MICROWAVE RANGE FINDER
MWS-RF PAT.PEND.
MICRO-RANGER

WIRE AUTOMATIC DEVICE CO., LTD.
MWS-RF Microwave Range Finder consists of an antenna connected to a controller by circular waveguide tubing. The heat resistant antenna is installed in the high temperature zone, while the controller is located in a room temperature area allowing the sensor to make accurate measurements in high temperature areas without special cooling.

### SPECIAL FEATURES

**1. UNAFFECTED BY ADVERSE CONDITIONS**
- The antenna, which is the sensing head, can be installed in the high temperature zone without the need of additional cooling devices.
- The antenna and controller are easily connected by circular waveguide tubing, using special 90° turns and straight pieces.
- Microwaves are unaffected by temperature, flames, vapour, airborne particles or dirt.

**2. HIGH ACCURACY AND RELIABILITY**
- Error less than 10mm.
- False measurements caused by double-reflected waves are eliminated through the use of rotary microwaves.
- The accuracy of the measured range is not affected by fluctuating temperatures nor does it deteriorate over extended periods.
- Utilises filters which eliminate spurious signals.

**3. THE OPERATIONAL STATE IS SHOWN ON YOUR PERSONAL COMPUTER**
- It displays a FFT spectrum, the received signal and various preset values.
- The received signal, FFT spectrum and the trend measurement are continuously displayed. This displayed data can be recorded and reviewed in real or accelerated time.
- Use of the recording and reviewing capabilities allows the system parameters to be optimised offline.
- The display indicates and outputs the internal temperature and any abnormal conditions. (i.e. a lowering of received signal power, rising temperature in the controller and communication failures.)

**4. CONVENIENT BUILT IN FUNCTIONS**
- A reference point and the required range can be preset. The length of waveguide is easily subtracted from the overall distance measured.
- Compatible for use with a personal computer.
- Automatic power supply 90~240V, 50/60Hz.
- Communicates with computer by RS-232C.
- 4-20mA, analogue output.
- RS-422 digital output and input terminals.

**5. LIGHTWEIGHT AND COMPACT**
- Portable (7.5kg controller only)
- Easy installation.

**6. HIGH VERSATILITY**
- Both hardware and software can be modified to suit your requirements.
## PRINCIPLE

The Micro-Ranger transmits a microwave signal towards the target with a frequency that increases linearly with time. The microwave signal transmitted at time, t1, with frequency, f1, is reflected by the target and received by the antenna at time, t2. The total time to travel to and from the target is $\Delta t$. The transmitted frequency increases to f2 at time, t2. The difference in frequency, $\Delta f$, between the transmitted and reflected waves is proportional to the distance, d, to be measured. The Micro-Ranger mixes the transmitted and reflected signals together to extract the difference in frequency. This signal is analysed by a FFT (Fast Fourier Transform) analyser to output a distance signal. This is called the FM-CW method and is suitable for improving the accuracy of distance measurements.

## SPECIFICATIONS

<table>
<thead>
<tr>
<th>Type</th>
<th>Controller</th>
<th>MWS-RF-1 (Without indicator)</th>
<th>MWS-RF-1D (With indicator)</th>
<th>Antenna Type</th>
<th>P-450A (Parabolic Antenna)</th>
<th>H-200A (Horn Antenna)</th>
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<tbody>
<tr>
<td>Power supply</td>
<td>AC90~240V, 50/60Hz</td>
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<td>Power consumption</td>
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<td>Microwave frequency</td>
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<td>Microwave power</td>
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<td>Modulation</td>
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<td>FFT</td>
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<td>Range</td>
<td>Max. 50m (Depending on target)</td>
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<tr>
<td>Accuracy</td>
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<td>Accuracy</td>
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<td>Abnormal output</td>
<td>1a relay contact</td>
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</tbody>
</table>

## INSTALLATION EXAMPLES

### Without waveguide
- **Controller:** MWS-RF-2
- **90° circular waveguide**
- **Straight waveguide**

### With waveguide
- **Controller:** MWS-RF-1

### With parabolic antenna
- **Controller:** MWS-RF-2

### With horn antenna
- **Controller:** MWS-RF-2
This specification may be changed without notice.

### SYSTEM EXAMPLE

**Controller**

- Abnormal output
- 4-20mA Current output
- RS-422 Digital input and output
- RS-232C

**Programmable controller**

**Antenna**

**Power supply**

AC90~240V,50/60Hz

**Liquid surface**

**Cable access hole for power wires**

Type G DMB322
22mm(3/4inch)

**Cable access hole for communication wires**

Type G DMB328
28mm(1inch)

**Union**

4-Ø6.6 Mfg. Holes

**Flange (Option)**

Loosen the union to remove the antenna. Affix the flange and reinsert the antenna into the union and fasten.

### COMPUTER DISPLAY

- Controller
- Programmable controller
- Abnormal output
- 4-20mA Current output
- RS-422 Digital input and output
- RS-232C
- Power supply
  - AC90~240V,50/60Hz
- Personal computer

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