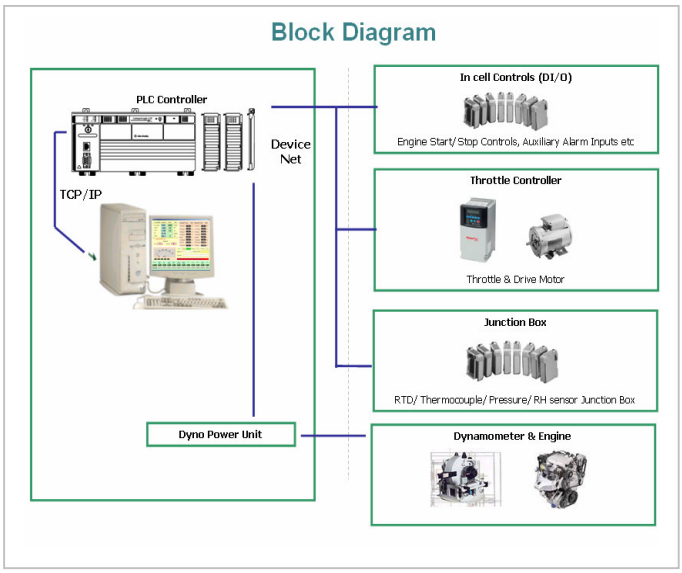
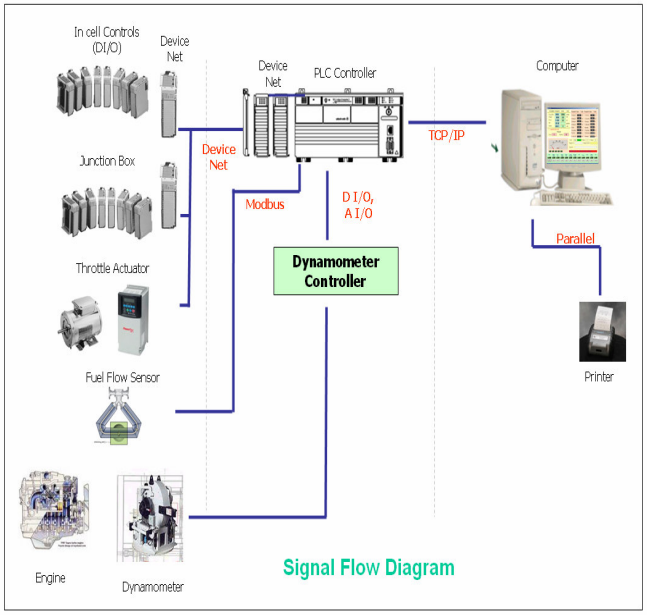
Integrated Engine Dynamometer Control System

Features:

- *Real Time Digital architecture for PID control and Data Acquisition.*
- *Digital Calibration for acquired parameters*
- *C F Standards : DIN 70020, SAE J 1349, JIS D 1001, ISO 1585, IS 10003, IS 14599, EEC 80/1269, ISO 8178*
- *Bump Less transfer modes*
- *High Dynamic Digital Communication between distributed IO devices and Controller, PC SCADA*
- *Industry Standard Protocols; ODBC, TCP/IP, MODBUS, AK, ACSII, CAN, PROFIBUS, SERCOS, ASAP-3, Digital IO. Analog IO*





In above block diagram, Integrated Engine Dynamometer is described in two sections: Control consol and In-cell controls.

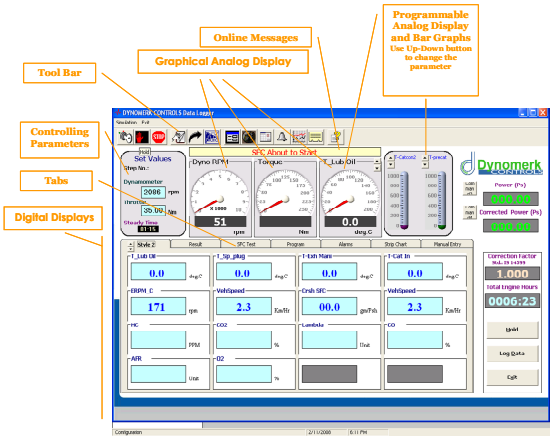
Control consol consists of Digital Controller, Dyno Power Unit, PC, software for data acquisition Analysis and Reports. The Controller supports for any third party instruments for integration with the protocols like MODBUS, TCP/IP, CAN, Digital IO. Analog IO, Device NET etc. Digital controller has Ethernet connectivity with computer. No additional hardware such as signal conditioning, add-on cards etc are required. Programme for PID algorithm (for close loop controls), real-time calculations etc are embedded in the controller; which ensures trouble free real-time control.

Test-Cell controls include four sections:

1. In-cell Controller – This includes Engine services like Ignition control, Hearer control, Engine Start-Stop Control, Auxiliary Alarm inputs and related pendent controls
2. Throttle Actuator – This is AC Servo Motor and Drive Package operates on 230 V AC single phase supply. Motor has built in encoder for position feed back.
3. Junction Box. – All the sensors like RTD, Thermocouple, Pressure, Relative Humidity, RPM sensor, Load Cell, etc are connected to the modules mounted in the Junction box. All the modules converts signals coming from various sensors in to their engineering value and send to main controller. This reduces signal conversion stages and errors added in various stages.
4. Dynamometer & Engine – EC Dyno connected to engine works on eddy current principle. This is water cooled device in which sensors like cooling water pressure, side plate temperature, Dyno RPM, Load Cell etc are mounted.

Sections 1, 2 & 3 are connected to main controller through Device NET and Dynamometer through Dyno Power Unit.

PC Controls:
DYNOTEST is the ultimate Eddy Current Dynamometer control, data acquisition, and analysis software. DYNOTEST puts an advanced, full function engine dynamometer lab console onto your Windows equipped PC. It features on-screen analog and digital gauges, graphical displays, and supports complete engine and cell control options. DYNOTEST Provides quick and easy test design and configuration and convenient test-data management, display and reporting. It lends a friendly computer interface to the dynamometer's electronic hardware system.



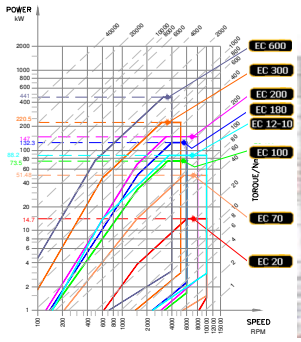
DYNOTEST Features

- Automatic / Semi-Automatic / Manual Modes
- User Friendly Test Sequence program editor for cyclic tests like Performance, Endurance etc. All major International (ESC, ELR, ETC etc) and Indian Test Procedures / customized test procedures can be programmed
- Library for different make equipments like smoke meters, blow-by meters, exhaust back pressure controllers, fuel and coolant conditioners, emission equipments including CVS, particulate samplers and gas analyzers
- User configurable Real-time display (Digital Indication, Dials & Meters, Trends & Bar graphs etc) for acquired and calculated parameters
- Standard & User configurable Reports, Graphs for analysis.
- User configurable Set-Points (Alarms) with actions (Indication Only, Idle, Stop Engine etc) for all acquired and calculated parameters for monitoring during engine testing
- Internet Enabled for Remote monitoring and control, .Data transfer troubleshooting and Up-gradation
- Simulation of Acquired Parameters

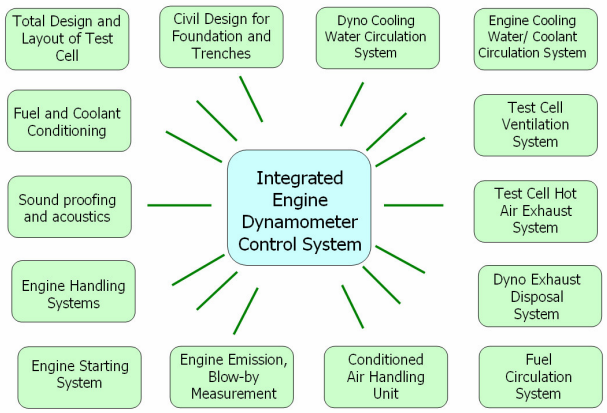
Dynamometer

Eddy Current Dynamometer is Bi-directional, Dry-gap Type. In a dry gap unit, the only resistance to movement of the rotor is that of bearing friction and the small effect of windage. With zero excitation, an almost no-load condition can be achieved over the entire speed range.

Models: EC-15, EC-20, EC-70, EC-100, EC-12-10, EC-180, EC-200, EC-300, EC-600, EC-1200.



Total Solution for Engine Testing



Specifications:

Control Modes:

- Dynamometer
  - I=C : Constant Current Control
  - N=C : Constant RPM Control
  - T=C : Constant Torque Control
  - $M \sim n^2$:Torque proportional to rpm square
- Throttle Actuator
  - P=C : Constant Position Control
  - N=C : Constant RPM Control
  - T=C : Constant Torque Control

Control Accuracy:

- Full Throttle
  - RPM : ± 2 rpm
  - Torque : ± 0.5 % of FSD
- Part Throttle
  - RPM : ± 5 rpm
  - Torque : ± 1 % of FSD

Throttle Actuator:

- Linear Travel: 30 to 110 mm
- Response Time: 0 to 100% in 50 mS.
- Push / Pull Force: 200 N force

RPM Indication:

- Range : 50 - 9999 RPM
- Accuracy: 1 RPM
- Resolution: 1 RPM

Torque Indication:

- Range : As per requirement
- Accuracy : ± 0.25 % of FSD
- Resolution: 0.1 Nm

Temperatures

- RTD:
  - No of Channels: As per requirement
  - Range: 0 to 100 ^{0}C
  - Accuracy: ± 1 ^{0}C
  - Resolution : 0.1 ^{0}C
- Thermocouple K-Type
  - No of Channels: As per requirement
  - Range: 0 to 1000 ^{0}C
  - Accuracy: ± 5 ^{0}C
  - Resolution : 0.1 ^{0}C

Pressure:

- No of Channels: As per requirement
- Range: As per Requirement
- Type: Gauge/Absolute
- Accuracy: ± 0.25 % of FSD
- Resolution : 0.1, 0.01, 0.001 as per range

Relative Humidity:

- Range : 0 to 100% RH
- Resolution: 1% of FSD
- Accuracy: 2% or 3% of FSD.

Fuel Consumption Measurement: - Diesel or Gasoline

- Volumetric – Sampling Volume
  - Sample Volumes – 10cc,20cc / 50cc,100cc
  - Time Measurement:
    - Resolution:0.1 Sec
    - Accuracy:0.1Sec
- Gravimetric – Sampling Weight
  - Set Weight Range: 0 to 200 grams
  - Set Time Range: 1 to 200 sec
  - Time Measurement:
    - Resolution:0.1 Sec
    - Accuracy:0.1Sec
  - Weight Measurement:
    - Resolution:0.1 gram
    - Accuracy: ± 1 grams
- Flow Sensor -
  - Accuracy **:**
    - Mass :± 0.05%
    - Volume :± 0.05%
    - Temperature:± 1%
    - Density :±0.0002 g/m3
  - Repeatability
    - Flow :± 0.025%
    - Density :±0.0001 g/m3
  - Performance – Gases
    - Mass flow accuracy :± 0.035%
    - Temperature :±0.0001 g/m3
  - Zero stabilities : 0.002 kg/h
  - maximum flow rate : 108 l / h
  - Suitable for liquid and gaseous fuel type.

EC Dynamometer

Sr. No.	Model	Torque Range Nm @ rpm Range	Power Range Hp @ rpm range
1	EC-20	25 @ 1500 to 6000	20 @ 6000 to 10000
2	EC-70	91 @ 1500 to 5500	70 @ 5500 to 10000
3	EC-100	205 @ 1500 to 3500	100 @ 3500 to 8000
4	EC-12/10	235 @ 600 to 3500	120 @ 3500 to 10000
5	EC-180	316 @ 1500 to 4000	180 @ 4000 to 6000
6	EC-200	415 @ 1000 to 3000	200 @ 3000 to 6000
7	EC-300	702 @ 1000 to 3000	300 @ 3000 to 5000
8	EC-600	1405 @ 600 to 3000	600 @ 3000 to 4000
9	EC-300TR	2100 @ 500 to 2000	600 @ 2000 to 5000

DYNOMERK CONTROLS

12 A/1, Laxmanrao Kirloskar Road, Opp K.O.E.L. Khadki, Pune, India
Pin 411 003. Phone: +91-020-25815111, 25821860-61
e-mail : dynomerkcontrol@vsnl.net Website:www.dynomerk.co.in