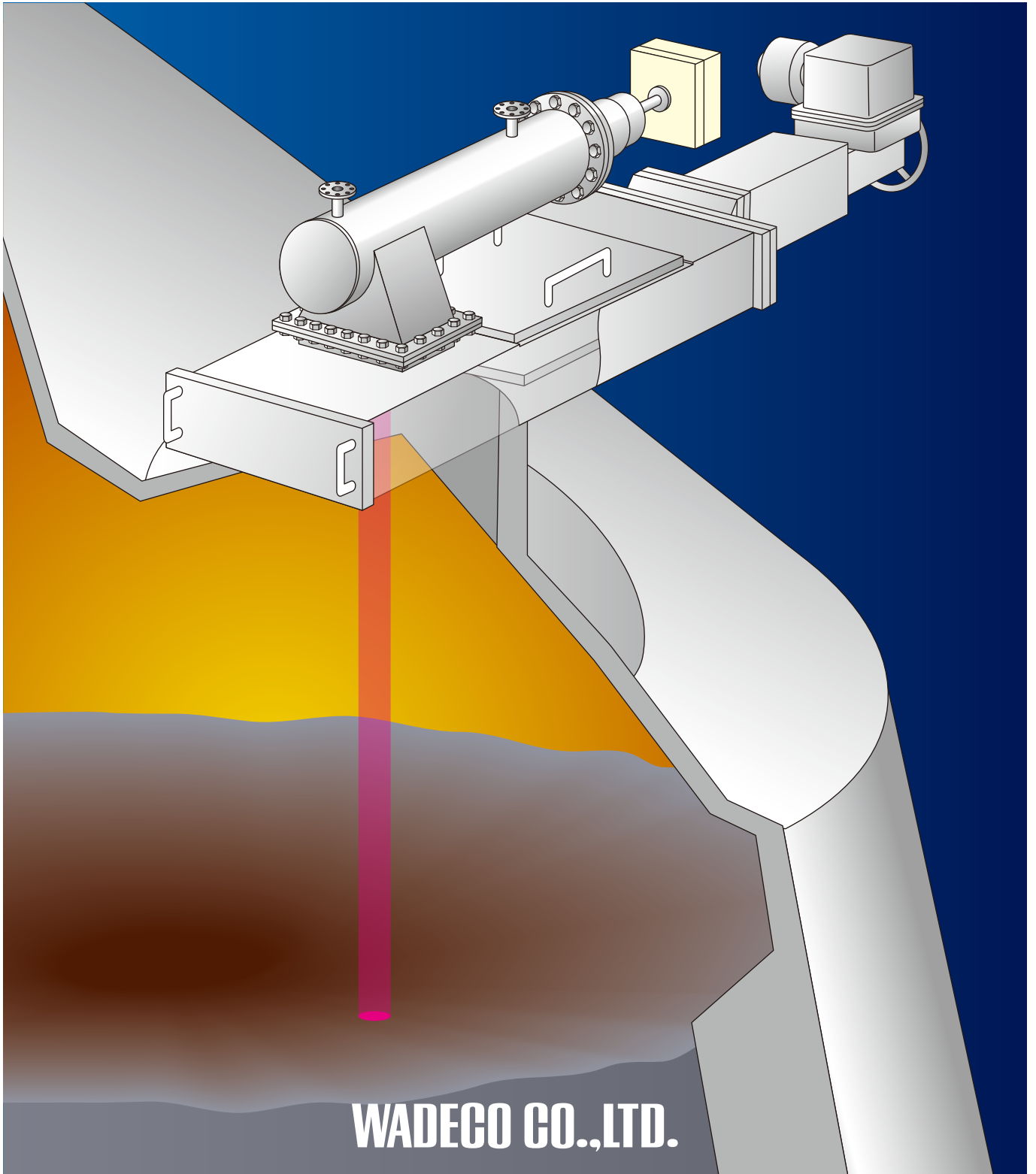




LANCELESS BLAST FURNACE 2D PROFILE METER

MWS-BF-2P PAT.

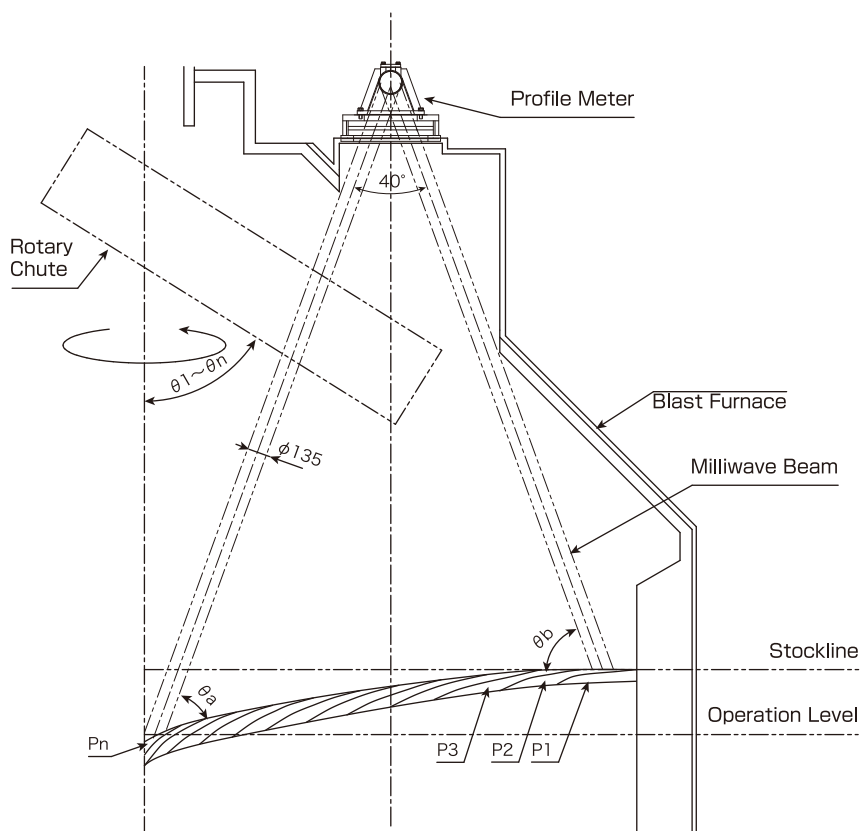
MILLI-SCANNER



WADECO CO.,LTD.

All problems with conventional lance systems solved!

The MWS-BF-2P Milli-Scanner Lanceless Blast Furnace Profile Meter is an FM-CW Radar type Milliwave Range Finder. Developed for 2D profile measurement of charging materials (coke or iron ore), the system consists of a range finder, enclosure, local control panel, local operation panel and valve. The milliwave beam transmitted from the antenna scans from the center to the edge of the furnace. The scanned positions and the distance to the material are calculated and converted to the profile measurement, output and the profile is displayed on a personal computer. By using this profile information, the charging profile of the material can always be controlled in real-time so as to keep an optimal concave shape. Greater charging control results in more stable gas flow in the blast furnace and this enables coke conservation and increases the longevity of the furnace.



Special Features

1. All problems with lance systems solved

- High speed measurement allows for better control of charging materials.
- Measures the profile of the coke or iron ore upon each rotation of the rotary chute, resulting in higher iron production while consuming minimal amounts of coke.
- The profile can be taken in between each rotation of the charging process. (minimum measuring time: approx. 5 seconds).
- Compact size and light weight lower installation costs and minimize the required installation space.

2. Unaffected by adverse conditions

- Unaffected by heat, flames, dust or vapor.
- The controller is installed outside of the furnace. Unaffected by the heat and pressure of the blast furnace, maintenance can be done easily.

3. High accuracy and reliability

- Better than ± 50 mm accuracy (Target: Iron Ore or Coke)
- Employs the rotary milliwave technique to secure measurement from the center to the wall of the blast furnace.
- Stable measurement even when the surface of the coke/iron ore is sloped.
- Due to the high S/N ratio, the sensor provides stable measurement even when the reflection from the target (coke/iron ore) is very weak.

4. Operational state shown on your PC

- The received signal, FFT spectrum and the measurement data are continuously displayed. This displayed data can be recorded and reviewed in real or accelerated time.
- Use of the recording and reviewing function allows the system parameters to be optimized offline.
- The display indicates, and the controller outputs, the internal temperature and any abnormal conditions (i.e. a lowering of received signal power, over heating in the controller and communication failures).
- The profile is displayed on the PC.

5. Convenient built-in functions

- A reference point and the required range are easily preset.
- Compatible for use with a personal computer.
- Power supply AC90~240V, 50/60Hz.
- Can connect with PC or PLC via RS-232C, RS-422 or RS-485.

6. Comprehensive stand alone system

- No additional hardware/software is needed as all signal processing is done in the controller and local control panel.

7. Light and compact

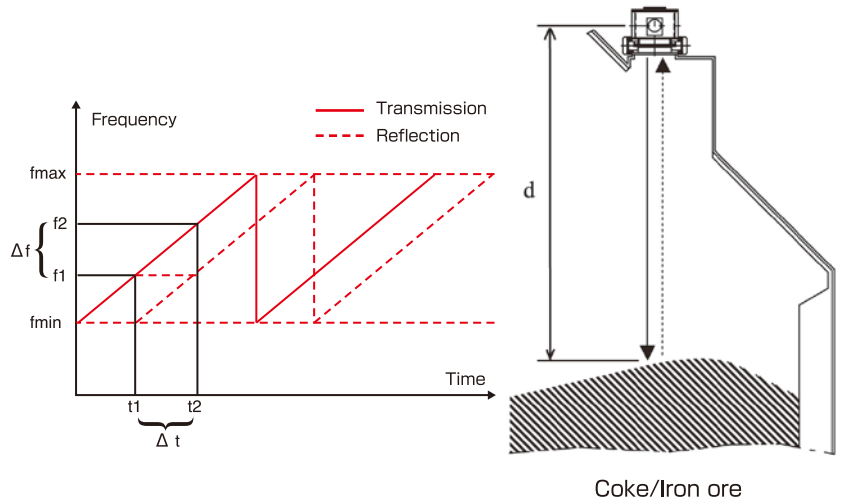
- Adoption of milliwaves allows a great reduction both in the size of the profile-meter and the opening in the blast furnace (565mm x 360mm).

8. Maintenance Free

- By closing the valve, maintenance can be done easily.

■ Principle

The Range Finder transmits a milliwave signal towards the target with a frequency that increases linearly with time. The milliwave signal transmitted at time, t_1 , with frequency, f_1 , is reflected by the iron ore/coke and received by 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 Range Finder mixes the transmitted and reflected signals together to extract the difference in frequency.



This signal is analyzed by an FFT (Fast Fourier Transform) analyzer to output a distance signal. This is called the FM-CW method and is suitable for improving the accuracy of distance measurements.

■ Specifications

Range Finder

| | |
|-----------------------------|---|
| Type | Milliwave Range Finder MWS-79RF-P |
| Power Supply | AC90~240V, 50/60Hz |
| Power Consumption | Approx. 30W |
| Modulation | FM-CW |
| Frequency Analysis | FFT |
| Range | Max.10m |
| Dead Zone | 0-500mm from antenna |
| Accuracy | Better than ± 50 mm (Target: Iron ore or Coke) |
| Personal Computer Interface | RS-232C, RS-422 or RS-485 |
| Analog Distance Output | Range 4mA~20mA Accuracy $\pm 0.5\%$ Max. Load Resistance 400 Ω |

| | |
|---|--|
| Abnormal Output | Major failure, minor failure both 1b contact (relays are excited under normal condition) DC30V, 0.1A |
| Delay time from power On to functioning | Approx. 5seconds |
| Ambient Temperature | Controller $-10^{\circ}\text{C}\sim 50^{\circ}\text{C}$ Antenna $-40^{\circ}\text{C}\sim 200^{\circ}\text{C}$ |
| Noise Tolerance | Square wave noise from noise simulator Rising time : 1 nanosecond Width : 1 microsecond $\pm 2\text{KV}$ (normal and common mode) |
| Vibration Resistance | 10-55Hz, 0.75mm single amplitude in X, Y and Z directions for 2 hours each |
| Construction | Controller : Aluminum Diecast Antenna : SUS316 |
| Color | Controller : Taupe |

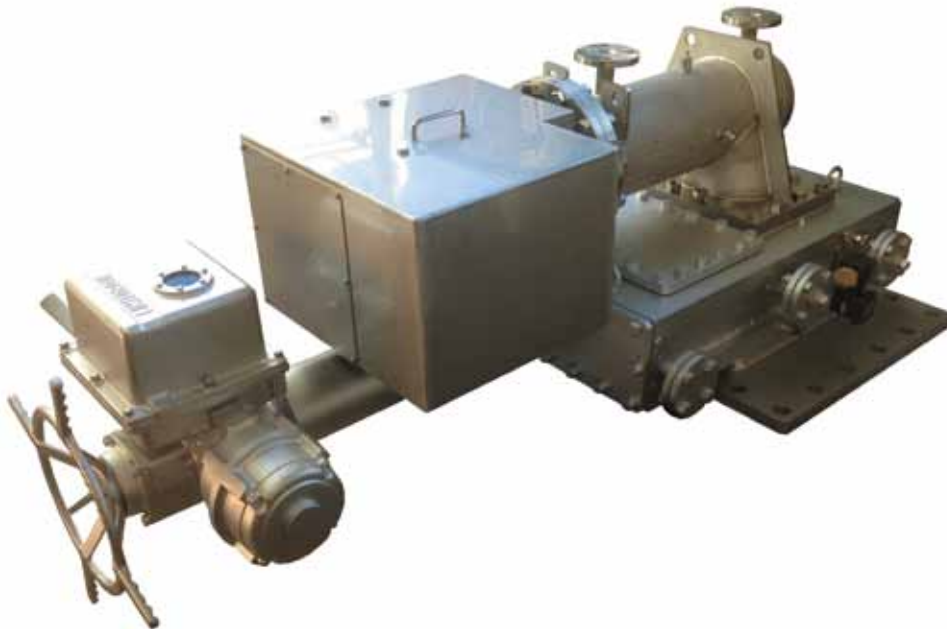
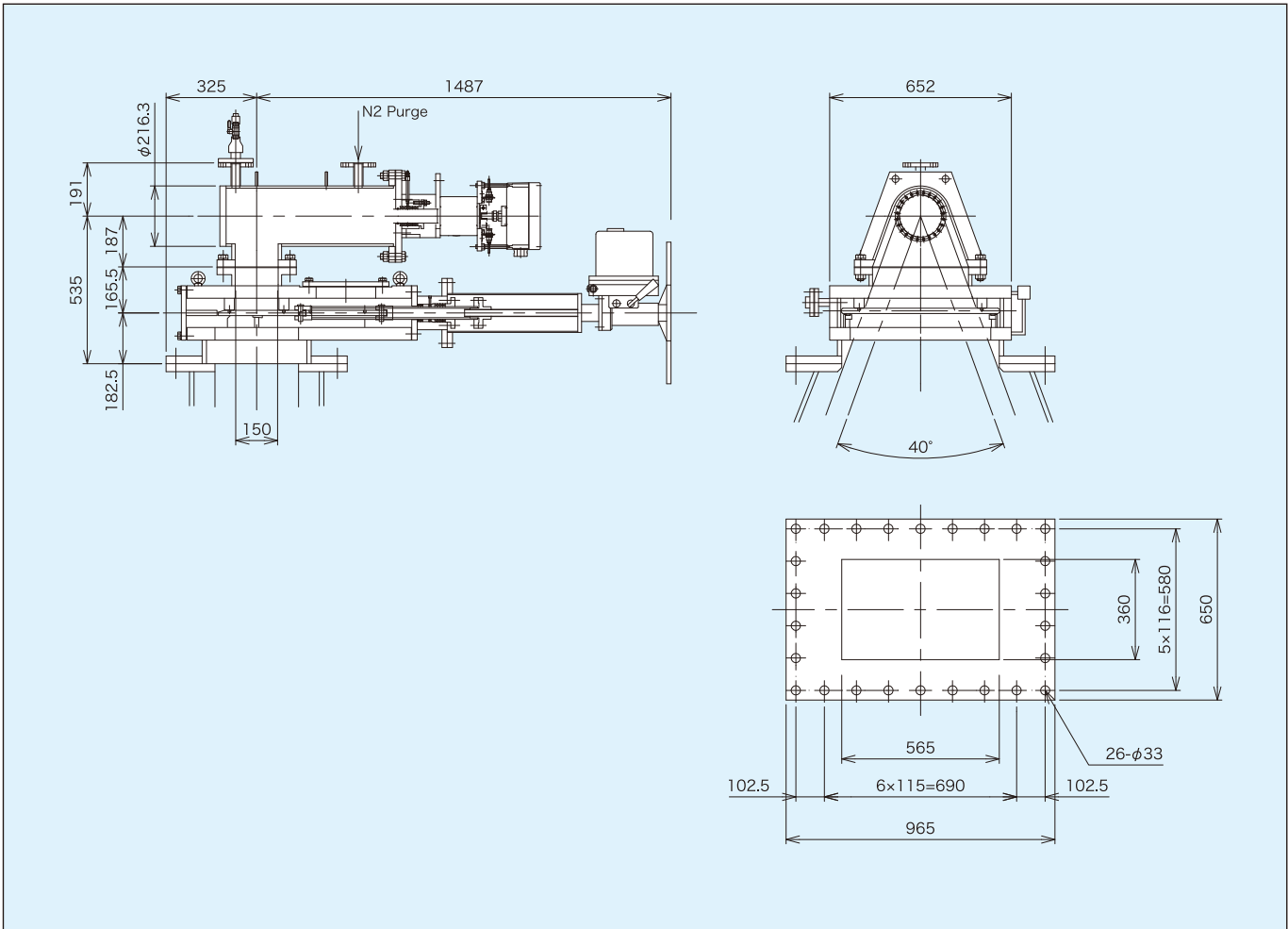
Enclosure

| | |
|----------------|---|
| Type | MWS-M-2P |
| Scanning Angle | Front/Back: $\pm 20^{\circ}$ |
| Scanning Speed | Front/Back: Approx. 5sec./ 40° |
| Construction | SUS304 |
| Weight | Approx. 210kg |

Sliding Valve

| | |
|--------------|--|
| Type | MWS-V-2P |
| Opening | 565mm(L) \times 360mm(W) |
| Motor | AC-3 ϕ -200/220V, 50/60Hz 0.5KW, with handle for manual operation |
| Construction | SS400: Main body SUS304: Shaft, sealed surface and base SUS420J2: Valve shaft Sealing material: High-strength silicon |
| Color | Metallic silver gray |
| Weight | Approx. 720kg |

■ Dimensions



These specifications may be changed without notice.

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