

P1/PD Electronic Controls Graphical User Interface (GUI)

S2E-19254 User Guide

HY28-2674-01/P1/US

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Pump Setup and Powering Electronic Controls

1. Power the pump electronics through CONNECTOR A according to the pin connections in Table 1 and the electronic control wiring diagram.

- A. Connect pin 2 to external power supply, 10-36 VDC 75 watt minimum.
- B. Pin 11 must be connected to external power supply ground.
- C. Power and solenoid connections are suggested to be 16AWG. Sensor and command functions 20 AWG.
- D. Pin 3, pump enable, must have system voltage applied to the pin for the controller to function. When Pin 3 is open the controller will send no current to the pump. CAUTION: depending upon pump control option selected the pump will go to full displacement or zero displacement when in this condition.

2. When Pins 2 and 3 have power supplied to them and pin 11 has ground the pump controller is ready to operate.

3. Displacement control of the pump can be accomplished in four ways.

- A. Fixed internal setting in the control that can be accessed and changed via the GUI.
- B. A variable voltage signal (0-5VDC) on pin 5 of connector A. See table 1.
- C. Internal function generator that can only be accessed via the GUI.
- D. Via the SAE J1939 CAN protocol see page 17 for J1939 information.

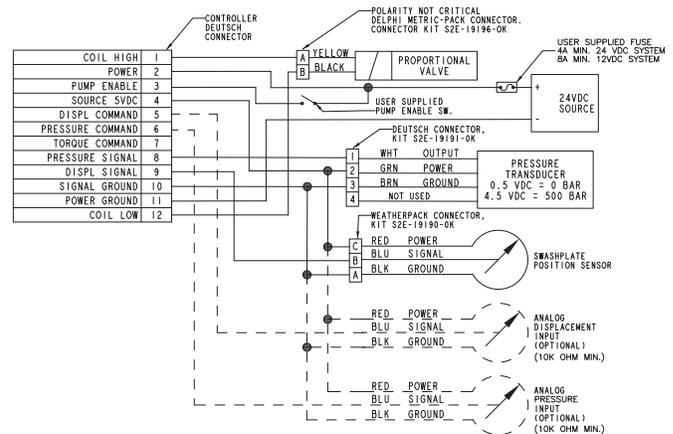
Table 1: CONNECTOR A – 12 Pin

Connector A 12 PIN Deutsch			
PIN	Designation	Type	Signal
1	Coil High	Output	PWM
2	External Power Supply	Input	10-36 VDC
3	Pump Enable	Input	10-36 VDC
4	+5 VDC Reference Supply	Output	+5 VDC
5	Displacement Command	Input	0-5 VDC
6	Pressure Command	Input	0-5 VDC
7	Torque Command	Input	0-5 VDC
8	Pressure Feedback	Input	0-5 VDC
9	Displacement Feedback	Input	0-5 VDC
10	+5 VDC Reference Supply Ground	Input	0 VDC
11	External Power Supply Ground	Input	0 VDC
12	Coil Low	Output	PWM

Table 2: CONNECTOR B 6-Pin

Connector B 6 PIN Deutsch Connector		
PIN	Designation	Signal
1	RS232 Receive	
2	RS232 Ground	
3	CAN Lo	
4	CAN Hi	
5	Chassis Ground*	0 VDC
6	RS232 Transmit	

Electronic Control – Wiring Diagram



Note:
Diagram may show options not included on your system.

Loading the GUI (Graphical User Interface) Software

1. Turn on the computer
2. Install the GUI software onto the computer.
 - A. Insert CD into CD drive
 - B. Run the file named “setup.exe”
 - C. Follow installation instructions
 - D. If the computer already has an older version of the GUI, the “setup.exe” file will need to be run twice.
 - i. The first time the “setup.exe” file is run it will prompt the user to uninstall the older version GUI.
 - ii. Run the “setup.exe” file again and it will prompt the user to install the new version of the GUI.
 - E. To place the P1/PD Control GUI on the desktop a shortcut needs to be created. Do Not try to copy the executable file to the desktop. Create a shortcut to the executable and place the shortcut on the desktop.
3. System Requirements
 - A. Desktop or laptop computer with Windows 98/NT/2000/XP/7 operating system

How to use the GUI (Graphical User Interface)

1. Plug in CONNECTOR B (6 pin cable S2E-19259 and RS-232 cable S2E-19180) into the controller, and plug the DB9 connector into the computer.
2. Make certain the pump electronics are powered according to the “Pump Setup and Powering Electronic Controls” section.
3. Start the P1/PD Electronic Controls_GUI program.
4. When connected to the Controller the GUI should look like this:



- A. If the computer isn't communicating with the pump, turn the power to the electronics off, close the GUI down, check the RS-232 connector and the 12 pin connector to make certain there is a good connection.
 - i. Turn the power back on to the pump electronics, wait a couple of seconds and then start the GUI software.
 - ii. If there is still a problem, make certain that the serial port is “enabled” in the BIOS setup.
5. The controller is equipped with two light emitting diodes (LED). The red LED indicates that the controller has power. The Green LED indicates that the processor is functioning; this LED will flash on and off. If the Green LED is not flashing then the main processor has been damaged and the controller will not function.

Data Monitor Quick View Tab

A. Pump Enable

- Green: Pin 3 is connected to external power
- Grey: Pin 3 is low or open
- When in this condition The pump will not function properly. The controller will send zero current to the displacement control valve.
 - Not all Electronic controlled pumps will respond the same to a zero current signal from the controller.
 - Pumps with valves defaulting to a minimum stroke value will go to 0 % stroke (or customer setting, see pump settings tab) or to -100% stroke for pumps equipped with overcenter capabilities.
 - Pumps with valve defaulting to maximum stroke value will go to 100% stroke (or customer setting, see pump settings tab).

B. Controller Ready

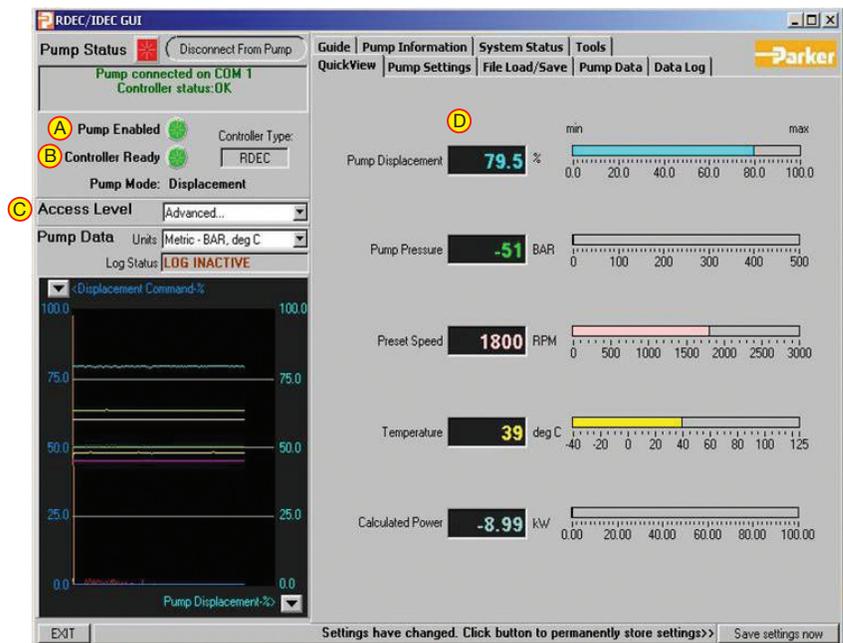
- Green: Sensor and valve coil circuitry are within specified limits
- Grey: There is an error in the system
 - Possible causes:
 - Pin 3 is low or open.
 - Displacement or pressure sensor feedback is out of range.
 - Valve coil circuit is open or grounded.
 - Go to system status tab and check active errors.

C. Access Level

- There are four levels of access in the GUI software
 - Display: End user can only view settings on the controller, no password is needed for this level.
 - Basic: End user has the capability to upload software to the controller, no password is needed for this level.
 - User: End user can recalibrate and tune the controller. Can also reset the pump model number. This level is password protected and can be access by entering "USER" into the password field when prompted.
 - Advanced: Parker internal use only.

D. Monitor:

- Basic pump command and feedback signals are displayed here.
 - For example: Pump displacement
 - If unit is a standard pump the monitor will show a displacement between 0-100%.
 - If the unit is an overcenter capable pump then the pump monitor will display a displacement between -100 and 100%.



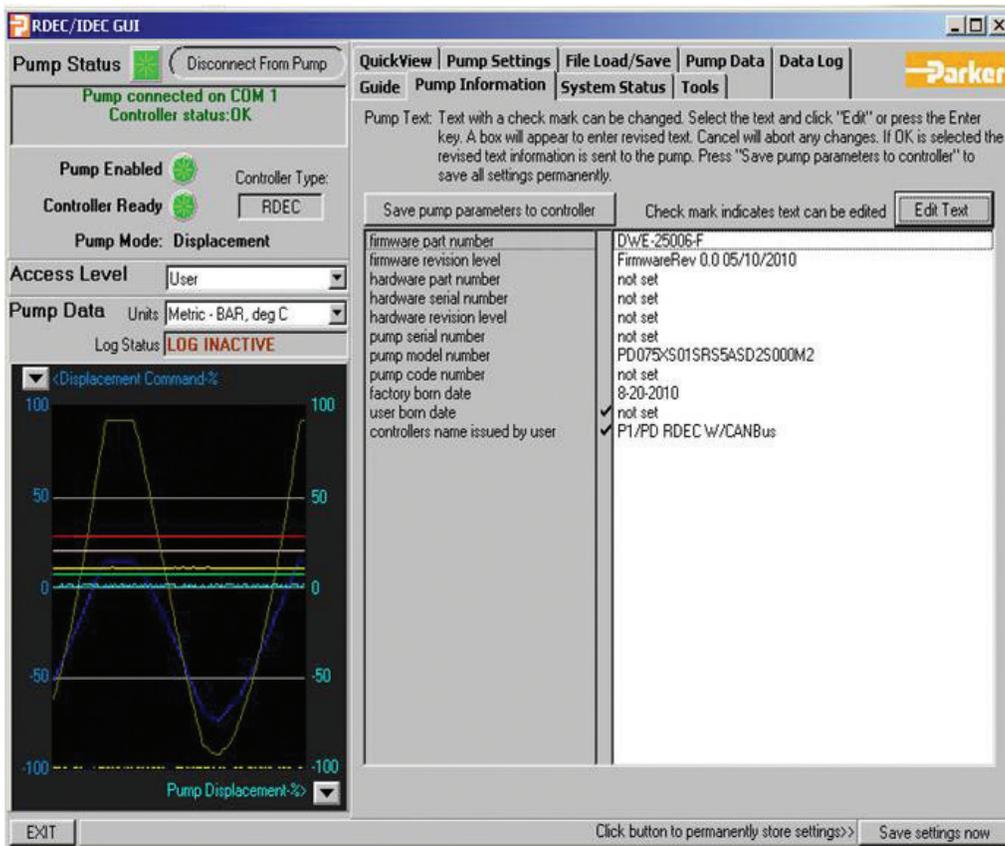
Pump Information Tab

A. Display Pump and controller information

User born date: End user may choose to enter a machine commissioning date or a date for the last time the parameter were changed. This information is end user generated and can be accessed by double clicking.

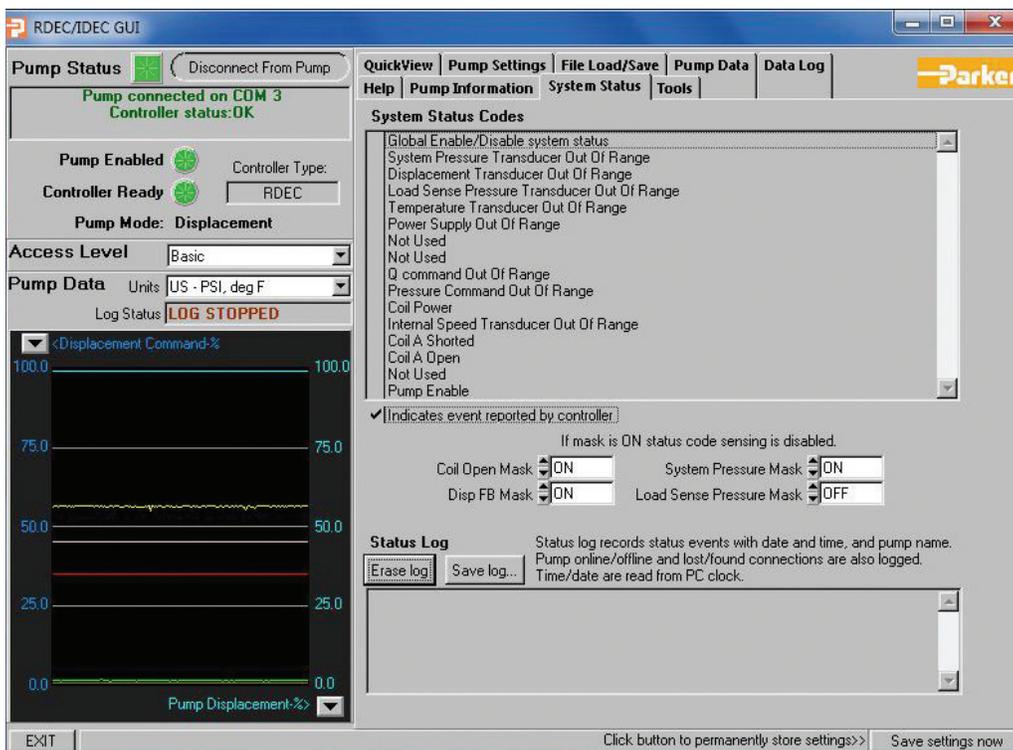
Controller name issued by user: Allows the end user to name function of the electronic control. This information is end user generated and can be accessed by double clicking.

Whenever a user changes a setting in the GUI they will need to click the **“save settings now”** button in the lower left corner of the GUI. If they do not settings will default back to original settings when the controller is started again.



System Status Tab

- A. Checks that the displacement sensor output is within its proper operating range
- B. Checks that the pressure sensor output is within its proper operating range
- C. Checks for opens or shorts in the the Valve coil circuitry.
- D. Under normal operating conditions the green LED will blink ever half second. When an error is active the green LED will blink every ten seconds. The red LED is active when the system has power. Prior to Firmware Revision C 7-26-2013 these were not used for error indication.



Pump Data Tab

A. Control Mode

- This identifies the control option running

B. Displacement Command Type

- There are 4 different command types the user can chose from
 - Digital
 - This is a fixed setting that can only be adjusted via the GUI.
 - Analog
 - This is a variable setting that can be adjusted externally via a 0 to +5 VDC command on pin 5 of the controller.
 - CAN
 - This is a variable setting that can be adjusted externally via the SAE J1939 CAN communication protocol.
 - Function Generator
 - This is an internally programmed command, function generator can only be changed via the GUI.

C. Pump Data Check boxes

- Checking the On/off all box will cause all signals to be shown in the data log. Removing the check from the On/Off all box will cause all signals to be removed from the data log.
- The user can also chose what signals they wish to see in the data log by individually checking or removing the check from each box.

D. Pump Data

- Allows the user to toggle between normal and extended data modes
- Normal data does not display feedback and command voltages, extended data will show this information in addition to the normal data.

Whenever a user changes a setting in the GUI they will need to click the **“save settings now”** button in the lower left corner of the GUI. If they do not settings will default back to original settings when the controller is started again.



Pump Setting Tab

A. Max Displacement Cmd

- Similar to a max volume stop, for example if 80% is entered and the pump is in analog mode then 5 volts will now correspond to 80% instead of 100% displacement.

B. Max Pressure Limit

- For example if 210 bar is entered then 5 volts would correspond to 210 bar instead of 280 bar.

C. Pump_Enable on Pin_3 goes low or Open

1. PumpEnable0_QCmd
 - Allows user to set displacement of pump when pin goes low. Can go to 0% stroke on over-center pumps. Adjustment is in counts. For standard pumps 100 counts equals 0% stroke, 4000 counts equals 100% stroke. For over center pumps 100 counts equals -100% stroke, 2050 counts equals 0% stroke, and 4000 counts equals 100% stroke.
2. PumEnable0_PCcmd
 - Allows user to set pressure setting when pin goes low. Default to 20 bar.

D. Analog Ramp

- RampUp or Ramp Down for Displacement signal on Pin_5. 1 sec corresponds for the time to go from 0 to 100 %.

E. Digital Ramp Function

- Fully internal control Ramp function.

F. Canbus Setup

1. Pump Canbus Address
2. External Controller Canbus Address

G. Fixed Pump Shaft Speed

- Setup by customer used to calculate Pump horsepower consumption.

H. Outlet System Pressure

- Default to 500 bar.

I. Enter Model Numbers

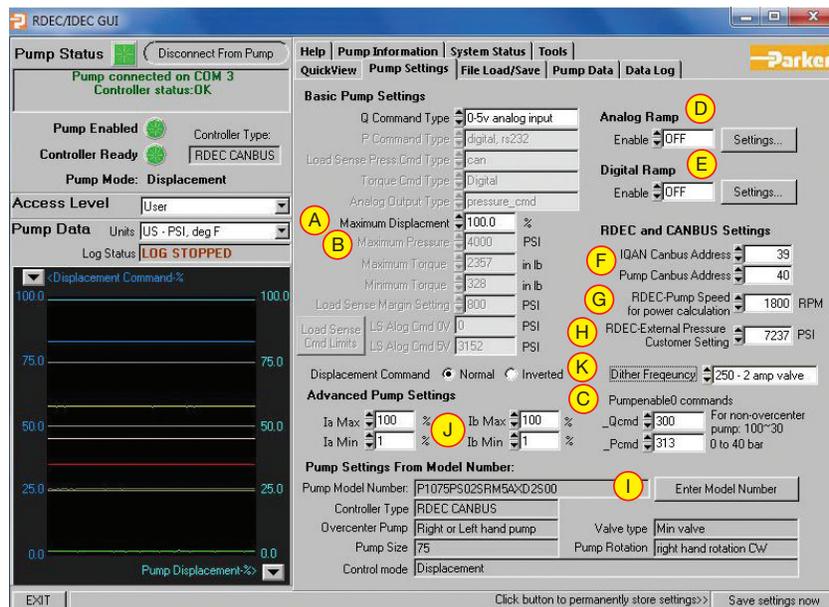
- Customer can enter the model # of the pump used with the controller. Entering model # of pump will enable factory default settings for the control type. Model # of pump must be entered.

J. Coil Current Limits

- Ia max and Ib max will set the maximum current the controller will deliver to the valve.
- Ia min and Ib min will set the minimum current the controller will deliver to the valve.
- These functions are only used when a customer specified valve is used and is running at a resistance not standard with the pumps.
- Standard setting for the maximum value is 100%, minimum value is 0%
- Contact technical support before adjusting these values.

K. Dither Frequency

- For 24V valve, dither frequency must be switched to "125 - 1 amp valve"



Enter Model Number Tab

A. Pump Model Number

- Customer option to use this electronic controller on a different pump

B. Pump Serial Number

- Used by customer support to store “as delivered” controller information.

C. Pump Part Number

D. Factory Born Date

E. Electronic Control

Ext Pressure Sensor Setting

- Allows for customer supplied pressure sensor to be configured. For example, factory default sensor is 500bar. Customer may use a 400bar sensor, then the setup will be 400 bar.

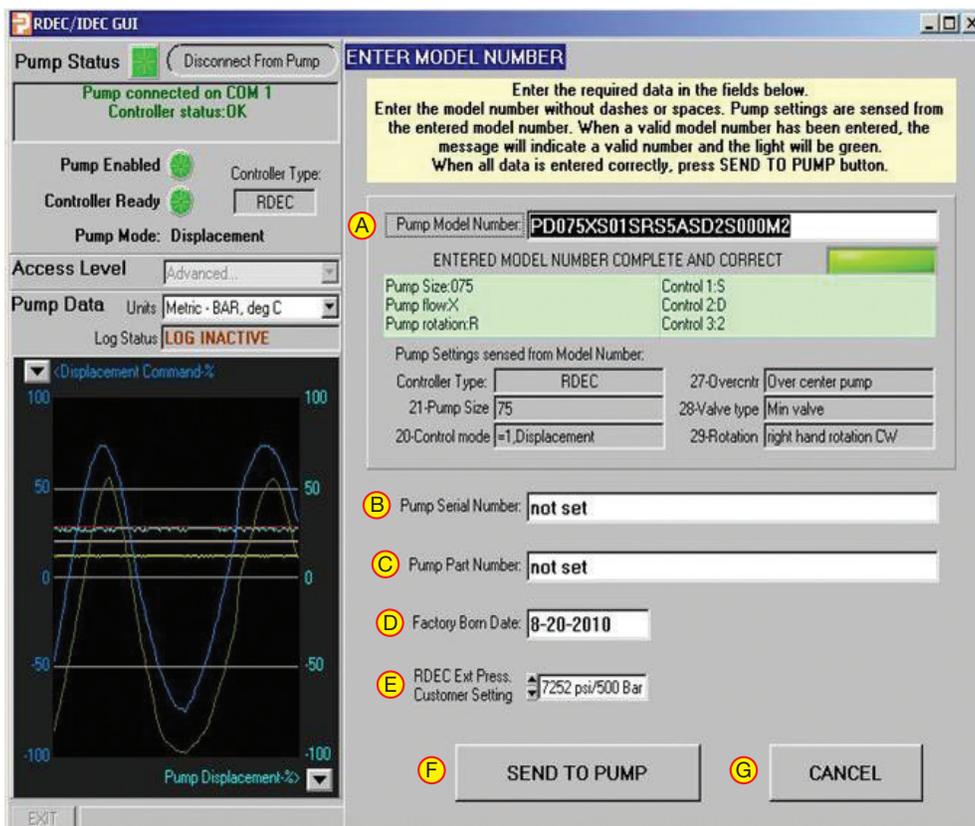
F. SEND TO PUMP

- This will send the model code to the controller and set defaults based on the model code selected.

G. CANCEL

- If you don't want to save parameters to the NOVRAM, then click this button to go to the previous panel.

Note: Once parameters are sent to the controller user must click on the “save settings now” button in the lower right to save the pump model code to the permanent memory.



File Load Save Tab

A. Save User Setting

- Will let the user save the pump parameter settings and values to a computer that is connected to the controller through the RS-232 cable.

B. Back all setting

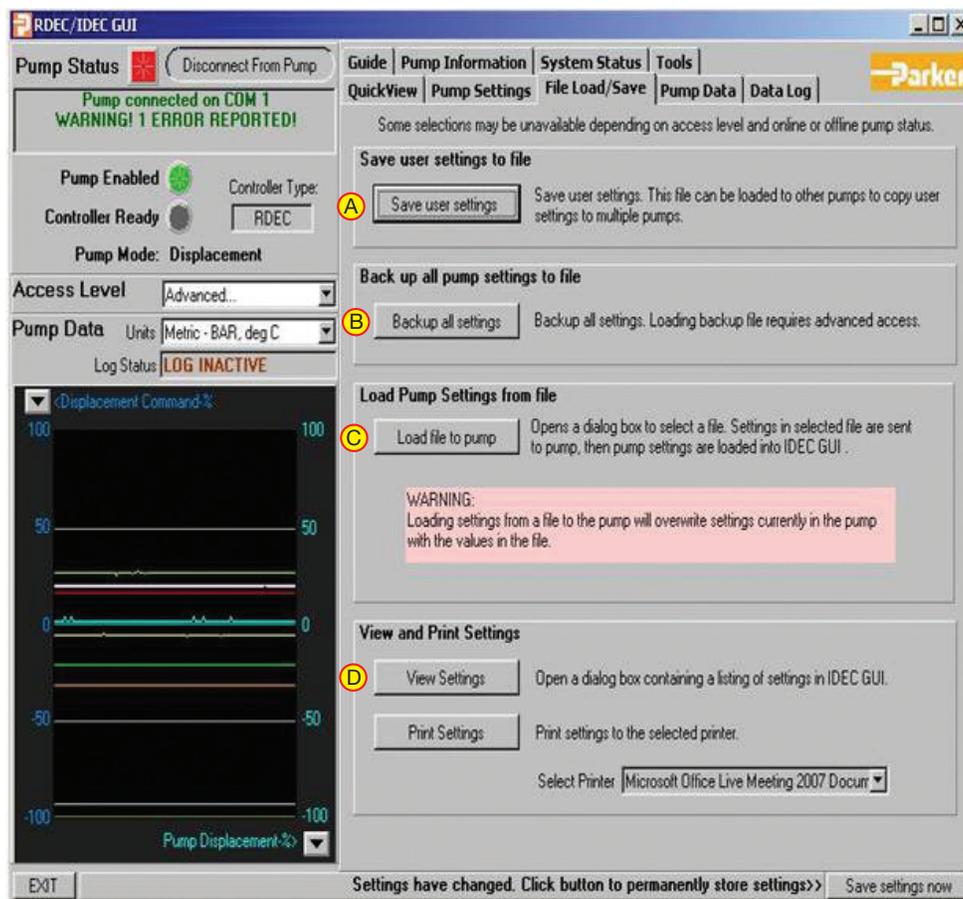
- Back up all the parameters in the controller. This will back up everything the user has changed as well as the other parameters they have not changed.

C. Load file to pump

- Will load saved pump parameter settings and values from the file on the computer to the electronic controller.

D. View Settings:

- Allows the user to see all the pump parameters and their settings or values.



Data Log Tab

A. Start/Stop Data Log

- Saves pump data.
 - Make sure to specify log interval (B), log frequency (C), log file name (D) and log file folder (E) before starting to log data.
- Click the button again to stop logging data.

B. Log Interval

- Specifies how often data is to be logged
 - Can be specified in seconds or minutes. Can also select to log all data points.
 - If all data points is selected time interval is not fixed.
 - If endurance logging is selected then the user will need to specify how often to activate the log and for how long.

C. Log save interval

- User can specify how often the data is saved.
 - Data is saves to a .csv file (comma separated values excel file). This file is retrievable in the event of power loss.

D. Log File Name

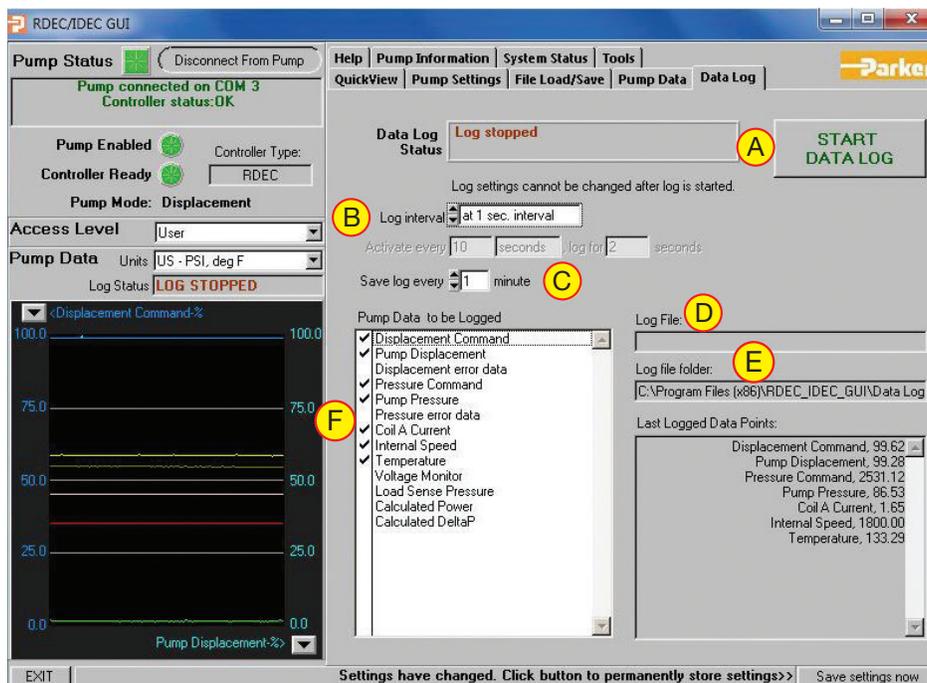
- User can save the file with a unique user generated name.

E. Log File Folder:

- User can save the file to a unique user generated folder

F. Data to be Logged

- User can specify what data they wish to log.
 - Checking the parameter will add the data to the log file. Removing the check with remove the data from the log file.



Tools Tab

A. Controller Tuning Mode:

- Advanced level access for changing the controller gain settings on the pump.

B. Comport Details

- Displays information on the Comport.

C. High Speed Data Logging

- Clicking on this will allow the user to access the high speed data logging functions in the GUI.
 - This function will log data faster than the standard data logging covered in data log portion of the user guide.
 - This function is covered in more detail in the High speed data logging section.

D. Update Pump Controller Software

- Allows the user to download an updated .hex file to the controller.

E. Function Generator Settings

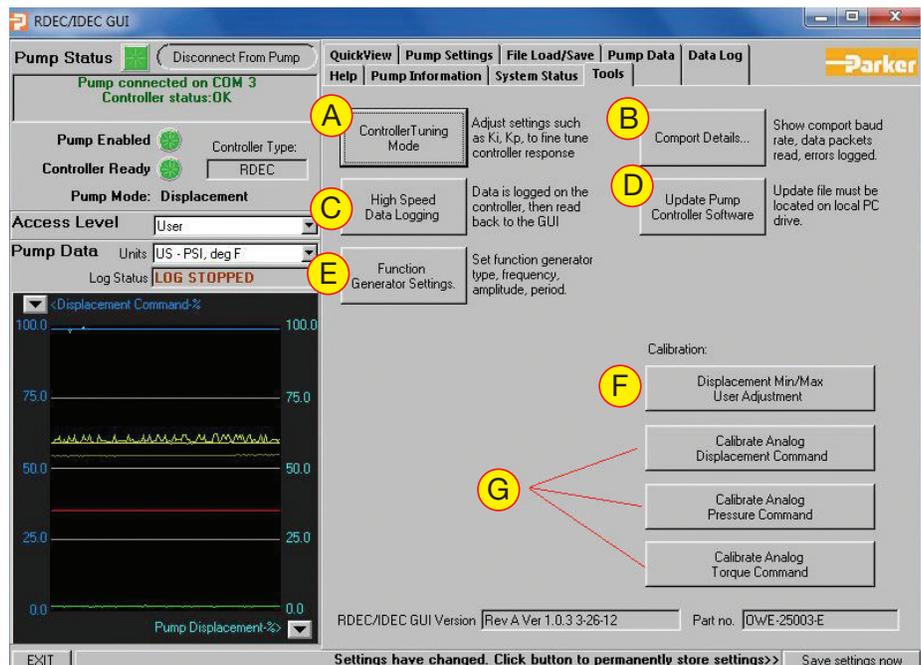
- Allows the user to access the function generator and tune the settings to the application.
 - Only active when displacement command type has function generator selected
 - This function is covered in more detail in the function generator setting section

F. Displacement Min/Max User Adjustment.

- Allows the user to calibrate their displacement feedback sensor
 - This function is covered in more detail in the displacement min/max user calibration section.

G. Calibrate Analog Input Commands

- Allows the user to calibrate the analog input commands to the controller
 - There are three input commands that can be calibrated
 - Displacement
 - Pressure
 - Torque
 - All three commands follow the same procedure
 - These functions are covered in more detail in the calibrate analog input commands section.

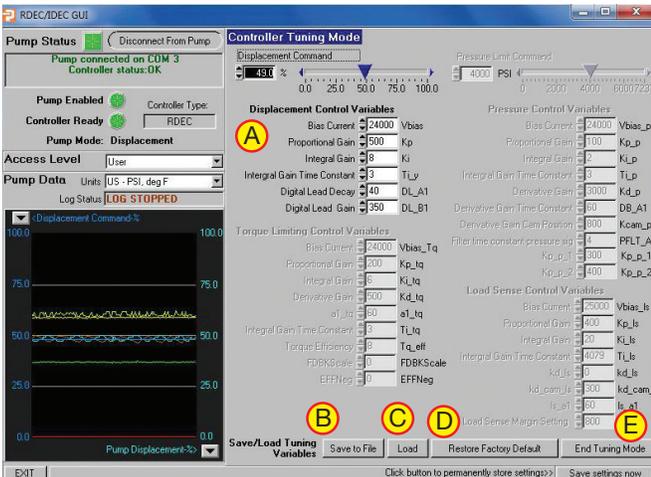


Controller Tuning Mode

A. Control Variables

- Here the user can change the individual control parameters for their application, but it is recommended users use the Autotune function in the Advanced Menu.
- These parameters include:
 - Bias Current
 - Bias current is the holding current applied to the valve to hold the pump in position.
 - This value has no unit, see the below chart for count to current correlation.
 - Nominal range is typically between 22800 (1.3487 A) and 25200 (1.5778 A) for the 12V valve and half that for the 24V valve, but can potentially be outside that range.
 - When making adjustments to this it is recommended that small steps are taken and then tested immediately.
 - If the displacement feedback is always higher than the command then the Vbias is too high.
 - If the displacement feedback is always lower than the command the Vbias is too low.

Vbias Count	Coil Current (A)						
700	0.009	8000	0.3127	19000	1	30000	2.0319
800	0.0123	9000	0.3645	20000	1.0908	31000	2.1066
900	0.0152	10000	0.4134	21000	1.1816	32000	2.1662
1000	0.0187	11000	0.4602	22000	1.2741	33000	2.2468
1100	0.0216	12000	0.5159	23000	1.3674	34000	2.324
2000	0.0513	13000	0.5942	24000	1.4629	35000	2.382
3000	0.0908	14000	0.6097	25000	1.56	36000	2.4574
4000	0.1363	15000	0.6942	26000	1.6488	37000	2.5342
5000	0.1804	16000	0.777	27000	1.7534		
6000	0.2241	17000	0.8256	28000	1.8632		
7000	0.2625	18000	0.9128	29000	1.9262		



- Proportional Gain
- Integral Gain
- Derivative Gain
- Integral Gain Time Constant
- Digital Lead Decay
- Digital Lead Gain
- Ensure machinery is in a safe condition before making adjustments to these items.

B. Save to file

- Saves the current settings to a file on a local hard drive
 - It is advised that the user save the settings before making any changes to create a restore point.

C. Load

- Load settings from a file on a local hard drive

D. Restore Factory Defaults

- Will restore all settings to factory condition
 - These settings will not be application specific and will not have any changes that may have been made specifically for the application.

E. Exit Tuning Mode

- Will return you to the Tools tab.
 - Be sure you click on the “save settings now” box in the lower right corner of the GUI. If this is not done the system will default to previous settings upon restart.

	140cc	100cc	75cc	60cc	45cc	28cc	18cc	Adjustment Range	
								Max	Min
Displacement Control Loop									
Vbias	22500	22500	22500	22500	22500	22500	22500	27000	18000
Q-Ctrl_Kp	500	500	500	250	225	200	125	630	100
Q-Ctrl_Ki	8	8	8	8	8	8	8	630	0
Q-Ctrl_Ti_y	3	3	3	3	3	3	3	630	0
Q-Ctrl_Digital lead_DL_A1	40	40	40	40	40	40	40	43	38
Q-Ctrl_lead_gain_DL_B1	350	350	350	350	350	350	350	350	350
Pressure Control Loop									
P-Ctrl_Kp_P	300	300	300	250	225	200	125	1200	100
P-Ctrl_Ki_P	20	20	20	20	30	30	30	1200	0
P-Ctrl_Ti_p	6	6	6	6	3	3	3	1200	0
P-Ctrl_Derivative_Gain_Kd_P	1000	1000	1000	1000	700	700	700	1200	0
P-Ctrl_Kd_P_Time constant_DB_A1	60	60	60	60	60	60	60	320	32
P-Ctrl_Cam_Derivative_Gain_Kcam_d	800	800	800	800	600	600	600	1200	0
P-Ctrl_sensor_feedback_filter	4	4	4	4	4	4	4	200	1
P-Ctrl_Kp_P_1	1000	1000	1000	500	500	500	500	1200	100
P-Ctrl_Kp_P_2	1200	1200	1200	700	700	700	700	1200	100



High Speed Data Logging

A. Select Data to be Logged

- Here the user can select what functions they wish to log.
 - Data can be toggled on and off by checking or removing the check from the read box

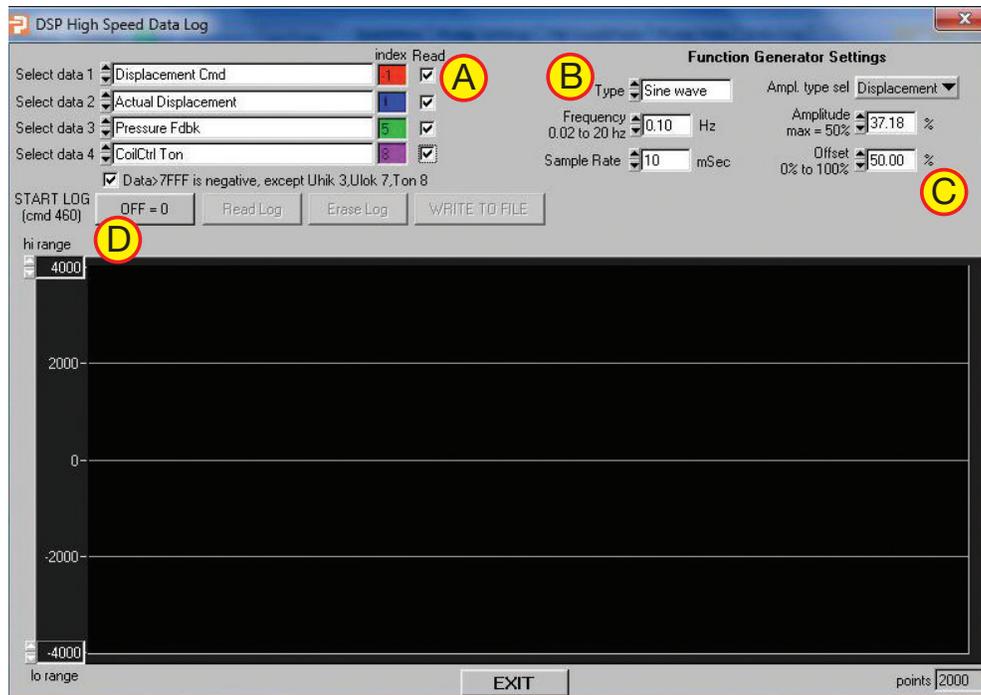
B. Type

- User can select the type of function generator the unit will be using.
 - There are three types:
 - Sine Wave
 - Pulse Signal
 - Ramp Function
 - Function generator frequency can be modified. Adjusting the frequency will automatically change the sample rate.

C. Amplitude

- Amplitude is expressed as a percent based on maximum sensor range.
- Offset
 - Default Offset is 50%
 - Offset and amplitude cannot have a sum greater than 100%.
 - If the offset is 40% then the maximum amplitude is 60%. If the maximum amplitude is greater than 60% it is truncated.
 - For over center pumps 0 to 100% is actually -100 to +100%.

D. Click here to start and stop data logging.



Function Generator Settings

A. Type

- User can select the type of function generator the unit will be using
 - There are three types:
 - Sine Wave
 - Pulse signal
 - Ramp function

B. Frequency

- User can adjust the frequency of the function generator
 - This will automatically adjust the sample rate

C. Command Type Select

D. Amplitude

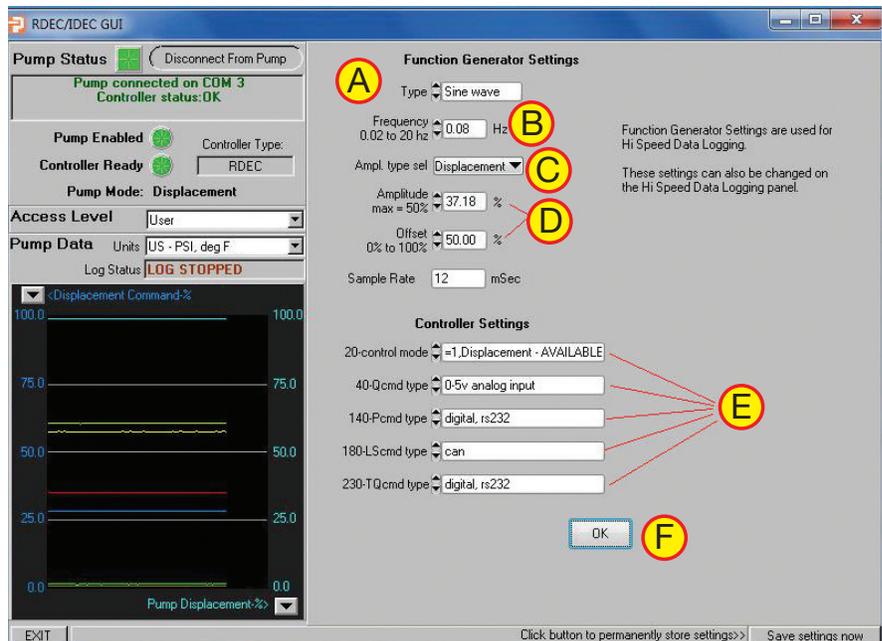
- Amplitude is expressed as a percent based on maximum sensor range.
- Offset
 - Default offset is 50%
 - Offset and amplitude cannot have a sum greater than 100%.
 - If the offset is 40% then the maximum amplitude is 60%.
 - If the maximum amplitude is greater than 60% it is truncated.
- For over center pumps 0 to 100% is actually -100 to +100%.

E. Control Mode and Command Type

- Control mode is what function the pump controller is regulating.
- 40-Qcmd type sets what input is controlling pump displacement.
- 140-Pcmd type sets what input is controlling pump pressure.
- 180-LScmd type sets what input is controlling pump load sense (this function is not currently active).
- 230-TQcmd type sets what input is controlling pump torque command.

F. Click OK to Return to Tools Tab

- Be sure you click on the **“save settings now”** box in the lower right corner of the GUI. If this is not done the system will default to previous settings upon restart.



Displacement Min/Max User Calibration

A. Pump Displacement Monitor

- Here the user can monitor the following displacement functions:
 - Displacement command percentage
 - Pump displacement percentage
 - Pump raw displacement counts
 - Sensor voltage based on raw displacement counts
 - Displacement sensor is connected to pin 9 of the controller.

B. Pump displacement feedback counts

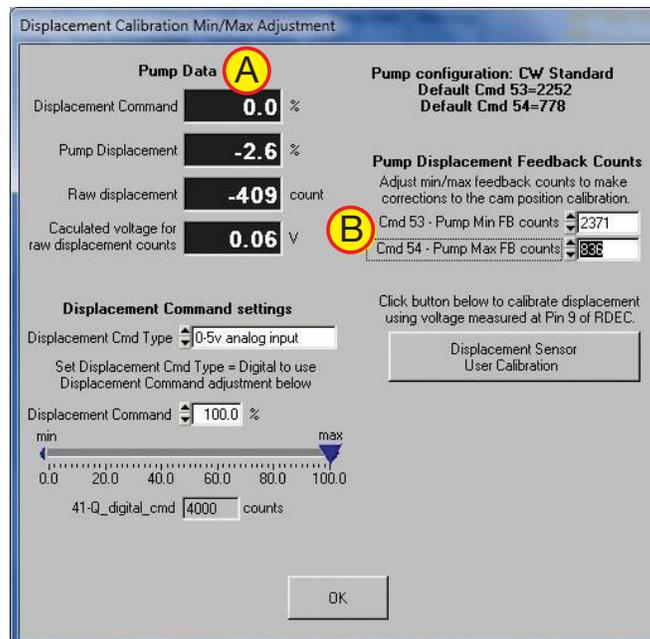
- Here the user will be able to adjust the minimum and maximum displacement feedback counts to calibrate the displacement sensor. This only needs to be performed on a pump that is having a new controller connected to it. Controllers shipped with the pump are calibrated to the pump at the factory.

The following table lists the Factory Default CMD 53 and CMD 54 setting for CW and CCW P1/PD pumps with electronic controls. These settings may or may not apply to your unit and are intended as a base start point when setting up a new application.

Rotation	Over Center?	CMD 53	CMD 54
CW	NO	2252	778
CCW	NO	2252	3726
CW	YES	3726	778
CCW	YES	778	3726

These settings are for the the A-mod pumps that use a 22 degree displacement sensor as standard. The standard B-mod pumps use an 18 degree sensor; therefore, on standard CW overcenter pumps, CMD 53 should be around 4058 counts and CMD 54 should be around 456 counts. This would be reversed for CCW overcenter pumps. Then for non-overcenter standard B-mod CW pumps CMD 54 would be around 456 counts and 4058 counts for CCW pumps. CMD 53 would remain similar to 2252 counts as shown in the table above for either CW or CCW standard B-mod pumps.

Note: Displacement Min/Max user calibration table is located on the next page.



Displacement Min/Max user calibration table:

This table gives a comparison between the raw counts and the position sensor voltage on pin 9 of the controller. The difference between 0 stroke and 100% stroke is always 1.6 VDC for the standard A-mod pump, which is 1474 counts, and always 1.95 VDC for the standard B-mod pump, which is 1801 counts. See expanded displacement counts table for finer tuning.

Voltage	Counts	Voltage	Counts	Voltage	Counts
0.5	410	1.13	990	1.76	1570
0.51	419	1.14	999	1.77	1579
0.52	428	1.15	1008	1.78	1589
0.53	438	1.16	1017	1.79	1598
0.54	447	1.17	1026	1.8	1607
0.55	456	1.18	1036	1.81	1616
0.56	465	1.19	1045	1.82	1625
0.57	474	1.2	1054	1.83	1635
0.58	484	1.21	1063	1.84	1644
0.59	493	1.22	1073	1.85	1653
0.6	502	1.23	1082	1.86	1662
0.61	511	1.24	1091	1.87	1671
0.62	520	1.25	1101	1.88	1681
0.63	529	1.26	1110	1.89	1690
0.64	538	1.27	1119	1.9	1699
0.65	548	1.28	1128	1.91	1708
0.66	557	1.29	1138	1.92	1717
0.67	566	1.3	1147	1.93	1727
0.68	575	1.31	1162	1.94	1736
0.69	584	1.32	1176	1.95	1745
0.7	593	1.33	1191	1.96	1754
0.71	602	1.34	1205	1.97	1763
0.72	612	1.35	1220	1.98	1773
0.73	621	1.36	1235	1.99	1782
0.74	630	1.37	1249	2	1791
0.75	640	1.38	1264	2.01	1800
0.76	649	1.39	1278	2.02	1810
0.77	658	1.4	1293	2.03	1819
0.78	667	1.41	1297	2.04	1828
0.79	677	1.42	1301	2.05	1838
0.8	686	1.43	1304	2.06	1847
0.81	695	1.44	1308	2.07	1856
0.82	704	1.45	1312	2.08	1865
0.83	714	1.46	1316	2.09	1875
0.84	723	1.47	1320	2.1	1884
0.85	732	1.48	1323	2.11	1893
0.86	741	1.49	1327	2.12	1902
0.87	750	1.5	1331	2.13	1911
0.88	760	1.51	1340	2.14	1920
0.89	769	1.52	1349	2.15	1930
0.9	778	1.53	1359	2.16	1939
0.91	787	1.54	1368	2.17	1948
0.92	796	1.55	1377	2.18	1957
0.93	806	1.56	1386	2.19	1966
0.94	815	1.57	1395	2.2	1975
0.95	824	1.58	1405	2.21	1984
0.96	833	1.59	1414	2.22	1994
0.97	842	1.6	1423	2.23	2003
0.98	852	1.61	1432	2.24	2012
0.99	861	1.62	1441	2.25	2022
1	870	1.63	1451	2.26	2031
1.01	879	1.64	1460	2.27	2040
1.02	888	1.65	1469	2.28	2049
1.03	898	1.66	1478	2.29	2059
1.04	907	1.67	1487	2.3	2068
1.05	916	1.68	1497	2.31	2077
1.06	925	1.69	1506	2.32	2086
1.07	934	1.7	1515	2.33	2096
1.08	944	1.71	1524	2.34	2105
1.09	953	1.72	1533	2.35	2114
1.1	962	1.73	1543	2.36	2123
1.11	971	1.74	1552	2.37	2132
1.12	980	1.75	1561	2.38	2142

Voltage	Counts	Voltage	Counts	Voltage	Counts
2.39	2151	3.11	2814	3.83	3478
2.4	2160	3.12	2823	3.84	3487
2.41	2169	3.13	2833	3.85	3496
2.42	2178	3.14	2842	3.86	3505
2.43	2188	3.15	2851	3.87	3514
2.44	2197	3.16	2860	3.88	3524
2.45	2206	3.17	2869	3.89	3533
2.46	2215	3.18	2879	3.9	3542
2.47	2224	3.19	2888	3.91	3551
2.48	2234	3.2	2897	3.92	3560
2.49	2243	3.21	2906	3.93	3570
2.5	2252	3.22	2915	3.94	3579
2.51	2261	3.23	2925	3.95	3588
2.52	2270	3.24	2934	3.96	3597
2.53	2280	3.25	2943	3.97	3606
2.54	2289	3.26	2952	3.98	3616
2.55	2298	3.27	2961	3.99	3625
2.56	2307	3.28	2971	4	3634
2.57	2316	3.29	2980	4.01	3643
2.58	2326	3.3	2989	4.02	3652
2.59	2335	3.31	2998	4.03	3662
2.6	2344	3.32	3007	4.04	3671
2.61	2353	3.33	3017	4.05	3680
2.62	2363	3.34	3026	4.06	3689
2.63	2372	3.35	3035	4.07	3698
2.64	2381	3.36	3044	4.08	3708
2.65	2391	3.37	3053	4.09	3717
2.66	2400	3.38	3063	4.1	3726
2.67	2409	3.39	3072	4.11	3735
2.68	2418	3.4	3081	4.12	3745
2.69	2428	3.41	3090	4.13	3754
2.7	2437	3.42	3100	4.14	3763
2.71	2446	3.43	3109	4.15	3773
2.72	2455	3.44	3118	4.16	3782
2.73	2464	3.45	3128	4.17	3791
2.74	2473	3.46	3137	4.18	3800
2.75	2483	3.47	3146	4.19	3810
2.76	2492	3.48	3155	4.2	3819
2.77	2501	3.49	3165	4.21	3828
2.78	2510	3.5	3174	4.22	3837
2.79	2519	3.51	3183	4.23	3846
2.8	2528	3.52	3192	4.24	3855
2.81	2537	3.53	3202	4.25	3865
2.82	2547	3.54	3211	4.26	3874
2.83	2556	3.55	3220	4.27	3883
2.84	2565	3.56	3229	4.28	3892
2.85	2575	3.57	3238	4.29	3901
2.86	2584	3.58	3248	4.3	3910
2.87	2593	3.59	3257	4.31	3919
2.88	2602	3.6	3266	4.32	3928
2.89	2612	3.61	3275	4.33	3938
2.9	2621	3.62	3284	4.34	3947
2.91	2630	3.63	3294	4.35	3956
2.92	2639	3.64	3303	4.36	3965
2.93	2649	3.65	3312	4.37	3974
2.94	2658	3.66	3321	4.38	3984
2.95	2667	3.67	3330	4.39	3993
2.96	2676	3.68	3340	4.4	4002
2.97	2685	3.69	3349	4.41	4011
2.98	2695	3.7	3358	4.42	4021
2.99	2704	3.71	3367	4.43	4030
3	2713	3.72	3376	4.44	4039
3.01	2722	3.73	3386	4.45	4049
3.02	2731	3.74	3395	4.46	4058
3.03	2741	3.75	3404	4.47	4067
3.04	2750	3.76	3413	4.48	4076
3.05	2759	3.77	3422	4.49	4086
3.06	2768	3.78	3432	4.5	4095
3.07	2777	3.79	3441		
3.08	2787	3.8	3450		
3.09	2796	3.81	3459		
3.1	2805	3.82	3468		

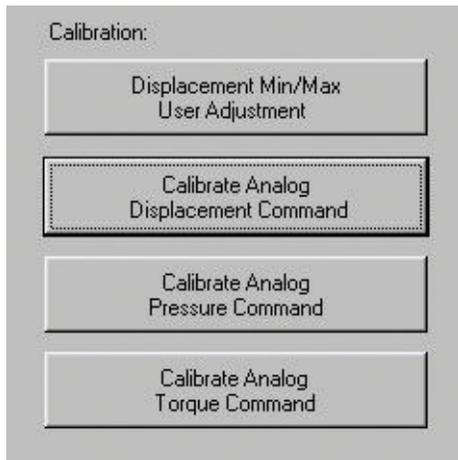


Calibrate Analog Pump Commands

The process for calibrating the analog input command is the same regardless of which command you are calibrating. In this example we are calibrating the displacement command input.

Step 1

Click on “calibrate analog displacement command”



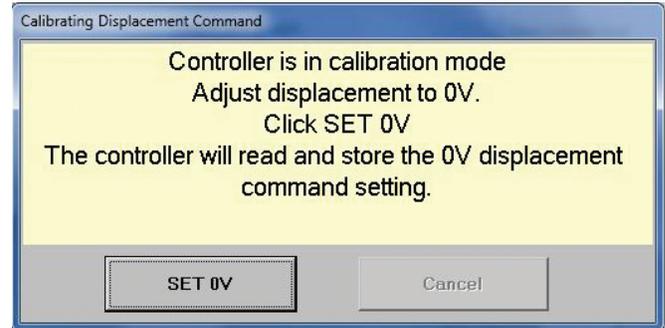
Step 2

Click on “Begin”



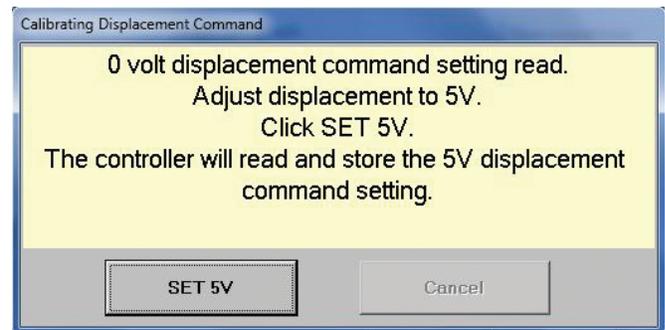
Step 3

Send a “0” command to your controller and click “set 0V”

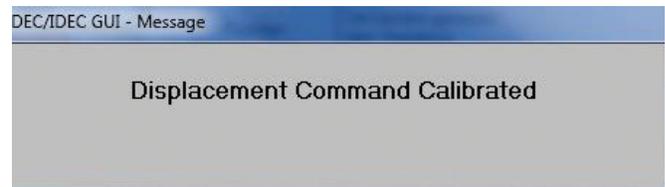


Step 4

Send a maximum displacement signal to your controller and click “set 5V”



Once this has been completed a screen momentarily display stating that calibration is complete



Can Bus Address Setup

- Electronic Control CanBus address:
 - By default is 40 = 0x28 (Hex)
- Customer ECU Canbus Address:
 - IQAN Default CanBus address is 39 = 0x27 (Hex)
- Canbus address verification and setup by RS232 configuration GUI software:
 - Command_31 Customer ECU Canbus address
 - Costumer has to set up this number to match customer(example:IQAN) ECU address =39
 - Command_32 Electronic Control Canbus Address (Read/Write can be saved to NOVRAM) Default = 40

Canbus J1939 message

Name	Identifier	Repeat Rate	Position Bytes	Parameter	Length	Comment
				Equipment operation and control		J1939/21
EOAC	18FDE3	As Request	3	P1/PD Q loop command	1 byte	0 ~ 100 % (for standard pump) 0 ~ 100 % = -100%~ 100 % (for overcenter pump)
	PGN = 64995	Read	4,5	P1/PD P command	2 byte	0 ~280 bar
			6	P1/PD load sense command	1 byte	20 ~80 bar, not used
			7, 8	Torque command	2 byte	0 ~375 Nm

Name	Identifier	Repeat Rate	Position Bytes	Parameter	Length	Comment
				Hydraulic pressure Governor Info		J1939/21
HPG	18F008SA	50 ms	1,2	P1/PD pressure feed back	2 bytes	0~128,510Kpa 0~ 280 bar
	PGN = 61448	Read	5,6	P1/PD Load sensor pressure feed back	2 bytes	0~ 280 bar – not used
			7,8	P1/PD Displacement position Feed back	2 bytes	0 ~ 100 % (for standard pump) 0 ~ 100 % = -100%~ 100 % (for overcenter pump)

Canbus J1939 message

Name	Identifier	Repeat Rate	Position Bytes	Parameter	Length	Comment
				Equipment Performance Data		J1939/21
EPD	18FDE4SA	500 ms				
	PGN = 64996	Read	3,4	P1/PD Pump fault detect	2-byte	3-1 global enable 3-2 = 1 pressure sensor fault 3-3 = 1 Displacement sensor fault 3-4 = 1 load sense pressure fault – not incorporated 3-5 = 1 internal temperature fault 3-6 = 1 power supply fault – not incorporated 3-7 = 1 external load sense fault – not incorporated 3-8 = 1 external outlet pressure fault – not incorporated 4-1 = 1 Q loop Command fault Q_p 4-2 = 1 P_loop command fault 4-3 = 1 internal speed sensor fault – not incorporated 4-4 = 1 external speed fault – not incorporated 4-5 = 1 Coil Circuit short fault 4-6 = 1 Coil Circuit open fault
			5,6	P1/PD pump temperature	2-byte	-40 ~ 250 c
			7,8	P1/PD pump internal speed	2-byte	0 ~ 4500 rpm, not used

Name	Identifier	Repeat Rate	Position Bytes	Parameter	Length	Comment
				Proprietary A		J1939/21
PropA	18EF0027	ASAP	1	Password	1 byte	170= 0xAA
	PGN = 61184	Write/Read	2	P1/PD Q loop Command	1 byte	0 ~ 100 % (for standard pump) 0 ~ 100 % = -100%~ 100 % (for overcenter pump)
			3,4	P1/PD Pressure Command	2 byte	0 ~ 280 bar
			5	P1/PD LS loop Command	1 byte	20 ~ 80 bar, not used
			6~7	Torque loop Command	2 byte	0~ 375 Nm
			8.1~8.7	Command Number	7 bit	Command number 42 = 0 x 2A(hex)
			8.8	MSB bit8 Command direction	1 bit	0 = read 1 = write

Functions We Can Provide

- Electronic Q control
- Electronic Q, with mech. pressure compensator
- Electronic P/Q
- Electronic P/Q, with mech. pressure compensator
- Electronic Torque control (can be included to the P/Q options above)

Content Revision Index

January 2021	Added B-mod content Added 24V content Corrected identifier error on CAN message table
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WARNING

This product can expose you to chemicals including lead, nickel (metallic), or titanium dioxide which are known to the State of California to cause cancer, or lead which is known to the State of California to cause birth defects and other reproductive harm. www.p65warnings.ca.gov

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4. Warranty. Seller warrants that the Products sold hereunder shall be free from defects in material or workmanship for a period of eighteen months from the date of delivery to Buyer. The prices charged for Seller's products are based upon the exclusive limited warranty stated above, and upon the following disclaimer: **DISCLAIMER OF WARRANTY: THIS WARRANTY COMPRISES THE SOLE AND ENTIRE WARRANTY PERTAINING TO PRODUCTS PROVIDED HEREUNDER. SELLER DISCLAIMS ALL OTHER WARRANTIES, EXPRESS AND IMPLIED, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.**

5. Claims; Commencement of Actions. Buyer shall promptly inspect all Products upon delivery. No claims for shortages will be allowed unless reported to the Seller within 10 days of delivery. No other claims against Seller will be allowed unless asserted in writing within 60 days after delivery or, in the case of an alleged breach of warranty, within 30 days after the date within the warranty period on which the defect is or should have been discovered by Buyer. Any action based upon breach of this agreement or upon any other claim arising out of this sale (other than an action by Seller for any amount due to Seller from Buyer) must be commenced within thirteen months from the date of tender of delivery by Seller or, for a cause of action based upon an alleged breach of warranty, within thirteen months from the date within the warranty period on which the defect is or should have been discovered by Buyer.

6. LIMITATION OF LIABILITY. UPON NOTIFICATION, SELLER WILL, AT ITS OPTION, REPAIR OR REPLACE A DEFECTIVE PRODUCT, OR REFUND THE PURCHASE PRICE. IN NO EVENT SHALL SELLER BE LIABLE TO BUYER FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF, OR AS THE RESULT OF, THE SALE, DELIVERY, NON-DELIVERY, SERVICING, USE OR LOSS OF USE OF THE PRODUCTS OR ANY PART THEREOF, OR FOR ANY CHARGES OR EXPENSES OF ANY NATURE INCURRED WITHOUT SELLER'S WRITTEN CONSENT, EVEN IF SELLER HAS BEEN NEGLIGENT, WHETHER IN CONTRACT, TORT OR OTHER LEGAL THEORY. IN NO EVENT SHALL SELLER'S LIABILITY UNDER ANY CLAIM MADE BY BUYER EXCEED THE PURCHASE PRICE OF THE PRODUCTS.

7. Contingencies. Seller shall not be liable for any default or delay in performance if caused by circumstances beyond the reasonable control of Seller.

8. User Responsibility. The user, through its own analysis and testing, is solely responsible for making the final selection of the system and Product and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met. The user must analyze all aspects of the application and follow applicable industry standards and Product information. If Seller provides Product or system options, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the Products or systems.

9. Loss to Buyer's Property. Any designs, tools, patterns, materials, drawings, confidential information or equipment furnished by Buyer or any other items which become Buyer's property, may be considered obsolete and may be destroyed by Seller after two consecutive years have elapsed without Buyer placing an order for the items which are manufactured using such property. Seller shall not be responsible for any loss or damage to such property while it is in Seller's possession or control.

10. Special Tooling. A tooling charge may be imposed for any special tooling, including without limitation, dies, fixtures, molds and patterns, acquired to manufacture Products. Such special tooling shall be and remain Seller's property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in apparatus belonging to Seller which is utilized in the manufacture of the Products, even if such apparatus has been specially converted or adapted for such manufacture and notwithstanding any charges paid by Buyer. Unless otherwise agreed, Seller shall have the right to alter, discard or

otherwise dispose of any special tooling or other property in its sole discretion at any time.

11. Buyer's Obligation; Rights of Seller. To secure payment of all sums due or otherwise, Seller shall retain a security interest in the goods delivered and this agreement shall be deemed a Security Agreement under the Uniform Commercial Code. Buyer authorizes Seller as its attorney to execute and file on Buyer's behalf all documents Seller deems necessary to perfect its security interest. Seller shall have a security interest in, and lien upon, any property of Buyer in Seller's possession as security for the payment of any amounts owed to Seller by Buyer.

12. Improper Use and Indemnity. Buyer shall indemnify, defend, and hold Seller harmless from any claim, liability, damages, lawsuits, and costs (including attorney fees), whether for personal injury, property damage, patent, trademark or copyright infringement or any other claim, brought by or incurred by Buyer, Buyer's employees, or any other person, arising out of: (a) improper selection, improper application or other misuse of Products purchased by Buyer from Seller; (b) any act or omission, negligent or otherwise, of Buyer; (c) Seller's use of patterns, plans, drawings, or specifications furnished by Buyer to manufacture Product; or (d) Buyer's failure to comply with these terms and conditions. Seller shall not indemnify Buyer under any circumstance except as otherwise provided.

13. Cancellations and Changes. Orders shall not be subject to cancellation or change by Buyer for any reason, except with Seller's written consent and upon terms that will indemnify, defend and hold Seller harmless against all direct, incidental and consequential loss or damage. Seller may change product features, specifications, designs and availability with notice to Buyer.

14. Limitation on Assignment. Buyer may not assign its rights or obligations under this agreement without the prior written consent of Seller.

15. Entire Agreement. This agreement contains the entire agreement between the Buyer and Seller and constitutes the final, complete and exclusive expression of the terms of the agreement. All prior or contemporaneous written or oral agreements or negotiations with respect to the subject matter are herein merged.

16. Waiver and Severability. Failure to enforce any provision of this agreement will not waive that provision nor will any such failure prejudice Seller's right to enforce that provision in the future. Invalidation of any provision of this agreement by legislation or other rule of law shall not invalidate any other provision herein. The remaining provisions of this agreement will remain in full force and effect.

17. Termination. This agreement may be terminated by Seller for any reason and at any time by giving Buyer thirty (30) days written notice of termination. In addition, Seller may by written notice immediately terminate this agreement for the following: (a) Buyer commits a breach of any provision of this agreement (b) the appointment of a trustee, receiver or custodian for all or any part of Buyer's property (c) the filing of a petition for relief in bankruptcy of the other Party on its own behalf, or by a third party (d) an assignment for the benefit of creditors, or (e) the dissolution or liquidation of the Buyer.

18. Governing Law. This agreement and the sale and delivery of all Products hereunder shall be deemed to have taken place in and shall be governed and construed in accordance with the laws of the State of Ohio, as applicable to contracts executed and wholly performed therein and without regard to conflicts of laws principles. Buyer irrevocably agrees and consents to the exclusive jurisdiction and venue of the courts of Cuyahoga County, Ohio with respect to any dispute, controversy or claim arising out of or relating to this agreement. Disputes between the parties shall not be settled by arbitration unless, after a dispute has arisen, both parties expressly agree in writing to arbitrate the dispute.

19. Indemnity for Infringement of Intellectual Property Rights. Seller shall have no liability for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights except as provided in this Section. Seller will defend and indemnify Buyer against allegations of infringement of U.S. patents, U.S. trademarks, copyrights, trade dress and trade secrets ("Intellectual Property Rights"). Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on an allegation that a Product sold pursuant to this Agreement infringes the Intellectual Property Rights of a third party. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of such allegations of infringement, and Seller having sole control over the defense of any allegations or actions including all negotiations for settlement or compromise. If a Product is subject to a claim that it infringes the Intellectual Property Rights of a third party, Seller may, at its sole expense and option, procure for Buyer the right to continue using the Product, replace or modify the Product so as to make it noninfringing, or offer to accept return of the Product and return the purchase price less a reasonable allowance for depreciation. Notwithstanding the foregoing, Seller shall have no liability for claims of infringement based on information provided by Buyer, or directed to Products delivered hereunder for which the designs are specified in whole or part by Buyer, or infringements resulting from the modification, combination or use in a system of any Product sold hereunder. The foregoing provisions of this Section shall constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for infringement of Intellectual Property Rights.

20. Taxes. Unless otherwise indicated, all prices and charges are exclusive of excise, sales, use, property, occupational or like taxes which may be imposed by any taxing authority upon the manufacture, sale or delivery of Products.

21. Equal Opportunity Clause. For the performance of government contracts and where dollar value of the Products exceed \$10,000, the equal employment opportunity clauses in Executive Order 11246, VEVRAA, and 41 C.F.R. §§ 60-1.4(a), 60-741.5(a), and 60-250.4, are hereby incorporated.

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