

Product Profile & Reference List

**Custom Products & Systems
Supplied to**

**Liquid Propulsion System Center
ISRO, Bangalore**



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BaHN Automation was privileged to associate with **Liquid Propulsion Systems Centre of ISRO, Bangalore** as a Technology Partner to assist their Advanced R&D programs and projects.

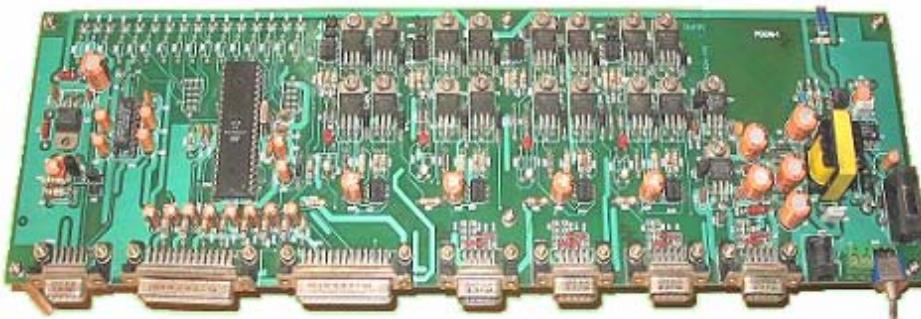
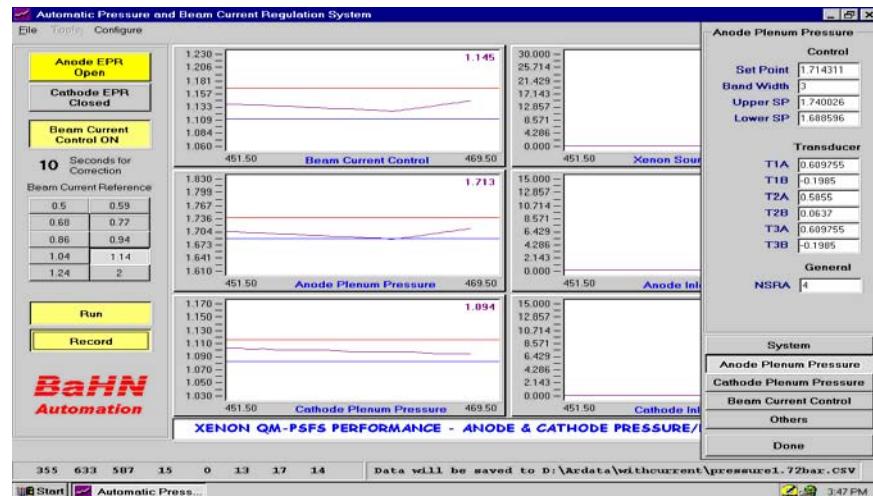
BaHN provided customized solutions in design and development of number of control systems viz., Electronic Regulators, Automated Test Equipments (ATEs), Data Acquisition Systems as detailed below:-

- Electronic Pressure Regulator for Xenon Feed System
- Electronic Pressure / Flow Regulator for Xenon Feed System
- HET Test Automation System for Hall Thrusters (18mN & 75mN)
- 16-Channel Data Logger for Testing EP & Pyro Valves
- Active Temperature Compensation Unit for Pressure Transducers
- Test & Calibration Unit for Pressure Transducers
- Programmable Pulse Generator for Testing of Solenoid Valves
- Digital Interface Units for Pressure Transducers
- Simulation Test Data Acquisition System (SiTe DAS)
- Tank & PAS Testing Data Acquisition System (TPT DAS)
- Portable & Real Time Data Acquisition System for CRYO Temperature Transducers (PRT-DAS)
- Control Electronics Module for Pulsed Plasma Thruster (CEM-PPT)

Electronic Pressure Regulator (EPR) Hardware & Software

Application :

Electronic Pressure Regulator For EM-EPS Xenon Feed System



Features :

- Based on high performance, low power Micro Controller with RISC architecture
- Pressure / Current Control algorithm
- Control of bi-directional latch valves (4nos)
- Driver circuits for ON/OFF control of Latch Valves, ON/OFF time programmable (30 to 50 ± 5ms duration)
- Data acquisition from Pressure Transducers, Flow Meters & Current Sensors (8nos)
- Setting of Reference / Configuration Parameters
- Graphical display of all analog channels in engineering units
- Saving of logged data in user definable file / file path for retrieval & analysis
- GUI Software for Data Acquisition & Control

Pressure/Flow Regulator (EPFR) Driver Electronics & Software

Application :

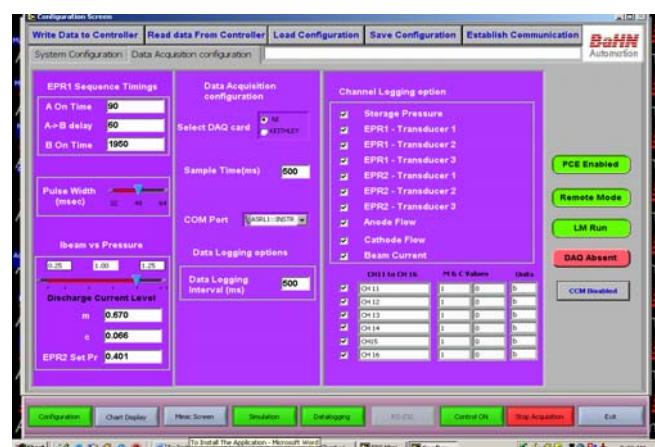
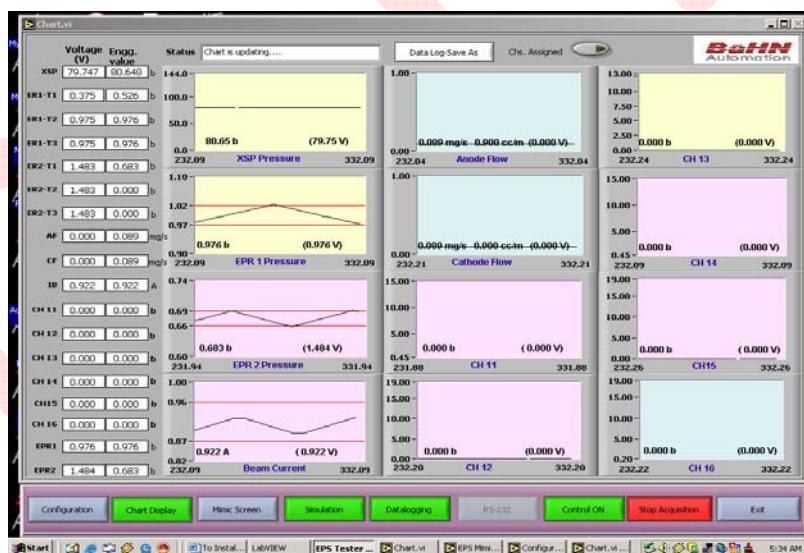
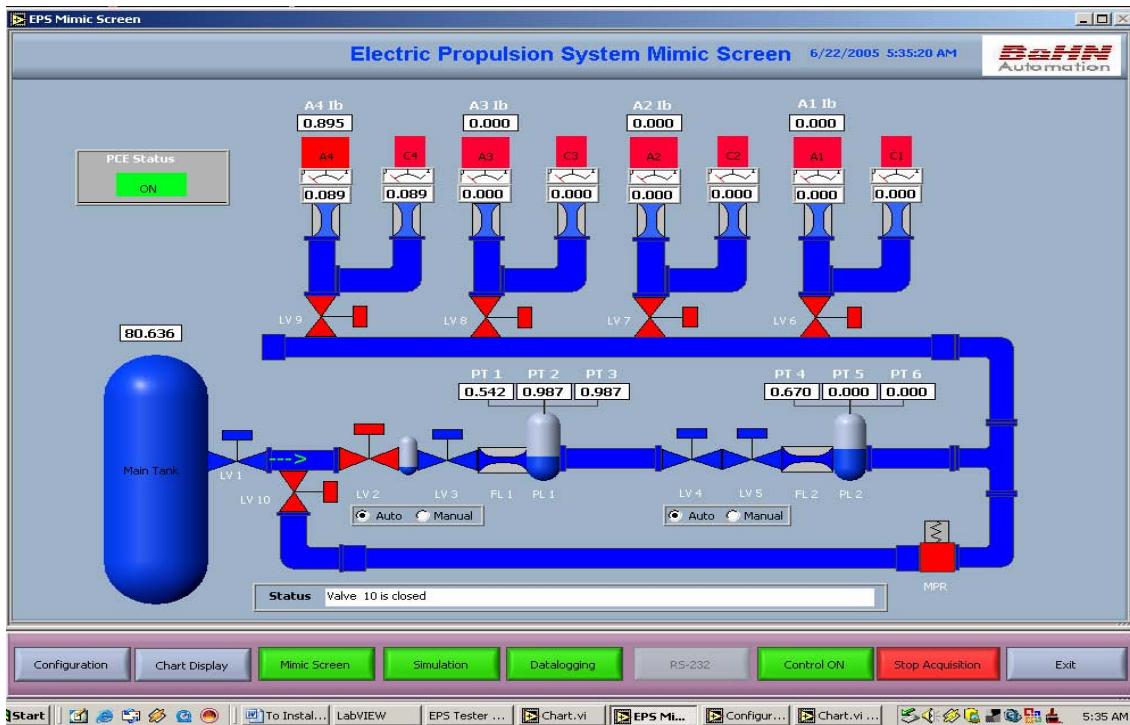
Electronic Pressure / Flow Regulator for QM-EPS XENON Feed System



Features :

- Based on high performance, low power Micro Controller with RISC architecture
- Pressure / Beam Current Control algorithms
- Control of bi-directional latch valves (10nos)
- Driver circuits for ON/OFF control of Latch Valves, ON/OFF time programmable (30 to 50 ± 5ms duration)
- Data acquisition form Pressure Transducers, Flow Meters & Current Sensors (16nos)
- Provision for Data acquisition from Keithley / NI DAQ Cards
- Setting of Reference /Configuration Parameters
- Process Diagram MIMIC display
- Graphical display of all analog channels in engineering units
- GUI Software for Data Acquisition & Control

Typical MMI Screens for Pressure/Flow Regulator (EPFR)



HET Test Automation System Hardware & Software

Application :

Automatic Testing of 18mN & 75mN Hall Thrusters



Features :

- Based on high performance, low power Micro Controller with RISC architecture
- Programming of "Xantrex" Power Supplies thro' GPIB
- Configuration of Various Switch Matrix Options
- Checking Various Switch Matrix Options thro' Simulation Loads
- Cathode Preparation & Conditioning
- Main Test Start and Shut down Sequencing with Protections
- High Speed Data Acquisition
- GUI for Configuration, Control & Process MIMIC
- Spectrum Analysis of Anode / Keeper Current & Voltage

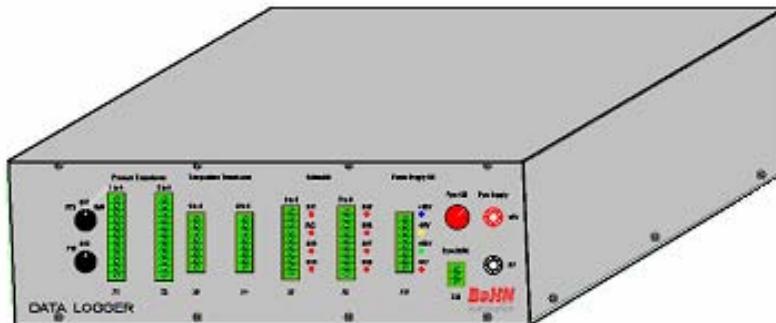
Typical MMI Screens for HET Test Automation System

Spectrum Analysis for Anode / Keeper Current & Voltage

16-Channel Data Logger

Application :

Data Logging, Testing & Control of EP Valves & Pyro Valves



Features :

- Pressure measurement from 4 to 20mA pressure sensors (8nos)
- Temperature measurement from PRT100 or PRT1000 (8nos)
- Control of solenoid valves (8nos)
- Normal data logging programmable from 1sec to 1 hour
- Fast data logging every 0.5ms (at 2000 samples/sec) for any 4 analog channels
- Graphical display of all 16 analog channels in engineering units
- Necessary drivers circuits for ON/OFF control of solenoid valves
- ON/OFF time for 2 solenoids programmable from 1ms to 999ms
- Saving of logged data in user definable file / file path for retrieval & analysis
- On line printing of logged data at programmable intervals.

Typical MMI Screens for 16-Channel Data Logger

MMI.vi

DataLogger MMI 05/07/2008 02:50:47

Pressure 1: 17.13 (1.0412V, 2.12 BAR)
 Pressure 2: 17.97 (1.0733V, 2.95 BAR)
 Pressure 3: 36.07 (1.7688V, 21.06 BAR)
 Pressure 4: 54.65 (2.4824V, 39.65 BAR)
 Pressure 5: 65.16 (2.8862V, 50.16 BAR)
 Pressure 6: 78.03 (3.3800V, 63.02 BAR)
 Pressure 7: 91.52 (3.8977V, 76.50 BAR)
 Pressure 8: 106.17 (4.4606V, 91.16 BAR)
 Temp 1: 80.89 (0.1257V, 65.88 degC)
 Temp 2: 23.00 (0.1031V, 7.94 degC)
 Temp 3: 20.30 (0.1021V, 5.26 degC)
 Temp 4: 21.17 (0.1024V, 6.16 degC)
 Temp 5: 34.10 (1.0750V, 19.18 degC)
 Temp 6: -16.31 (0.9756V, -6.25 degC)
 Temp 7: -16.62 (0.9744V, -6.55 degC)
 Temp 8: -16.76 (0.9738V, -6.70 degC)

Solenoid Valve: Valve 1 (Green), Valve 2 (Red), Valve 3 (Red), Valve 4 (Red), Valve 5 (Red), Valve 6 (Red), Valve 7 (Red), Valve 8 (Red)

Fast Log Option: Auto

Buttons: Configuration, MMI, Stop Acquire, Normal log, Fast log, Print, Read Data, Help, Exit

D-Config.vi

Data Acquisition Configuration - Instrumentation Configuration

Pressure	RCF	M	C	Title	Units
Channel A0	240	6250	-25	Pressure 1	BAR
Channel A1	240	6250	-25	Pressure 2	BAR
Channel A2	240	6250	-25	Pressure 3	BAR
Channel A3	240	6250	-25	Pressure 4	BAR
Channel A4	240	6250	-25	Pressure 5	BAR
Channel A5	240	6250	-25	Pressure 6	BAR
Channel A6	240	6250	-25	Pressure 7	BAR
Channel A7	240	6250	-25	Pressure 8	BAR

Temperature	CCF	Title	Units	RTD
Channel A0	1	Temp 1	degC	100E-3
Channel A1	1	Temp 2	degC	100E-3
Channel A2	1	Temp 3	degC	100E-3
Channel A3	1	Temp 4	degC	100E-3
Channel A4	1	Temp 5	degC	1K
Channel A5	1	Temp 6	degC	1K
Channel A6	1	Temp 7	degC	1K
Channel A7	1	Temp 8	degC	1K

D-Config.vi

Data Acquisition Configuration - Instrumentation Configuration

Data logging options:

- Samples/sec: 2000, Logging Interval: 2 sec, Fast log period: 3 sec, File Size: 50 K
- File Path: Auto, Output Header: None, Date & Time, Header comments: None, Date & Time, Footer comments: None
- Output Footer: None, Date & Time, Footer comments: None, Date & Time, Footer comments: None

Data printing options:

- Print interval: 0 sec, Output Header: None, Date & Time, Header comments: None, Channel number, Channel name, Title row: None, Channel number, Channel name, Output Footer: None, Date & Time, Footer comments: None, Date & Time, Footer comments: None

Read_data_plot.vi

Read File Name: %H:\sro-16ch-logger\LabView Software\Installer_Datalogger_07_07_2008\data\Normal_Log_8_Channels_10_21_30_AM_08072008.xls

Waveform Graph Pressure

Pressure 1: 40, Pressure 2: 35, Pressure 3: 30, Pressure 4: 25, Not Used: 20, Not Used: 15, Not Used: 10, Not Used: 5

Waveform Graph Temperature

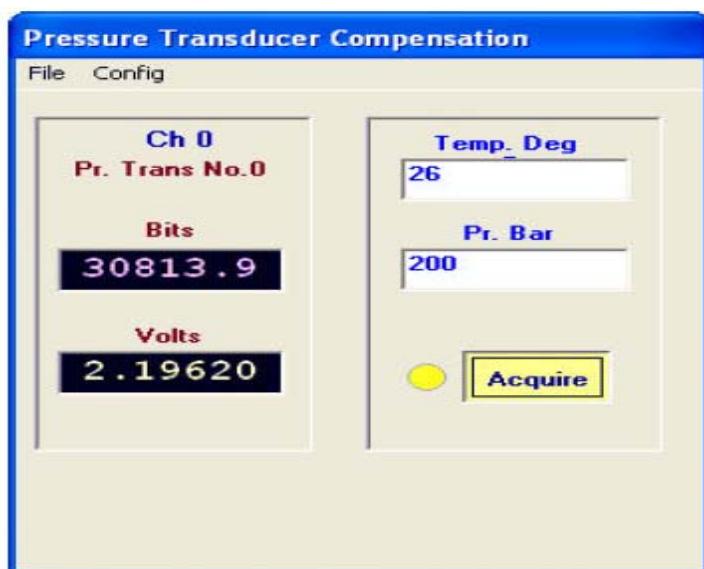
Temp 1: 70, Temp 2: 65, Temp 3: 60, Temp 4: 55, Not Used: 50, Not Used: 45, Not Used: 40, Not Used: 35

Buttons: Print Pressure, Print Temp, Close Graph

Compensation Unit for MEMS Pressure Transducers

Application :

Active Temperature Compensation of Analog or Digital Pressure Transducers



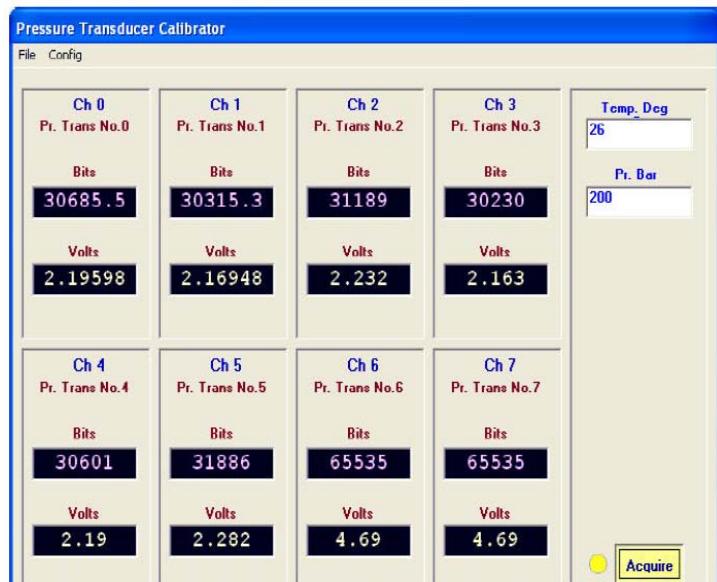
Features :

- Active temperature compensation of either analog or digital pressure transducer
- Based on high performance, low power Micro Controller with RISC architecture
- All in one signal processing unit with following functionalities
 - High accuracy digital voltmeter
 - Digital programming interface for programming one transducer at a time
 - Micro controller based interface to receive and decode the digital output
 - RS232 communication interface with PC
 - PC based GUI for effective measurement & data acquisition

Calibration Unit for MEMS Pressure Transducer

Application :

Test and Calibration of Analog or Digital Pressure Transducers



Features :

- Test and Calibration of either analog or digital pressure transducers
- Based on high performance, low power Micro Controller with RISC architecture
- All in one signal processing unit with following functionalities.
 - High accuracy digital voltmeter
 - 8nos of individual channels can be configured for either analog or digital type pressure transducers in any mix
 - Micro controller interface to receive and decode the digital output
 - RS232 communication interface with PC
 - PC based GUI for effective measurement, data acquisition

Programmable Pulse Generator

Application :

Endurance & Performance Testing of Solenoid valves



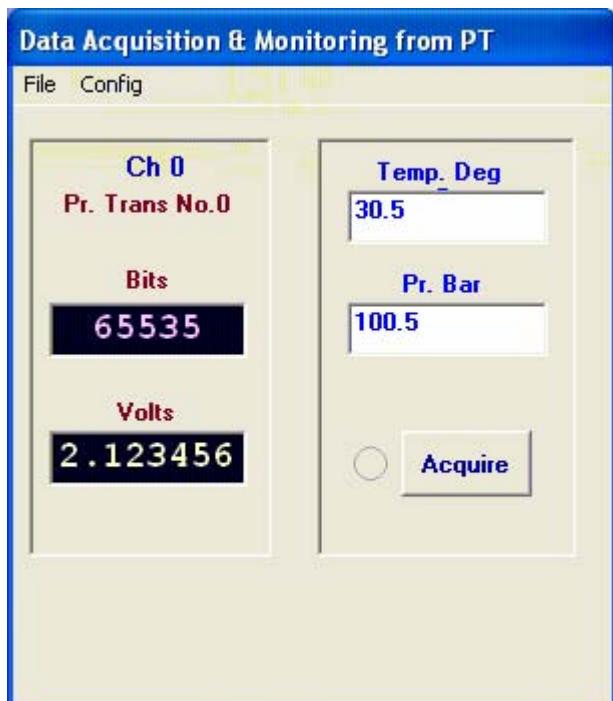
Features :

- Testing of solenoid valves with Pulse or Continuous type of output
- Based on high performance, low power Micro Controller with RISC architecture
- Pulse ON / OFF time independently settable from 1 to 9999ms
- Pulse count settable from 1 to 999999.
- Configuration parameters can be easily set thro' a Keypad along with MENU based LCD Display.
- High intensity 6-Digit LED Display for counting number of pulses.
- 6-Digit Electro-Mechanical Counter is also be used for counting number of pulses as it retains the count in case of power failure
- Built-in solenoid valve driver circuits for driving valves rated for 42Vdc, 3A.
- Over current / Short circuit and device failure protections
- Provision for monitoring Pulse Output (TTL) & Solenoid Valve current

Digital Interface Units for Pressure Transducers (DIUPTs)

Application :

Processing of output from Digital Pressure Transducers with built-in ADCs (LTC-2450, 1864, 2440, 1609 & ADS-1114)



DIUPT is an all in one signal-processing unit with following features:-

- High accuracy digital voltmeter
- Display of both raw data as well engineering value
- Micro controller based interface to receive and decode the digital output
- RS232 communication interface with PC
- PC based GUI for measurement, data acquisition.
- SPI and I2C Compatible serial I/O

Simulation Test Data Acquisition System (SiTe DAS)

Application:

Simulation & Flow Characterization Testing of Flight Components before Integration in Spacecraft



Features :

- Data acquisition from Digital & Analog Pressure Transducers, Flow Meters, Weighing Balances and Temperature Sensors
- Acquisition of data directly from sensors and also thro' RS232/RS485 from Weighing Machines and Keller Pressure Transducers
- Conversion of acquired data to equivalent engineering units
- Configuration of data acquisition parameters viz., Communication parameters, Sensors & graph parameters, Data logging parameters
- Acquire and display of acquired data through a suitable Graphical User Interface (GUI)
- Hierarchical pull-down menus for all operations with short cut keys
- Multiple pages of display, multiple charts per page and multiple channels/chart
- Zoom, Pan and Measurements options
- Data logging, storing with date & time stamp, compatible for processing in MS-EXCEL
- Status log and diagnostics
- Read from stored file and printing options

Typical MMI Screens for SiTe DAS

Status Log

```

7:47:37 AM - Checking USB DAQ devices
7:47:37 AM - Physical Device Dev1 not found - Using simulated device
7:47:37 AM - Physical Device Dev2 not found - Using simulated device
7:47:37 AM - Loading initial settings
7:47:38 AM - Loaded E:\Effort\kpsi\BaHN\ISRO-VenkatReddy\VB Daq\Copy of kps trial0\SI
7:47:38 AM - Establishing communication links
7:47:38 AM - Opening Serial Port for Bell Weighing M/c
7:47:39 AM - Problem.. Could not establish link with Bell
7:47:39 AM -
7:47:39 AM - Opening Serial Port for Orion Weighing M/c
7:47:39 AM - Link established with Orion
7:47:39 AM -
7:47:39 AM - Opening Serial Port for Essae Weighing M/c
7:47:40 AM - Problem.. Could not establish link with Essae
7:47:40 AM -
7:47:40 AM - Opening Communication link with Keller RS485 interface App
7:47:40 AM - Connected to Keller RS485 Interface App
7:47:40 AM - Setting up Daq devices
7:47:40 AM - System startup process completed
7:47:40 AM -
7:47:40 AM - One or more communication links could not be established.
    
```

Keller RS485 Interface

Keller - Absolute Pr.		Keller - Differential Pr.	
Ch 1	'Error'	Ch 9	'Error'
Ch 2	0.91883	Ch 10	'Error'
Ch 3	'Error'	Ch 11	0.05207
Ch 4	'Error'	Ch 12	'Error'
Ch 5	'Error'	Ch 13	'Error'
Ch 6	'Error'	Ch 14	'Error'
Ch 7	'Error'	Ch 15	'Error'
Ch 8	'Error'		

Clear Errors

Keller Serial Port Settings

COM Port: COM 9

Configure Communications

Bell Weighing Machine

COM Port: COM 2

Bell

```

775 - 0009.50
776 - 0009.50
777 - 0009.50
778 - 0009.50
    
```

Orion Weighing Machine

COM Port: COM 5

Orion

```

773 - 00012.7
774 - 00012.7
775 - 00012.7
776 - 00012.7
    
```

Essae Weighing Machine

COM Port: COM 7

Essae

```

772 - 2.08
773 - 2.08
774 - 2.08
775 - 2.08
    
```

Keller Internal interface

01	'Error'	09	'Error'
02	0.91883	10	'Error'
03	'Error'	11	0.05207
04	'Error'	12	'Error'
05	'Error'	13	'Error'
06	'Error'	14	'Error'
07	'Error'	15	'Error'
08	'Error'		

Configure Sensors & Graph

Analog Pr. Sensors (Abs)

Flow Meters

Digital Pr. Sensors (Abs)

Weighing Machines

Analog Pr Sensors (Diff)

Temperature Sensors

Digital Pr. Sensors (Diff)

Polynomial Equation

No	Title	Vmin	Vmax	a ₁ * x	+	a ₀	Eng. Val. Min	Eng. Val. Max	Units	Y Axis	Color	Width	Style	
0	AnlAbs_Pr_1	-5	5			3	15	0	30	BAR	1	Black	1	Solid
1	AnlAbs_Pr_2	-5	5			3	15	0	30	BAR	NC	Red	1	Solid
2	AnlAbs_Pr_3	-5	5			3	15	0	30	BAR	NC	Yellow	1	Solid
3	AnlAbs_Pr_4	-5	5			3	15	0	30	BAR	NC	Green	1	Solid
4	AnlAbs_Pr_5	-5	5			30	150	0	300	BAR	2	Blue	1	Solid
5	AnlAbs_Pr_6	-5	5			30	150	0	300	BAR	NC	Cyan	1	Solid
6	AnlAbs_Pr_7	-5	5			30	150	0	300	BAR	NC	Magenta	1	Solid
7	AnlAbs_Pr_8	-5	5			30	150	0	300	BAR	NC	Custom	1	Solid

Configure Graph

No:

Title: Analog Pr. Sensors (Abs)

Graph Background Color:

X-Axis

X Max:

X Min:

Major Grids:

Minor Grids:

Major Ticks:

Minor Ticks:

Y-Axis

Y1 Max:

Y1 Min:

Major Grids:

Minor Grids:

Major Ticks:

Minor Ticks:

Configure Data Acquisition & Logging

Samples Per Sec	Chart History Length Samples	Log Interval milli sec	Log Period Min	Excel Row Limit	
1000	100000	1	2	60000	

Data File Path

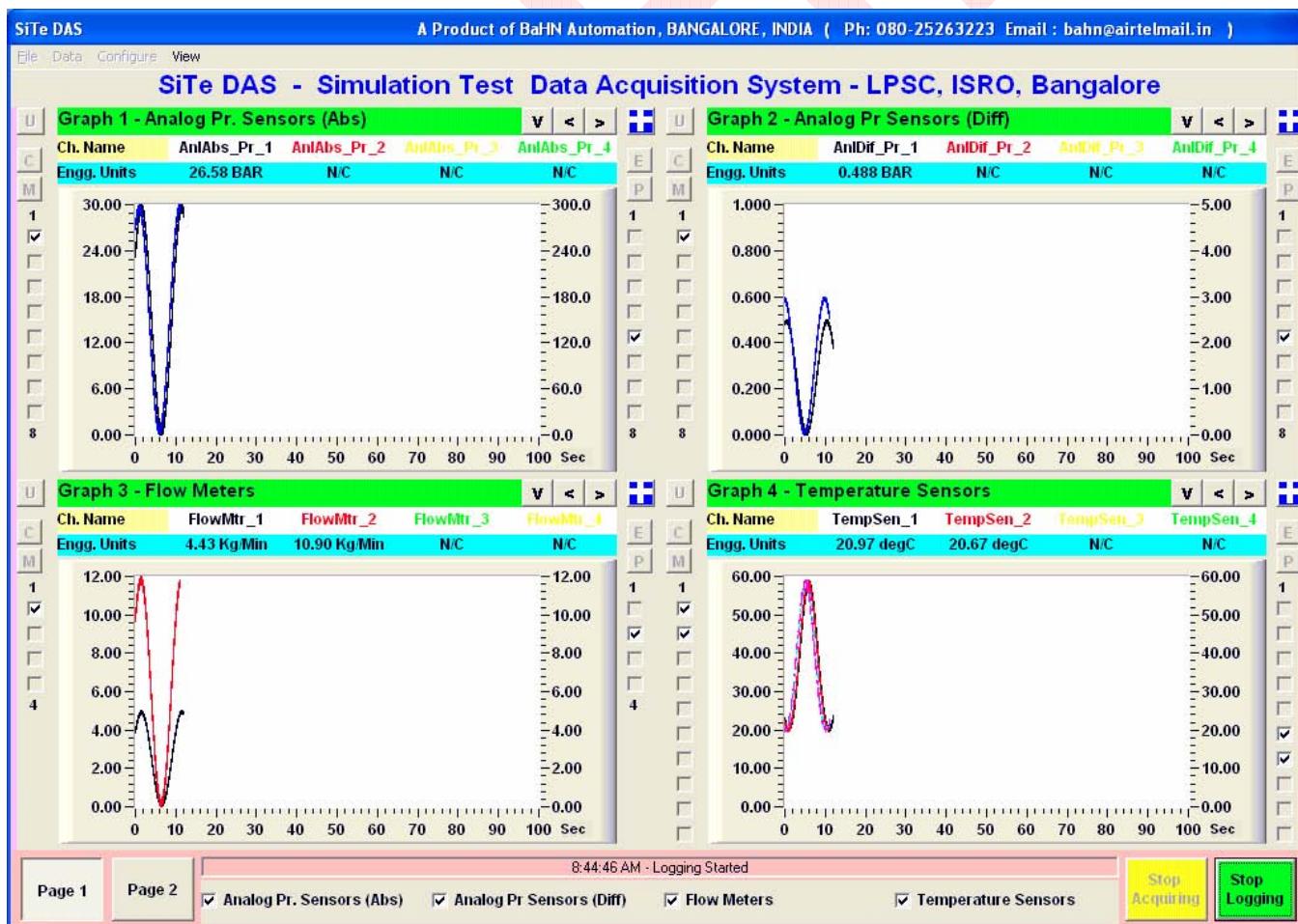
(Default) (User Defined) E:\Effort\kps\BaHN\ISRO-VenkaReddy\VB Daq\kps trial0

Global X Parameters

X Max
X Min
X Format
Maj Div
Min Div
Major Grids
Minor Grids
Major Ticks Apply
Minor Ticks Save

Analog Pr. Sensors (Abs)	Analog Pr Sensors (Diff)	Flow Meters	Temperature Sensors	Digital Pr. Sensors (Abs)	Digital Pr. Sensors (Diff)	Weighing Machines
<input checked="" type="checkbox"/> AnlAbs_Pr_1 <input type="checkbox"/> AnlAbs_Pr_2 <input type="checkbox"/> AnlAbs_Pr_3 <input type="checkbox"/> AnlAbs_Pr_4 <input checked="" type="checkbox"/> AnlAbs_Pr_5 <input type="checkbox"/> AnlAbs_Pr_6 <input type="checkbox"/> AnlAbs_Pr_7 <input type="checkbox"/> AnlAbs_Pr_8	<input checked="" type="checkbox"/> AnlDif_Pr_1 <input type="checkbox"/> AnlDif_Pr_2 <input type="checkbox"/> AnlDif_Pr_3 <input type="checkbox"/> AnlDif_Pr_4 <input checked="" type="checkbox"/> AnlDif_Pr_5 <input type="checkbox"/> AnlDif_Pr_6 <input type="checkbox"/> AnlDif_Pr_7 <input type="checkbox"/> AnlDif_Pr_8	<input checked="" type="checkbox"/> FlowMtr_1 <input checked="" type="checkbox"/> FlowMtr_2 <input type="checkbox"/> FlowMtr_3 <input type="checkbox"/> FlowMtr_4	<input checked="" type="checkbox"/> TempSen_1 <input checked="" type="checkbox"/> TempSen_2 <input type="checkbox"/> TempSen_3 <input type="checkbox"/> TempSen_4 <input type="checkbox"/> TempSen_5 <input checked="" type="checkbox"/> TempSen_6 <input checked="" type="checkbox"/> TempSen_7 <input type="checkbox"/> TempSen_8 <input type="checkbox"/> TempSen_9 <input type="checkbox"/> TempSen_10	<input type="checkbox"/> DigAbs_Pr_1 <input type="checkbox"/> DigAbs_Pr_2 <input type="checkbox"/> DigAbs_Pr_3 <input type="checkbox"/> DigAbs_Pr_4 <input checked="" type="checkbox"/> DigAbs_Pr_5 <input type="checkbox"/> DigAbs_Pr_6 <input type="checkbox"/> DigAbs_Pr_7 <input type="checkbox"/> DigAbs_Pr_8	<input type="checkbox"/> DigDiff_Pr_1 <input type="checkbox"/> DigDiff_Pr_2 <input type="checkbox"/> DigDiff_Pr_3 <input type="checkbox"/> DigDiff_Pr_4 <input checked="" type="checkbox"/> DigDiff_Pr_5 <input type="checkbox"/> DigDiff_Pr_6 <input type="checkbox"/> DigDiff_Pr_7	<input checked="" type="checkbox"/> Weight_1 <input checked="" type="checkbox"/> Weight_2 <input checked="" type="checkbox"/> Weight_3

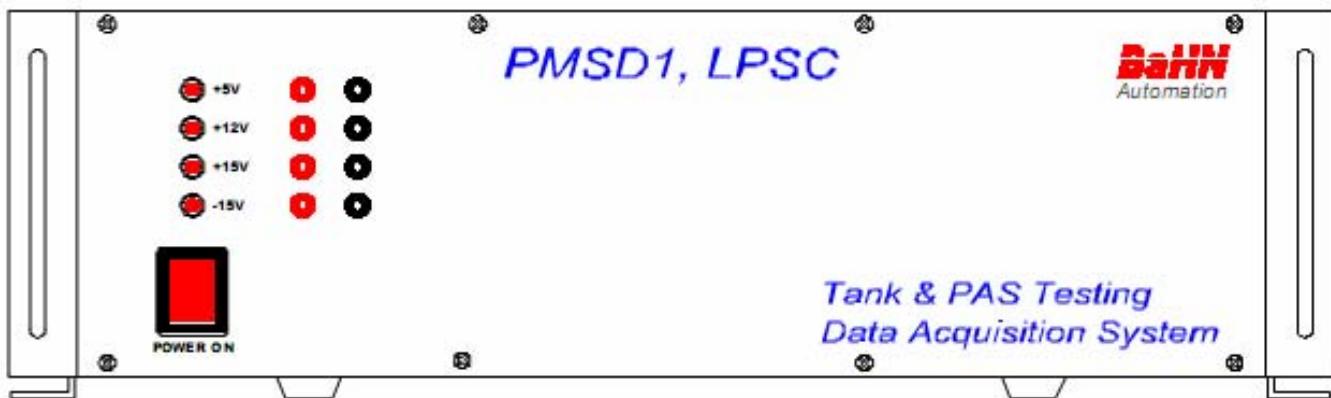
Select All **Unselect All** **Cancel** **Done**



Tank & PAS Testing Data Acquisition System (TPT DAS)

Application :

Tank & Component Testing Data Acquisition System



Features :

- Data acquisition from Digital & Analog Pressure Transducers, Flow Meters, Weighing Balances and Temperature Sensors
- Acquisition of data directly from sensors and also thro' RS232/RS485 from Weighing Machines and Keller Pressure Transducers
- Conversion of acquired data to equivalent engineering units
- Configuration of data acquisition parameters viz., Communication parameters, Sensors & graph parameters, Data logging parameters
- Acquire and display of acquired data through a suitable Graphical User Interface (GUI)
- Hierarchical pull-down menus for all operations with short cut keys
- Multiple pages of display, multiple charts per page and multiple channels/chart
- Zoom, Pan and Measurements options
- Data logging, storing with date & time stamp, compatible for processing in MS-EXCEL
- Status log and diagnostics
- Read from stored file and printing options

Typical MMI Screens for TPT DAS



RS485 Interface for Keller Transducers

Ch No.	Address	Parameter	Value
1	2	P1	"Error"
2	2	P1	"Error"
3	2	P1	"Error"
4	1	T	"Error"
5	2	P1	"Error"
6	1	TOB2	"Error"
7	1	TOB2	"Error"
8	2	P1	"Error"
9	5	P1	"Error"
10	10	P2	"Error"
11	11	Diff. Pr	"Error"
12	12	TOB1	"Error"
13	13	TOB2	"Error"
14	14	Diff. Pr	"Error"
15	11	Diff. Pr	"Error"
16	11	Diff. Pr	"Error"

Acquire 6317-891 900

Keller Serial Port Settings
COM Port: COM 9

Edit Polynomial Constants

iChId	Name	PolyOrder	a0	a1	a2
1	PrTr1-G1Main	1	-2.5	2.5	
2	PrTr2-G1M	1	-5.0	5.0	
3	PrTr3-G2M	1	-25	25	
4	PrTr4-G2M	1	-50	50	
5	PrTr1-G1B	1	-10	10	
6	PrTr2-G1B	1	-125	125	
7	PrTr3-G2B	1	-25	25	
8	PrTr4-G2B	1	-50	50	
9	KDPT1-G1M	1	-0.25	0.25	
10	KDPT2-G2M	1	-0.5	0.5	
11	KDPT1-G1B	1	-500	500	
12	KDPT2-G2B	1	-250	250	
13	LVDT1	1	0	1	
14	LVDT2	1	0	1.5	
15	LVDT3	1	0	2	
16	LVDT4	1	0	3	
17	FM1-G1M	1	-1	1	
18	FM2-G2M	1	-2	2	
19	FM1-G1B	1	-1	1	
20	FM2-G2B	1	-2	2	
21	TEMP1	2	92.28	-34.54	2.98
22	TEMP2	2	92.28	-34.54	2.98
23	TEMP3	2	92.28	-34.54	2.98
24	TEMP4	2	92.28	-34.54	2.98
25	TEMP5	2	92.28	-34.54	2.98
26	TEMP6	2	92.28	-34.54	2.98
27	TEMP7	2	92.28	-34.54	2.98
28	TEMP8	2	92.28	-34.54	2.98
29	TEMP9	2	92.28	-34.54	2.98
30	TEMP10	2	92.28	-34.54	2.98
31	TEMP11	2	92.28	-34.54	2.98
32	TEMP12	2	92.281234	-34.54321	2.98
33	KDA-1	1	0	1	
34	KDA-2	1	0	1	
35	KDA-3	1	0	1	
36	KDA-4	1	0	1	
37	KDA-5	1	0	1	
38	KDA-6	1	0	1	
39	KDA-7	1	0	1	
40	KDA-8	1	0	1	
41	KDD-1	1	0	1	
42	KDD-2	1	0	1	
43	KDN-3	1	0	1	

System Parameters

Sample Rate	20	Samples / Sec
History	50	Sec
Log Duration	25	Sec
Auto Save Dur	5	Sec
Excel Row Limit	60000	Rows
X Axis - Min		Sec
X Axis - Max		Sec

Mouse Zoom Option X X & Y

Mouse Pan Option X X & Y

Data Log Directory
E:\Effort\kps\BaHN\ISRO-Manikantan\SKN\

Configure Chart No. 1 - Group 1 - Main

Configure Plot Channels

Plot No	Signal Name	Ev Min	Ev Max	Axis	Plot Color	Plot Style	Plot Width
1	PrTr1-G1Mai			Y1	Blue	Solid	2
2	PrTr2-G1M			Y1	Black	Dash-dot	1
3	KDPT1-G1M			Y2	Green	Solid	3
4	FM1-G1M			Y2	Red	Solid	3

Configure Axes

Axis	Min	Max	Maj Div	Min Div	Maj Grid	Min Grid	Maj Tick	Min Tick	MajGrd Color	MnrGrd Color
X	0	100	4	2	✓	✓	□	□	Light Blue	Orange
Y1	0	20.00	4	2	✓	✓	□	□	Light Purple	Orange
Y2	0.00	4.00	4	2	□	□	□	□	Light Purple	Orange

Chart Background Color

Chart Name

Group 1 - Main

A Product of BaHN Automation, Bangalore, India

File | Configure | Display

11:08:07 AM - Acquisition started

Chart No. 1 - Group 1 - Main				
Plot No / Axis	1_Y1	2_Y1	3_Y2	4_Y2
Name	PrTr1-G1Mai (Psi)	PrTr2-G1M (Bar)	KDPT1-G1M (Bar)	FM1-G1M (LPM)
E_Value	1.08	1.73	0.01	0.43
E_Max	9.99	19.99	1.00	3.99
E_Min	0.93	1.14	0.00	0.31
Volts	1.43	1.35	1.06	1.43

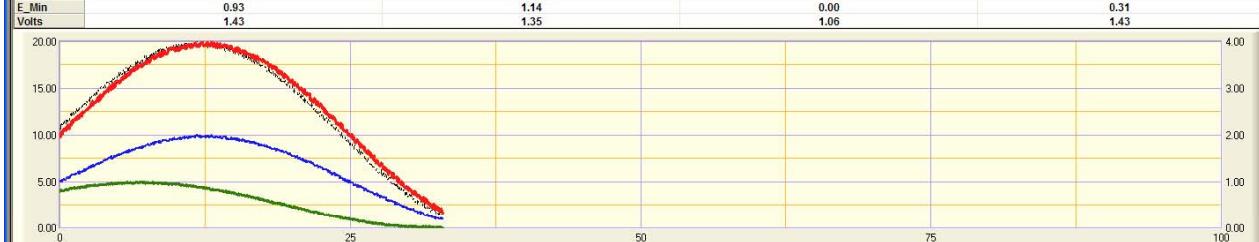
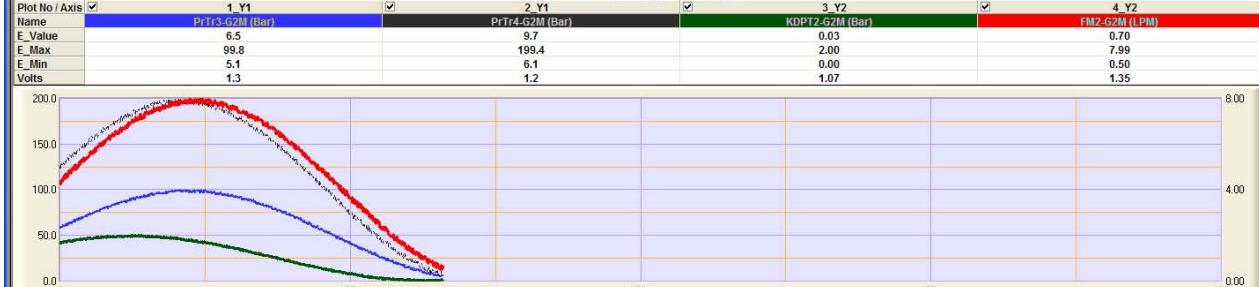


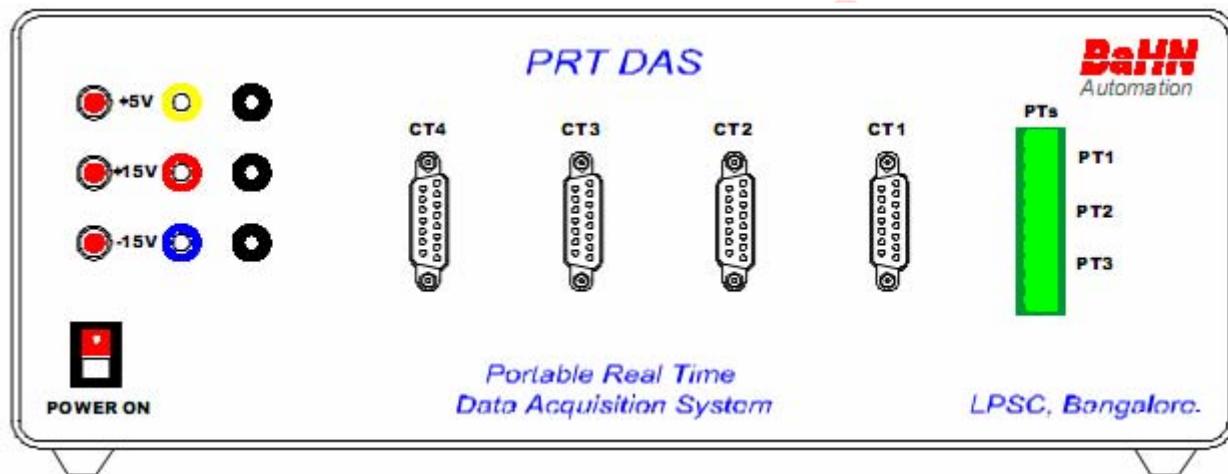
Chart No. 2 - Group 2 - Main				
Plot No / Axis	1_Y1	2_Y1	3_Y2	4_Y2
Name	PrTr3-G2M (Bar)	PrTr4-G2M (Bar)	KDPT2-G2M (Bar)	FM2-G2M (LPM)
E_Value	6.5	9.7	0.03	0.70
E_Max	99.8	199.4	2.00	7.99
E_Min	5.1	6.1	0.00	0.50
Volts	1.3	1.2	1.07	1.35



Portable Real Time Data Acquisition System (PRT DAS)

Application :

Qualification Testing of CRYO Temperature Transducers



Features :

- Data acquisition from Pressure Transducers (3nos.) and Cryo Temperature Transducers (12nos.)
- To measure response time of Cryo Temperature Transducers
- To provide highly stable excitation current of <0.5mA to Cryo Temperature Transducers
- Conversion of acquired raw data to equivalent engineering units
- Configuration of data acquisition parameters viz., Sensors & graph parameters, Data logging parameters
- Acquire and display of acquired data through a suitable Graphical User Interface (GUI)
- Hierarchical pull-down menus for all operations with short cut keys
- Zoom, Pan and Measurements options
- Data logging, storing with date & time stamp, compatible for processing in MS-EXCEL
- Status log and diagnostics
- Read from stored file and printing options

Typical MMI Screens for PRT DAS



Edit Polynomial Constants

iChild	Name	PolyOrder	a0	a1	a2	a3	a4
1	Ref Volt	1	0	1			
2	PT1	4	0	1	0	0	0
3	PT2	4	0	1	0	0	0
4	PT3	4	0	1	0	0	0
5	CT1a	1	0	193			
6	CT1b	1	0	193			
7	CT1c	1	0	193			
8	CT2a	1	0	193			
9	CT2b	1	0	193			
10	CT2c	1	0	193			
11	CT3a	1	0	193			
12	CT3b	1	0	193			
13	CT3c	1	0	193			
14	CT4a	1	0	193			
15	CT4b	1	0	193			
16	CT4c	1	0	193			

Buttons: Cancel, Apply, Refresh, Done

System Parameters

Sample Rate	10	Samples / Sec
History	50	Sec
Log Duration	100	Sec
Auto Save Dur	5	Sec
Excel Row Limit	32000	Rows
X Axis - Min		Sec
X Axis - Max		Sec

Mouse Zoom Option: X X & Y Mouse Pan Option: X X & Y

Data Log Directory: E:\Effort\kps\BaHN\ISRO-Prasad-PRTDas\Test1_SIT

Buttons: Cancel, Apply, Exit

Configure CryoTemp 3a

Configure Plot Channels

Plot No	Signal Name	Ev Min	Ev Max	Axis	Plot Color	Plot Style	Plot Width
1	CT3a			Y1	Magenta	Solid	3

Configure Axes

Axis	Min	Max	Maj Div	Min Div	Maj Grid	Min Grid	Maj Tick	Min Tick	MajGrd Color	MnrGrd Color
X	0	100	5		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Y1	0	600.00	4		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Y2	0	200			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

Chart Background Color:

Chart Name: CryoTemp 3a

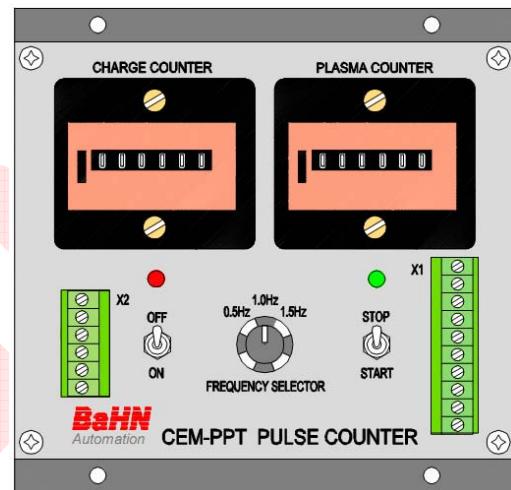
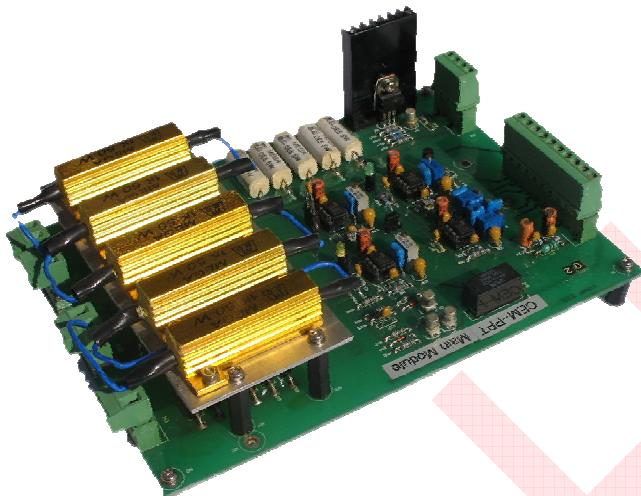
Buttons: Cancel, Apply, Done



Control Electronics Module for Pulsed Plasma Thruster (CEM PPT)

Application :

Technology Demonstration of Pulsed Plasma Thruster



Features :

- Main Discharge Module for charging the capacitor bank of PPT
- Discharge Ignition Module for operating the Exciter Box for igniting the spark plug
- Time Synchronization Module for synchronization of Main Discharge & Ignition Module
- Counter Modules for counting the number of charge pulses and plasma pulses during operation of the thruster
- Selection of duty cycle frequency from 0.5Hz to 1.5Hz