Focusing on ease of use

**Measurement**
Quick temperature adjustment, short measuring time (min. 1 sec.)

**Preparation**
Fill 300 µl of the sample in the sample container

**Cleaning**
No cleaning required – increased efficiency

**EMS-1000S**
Electro Magnetically Spinning Viscometer

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Specifications and design subject to change for improvements without notice. Printed in Japan.
New style of viscosity measurement
Innovative viscometer with cutting-edge technology and user-friendly operation

EMS-1000S employs Electro Magnetically Spinning method. A small probe sphere in the sample rotates by Lorentz force and its speed depends on the sample viscosity. EMS-1000S measures that speed and figures out the viscosity. The intuitive and user-friendly software make it easy to operate. A variety of probe spheres are lined up for the best performance of viscosity measurement to match sample property. EMS-1000S measures small volume of sample, low viscosity sample which were difficult to measure by conventional instrument. The application of EMS-1000S expands in a wide range of industry. This new contact free viscometer was developed in collaboration with Institute of Industrial Science, the University of Tokyo within the framework of JST Japan Science and Technology Agency.

Wide Temperature Range

<table>
<thead>
<tr>
<th>Temperature range:</th>
<th>0 ... 200 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature stability:</td>
<td>± 0.1 °C</td>
</tr>
<tr>
<td>Heating rate:</td>
<td>within 10 minutes (25 → 200 °C)</td>
</tr>
</tbody>
</table>

A special program mode facilitates easy and fast studies of the temperature dependency of the viscosity.

Prepared spherical probes for matching sample property

Viscosity range: 0.1 ... 100,000 mPa·s

To realize more accurate viscosity measurement, you can select a spherical probe according to the properties of the samples.

Best suited for Very Small Samples and Reuse of Precious Samples

Sample volume required: 300 µL
90 µL (Option)

As small volume of sample as 300 µL/90 µL (Option) is enough to measure. During measurement the samples are contamination-free. Samples can be reused for other purposes after measurement.

Versatile Measuring Container and Disposal

No cleaning required
Measurements are performed in a disposable sample container. No cleaning required – no cross contamination possible.

Autoclavable
Ideal for samples which must be measured in a sterile environment such as proteins.

Suitable for measurements under anaerobic conditions
Sealed sample container allows to perform measurements in an inert-gas atmosphere.

Intuitive and user-friendly GUI (Graphic User Interface) Operation

The measurement result, the status of the sample, the status of the device and the graph plotting the measurement result, show up together on one screen. It is easy to compare the measured data with the data acquired in the past by the powerful search function of the database.

Reliable measurement by viewing the status of sample with the built-in camera

You can check the status of the sample in real time with the built-in camera in the main unit. In addition, more accurate measurement is possible by checking and adjusting the position and rotation status of the spherical probe.
**Application**

**Observe what you wanted to see**

**Wide temperature range from 0 to 200 °C by built-in temperature control system**

Heating up from room temperature to 200°C within 10 minutes. Studies of the temperature dependency of the viscosity have never been that quick and easy.

![Viscosity vs. Temperature (silicon oil)](image_url1)

**A CMOS camera lets you keep track of what's going on during measurement**

Changes in the sample characteristics like coagulation or formation of precipitates can be studied during and after measurements, impurities in the sample can easily be detected.

![Viscosity change at phase transition temp. (liquid crystal)](image_url2)

**Application by industry**

**Biochemistry**

Viscosity measurements of biological samples available in small quantities only such as blood can be measured.

**Viscosity vs. concentration of protein solutions**

No series of dilution is required. The same sample can simply be diluted by adding known amounts of the diluent to the sample between measurements.

![Viscosity vs. concentration (protein)](image_url3)

**Polymers**

Melt viscosity of plastic

Solid samples can be melted directly in the measuring cell.

**Thermocasting resins**

Examination of the flow properties during polymerization process. No cleaning required after measurement.

![Curing process (epoxy resin)](image_url4)

**Suitable for air-sensitive samples thanks to sealed measuring cell**

A completely sealed measuring makes sure you can measure all types of samples, regardless of whether they are toxic, highly hygroscopic, volatile or very sensitive to oxygen.

![Viscosity vs. Temperature (ionic liquid)](image_url5)

**Highly volatile samples can be measured under overpressure**

Measurements can be performed at elevated temperatures and pressures. Samples can thus be measured even well above their boiling point.

![Viscosity at boiling temperature (glycerol)](image_url6)

**Petrochemistry**

Viscosity of heavy oil and waste oil

No time consuming cleaning required after measurement.

**Temperature dependency of the viscosity of asphalt**

The sealed measuring cell protects operators from direct contact with toxic vapors.

![Viscosity vs. temperature (asphalt)](image_url7)

**Cosmetics**

Quality control of cosmetics

Reliable measurements of low viscous samples.

**Flow properties of lotions**

Examination of thixotropy and shear rate dependency of the viscosity.

![Viscosity vs. shear rate (lotion)](image_url8)
Specifications

Standard Accessories

No. | Item Code | Remarks |
--- | --- | --- |
1 | AC power code | |
2 | 64-0044-06 | USB 2.0 cable (= 1.8 m [USB-AMBM-06]) A 8-pole type |
3 | 66-0014-01 | Stand for measuring cell |
4 | 66-0015 | Storage container for spherical probes |
5 | 66-0015-01 | Plastic tweezers |
6 | 12-01z1 | Fuse 6.3A |
7 | 12-05z0-1 | Assay kits (50 pieces) Consisting of 50 test tubes, spheres (φ 2 mm), caps, and seals |
8 | 12-05z5-03 | Aluminum Spheres, φ 4.7 (50 pieces) |
9 | 20-01z5 | Inspecti’ on card / Warranty card |
10 | 12-07z5-02 | EMS-1000S operation manual [USB] USB memory stick with EMS-1000S operation manual and PC software |

Consumables

No. | Item Code | Remarks |
--- | --- | --- |
1 | 12-05z8 | Consumables required for 500 measurements items 2 and 3 |
2 | 12-05z8-01 | Sample containers, φ 15 mm, 100 pieces |
3 | 12-01z4 | Aluminum spheres, φ 2 mm, 100 pieces |
4 | 12-01z4-01 | Titanium spheres, φ 4.7 mm, 100 pieces |
5 | 12-01z9 | Screw caps, 100 pieces for sample containers φ 1.3 mm |
6 | 12-01z7 | Seals, 100 pieces for sample containers φ 1.3 mm |

Options

In order to meet specific requirements, we offer the options below. For more information please contact one of our sales offices or your local dealer.

No. | Item Code | Remarks |
--- | --- | --- |
1 | 12-07z9 | Key code for using φ 1.5 Sphere (ROM) |
2 | 12-05z4-04 | Aluminum Spheres, φ 1.5, 100 pieces |
3 | 12-07z9-07 | Assay kit for Titanium Sphere |
4 | 12-05z4-05 | Titanium Spheres, φ 4.7, 100 pieces |
5 | 12-07z9-03 | Assay kit for 90 μL container |
6 | 12-05z7 | Dry air unit |
7 | 12-05z7 | Compressor |

Viscosity measurement of very low viscous samples

φ 1.5 aluminum spheres is newly developed for measuring very low viscous samples. To enable the instruments to measure with this type of sphere, a ROM containing the corresponding key code is required.

Measurements at 0°C

When performing measurements at a temperature below ambient temperature condensation inside the instrument must safely be ruled out. If there is no source of dry air available for this purpose, a special compressor and a dry air unit which are available as options can be used.

The EMS viscometer is based on a new measuring principle using the University of Tokyo patent.

In a sample container an aluminium sphere is submerged in the sample to be measured.

The aluminium sphere is located in the center of a rotor equipped with magnets which create a rotating magnetic field. The rotating magnetic field induces eddy currents in the sphere. The resulting Lorentz interaction between the magnetic field and these eddy currents generate torque that rotates the sphere. The aluminium sphere is thus driven contact free.

The rotational speed of the sphere depends on the sample's viscosity.

The viscosity of the sample η is calculated based on the angular velocity of the sphere.

Patent application No. 5093599, US 8,365,382 B2, Applicant name: The University of Tokyo