

# FM-CW Type Microwave Level Meter

For High-temperature, High-pressure and Adverse Environments

## ***FM-CW Type Microwave Level Meter***

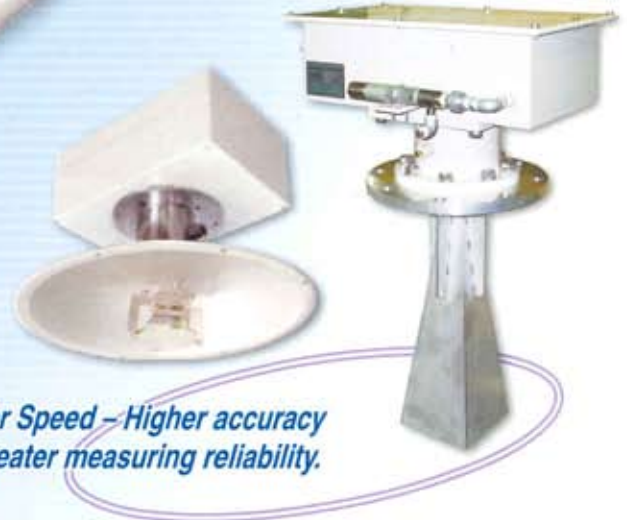


# Technology for Microwave Measuring Result of 20 Years of Experience Featuring M-MIC

Matsushima's new microwave level meter has revolutionized the system of microwave measurement by combining the technology used in our earlier Frequency-Modulated Continuous-Wave (FM-CW) microwave level meters with our Matsushima-Microwave Integrated Circuits (M-MIC), our newest development in control technology, and Fast Fourier Transformation (FFT).

This is the FM-CW type microwave level meter. It features compact size, high accuracy, and low price in addition to high stability, reliability, and durability.

Also, we will provide our high quality after-sales service to cope with product compatibility and continuous maintenance when changing models.



*More Compact – Faster Speed – Higher accuracy  
make for greater measuring reliability.*

## Matsushima's New Microwave Technology

### Matsushima-Microwave Integrated Circuit

The Matsushima-Microwave Integrated Circuit (M-MIC) is the new measuring theory that combined Matsushima's own many application technologies with integrated circuit technology and new measuring theories.

The processing capability was greatly improved by developing our unique signal processing boards with the latest technology.

The control board for signal processing and microwave section were integrated to three boards, resulting in significant downsizing.

### Fast Fourier Transformation Analytical Technology

Microwaves emitted at the speed of light are required for high-speed analysis technology.

High-speed and precise analytical processing is achieved by installing the high-speed calculation frequency analysis technology to the microwave signal processing circuit through application of Fast Fourier Transformation (FFT) technology.

This new technology features rapidly capturing and analyzing the correct level regardless of noise or irregular reflection from the object to be measured and automatic continuous follow searching.

### New Antenna System

The new FM-CW microwave level meter uses a cassegrain antenna that improves its measuring performance/accuracy at high temperatures and simplifies the system.

By reducing the size of the antenna, antenna characteristics such as high gain also improved.

Parabolic, horn, or reflecting antennas are available, and the antenna can be separated from the signal processing section.

APPLICATIONS

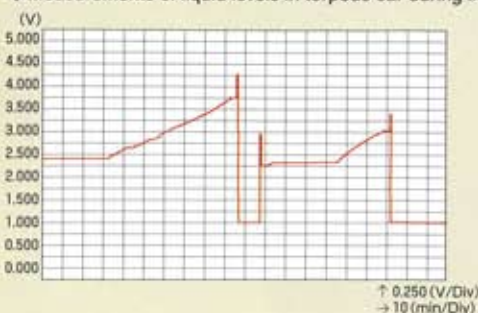
## 1 Blast furnaces

### Measurements for torpedo levels, stockline levels, or burden levels

With the meter, steady, continuous measurement is possible even under the adverse conditions of a blast furnace.

This meter has been highly evaluated in Japan and overseas and has proven to have high reliability. High-accuracy measurement stability is assured even under severe conditions such as those created while material is being charged for a blast furnace, during iron tapping, or during desilicization. With this new technology, the size was greatly reduced and this meter shows its remarkable potential in new applications such as steel converters or steel making.

#### ◆ Measurements of liquid levels in torpedo car during iron tapping

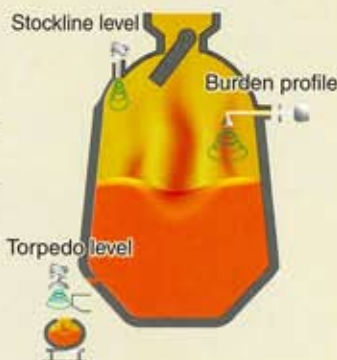
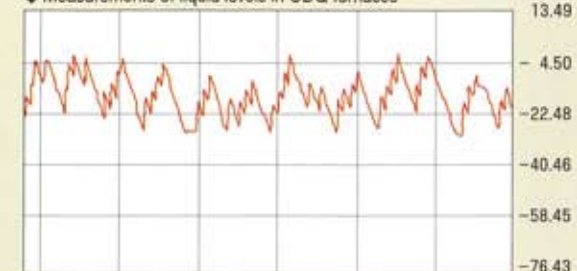


## 2 Coke Dry Quenching (CDQ)

### Continuous measurements in a coke oven from top to bottom in the furnace without contact

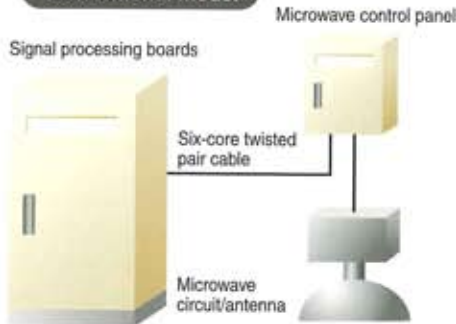
The meter is not affected by high-temperature gases or flames, so highly accurate continuous monitoring of the levels is possible even when red-hot coke is being charged. Raising the level of control increases safety. Also, high-energy loss related to power generation from coke dry quenching (CDQ) can be greatly reduced. It is no longer necessary to use measurement systems using gamma rays that are risky and difficult to control. This meter is small enough that it can be attached to a movable-furnace cover. (Patented)

#### ◆ Measurements of liquid levels in CDQ furnaces



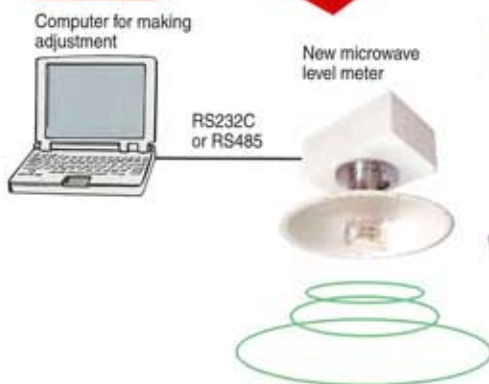
## Features

### Conventional model

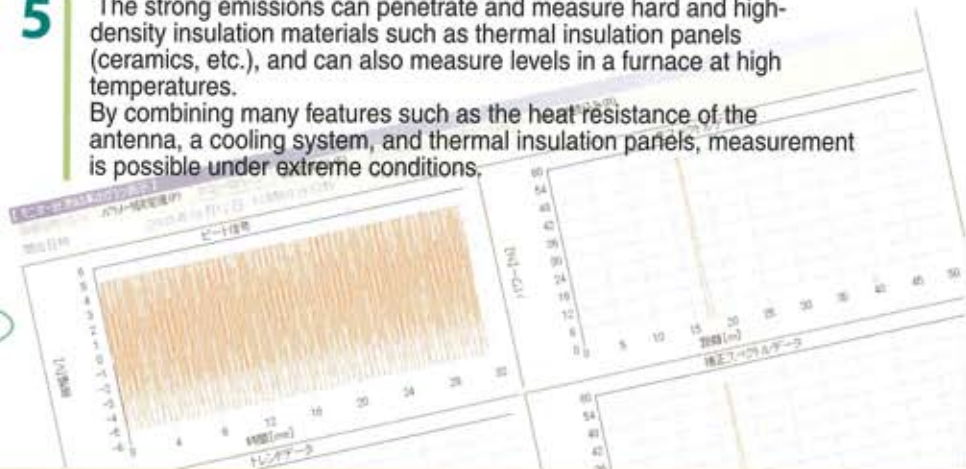


Volume reduced to  
**1/50**

### New model



- 1 By integrating the microwave-transmission circuit with the signal processor onto three boards, the meter became compact with improved maintainability. With no wear and tear of the components, running costs or maintenance-related expenses are eliminated.
- 2 With the combination of Matsushima's M-MIC technology and the FFT analysis, the latest measurement system can be used for continuous, high-speed data processing. At the same time, all parts are unitized so as to establish the future stable supply system and reliable maintenance system.
- 3 The completely digitalized M-MIC is used with a personal computer for communications. Set simple parameter settings on the computer for the optimum settings for the measurement environment. Also on the computer, you can refer to real-time data or past records related to the measurement environment, such as the emitted waveforms, analyzed waveforms, measurement trends, and use this information for maintenance or device management.
- 4 Parabolic, horn, or reflecting antennas are available. By using waveguides or coaxial cables, the antenna can be separated from the signal processing section. Because of the cassegrain parabola antenna, the structure of the meter is simplified and compact and the heat resistance of antenna is also improved. (Max heating resistance: 500°C with a standard cooling system.)
- 5 The strong emissions can penetrate and measure hard and high-density insulation materials such as thermal insulation panels (ceramics, etc.), and can also measure levels in a furnace at high temperatures. By combining many features such as the heat resistance of the antenna, a cooling system, and thermal insulation panels, measurement is possible under extreme conditions.



### 3 Fusion furnaces, reactors, or furnaces for industrial waste treatment

Reliable information about the levels is assured in adverse environments such as furnaces with high temperatures, narrow spaces, and excessive dust.

This microwave level meter measures many environmental factors in cracking furnaces or fusion furnaces for municipal waste or industrial waste treatment as well as other substances that add to environmental loads.

For materials or environments, such as the inside of a furnace, that were thought to be impossible to measure, the possibility of continuous measurement without contact has been improved.



### 4 Firing furnaces or melting furnaces for glass or nonferrous metals

Because the microwave level meter can be attached to any irregular shape or in a narrow space, its applications and the possibility for new applications are endless.

Continuous high-speed, high-precision measurement is possible even if levels suddenly fluctuate. It is possible to accurately monitor minute level fluctuations.



### 5 Chemical or sewage treatment or food processing

Because this meter uses a system of measurement that does not require contact and does not affect human bodies or the objects to be measured, it can meet your requirements for a wide range of applications.

Microwaves can be measured without contact and are free from the influence of vapors, foam, dust, noise, gases, temperature, or pressure. So, this totally new measurement system can take measurements that were previously thought to be difficult or even impossible.

