

LM

Radar Level Meter



Radar Level Meter (LM)

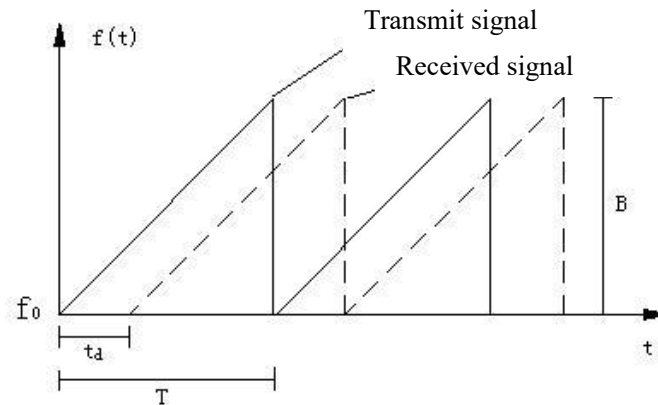
I. Product Overview

Radar Level Meter (LM) adopts four-wire X band FMCW mode. It expands radar level meter from single point to comprehensive applications, focusing on solid level detection but not limited by it. The product shows outstanding measurement capability under general solid level detection condition. It stands out under environment with heavy dust or other interference factors for it can provide a unique measurement & analysis solution for clients. The measurement of which is not affected by dust, noise of feedings, and airflow or temperature changes, and material level detection is more comprehensive and accurate by the breakthrough of large beam angle detection technology. Compared with radar level meter adopting pulse measurement principle, there will be no “wave loss” or “wave locking” phenomenon appears even under the working conditions like extreme dust, fast changing in material level and so on, the measurement will be extremely stable and reliable.



II. Operating Principle

FM continuous wave (FMCW) principle is adopted for LM, and the objective distance is determined from frequency difference between transmitted signal and the received signal. The aerial transmits microwave with continuous linear changes, which, after being reflected by the objective, is received by the aerial again. Due to the linear changes of frequency, there is a frequency difference between the received signal and transmitted signal, which proportional to the distance, and by which the distance is calculated.



$$S = \frac{1}{2} \cdot C \cdot \Delta f \cdot T / B$$

III. Product Features

- Commercialized X-band radar level meter focusing on solid material level detection

X-band is a radar frequency band with best overall performance with consideration of penetrability, anti-interference ability, measurement precision and echoing characteristics, etc. It is widely used in most advanced military radar technology all over the world. X band can effectively penetrate heavy dust or overcome ashy antenna, it can also get effective echo from materials with low reflectivity, thus to ensure stable measuring data.

- Large beam angle application in solid material level detection area

The breakthrough of large beam angle detecting technology expands high precision liquid level detection to high performance solid level detection area. With the same vertical distance, it enlarges the detection area of solid material surface. With irregular material surface, it improves the measurement representativeness because of larger detecting area. Thus, LM detects material level while eliminating the false echo interference made by obstacles in the silo.

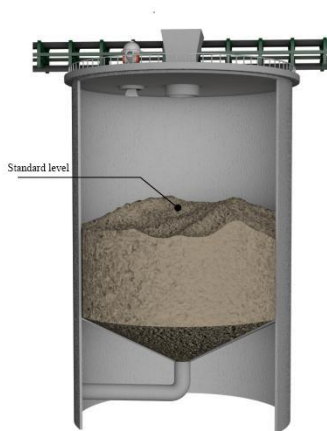
- Excellent comprehensive performance

The range of the LM is 150 m which enables the instrument possesses stronger adaptability for difference operating condition, guarantees detection reliability of whole material level variation range; High precision and high resolution allow LM notices any slight change in the silo and provides most reliable data for the subsequent comprehensive analysis.

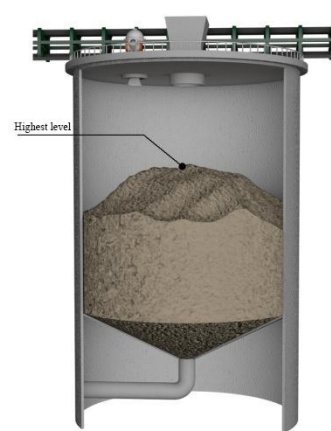
- Radar level meter with comprehensive detecting functions

On the basis of large beam angle, multiple level detection modes can be provided:

1. Standard level detection mode



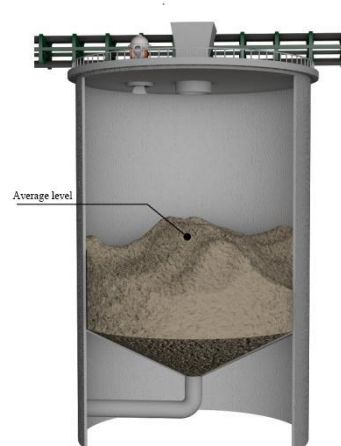
2. Highest level detection mode



3. Lowest level detection mode



4. Average level detection mode



5. Intelligent level detection mode

Under this mode, LM has self-calibration ability which means LM can output the level information which is most helpful for current production.

To be specific, when the level is high, LM shifts to highest level detection mode in case of overflow accident; when the level is low, LM shifts to lowest level detection mode to inform user feed in time; during normal operation, LM shifts to average level detection mode to indicate the material level information in the silo.

- Unique anti-interference function during feeding

When the installing location of LM can't avoid feeding interference entirely, this function can effectively reduce the interference and ensure the accuracy of detecting data, improve the

adaptability of LM for different operating conditions. (The specific performance shall be determined by site condition)



- Easy for operation

Local and remote setup and check can be achieved by infrared remote, long-distance remote, upper computer software, etc. Intelligent menu structure and options are convenient for commissioning.



Infrared remote



Long-distance remote

IV. Technical parameters

| Operating mode | |
|---------------------|----------------------------|
| Measuring principle | FMCW radar level detection |
| frequency | 10GHz (X band) |
| Technical index | |
| Range | EC -75m |

| | |
|------------------|--|
| | ST -100m |
| | AI -120m |
| | AII -150m |
| Repeatability | 0.5mm |
| Resolution | 0.3mm |
| Beam angle | 18° |
| Max. change rate | 12m/min |
| Detecting mode | Standard level detection mode Highest level detection mode Lowest level detection mode Average level detection mode Intelligent level detection mode |

Ambient condition

| | |
|---------------------|--|
| Ambient temperature | -40 ~ +65°C |
| Ambient humidity | 0~90% relative humidity (no condensing) |
| Location | Indoor/ Outdoor (Shed is recommended when using outdoor) |

Medium condition

| | |
|------------------------------|--|
| Dielectric constant | Er >1.4 |
| Standard process temperature | Standard type: -40 ~ +65°C High-temp type: -40 ~ +200°C |
| Pressure | 0.5bar |

Host computer

| | |
|--------------|---|
| Refresh time | 1s |
| Display | 128×64 characters lattice, black-mask OLED. |

Connector

| | |
|----------------------|---|
| Communication | RS-485 |
| Output | 4 ~ 20mA, ±0.15% reading error |
| Failure alarm signal | 3.6mA when no effective echo 22.5mA when level within 0.5m |

| | |
|--------------|--|
| Load | RL < 600Ω |
| Switch value | High/ Low level alarm and supplementary area indication, contact capacity: 400V, 150mA |
| Software | Host computer with measuring system 'LM online detecting system' software can be installed and operated on PC, provides real-time detecting data and enables remote control of LM |

Design

| | |
|--------------------|---|
| Enclosure | Cast aluminum, painting |
| Cable entry | 2×M20×1.5 |
| Protection level | IP65 |
| Weight | Around 13.6kg |
| Process connection | SS 304, GE flange, Rapid sighting device |
| Programming | Infrared remote (standard), long distance remote (optional) |

Power supply

| | |
|----|------------------------------|
| AC | 220V AC ±15%, 50Hz/60Hz, 10W |
| DC | 24V DC ±25%, 8W |

V. Product Application

1) Cement industry

Application locations: raw meal silo; raw coal bunker; blending station; cement silo; surge bin of blending station after limestone homogenization, etc.

2) Mineral industry

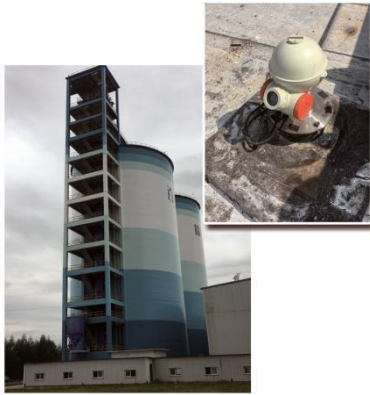
Application locations: crushing bin; grinding & ore dressing bin; feeding bin, etc.

3) Coal industry

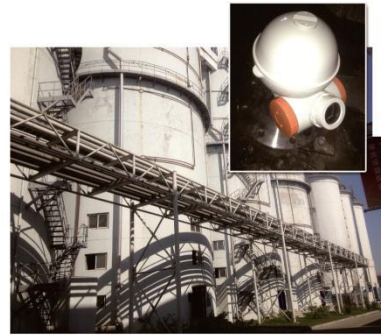
Application locations: raw coal bunker; washing water coal bunker, etc.

4) Power industry

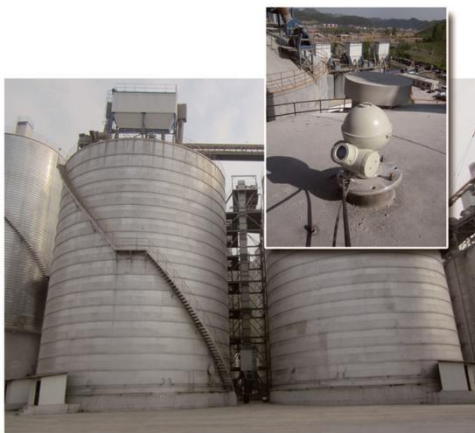
Application locations: raw coal bunker; pulverized coal bunker, etc.



Aluminum oxide silo



Raw coal silo at power plant



Cement silo



Clean coal silo at coal washery



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