

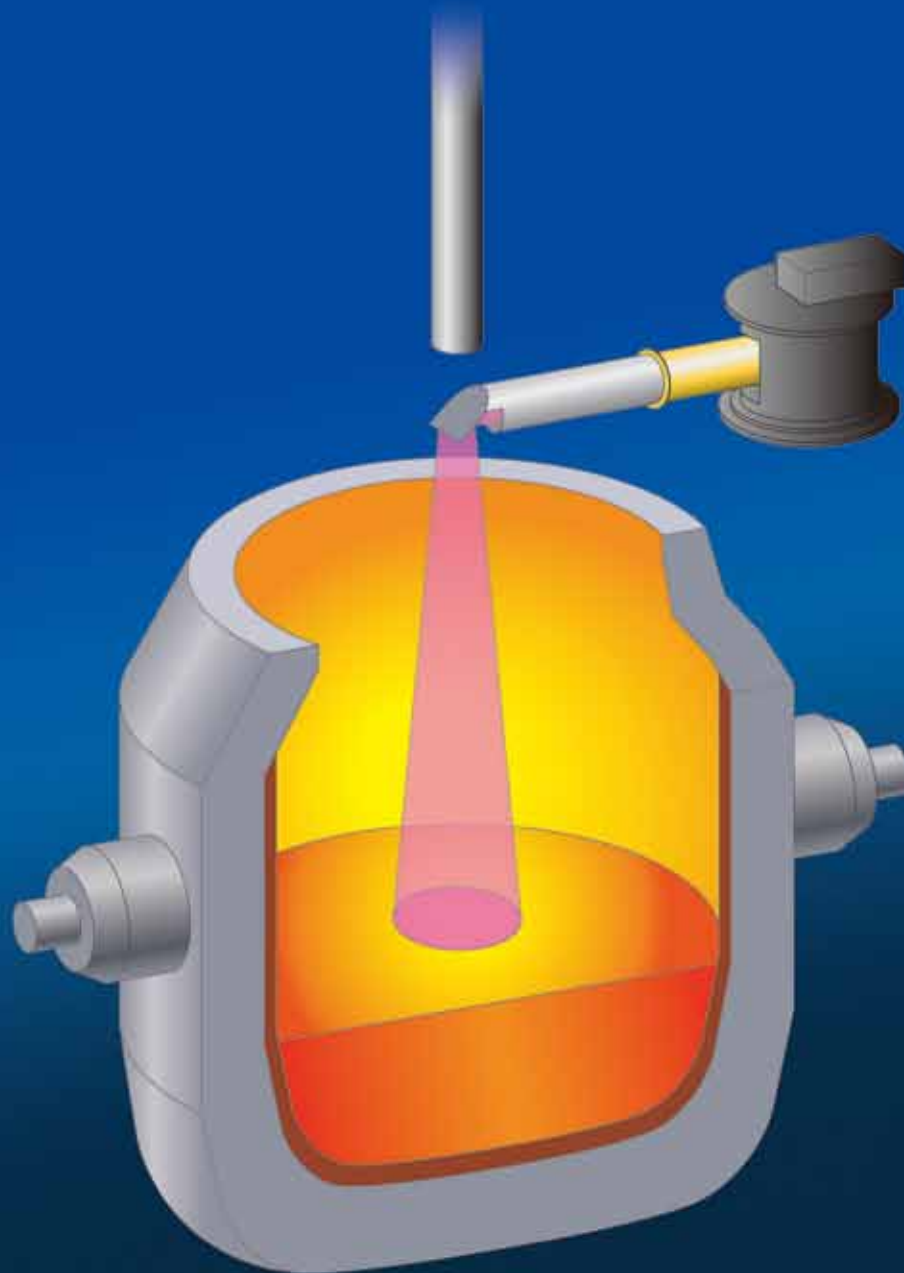


**MICROWAVE RANGE FINDER
FOR POWDER AND HIGH
TEMPERATURE MATERIALS**

MWS-24RF PAT.PEND.

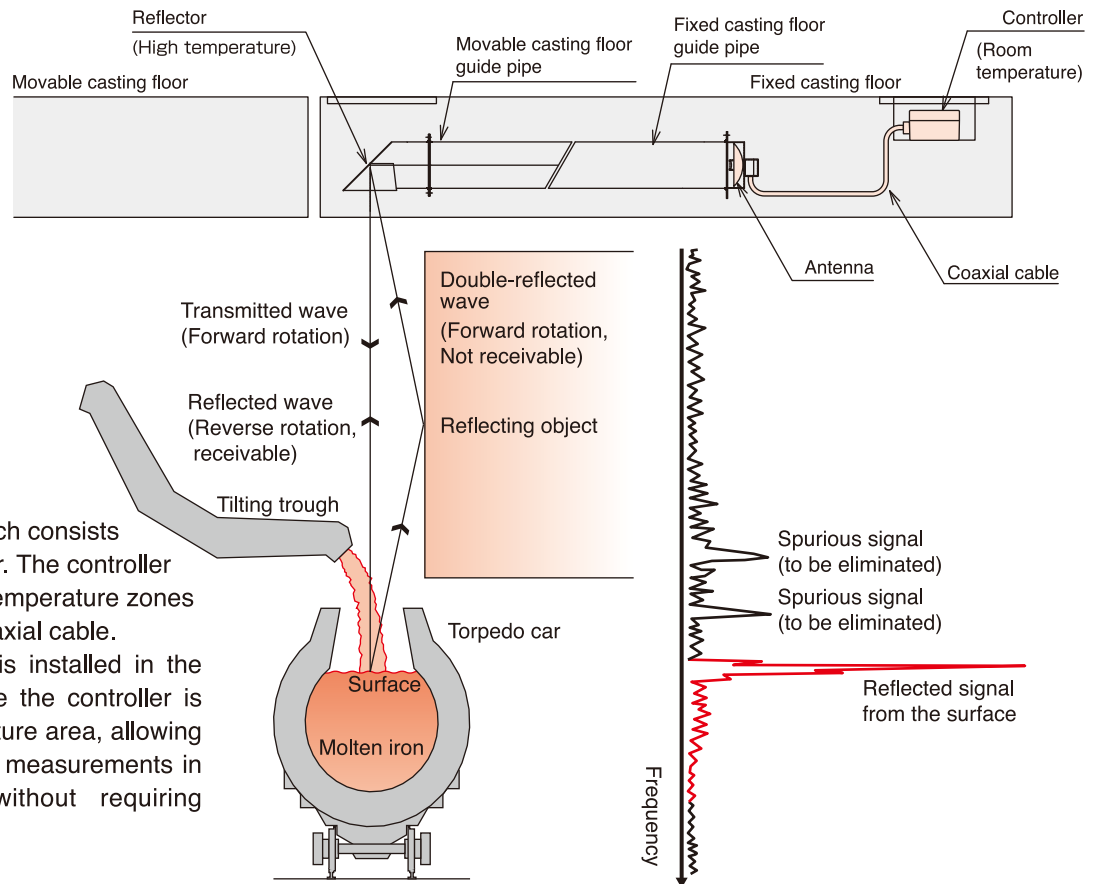
MICRO-RANGER

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

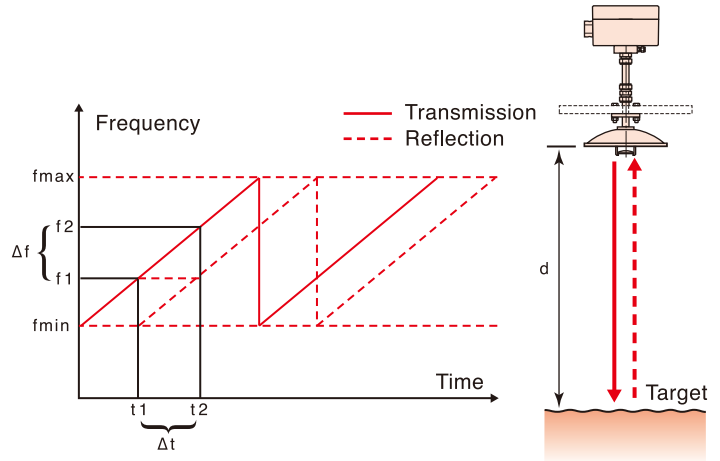
- Both hardware and software can be modified to suit your requirements.

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.

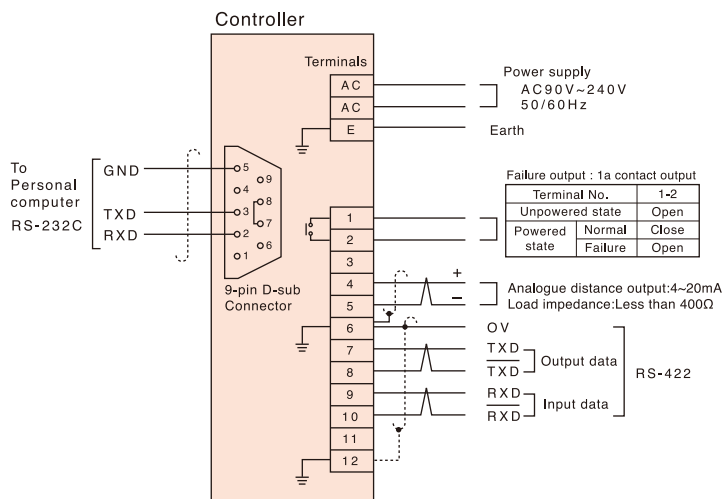


SPECIFICATIONS

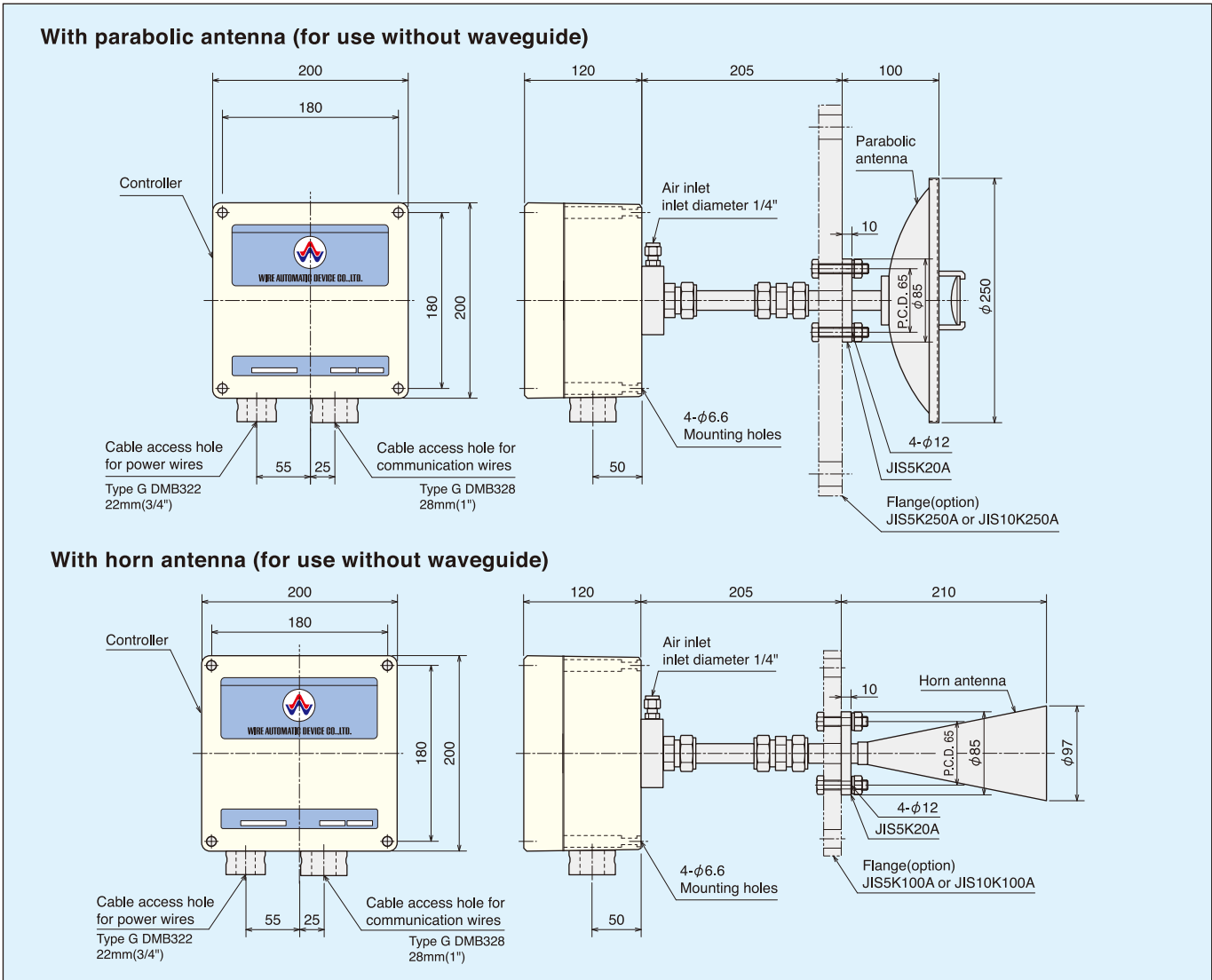
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|-----------------------------|--|
| Type | Controller With waveguide type..... MWS-24RF-1 (Without indicator, Standard) MWS-24RF-1D (With indicator, Optional) Without waveguide type... MWS-24RF-2 (Without indicator, Standard) MWS-24RF-2D (With indicator, 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 | ±0.1% F.S. or ±5mm (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..... ±0.5% to full scale Max. Load resistance..... 400Ω |
| 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. ±2° (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. ±5° (Angle in half of receiving power value) |
| Beam angle adjustment | ±15° (Optional) |
| Ambient temperature | Controller..... -10°C~50°C Antenna..... -20°C~600°C Antenna... -20°C~600°C(for use with waveguide) -20°C~600°C(for use without waveguide) -20°C~120°C(for use with coaxial cable) |
| Noise tolerance | Square wave noise from noise simulator (Rising time:1 nanosecond Width:1 microsecond) ±2KV(normal and common mode)with the frequency of the power supply in the 0°~360°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-2..... approx. 5.7kg Parabolic antenna P-250A-24-2..... approx. 1.5kg Horn Antenna H-100A-24-2..... approx. 0.8kg |

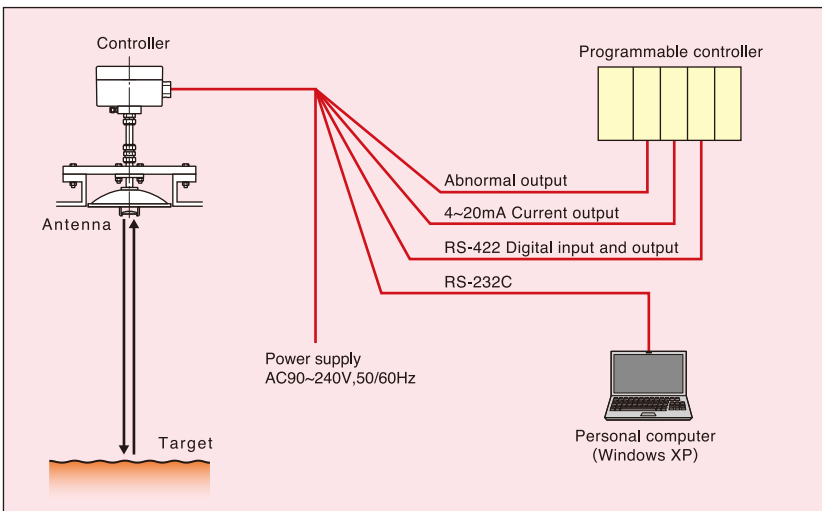
TERMINAL CONNECTION



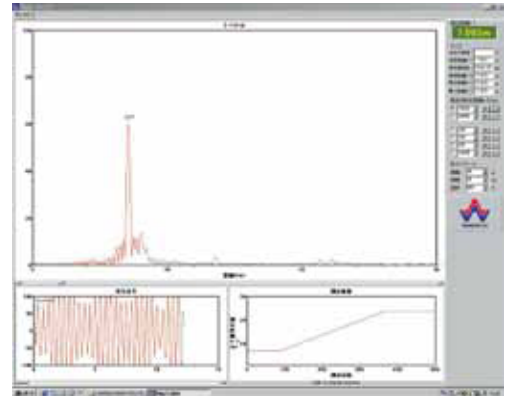
DIMENSION



SYSTEM EXAMPLE



COMPUTER DISPLAY



This specification may be changed without notice.



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