

SOM-R

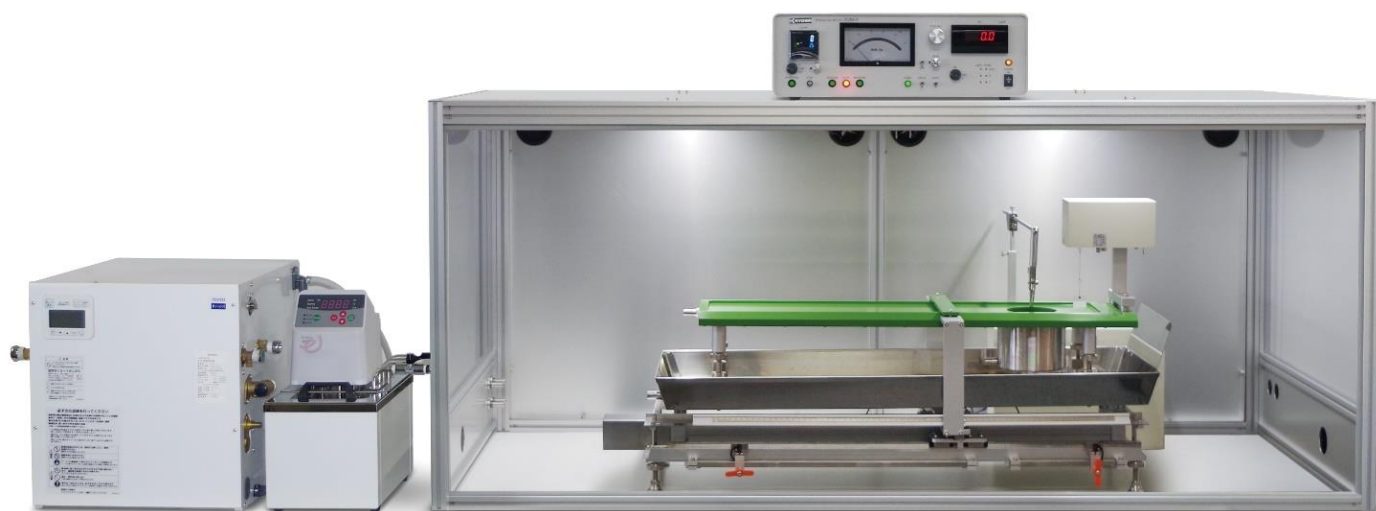
Automatic Spread Oil Meter



■ Outline and Features

The rolled steel sheets production line has coating processes for anti-rust oil such as DOS, ATBC, CSO, etc., and the amount of coating is controlled.

The SOM-R measures the small amount of oil deposited on rolled steel sheets. The Hydrophil Balance Method, which utilizes the characteristics of oil film pressure spreading over the water's surface, is used.



■ Features

- ◆ The small amount of oil on the test piece on the micro-gram (μg) order can be measured.
- ◆ The precise Wilhelmy Plate Method is used for detecting surface film pressure,
- ◆ The trough is coated with Teflon for corrosion resistance and easy cleaning.
- ◆ Easy cleaning of the detecting glass plate.
- ◆ Calibration of the surface film pressure meter by the operator is possible.
- ◆ The temperature control system is equipped for obtaining stable data.
- ◆ The oil volume by "mg/m²" is directly read on the digital display.

■ Partial List of Users

Japan

Nippon Steel / JFE Steel / Kobe Steel / Toyo Seikan / Toyo Kohan

Furukawa Electric / UACJ / Altemira / MA Aluminum

Overseas

Baoshan Iron & Steel (China) / Hbis Group Hengshui Strip Processing (China) / Jiangsu Youfu Sheet Technology (China)

China Shipbuilding Industry Equipment & Materials (China) / Ton Yi Industrial (Taiwan & China) / China Steel (Taiwan)

POSCO (Korea) / Shin-Hwa Silup (Korea) / Perstima Tin Plate (Malaysia, Vietnam) / Siam Tinplate (Thailand)

UACJ (Thailand) / Tinplate Company of India / JSW Groupe (India) / PT. Latinusa (Indonesia) / Erdemir (Turkey)

Ternium Siderar (Argentina)

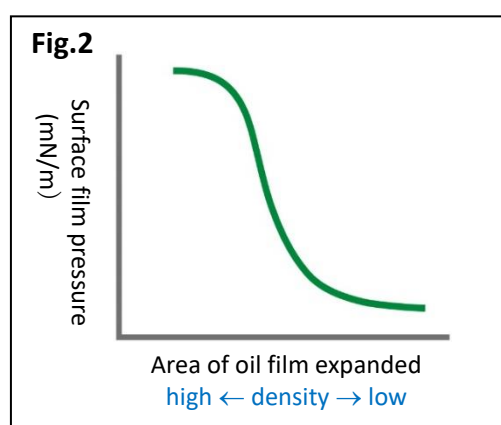
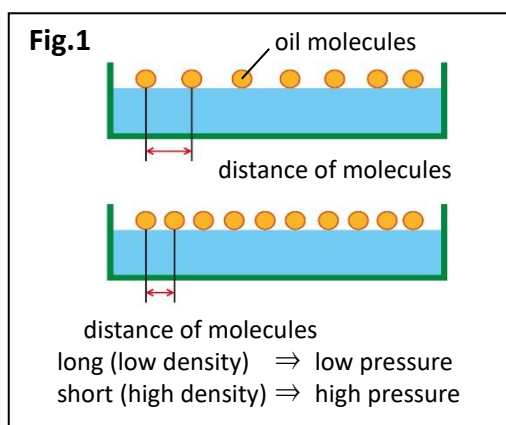
■ Principle

Most oils have the property of spreading as a monolayer film over a sufficiently wide water surface.

If the density of the oil molecules is even, the area of the oil film expanded on the water surface is proportional to the volume of the oil (the number of oil molecules). In other words, if the density of oil molecules can be adjusted even when the oil film is spread and the equation relating the oil volume to its expanded area is obtained in advance by experiment, the oil volume can be determined from the area of the oil film expanded.

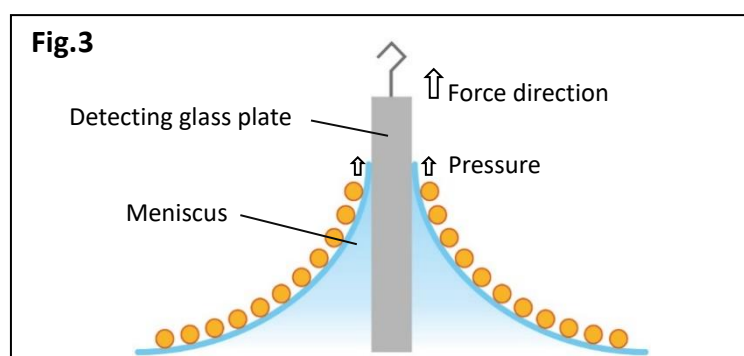
How can the even density of oil molecules be controlled?

As oil molecules get closer to each other, the intermolecular interactions become stronger, and the pressure increases. This pressure is called *Surface Film Pressure* and is the reason why the oil molecules spread over water on a monolayer (Fig.1). The relationship between the area of expanded oil film and the surface film pressure for a given amount of oil indicates a curve as in Fig.2. Therefore, the density of oil molecules is adjustable uniformly by determining the surface film pressure. This SOM-R sets this pressure at 8 mN/m, called *Measurement Pressure*.



How to measure the Surface Film Pressure?

When the bottom of the detecting glass plate is immersed in the surface of the water, a phenomenon called meniscus occurs, in which the plate surface wets the water up with a curved surface, as shown in Fig.3. The oil molecules spread above the water, and the intermolecular interactions work as the pressure, which acts as an upward force to push the detecting glass plate up.



■ Specifications

Control box

It equips the power switch, operates the barrier transfer unit and the elevator device, and displays data on surface film pressure and oil volume.

■ Surface film pressure meter – measurement & display

Measuring method	Wilhelmy Plate method
Measuring range	0-50.0mN/m (Analog meter)
Accuracy	±0.5%F.S

■ Oil volume meter – measurement & display

Measuring range	0.3-17.5mg/m ² (in the case using DOS oil, test piece φ60mm)
Spreadable oil volume	0.7-50.0μg
Display method	Digital
Display resolution	0.1mg/m ²
Accuracy	±2%F.S on 35°C basis
Settings of oil type	Possible up to 3 types
External size, weight	430 ^W ×305 ^D ×150 ^H mm, 5.5kg

Teflon coated trough

It is filled with water to spread the oil to be measured. Circulating the temperature-controlled water inside the trough stabilizes the measurements.

Configuration	Trough, Level adjust stands (x4), Surface film pressure meter
Material of trough	Base metal: aluminum Top surface: Teflon coating
Internal size, weight	700 ^W ×140 ^D ×5 ^H mm, 10.2kg
Cylinder section size	φ90×90 ^D mm (section of test piece immersion)

Barrier transfer unit

It moves the barrier and compresses the area of oil film spread over the water. The drain pan is built in.

Configuration	Transfer unit, Drain pan, Actuator, Level adjust stands (x4)
Transfer speed	Compress: 300mm/min (fixed) Reversion: 600mm/min (fixed)
External size, weight	945 ^W ×335 ^D ×295 ^H mm, 21.4kg * Splash prevention board included.

Elevator device

It sets a test piece coated with oil and dips it into the water in the trough repeatedly a preset number of times to transfer the oil on the test piece to the water surface.

Configuration	Main body built-in drive motor, Arms, Test piece fixture
Cycle speed setting	3 modes: Hi, Low, Adj (adjustable)
Approximate cycle speed	Elapsed time for 25 ups & downs: Hi 40sec., Low 150sec. Adj 24sec.-∞
External size, weight	330 ^W ×145 ^D ×380 ^H mm, 7.2kg *Arms excluded.

Environmental chamber

A case to protect instruments, windshield, and dustproof.

Configuration	Chamber, LED lights (x2), Slide doors & open/close sensors (x4),
---------------	--

Material	Slide door, side panel: PVC boards, static-dissipative, transparent Frames: aluminum alloy Top & side panels: aluminum
External size, weight	1,600 ^W ×700 ^D ×700 ^H mm, 33.5kg

Hot water supplier

It controls the tap water temperature to about 35°C and provides it as the subphase water in the trough.

Temperature range	About 35°C - 70°C
Control accuracy	±5.0°C (water temperature provided)
Control method	Thermistor
Safety functions	Temp. fuse, Manual return bimetal
Heater capacity	1,100W
Pressure	0.08MPa
Bath volume	25L
External dimensions	434 ^W ×395 ^D ×395 ^H mm
Weight	About 38kg (when filling water)

Hot water circulator

It circulates the temperature-controlled water in the jacket system inside the trough.

Temperature range	Room temp.+5°C - 95°C
Control accuracy	±0.05°C
Control method	PID
Safety functions	Diagnosis function
Tube inlet/outlet	φ10mm
Heater capacity	1,100W
Pump flow rate	5L/min
Bath volume	5.5L
External dimensions	195 ^W ×305 ^D ×360 ^H mm
Weight	About 13.5kg (when filling water)

Power supply

Total power consumption of main instrument, Hot water supplier & Hot water circulator: 2,600W

Power voltage

Control box: AC100-240V 50/60Hz

Other than the control box: AC100V 50/60Hz

*The step-down transformers required

Footprint

2,400(W) × 800(D)mm

*When hot water supplier & circulator are laid flat.

Standard accessories

Teflon coated barrier	4 pcs	Micro-syringe 250μL	2 pcs
Detecting glass plate	5 pcs	Calibration weight 200mg	2 pcs
Area reducing block (Teflon coated)		1 set (2 pcs)	
Hoses: Pressure vinyl hose IDφ10×5m			
Silicon hose IDφ10×10m & IDφ15×5m			

We recommend using purified water to measure as much as possible. Do not use hard water. (When using tap water, an outlet of 15 to 15.5 mm dia. with a constant pressure and a flow rate of 1 L/min. is essential.)

Saltwater cannot be used with the standard model because it corrodes the trough and the peripheral equipment.

*The specifications and designs are subject to change without notice.

2308