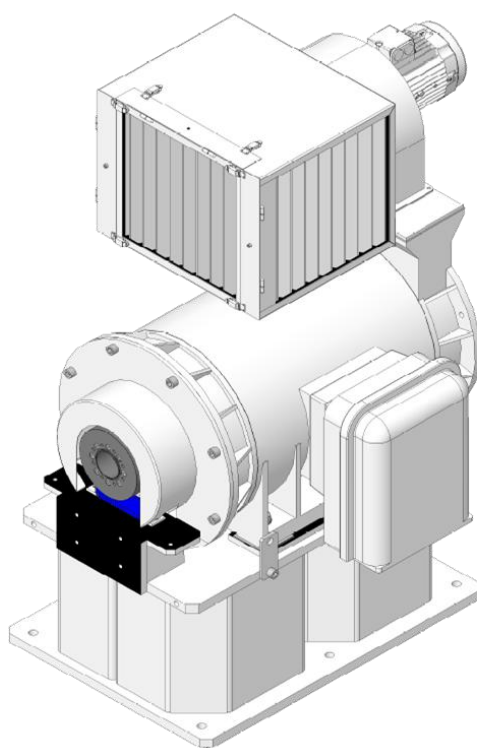


~Advanced Test System and Test Bench Engineering Professional~

Tokyo Plant Co., Ltd.

Product catalog



AC Dynamometer

■ Overview

Our group (Tokyo Plant and ENORISE) manufactures AC-type electric dynamometers that offer high accuracy and excellent durability, and they have been adopted by many customers both in Japan and overseas.



■ Product Lineup

We offer a wide product lineup ranging from 1 kW to 2,500 kW.

■ Performance Record

Total units delivered: Over 300
Destinations:
Japan and more than 30 countries worldwide

■ Delivery Record (in no particular order)

Japan)

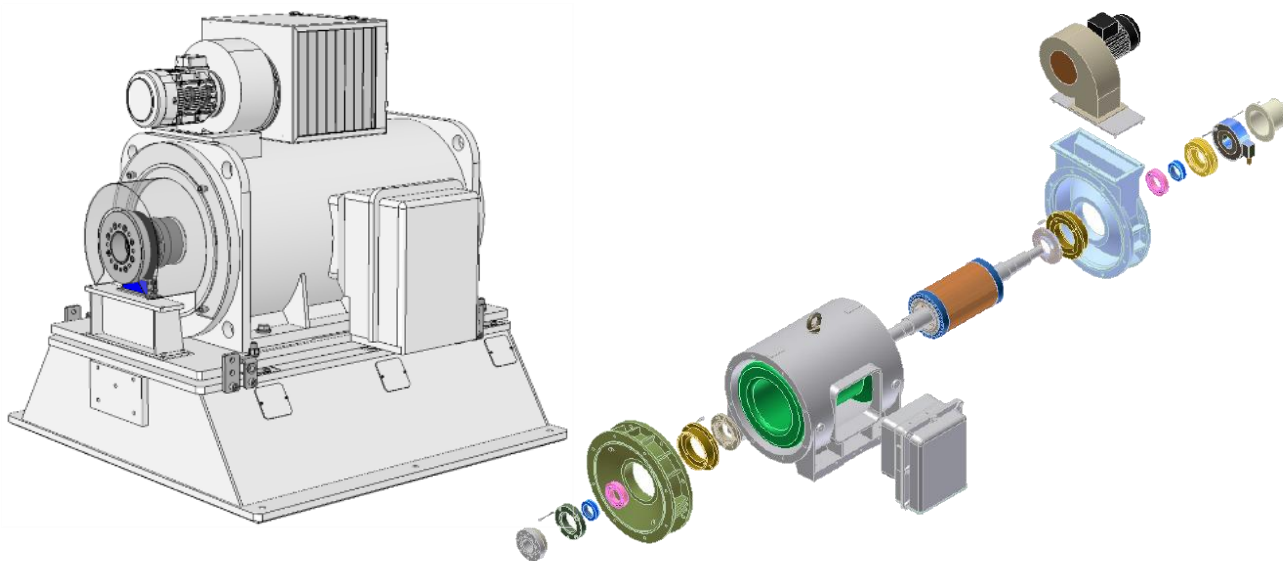
Komatsu Cummins, Dynax, Yamaha Motor, Daikin Industries, FEV

Overseas)

RENAULT, RENAULT Truck, VOLVO, VOLVO Truck, DAIMLER UNIMOG, BMW, HYUNDAI, PSA Peugeot-Citroën, FIAT Elasis, ZF Sachs (Germany) RSA (France), CETIM Test Center (France), KST, CAT, FEV, HONDA, KIA, JOHN DEERE – SEEC – USA, Various research institutes, racing teams, AIRBUS, SAFRAN, Microturbo, DGA, Arianespace, RUAG, DAHER overseas military organizations, universities, technical colleges, and others (More than 150 companies in total)

■ Key features

High performance	- Because of its low moment of inertia, highly repeatable testing can be performed at values equivalent to, or close to, those of actual engines and vehicles. - Speed, torque, and current control modes are provided as standard features. - The lineup covers ultra-compact to large units, including high-speed and high-torque models. - An alarm signal is output in the event of overspeed or insufficient lubrication oil supply, and relay contacts can also be accessed.
Compact Lightweight	- The drive unit requires only a small installation footprint. - The dynamometer also requires minimal installation space.
Easy operation	- Rotational speed and torque are displayed digitally as standard features. - Analog voltage outputs for rotational speed and torque are also provided. - To prevent incorrect cable connections, connector-type interfaces are used.
A wide range of optional features (paid option)	- With the automatic control system, constant-speed control, constant-torque control, and programmed operation control can be performed. - The center height can be modified according to customer requirements. - The anchor-bolt positions of the dynamometer frame can also be manufactured to meet customer specifications. - The system supports powertrain evaluation testing from single-axis configurations up to a maximum of five axes.



- Utilizing the electromagnetic induction principle of an AC motor, it absorbs and drives the output of the test specimen.
- Inside the AC motor are a stator and a rotor. When AC current is applied to the stator, a rotating magnetic field is generated. This rotating magnetic field induces current in the rotor, producing torque through electromagnetic force.
- Torque and rotational speed are controlled by adjusting the frequency and voltage supplied from the drive unit.
- The structure is simple and contains few wear components, resulting in excellent maintainability.

■ Main application of the products

Engine Performance Testing

Evaluation of output, torque, efficiency, and overall performance characteristics of various engines.

Durability and Endurance Testing

Long-duration operation to assess wear, reliability, and lifecycle performance.

Emission and Environmental Testing

Measurement and analysis of exhaust emissions under controlled load conditions.

Research and Development

Use in OEM and academic R&D facilities for prototype evaluation, calibration, and advanced engineering studies.

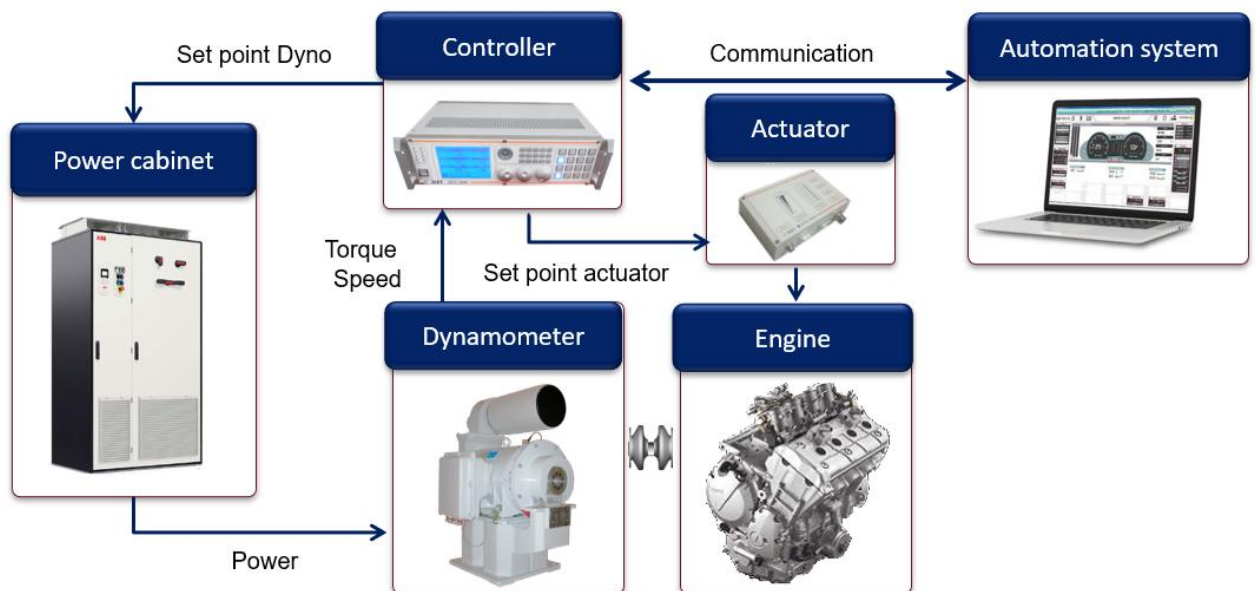
Quality Assurance and Production Line Testing

Verification of engine performance during manufacturing and final inspection.

Maintenance and Overhaul Facilities

Performance checks and diagnostics for large engines after overhaul or repair.

■ Typical system configuration



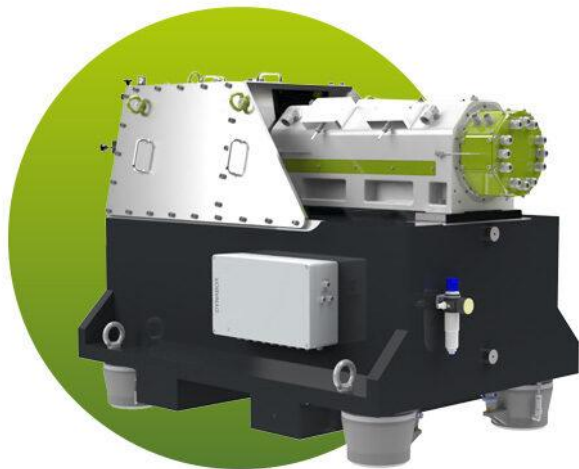
We are able to propose the optimal dynamometer, measurement system, and auxiliary equipment tailored to each customer's needs. If required, we can also support the selection of automation systems, data-acquisition sensors, test bench layout, shafts, and dampers. Please feel free to contact our Sales Department with your requirements. We will provide the most suitable proposal that aligns with your budget and technical expectations.

■ Product lineup

○ DX series

It offers an ideal product lineup for motor and turbine testing.

GNORISE



Model	Max power <i>kW</i>	Max torque <i>N.M</i>	Base speed <i>min⁻¹</i>	Max speed <i>min⁻¹</i>	Moment of Inertia <i>kg.m²</i>	Voltage (V) Current (A)
DX250	250	400	6,000	25,000	0.066	460/490
DX300	300	600	4,780	21,000	0.129	495/554
DX400	400	500	7,700	24,000	0.130	460/1,207
DX500	500	600	8,000	20,000	0.139	460/1,554

※Specification Changes: Specifications are subject to change without prior notice due to improvements or updates.

■ Custom specifications available

We can also manufacture custom-specification products in accordance with the customer's requirements.

Main specifications of motor)

Max power : ~2,500kW

Max torque : ~2,000Nm

Max speed : ~40,000min⁻¹



■ Product lineup

○ DR series

It offers an ideal product lineup for testing small- to medium-sized gasoline and diesel engines.

GNORISE



Model	Max power <i>kW</i>	Max torque <i>N.M</i>	Base speed <i>min⁻¹</i>	Max speed <i>min⁻¹</i>	Moment of Inertia <i>kg.m²</i>	Voltage (V) Current (A)
DR160	160	350	4,377	10,000	0.22	460/250
DR250	250	550	4,365	10,000	0.29	460/380
DR300	300	700	4,070	10,000	0.65	460/450
DR380	380	820	4,450	10,000	0.65	460/600
DR500	500	1,100	4,340	8,500	0.9	460/730
DR600	600	1,340	4,261	6,500	1.14	460/930

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■ Custom specifications available

We can also manufacture custom-specification products in accordance with the customer's requirements.

Main specifications of motor)

Max power : ~1,000kW

Max torque : ~2,000Nm

Max speed : ~10,000min⁻¹

■ Product lineup

○ DS series (High torque series)

It offers an ideal product lineup for testing small- to medium-sized diesel engines.

GNORISE



Model	Max power <i>kW</i>	Max torque <i>N.M</i>	Base speed <i>min⁻¹</i>	Max speed <i>min⁻¹</i>	Moment of Inertia <i>kg.m²</i>	Voltage (V) Current (A)
DS250	250	1,110	2,155	8,500	0.9	460/390
DS300	300	1,400	2,046	8,500	1.85	480/450
DS380	380	1,800	2,014	8,000	2.25	460/580
DS470	470	2,200	2,043	7,500	2.85	460/770
DS530	530	3,060	1,691	7,500	3.1	460/840
DS590	590	3,450	1,631	4,500	3.7	480/1,080

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■ Custom specifications available

We can also manufacture custom-specification products in accordance with the customer's requirements.

Main specifications of motor)

Max power : ~1,000kW

Max torque : ~5,000Nm

Max speed : ~8,500min-1

■ Product lineup

○DT series (Low speed series)

It offers an ideal product lineup for testing small- to medium-sized diesel engines.

GNORISE



Model	Max power <i>kW</i>	Max torque <i>N.M</i>	Base speed <i>min⁻¹</i>	Max speed <i>min⁻¹</i>	Moment of Inertia <i>kg.m²</i>	Voltage (V) Current (A)
DT280	280	1,900	1,407	4,000	4.2	460/435
DT360	360	2,300	1,498	4,000	4.9	460/540
DT410	410	2,600	1,507	4,000	6	480/590
DT490	490	3,100	1,510	3,500	6.7	480/700
DT570	570	3,600	1,510	4,000	11	460/840
DT610	610	4,000	1,457	4,000	12.7	480/870
DT800	800	5,100	1,498	3,500	12.9	460/1,200

※Specification Changes: Specifications are subject to change without prior notice due to improvements or updates.

■ Custom specifications available

We can also manufacture custom-specification products in accordance with the customer's requirements.

Main specifications of motor)

Max power : ~2,000kW

Max torque : ~8,000Nm

Max speed : ~4,000min-1

■ Product lineup

○ DW series

It offers an ideal product lineup for testing powertrain.

GNORISE



Model	Max power <i>kW</i>	Max torque <i>N.M</i>	Base speed <i>min⁻¹</i>	Max speed <i>min⁻¹</i>	Moment of Inertia <i>kg.m²</i>	Voltage (V) Current (A)
DW200	200	2,500	764	3,000	0.64	440/800
DW255	259	2,810	879	4,000	2.833	460/425
DW335	337	4,200	767	3,500	8.880	460/528
DW360	361	4,600	750	3,000	7.1	460/860
DW430	420	5,200	791	3,500	10.98	460/671
DW505	506	5,200	929	3,500	10.98	460/783

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■ Custom specifications available

We can also manufacture custom-specification products in accordance with the customer's requirements.

■ Product lineup

○ ACS series

This is the drive unit designed for use with each AC-type electric dynamometer.

■ Main Specifications

Rated Output: 170 kVA to 130 kVA (※)
 Power Supply Voltage: 400 V / 480 V / 690 V
 Frequency: 48–63 Hz
 Motor Connection
 Frequency: 0 to ± 300 Hz
 Rated Current: 250–1528 A (※)
 Operating Temperature Range: -15 to $+50$ °C
 Operating Relative Humidity: 5–95%
 Heat Dissipation: 12 kW
 Noise Level: 75 dBA
 Interface Profibus 12 Mbit/s
 EtherCAT 100 Mbit/s
 Protection Rating IP42
 EMC Test Standard EN61800-3



※Specification Changes: Specifications are subject to change without prior notice due to improvements or updates.

■ Product lineup

○ PM series

This is the drive unit designed for use with each PM-type electric dynamometer.

■ Main Specifications (Example)

Communication : EtherCAT, CAN-Bus, Profinet
 Primary Power Supply : Three-phase 400 V $\pm 10\%$, 50 Hz

Control Panel (Control Cabinet)

- Power supply with main power switch
- Main power voltage: Three-phase 400 V $\pm 10\%$, 50 Hz
- Control power supply: DC 24 V
- Emergency stop circuit: PNOZ (safety-relay system)



Active Front End (AFE)

- Overload capability: 120%
- (Allows 30 seconds of overload operation within a 10-minute period)
- DC bus voltage: 650 VDC
- Switching frequency: 6 kHz

Motor Inverter

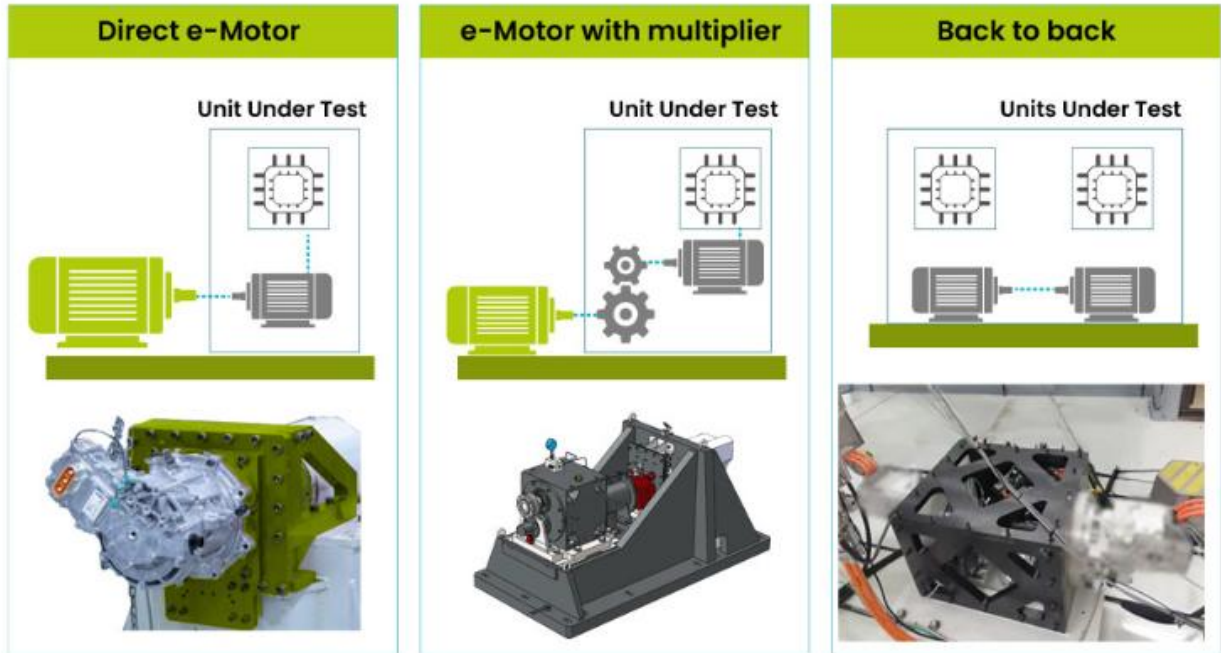
- Rated performance: Continuous current 1435 A (S1 operation)
- Overload capability: 120% (1760 A for 30 seconds within a 10-minute period)
- DC bus voltage: 650 VDC
- Switching frequency: 12 kHz

※Specification Changes: Specifications are subject to change without prior notice due to improvements or updates.

■ eMotor solution examples

○ Motor test bench

enORISE



We support a wide range of motor test benches tailored to the customer's unit under test and test requirements.

Motor Evaluation Test Bench with Temperature-Controlled Chamber



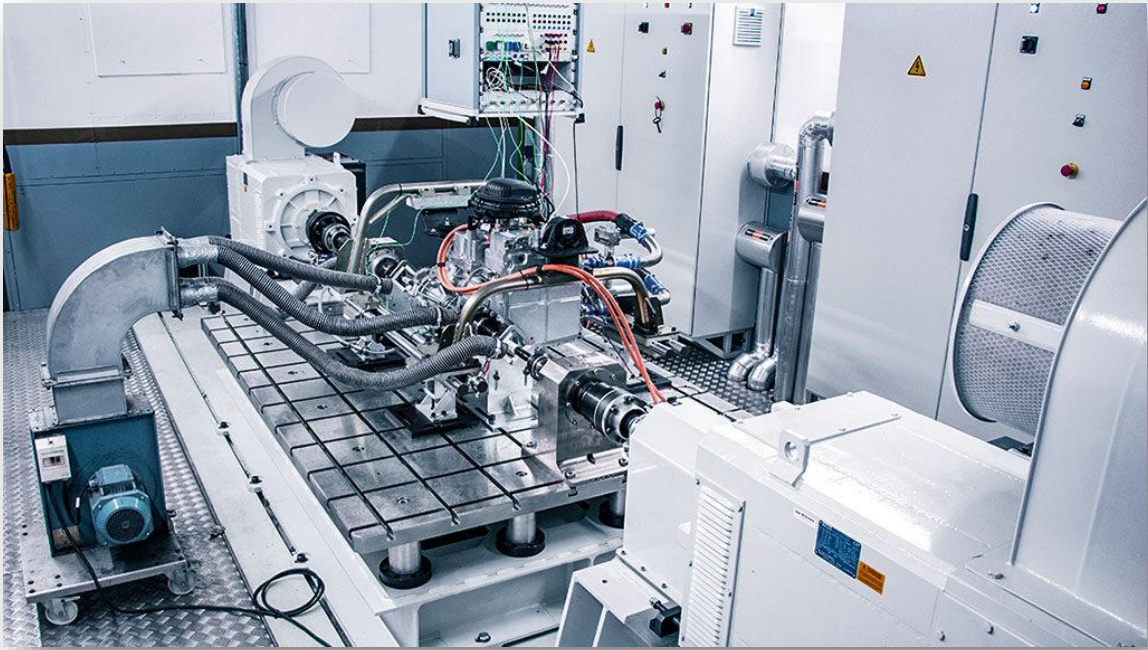
In evaluating electric powertrains, environmental testing of components such as motors and batteries is required in order to simulate actual vehicle driving conditions.

As an option, we can also offer test benches equipped with a Temperature-controlled chamber.

■ Powertrain Test Bench examples

○ eAxe test bench

GNORISE



By using two dynamometers, eAxe evaluation testing can be performed.

Main configuration:

Motor 1: Functions as the driving motor to simulate motor behavior.

Motor 2: Functions as the driven motor to absorb load.

Rated torque: Supported up to 2800 Nm.

○ Transmission test bench



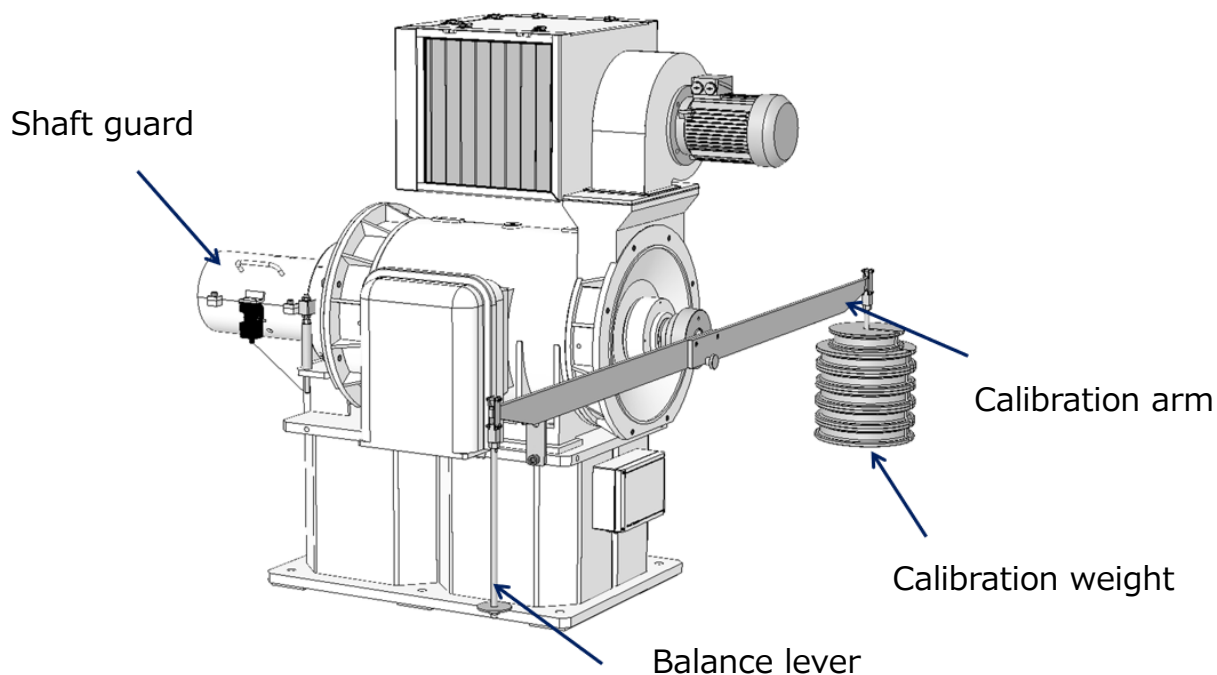
By using two or three dynamometers, transmission evaluation testing can be performed.

Main configuration:

Motor 1: Functions as the driving motor to simulate engine behavior.

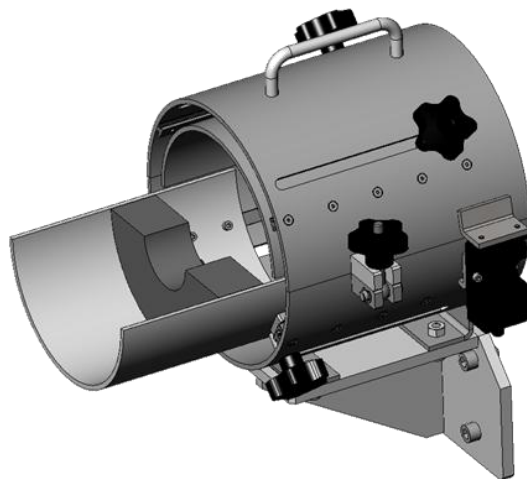
Motors 2 and 3: Function as driven motors to absorb load.

■ Accessories ○ Calibration tools



Regular calibration is required to ensure the measurement accuracy of the dynamometer. We also recommend purchasing the calibration tools when acquiring the dynamometer.

○ Sliding shaft guard



During testing of the specimen, if the shaft connecting the specimen and the dynamometer were to break, it could lead to serious accidents, including operator injury. Always ensure that the shaft guard is installed during operation.

Optional Function:

By outputting a contact signal indicating whether the shaft-guard cover is installed, the system helps prevent human error.

■ Optional product lineup

○Dynamometer controller (automatic control controller)

enorise


Overview)

This controller is a dedicated controller for AC-type electric dynamometers.

It is a control and measurement system designed to perform specimen measurement and feedback control using an eddy-current dynamometer.

It is equipped with measurement functions for rotational speed and torque, control functions for manual or automatic control of the specimen's rotational speed and torque, and alarm functions for detecting and handling system abnormalities.

○Main specifications

Model	DCU3000
Control mode	Manual Control: Torque, rotational speed, and control are executed based on the potentiometer settings adjusted manually. Constant-Speed Control: Feedback control is performed to maintain the specified rotational speed. Constant-Torque Control: Feedback control is performed to maintain the specified torque. External Control: Automatic operation is performed via an external automation system.
Control accuracy	Control Loop: Digital PID, 2 kHz Constant-Speed Control Accuracy: $\pm 1 \text{ min}^{-1}$ Constant-Torque Control Accuracy: $\pm 0.1\% \text{ F.S}$ or better Note: Depending on the condition of the engine or dynamometer, PID tuning parameters, and external disturbances, the control accuracy may not always remain within the specified range.
Alarm set Monitor	Emergency Stop: Control is halted via the emergency stop button when an abnormal condition occurs. Overspeed Protection: Monitors the upper limit of the dynamometer's maximum rotational speed. Overload Protection: Monitors the upper limit of the dynamometer's maximum torque. Bearing Temperature Monitoring: Monitors the dynamometer's bearing temperature (80°C). External Alarm Input: Monitors connected external devices via contact-signal input.
External Input/output	Analog Voltage I/O (DC 0–10 V): 3 channels Pulse Input: 3 channels Digital Input: 16 channels PC Interface: EtherCAT
Power	24VDC
Dimension	Main Unit: W483 mm × H132 mm × D285 mm (rack-mount type)
Weight	Main Unit: Approx. 5 kg

■Paid Optional Products

○Automation system MORPHEE



MOPRHEE main screen (Reference)

Product Overview

This system provides essential functions for test benches, including data acquisition, programmed operation, and test-sequence configuration. In addition to these core capabilities, it implements a comprehensive set of advanced features such as automation, integration with ECU calibration workflows, and real-time model execution on the test bench.

These functions enhance the reliability of testing on the bench and contribute to reducing workload in bench testing, vehicle testing, and calibration processes.

MORPHEE is developed and distributed by ENORISE.

○Sensor terminal box (MIO)



Product Overview

In engine and drivetrain bench testing, highly robust and scalable I/O modules are essential.

The sensor relay box allows flexible configuration of modules and signal types—such as temperature, pressure, analog, digital, and contact signals—based on the customer's specific requirements.

○Product Overview

We provide various utilities required for test benches according to customer requirements.

To reduce engine torsional vibration, we also perform optimal selection of shafts and dampers.



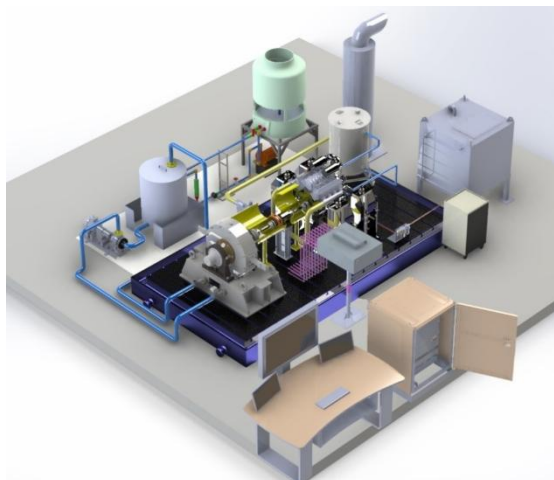
Battery Evaluation Equipment,
Temperature-Control Units, etc.



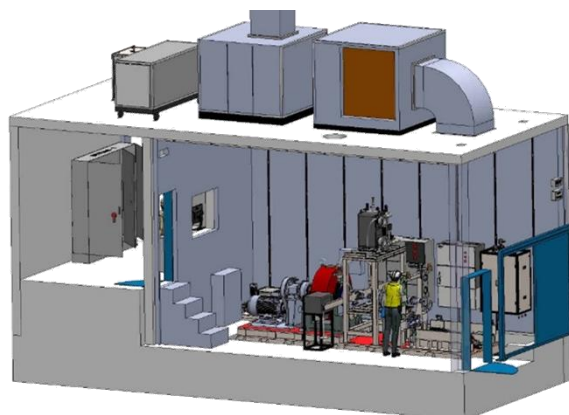
Shafts, Dampers, Custom Adapters,
and Safety Covers for Shafts

■ Turn-key project

This solution is ideal for customers who are pressed for time due to daily research and development activities, or whose development teams require significant manpower, resulting in a high workload for facility engineers and a greater need for outsourcing various tasks. We participate from the customer's planning stage to support the entire process.



- ✓Startup of entire engine test facility
- ✓Test cell renovation
- ✓Startup of engine production line



Upgrade or Installation of auxiliary equipment
Cooling tower, power-receiving panel, air-conditioning system, T-slot surface plate, custom silencer, intake/exhaust system, fuel-supply system, and more.

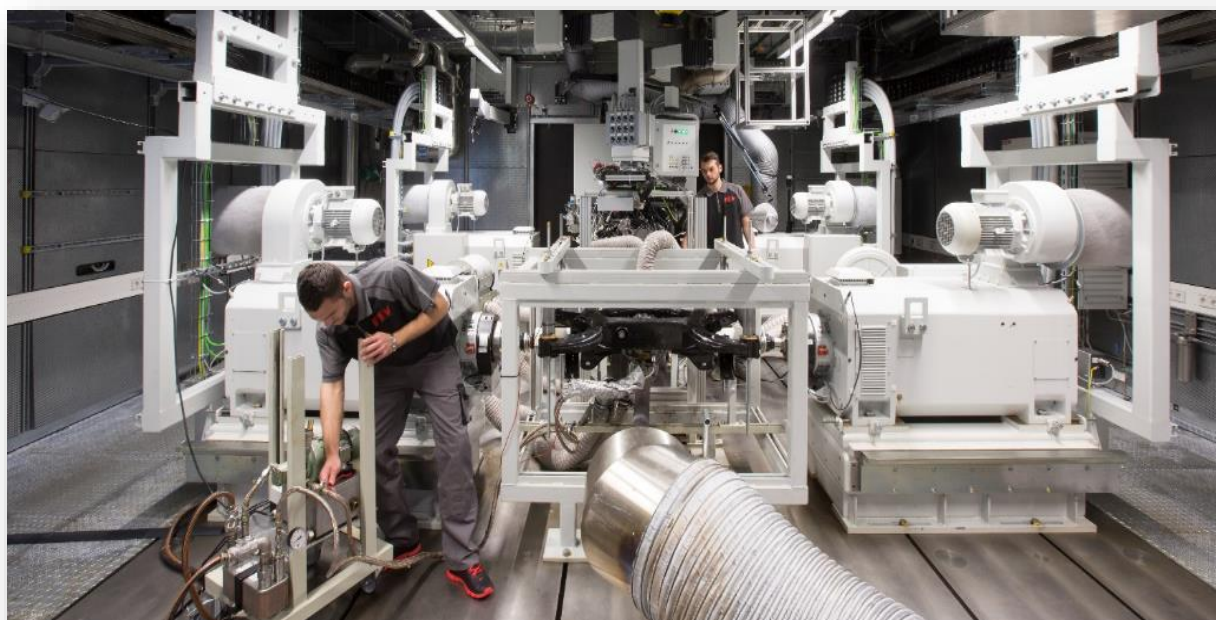


Photo) Power train test bench

■ Maintenance and after-sales service

Even people who pay close attention to their daily health can only make a rough judgment about how they feel on a given day; without the support of a specialist, it is impossible to accurately understand the internal condition of the body.

Similarly, test equipment experiences slight wear on numerous components each time a test is performed. The oil used to minimize this wear also deteriorates and is consumed over time and with repeated operation. Because test equipment does not possess the natural ability to regenerate, its condition must be checked through regular maintenance. By performing the necessary servicing, the equipment can be kept in optimal condition.

Regular maintenance is essential to ensure accurate data measurement on test equipment.



Regular maintenance prevents failures before they occur.

Especially in continuous endurance testing or other harsh operating conditions, bearings and various seals wear out more quickly and therefore require periodic replacement. After maintenance is completed, we perform detailed inspections—such as calibration checks and operational tests—before shipment to ensure the equipment's condition. Only test systems that meet our strict quality standards are delivered back to the customer.

Recommendation for Regular Inspections

To ensure continuous and accurate data acquisition on test benches, we recommend performing regular inspections once every six months to one year, in addition to routine maintenance. Our engineers can provide on-site service anywhere in Japan and worldwide. (Regular maintenance and periodic inspections are offered as paid services.)



■ Spare Parts and Calibration Services

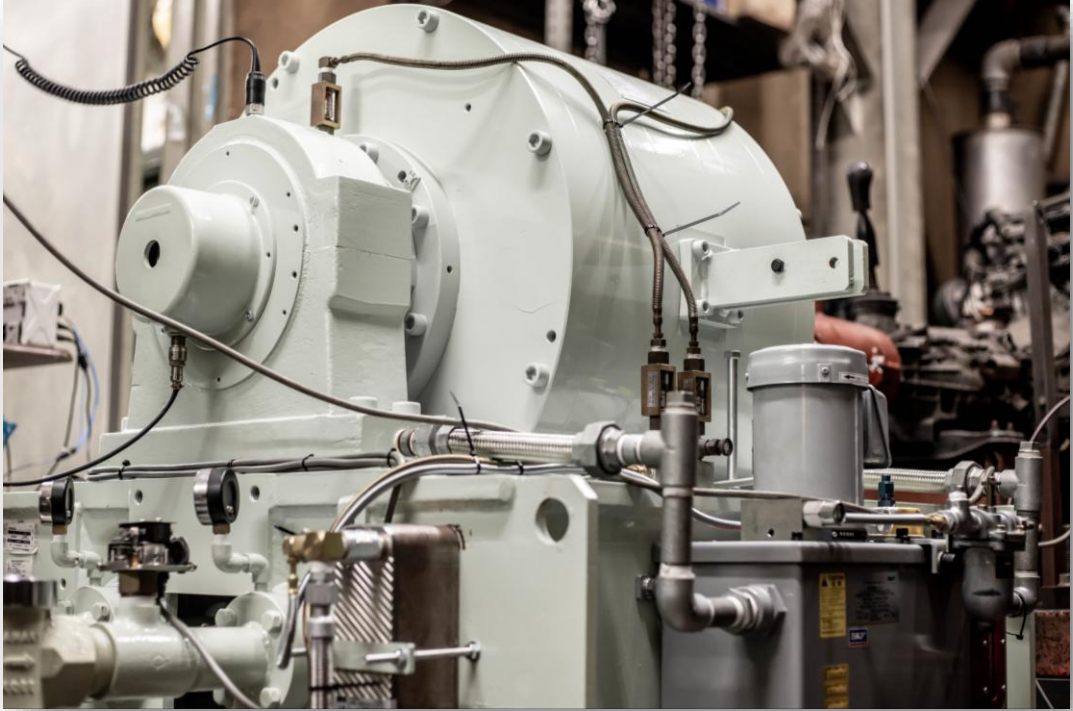
We can supply individual spare parts for dynamometers, including load cells, rotation detectors, and other sensors. We also provide calibration services for load cells and display units, with pickup and return handling. Please contact us when calibration is required according to your internal maintenance schedule. (Advance reservation is necessary.)



■ Related products

○ Eddy current dynamometer

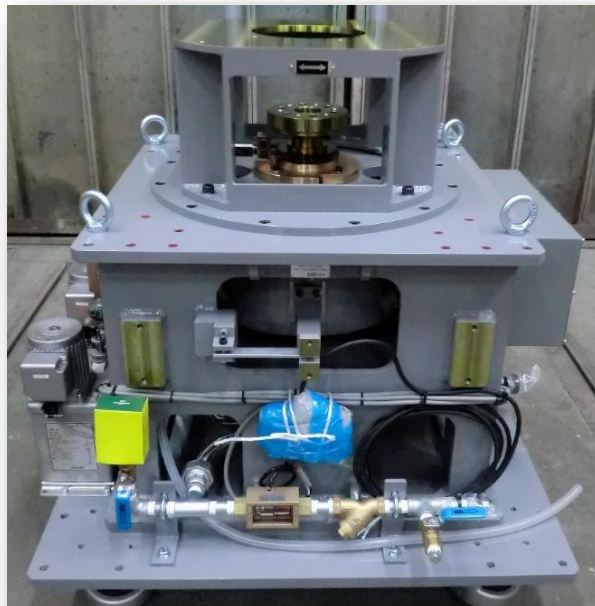
Our company also manufactures and supplies eddy-current dynamometers. We offer a wide product lineup ranging from 2.2 kW to 1000 kW, including models capable of high-torque applications. These dynamometers enable a wide variety of engine load-performance tests with minimal installation space and low overall cost. Our products are used by customers both in Japan and overseas.



For further details, please refer to the product catalog for our eddy-current dynamometers.

○ Solution examples ED-V type

The eddy-current dynamometer can be installed in a vertical orientation, allowing direct connection to the test object. This configuration is ideal for VTOL testing systems.



Inquiry Process

Please feel free to contact our sales representatives by phone, email, or through our website.

○Frequently Asked Inquiries

Planning

Please share your plans for test cell and test bench commissioning, equipment upgrades, or modifications.

Quotation

Please provide information on the intended use of the dynamometer, test contents, engine specifications, measurement items, test patterns, and schedule.

Repair inspection

Please provide the model and serial number of the product you are using, as well as your preferred date and time for the requested service.

Technical questions

If you have any questions regarding the product's structure or operating principles, please let us know. We will connect you with our technical specialists.

Products Handling

If you have any questions regarding product operation or usage, please let us know. We will connect you with the product specialist.

Other inquiries

If you have any requests, comments, or questions, please let us know. We will connect you with the appropriate product specialist.

Any information you provide during inquiries or discussions will be handled with strict confidentiality. We take full responsibility for ensuring that all such information is securely managed within our company.



Contact Information

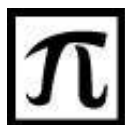
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