

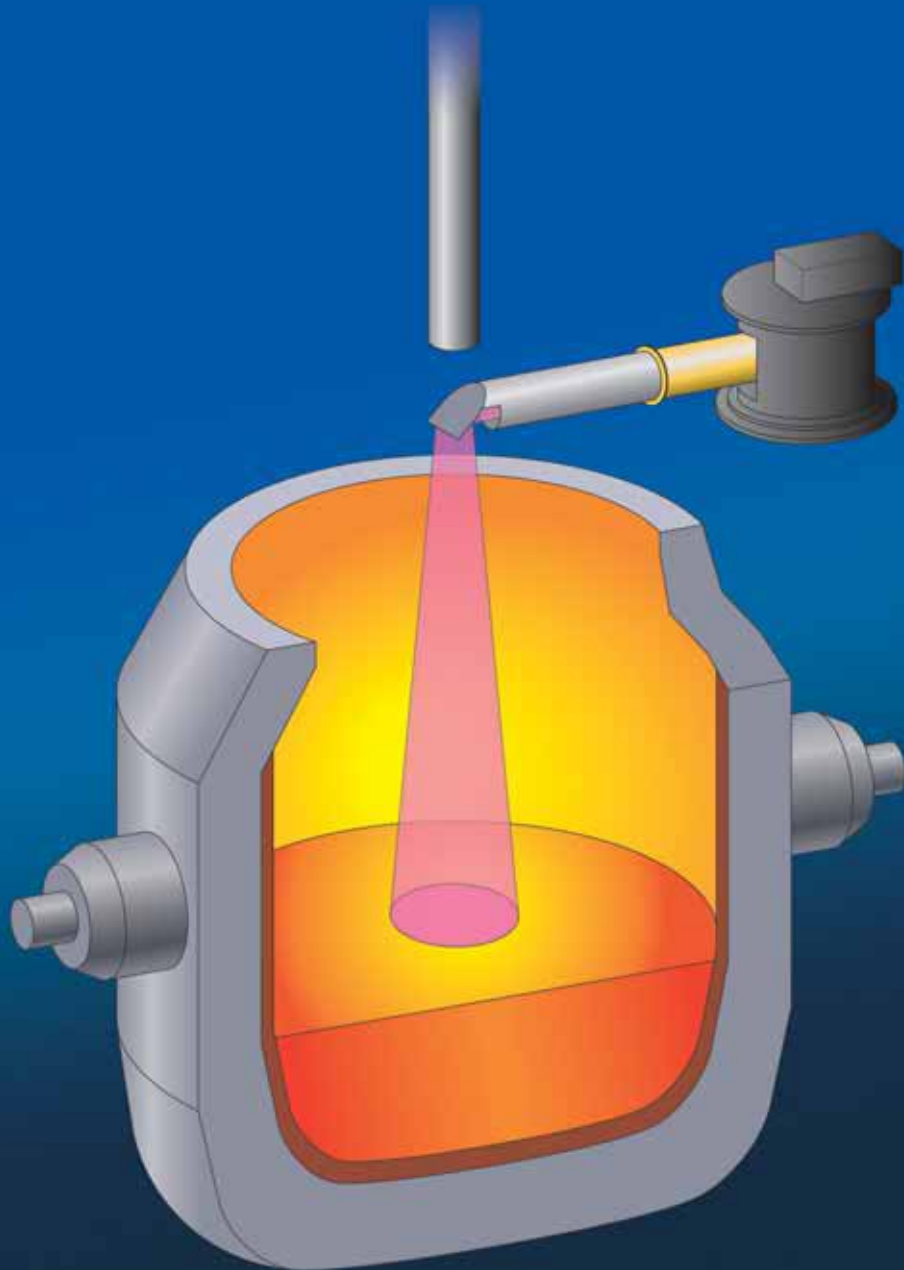


**MICROWAVE RANGE FINDER
FOR POWDER AND HIGH
TEMPERATURE MATERIALS**

MWS-24RF PAT.PEND.

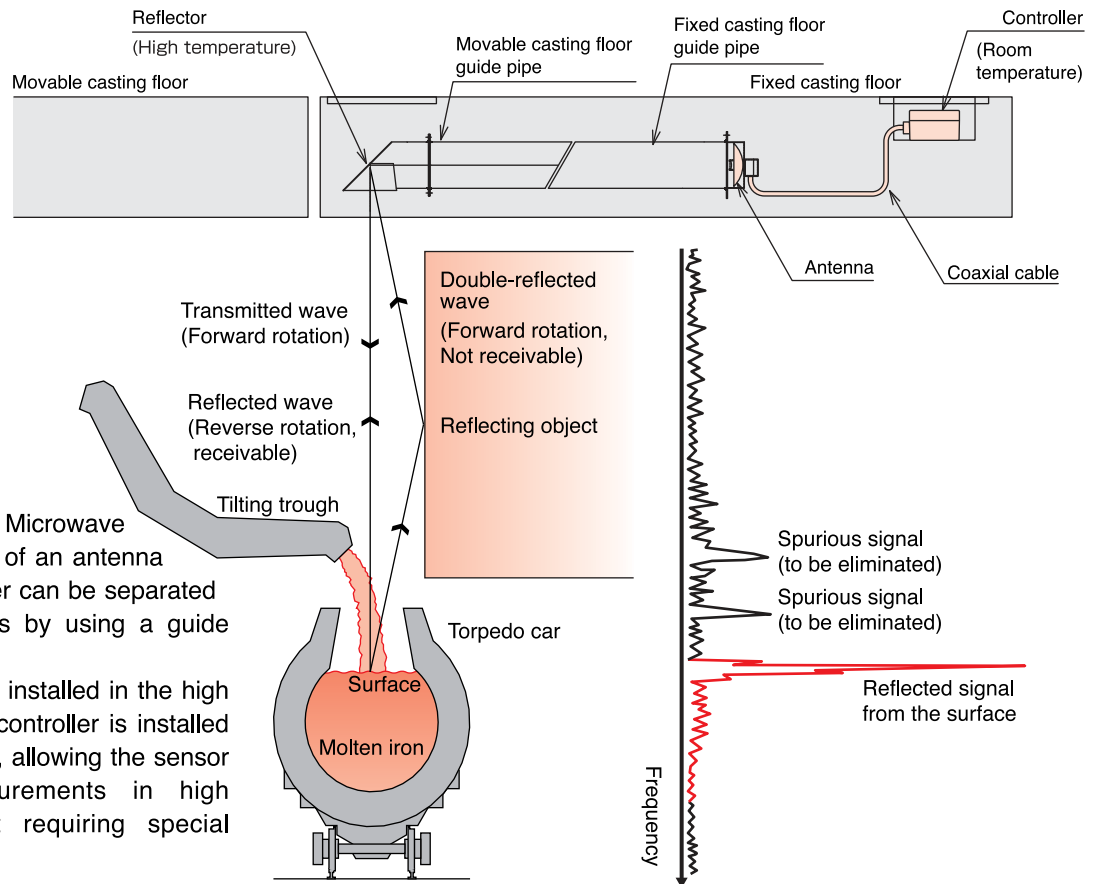
MICRO-RANGER

NEW 24GHz MICRO-RANGER DEBUT !!



WADECO CO.,LTD.

UNAFFECTED BY HEAT, FLAMES OR VAPOUR



The MWS-24RF is a FM-CW Microwave Range Finder which consists of an antenna and a controller. The controller can be separated from high temperature zones by using a guide pipe and coaxial cable.

The heat resistant reflector is installed in the high temperature zone, while the controller is installed in a normal temperature area, allowing the sensor to make accurate measurements in high temperature areas without requiring special cooling.

SPECIAL FEATURES

1. UNAFFECTED BY ADVERSE CONDITIONS

- The reflector, which is the sensing head, can be installed in the high temperature zone without the need of additional cooling devices.
- A circular waveguide or coaxial cable can be used to distance the controller from the antenna in high temperature area. This distance can be greatly extended by using a guide pipe and reflector.
- Microwaves are unaffected by temperature, flames, vapour, airborne particles or dirt.

2. HIGH ACCURACY AND RELIABILITY

- The 24GHz model uses a smaller antenna, creating a sharper beam angle. This makes the Range Finder ideal for installations where space is limited.
- Previously difficult materials, such as ash, are easier to detect.
- Accuracy $\pm 5\text{mm}$.
- 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.
- The software utilizes filters which eliminate spurious signals.

3. THE OPERATIONAL STATE IS SHOWN ON YOUR PERSONAL COMPUTER

- It displays a FFT spectrum, received signal and various preset values.
- The received signal, FFT spectrum and 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, software version mismatch and communication failures)

4. CONVENIENT BUILT IN FUNCTIONS

- A reference point and the required range can be preset. The length of the waveguide or coaxial cable can be 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 (5.7kg controller only). Smaller antenna size.
- Easy installation.

6. HIGH VERSATILITY

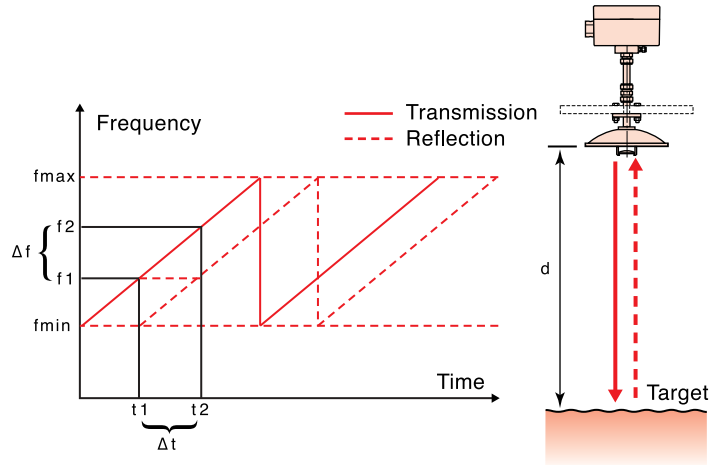
- Both hardware and software can be modified to suit your requirements.

7. BEAM ANGLE ADJUSTER (optional)

- Allows the beam angle to be adjusted to hit the desired position.

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, t_1 , with frequency, f_1 , is reflected by the target and received by the antenna at time, t_2 . The total time to travel to and from the target is Δt . The transmitted frequency increases to f_2 at time, t_2 . The difference in frequency, Δf , 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.

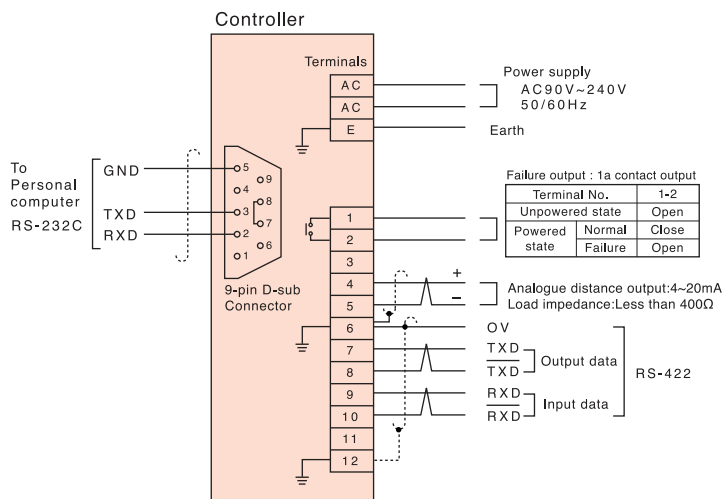


SPECIFICATIONS

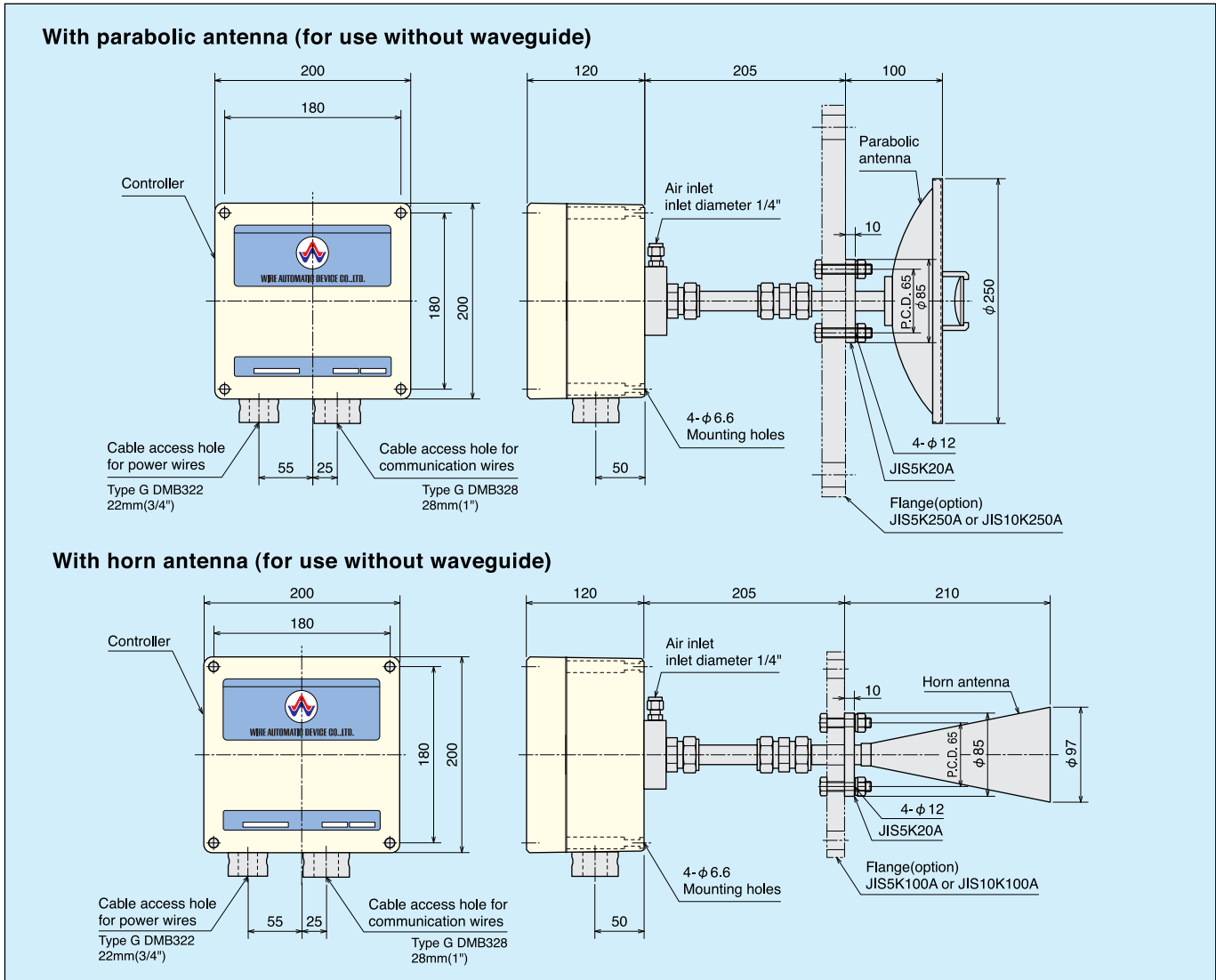
Type	Controller With waveguide type..... MWS-24RF-1 (Without indicator,Standard) MWS-24RF-1D (With indicator,Optional) Without waveguide type... MWS-24RF-2 (Without indicator,Standard) MWS-24RF-2D (With indicator,Optional) With coaxial cable type... MWS-24RF-3 (without indicator, Standard) MWS-24RF-3D (with indicator, optional)
Power supply	AC90~240V, 50/60Hz
Power consumption	Approx. 15W
Microwave frequency	Approx. 24GHz
Modulation	FM-CW
Frequency analysis	FFT
Range	Max. 50m or 100m (optional) (Depending on target)
Accuracy	$\pm 0.1\%$ F.S. or $\pm 5\text{mm}$ (whichever value is larger) When target is a metal plate
Update time	1 sec., 0.25 sec. (Optional)
Distance indication	5-digit 00.000m (Optional)
Received power indication	2-digit (Optional)
Personal computer interface	RS-232C
Digital output	RS-422
Digital input	RS-422
Analogue distance output	Range..... 4mA~20mA Accuracy..... $\pm 0.5\%$ to full scale Max.Load resistance..... 400 Ω
Abnormal output	1a relay contact (Relay is excited under normal condition) DC30V 2A or AC250V 0.5A

Delay time from power on to function	Approx. 5sec.
Antennas (Either one)	Parabolic Antenna Type..... P-250A-24-1(for use with waveguide) P-250A-24-2(for use without waveguide) P-250A-24-3(for use with coaxial cable) Size..... 250A Beam Angle..... Approx. $\pm 2^\circ$ (Angle in half of receiving power value) Horn Antenna Type..... H-100A-24-1(for use with waveguide) H-100A-24-2(for use without waveguide) H-100A-24-3(for use with coaxial cable) Size..... 100A Beam Angle..... Approx. $\pm 5^\circ$ (Angle in half of receiving power value)
Beam angle adjustment	$\pm 15^\circ$ (Optional)
Ambient temperature	Controller..... $-10^\circ\text{C}\sim 50^\circ\text{C}$ Antenna..... $-40^\circ\text{C}\sim 600^\circ\text{C}$ Antenna..... $-40^\circ\text{C}\sim 600^\circ\text{C}$ (for use with waveguide) $-40^\circ\text{C}\sim 600^\circ\text{C}$ (for use without waveguide) $-40^\circ\text{C}\sim 120^\circ\text{C}$ (for use with coaxial cable)
Noise tolerance	Square wave noise from noise simulator (Rising time:1 nanosecond Width:1 microsecond) $\pm 2\text{KV}$ (normal and common mode)with the frequency of the power supply in the $0^\circ\sim 360^\circ$ phase.
Vibration resistance	10~55Hz, 0.75mm single amplitude in X,Y and Z directions, for 2 hours each.
Construction	Controller..... Aluminium diecast Antenna..... SUS316
Colour	Controller..... Taupe
Weight	Controller MWS-24RF-1..... approx. 5.7kg Parabolic antenna P-250A-24..... approx. 1.5kg Horn Antenna H-100A-24..... approx. 0.8kg

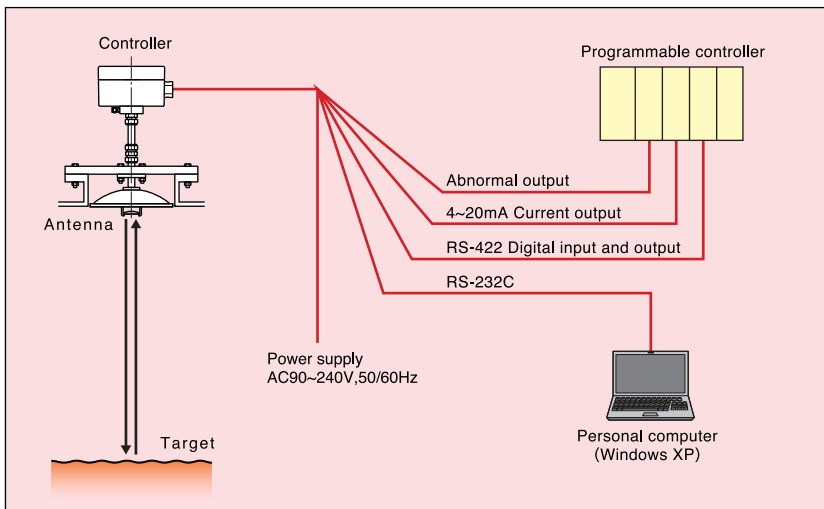
TERMINAL CONNECTION



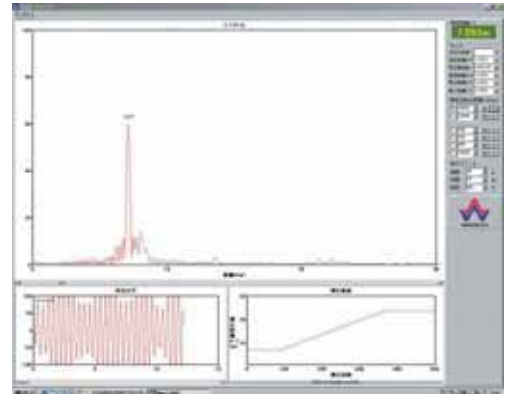
DIMENSION



SYSTEM EXAMPLE



COMPUTER DISPLAY



This specification may be changed without notice.



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