

# EDDY CURRENT DYNAMOMETERS & CLUTCHES (PROGRAMMABLE)

## Application:

**MEDM** series of eddy current dynamometers are available in more than 150 different models (1.0 watts to 1000 kilo watts/ 500 to 50,000 rpm) including some tailor made models practically offering readymade solution in measurement, testing / diagnostic of any principal parameter like power, rpm and torque as well as other inferential parameter like rated power/torque capacity, overload power/torque capacity, efficiency and plotting torque/slip and power/slip curve, desired phase trajectories etc of any electrical motors and diesel engines ( low/high rpm). It step-lessly loads to the resolution of 1/ 10<sup>th</sup> of rated capacity, enabling to detect higher order (synchronous/asynchronous) degenerating harmonic qualitatively and quantitatively hiding in Torque/Speed & Power/speed characteristic of prime mover. These fast responding dynamometers possess least mechanical time constant, windage losses, least rheological problem, mechanical black-lash/ dead band, and exhibit a repeatable and hysteresis less Torque/Power Vs Excitation current characteristics which guarantees accurate identification and characterization of parameters during steady state/transient conditions.

These dynamometers are assisted with temperature, rpm, torque and real power sensors interface to Digital controller / SCADA system with facility to simulate desired characterization with consistency and accuracy.

## Operating Principle:

In eddy current clutch, 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....

$$P = 0.438 I_f^2 \times N^3$$

$$T = 0.438 I_f^2 \times N^2$$

(Maximum torque varies between 0.09 N.m to 100.0 N.m)

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.

## Technical specifications of Tension controller:

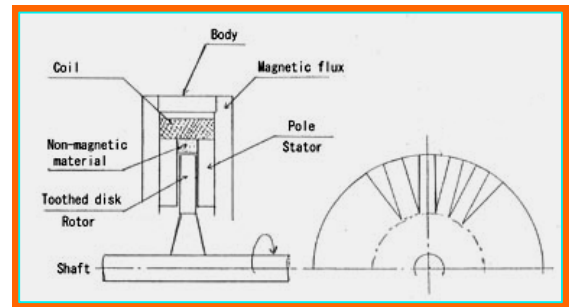
Operating Power supply	220 volts/50 hz
Excitation current	100 amps (max)
Current ripple	50 micro amp
Conversion frequency of chopper	50 Hz/50 kHz
Display	Torque/Power/Speed /Frequency( 3-1/2 digit)
Short-circuit current	50% of rated current
Equivalent magnetic field	0.0 to 1.0 tesla.

## Weight/ Size (inches):

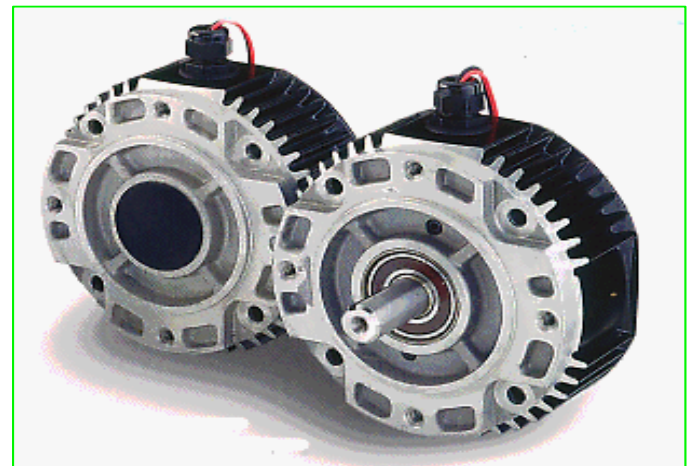
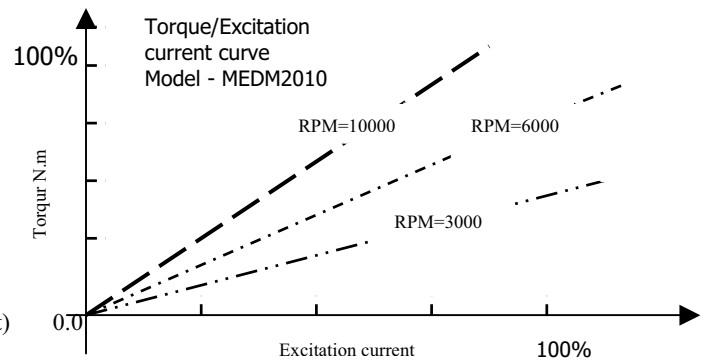
MEDC20002	4.5kg/4x5x5	MEDC20010	10.0kg/6x7x7
MEDC20003	5.0kg/4x5x5	MEDC20015	12.0kg/6x7x7
MEDC20004	6.0kg/4x6x6	MEDC20020	15.0 kg/6x8x8
MEDC20005	7.0kg/6x6x6	MEDC20050	20.0kg/6x10x10



Eddy Current Clutches Controller MEDC-20004



Sectional view of Eddy current clutch/dynamometer



Eddy Current Clutches MEDM-2008

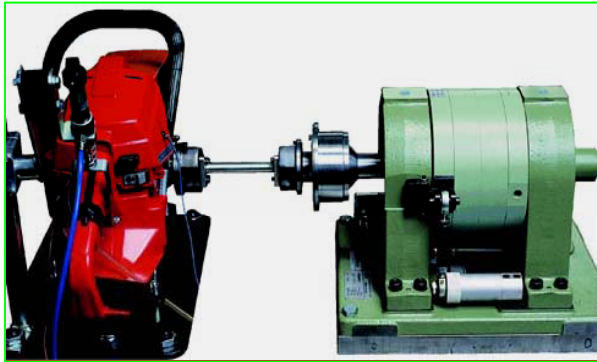
➤ First two numeral after MEDC indicates voltage and next two digit current.

## MOTORON SEMICONDUCTORS CORPORATION

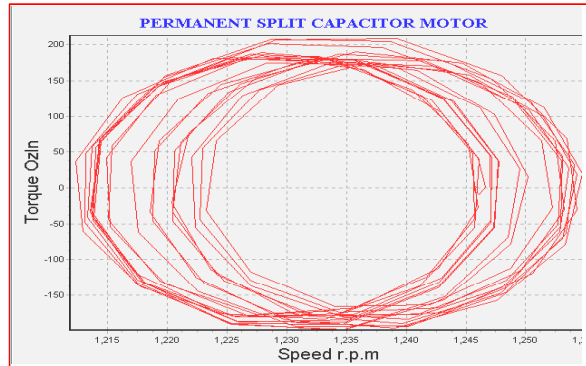
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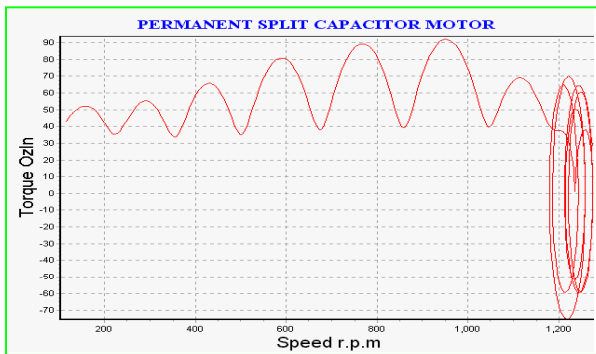
# EDDY CURRENT DYNAMOMETERS & CLUTCHES (PROGRAMMABLE)



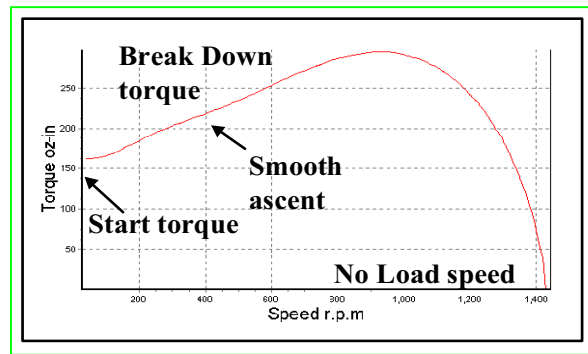
*Dynamometer Test Bench*



*Torque/speed plot of permanent capacitor motor*



*Transient Torque/speed plot of Sq-cage induction motor*



*Torque/speed plot of Sq-cage induction motor*

## Technical specifications and selection chart (MEDM- series) P<100.0 kilowatts

Model	Rated Torque N.m	Non excited torque % R.T.	RPM	Brake Power K.watts	Cooling Water/Air	Thermal rise °C (an hour)
MEDM10010	95.0	0.0	10000	100	Liquid	65
MEDM8010	76.0	0.0	10000	80	Liquid	65
MEDM6010	57.0	0.0	10000	60	Liquid	65
MEDM4010	38.0	0.0	10000	40	Liquid	65
MEDM2010	19.0	0.0	10000	20	Air	65
MEDM1010	9.0	0.0	10000	10	Air	65
MEDM0515	3.0	0.0	15000	5	Air	65
MEDM0215	1.23	0.0	15000	2	Air	65
MEDM0115	0.63	0.0	15000	1	Air	65
MEDM0.520	0.23	0.0	20000	0.5	Air	65
MEDM0.220	0.09	0.0	20000	0.2	Air	65

- First two numeral after MEDM indicates power and next two digit indicate rpm.
- Company supply always responds to tailor mde specification Dynamometers.

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# MICROCONTROLLER BASED TACHOMETERS & CONTROLLERS

## Introduction:

MPTM range of programmable tachometers indicator/controller is available in 8 different regular models apart from tailor made solutions including *time-weighted rate of change of R.P.M. w.r.t. time protection in real time* virtually covering all industrial and research applications meeting all electrical, thermal, mechanical, and environmental specifications. These indicator/controllers are first choice for online monitoring R.P.M. of turbines/motors/diesel engine/chassis dynamometers/drives/wind mill and many other uncountable applications. These also find application in heavy electrical engineering industries, defense, and electrical/mechanical m/c testing instrument, industrial electronics, railway, and avionics and many research and development activities and are compatible to any standard r.p.m. transducer like hall sensor, proximity, spark plug pulse/fuel flow in dynamometers with very high degree of accuracy/repeatability/reliability. These indicator/controllers are available in different constructional material like ceramic-coated ms/poly carbonate.

## Benefits:

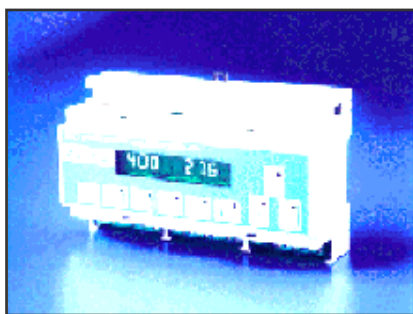
- Simple installation and operational compatibility.
- Consistent performance over large temperature range (80°C)
- Scaled directly in R.P.M. with repeatable accuracy.
- Auto zero offset without drift/option of dN/dt protection.
- All standards din sizes and custom sizes.



Hall effect sensor



MPTM-0060



MPTM- 0200



multi function tachometers for dynamometers

## TACHOMETER

## R.P.M.<20000 R.P.M. TACHOMETER

## R.P.M.< 9999999R.P.M.

Model	R.P.M.	R.P.M. Signal (d.c./pulse)	Sensor Compatibility	Accuracy % of reading	Display	Model	R.P.M.	R.P.M. Signal (d.c./pulse)	Sensor compatibility	accuracy % of reading	Display
MPTM-0030	0030	12.0/option	1/2/3/4	0-50	LCD/LED	MPTM-0500	0500	12.0/option	3 / 4	0-50	LCD/LED
MPTM-0060	0060	12.0/option	1/2/3/4	0-50	LCD/LED	MPTM-0999	0999	12.0/option	3 / 4	0-50	LCD/LED
MPTM-0120	0120	12.0/option	2/3/4	0-50	LCD/LED	MPTM-1500	1500	12.0/option	3 / 4	0-50	LCD/LED
MPTM-0200	0200	12.0/option	2/3/4	0-50	LCD/LED	MPTM-9999	9999	12.0/option	3/ 4	0-50	LCD/LED

Pl. see as under for sensor compatibility as under.

## General electrical/mechanical specifications:

Operating voltage: 220 volts A.C./50Hz/ 12 volts d.c.  
 Response time: 0.1 microseconds  
 R.P.M. range: 1.0 - 999.0 kilo cycle per second in different model.  
 Signal: 1-inductive sensor, 2-photoelectric sensor 3-magnetic pick-up 4-hall effect sensor.  
 R.P.M. signal: 12.0 volts D.C./PULSE  
 Accuracy: 0.5/1.0/2.0 % reading  
 Repeatability: 100 of reading  
 Step down ratio: 1:100000  
 Interfaceability: RS-232/0-12 volts D.C.-Linear  
 Control: relay changeover against RPM set point/total revolution  
 Tripping aging dN/dt setting-optional  
 Transmission range: upto 1000 meters  
 Display: 3/4/5/6 digit LED/LCD display- acceleration display option  
 Size: 48x96, 96x96, 192x96  
 Resolution: 1/10 of least significant bit  
 Size: 48x48/48x96/96x96/192x96



r.p.m. sensors for tachometers

NOTES:  
 1-inductive sensor, 2-photoelectric sensor 3-magnetic pick-up 4-hall effect sensor.  
 2.The numeral after product code indicates the ( volt/ampere) range and last digit corresponds to size of panel (48x48-1, 48x96-2, 96x96-3, 96x192-4 As for example, MPTM-999991 corresponds to 99999 R.P.M. (max) and panel body is ceramic coated mild steel.

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# IN LINE TORQUE TRANSDUCERS & MONITORS

MRTT series

## Introduction:

MRTT series of precision strain gauge based load cells are available in (0.1 to 1000 kg.m), more than 50 different models virtually offering solution to in-line torque measurement related to paper/plastic industries, petrochemical industry, organic/inorganic chemical, heavy electrical/mechanical industries, machine tools, non-conventional energy, solids state physics application and many uncountable defense/nuclear applications. Careful selection design topology ensures better controllability and reliability with additional integrated power/voltage and control/protection. Company offers tailor made solution to custom requirement.

## Operating Principle:

Strain-gage load cells convert the load acting on them into electrical signals. The gauges themselves are bonded onto a rotary shaft. In most cases, four strain gages are used to obtain maximum sensitivity and temperature compensation. Two of the gauges are usually in tension, and two in compression, and are wired with compensation adjustments. When weight is applied, the strain changes the electrical resistance of the gauges in proportion to the load. This strain gauge bridge is excited through rotary transformer and amplified by in shaft installed amplifier card. Output signal is collected through either IR diode or magnetically coupled transformer.



MRTT- 002 (saic torque measurement)



MRTT- 005 (in-line-rotary type)



MRTT-010(flange type)

## Electrical/Mechanical specifications of Rotary Torque transducer

Torque <50000.0 Kg.m.

model	T <sub>olerating</sub> [Kg]	R.P.M. [x100]	Bearing size [inches]	material [ceramic coated]	Mounting Of load cell	% linearity/ thermal drift/°C [1:100]	T <sub>Break-away</sub> [Kg] % T <sub>operating</sub>	% Repeatability/ accuracy	T <sub>operati</sub> ng °C
MRTT-00001	5.0	15/30	1.0	M. S/ S. S	option	100/0.03	150	0.03/99.9	70
MRTT-00002	5.0	15/30	1.0	M. S/ S. S	option	100/0.03	150	0.03/99.9	70
MRTT-00010	10.0	15/30	1.0	M. S/ S. S	option	100/0.03	150	0.03/99.9	70
MRTT-00020	20.0	15/30	1.0	M. S/ S. S	option	100/0.03	150	0.03/99.9	70
MRTT-00050	50.0	15/30	2.0	M. S/ S. S	option	100/0.03	150	0.03/99.9	70
MRTT-00100	100.0	15/30	3.0	M. S/ S. S	option	100/0.03	150	0.03/99.9	70
MRTT-00200	200.0	15/30	3.0	M. S/ S. S	option	100/0.03	150	0.03/99.9	70
MRTT-00500	500.0	15/30	3.5	M. S/ S. S	option	100/0.03	150	0.03/99.9	70
MRTT-00100	1000.0	15/30	3.5	M. S/ S. S	option	100/0.03	150	0.03/99.9	70
MRTT-02000	2000.0	10/7	4.0	M. S/ S. S	option	100/0.03	150	0.03/99.9	70
MRTT-05000	5000.0	10/7	5.0	M. S/ S. S	option	100/0.03	150	0.03/99.9	70
MRTT-10000	10000.0	6/4	6.0	M. S/ S. S	option	100/0.03	150	0.03/99.9	70
MRTT-50000	50000.0	6/4	8.0	M. S/ S. S	option	100/0.03	150	0.03/99.9	70

## Rotary Torque transducer and signal conditioners specification:

Operating voltage 220 volts/110volts A.C or 24 volts D  
 Excitation current 0.0- 12 VOLTS/500 mas  
 Regulation better than 0.5 % of measurement  
 Accuracy 99.5% of set point  
 Repeatability 100 percent  
 Response time 0.05 -10.0 sec  
 Interface Signal 0.0-12.0 volts D.C. (proportional to tension)  
 Step down ratio 1:100  
 Control option constant torque/speed mode/synchronous mode  
 Display RPM/Torque in 3½ & 4½ digit red glow LED/LCD display  
 Protection: Over/under voltage & with power on Indication



MRTT-00100



Torque display

Three numerals x 10 after MRTT indicates power of load cell and last two x 100 indicate armload cell with tailor specs are also available.

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# HALL EFFECT PROXIMITY SENSORS & SWITCHES

## MHPS-Series

### Introduction:

MHPS series of high performance hall effect proximity sensors/switches are available in more than 25 different models in cylindrical/flush/threaded barrels in variety of dimensions and in different contact voltage/current rating. These hall effect proximity sensors/switches, virtually offers solutions to flow, speed, torque, power, frequency measurement and control in paper, machine-tools, plastic/yarn, milk/brewery plant, petrochemical industry, organic/inorganic chemical, rubber, sugar, textiles, water management/treatment, heavy electrical/mechanical industries, research and development organizations and many defense applications. Special machine design ensures better efficiency and enhanced torque transmission.

### Operating Principle:

Hall effect proximity sensors are suitable for the detection of ferromagnetic/ferromagnetic elements. The operating principle is based on The Hall element, which is placed in a small air gap, changes the state under the influence of feeble magnetic field. This sensor also offers a galvanic isolation. The small output voltage of the Hall element is amplified to generate output pulse with high degree of stability and repeatability. The sensing accuracy of the sensor depends on the actuator shape and size and is strictly linked to the nature of the metal. The cases of the Hall Effect proximity sensors can be a metallic cylindrical, plastic or metallic rectangular or plastic slot.



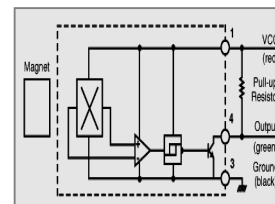
Cylindrical threaded non flash



Cylindrical threaded flash type



Fasten mounted with hole



schematic of hall sensor

### Electrical and mechanical specifications of Hall effect proximity sensors/switches:

2.0 < Pr < 50.0 Watts

Technioical data	Cylindrical W/ W.O. collar Flush/Non flush	Cylindrical W/ W.O. collar Flush/Non flush	Cylindrical W/ W.O. collar Flush/Non flush	Cylindrical W/ W.O. collar Flush/Non flush	Cylindrical w/th W/ W.O. collar Flush/Non flush	Cuboidal With hole	S.M.D. mouting
Housing size	M12	M18	MM30	M48	D=4/D=6.5	18x18x36 mm	12x26x40 mm
Output mode	PNP/NPN	PNP/NPN	PNP/NPN	PNP/NPN	PNP/NPN	PNP/NPN	PNP/NPN
Supply voltage[D.C.]	12-24	12-24	12-24	12-24	12-24	12-24	12-24
Sense range [m.m.]	1.8/2.5	4.0/5.6	8.0/12.0	18	4	4	2.4/4
Load/work current[m.a.]	< 100	< 100	< 100	< 100	< 100	< 100	< 100
switching frequency [Hz]	100000	100000	100000	100000	100000	100000	100000
Hysteresis band[mili ohm]	+/- 10%	+/- 10%	+/- 10%	+/- 10%	+/- 10%	+/- 10%	+/- 10%
Connection mode	D=5 , 2mm	D=5 , 2mm	D=5 , 2mm	D=5 , 2mm	D=5 , 2mm	D=5 , 2mm	D=5 , 2mm
Ambient temp °C	120	120	120	120	120	120	120
Temperature variation°C	50	50	50	50	50	50	50
Reverse polarity protection	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Short circuit protection	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Shock resistance[g]	50	50	50	50	50	50	50
Housing material	S.S./Brass/Nylon	S.S./Brass/Nylon	S.S./Brass/Nylon	S.S./Brass/Nylon	S.S./Brass/Nylon	S.S./Brass/Nylon	S.S./Brass/Nylon
Storage Temperature°C	85	85	85	85	85	85	85
Protection class	IP67	IP67	IP67	IP67	IP67	IP67	IP67
Termination	X/Y/Z	X/Y/Z	X/Y/Z	X/Y/Z	X/Y/Z	X/Y/Z	X/Y/Z

### Shapes of effect Hall effect proximity sensor:



plug -in type hall sensor



Sensor with mounting



sensor for gear sensing

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