

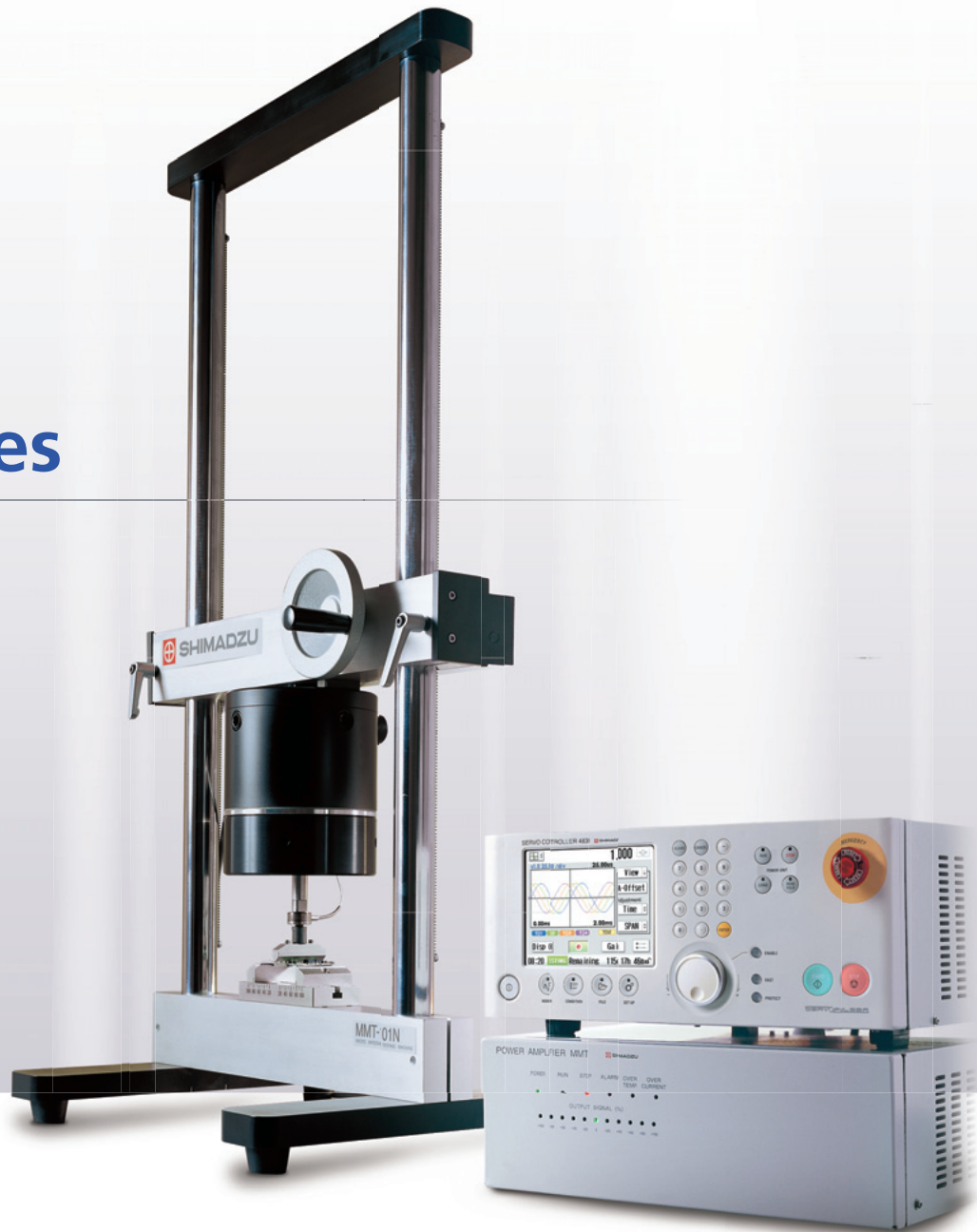
Magnetic Micro Testing System

Microservo MMT Series



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Magnetic Micro Testing System



In recent years strength evaluation of micro materials and micro parts is increasing its importance in a variety of fields. These include the development of new materials such as composite and superconductive materials; the practical application of micro machines such as micro actuators and micro sensors; the development of lead-free solder joint technology, which is attracting interest with the increasing concern for environmental aspects, and the increasing demands for small and highly functional parts in the electronics and communication industries; and bio-related industries.

The Microservo MMT series adopts an electromagnetic actuator with an exceedingly high frequency response for its loading mechanism. By combining this with closed loop control, high speed and high precision control is possible over micro loads and micro displacement.

Features

Compact and lightweight body

Installation is easy due to lightweight and small body

An electrical power source is the only utility required

Other utilities such as water and air are unnecessary

Quiet operation allows installation at any place

Operation noise has been reduced compared to hydraulic systems

Easy operation

The simple configuration allows easy operation

Working Principle (Control of Micro Loads)

The load generator is comprised of a permanent magnet and a force coil as shown in the diagram on the right. The permanent magnet is fixed and the coil moves up and down.

When a current is passed through the coil, an electromagnetic force F proportional to this coil current is generated according to the following equation:

$$F = 2\pi r n B I$$

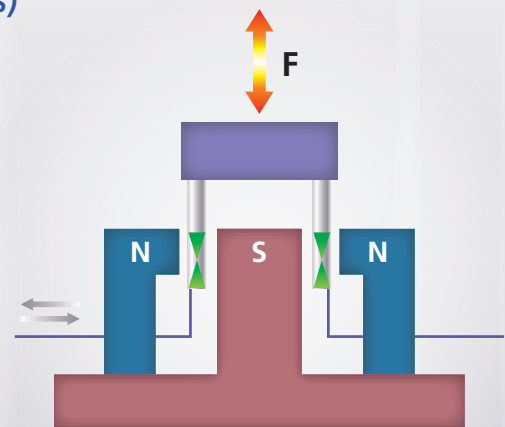
r : coil radius

n : turns of coil

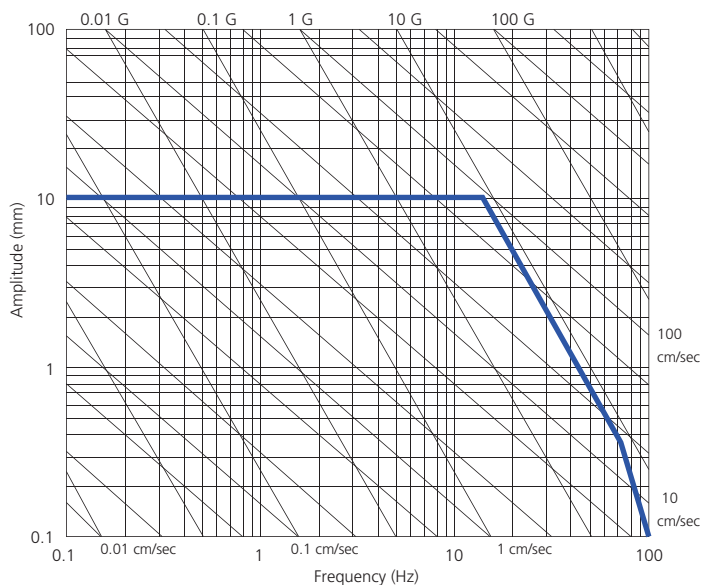
B : magnetic flux density

I : coil current

The micro load is controlled with great precision by generating the electromagnetic force through the control of the coil current using the closed loop system.

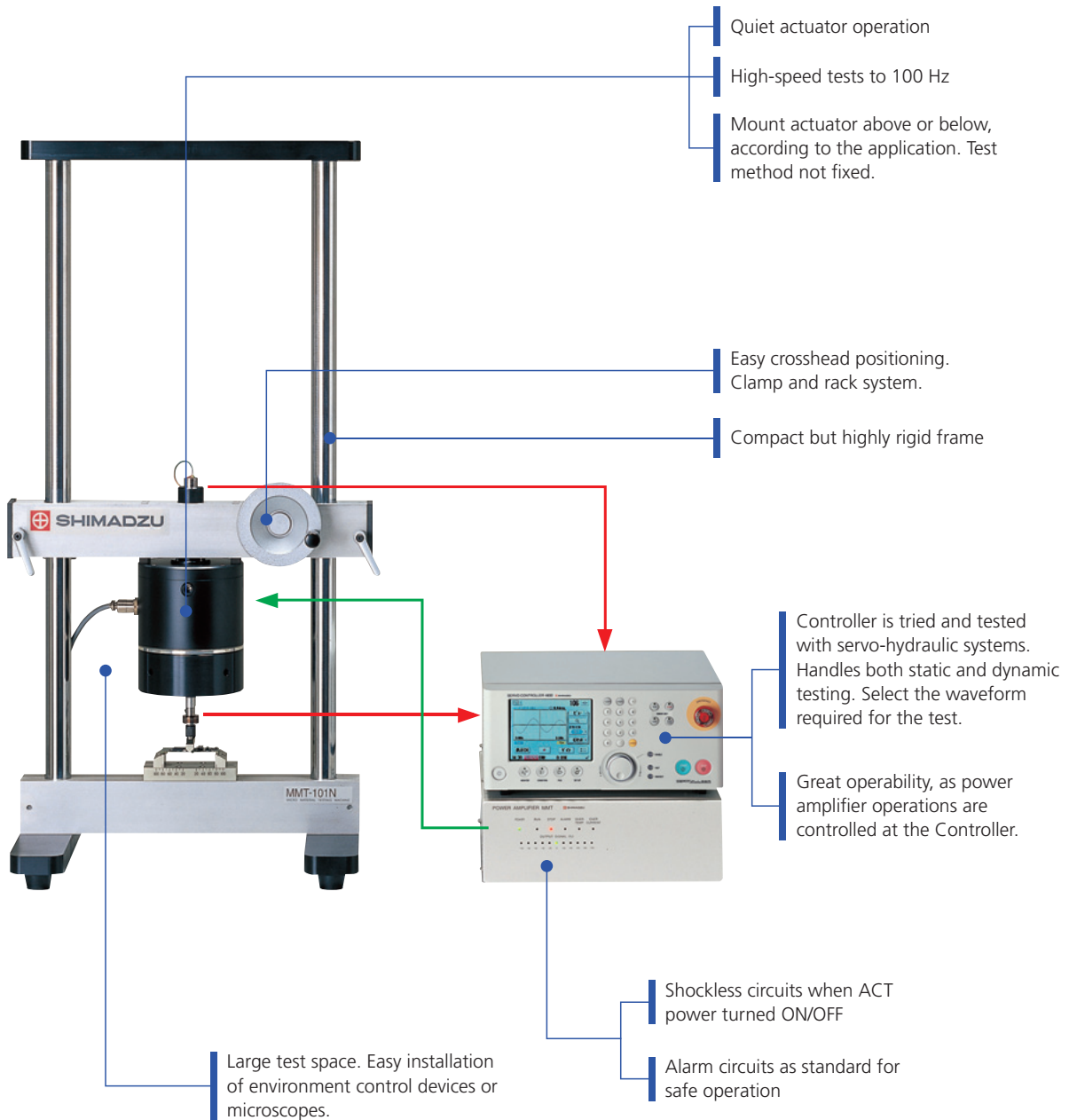


Amplitude Characteristics



- This graph shows the relationship between the amplitude and the frequency under sine wave generation (with no load).
- The characteristics of the frame and load cell are not considered. Compensate for the influence of these factors to obtain the actual amplitude characteristics.
- These characteristics have been estimated based on the typical characteristics of the ACT used; there will be a variation of about 10% on the frequency axis.

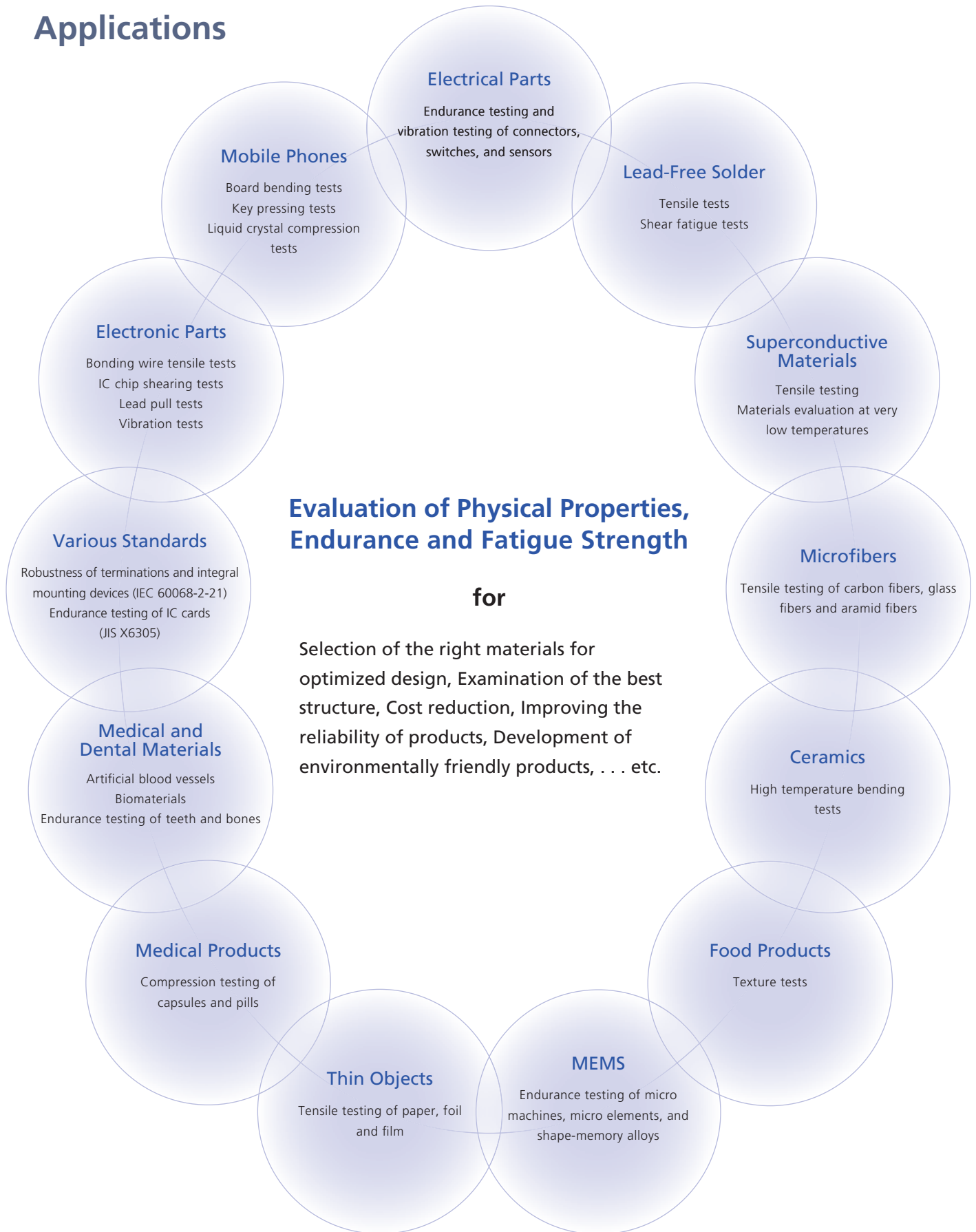
Basic Construction of the Microservo MMT Series



Highly efficient cooling

Requires only AC 100 V. No other equipment needed.

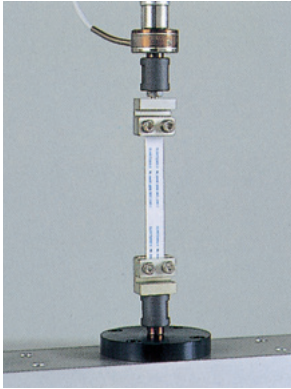
Applications



Applicable Test Devices

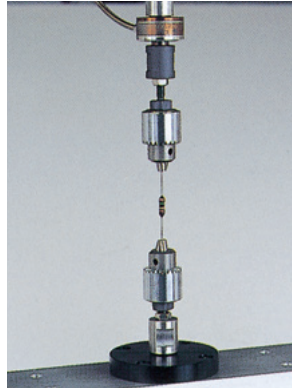
Tensile Test Jig

Test force: 100 N
 Specimen shape: Round bar ($\varnothing 4$)
 or
 flat plate (1 mm thickness \times 5 mm
 width maximum)



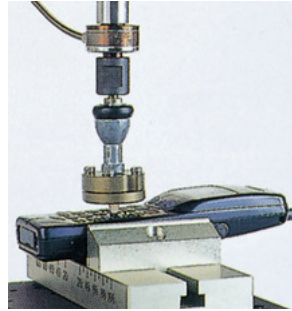
Drill Chuck Grip

Test force: 100 N
 Specimen shape: Round bar ($\varnothing 0.5$
 to 3 mm)
 or
 flat plate (1 mm thickness \times 4 mm
 width maximum)



Key Pressing Test Jig

Test force: 100 N
 Punch tip radius: $\varnothing 3$
 Punch material: Rubber
 Specimen:
 Mobile phones, keyboards



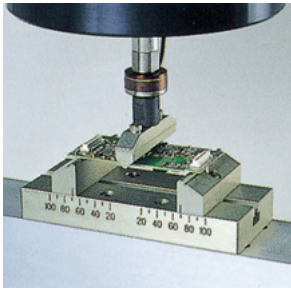
Compression Test Jig

Test force: 100 N
 Lower platen: $\varnothing 110$ mm
 Upper platen: $\varnothing 30$ mm
 * Various compression testing jigs,
 including tooth type, spherical type
 and those for key pressing tests, are
 available.



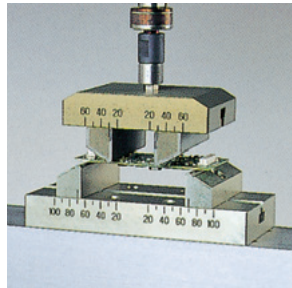
3-Point Bending Test Jig

Test force: 100 N
 Punch tip radius \times width: R2 \times 60mm
 Support roller radius \times width:
 R2 \times 60 mm
 Support spacing: 20 to 100 mm



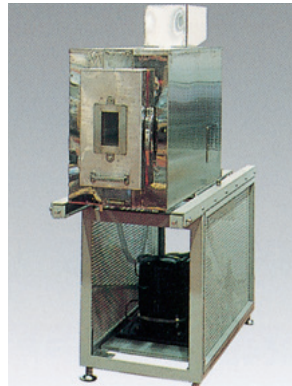
4-Point Bending Test Jig

Test force: 100 N
 Punch tip radius \times width: R2 \times 60 mm
 Punch span: 20 to 60 mm
 Support roller radius \times width:
 R2 \times 60 mm
 Support spacing: 20 to 100 mm



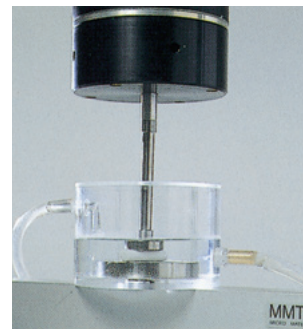
Thermostatic Chamber

Temperature range: Room
 temperature + 10 to 300°C



Constant Temperature Water Immersion Test Equipment

Temperature range: Room
 temperature + 10 to 50°C



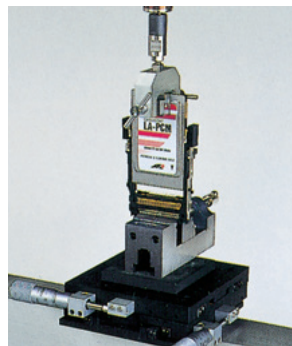
Microscope



Excitation Table



Card Insertion Test Jig



X-Y Stage

Distance: ± 12.5 mm



Control System



Controller 4830

Easy-to-use and multi-functional! The next generation of controller...

Extremely simple operation using a color LCD and touchpanel

Waveform generation with excellent reproducibility

Fully digital control with control parameter autotuning and waveform distortion correction functions achieves faithful load waveform reproducibility.

Push test function for testing actual objects

Achieves stable peak-value control using the test force, even for specimens with "play" (areas where no test force is applied).

World-class basic performance

The 24-bit high-resolution AD converter and detector-output linearization function achieve Class 0.5 test force accuracy (0.5% indicated value) with a standard system.

Waveform display functions

Test waveform display functions installed as standard permit the realtime display of time graphs, X-Y graphs, and peak graphs.

Major Specifications

In combination with Controller 4830

| Main Unit Model | MMT-500NV-10 | MMT-250NV-10 | MMT-101NV-10 | MMT-101NV-2 | MMT-11NV-2 |
|----------------------------------|---|------------------|------------------|-----------------|-----------------------|
| Part No. | 348-20803-00 | 348-20802-00 | 348-20801-00 | 348-20801-01 | 348-20800-01 |
| Test force | Max. ± 500 N | Max. ± 250 N | Max. ± 100 N | | Max. ± 10 N |
| Piston stroke | Max. ± 10 mm | | | Max. ± 2 mm | |
| Frequency | Max. 100 Hz | | | | Max. 60 Hz |
| Controlled items | Test force, piston stroke (can be expanded by adding options) | | | | |
| Load cell (standard accessory*1) | ± 500 N | ± 250 N | ± 100 N | | ± 10 N |
| Jigs and test devices | Not included in standard configuration (standard specification). (Select options or consult Shimadzu.) | | | | |
| Indication accuracy | Test force : within $\pm 0.5\%$ indicated value or within $\pm 0.02\%$ dynamic max. test force, whichever is larger*2 Stroke : within $\pm 1\%$ indicated value or within $\pm 0.1\%$ max. stroke, whichever is larger | | | | |
| Installation space (W x D x H) | 1000 x 500 x 1200 mm (approx.) | | | | |
| Total weight | approx. 150 kg | approx. 120 kg | approx. 100 kg | | approx. 80 kg |
| Power supply | 1 ϕ 100 V 1 kVA | | | | 1 ϕ 100 V 500 VA |

*1 Various capacity load cells are available as options.

*2 For MMT-11NV-2, this becomes "within $\pm 1\%$ indicated value or within $\pm 0.02\%$ dynamic max. test force, whichever is larger."

• CE marked models are available as options.

Installation Requirements

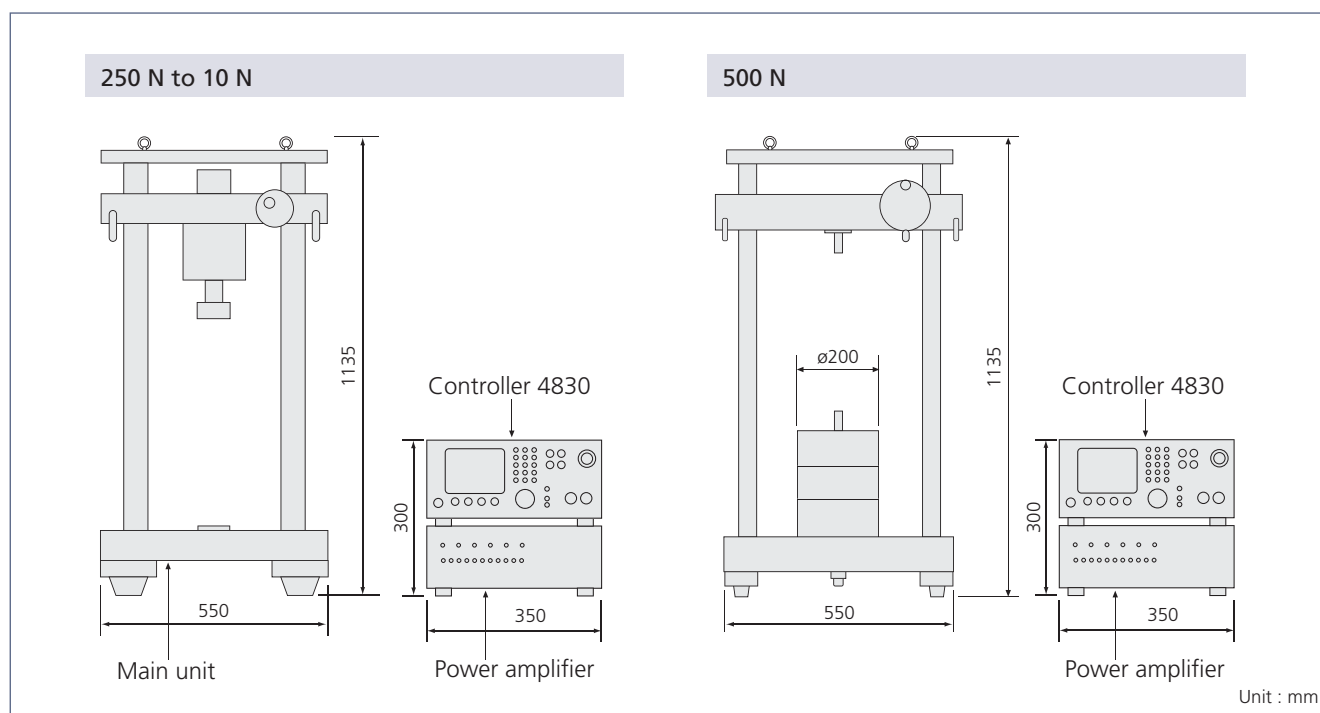
1. Avoid the following conditions when installing the device.

- Large temperature fluctuation (Recommended temperature range: + 10 to + 40°C with temperature fluctuation within $\pm 5^\circ\text{C}$)
- High humidity
- Direct air blow from air-conditioners
- Exposure to direct sunlight
- Dust
- Vibration (Recommended: below 5 μm)

2. Power source conditions

- Avoid power sources with large voltage fluctuation (within $100\text{ V} \pm 10\%$).
When voltage fluctuation is unavoidable, use a dedicated constant voltage power supply.
- Grounding
D Class (Less 100 Ω)

External Dimensional Drawings



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