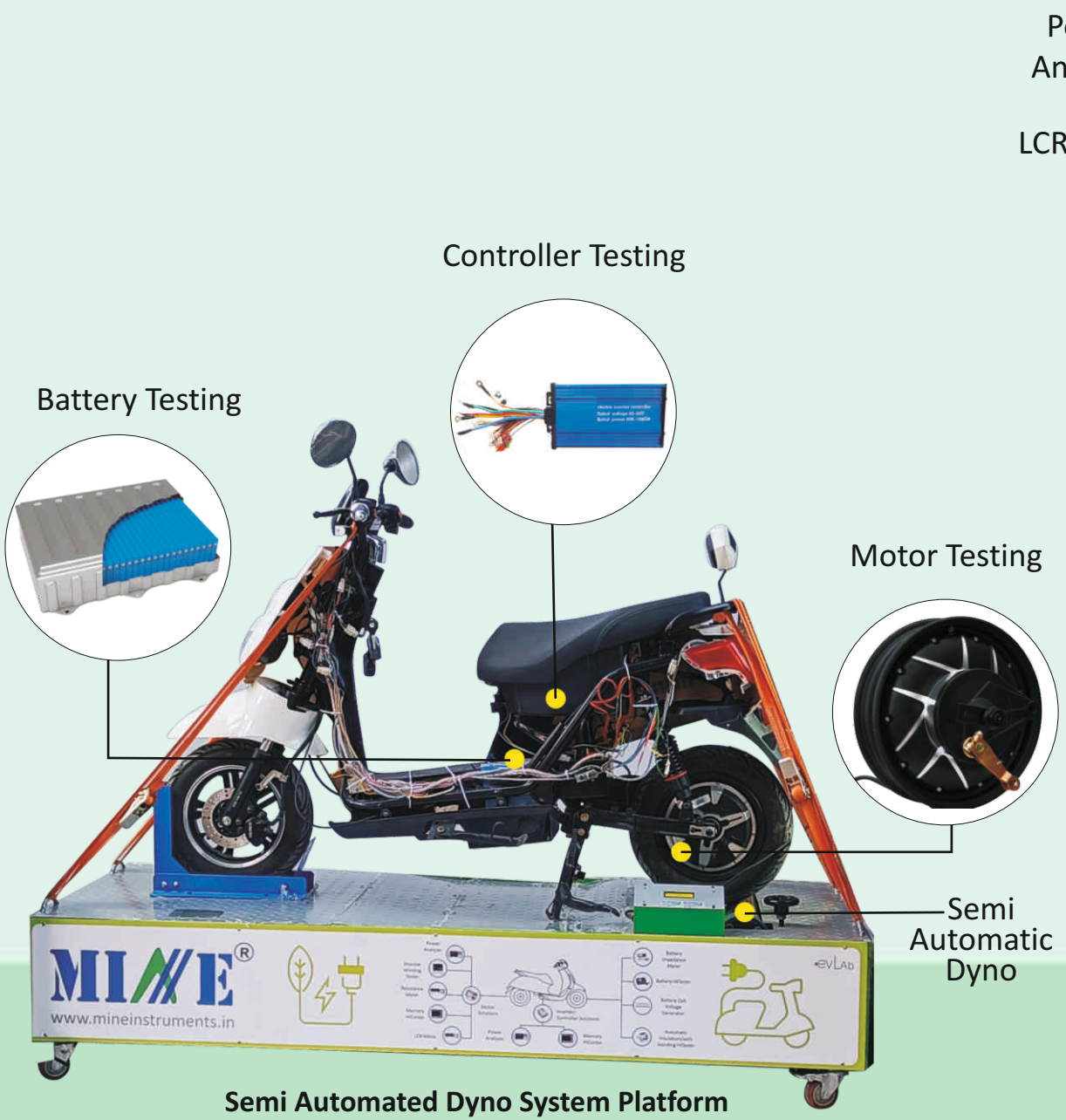
Electrical Vehicle Training System Work Bench -I



Semi Automated Dyno System Platform

Electrical Vehicle Work bench - I
MI-EVW01

The electric vehicle industry in India is picking pace, new manufacturing hubs, and increased push to improving charging infrastructure. The global automotive industry is undergoing a paradigm shift at present in trying to switch to alternative/less energy intensive options. India, too, is investing in this electric mobility shift.

To understand concept and development criteria of Electric Vehicles, **Mine Instruments Pvt. Ltd.** designed a industrial grade test bench for learner. This Test Bench is very helpfull to determine parameters used in design of a electric vehicle.

Features

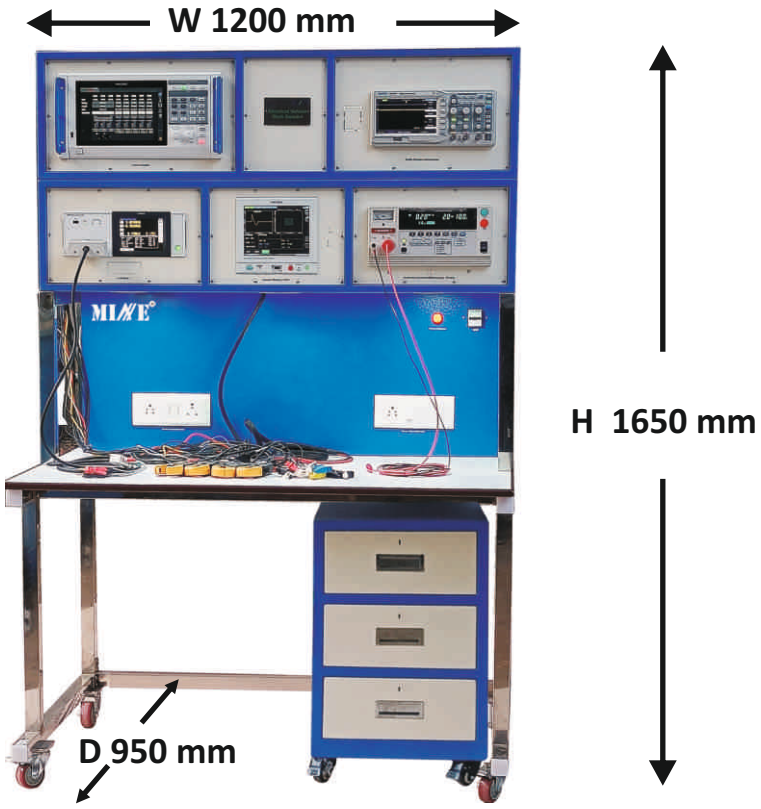
- Design by considering all safety standards.
- Fabricated on Stainless Steel Frame.
- Full demonstration of a two wheeler electric vehicle.
- Include Individual study module for EV Components Characterization.
- MCB is provided with AC supply for safety purpose
- Detachable Block Drawer
- Locking Wheels
- Top covered by Anti Static Mate
- Shocked Proof design
- All instruments are fitted inside of workbench
- Easy accessible Interface
- Come along with a running of model of two wheeler electric vehicle

Electrical Vehicle Work bench - I
MI-EVW01

Technical Specifications

Bench Dimensiions (in mm)

Length	:	950mm
Width	:	1200 mm
Height	:	1650 mm
Material	:	Stainless Steel
Chassis	:	38mm x 38mm x 1.5 mm Stainless Steel pipes for sturdiness.
Side Walls	:	Stainless Steel (1.5mm)
Table Top	:	Plywood (thickness : 18mm)
		MICA (thickness : 1mm)



MS drawers

Drawer Qty	:	03
Width	:	275 mm
Depth	:	375 mm
Height	:	100 mm
Wall Thickness	:	1.2mm
Handle & Lockers	:	Separate lock & Handle
MCB	:	Two Pole MCB (16/32A – Havells / Siemens) is provided for safety

Note: Dimension of workbench may be vary depend upon ease of use. Electric Vehicle Model's shape and color as shown in

Image may be vary.

Electrical Vehicle Work bench - I
MI-EVW01

Instruments On-Bench/Fitted in Workbench

Power Analyzer

Make-Hioki PW8001-13

Parameter		Specifications
Measurement frequency band	:	DC, 0.1 Hz to 1 MHz
Basic accuracy for 50/60 Hz power	:	± (0.02% of reading + 0.05% of range),
Accuracy for DC power	:	± (0.02% of reading + 0.05% of range)
Accuracy for 10 kHz power	:	± (0.2% of reading + 0.05% of range)
Accuracy for 50 kHz power	:	± (0.4% of reading + 0.1% of range)
Number of power measurement channels	:	1 to 8 channels
Voltage, current ADC sampling	:	16-bit, 2.5 MHz
Voltage range	:	6 V, 15 V, 30 V, 60 V, 150 V, 300 V, 600 V, 1500 V
Current range	:	Probe 1: 100 mA to 2000 A (6 ranges, based on sensor) Probe 2: 100 mV, 200 mV, 500 mV, 1 V, 2 V, 5 V
Display	:	10.1” WVGA TFT color LCD, touch screen
External storage media	:	USB 3.0
LAN (100BASE-TX, 1000BASE-T)	:	Yes
GP-IB	:	Yes
RS-232C	:	Yes (maximum 115,200 bps)
External control	:	Yes

Accessories:

- 2.5MS/S Input Unit - 8nos
- AC/DC Current Probe-8nos
- Voltage Cord -2nos
- 1000 V CAT III, 10 A, 600 V CAT IV, 10 A banana-banana (red, yellow, blue, gray, 1 each, black × 4), alligator clip, approx. 3 m (9.84 ft.) Length

Make - Hioki U7001

Make - Hioki CT6843A

Make - Hioki L1000

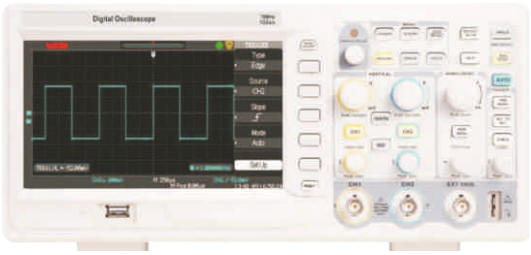
LCR Meter

Make - Hioki IM3536

Parameter		Specifications
Measurement modes	:	LCR (Measurement with single condition), Continuous testing (Continuous measurement under saved conditions)
Measurement parameters	:	Z, Y, θ, X, G, B, Q, Rdc (DC resistance), Rs (ESR), Rp, Ls, Lp, Cs, Cp, D (tanδ), σ, ε
Measurable range	:	100 mΩ to 100 MΩ, 10 ranges (All parameters are determined according to Z)
Basic accuracy	:	Z ±0.05% rdg. θ: ±0.03° (representative value, Measurable range: 1 mΩ to 200 MΩ)
Display	:	5.7-inch color TFT displaying 4 Parameters with Settings, Touch Screen Enabled
Interfaces	:	EXT. I/O (HANDLER), USB, USB flash drive, LAN, GP-IB, RS-232C, BCD Standard supply
Power supply	:	100 to 240 V AC, 50/60 Hz, 50 VA max.
Dimensions and mass	:	330 mm (12.99 in) W × 119 mm (4.69 in) H × 230 mm (9.06 in) D, 4.2 kg
Basic accuracy	:	Z: ±0.05% rdg. θ: ±0.03° (representative value)
Guaranteed accuracy range	:	1 mΩ to 200 MΩ (impedance)
Power supply and maximum rated power	:	00 V AC to 240 V AC (50/60 Hz), 50 VA
Dielectric strength	:	1.62 kV AC for 1 min. between power line and ground line
Accessories	:	Power cord ×1, Instruction manual ×1, Application Software to control the equipment as well as save data in PC or Laptop in .csv format, txt. format using the application software 4 terminal Test probe (frequency supporting up to 8MHz)

Make - Hioki L2000 :1 no

Digital Storage Oscilloscope



Signal Bandwidth	:	70 MHz
No. Of Channels	:	2-Channel
Real time sampling	:	Max 1 GSa/s
Memory Depth	:	2 Mpts

Memory HiCorder

Make-Hioki LR8450

Parameter		**Specifications**
Maximum number of Connectable modules	:	4 plug-in modules
No. of measurement channels	:	Up to 120 ch with plug-in input modules
Internal buffer memory	:	Volatile memory, 256 M-words
Display	:	7-inch TFT color LCD
Repeat recording	:	On/off (user-selectable)
Display format	:	Time-axis waveform display: 1 screen X-Y waveform display: 1 screen
X-Y composite	:	Composite up to 8 waveforms
Numerical display format	:	SI units, decimal, or exponent (user-selectable) When decimal is selected, number of decimal places to display can be set (values will then be rounded to set number of places)
Accessories	:	Universal Unit-2no(Memory Hilogger) Hioki-Z4001 SD Memory Card 2GB, Hioki-Z1007 Battery-2Pack

Electrical Vehicle Work bench - I
MI-EVW01

Automatic Insulation / Withstand HiTester

Make-Hioki 3153

Parameter		Specifications
Voltage Withstand Testing		
Output voltage	:	0.20 kV to 5.00 kV
Voltage output method	:	PWM switching method
Transformer capacity	:	AC(500 VA (rated 30 minutes)), DC(N/A
Output capacity	:	AC(N/A), DC(50 VA (continuous))
Output voltage accuracy	:	±1.5% of setting voltage ±2 dgt.
AC Voltage waveform	:	Sine wave (5% or less distortion, unloaded)
AC Voltage frequency	:	50 Hz/60 Hz, ±0.2%
Output ripple DC voltage	:	6% of output voltage or less (at 5 kV DC, 10 mA, resistive load)
Output current	:	100 mA
Voltmeter	:	Digital: 0.00 to 5.00 kV (full scale) Accuracy: ±1.5% f.s. Analog: 0 to 5 kV (full scale) Accuracy: ±5% f.s.
Power supply voltage	:	100V to 240V AC (installed fuse depends on actual voltage, so specify supply voltage when ordering) 100V to 120V AC: installed fuse 250V T10AL 200V to 240V AC: installed fuse 250V T5AL
Power supply frequency	:	50 Hz/60 Hz
1000 VA	:	1000 VA
Accessories	:	Power cord × 1 Instruction manual ×1 Spare fuse ×1

Impulse winding Tester

Make-Hoki ST4030A

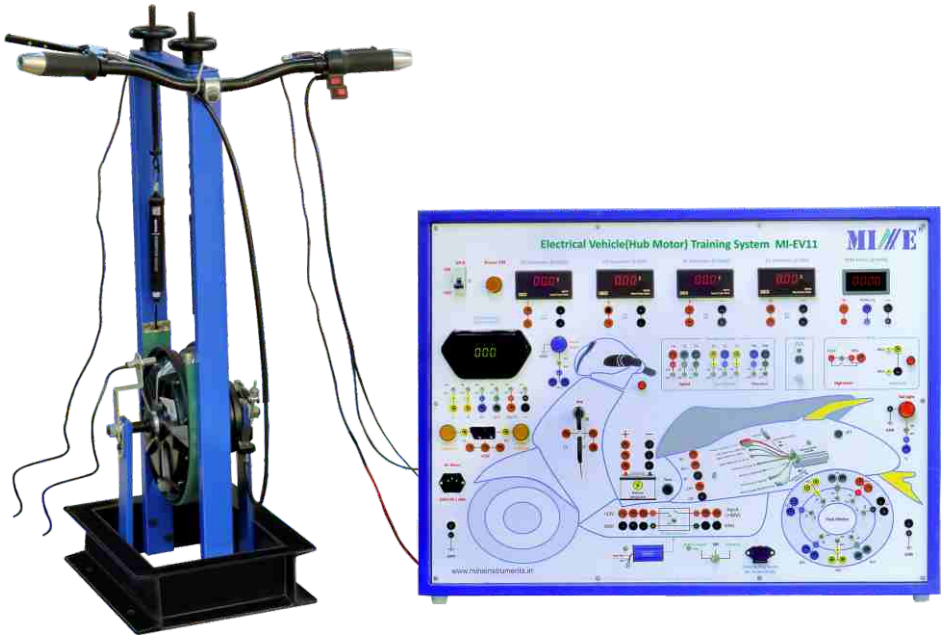
Parameter		Required
Applied voltage	:	100 V to 4200 V (resolution set in 10 V steps)
Testable inductance range	:	10 µH to 100 mH
General Specification		
Standards compliance	:	Safety: EN 61010, EMC: EN 61326 Class A
Operating temp. and humidity range	:	0°C to 40°C (32°F to 104°F), 80% RH or less (no condensation)
Storage temperature and humidity	:	-10°C to 50°C (14°F to 122°F), 80% RH or less (no condensation)
Standards compliance	:	Safety: EN 61010, EMC: EN 61326 Class A
Power supply	:	AC100 V to 240V, 50 Hz/60 Hz
Accessories	:	Hioki ST9000 Discharge Detection Upgrade-1nos, Clip Type Lead-1nos.

Suitable software to operation of relevant instruments fitted in bench.

Electrical Vehicle Work bench - I
MI-EVW01

Modules along with Workbench

Hub Motor /Electrical Vehicle Trainer



Mine Electrical Vehicle Training System India unveiled 'National Electric Mobility Mission Plan (NEMMP) 2020' in 2013 to address the issues of National energy security, vehicular pollution and growth of domestic manufacturing capabilities. The Government of India is having a plan to make a major shift to electric vehicles by 2030. To enhance the effect of NEMMP country will need lot of Electric Vehicle Engineers and Technicians. To support NEMMP Mission Mine has developed E-Vehicle Training system to provide technical manpower to the country.

Features

- Provided with all the sensors and its functionality
- Provided with meters for measurement analysis
- Throttle with 3 mode speed
- Testing -RPM, Torque, Input Power
- PWM Signal on Panel
- On Panel Charging Switch
- Real time and interactive training setup
- Motor Assembly Mechanical Arrangement for Experiments

Experiments

- Study the types of motors used in EV.
- Study the different Sensors of EV.
- Study of Motor Driver Controller in EV.
- Study of running, reversing & braking of HUB motor in two wheeler vehicle.
- Study of speed control of HUB motor using PWM method.
- Study of Hall Sensor.
- Study the N-T (Speed -Torque) characteristic of HUB Motor.

Electrical Vehicle Work bench - I
MI-EVW01

Technical Specifications

Type of Motor	:	Hub motor (12 inch)
Rated Voltage	:	48V
Power	:	1000W
Digital RPM Meter (0-9999 Count)	:	1 nos.
Battery LiFePo4 Cell (3.3V)	**:**	1 nos.
Battery with inbuilt BMS Protection	**:**	1nos .
Type of battery	:	Li-ion Phosphate
Capacity	:	12 AH
Voltage	:	48V
Battery Charger	:	1 nos.

Digital Meters & Indication

AC Voltmeter (1 nos)	:	0-500V AC
AC Ammeter (1 nos)	:	0-30Amp AC
DC Voltmeter (1 nos)	:	0-500V DC
DC Ammeter (1 nos)	:	0-20Amp DC

Motor Controller	:	Inside of Trainer
Motor Speed Controlling	:	PWM
Spring Balance	:	2 nos.
Inter connection	:	4mm Patch cord
Digital Battery Level Indicator	:	1 nos.
Motor Assembly (mechanical)	:	1 nos.

Additional Features

- Key switch for ON/OFF
- Head light & Tail light
- Brake System

Accessories

- Operating Manual-1nos.
- Patch Cord-15 nos.
- Wall poster with attractive study content - 2Qty.

Electrical Vehicle Work bench - I
MI-EVW01

BLDC (Brushless DC) Motor Trainer

A motor converts supplied electrical energy into mechanical energy. Various types of motors are in common use. Among these, brushless DC motors (BLDC) feature high efficiency and excellent controllability, and are widely used in many applications. The BLDC motor has power-saving advantages relative to other motor types.

Trainer kit consist a BLDC Motor with Controller help students to learn about operations and working of BLDC Motor.

Features

- Diagrammatic representation for the ease of connections.
- Designed by considering all the safety standard.
- Metallic Body.
- Machine with Mechanical Loading Arrangement.
- Exclusive and Compact Design.
- Motor Assembly Mechanical Arrangement for Experiments.

Experiments

- Study of Motors.
- Study of BLDC Motor and its construction.
- Study of Hall Sensor.
- Study the N-T (Speed -Torque) characteristic of BLDC Motor.
- Study the construction and working of a BLDC Motor.
- Study of running, reversing of BLDC motor.

Electrical Vehicle Work bench - I
MI-EVW01

Technical Specifications

Machine Type	:	BLDC Motor
Rating	:	220W approx.
Voltage Rating	:	24V
Speed	:	3000 rpm ± 10%
Loading arrangement	:	Mechanical
Brake Drum/Pulley	:	Aluminum casted
DC power supply	:	24V, 10Amp.
On board Digital Panel Meters		
DC Voltmeter (1 nos)	:	0 - 300V
DC Ammeter (1 nos)	:	0 - 10A
Digital RPM Meter (0-9999 rpm)	:	1 nos.
Speed Controlling Method	:	PWM
Spring Balance	:	2 nos.
DC Supply 24V 10 Amp	:	1nos.
Inter connection	:	4mm Patch cord
Motor Assembly	:	1 nos.
Motor Controller	:	Inside of Trainer

Accessories

- Operating Manual-1nos.
- Patch Cord-10 nos.
- Wall poster with attractive study content - 2Qty.

Electrical Vehicle Work bench - I
MI-EVW01

PMDC Machine Trainer

A PMDC (Permanent Magnet DC motor) is a kind of DC motor that includes a permanent magnet rather than field winding to form the magnetic field necessary for the DC motor operation. The PMDC motor is one of the most preferred motor for the electric vehicle application due to its traction characteristics such as high starting torque, high power density and good efficiency.

PMDC Machine Trainer is an important and exclusively designed product for electrical laboratories. PMDC Machine is an important part of Electrical

Engineering Syllabus considering upgraded technologies. This product plays a vital role in letting the students have a basic knowledge about the operating principle of PMDC machine. It provides complete learning contents to enhance practical knowledge and explains students the fundamental concepts of PMDC Machine.

Features

- Heavy Duty Base/Channel.
- Designed by considering all the safety standards.
- Diagrammatic representation for the ease of connections.
- Machine with Mechanical Loading Arrangement.
- Provided with Digital Tachometer.
- Motor Assembly Mechanical Arrangement for Experiments.

Experiments

- Study of Motors.
- Study of PMDC Motor and its construction.
- Study of PWM Speed Control.
- Study the N-T (Speed -Torque) characteristic of PMDC motor.
- Study of running, reversing of PMDC motor.

Electrical Vehicle Work bench - I
MI-EVW01

Technical Specifications

DC Machine

Type	:	PMDC Motor
Rating	:	1HP
Voltage Rating	:	180V ±10%
Speed	:	1500RPM ±10%
Loading Arrangement	:	Mechanical
Break Drum/Pulley	:	Aluminum Cast

On board Digital Panel Meters

DC Voltmeter (1 nos)	:	0-500V
DC Ammeter (1 nos)	:	0-20A
Digital RPM Meter (0-9999 rpm)	:	1 nos.
DC Drive	:	0-180V (variable), Inside of Trainer
Inter connection	:	4mm Patch cord
Spring Balance	:	2nos.

Accessories

- Operating Manual-1nos.
- Patch Cord-10 nos.
- Wall poster with attractive study content - 2Qty.

Learning's

- Understanding Electric Vehicle.

- Learning of Different type of Testing Parameter in Electric Vehicle.
- Study of running, reversing & braking of HUB motor in two wheeler vehicle.
- Study the types of motors used in EV.
- Study of speed control of HUB motor using PWM method.
- Study of Hall Sensor.
- Study of Motor Driver Controller in EV.
- Study the N-T (Speed -Torque) characteristic of HUB Motor.
- Study the different Sensors of EV.
- Study of working of HUB motor and Hall sensor with real time waveform analysis.
- Study the N-T (Speed -Torque) characteristic of BLDC Motor.
- Study of running, reversing of BLDC motor
- Evaluating BLDC Motor Efficiency and Loss.
- Study the N-T (Speed -Torque) characteristic of PMDC motor.
- Study of running, reversing of PMDC motor.
- Evaluating PMDC Motor Efficiency and Loss.
- Measuring Motor and Winding Insulation Resistance and Withstand Voltage by insulation tester.
- Measuring Winding Resistance.
- Measuring Motor Coil Inductance.

Electrical Vehicle Work bench - I
MI-EVW01

List of Instruments On-Bench/Fitted in Workbench

- Hioki - PW8001-13 Power Analyzer -1nos
- Hioki - IM3536 LCR Meter -1nos
- Hioki - 3153Automatic Insulation/Withstand HiTester-1nos
- Hioki - LR8450 Memory HiCorder -1nos
- Hoki ST4030A -Impulse winding Tester -1nos
- Digital Storage Oscilloscope -1nos

List of Modules along with Workbench

Hub Motor/Electrical Vehicle Trainer

Electrical Vehicle Workbench-I MI-EVW01

MI-D15 Analog Digital Trainer.pdf

MI-EV03 BLDC (Brushless DC) Motor Trainer

MI-EV04 PMDC Machine Trainer

Included Standard Accessories & Suitable Software

Mine Instruments Pvt. Ltd. An ISO 9001:2015 Certified Company

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MAKE IN INDIA

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