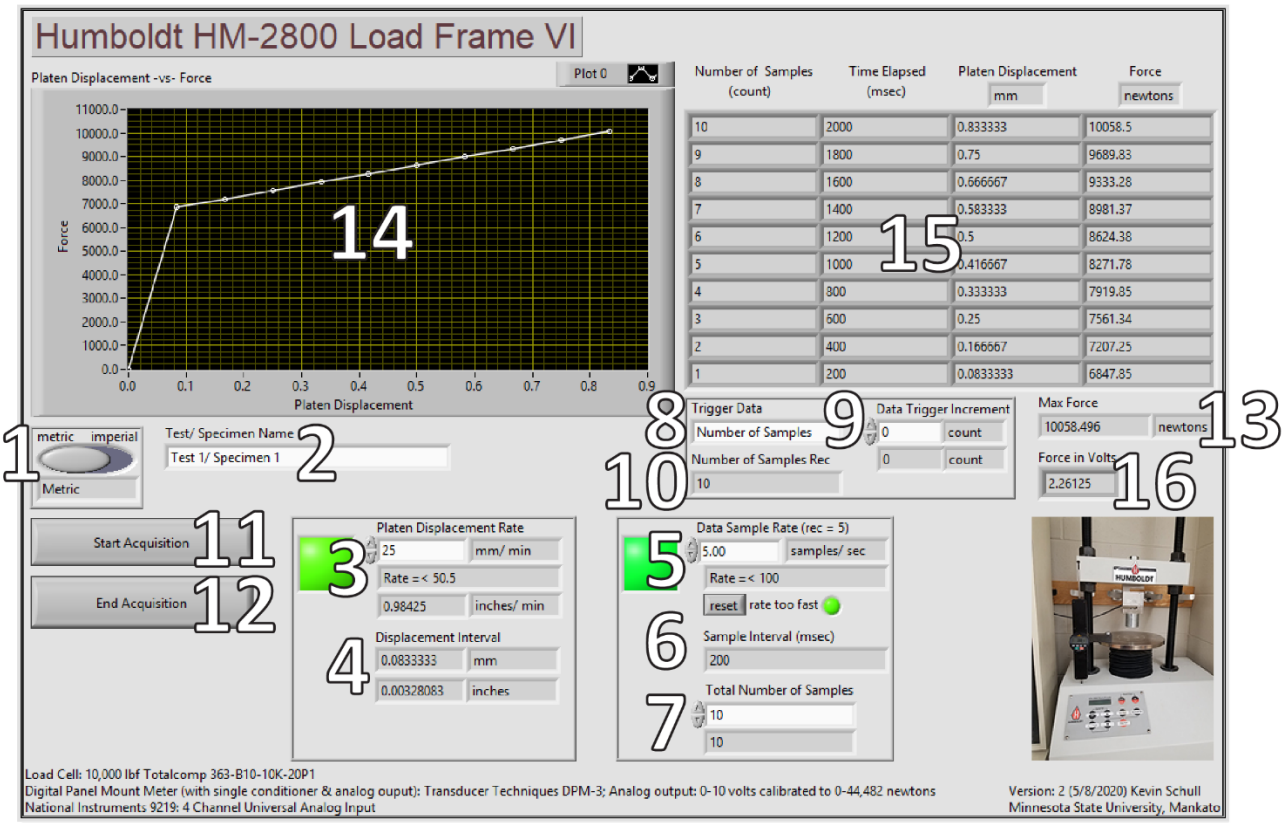
"Humboldt HM-2800 Load Frame VI" Manual

The "Humboldt HM-2800 Load Frame VI" (HM-VI) along with "NI 9219: 4 Channel Universal Analog Input module" is a data acquisition system for the "Humboldt HM-2800 Multi-Speed Load Frame" (HM-2800). The HM-VI (VI is short for Virtual Instrument) will collect the force data from HM-2800 load cell (refer to: *Figure 1: Data Source Diagram "Force"*) and along with HM-2800 "Platen Displacement Rate" inputted by the operator the HM-VI will output a data spreadsheet as shown the lower portion of "*Figure 2: Front Panel (top) & Data Output Spreadsheet (bottom)*".

Description of the HM-VI front panel and data output spreadsheet [refer to: *Figure 3: Front Panel (top) & Data Output Spreadsheet (bottom)*. The numbers shown below correspond the numbers shown on Figure 1:

1) **"Metric Imperial"**: Select the units for the data
2) **"Test/ Specimen Name"**: Type in the name of the test. Note: after typing in the test name, do not press the "Enter" key. Instead with the mouse, click on the next selection to make on the HM-VI. The data output spreadsheet will contain the "Test/ Specimen Name" information.
3) **"Platen Displacement Rate"**: Type in the Speed Range set on the HM-2800 (imperial = 0 to 1.99 inches/min or metric = 0 to 50.5 mm/min). The green square will indicate "red" and will not run the data acquisition until the rate is within range (range limitations will be shown in the middle field). The lower field will convert to opposing units ("metric to imperial" or "imperial to metric"). The data output spreadsheet will contain the "Platen Displacement Rate" information.
4) **"Displacement Interval"**: Indicates the platen displacement interval. Formula:
   $(Platen\ Displacement\ Rate) x \left(\frac{1}{60}\right) x \left(\frac{1}{Data\ Sample\ Rate}\right)$
   The lower field will convert to opposing units. The data output spreadsheet will contain the "Displacement Interval" information.
5) **"Data Sample Rate"**: Type in the sampling rate for the test. If you type in a number greater than 100 samples/ sec, the green square will indicate "red" and will not run the data acquisition until the rate is within range (range limitations will be shown in the lower field). It is recommended to have a rate of 5 sample/ sec. If the sampling rate is too fast while the data acquisition is running, the "rate too fast" circle will indicate "red" ("reset" will reset the "rate too fast" circle back to "green"). For more information on the sampling rate capabilities of the NI 9219, refer to the NI 9219 section of *Figure 4: Data Source Diagram "Force"*. The data output spreadsheet will contain the "Data Sampling Rate" information.
6) **"Sample Interval (msec)"**: Indicate the time between samples. Formula:
   $\left(\frac{1}{Data\ Sample\ Rate}\right) x 1000$
   The data output spreadsheet will contain the "Sample Interval (msec)" information.
7) **"Total Number of Samples"**: Type in the total number of samples for the test. Make sure this value is larger than what is needed for the test. The bottom field will indicate the total number of samples already taken. The data output spreadsheet will contain the "Total Number of Samples" information.
8) "**Trigger Data"**: Select the data you want the HM-VI to Trigger. Selection: "Number of Samples"; "Time Elapsed"; "Platen Displacement"; or "Force". The data output spreadsheet will contain the "Trigger Data" information.

9) **“Data Trigger Increment”**: Type in the data trigger increment. The HM-VI will use the “Data Trigger Increment” number to increment the selected “Trigger Data” (8) as the data is being collected. Example: If “Force” is selected in “Trigger Data” (8) and “Data Trigger Increment” is set for 250 Newtons, then the HM-VI will trigger a value “greater than” or “equal to” the absolute value of 250 Newtons (example: 250, 500, 750……and so on). The higher the data sample rate, the more data points will be collected. More data points will increase the chance of the resulted number to be close to the “Data Trigger Increment” number. If “Trigger Data” is equal to “Total Number of Samples” and “Data Trigger Increment” is equal to either 0 or 1, then all the sampled data will be recorded (“*Figure 5: Front Panel (top) & Data Output Spreadsheet (bottom)”* number “15” has all the data samples recorded) The data being collected is “Total Number of Samples”, “Time Elapsed”, “Platen Displacement”, and “Force”. The lower field will convert to the opposing units (if applicable). The data output spreadsheet will contain the “Data Trigger Increment” information.
10) **“Number of Samples Rec”**: Indicate the number of samples which will appear in the spreadsheet. Example: If you select 250 Newtons in the “Data Trigger Increment” (7), only increments of 250 Newton will show up in the data. The data output spreadsheet will contain the “Number of Samples Rec” information.
11) **“Start Acquisition”**: This will start the data acquisition.
12) **“End Acquisition”**: This will end the data acquisition.
13) **“Max Force”**: Indicates the maximum force looking at the “Total Number of Samples”.
14) **“Platen Displacement -vs- Force”**: Real time graph of Platen Displacement verses Force
15) Front panel (top): displays the real time data of the last 10 data points. Data output spreadsheet (bottom): the recorded data points.
16) **“Force in Volts”**: Indicates the voltage value from the DPM-3 analog output (refer to: *Figure 6: Data Source Diagram “Force”* -> “Digital Panel Meter” block on diagram -> number “4)”).



	A	B	C	D	E
1	Test/ Specimen Name	Data Sample Rate	Sample Interval	Platen Displ Rate	Displacement Interval
2		(samples/sec)	(msec)	(mm/min)	(mm)
3	Test 1/ Specimen 1	5	200	25	0.083333
4	**********	**********	**********	**********	**********
5	Max Force	Trigger Data	Data Trigger Increment	Number of Samples Rec	
6	(newtons)		(count)	(count)	
7	10058.4956	Number of Samples	0	10	
8	**********	**********	**********	**********	**********
9	Total Number of Samples	Time Elapsed	Platen Displacement	Force	
10	(count)	(milliseconds)	(mm)	(newtons)	
11					
12	1	200	0.0833	6847.8468	
13	2	400	0.1667	7207.2484	
14	3	600	0.25	7561.3367	
15	4	800	0.3333	7919.8474	
16	5	1000	0.4167	8271.7802	
17	6	1200	0.5	8624.3811	
18	7	1400	0.5833	8981.3726	
19	8	1600	0.6667	9333.2815	
20	9	1800	0.75	9689.8276	
21	10	2000	0.8333	10058.4956	

Figure 7: Front Panel (top) & Data Output Spreadsheet (bottom)

Data Source Diagram “Force”

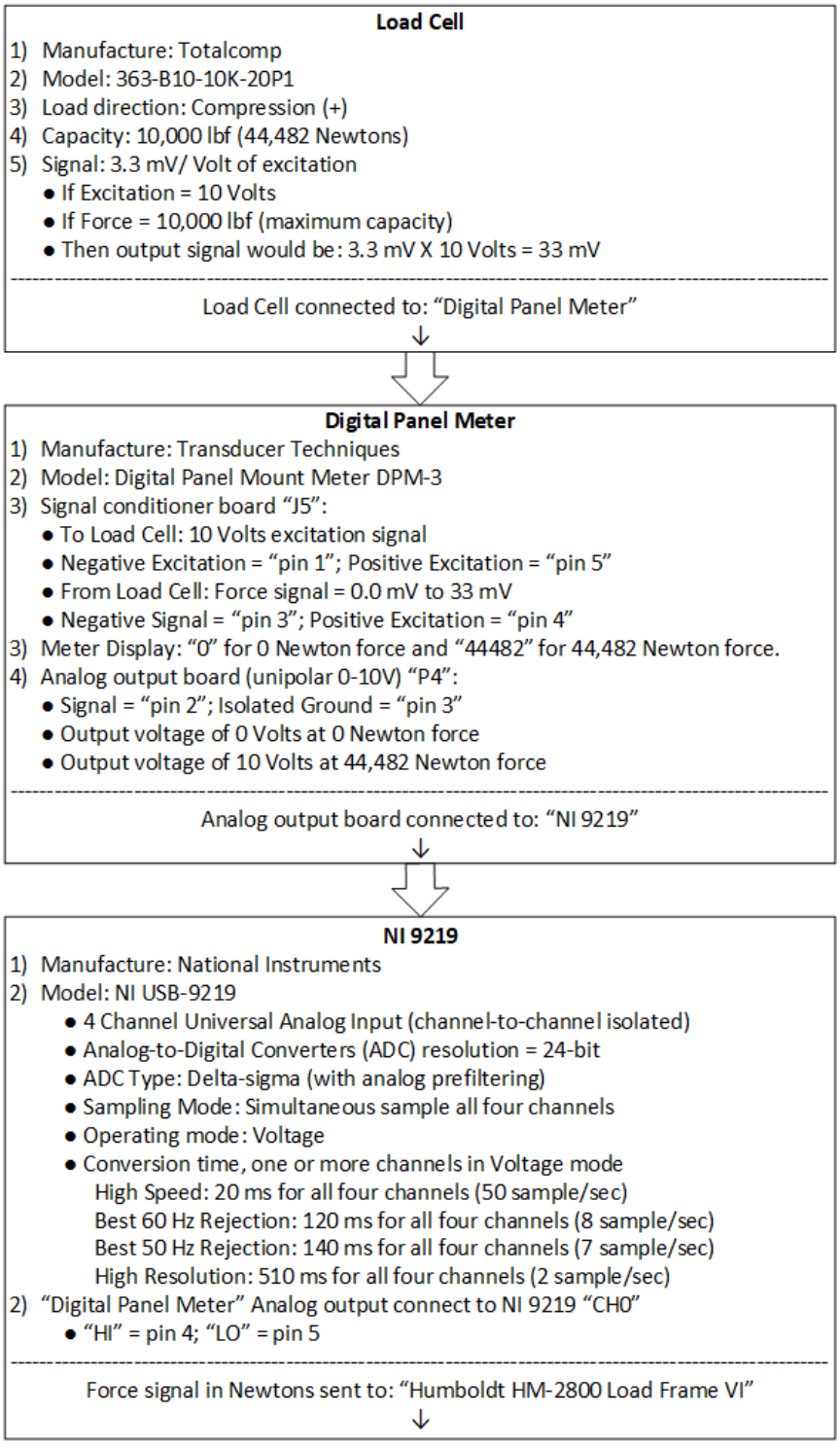


Figure 8: Data Source Diagram “Force”