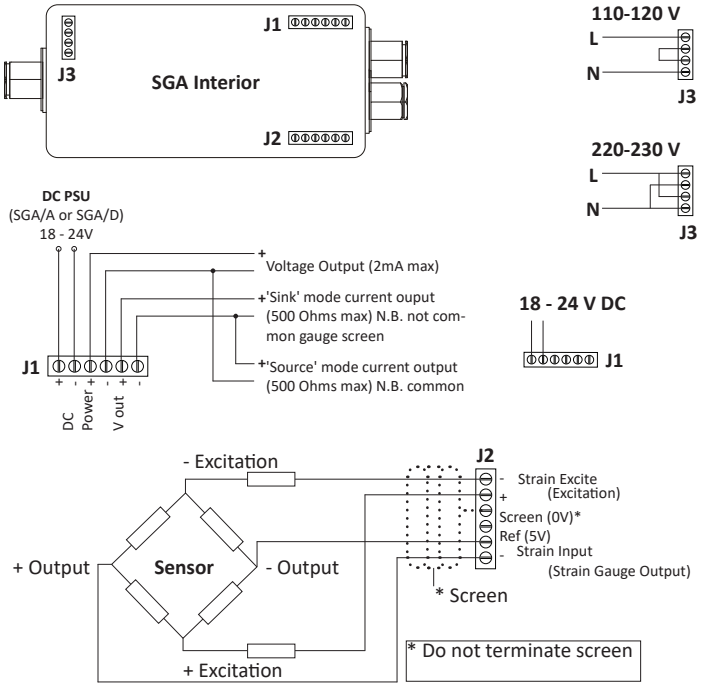
STANDARD CONFIGURATION

MODEL SGA

DIMENSIONS



WIRING DIAGRAM

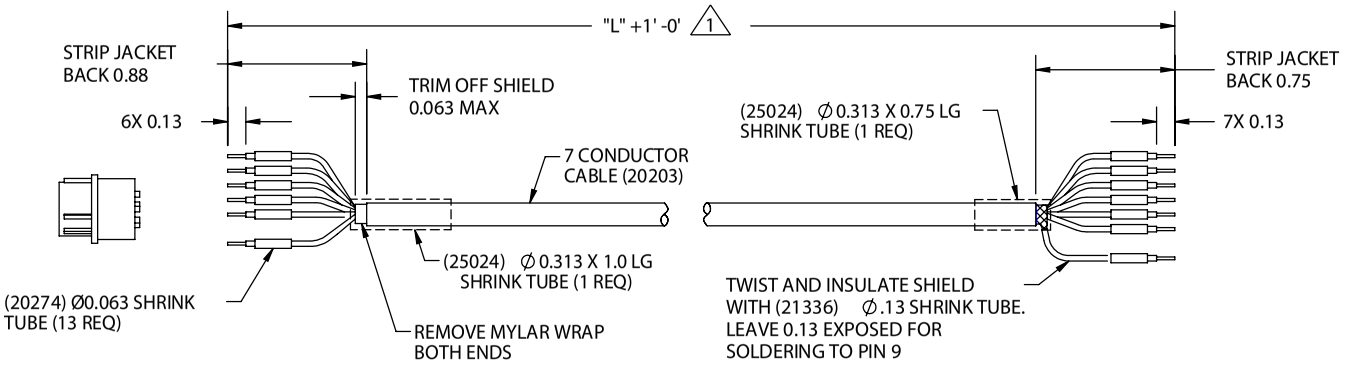


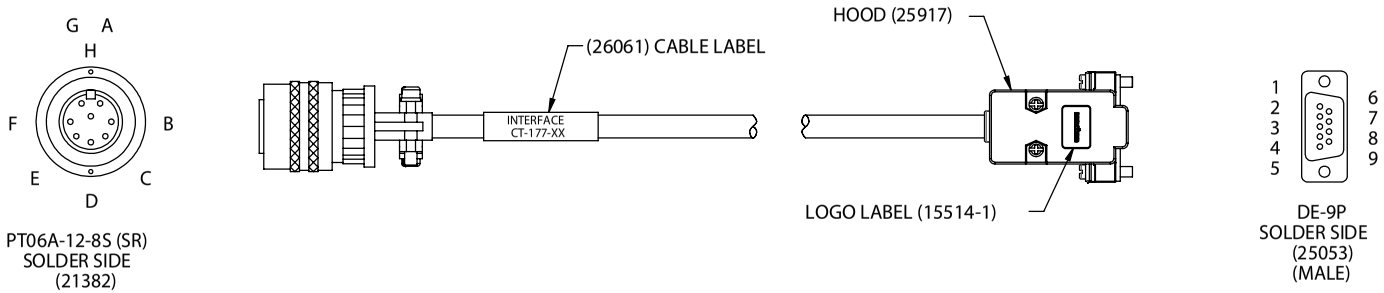
12802

REVISIONS

REV.	DESCRIPTION	DATE	APPROVED
B	REMOVE WHITE/YELLOW CONNECTION	06/16/00	
C	REDRAWN, (25053) WAS (21395)	03/17/16	DLC
D	ADDED 15514-1 LABEL, 25917 WAS 21396, UPDATED SHIELD CONNECTION	03/20/2018	RMP

LOAD CELL END





PT06A-12-8S (SR) SOLDER SIDE (21382) (FEMALE)

DE-9P SOLDER SIDE (25053) (MALE)

PT06A-12-8S (21382)

CC	CT		DE-9P (25053)
B	B	GREEN	3 + SIGNAL
E	F	WHITE/RED	2 + SENSE
D	A	RED	1 + EXCITATION
C	C	WHITE	4 - SIGNAL
		WHITE/YELLOW	N/C
F	E	WHITE/BLACK	5 - SENSE
A	D	BLACK	6 - EXCITATION
			9 - GUARD (SHIELD)

CT = TENSION READING UPSCALE

CC = COMPRESSION READING UPSCALE

2. CLIP WHITE/YELLOW WIRE BOTH ENDS.

1 DRAWING DASH No. = LENGTH IN FEET.

REMOVE BURRS AND SHARP EDGES .02 MAX
SURFACE FINISH 63 MICROINCHES

CREATOR	DATE
DESIGNED:	
DETAILED: RG	
CAM DATA:	

interface
FORCE MEASUREMENT SOLUTIONS.
7418 E. HELM DRIVE SCOTTSDALE, AZ 85260 USA

TITLE: 7 CONDUCTOR CC/CT-177-XXX CABLE - 9840 TO 1600 SERIES

SIZE: A | DWG. NO: 12802 | REV: D

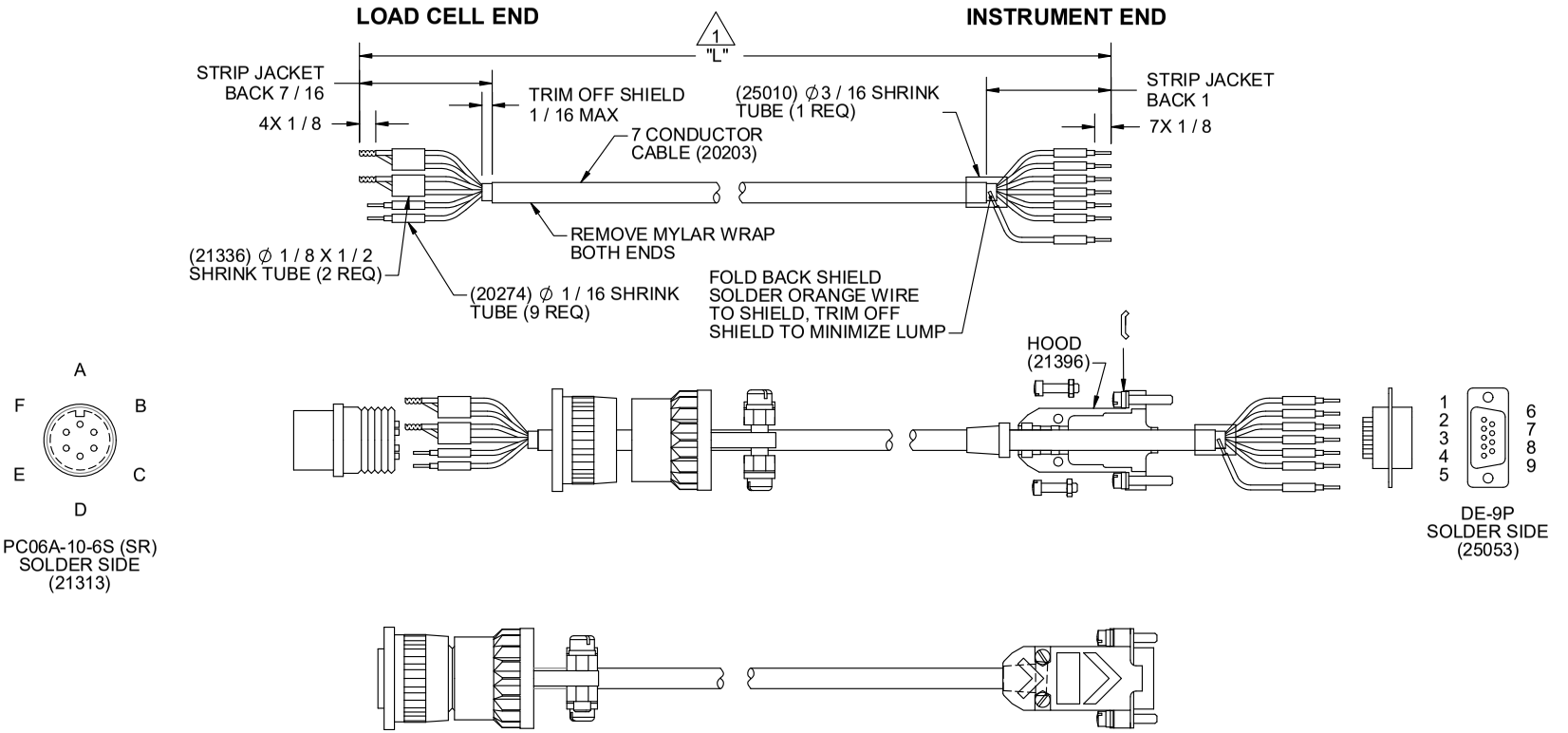
SCALE: 1:1 | SHEET 1 OF 1

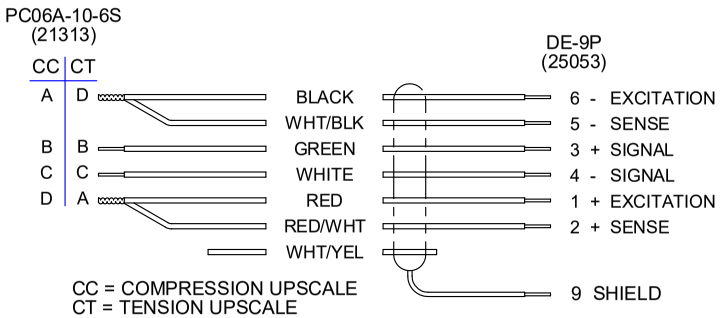
CAD FILE <_Document Vault:\~\12802.SLD***>

12679

REVISIONS

REV	DESCRIPTION	DATE	APPROVED
A	INITIAL RELEASE	10/14/98	
B	ADDED PIN P/N 21397	10/16/98	
C	CORRECTED COLOR CODE	05/04/99	
D	CLIP WHT/YEL, 25053 WAS 21395	02/15/13	





2. CLIP WHT/YEL WIRE BOTH ENDS.

1 "L" = LENGTH IN FEET.

CC = COMPRESSION UPSCALE
CT = TENSION UPSCALE

REMOVE BURRS AND SHARP EDGES .02 MAX
SURFACE FINISH 63 MICROINCHES

CREATOR	DATE
DESIGNED:	
DETAILED: RG	10/12/98
CAM DATA:	

interface
ADVANCED FORCE MEASUREMENT
7401 E. BUTHERUS DR. SCOTTSDALE, AZ USA 85260

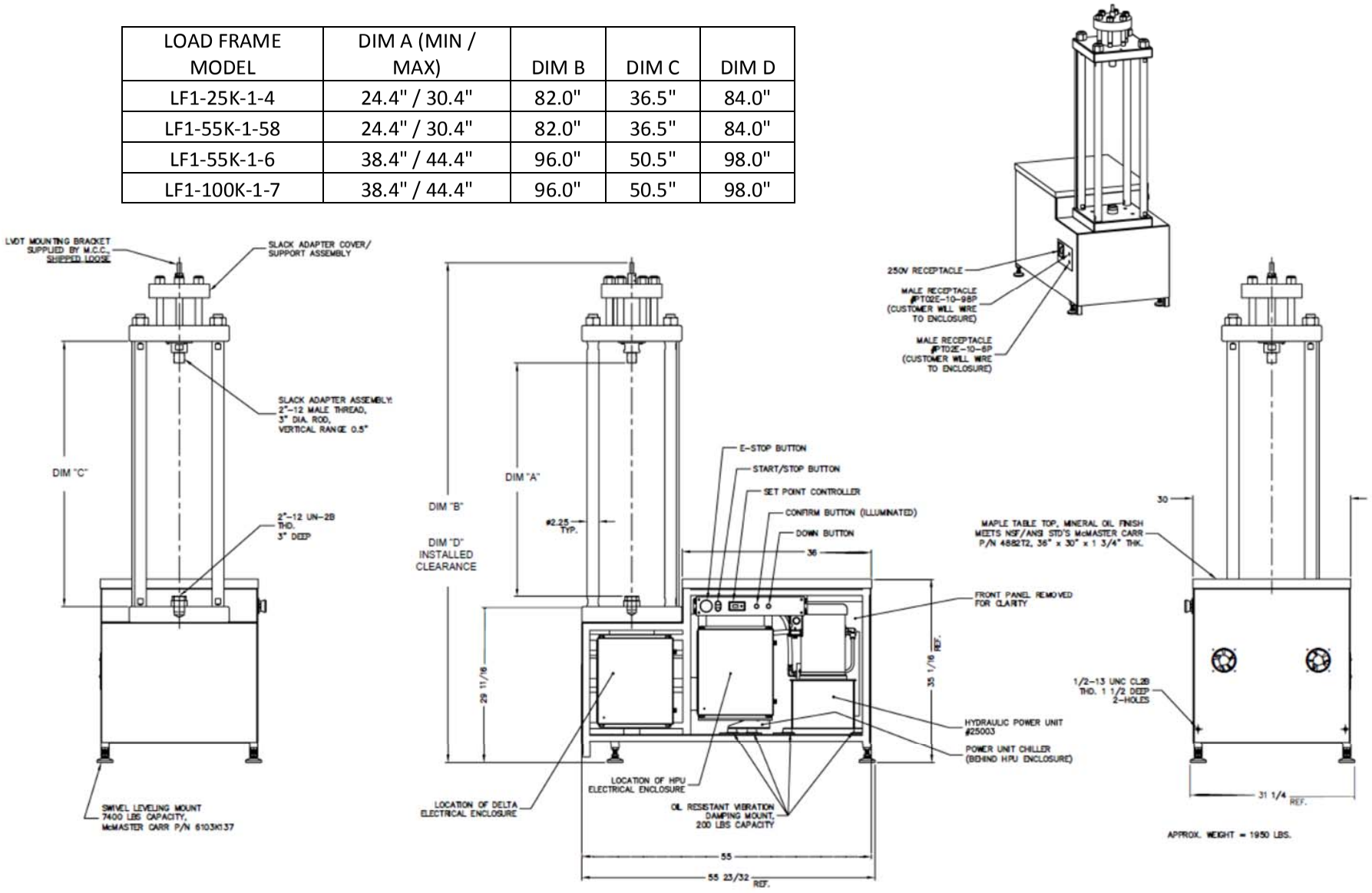
TITLE:
CC/CT-173-XX INTERCONNECT
CABLE MODEL 9840 TO STD. LOAD CELL

SIZE: A | DWG. NO: 12679 | REV: D

SCALE: NONE | SHEET 1 OF 1

CAD FILE <N:\~\12679D.SLD***>

LOAD FRAME MODEL	DIM A (MIN / MAX)	DIM B	DIM C	DIM D
LF1-25K-1-4	24.4" / 30.4"	82.0"	36.5"	84.0"
LF1-55K-1-58	24.4" / 30.4"	82.0"	36.5"	84.0"
LF1-55K-1-6	38.4" / 44.4"	96.0"	50.5"	98.0"
LF1-100K-1-7	38.4" / 44.4"	96.0"	50.5"	98.0"



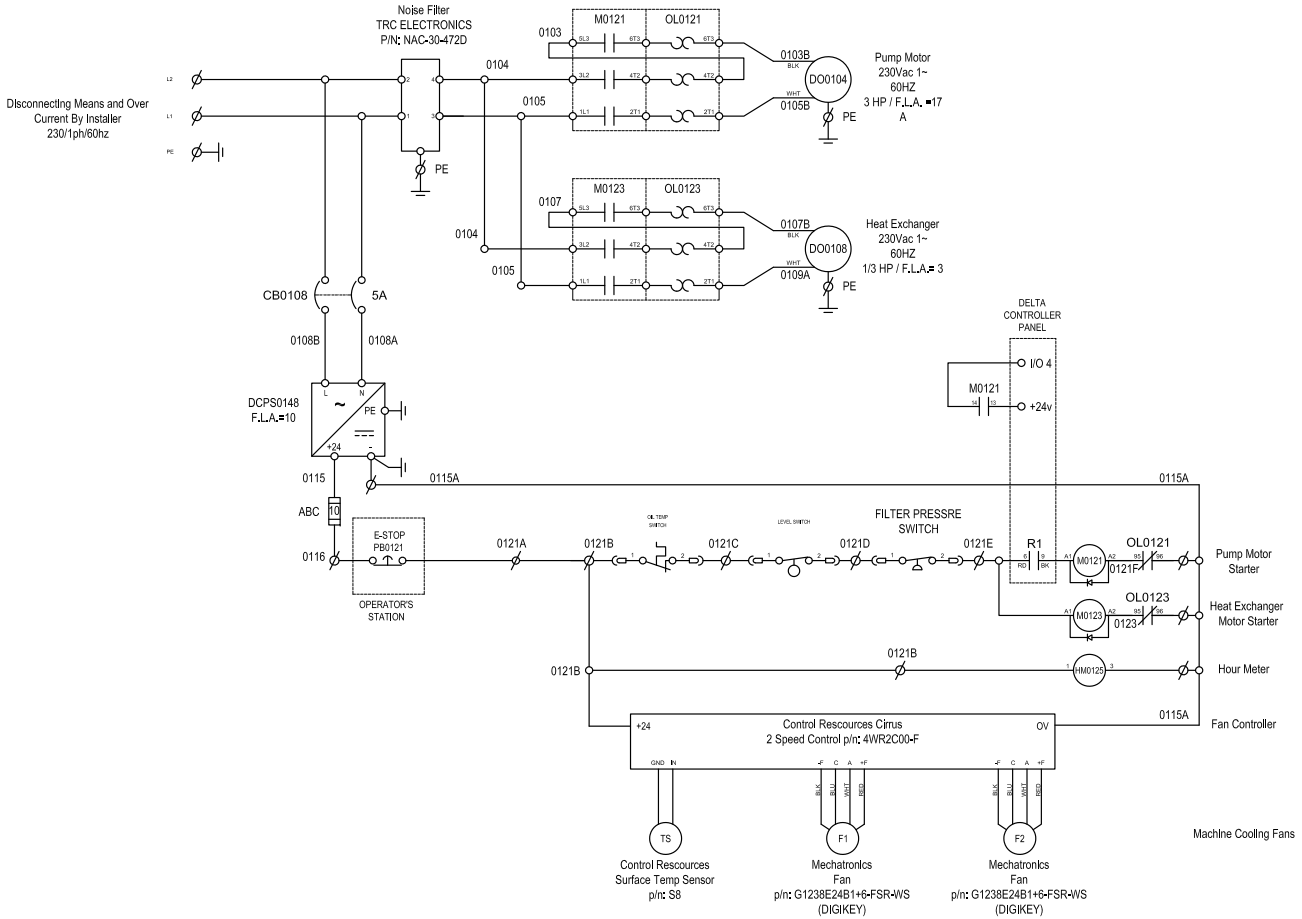
REV	DESCRIPTION	DATE	APRVD
A	INITIAL RELEASE	01/02/18	JS
B	CLARIFICATION UPDATES	11/19/19	JS
C	UPDATED TO CURRENT CONF	03/31/20	JS

NOTES / COMMENTS:

Interface, Inc.
7401 E Butherus Drive, Scottsdale, Arizona 85260

DRAWING NO: **82238**

TITLE:	SHEET:	DRAWN BY:	DATE:
OUTLINE MODEL: LOAD FRAME	1 - 6	BRET B.	12/15/2017
	SIZE: A	APPROVED BY: JAKE S.	REVISION: **C**



REV	DATE	APP	E.C.O. NO.
1	4/3/20	FJB	5419

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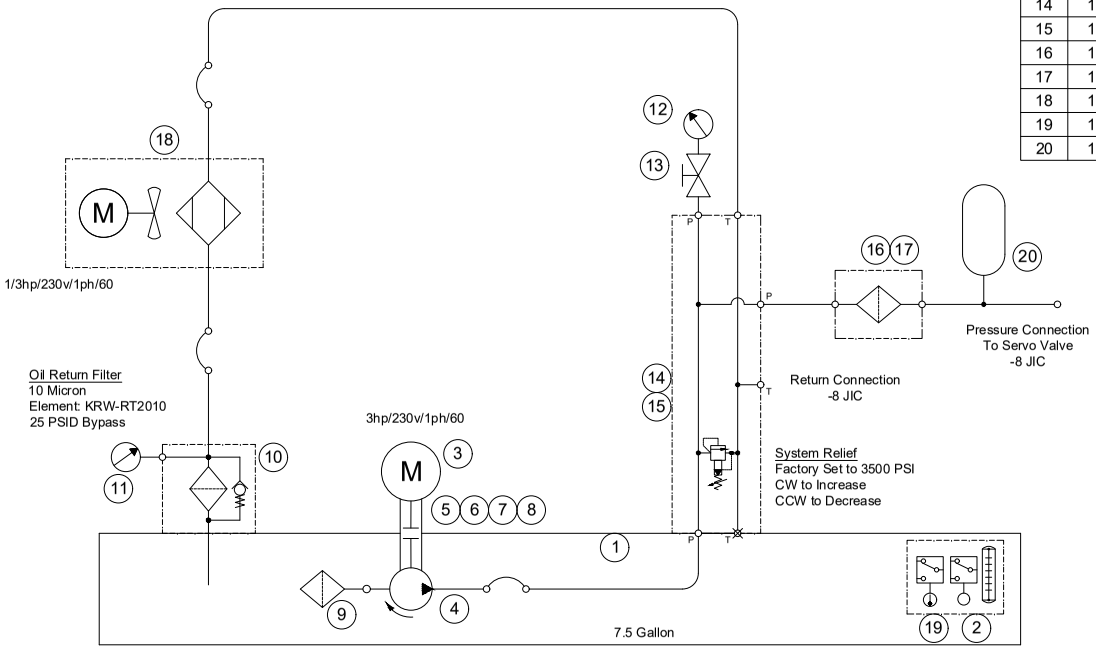
milwaukee cylinder

HYDRAULIC POWER UNIT ELECTRICAL SCHEMATIC

DR	SCALE	DRAWING NO	REV
PMF	1/2	25003-60-ES	1
CK	DATE 1/3/2020		

ITEM	QTY.	PART NUMBER	DESCRIPTION	MFR.
1	1	25003-TANK	Reservoir 7.5 Gallon	KR West
2	1	TS-SNA/SNK-O-60	Temp Switch	Stauff
3	1	131545	Electric Motor 3hp/230//1ph/60	Leeson
4	1	G1.3B36	Gear Pump 1.25 GPM	Continental Hydraulics
5	1	2196	Bell Housing	LDI
6	1	M200-1 1/8X1/4	Motor Coupling	Magnaloy
7	1	M200-1/2X1/8	Pump Coupling	Magnaloy
8	1	270-U	Coupling Insert	Magnaloy
9	1	SUS-A-050-N08F-90-125-0	Suction Strainer	Stauff
10	1	KRW-RT20-G10B	Return Filter	KR West
11	1	SPG-040-00100-03-P-N02-402928	Filter Service Gauge	Stauff
12	1	2240GXB5000	Gauge 0-5000 PSI	Valley Instruments
13	1	SWS-N04-A2	Needle Valve	Stauff
14	1	553022	P and T Block	Continental Hydraulics
15	1	RPEC-LCN	Relief Valve	Sun Hydraulics
16	1	SF-014-H-10-B-T-U12-O-V	High Pressure Filter	Stauff
17	1	HI-ETB-5.0B	High Pressure Filter Switch	Stauff
18	1	BOL-8-2-2	Heat Exchanger	Thermal Transfer
19	1	SNK127V0012	Level Gauge / Switch	Stauff
20	1	BA001B3U01Y2	Accumulator	Parker

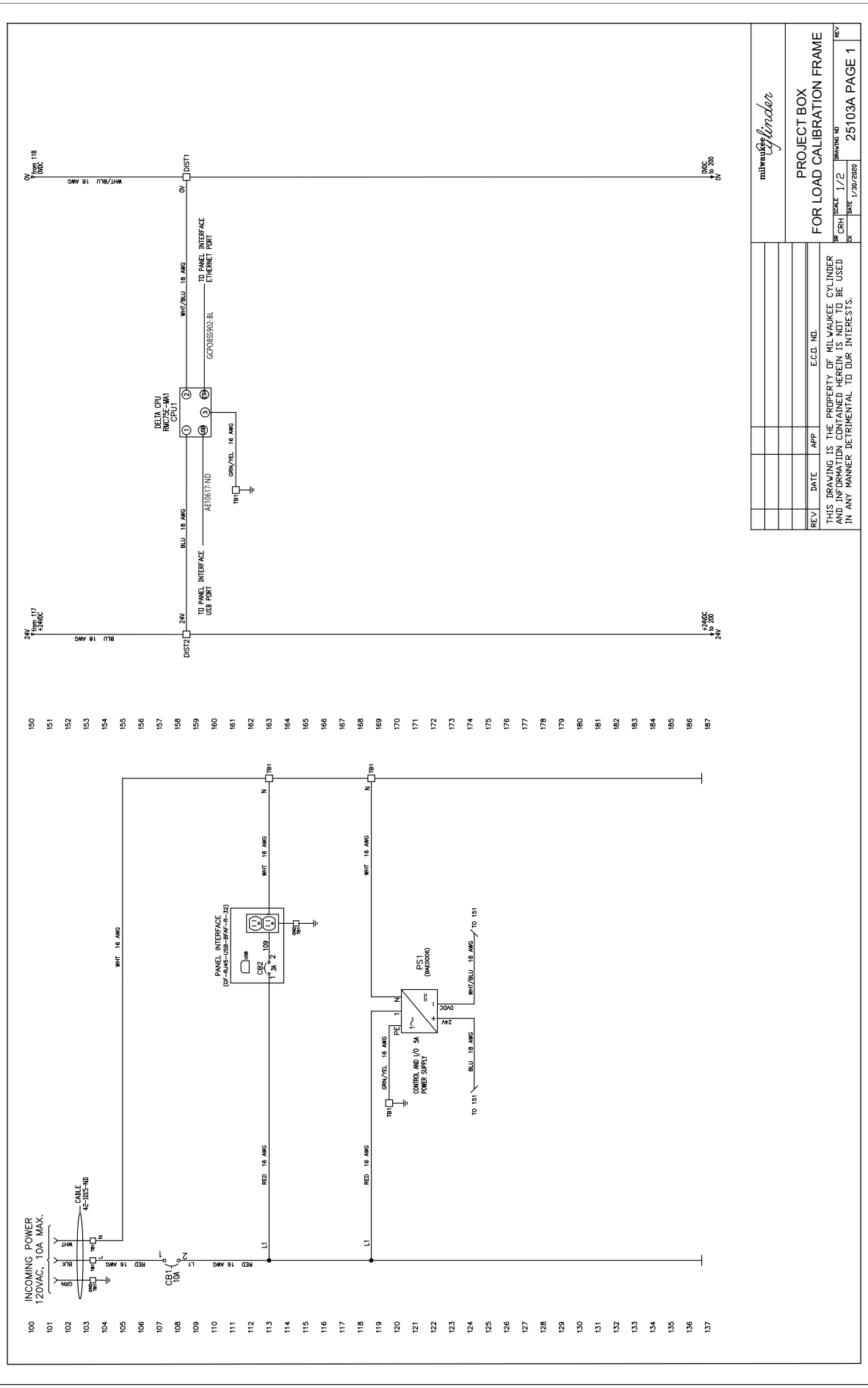


REV	DATE	APP	E.C.O. NO.
1	3/3/20		ADDED ACCUMULATOR

milwaukee cylinder

HYDRAULIC POWER UNIT
3 HP, 1.25 GPM

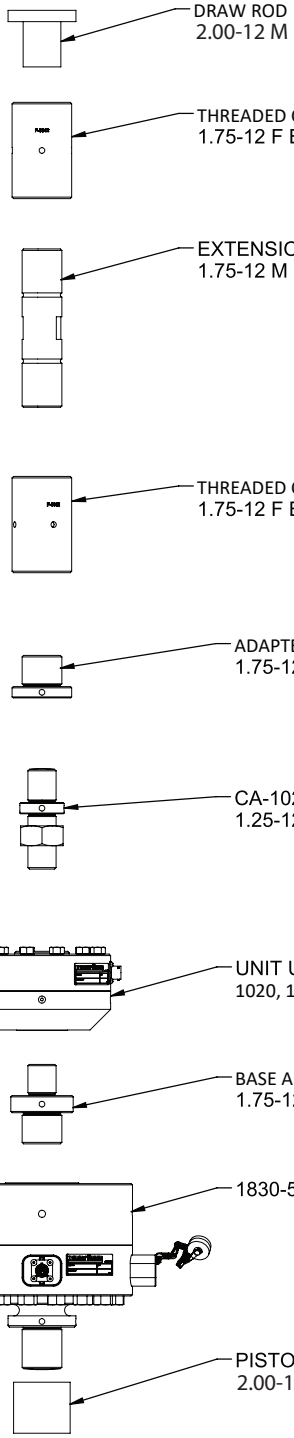
DR	SCALE	DRAWING NO	REV
PMF	1/2	25103 HYD SCHEMATIC	1
CK	DATE 1/3/2020		

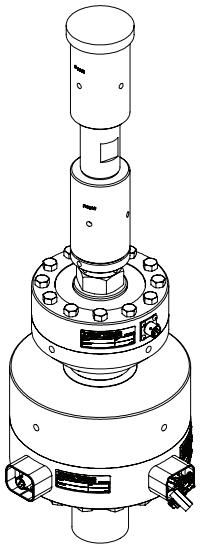

milwaukee cylinder
PROJECT BOX
FOR LOAD CALIBRATION FRAME
DR CRH
CK
SCALE 1/2
DATE 1/30/2020
DRAWING NO 25103A PAGE 1
REV
REV DATE APP E.C.O. NO.
THIS DRAWING IS THE PROPERTY OF MILWAUKEE CYLINDER AND INFORMATION CONTAINED HEREIN IS NOT TO BE USED IN ANY MANNER DETRIMENTAL TO OUR INTERESTS.
INCOMING POWER 120VAC, 10A MAX.
CABLE 42-1015-ND
CB1 10A
PANEL INTERFACE (EA-RA45-USB-BP4-A-32)
CB2 3A
PS1 (BAE200R)
CONTROL AND I/O POWER SUPPLY
DELTA CPU RMC75E-MA1 CPU1
AE10617-ND
GCPOBSS902-BL
TO PANEL INTERFACE ETHERNET PORT
TO PANEL INTERFACE USB PORT
0V from 118 0VDC
24V from 117 +24VDC
0VDC to 200 0V
+24VDC to 200 24V
TO 151

82135

REVISIONS

REV.	DESCRIPTION	DATE	APPROVED
A	INITIAL RELEASE	08/14/17	BS





UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES [mm] TOLERANCES ARE:		REMOVE BURRS AND SHARP EDGES .02 MAX SURFACE FINISH 63 MICROINCHES	
ANGLES	± 0 °30'	CREATOR	DATE
.XX	± .01 [0.25]	DESIGNED: BS	08/14/17
.XXX	± .005 [0.13]	DETAILED: NS	08/14/17
STD. RADII	.015-.035 [0.38-0.89]		
∅ RUNOUT	.002 [0.05]		
MATERIAL:	WEIGHT: (APPROX) 109.23 (lbs)		
FINISH:	OUTPUT:	CAM DATA:	

interface FORCE MEASUREMENT SOLUTIONS 7401 E. BUTHERUS DR. SCOTTSDALE, AZ 85260 USA

TITLE:
CAL ADAPTERS
THD-ADAPT-KIT-1

SIZE:	DWG. NO:	REV:
A	82135	A

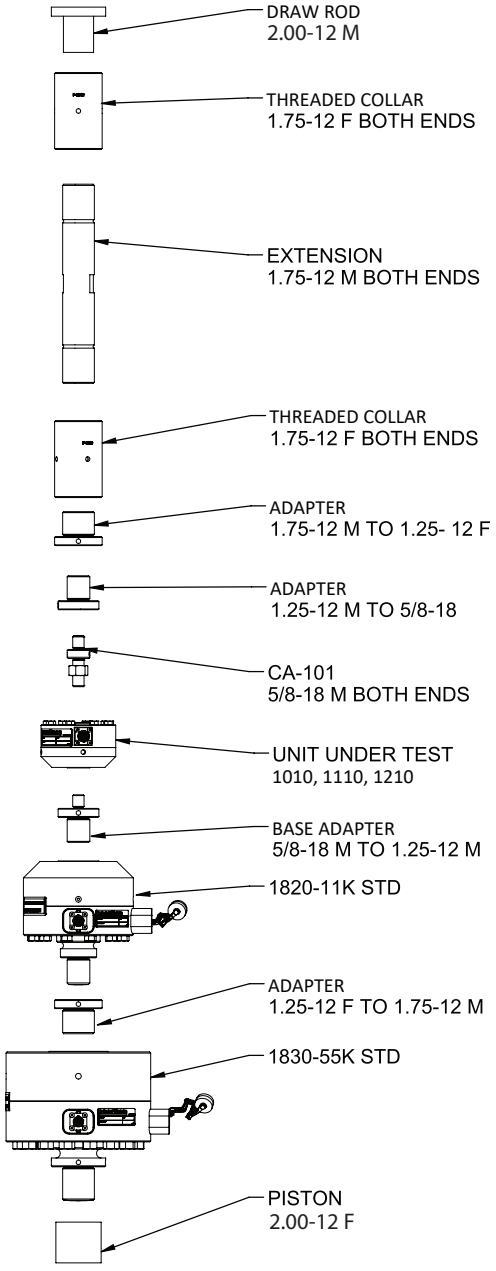
SCALE: 1:8 SHEET 1 OF 2

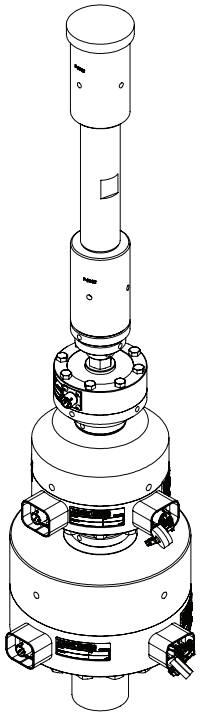
CAD FILE <_Document Vault:\~\82135.SLD***>

82135

REVISIONS

REV.	DESCRIPTION	DATE	APPROVED
-	See Sheet1	-	-





SCALE 1:10

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES [mm] TOLERANCES ARE: ANGLES ± 0 °30' .XX ± .01 [0.25] .XXX ± .005 [0.13] STD. RADII .015-.035 [0.38-0.89] ∅ RUNOUT .002 [0.05]	REMOVE BURRS AND SHARP EDGES .02 MAX SURFACE FINISH 63 MICROINCHES		interface FORCE MEASUREMENT SOLUTIONS 7401 E. BUTHERUS DR. SCOTTSDALE, AZ 85260 USA
	CREATOR	DATE	
	DESIGNED: BS	08/14/17	TITLE: CAL ADAPTERS THD-ADAPT-KIT-1
	DETAILED: NS	08/14/17	
MATERIAL:	WEIGHT: (APPROX) 109.23 (lbs)		SIZE: A / DWG. NO: 82135 / REV: A
FINISH:	OUTPUT:	CAM DATA:	SCALE: 1:8 / SHEET 2 OF 2

CAD FILE <_Document Vault:\~\82135.SLD***>

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Interface engineers around the world are empowered to create high-level tools and solutions that deliver consistent, high quality performance. These products include load cells, torque transducers, multi-axis sensors, wireless telemetry, instrumentation and calibration equipment.

Interface, Inc., was founded in 1968 and is a US-based, woman-owned technology manufacturing company headquartered in Scottsdale, Arizona.

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FORCE MEASUREMENT SOLUTIONS

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