

EDDY CURRENT DYNAMOMETERS & CONTROLLER

Introduction:

MEDA series of eddy current dynamometers are available in more than 150 different models (1.0 kilo watts to 1000 kilo watts/ 500 to 15,000 rpm) including some tailor made models practically offering readymade solution in measurement, testing / diagnostic of any principal parameter like power, torque rpm and efficiency (rated/overload), plotting torque/speed and power/speed phase trajectories of any diesel engine/automobile (low/high rpm). It step-lessly loads to the resolution of $1/10^{\text{th}}$ of rated capacity, enabling to detect some of the intricate stray parameter of engine, qualitatively and quantitatively. These fast responding dynamometers posses least mechanical time constant, windage losses, least rheological problem, mechanical black-lash/ dead band, and exhibits a repeatable and hysteresis less Torque/Power Vs Excitation current characteristics which guarantees accurate identification of parameters during steady state/transient conditions.

Operating Principle:

In eddy current dynamometer, a special metal drag cup rotor rotate under the Influence of time invariant magnetic field or a magnetic field rotor rotates inside a cup type special metal stator (driver). In either case, the magnetic field intensity is controlled by a high frequency magnetic field feedback controlled chopper, which ensures a time invariant ripple free magnetic field. Rotor rotating under the influence magnetic field cuts the magnetic flux, by virtue of which there develops eddy current in it.

Power absorbed by eddy current actuator and its Torque loading is ...

as under.... $P = 0.438I_f^2 \times N^3$ & $T = 0.438I_f^2 \times N^2$ -limited by magnetis saturation/parametric variation

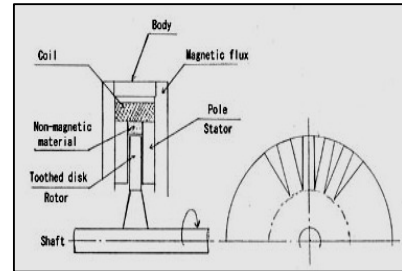
(Maximum torque varies between 0.3 lbs-ft to 1000.0 lbs-ft) Feedback controlled power supply ensure fine resolution in loading i.e. 0.1% of torque/power at any time, with a very high degree of stability and repeatability.



Dynamometer Test Bench (Diesel Engine)



Torque Vs Excitation current curve



Sectional view of eddy current Dyn
Torque <500000.0 Kg.m.

Electrical/Mechanical specifications of Eddy current dynamometer

model	Tolerating [Kg.f.m.]	R.P.M. [x100]	Bearing/shaft size/[inches]	material [ceramic coated]	% linearity/thermal drift/°C	T Break-away [Kg]	% Repeatability/ Accuracy	°C
MEDM-00001	1.0	15/30	1.0	M. S/ S. S	100/0.03	150	0.03/99.9	100
MEDM-00002	2.0	15/30	1.0	M. S/ S. S	100/0.03	150	0.03/99.9	100
MEDM-00010	10.0	15/30	1.0	M. S/ S. S	100/0.03	150	0.03/99.9	100
MEDM-00020	20.0	15/30	1.0	M. S/ S. S	100/0.03	150	0.03/99.9	100
MEDM-00050	50.0	15/30	2.0	M. S/ S. S	100/0.03	150	0.03/99.9	100
MEDM-00100	100.0	15/30	3.0	M. S/ S. S	100/0.03	150	0.03/99.9	100
MEDM-00200	200.0	15/30	3.0	M. S/ S. S	100/0.03	150	0.03/99.9	100
MEDM-00500	500.0	15/30	3.5	M. S/ S. S	100/0.03	150	0.03/99.9	100
MEDM-00100	1000.0	15/30	3.5	M. S/ S. S	100/0.03	150	0.03/99.9	100
MEDM-02000	2000.0	10/7	4.0	M. S/ S. S	100/0.03	150	0.03/99.9	100
MEDM-05000	5000.0	10/7	5.0	M. S/ S. S	100/0.03	150	0.03/99.9	100
MEDM-10000	10000.0	6/4	6.0	M. S/ S. S	100/0.03	150	0.03/99.9	100
MEDM-50000	50000.0	6/4	8.0	M. S/ S. S	100/0.03	150	0.03/99.9	100

General electrical/mechanical specifications of eddy current dynamometer:

Operating voltage: 220 volt A.C. (50-20,000 Hz)/ 12 volts D.C.
 Measurement range (full scale): as above in different model.
 Torque-range: 10^{-06} - 10^{-03} / 10^{-3} - 10^{+2} / 10^{+2} - 10^{+6} volt least count- 500000 N.m. (STATIC/DYNAMIC)
 R.P.M. range: 10^{-3} / 10^{+0} / 10^{+3} / 10^{+6} RMP
 Residual torque: approx-o, .1%
 Excitation current: upto 100 volt/300 amps
 Duty cycle: 2.0 hour -on/2.0 hour off/force air-cooled/ 10.0 horse-water cooled
 Response time: 1000 sample/sec
 Instrumentation Burden: less than 100 counts of full scale or better
 Loading Accuracy error: 0.5/1.0/2.0 % reading
 Torque/rpm/power sensing Linearity adjustment: upto 100 counts
 Torque/rpm/power measurement Repeatability: 100 of reading
 Torque/rpm/power measurement Resolution: 1:100000
 Interface o/p: 0-10 volt D.C.
 Cooling: water/forced air
 Interface: RS-232
 Option: Additional software to plot T/RPM or any inferential parameters.



MEDM-00050

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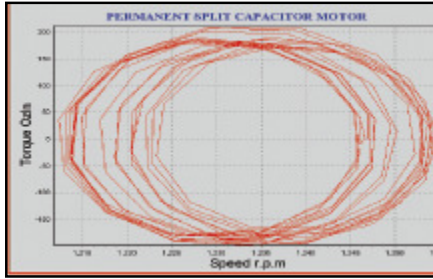
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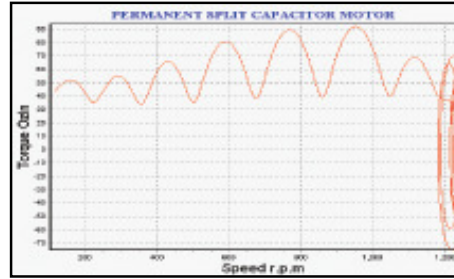
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Programmable/non-programmable

MEDM-00500



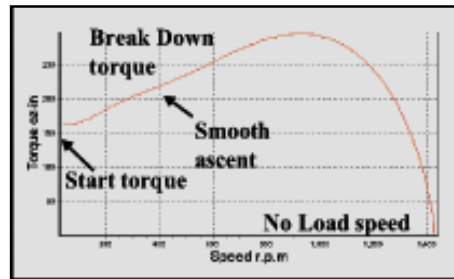
Torque/speed plot of permanent capacitor motor



Transient Torque/speed plot of Sq-cage induction motor



Loading test bench



Torque/speed plot of Sq-cage induction motor

Electrical/Mechanical specifications of Eddy current dynamometer controller

Model	Power watts	Volts	Current	cooling	Model	Power watts	Volts	Current	Cooling
MEDM-0301002	03000	030	100.0	Air/oil	MEDM-0300102	06000	30.0	20.0	Air/oil
MEDM-0500402	02000	050	040.0	Air/oil	MEDM-0500102	05000	50.0	10.0	Air/oil
MEDM-0501002	05000	050	100.0	Air/oil	MEDM-0500202	01000	50.0	20.0	Air/oil
MEDM-0500202	02000	100	020.0	Air/oil	MEDM-0500402	02000	50.0	40.0	Air/oil
MEDM-0100502	05000	100	050.0	Air/oil	MEDM-0501002	05000	50.0	100.0	Air/oil
MEDM-0101002	01000	100	100.0	Air/oil	MEDM-1000102	01000	100.0	10.0	Air/oil
MEDM-0105002	05000	100	500.0	Air/oil	MEDM-1000202	02000	100.0	20.0	Air/oil
MEDM-0109992	10000	100	1000.0	Air/oil	MEDM-1000502	05000	100.0	50.0	Air/oil
MEDM-0200502	01000	200	050.0	Air/oil	MEDM-1001002	10000	100.0	100.0	Air/oil
MEDM-0201002	02000	200	100.0	Air/oil	MEDM-2002002	10000	200.0	50.0	Air/oil
MEDM-0205002	10000	200	500.0	Air/oil	MEDM-2002002	20000	200.0	100.0	Air/oil
MEDM-0209992	20000	200	1000.0	Air/oil	MEDM-4000502	20000	400.0	50.0	Air/oil

Eddy current dynamometer exciter controller:

MEDM-0301002	08X06X06	MEDM-0300103	14x14x14	MEDM-0301002	14x14x14
MEDM-0500402	12x08x08	MEDM-0500103	18x16x16	MEDM-0500402	18x16x16
MEDM-0501002	12x10x10	MEDM-0500203	20x18x18	MEDM-0501002	20x18x18
MEDM-0500202	12x10x10	MEDM-0500403	20x18x18	MEDM-0500202	20x18x18
MEDM-0100502	14x10x10	MEDM-0501003	14x12x12	MEDM-0100502	14x12x12
MEDM-0101002	16x12x12	MEDM-1000103	18x16x16	MEDM-0101002	18x16x16
MEDM-0105002	16x14x14	MEDM-1000203	14x14x14	MEDM-0105002	14x14x14
MEDM-0109992	18x10x10	MEDM-1000503	18x16x16	MEDM-0109992	18x16x16
MEDM-0200502	18x12x12	MEDM-1001003	20x16x16	MEDM-0200502	20x16x16
MEDM-0201002	18x14x14	MEDM-2002003	22x18x18	MEDM-0201002	22x18x18
MEDM-0205002	18x16x18	MEDM-2002003	24x18x18	MEDM-0205002	24x18x18
MEDM-0209992	16x16x16	MEDM-4000503	24x20x16	MEDM-0209992	24x20x16

Three numerals after MEDM indicate wattage x10 of supply and last three digit indicates milli amps. All dimensions are in inches. Above models are in current range of production, however company undertake any tailor made specification power supply.

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