



Research Private Limited

User's Manual

Computerized **ENGINE SIMULATION** **TESTING** Machine



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- Please read this manual carefully before using.
- Retain it for future reference.

Safety Precautions

CAUTION

- Read the user manual carefully
- Contact the authorized service technician for repair or maintenance of the machine
- Ensure the MCB for the starter motor is pulled down before mounting an engine
- The engine should be placed on dampers and bolts should be tightened by applying a certain torque [to avoid hazards and read vibration sensor values accurately]
- Ensure the sensor wires are correctly placed in their desired positions while dismantling or assembling the engine to avoid squashing of wires
- Connect the wires by matching the colour coding [failing in colour matching may occur hazards to sensors which may lead to malfunction or depict error in sensor values]
- Ensure the protective cover for moving parts are pulled down and clamped to avoid hazards
- In case of any sensor malfunction, ensure to replace the faulty sensor with the same specification provided in the name of parts chart [refer to page No.3]
- Please turn off the MCB's of the machine before cleaning or maintenance in order to avoid hazards.

Name of the Parts

- Sensors**

Sensor Name	Make & Model	Description	Range	Picture
Blow Bye Pressure sensor	Danfoss MBS 3000 060G1106	Output : Variable Current(4-20mA)	0-16 BAR	
Compression Pressure Sensor of 1 st Cylinder	Danfoss MBS 3000 030G1133	Output : Variable Current(4-20mA)	0-60 BAR	
Compression Pressure Sensor of 2 nd Cylinder	Danfoss MBS 3000 030G1133	Output : Variable Current(4-20mA)	0-60 BAR	
Coolant Temperature	0-5 Volt Uno Minda	Output : Variable Voltage(0-5V)	-80 TO 130 Degree cel.	
Manifold Air Flow	Bosch MAF Sensor 0281002862 86J0 - 5 V	Output : Variable Voltage(0-5V)	0-410 kg/hr	
Manifold Air Pressure	DENSO MAP SENSOR 079800-5050 5V	Output : Variable Voltage(0-5V)	0-2 BAR	
Oil Pressure Sensor	Danfoss MBS 3000 060G1106	Output : Variable Current(4-20mA)	0-16 BAR	
Oil Temperature Sensor	Uno Minda TD - 1119	Output : Variable Voltage(0-5V)	-80 TO 130 Degree cel.	
Solenoid Valve	GALAXY 7000 BH15V	Input : AC Current(220V)	2.5 MM ORIFICE	
RPM Sensor	BCH Proximity NPN 24 Volt	24 Volt DC Digital output	Upto 5000 RPM	

• Electronic System

Part Name	Description	Picture
PLC Fuji (NAOPB24R-34C)	Main Control System	
HMI Fuji (TS-1070S)	Graphical User Interface(GUI)	
Analog Card Fuji (NAOAW06-MR)	ADC- Converts Analog signals to Digital for PLC	
Relay Card (8CH 24V DC)	Control System for Buttons & Switches	
Mitsubishi Drive 7.5 KW(VFD) FRE740170EC	Motor Drive	
Contactor (Schneider)	Contactor for switching on the Coolant Pump	
24 Volt Power Supply	24 Volt 6.5 Amp SMPS	
12 Volt Power Supply	12 Volt 30 Amp	
5 Volt Power Supply	5 Volt 2.1 Amp SMPS	
Relay (12Volt) Starter motor Relay.	A Relay to self start the Engine	

- Buttons, Switches & Miscellaneous**

Part Name	Description	Picture
MCB 63 AMP (3 switch)	Power on the Motor Drive (VFD)	
MCB 63 AMP (4 switch)	Power on the Machine	
Illuminated 220v Green	Button to Start the Test run	
Illuminated 220v Red	Button to stop the ongoing test	
Emergency Stop	Emergency Stop	
Switch (On/Off)	On / OFF the machine	
Cooling Fan's (5)	220 V AC	

Panel Sheet Layout

			
VFD(7.5Kw) for main Motor	SMPS Output – 2.1Amps 24V DC	SMPS Output – 30Amps 12V DC	SMPS Output – 2.1Amps 5V DC

Main PLC Unit

			
Main CPU Unit	Analog Card's (1 st , 2 nd and 3 rd)	Relay Card 8-Channel 24V DC Relay	Relay for Starter Motor 12V
			
Terminal Block Units		Coolant Contactor	



USB Port



HMI – Human Machine Interface



Cycle Start Button



Cycle Stop Button

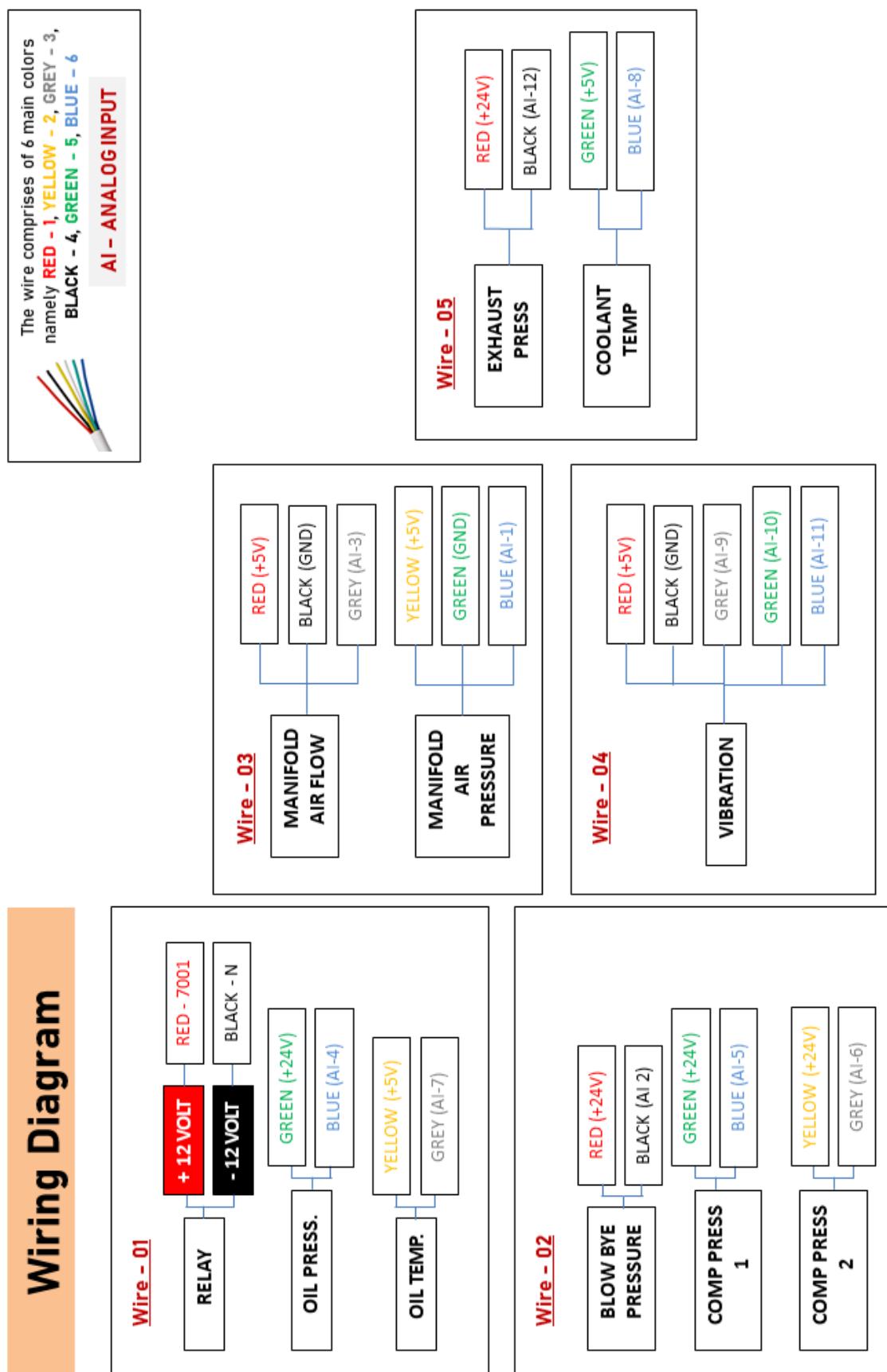


ON/OFF Button



Emergency Button

Wiring Diagram



Main CPU Input Wiring Detail

S/S	SINK SOURCE POINT	24V DC INPUT
X0	4000	MAIN DRIVE READY
X1	4001	SWITCH EMG
X2	4002	SWITCH START
X3	4003	SWITCH STOP
X4	4004	SPARE
X5	4005	SENSOR_SPEED
X6		SPARE
X7		SPARE
X8		SPARE
X9		SPARE
X10		SPARE
X11		SPARE
X12		SPARE
X13		SPARE

PLC Output Wiring Detail

C0	0V	24V DC INPUT (0V)
Y0	6000 (R3)	COOLANT PUMP
Y1	6001 (R2)	OIL SV
C2	0V	24V DC INPUT (0V)
Y2	6002 (R3)	MAIN MOTOR FWD COMMAND
Y3	6003 (R4)	STARTER MOTOR RELAY
C4	0V	24V DC INPUT (0V)
Y4	SPARE	
Y5	SPARE	
C6	0V	24V DC INPUT (0V)
Y6	SPARE	
Y7	6007	LAMP CYCLE START
Y8	6008	LAMP CYCLE STOP
Y9	SPARE	

PLC ANALOG CARD - 01 Wiring Detail

+24V	24V	+24V DC INPUT
0V	0V	0V DC INPUT (-24V DC)
00+	A10+	MAIN DRIVE ANALOG INPUT (0 - 5V DC)
00-	A10_-	
01+	SPARE	
01-	SPARE	
I0+	15	MANIFOLD AIR PRESSURE [0 - 140 bar] [0 - 5V ANALOG INPUT]
I0-	0V	
I1+	16	BLOW BYE PRESSURE [4 - 16 bar] [4 - 20mA]
I1-	0V	
I2+	17	MANIFOLD AIR FLOW [0 - 410 bar] [0 - 5V ANALOG INPUT]
I2-	0V	
I3+	18	OIL PRESSURE [0 - 60 bar] [4 - 20mA]
I3-	0V	

PLC ANALOG CARD - 02 Wiring Detail

+24V	24V	+24V DC INPUT
0V	0V	0V DC INPUT (-24V DC)
00+	SPARE	
00-	SPARE	
01+	SPARE	
01-	SPARE	
I0+	19	COMPRESSION PRESSURE CYLINDER - I [4-20ma] [0-60bar]
I0-	0V	
I1+	20	COMPRESSION PRESSURE CYLINDER - II [4-20ma] [0-60bar]
I1-	0V	
I2+	21	OIL TEMPERATURE [0 - 5V ANALOG INPUT] [-80°C - 130°C]
I2-	0V	
I3+	22	COOLANT TEMP [0 - 5V ANALOG INPUT] [-90°C - 130°C]
I3-	0V	

PLC ANALOG CARD - 03 Wiring Detail

+24V	24V	+24V DC INPUT
0V	0V	0V DC INPUT (-24V DC)
00+	SPARE	
00-	SPARE	
01+	SPARE	
01-	SPARE	
I0+	23	X – AXIS VIBRATION [0 – 5V ANALOG INPUT]
I0-	0V	
I1+	24	Y – AXIS VIBRATION [0 – 5V ANALOG INPUT]
I1-	0V	
I2+	25	Z – AXIS VIBRATION [0 – 5V ANALOG INPUT]
I2-	0V	
I3+	26	EXHAUST AIR PRESSURE [4-20ma] [0-16bar]
I3-	0V	

GUI - Guidelines

Starting Pages



Home Page

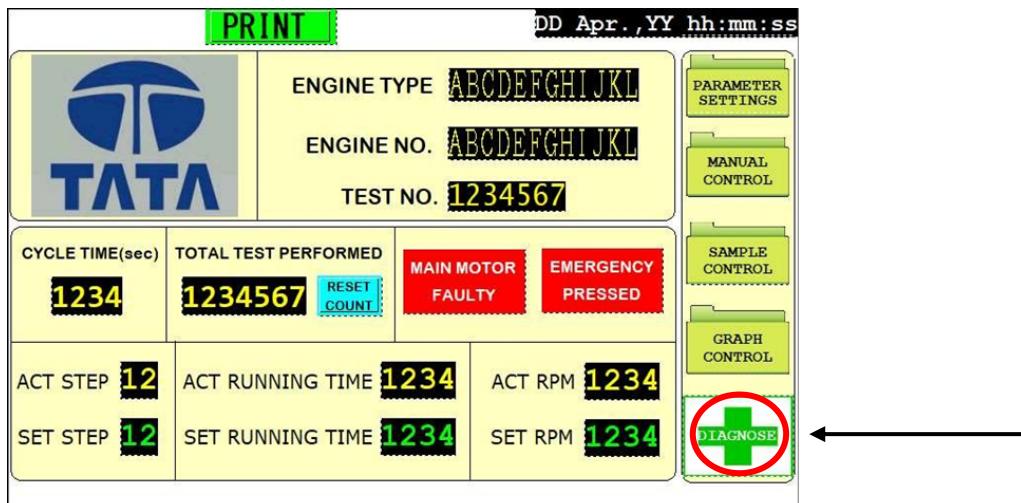
The home page interface is designed for a vehicle diagnostic system. It includes the following elements:

- Header:** A green bar at the top with "PRINT" and "DD Apr., YY hh:mm:ss".
- Branding:** A large TATA logo on the left.
- Information:** Text fields for "ENGINE TYPE" (ABCDEFHIJKLMNOP), "ENGINE NO." (ABCDEFHIJKLMNOP), and "TEST NO." (1234567).
- Metrics:** A grid of metrics including "CYCLE TIME(sec)" (1234), "TOTAL TEST PERFORMED" (1234567 with a "RESET COUNT" button), "MAIN MOTOR FAULTY" (red button), "EMERGENCY PRESSED" (red button), "ACT STEP" (12), "ACT RUNNING TIME" (1234), "ACT RPM" (1234), "SET STEP" (12), "SET RUNNING TIME" (1234), and "SET RPM" (1234).
- Navigation:** A vertical sidebar on the right with buttons for "PARAMETER SETTINGS", "MANUAL CONTROL", "SAMPLE CONTROL", "GRAPH CONTROL", and "DIAGNOSE".

Diagnose: In Diagnose menu, the programmer can find and locate the sensor input and control button output pins which are connected to PLC – Programmable Logic Controller.

Steps to open Diagnose window

- Click on the Diagnose button on the home page as shown



A new window will be opened, named INPUT as shown below

MODE:INPUT			
X0	MAIN DRIVE READY	X8	SPARE
X1	SWITCH_EMG	X9	SPARE
X2	SWITCH_START	X10	SPARE
X3	SWITCH_STOP	X11	SPARE
X4	SPARE	X12	SPARE
X5	SENSOR_SPEED	X13	SPARE
X6	SPARE		
X7	SPARE		

MAIN

OUTPUT
DIAGNOSE

- Click on the OUTPUT DIAGNOSE button to locate output pins



A new window will be opened, named OUTPUT as shown below

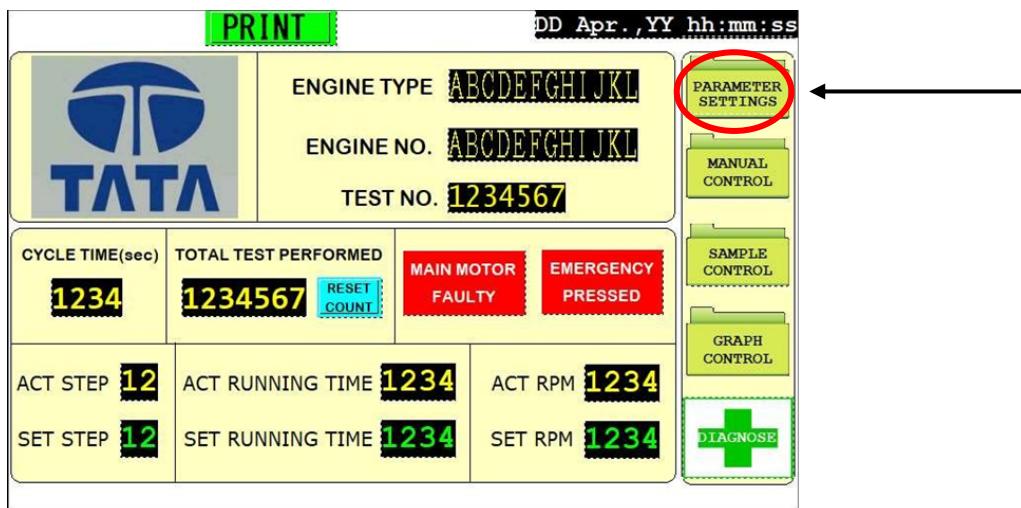


Note: Don't change any of the parameters in Diagnose menu as it may intend to read errors in sensor values or may misguide the machine from input or output buttons.

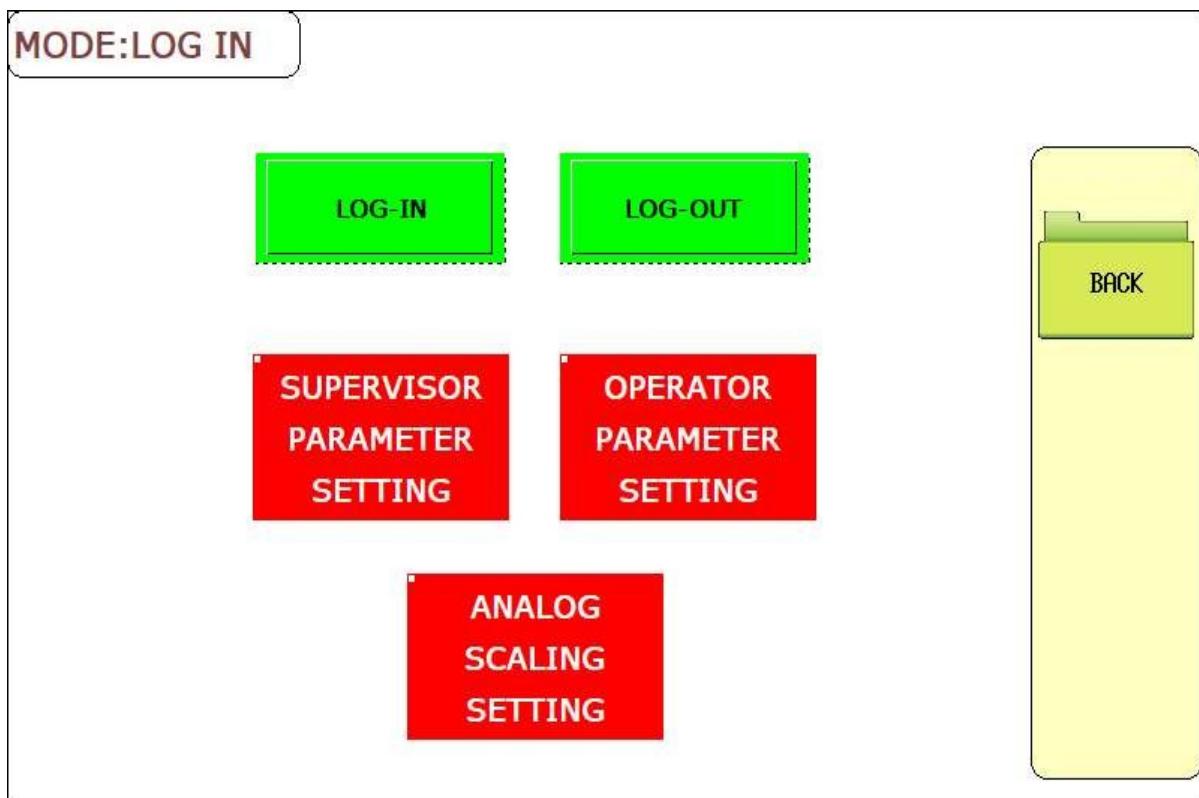
Parameter Settings: In here there are three main parameter settings (Supervisor parameter settings, Operator parameter settings, and Analog scaling settings) which are delimited by Supervisor, Operator, and System Engineer respectively.

Steps to open **PARAMETERS SETTINGS** window

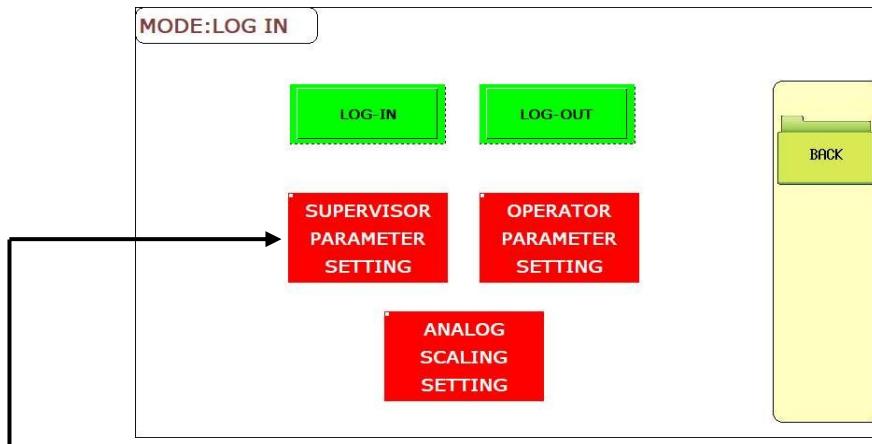
- Click on the Parameter Settings button on the home page as shown



A new window will be opened, named **LOG IN** as shown below

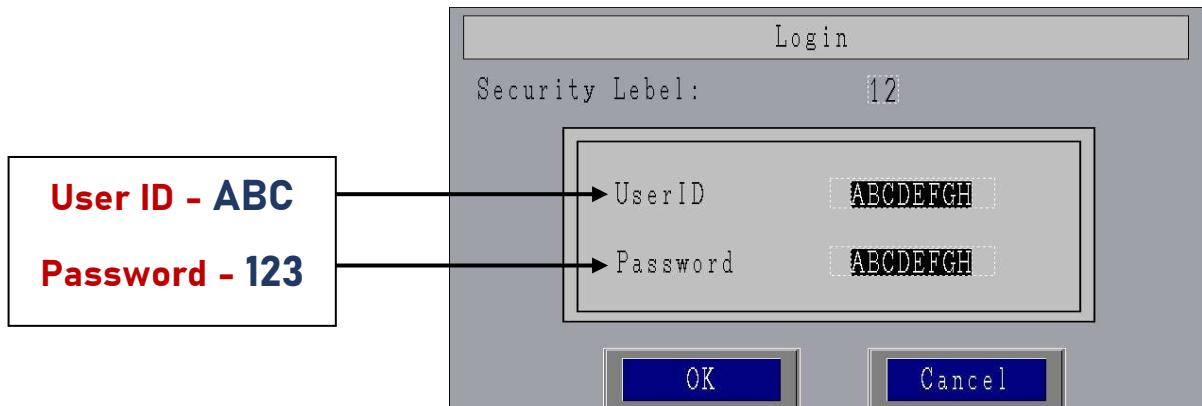


Supervisor Parameter Setting: This can be only accessed by Supervisor to set parameters of a respective Engine.

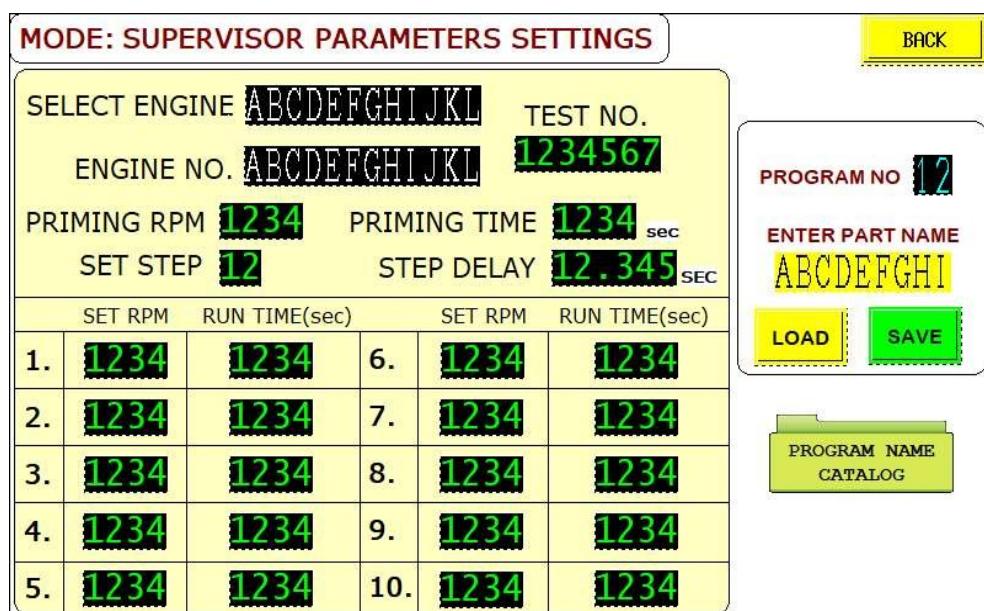


Click on **SUPERVISOR PARAMETER SETTING**, a new window will be opened requesting a username and a password.

Enter the following details to access the supervisor parameter settings window -

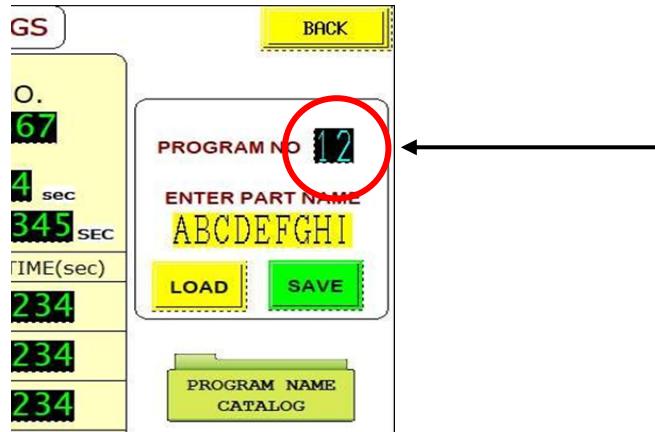


After entering the username and password a new window will be opened as shown below -

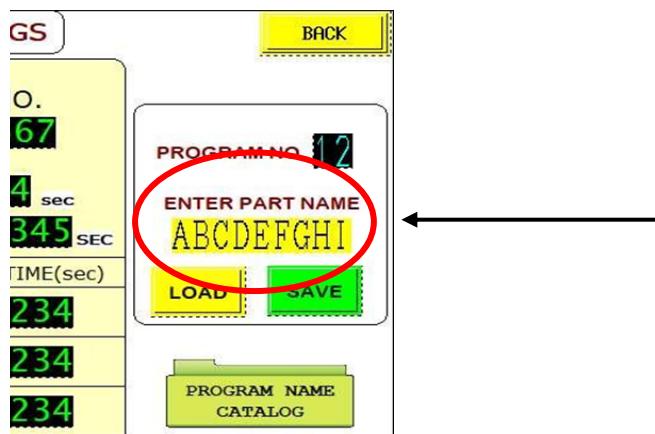


Follow the steps to set default parameters for a respective Engine

- First input any number in the blank beside the **Program No** (for Ex.12)



- Enter the **Part Name** for reference purposes (for Ex. TATA_ACE01)



- Enter Engine Name in **Select Engine Tab** (for Ex. TATA_ACE)



- Enter Engine Number in **Engine No. Tab** (for Ex. ACE_0808)



- Set the **Priming RPM and Time** – for which the motor should run for a certain time before the cycle test (for Ex. RPM – 900, Time - 50)

MODE: SUPERVISOR PARAMETERS SETTINGS

SELECT ENGINE ABCDEFGHIJKL	TEST NO.
ENGINE NO. ABCDEFGHIJKL	1234567
PRIMING RPM 1234	PRIMING TIME 1234 sec
SET STEP 12	STEP DELAY 12.345 SEC

- Set number of steps required to complete the cycle test (For Ex.8)
[In here, 8 number of rows will be created]

MODE: SUPERVISOR PARAN

SELECT ENGINE ABCDEFGH	
ENGINE NO. ABCDEFGH	
PRIMING RPM 1234	PRIM
SET STEP 12	ST

- Now in the table set different **RPM's and run time** as per the requirement for testing the respective Engine

SET STEP 12		STEP DELAY 12.345 SEC	
SET RPM	RUN TIME(sec)	SET RPM	RUN TIME(sec)
1. 1234	1234	6. 1234	1234
2. 1234	1234	7. 1234	1234
3. 1234	1234	8. 1234	1234
4. 1234	1234	9. 1234	1234
5. 1234	1234	10. 1234	1234

- And at last, click on Save

O. 67 4 sec 345 SEC TIME(sec) 234	PROGRAM NO 12 ENTER PART NAME ABCDEFGHII LOAD SAVE
--	--

Here, a default program parameter is created and saved in the shared memory of the **PROGRAM NAME CATALOG** with the following values entered

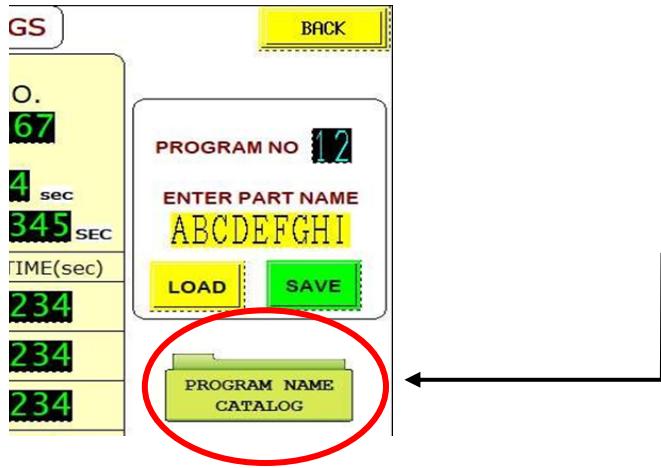
Program Number – 12 Engine No - ACE_0808 Select Engine - TATA_ACE

Part Name - TATA_ACE01 Priming RPM – 900 Priming time – 50sec

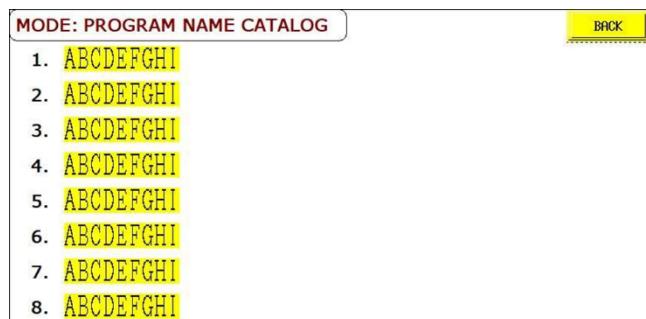
Set Steps – 8 and with the other parameters entered

To check and manipulate different programs saved, follow the steps navigated below

- To check the number of programs saved, Click on **PROGRAM NAME CATALOG**

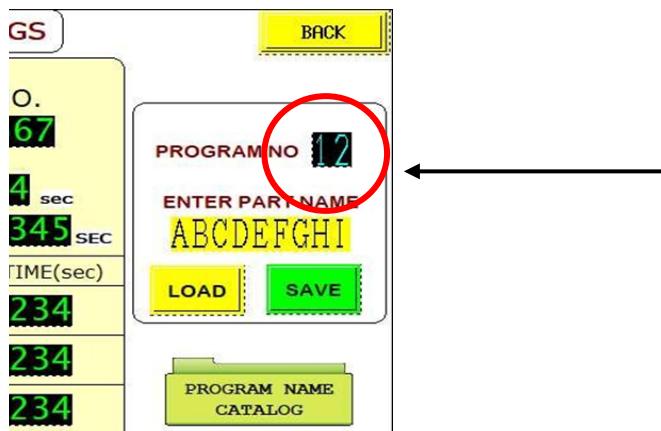


- A new window will be opened, in which all saved programs listing is displayed [In here all program parameters are saved with the name given, for Ex. In the previous tutorial, we saved a program in the shared memory with program No.12 and Part Name TATA_ACE01. Supervisor and Operator can locate this in the Program Name Catalogue]

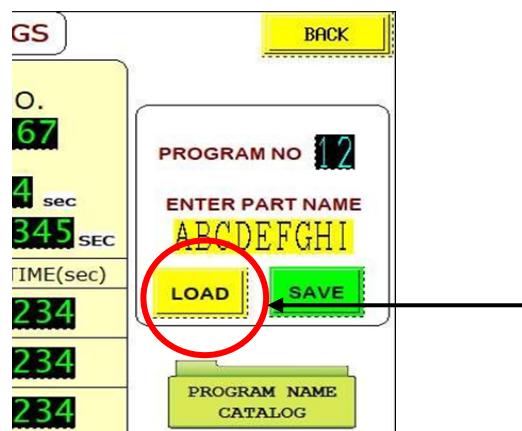


To load a previously saved program, follow the below steps

- Enter the Program Number which you want to load the parameters and display it on the display (For Ex.12)



- Now click on LOAD



[Here, the parameters which we had set in the previous tutorial will load up and be displayed on their respective blanks]

Program Number - 12

Engine No - ACE_0808

Select Engine - TATA_ACE

Part Name - TATA_ACE01

Priming RPM - 900

Priming time - 50sec

Set Steps - 8 and with the other parameters entered

MODE: SUPERVISOR PARAMETERS SETTINGS					
SELECT ENGINE	TATA_ACE		TEST NO.		
ENGINE NO.	ACE_0808		1234567		
PRIMING RPM	900	PRIMING TIME	50	sec	
SET STEP	08	STEP DELAY	12.345		SEC
SET RPM	900	RUN TIME(sec)	20	SET RPM	RUN TIME(sec)
1.	900		6.	1800	20
2.	1100		7.	1900	25
3.	1300		8.	2000	15
4.	1400				
5.	1700				

BACK

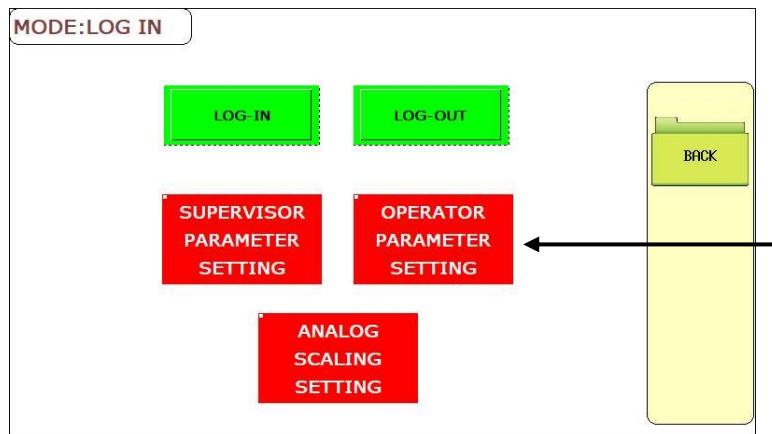
PROGRAM NO 12

ENTER PART NAME
TATA_ACE01

LOAD SAVE

PROGRAM NAME CATALOG

Operator Parameter Setting: This can be only accessed by the operator to select parameters that are retained by the supervisor of the respective Engine.



Press on **OPERATOR PARAMETER SETTING**, a new window will be opened requesting a username and a password.

Enter the following details to access the operator parameter settings window -

A "Login" window with a "Security Label" of "12". It has two input fields: "UserID" containing "ABCDEFGH" and "Password" containing "ABCDEFGH". To the left, "User ID - CBA" and "Password - 321" are highlighted in red. At the bottom are "OK" and "Cancel" buttons.

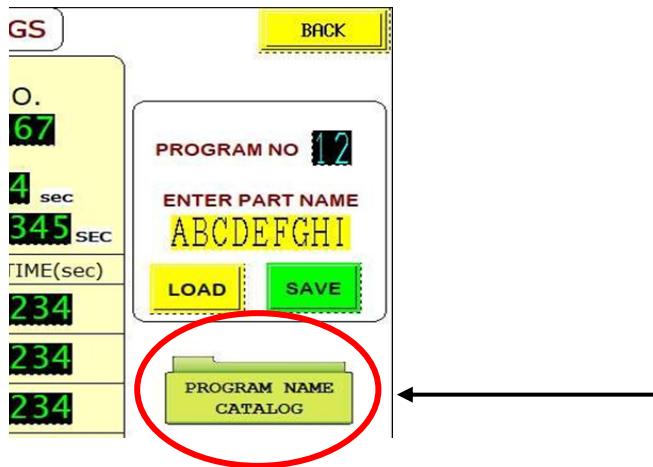
After entering the username and password a new window will be opened as shown below -

The main window title is "MODE: OPERATOR PARAMETERS SETTINGS". It shows engine selection: "SELECT ENGINE ABCDEFGHIJKL" and "TEST NO. 1234567". Below are "ENGINE NO." (ABCDEFHIJKL), "PRIMING RPM 1234", "PRIMING TIME 1234 sec", "SET STEP 12", and "STEP DELAY 12.345 SEC". A table follows with rows for steps 1 through 10, each with "SET RPM" and "RUN TIME(sec)" columns. To the right is a "PROGRAM NO. 12" section with "ENTER PART NAME ABCDEFGHI" and a "LOAD" button. At the bottom is a "PROGRAM NAME CATALOG" button.

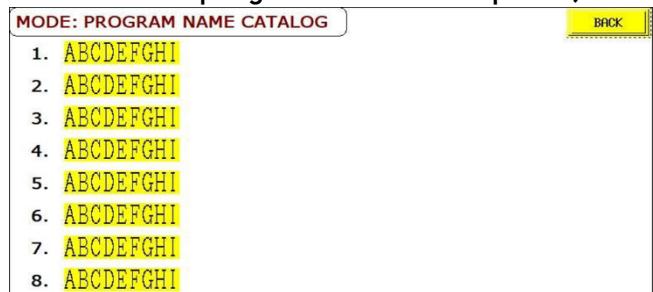
	SET RPM	RUN TIME(sec)	SET RPM	RUN TIME(sec)
1.	1234	1234	6.	1234
2.	1234	1234	7.	1234
3.	1234	1234	8.	1234
4.	1234	1234	9.	1234
5.	1234	1234	10.	1234

Follow the steps to select default parameters for the respective Engine

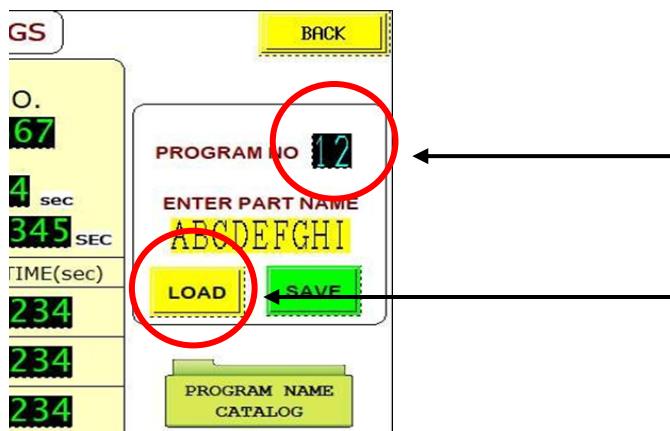
- Press on **PROGRAM NAME CATALOG** and a new window will be opened with the number of programs



- A list will be appeared with the Part name and Program Number (Keep in mind for the exact program number required) and press back



- Enter the desired **Program number** (For Ex.12) in the tab located and click on **LOAD**



- Enter the **Engine Name and Engine Number**



So here the default values which were programmed by the supervisor load up with program number 12 [which cannot be manipulated by the operator].

MODE: SUPERVISOR PARAMETERS SETTINGS						BACK
SELECT ENGINE		TATA_ACE		TEST NO.		
ENGINE NO.		ACE_0808		1234567		
PRIMING RPM		900	PRIMING TIME	50	sec	
SET STEP		08	STEP DELAY	12.345	SEC	
SET RPM		RUN TIME(sec)	SET RPM	RUN TIME(sec)		
1.	900	20	6.	1800	20	
2.	1100	30	7.	1900	25	
3.	1300	35	8.	2000	15	
4.	1400	40				
5.	1700	30				

PROGRAM NO 12
 ENTER PART NAME
 TATA_ACE01
 LOAD SAVE
 PROGRAM NAME CATALOG

NOTE: The Operator has no access to change parameter values, in case of any requirement for changing in parameters contact the respective Supervisor.

Calibration & Sensor Scaling Values

Analog Scaling Setting: A programmable logic controller (PLC) uses a 16-bit analog-to-digital converter in an analog input card to convert 4-20 mA and 0-5V signals into digital number values ranging from 3277 (at 4 mA) to 16384 (at 20 mA) and 0 (at 0V) to 16384(at 5V).

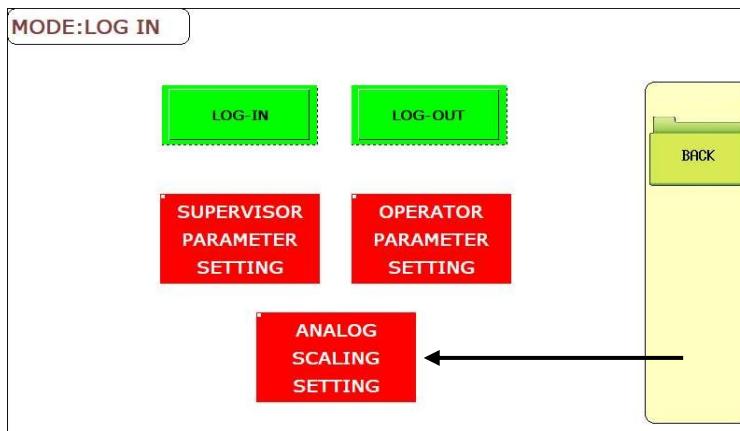
DEFAULT SCALING VALUES IN BYTES

SCALING	MINIMUM VOLTS IN BYTES	MAXIMUM VOLTS IN BYTES
0 - 5V	0	16384
4 - 20mA	3277	16384

DEFAULT SCALING VALUES IN BYTES AND CORRESPONDING UNITS

SENSOR NAME	OUTPUT	MINIMUM VOLTS IN BYTES	MAXIMUM VOLTS IN BYTES	MINIMUM VALUE IN UNITS	MAXIMUM VALUE IN UNITS
Manifold Air Pressure	0 - 5V	0	8192	0 bar	1.30 bar
Blow Bye Pressure	0 - 5V	0	8192	0 bar	1.30 bar
Manifold Air Flow	0 - 5V	0	8192	0 bar	410bar
Oil Pressure	4 - 20mA	3250	16380	0 bar	60bar
Compression Pressure I	4 - 20mA	3100	16380	0 bar	60bar
Compression Pressure II	4 - 20mA	3100	16380	0 bar	60bar
Oil Temperature	0 - 5V	0	8192	-80°C	130°C
Coolant Temperature	0 - 5V	0	8192	-90°C	130°C
X - Axis Vibration	0 - 5V	1850	5406	0 cm/sec ²	2940 cm/sec ²
Y - Axis Vibration	0 - 5V	1815	5406	0 cm/sec ²	2940 cm/sec ²
Z - Axis Vibration	0 - 5V	2118	5406	0 cm/sec ²	2940 cm/sec ²

Parameter Setting: This can be only accessed by the System Engineer to select parameters that are retained by the supervisor of the respective Engine.



Press on ANALOG SCALING SETTING, a new window will be opened requesting a username and a password.

Enter the following details to access the operator parameter settings window -

The image shows a 'Login' window with fields for 'User ID' and 'Password'. Arrows point from the text 'User ID - XYZ' and 'Password - 321' to their respective input fields. The 'User ID' field contains 'ABCDEFH' and the 'Password' field also contains 'ABCDEFH'. Below the fields are 'OK' and 'Cancel' buttons.

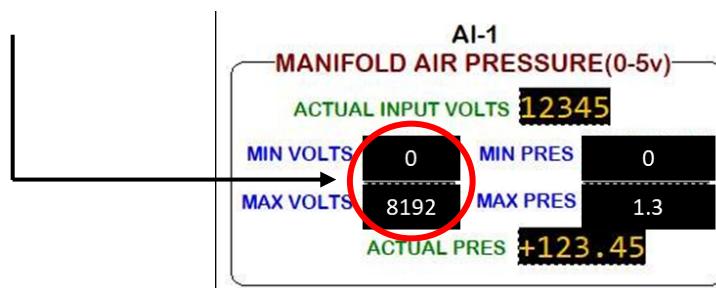
After entering the username and password a new window will be opened as shown below -

The image shows a window titled 'MODE: ANALOG INPUTS SCALING-1' with four sections: AI-1, AI-2, AI-3, and AI-4. Each section displays sensor details and configuration fields. The sections are:

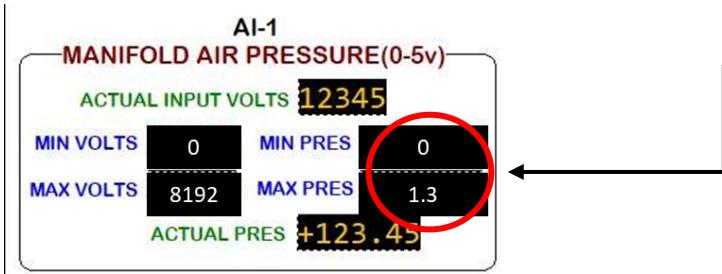
- AI-1 MANIFOLD AIR PRESSURE(0-5v)**: Actual Input Volts: 12345, Min Volts: 12345, Max Volts: 12345, Actual Pres: +123.45.
- AI-2 BLOW BYE PRESSURE(4-20ma)**: Actual Input Volts: 12345, Min Amps: 12345, Max Amps: 12345, Actual Pres: +123.45.
- AI-3 MANIFOLD AIR FLOW(0-5v)**: Actual Input Volts: 12345, Min Volts: 12345, Max Volts: 12345, Actual Pres: +1234.5.
- AI-4 OIL PRESURE(4-20ma)**: Actual Input Amps: 12345, Min Amps: 12345, Max Amps: 12345, Actual Pres: +123.45.

Steps to calibrate Analog scaling of a sensor which gives an output of 0-5V

- Considering the default details provided in the table given for the respective sensor and enter the values in their respective fields. [for Ex. Consider Manifold Air Pressure (0-5V), enter minimum volts in bytes for 0V output as '0', and maximum volts in bytes for 5V output as '8192'].

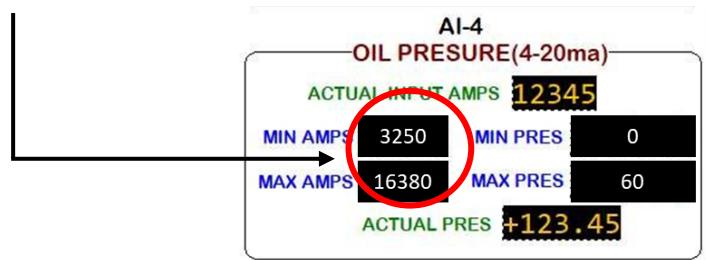


- Enter 0 bar in the minimum pressure field and 1.3 bar in the maximum pressure field. [DENSO Map sensor ranges from 0 – 1.3 bar]

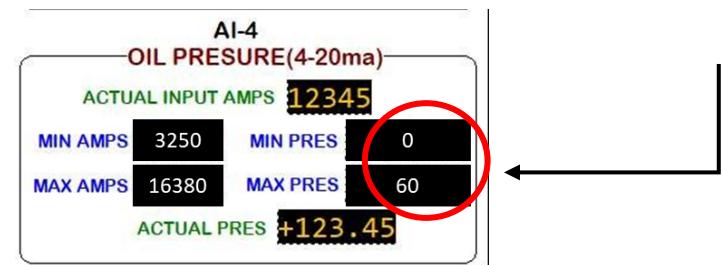


Steps to calibrate Analog scaling of a sensor which gives an output of 4-20mA

- Considering the default details provided in the table given for the respective sensor and enter the values in their respective fields. [for Ex. Consider Oil Pressure (4-20mA), enter minimum volts in bytes for 4mA output as '3250', and maximum volts in bytes for 20mA output as '16380'].



- Enter 0 bar in the minimum pressure field and 60 bar in the maximum pressure field. [DANFOSS MBS 3000 sensor ranges from 0 – 60 bar]

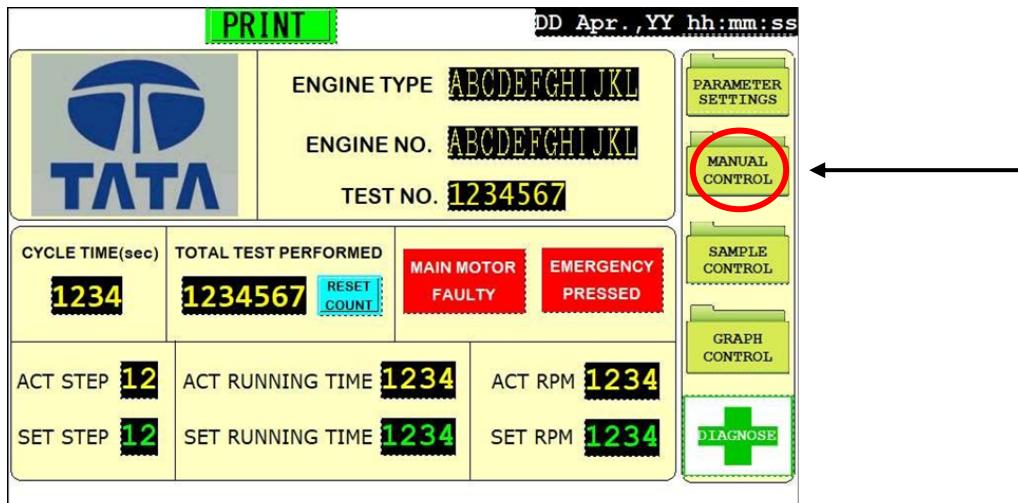


Manual Testing

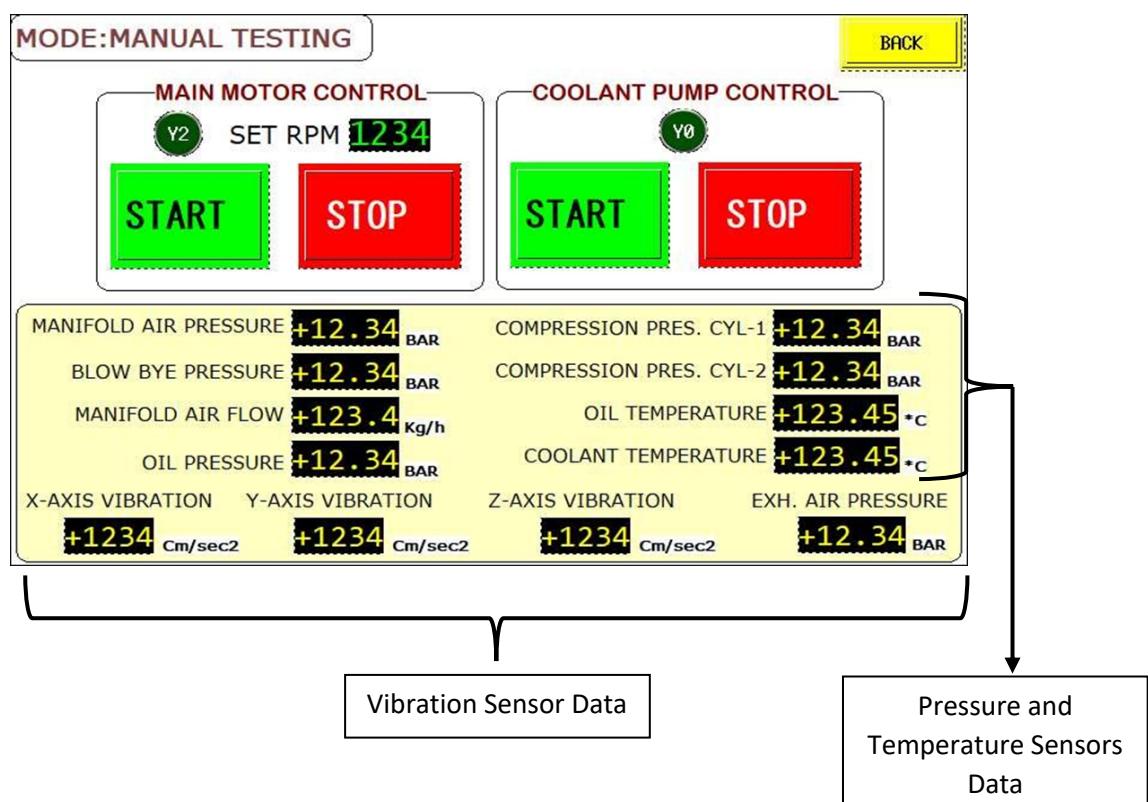
In a manual testing window, an operator can run the motor in different RPMs and can check the sensor outputs whether each sensor is functioning or not.

Steps to open Manual Testing window

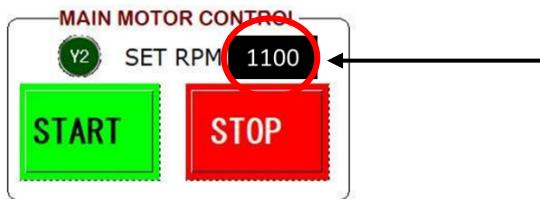
- Click on the Manual Control button on the home page as shown



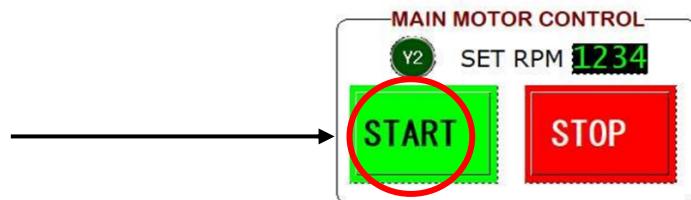
A new window will be opened, named **MANUAL TESTING** as shown below



- Enter certain RPM values, corresponding to SET RPM (For Ex.1100)



- To start the Main motor, click on the **START** button which is corresponding to the Main motor control

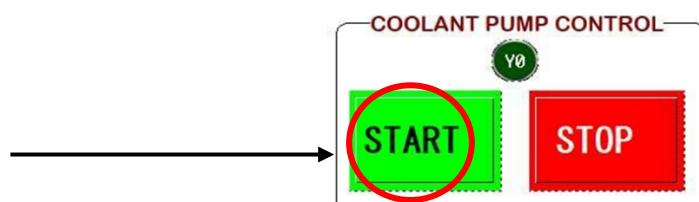


[Here, the motor starts to run at 1100 RPM, and all sensor values are displayed on the screen]

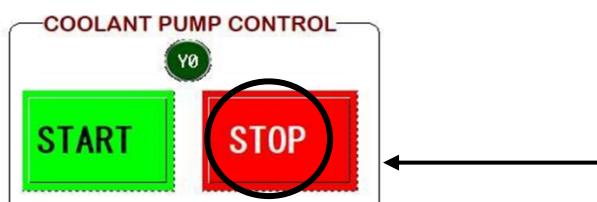
- To stop the Main motor, click on the **STOP** button which is corresponding to the Main motor control



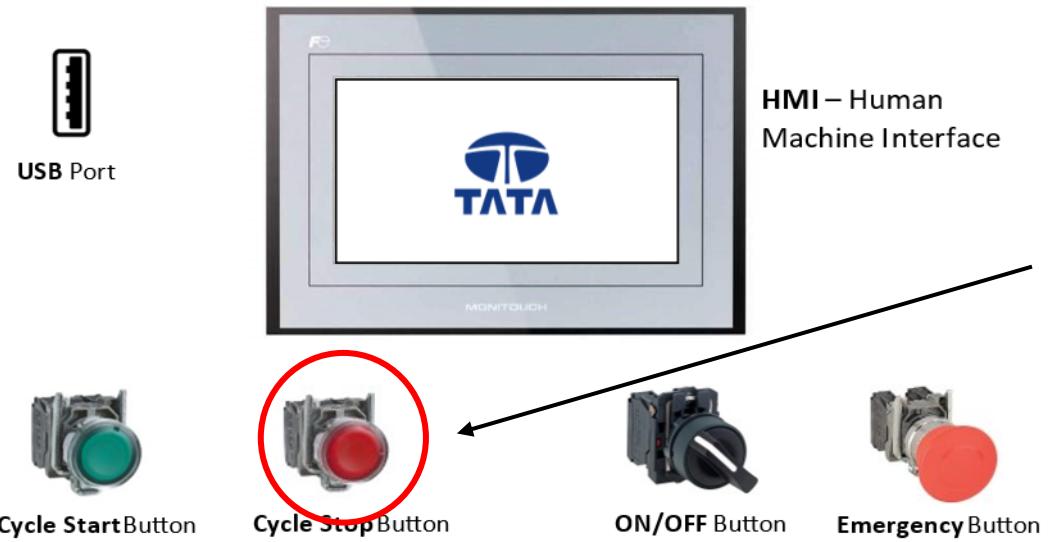
- To start the Coolant Pump, click on the **START** button which is corresponding to the coolant pump control



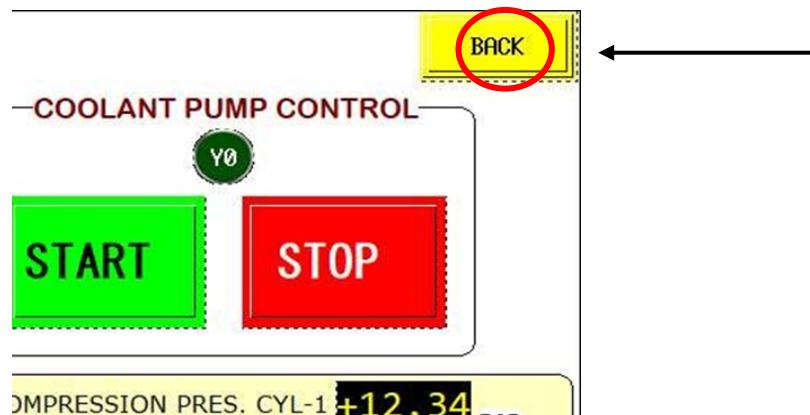
- To stop the Coolant Pump, click on the **STOP** button which is corresponding to the coolant pump control



- To stop all the running processes, press the red button on the operating panel



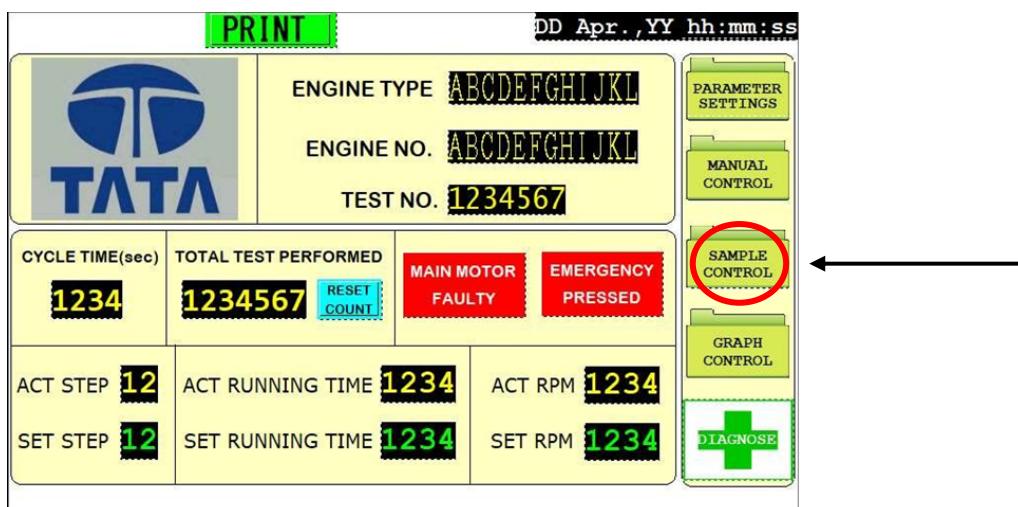
- Click on **BACK** to go back to the homepage



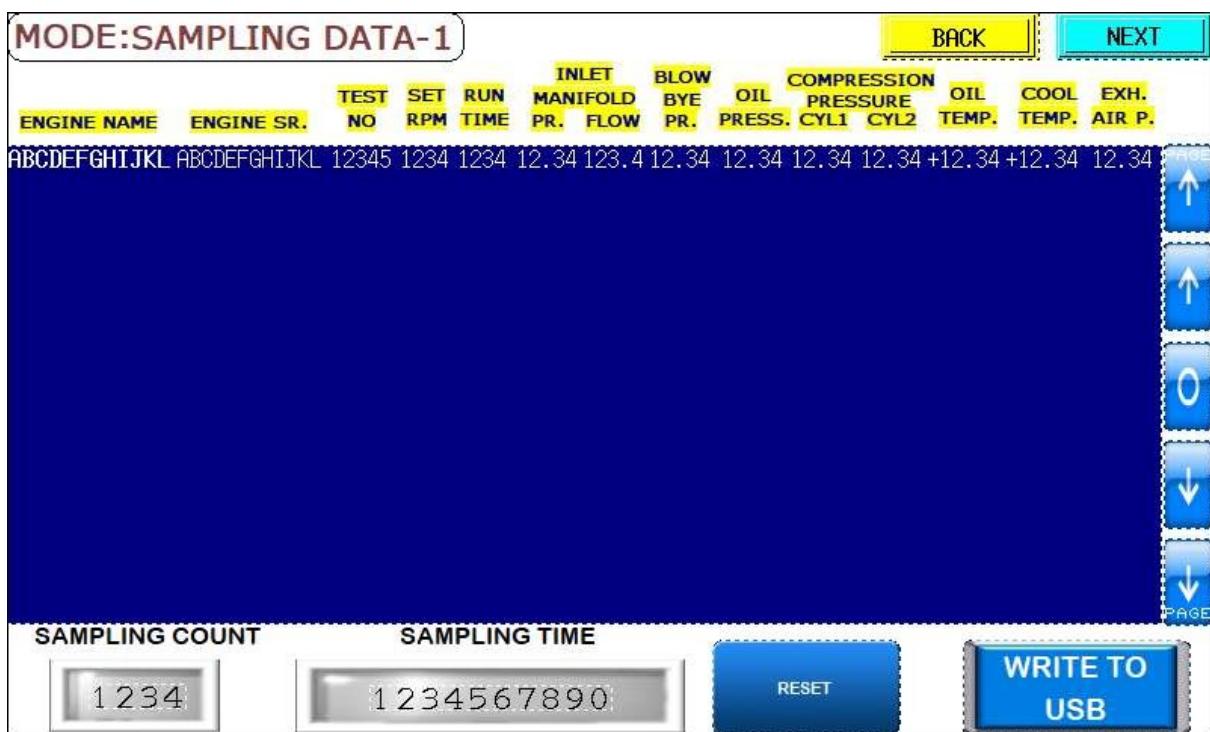
Sampling Data Control: In here the values of all sensors which are captured while testing a cycle run are saved in stacks in shared memory. An operator can observe the values, save the values into a hard drive, or can delete the complete data.

Steps to open Sampling Data-I window

- Click on the Sample Control button on the home page as shown

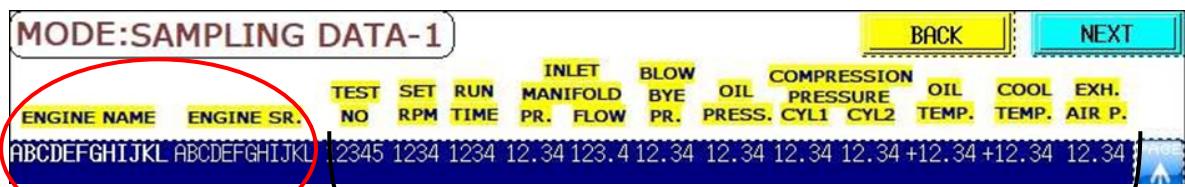


A new window will be opened, named **SAMPLING DATA-1** as shown below



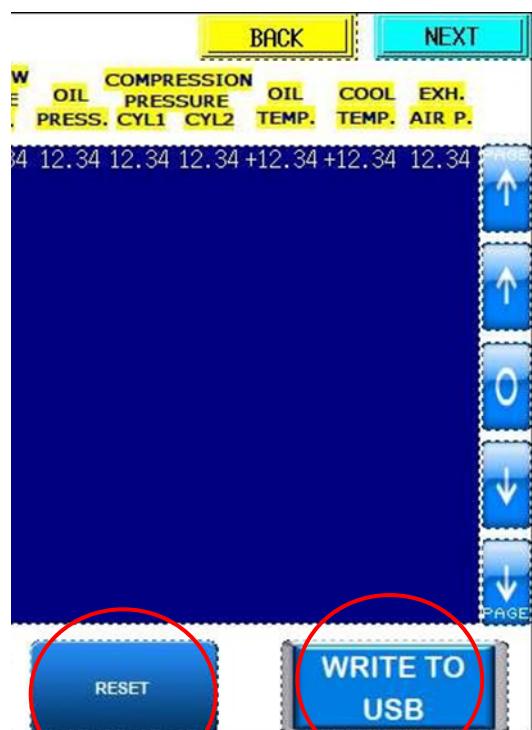
Steps to Observe and navigate saved data

- The whole data captured for all engines while running at different RPMs are saved in their respective rows indicating the Engine name and serial number and other parameters



Engine Name and Serial Number

Sensor values captured and stored



Navigation buttons for moving upward and downward directions

Write to USB to save whole data to an USB

Reset button to delete whole sampling data

To open vibration graph data, follow the below steps

- Click on the Next button, as shown in the figure

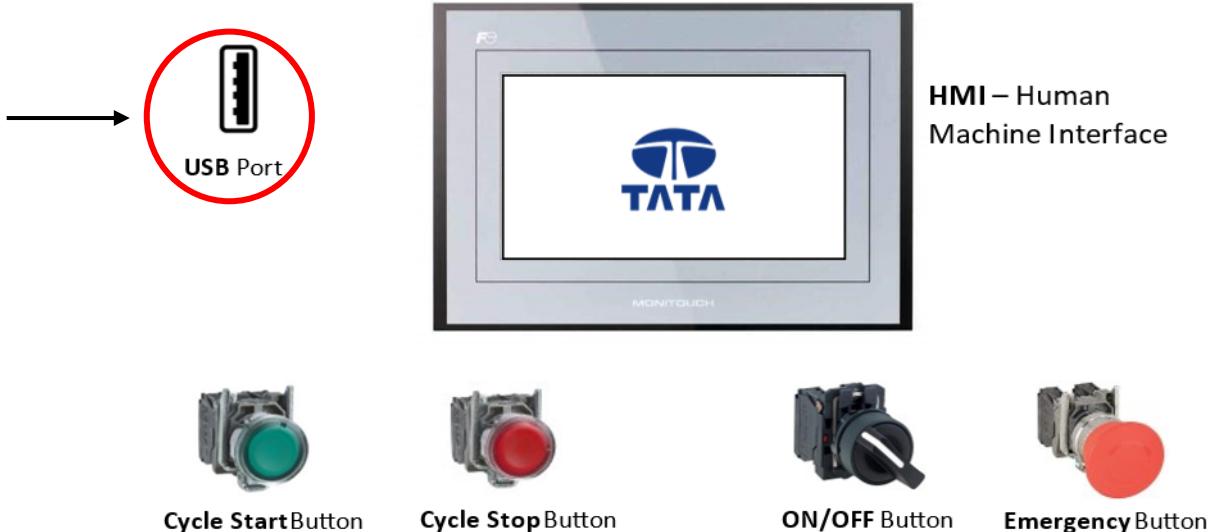


A new window will be opened, named **SAMPLING DATA II** as shown in the figure



To save data into a hard drive, follow the below steps

- Insert a drive in the USB port located on top of the display panel



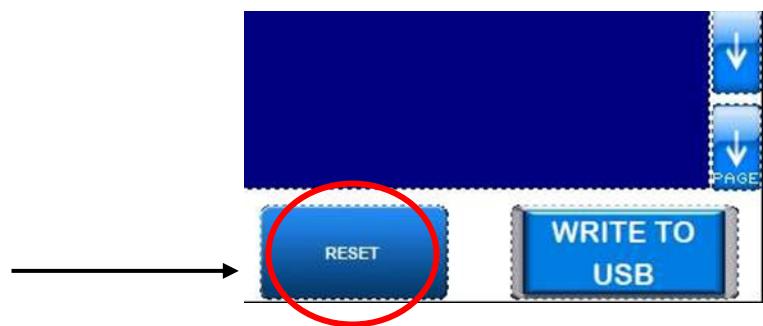
- Click on the WRITE TO USB button, as shown in the figure



[Here the whole data is stored in USB in the .xml format]

To delete data, follow the below steps

- Click on the RESET button, as shown in the figure

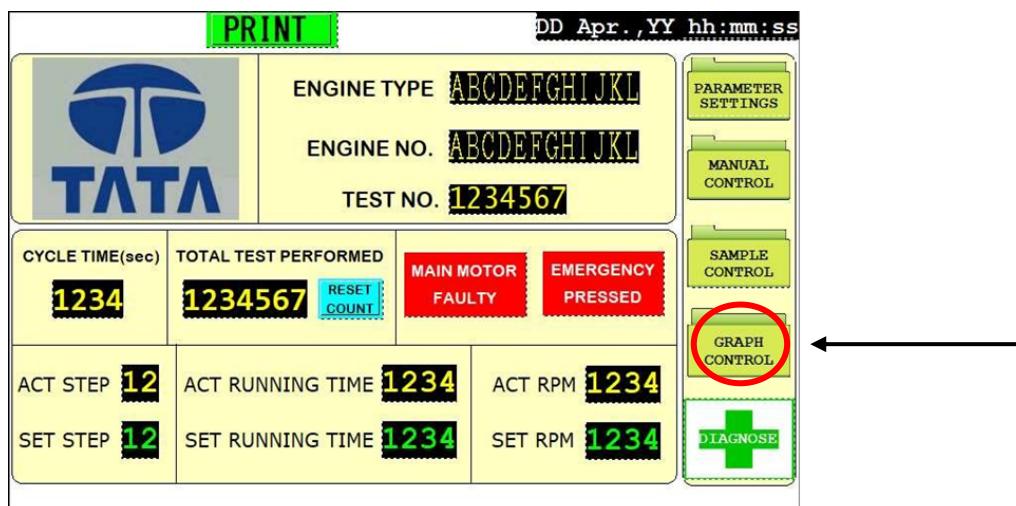


[Here the whole data will be deleted and the sampling data page will become empty]

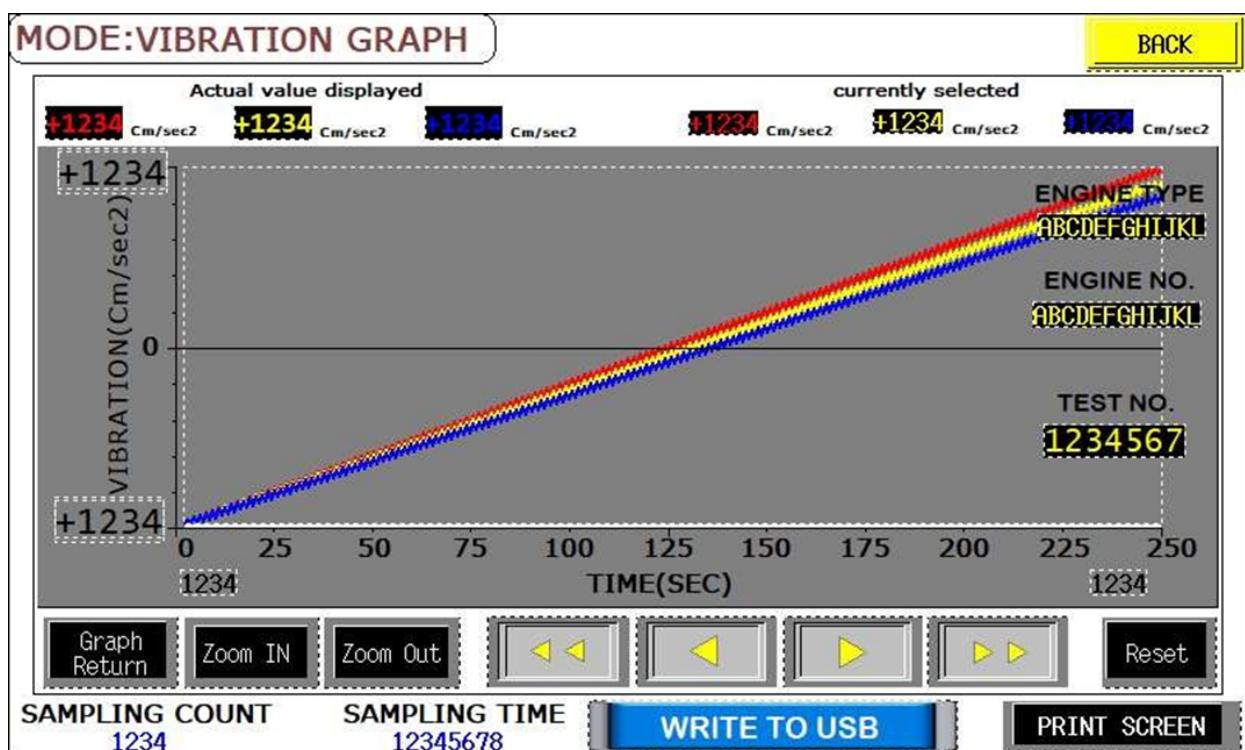
Sampling Data Control: In here the output signal of the vibration sensor is converted from bytes to cm/sec² and a live graph is plotted in 3-dimensional space, indicated as **RED** X-axis, **Yellow** Y-axis, and **Blue** Z-axis

Steps to open Vibration Graph Control window

- Click on the Graph Control Button on the home page as shown

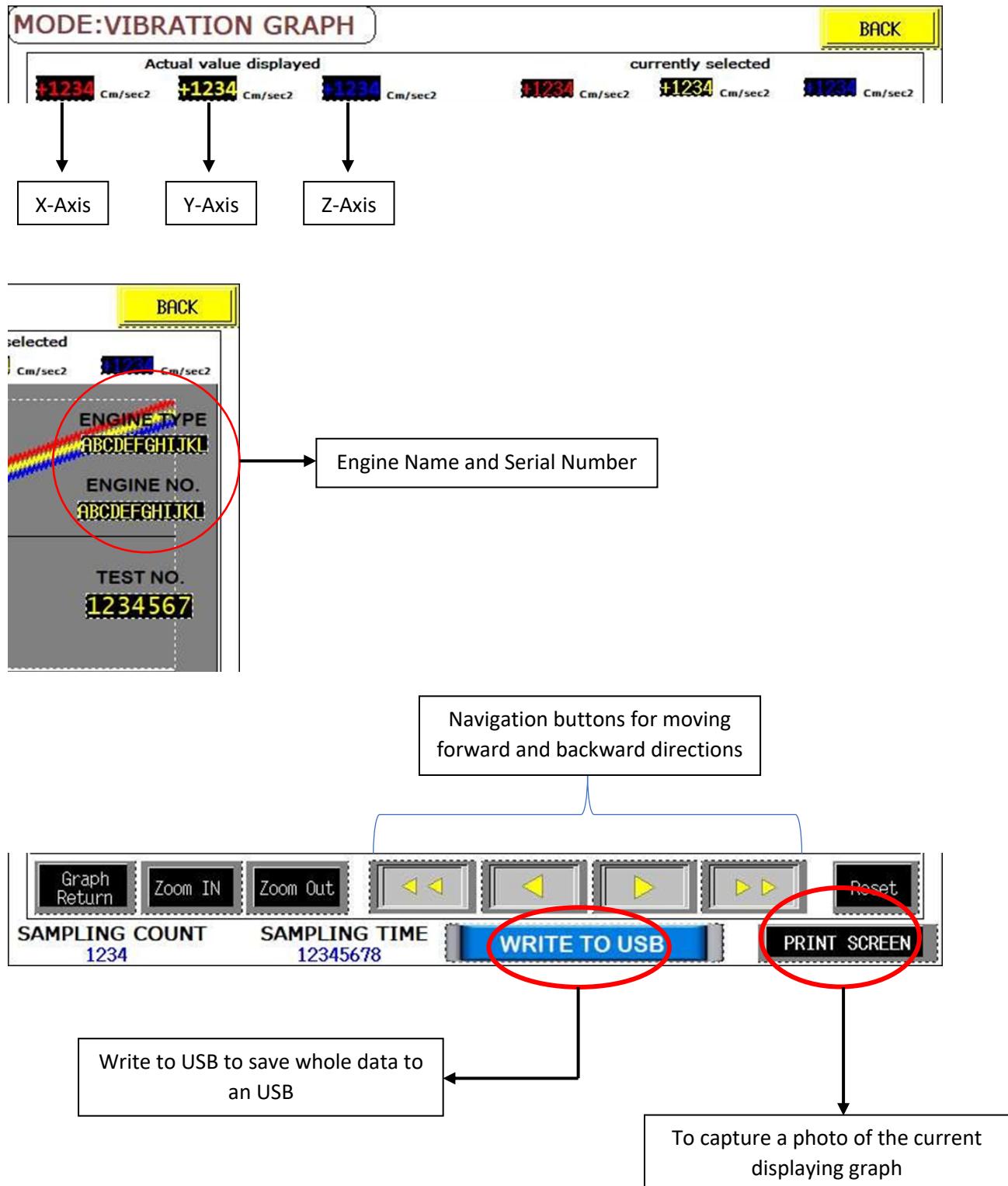


A new window will be opened, named **VIBRATION GRAPH** as shown below



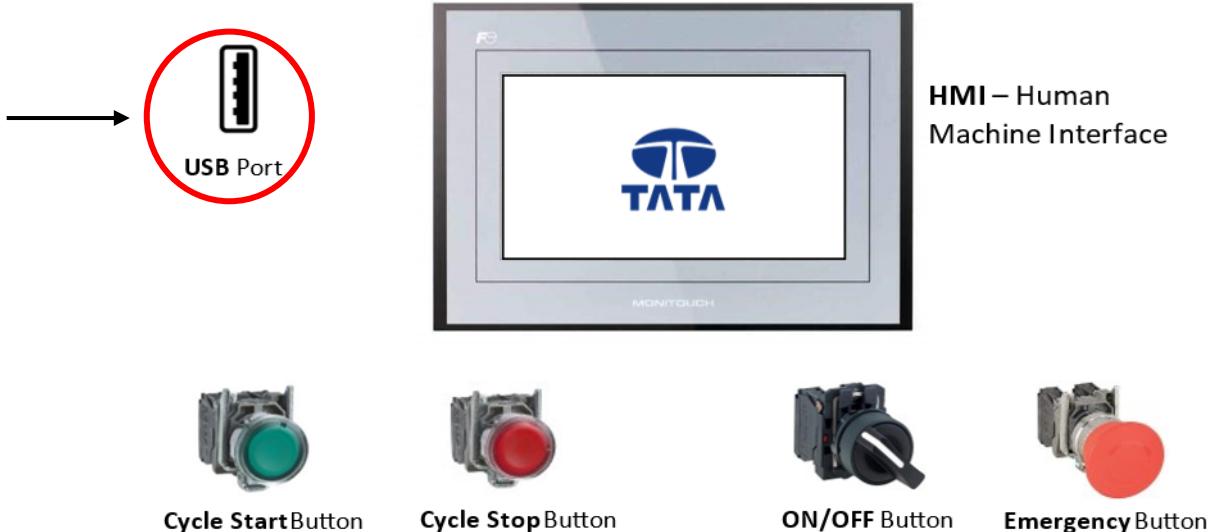
Steps to Observe and navigate live Vibration graph

- The 3-axis vibration graph is plotted in cm/sec² units, indicating the Engine name and Engine serial number

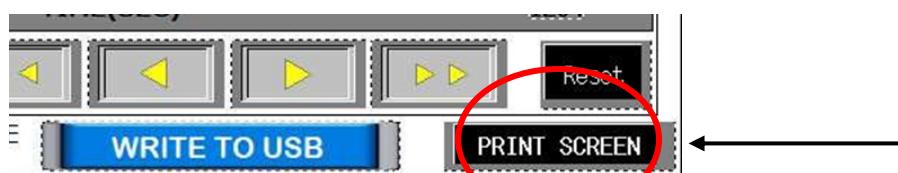


To capture and save pic into a hard drive, follow the below steps

- Insert a drive in the USB port located on top of the display panel



- Click on the WRITE TO USB button, as shown in the figure



- Click on the WRITE TO USB button, as shown in the figure

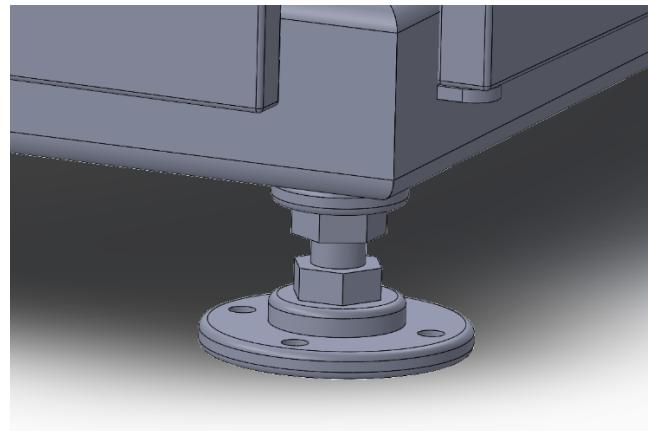


[Here the captured pic stored in USB in the JPEG format]

Instalment & Adjustments

Alignment & Calibration

- Place the Machine on a straight level surface, & adjust the legs placing a Calibration device on the machine, to maintain a flat and straight level for acquiring prominent values from the vibration sensor.



Wiring & Connections

- The outlet wire consists of four different colored wires.
- Connect **RED**, **YELLOW** & **BLUE** to the 3-Phase power supply & **GREEN** to the Neutral.
- Connect the Earth of 3-Phase power supply at the mentioned place on the machine.
- Connect a printer wire to the HMI at the mentioned Location as shown in the figure.

Note: The printer should be filled with the paper pack before starting the test run

Engine Mounting

- Place the Engine on the machine, facing the inlet manifold of the engine towards the front direction of the Sim Testing machine, as shown in the figure.
- Bolt down the nuts to the engine through the three specified dampers' positions, as shown in the figure.
- Connect the Couple shaft of the motor outlet to the Engine output rotor, as shown in the figure

Piping of Lubrication Oil & Coolant

- Connect the inlet pipe & outlet pipe of the coolant to the engine (as shown in the figure) and ensure the screw is tightened so there is no leakage
- Pour Sufficient Engine oil through the inlet located at the top of the Engine, & connect the outlet pipe of the Engine oil located at the bottom of the Engine (as shown in the figure)

Preparation before starting Sim Test

- Ensure all sensors are mounted correctly in their respective positions according to the mentioned numbers on the chart.
- Ensure that the Emergency switch is open.
- Ensure that the Main motor and Emergency Labels on the main page of the GUI are green in color before starting the Sim Test.
- Ensure that the lid cover of the coupling is covered.
- Ensure that the Coolant inlet pipe and outlet pipe are tightly fitted to prevent leakage.
- Ensure that the sensors are tightly mounted so there is no leakage of air or oil, to get accurate readings.
- Ensure that the electric plugs on the top of the sensors are tightly fitted.

Pre-Check

- Before starting the test loop, go to the manual control page in GUI and test run the motor and pump manually at a certain RPM, and check the sensor values, to ensure whether the sensors are correctly working or not.
-