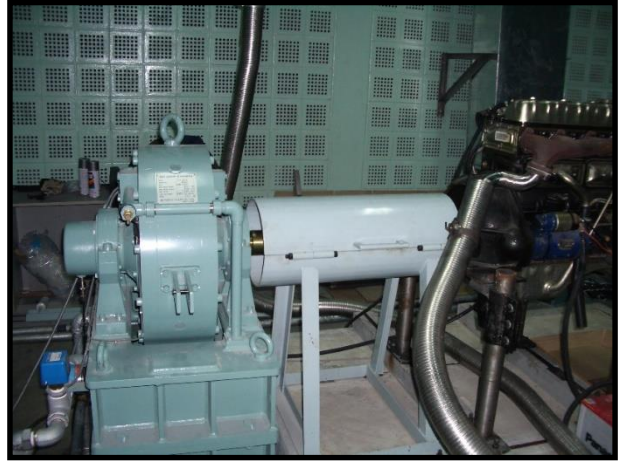


Eddy Current Dynamometer Product Catalog

■ Overview

Our eddy current dynamometers are excellent in high accuracy and durability and adopted to many customers in domestic and internationally.



■ Product range

2.2kW to 1800kW We have the widest range in Japan.

■ Past Performance

Cumulative No. of delivery: 1,000 sets and counting

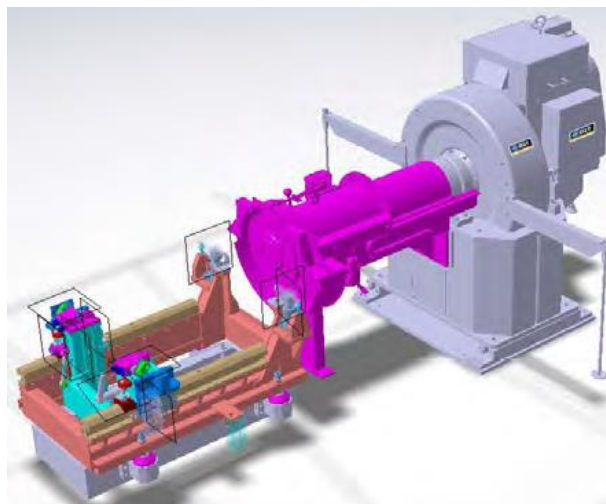
Destination: Japan and more than 10 countries

Major users: OEM (off-road, automobile), component supplier (Tier 1 ~), gas company, engine maintenance shop, JSDF, universities, colleges of technology, research institutes

■ Major customers

Yanmar, Kubota, Mitsubishi Heavy Industries, IHI Shibaura, Hitachi, Kanzaki Kokyukoki MFG, Shinko Engineerings, Kawasaki Heavy Industries, CAT, DBS, Osaka Gas, Tokyo Gas, Makita, Honda Motor, Subaru, Mitsubishi Motors, Aishin Seiki, Komatsu Zenoah, Showa Shell Sekiyu, General Sekiyu, Cosmo Oil, Panasonic, Bridgestone, Exedy, Mitsuboshi Belting, Daido Kogyo, Enuma Chain, Bando Chemical, JEF Technos, ACR, TYK, ONO SOKKI, Unitta, University of Tokyo, Chiba University, Tokyo University of Technology, Kogakuin University, Kyushu Institute of Technology, universities, colleges of technology, research institutes, racing teams, JGSDF, JMSDF service school, Naval Air Facility Atsugi and etc.

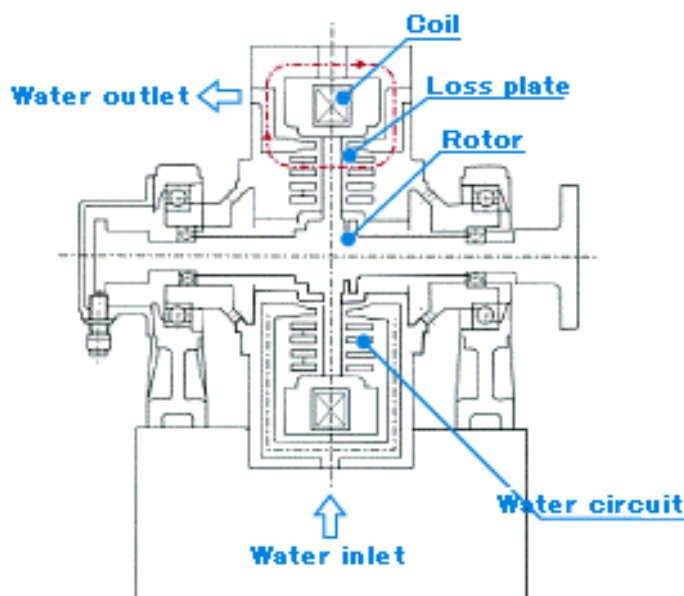
(Total of 300 companies)



■ Characteristics

High performance	<ul style="list-style-type: none"> • High repeatability tests can be realized with similar values to actual engines and vehicles due to low inertia. • Controls of speed, torque and current are standard features. • Wide range of product from ultra-small to large, high speed and high torque. • Alarm signal generates when overspeed and oil failure. Relay contact can be set.
Compact and lightweight	<ul style="list-style-type: none"> • Small installation space. • 30% lighter than conventional model.
Easy operation	<ul style="list-style-type: none"> • Speed and torque employs digital indicator as standard. • Outputs analog voltages of speed and torque. • Connector is employed to prevent cable disconnection.
Options (Chargeable)	<ul style="list-style-type: none"> • Automatic control system can conduct constant speed, constant torque and programmed operation control. • It can be also installed vertically. • T-slot bedplate is not needed because of the portable stand. If environmental regulation meets, it can be installed outside. • Center height variation as requested • Location of anchor bolts for a stand can be manufactured according to customer's request.

■ Principle and Structure



- When current flows into a ring-shaped coil, magnetic flux is generated as shown by the dashed arrow. Braking force can be obtained by eddy current occurred when a rotor cuts magnetic flux. The generated heat is taken away by the cooling water flow in the casing.
- A load cell detects the torque that rotates casing by braking force.

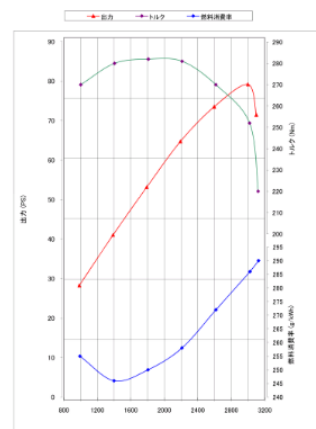
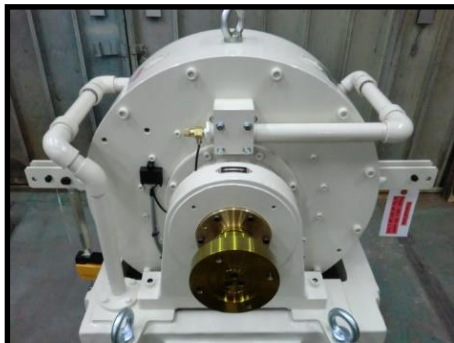
■ Applications

○ Targets

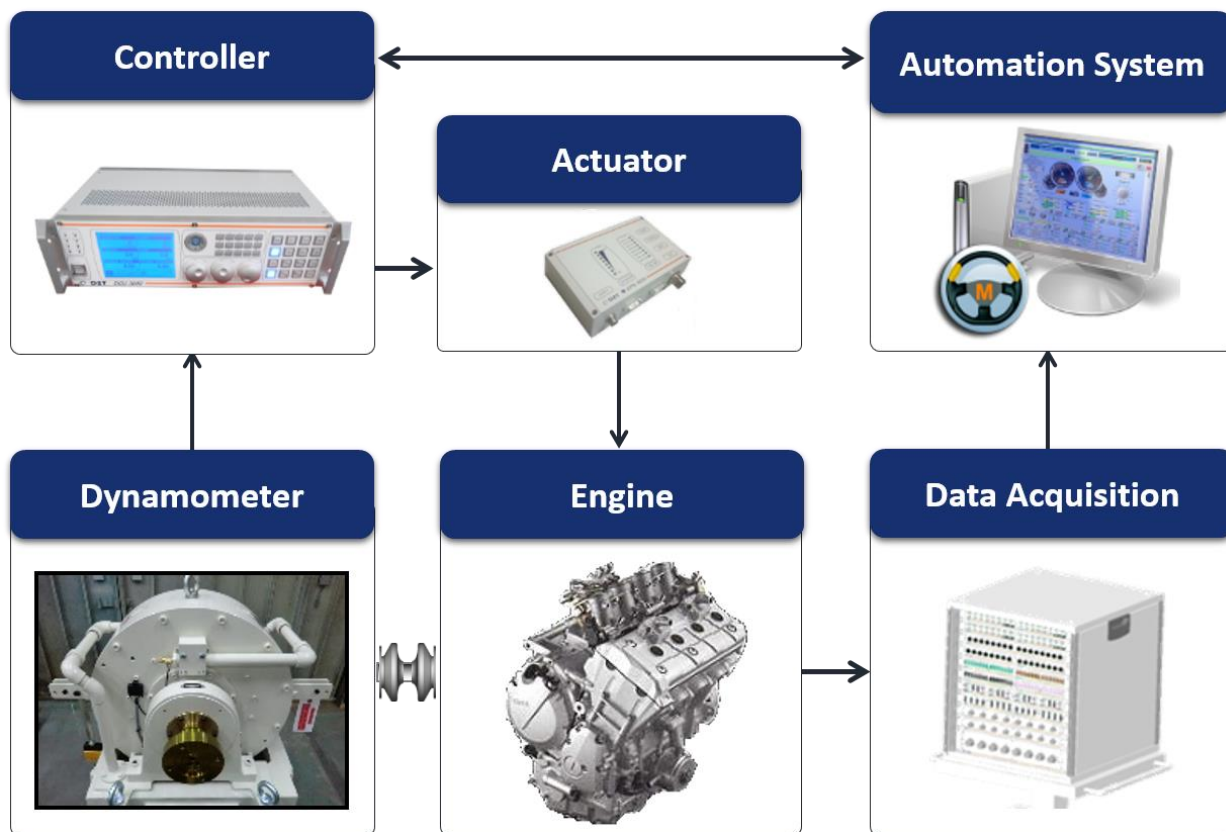
- Marine engine
- Agricultural machine engine
- Construction vehicle engine
- Generator
- Small turbine
- Pump
- Passenger cars
- Motor
- Truck engine
- Motorcycle engine
- Gear box

○ Tests

- Durability performance test
- Partial load performance test
- Full-open performance test
- Component evaluation test
- other performance tests (steady state and transient)...



■ System Configuration

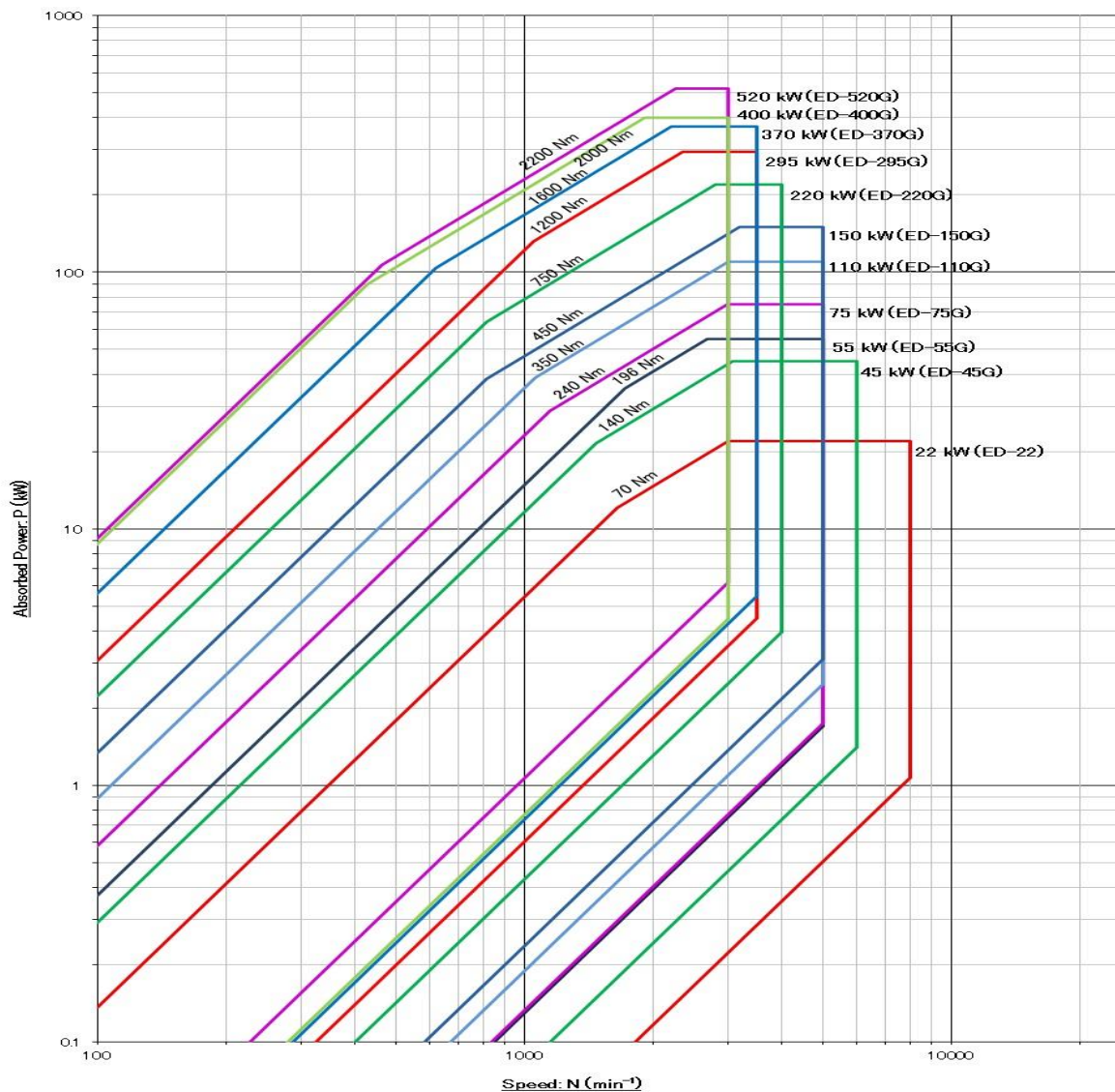


We can offer the most suitable testbed engineering to customers. Please contact us for further details about automation system, data acquisition sensors, testbed layout and shaft couplings. We can offer the suitable proposal for your budget and request.

■ Product range

○ED-G type (reversible type)

Best product range for the test of small to middle diesel engines.



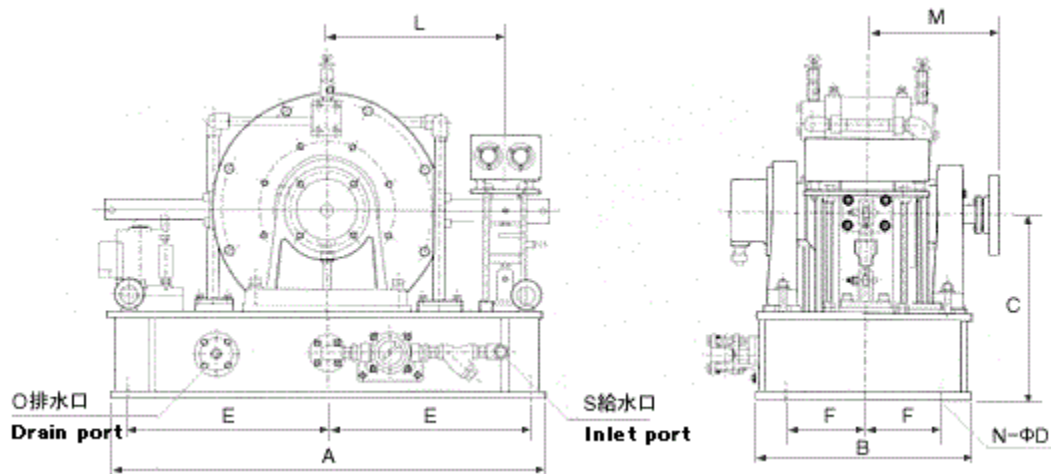
Model	Max. braking power kW	Max. braking torque Nm	Max. speed min ⁻¹	Constant torque range min ⁻¹	Inertia kg.m ²	Cooling water L/min
ED-22G	22	70	8,000	1,648~3,001	0.0105	12
ED-45G	45	140	6,000	1,470~3,069	0.025	24
ED-55G	55	196	5,000	1,717~2,679	0.0225	30
ED-75G	75	240	5,000	1,146~2,984	0.0375	40
ED-110G	110	350	5,000	1,059~3,001	0.0825	60
ED-150G	150	450	5,000	814~3,183	0.1175	80
ED-220G	220	750	4,000	814~2,801	0.25	120
ED-295G	295	1200	3,500	1050~2,347	0.625	160
ED-370G	370	1,600	3,500	620~2,208	0.8675	200
ED-400G	400	2,000	3,000	428~1,909	1	220
ED-520G	520	2,200	3,000	463~2,257	1.11	280

* Water flow: theoretical water flow when inlet water temp is 35° C and outlet water temp is 60° C.

* Specification is subject to change due to product modification.

■ Product range

○ED-G type: Dry weight and dimension



Model	Mass kg	Dimension (mm)									
		A	B	C	E	F	L	M	N-ΦD	S(A)	O(A)
ED-22G	250	700	360	300	325	155	286.8	227	4-20	10	40
ED-45G	350	760	400	350	355	175	286.5	270	4-20	15	40
ED-55G	300	710	400	350	325	140	300	263	4-20	20	25
ED-75G	500	820	420	400	375	175	358.1	295	4-22	20	25
ED-110G	600	820	420	400	375	150	358.1	275	4-22	25	32
ED-150G	700	840	550	500	380	200	358.1	303	4-22	25	40
ED-220G	1,150	1,100	620	600	500	200	477.5	380	4-24	40	40
ED-295G	1,400	1,260	720	650	600	300	500	455	4-24	40	40
ED-370G	1,500	1,160	720	650	545	280	477.5	457	4-24	50	50
ED-520G	2,000	1,350	760	700	620	280	700	480	4-24	50	50

* Mass is determined by a stand and specification.

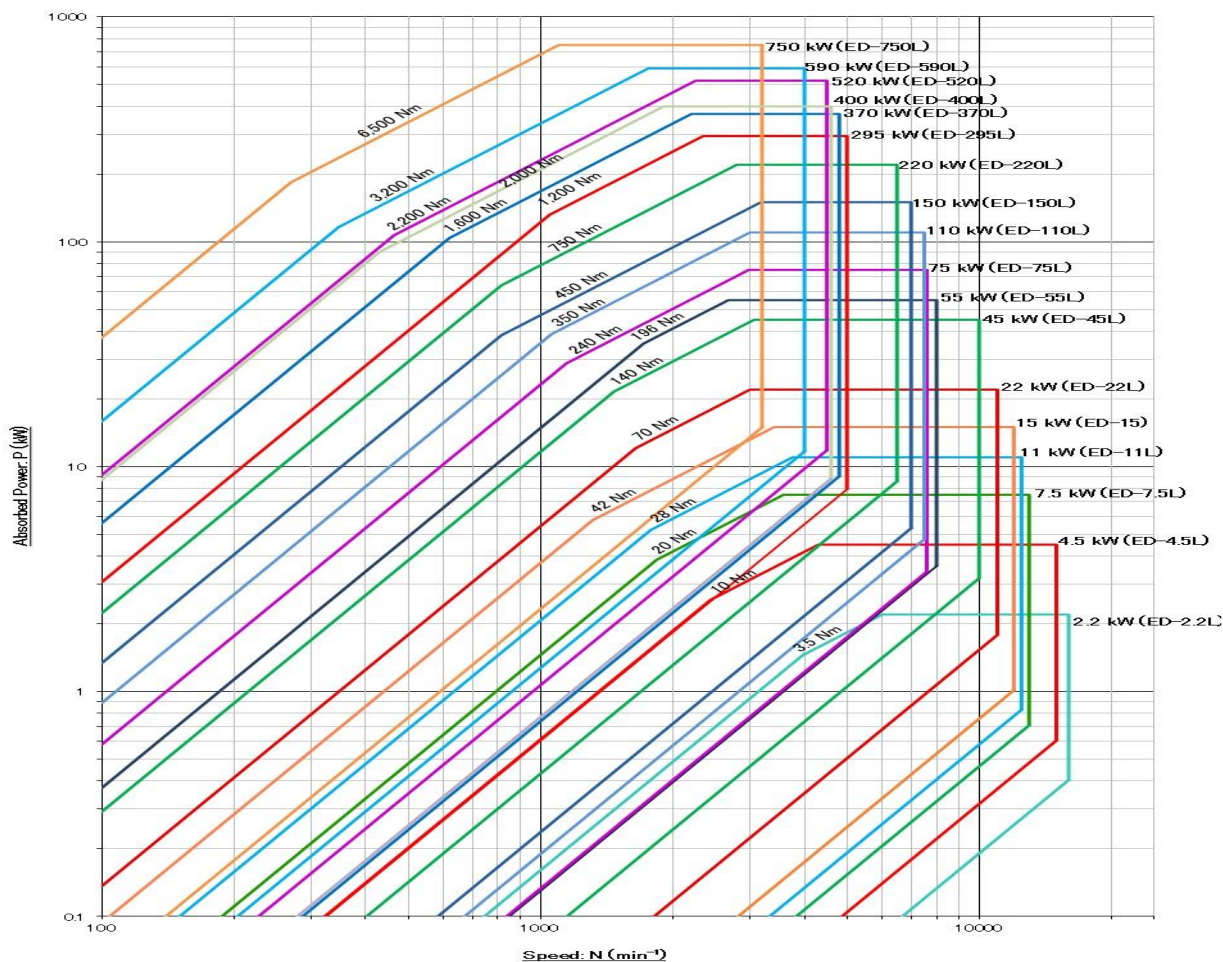
* Specification is subject to change due to product modification.

Standard Accessories	<ul style="list-style-type: none"> • Dynamometer main body • Outlet water temp sensor • Flowmeter for cooling water
Option (Chargeable)	<ul style="list-style-type: none"> • Dyno controller • Coupling flange on the dyno side • Calibration inspection tool (tool for dyno calibration) • Adjusting center height, except standard specification. • Bearing temp sensor • Coil temp sensor • Inlet cooling water temp sensor

■ Product range

○ED-L type (reversible type)

Best product range for the test of small to middle gasoline or diesel engines.



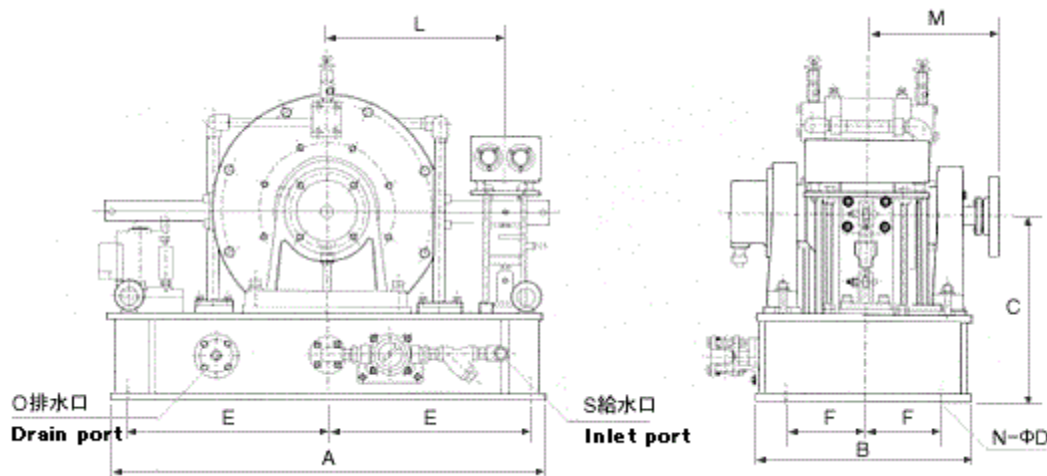
Model	Max. braking power kW	Max. braking torque Nm	Max. speed min ⁻¹	Constant torque range min ⁻¹	Inertia kg.m ²	Cooling water L/min
ED-2.2L	2.2	3.5	16,000	3,963~6,002	0.00017	1.2
ED-4.5L	4.5	10	15,000	2,443~4,297	0.00025	2.4
ED-7.5L	7.5	20	13,000	1,839~3,580	0.0025	4
ED-11L	11	28	12,500	1,786~3,751	0.0040	6
ED-15L	15	42	12,000	1,316~3,410	0.0053	8
ED-22L	22	70	11,000	1,648~3,001	0.0105	12
ED-45L	45	140	10,000	1,470~3,069	0.025	24
ED-55L	55	196	8,000	1,717~2,679	0.0225	30
ED-75L	75	240	7,600	1,146~2,984	0.0375	40
ED-110L	110	350	7,500	1,059~3,001	0.0825	60
ED-150L	150	450	7,000	814~3,183	0.1175	80
ED-220L	220	750	6,500	814~2,801	0.25	120
ED-295L	295	1,200	5,000	1,050~2,347	0.625	160
ED-370L	370	1,600	4,800	620~2,208	0.8675	200
ED-400L	400	2,000	4,600	428~1,909	1	220
ED-520L	520	2,200	4,500	463~2,257	1.11	280
ED-590L	590	3,200	4,000	346~1,760	1.8375	320
ED-750L	750	6,500	3,200	270~1,101	9.6	400

* Water flow: theoretical water flow when inlet water temp is 33°C and outlet water temp is 60° C.

* Specification is subject to change due to product modification.

■ Product range

○ED-L type: Dry weight and dimension



Model	Mass kg	Dimension (mm)									
		A	B	C	E	F	L	M	N-φD	S(A)	O(A)
ED-2.2L	100	470	310	300	210	140	160	175	4-14	8	20
ED-4.5L	120	470	310	300	210	140	170	190	4-14	8	20
ED-7.5L	150	620	332	300	240	150	215	195	4-14	10	25
ED-11L	180	620	310	300	290	135	215	200	4-14	10	40
ED-15L	200	620	310	300	290	135	215	205	4-14	10	40
ED-22L	250	700	360	300	325	155	286.8	227	4-20	10	40
ED-45L	350	760	400	350	355	175	286.5	270	4-20	15	40
ED-55L	300	710	400	350	325	140	300	263	4-20	20	25
ED-75L	500	820	420	400	400	175	358.1	295	4-22	20	25
ED-110L	600	820	420	400	375	150	358.1	275	4-22	25	32
ED-150L	700	840	550	500	380	200	358.1	303	4-22	25	40
ED-220L	1,150	1,100	620	600	500	200	477.5	380	4-24	40	40
ED-295L	1,400	1,260	720	650	600	300	500	455	4-24	40	40
ED-370L	1,500	1,160	720	650	545	280	477.5	457	4-24	50	50
ED-520L	2,000	1,350	760	700	620	280	700	480	4-24	50	50
ED-590L	3,800	1,580	800	700	750	300	406	680	6-24	50	65
ED-750L	6,000	1,700	800	800	400	320	800	525	8-24	65	65

* Mass is determined by a stand and specification.

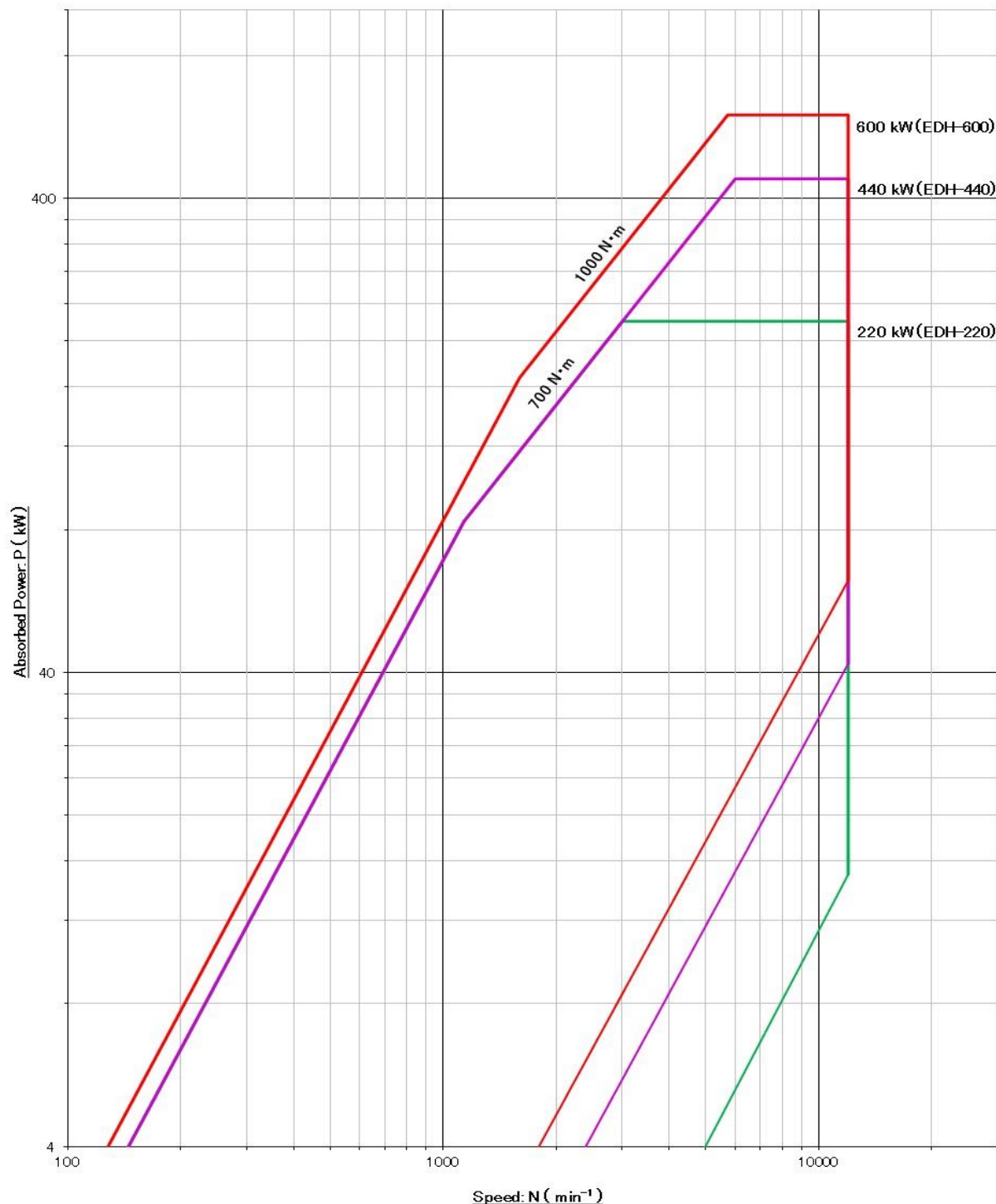
* Specification is subject to change due to product modification.

Standard Accessories	<ul style="list-style-type: none"> • Dynamometer main body • Outlet water temp sensor • Flowmeter for cooling water
Option (Chargeable)	<ul style="list-style-type: none"> • Dyno controller • Coupling flange on the dyno side • Calibration inspection tool (tool for dyno calibration) • Adjusting center height, except standard specification. • Bearing temp sensor • Coil temp sensor • Inlet cooling water temp sensor

■ Product range

○EDH type (high speed and reversible type)

Best product range for the test of small to middle gasoline or diesel engines.



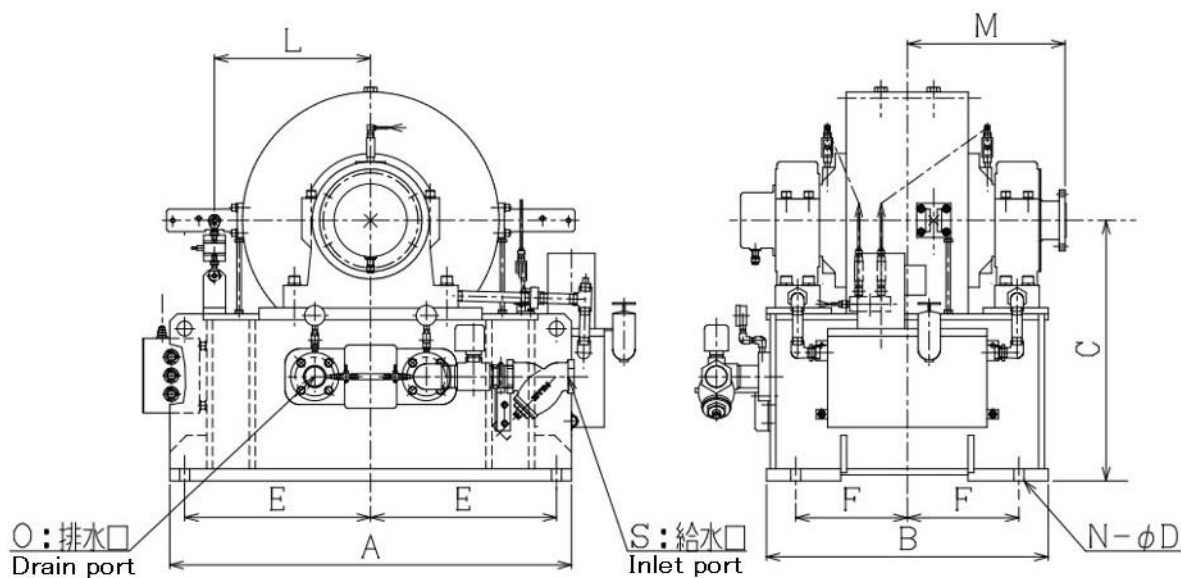
Model	Max. braking power kW	Max. braking torque Nm	Max. speed min ⁻¹	Constant torque range min ⁻¹	Inertia kg.m ²	Cooling water L/min
EDH-220	220	700	12,000	1,137~3,001	0.21	120
EDH-440	440	700	10,000	1,137~6,002	0.32	240
EDH-600	600	1,000	10,000	1,597~5,730	0.47	320

* Water flow: theoretical water flow when inlet water temp is 35° C and outlet water temp is 60° C.

* Specification is subject to change due to product modification.

■ Product range

OEDH type: Dry weight and dimension



Model	Mass kg	Dimension (mm)									
		A	B	C	E	F	N-φD	L	M	S(B)	O(B)
EDH-220	1,000	870	800	500	400	365	4-24	360	363	40	40
EDH-440	1,500	1,080	758	700	500	300	4-27	420	424	50	50
EDH-600	2,000	1,080	900	700	500	350	4-27	420	495	50	50

* Mass is determined by a stand and specification.

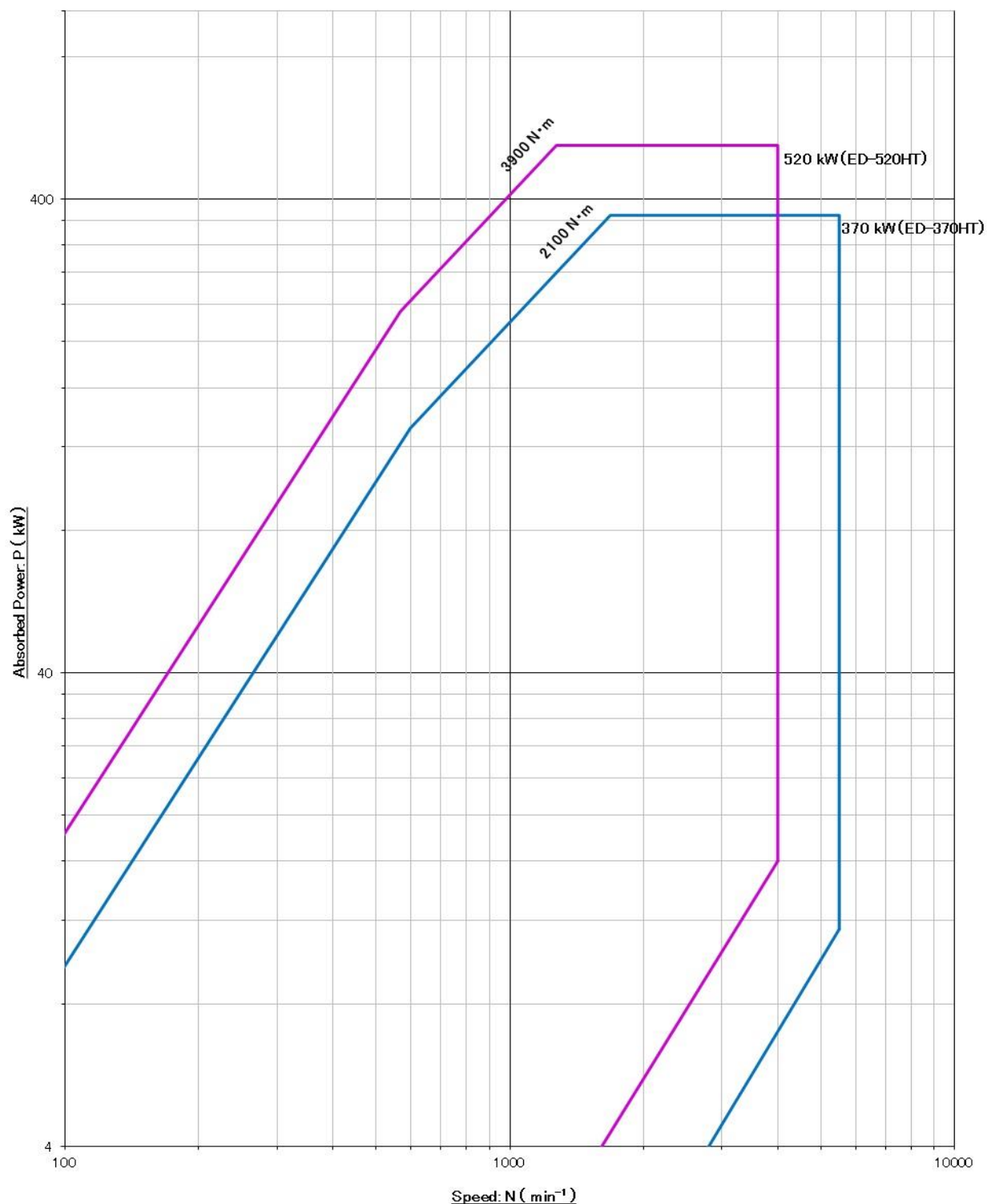
* Specification is subject to change due to product modification.

Standard Accessories	<ul style="list-style-type: none"> • Dynamometer main body • Outlet water temp sensor • Flowmeter for cooling water
Option (Chargeable)	<ul style="list-style-type: none"> • Dyno controller • Coupling flange on the dyno side • Calibration inspection tool (tool for dyno calibration) • Adjusting center height, except standard specification. • Bearing temp sensor • Coil temp sensor • Inlet cooling water temp sensor

■ Product range

○ED-HT type (high torque and reversible type)

Best product range for the test of small to middle gasoline or diesel engines.



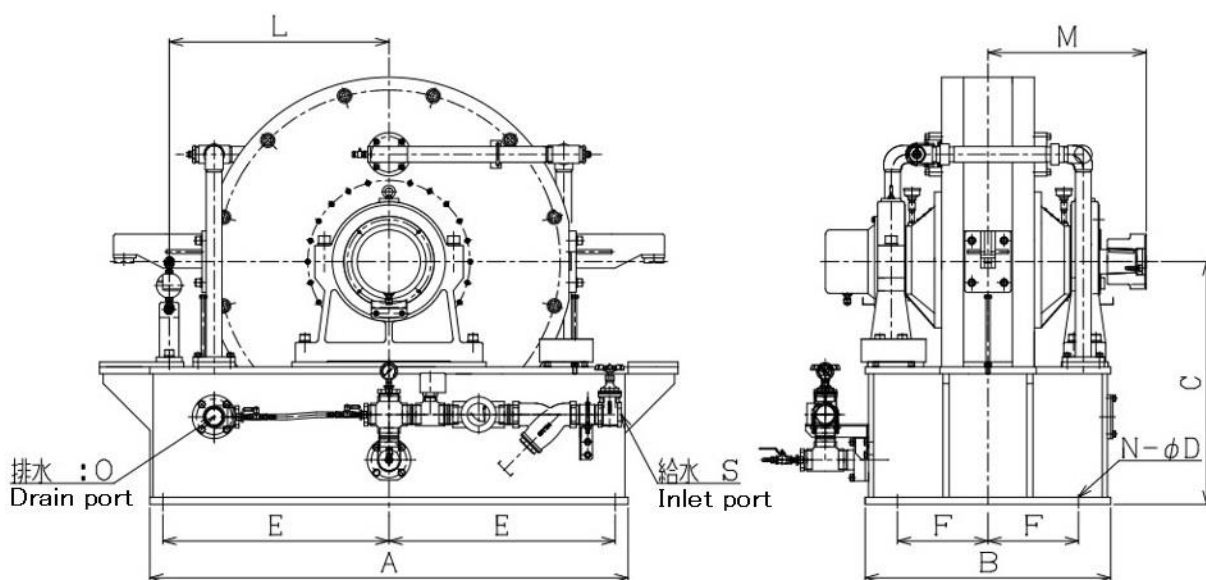
Model	Max. braking power kW	Max. braking torque Nm	Max. speed min ⁻¹	Constant torque range min ⁻¹	Inertia kg.m ²	Cooling water L/min
ED-370HT	370	2,100	5,500	598~1,682	1.04	200
ED-520HT	520	3,900	4,000	568~1,273	1.84	280

* Water flow: theoretical water flow when inlet water temp is 35° C and outlet water temp is 60° C.

* Specification is subject to change due to product modification.

■ Product range

OED-HT type: Dry weight and dimension



Model	Mass kg	Dimension (mm)									
		A	B	C	E	F	N-φD	L	M	S(B)	O(B)
ED-370HT	2,500	1,000	720	745	450	250	4-24	555.6	474	50	50
ED-520HT	3,000	1,480	760	750	700	280	4-24	680	490	50	50

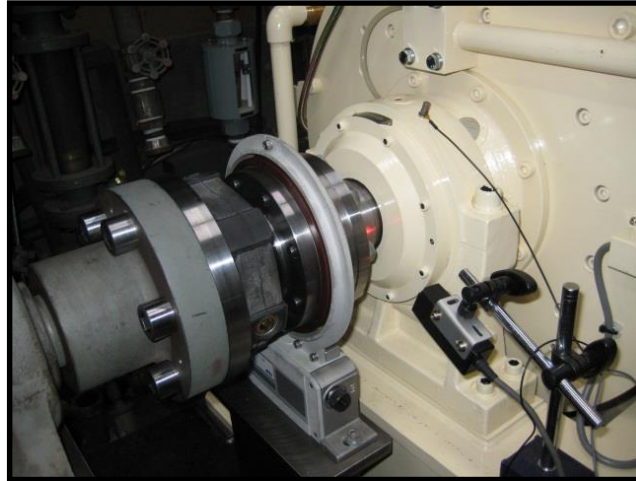
* Mass is determined by a stand and specification.

* Specification is subject to change due to product modification.

Standard Accessories	<ul style="list-style-type: none"> • Dynamometer main body • Outlet water temp sensor • Flowmeter for cooling water
Option (Chargeable)	<ul style="list-style-type: none"> • Dyno controller • Coupling flange on the dyno side • Calibration inspection tool (tool for dyno calibration) • Adjusting center height, except standard specification. • Bearing temp sensor • Coil temp sensor • Inlet cooling water temp sensor

■ Special Specification

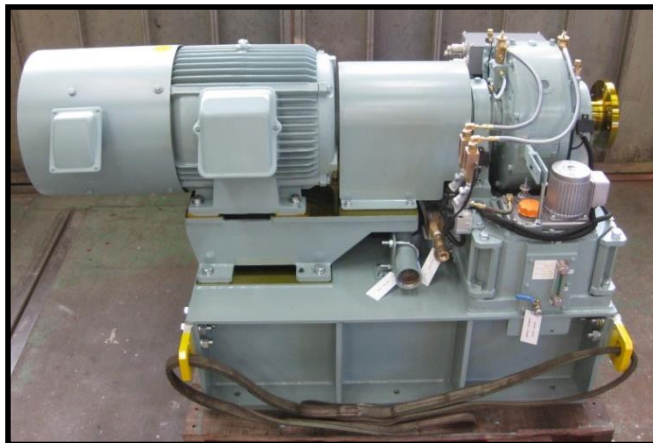
○ EDB type



It is a non-oscillated type eddy-current dynamometer, which adopts, for torque sensor, a torque flange replaces a load cell to enable high accuracy detection.

* Detection accuracy varies according to manufacturer and specification of torque flange. It is suitable for emission test such as NRTC to off-road manufacturers. Main body of eddy-current dynamometer is available from our product range.

○ ED-M type

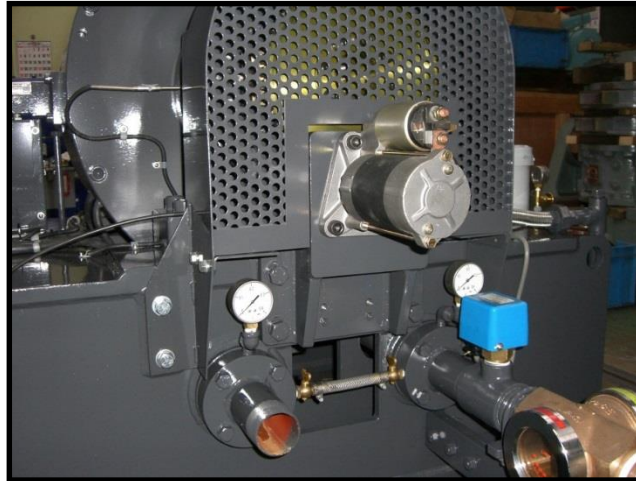


The rear side of an eddy-current dynamometer can be connected to a motor via an electromagnetic clutch. Motor output is determined according to customer's request. It is suitable for motoring test, checking noise and vibration for cranking test, HoI and Cold tests. Main body of eddy-current dynamometer is available from our product range.

* Please contact us for further information.

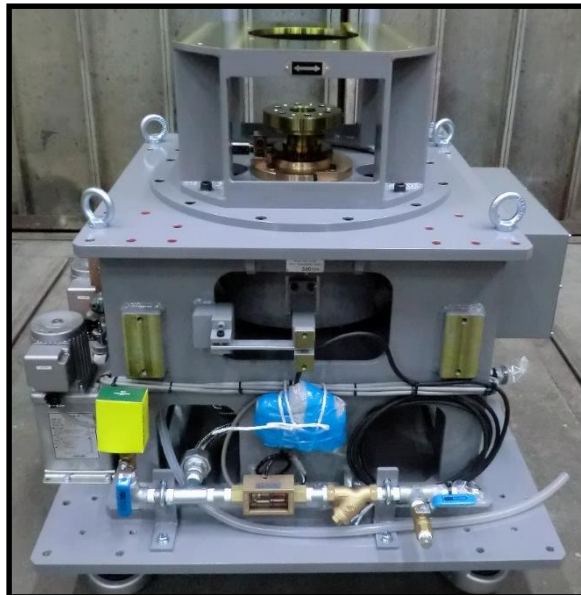
■ Special Specification

○ ED-S type



The rear side of an eddy-current dynamometer can mount a starter motor. Starter motor output is determined according to customer's request. Also customer's in-vehicle starter motor can be mounted. Main body of eddy-current dynamometer is available from our product range.

○ ED-V type

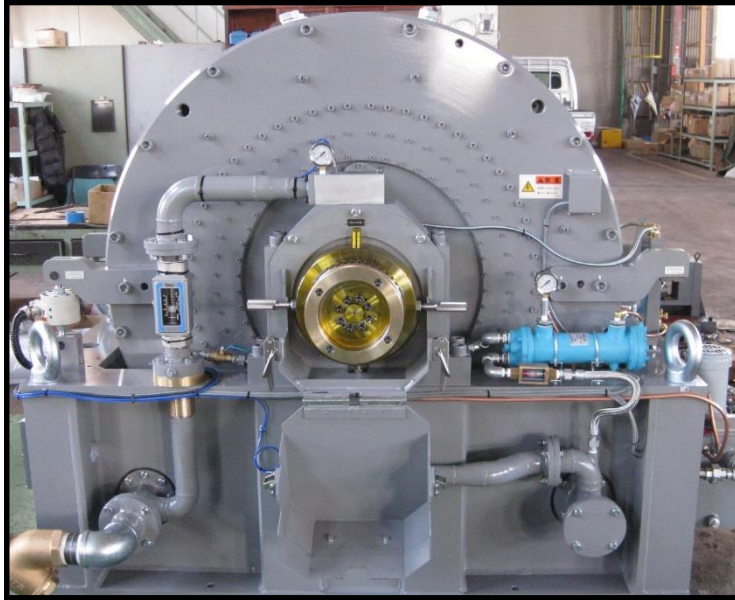


Eddy-current dynamometer can be installed vertically to connect with a test piece. Shaft couplings and test piece stand are available as optional. Main body of eddy-current dynamometer is available from our product range.

* Please contact us for further information.

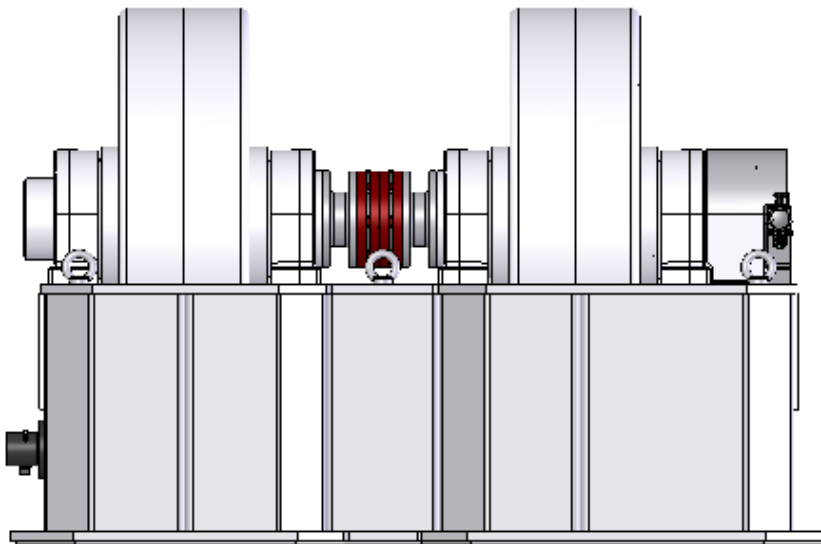
■ Special Specification

○ Large model



Eddy-current dynamometer with over 735kW is also available as special specification.
Detailed specification is determined according to customer's request.
Sample of 750kW model

○ Tandem type



2 Eddy-current dynamometers are connected in tandem to test a large engine.
Detailed specification is determined according to customer's request.
Main body of eddy-current dynamometer is available from our product range.

* Please contact us for further information.

- Optional product range
- Dyno controller (automatic control)



This controller is dedicated for eddy-current dynamometer. It is a control measurement system that conduct measurement and feedback control of test piece by using eddy-current dynamometer. It is equipped with measurement function for speed and torque, control function for speed and torque of test piece by manual or automatic, and alarm function that detects and processes system malfunction.

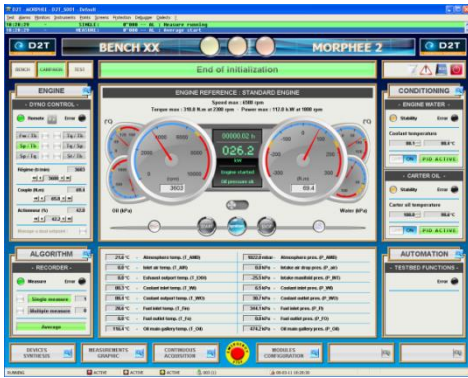
○Main specification

Model	DY-1000T
Control mode	Manual control: Controls torque and speed by set value of the manual potentiometer dial. Constant speed control: Conducts feedback control to set speed. Constant torque control: Conducts feedback control to set torque. External control: Receives programmed operation from an external automation system to conduct control and measurement.
Control accuracy	Constant speed control: $\pm 5 \text{ min}^{-1}$ Constant torque control: within $\pm 0.3\%$ F.S. Control accuracy may not be within accuracy range due to the condition of engine and dyno, setting of PID adjustment and effect of cooling water pressure.
Alarm setting and monitoring	Emergency stop: Conducts control stop with emergency button when abnormal condition. Overspeed: Monitors the upper limit of the dyno maximum speed. Overload: Monitors the upper limit of the dyno maximum torque. Outlet water temp: Monitors the cooling water temp (60°C). Bearing temp: Monitors the bearing temp (80°C). External alarm: Alarm generates with contact signal input from external device.
External I/O	Analog voltage I/O (DC 0-10V)
Necessary electric power	Three-phase AC200V, 50/60Hz, 13A
Dimension (mm)	Main body: W480 x H150 x D350 (cabinet mounted type) Stored in case: W500 x H193 x D350
Mass	Main body: approx. 10kg

* Specification is subject to change due to product modification.
* Please see the dyno controller catalog for the detail.

■ Option

○ Automation System MORPHEE



MORPHEE Main screen
(reference)

MORPHEE is implemented with basic functions of test bench data acquisition, programmed operation and test sequence setting, as well as integrating automation and ECU calibration, and real-time model execution in test bench. And it improves reliability of test in test bench and contributes to bench test, actual vehicle test and decreasing man-hour of calibration process. MORPHEE is developed and sold by FEV.

○ Data acquisition system (MIO module)



High robustness and high expandable I/O modules are expected in engine and drivetrain bench tests. Our data acquisition system can combine modules and I/O signal types (temp., pressure, analog, digital and contact) according to customers' needs.

○ Test bed utilities (optional)

We can offer a wide range of test bed utilities according to customer's needs. We also select the most suitable shaft couplings to reduce engine torsional vibration.



Engine mount, mobile common stand

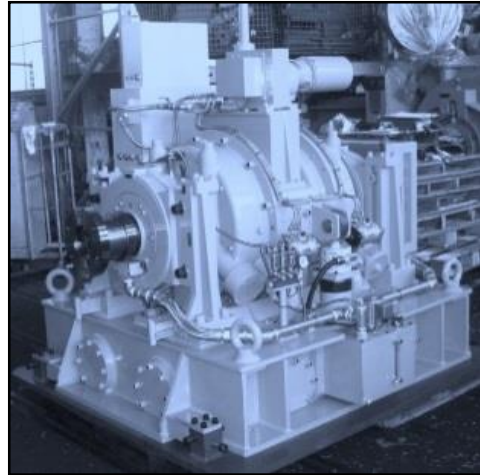


CVJ, damper, adapter
Safety guard for joint

■ Related Products

○ Tanaka's Hydraulic Dynamometer

Tanaka's Hydraulic Dynamometer is a world representative hydraulic dynamometer. It has been introduced in many references, such as Automotive Engineering Handbook. It has great durability, high accuracy and low inertia. It has been introduced to many customers both domestically and internationally. We have a wide range of product; output range of 88 to 20,000 kW, low speed type, high speed type and high torque.



Please see the Tanaka's hydraulic dynamometer catalog for more details.

■ Rental and Refurbished Products

○ Reduce initial cost

Rental and rebuild products are available to meet customers request.

【Customers' specific needs】

- Need a dynamometer immediately for urgent schedule.
- Budget is not fully acquired.
- Want to include in deductible expenses without capitalizing assets.

○ Rental

The longest period of 2 years

Stock: Please contact us for models and stock.

○ Refurbished products

Fully overhauled product (as good as new)

Warranty period of 1 year

* Coupling flange and frame need to be newly manufactured.

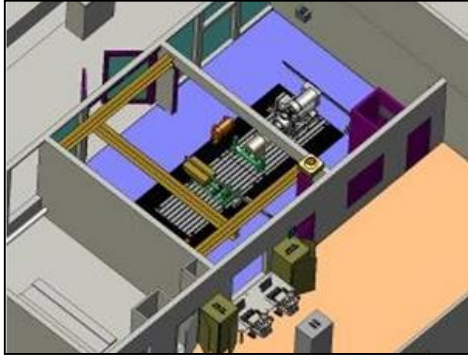
○ Calibration Certificate

We provide calibration certificate for dynamometers needed for ISO.

■ Turnkey Project

We have a partnership with architect offices and engineering companies. We can deal with the following requests. We can collaborate with you from the planning phase. Please do not hesitate to contact us.

Design/Construction work for Labs



Samples:

- Test cell for gasoline engines
- Test cell for diesel engines
- Firing Bench of mass production line

Design/Construction Work for Test cells



Samples:

- Test cell for gasoline engine
- Test cell for diesel engines
- Firing Bench of mass production line

Test Cell Auxiliary Facilities



Samples:

Cooling tower, incoming panel, air-conditioning system, T-slot bedplate, custom silencer, intake/exhaust, fuel supply system, and etc.

Auxiliary Works



Workable items:

Delivery, installation, adjusting alignment, piping, wiring and etc.

■ Maintenance

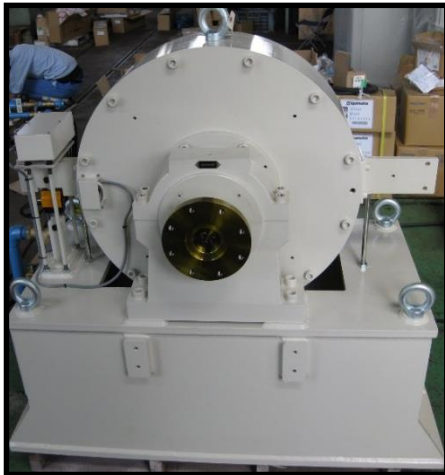
Even a health enthusiast can roughly judge his/her body condition on the day. However, complete health condition cannot be known without medical help. For the testing devices, each component gets worn little by little as tests are repeated. And oil used to prevent wear as little as possible also gets worn and deteriorated according to frequency of use and elapsed time. Because testing machines don't have self-healing abilities, knowing the machine condition by periodic maintenance can maintain the best condition.

In order to have accurate data acquisition with testing devices, periodic maintenance is necessary.



■ Periodic maintenance prevents malfunctions.

In case a testing device is used under the severe condition, especially continuous durability test, bearings and sealings suffer faster; these need periodic replacement. After maintenance work, we in detail confirm the condition of products by calibration inspection, running inspection and etc before delivery. Testing devices which pass the rigid company criteria can be delivered to customers again.



■ Recommendation of periodic maintenance

In order to conduct accurate measured data acquisition in test benches, we recommend to have periodic inspection once or twice an year, aside from maintenance. Our engineers can visit your sites domestically and internationally.

* Periodic maintenance and inspection are charged.

■ Spare parts and calibration work

Dyno spare parts and sensors such as load cell and speed detector can be delivered. And also we calibrate load cells and indicators. Please contact us for further information.

* On-site work must be reserved.

■ Flow of Inquiry

Please do not hesitate to contact our sales by phone, email or web.

○ FAQ

Planning

Please tell us your planning about launching test cell or test bed and updating facilities.

Request for Quotation

Please tell us about application of dyno, test contents, engine specification, measurement items, test patterns and etc.

Request for Services

Please tell us product model and manufacturing number.

Technical Questions

Please tell us if you are concerned about our product structure and principle. Our sales will contact you.

Questions about Product

Please tell us if you are concerned about our product usage. Our sales will contact you.

Others

Please tell us if you have requests, opinions and concerns. Our sales will contact you.

We are responsible for handling customer information and inquiry contents as confidential.

【Contact】

Sales Group, Tokyo Plant Co., Ltd.

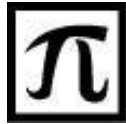
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