Authorized Distributor

Flu-Tech บริษัท ฟลูเทค จำกัด Flu-tech co.,ltd
Fluid Control Specialists

FMCW Radar Level Transmitter

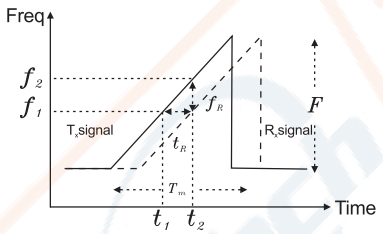
FineTek
Innovation · Quality · Sharing

PRODUCT INTRODUCTION

FMCW Radar level transmitter is a non contact measuring device, which is suitable for high temp., high pressure, and corrosive applications. It is easy to install and free of maintenance, especially for the high accuracy requirement environment.

PRINCIPLE

FMCW radar adopts a high frequency signal, which is emitted via an antenna and swipe frequency increment by 0.5GHz during the measurement, reflected by the target surface and received at a time delay. The frequency difference, which is calculated from the transmitting frequency and the received frequency, which is directly proportional to the measured distance (or material surface).
The frequency difference then is processed by Fast Fourier Transformation (FFT) to identify the signal in Intermedium Frequency (IF). This FMCW radar is innate with signal / noise enhancement and filtering of echo-back via Phase-Lock Loop (PLL) circuit that is the best solution for complex environment and high accuracy measurement.

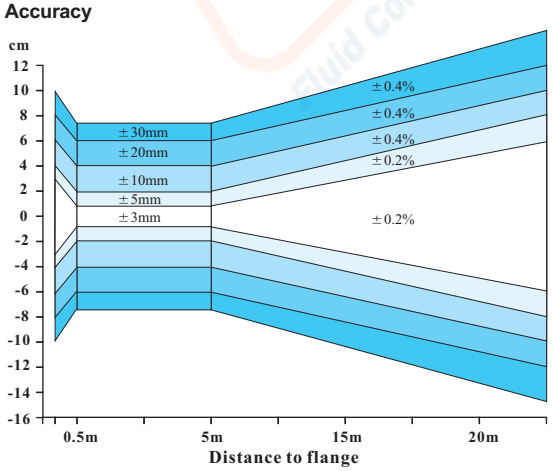


Design formula

$$Slop = \frac{F}{T_m} = \frac{f_R}{t_R} = \frac{f_R}{\frac{2R}{c}} \qquad t_R = \frac{2R}{c}$$

$$R = \frac{F_R \times c \times T_m}{2F}$$

LINEARITY DIAGRAM



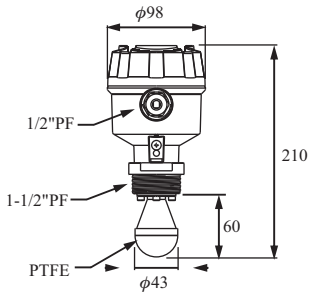
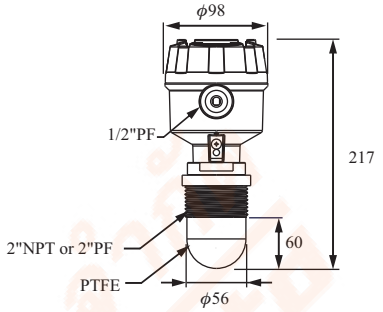
FEATURES

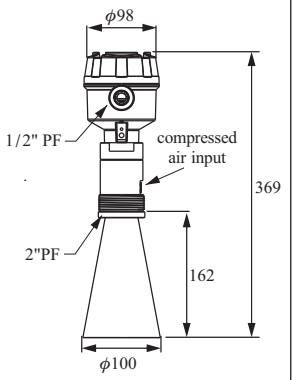
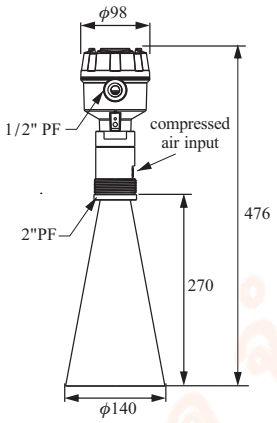
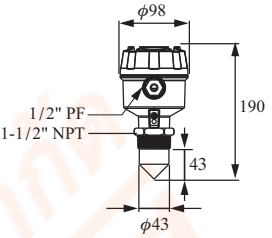
- Non contact measuring
- Corrosive and toxic liquid, hydrocarbons, slurries
- Not affected by specific gravity, pressure, temperature, viscosity, foam
- 5 digits LCM display
- Indicate signal wave inside the silo.
- Selection of Different Measurement unit(m, cm, mm, inch, Ft, %, mA)
- Measuring distance and actual level.
- Language selection of traditional Chinese, simplified Chinese, English.
- 4-20mA / 4 wires / 2 wires
- Modbus RS-485 to enhance isolation and easy for remote control.
- CE standards for isolation(EFT 2000V, B class or better)
- Suitable for mid-range signal
- 4mA, 20mA output
- Isolated circuit design.

TEST STANDARDS

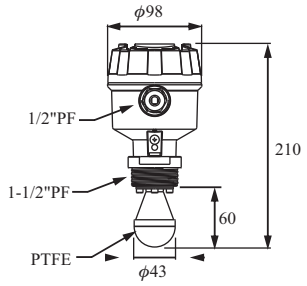
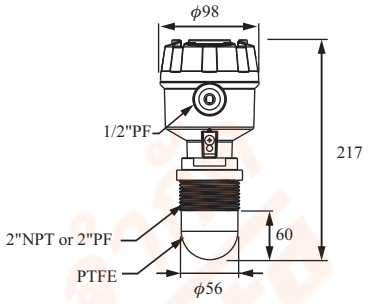
- High voltage : IEC60947-2
- Isolated resistance : IEC60092-504
- Power supply change : IEC60092-504
- Power supply failure : IEC60092-504
- Electrical burst testing : IEC61000-4-4
- Voltage DIPS : IEC61000-4-11
- Humidity : IEC60068-2-30
- High/Low temperature test : IEC60068-2-38
- IP protection rating : IEC60529

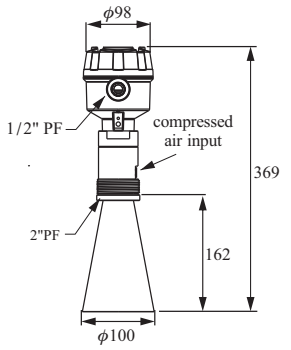
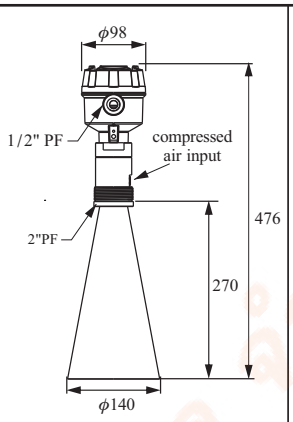
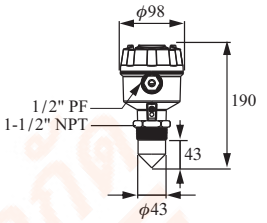
SPECIFICATION (26GHz 4-wire)

Dimensions (Unit:mm)		
Model	**JFR-204**	**JFR-214**
Medium	General liquid	General liquid /suitable for acid and alkaline in liquid
Min. Dielectric constant (liquid)	1.4	
Measuring range	30m	
Accuracy	±3 mm	
Repeatability	±1 mm	
Digital communication	RS485 (Isolated)	
Ambient temperature	-40~80 °C(LCM<75°C)	
Operating temperature	-40~200 °C	
Operating pressure	0~40 bar	
Frequency	K Band	
Analog output	4~20mA / 4 Wire	
Protection rating	IP67	
Power supply	9.5~30Vdc	
Local display	5 digits LCM display	
Housing material	Aluminum	
Antenna type	Horn (43D)	Lens (56D)
Half-power beam width	±9°	
Antenna material	SUS316+PTFE	PTFE
Blind distance	500mm	

Dimensions (Unit:mm)			
Model	**JFR-224**	**JFR-234**	**JFR-244**
Medium	General liquid		
Suitable For	Long dlstance measurement	Super dlstance measurement	Corrosion type acid and alkaline liquid
Min. Dielectric constant (liquid)	1.4		
Measuring range	40m	70m	20m
Accuracy	±3mm @distance≤30m, ±0.01% F.S.@distance>30m		±3 mm
Repeatability	±1 mm		
Digital communication	RS485 (Isolated)		
Ambient temperature	-40~80 °C(LCM<75°C)		
Operating temperature	-40~200 °C		
Operating pressure	0~40 bar		
Frequency	K Band		
Analog output	4~20mA / 4 Wire		
Protection rating	IP67		
Power supply	9.5~30 Vdc		
Local display	5 digits LCM display		
Housing material	Aluminum		
Antenna type	High gain horn (100)	High gain horn (140)	Lens(43DS)
Half-power beam width	±5°	±3°	±10°
Antenna material	SUS 316		PTFE
Blind distance	500 mm		

SPECIFICATION (26GHz 2-wire)

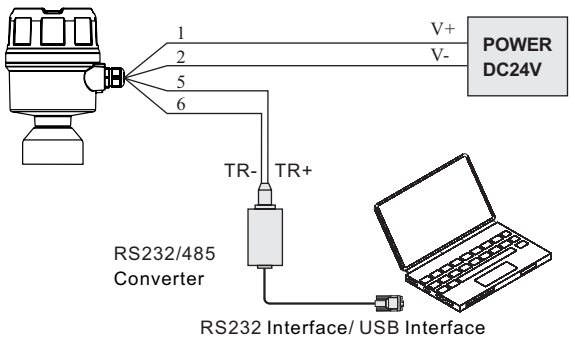
Dimensions (Unit:mm)		
Model	**JFR-202**	**JFR-212**
Medium	General liquid	General liquid /suitable for acid and alkaline in liquid
Min. Dielectric constant (liquid)	1.4	
Measuring range	20m	
Accuracy	±5mm	
Repeatability	±3mm	
Digital communication	HART	
Ambient temperature	-40~80°C(LCM<75°C)	
Operating temperature	-40~200°C	
Operating pressure	0~40 bar	
Frequency	K Band	
Analog output	4~20mA	
Protection rating	IP67	
Power supply	24Vdc±10%	
Local display	5 digits LCM display	
Housing material	Aluminum	
Antenna type	Horn (43D)	Lens (56D)
Half-power beam width	±9°	
Antenna material	SUS 316 + PTFE	PTFE
Blind distance	500 mm	

Dimensions (Unit:mm)			
Model	**JFR-222**	**JFR-232**	**JFR-242**
Medium	General liquid		
Suitable For	Long dlstance measurement	Super dlstance measurement	Corrosion type acid and alkaline liquid
Min. Dielectric constant (liquid)	1.4		
Measuring range	30m	35m	15m
Accuracy	±5mm @distance≤20m, ±0.025% F.S.@distance>20m		±5 mm
Repeatability	±3mm		
Digital communication	HART		
Ambient temperature	-40~80°C(LCM<75°C)		
Operating temperature	-40~200°C		
Operating pressure	0~40 bar		
Frequency	K Band		
Analog output	4~20mA		
Protection rating	IP67		
Power supply	24Vdc±10%		
Local display	5 digits LCM display		
Housing material	Aluminum		
Antenna type	High gain horn (100D)	High gain horn (140D)	Lens (43DS)
Half-power beam width	±5°	±3°	±10°
Antenna material	SUS 316		PTFE
Blind distance	500 mm		

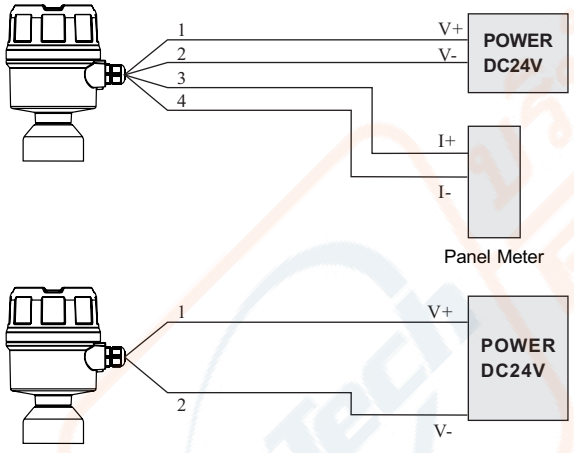
WIRING/CALIBRATION

WIRING INFORMATION

RS485 wiring

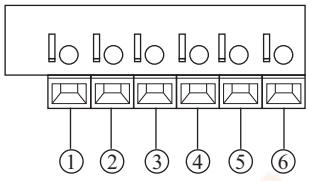


JFR Series and Indicator(External Power)

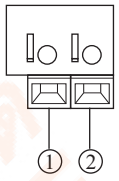


WIRING DIAGRAM

JFR-2X4



JFR-2X2



① Power Supply: V+
② Power Supply: V-
③ Analog Output: I+ (4~20mA)
④ Analog Output: I- (4~20mA)
⑤ Communication: TR+ (RS485)
⑥ Communication: TR- (RS485)

CALIBRATION

Two ways to calibrate the JFR Series:

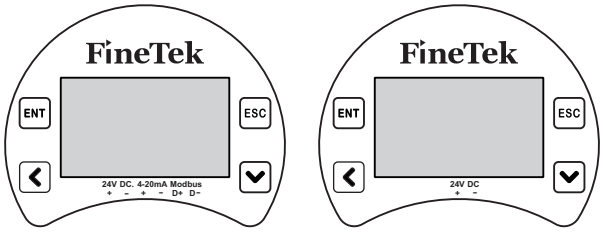
4-wire:

1. Display/Adjustment module
2. By pcbased fas soft ware

2-wire:

1. Display/Adjustment module
2. HART

Adjustment module is an adjustment tool with 4 buttons to click on. It also has a transparent window to allow display reading.



5 digits LCM displat

[ENT] **Button**
-Enter Edit status
-Confirm Edit
-Confirm parameter modification

[<] **Button**
-Select Edit
-Select parameter
-Parameter

[ESC] **Button**
-Return
-Cancel

[v] **Button**
-Increase
-Select

PARAMETER SETTING

Measurement bench-mark starts at contact surface of connection.

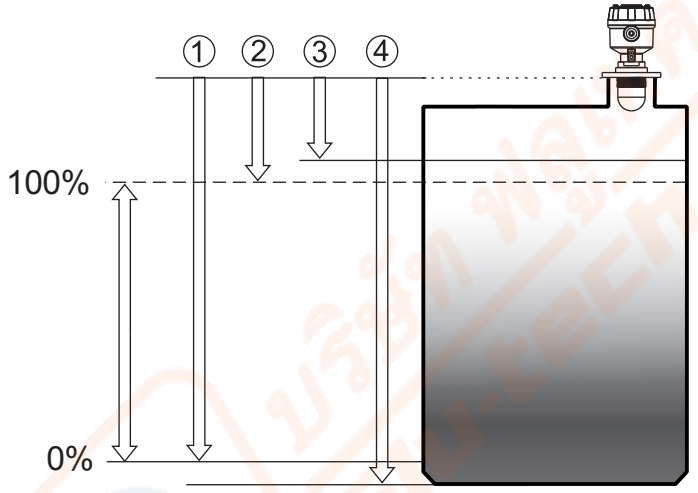
① Low level calibration

② High level calibration

③ Blind Distance

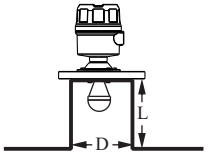
④ Measuring Distance Setup

Note: Be aware of blind distance when measuring material high level.(Shown in ③)



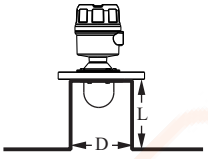
INSTALLATION

1. JFR-20x can be hidden in the extension tube, the recommendation of the tube diameter D and length L are shown in the table.



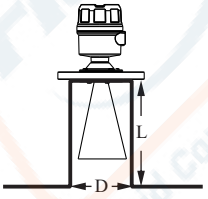
Diameter D (Inch)	Length L (mm)
2"	L≤160
4"	L≤300
5"	L≤400
6"	L≤500

2. JFR-21x can be hidden in the extension tube, the recommendation of the tube diameter D and length L are shown in the table.



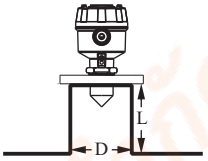
Diameter D (Inch)	Length L (mm)
3"	L≤200
4"	L≤300
5"	L≤400

3. JFR-22X and JFR-23X can be hidden in the extension tube, the recommendation of the tube diameter D and length L are shown in the table.



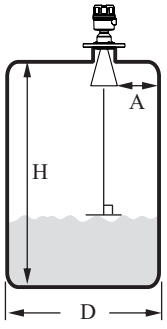
Model	Diameter D (mm)	Length L (mm)
JFR-22X	D>100	L≤150
JFR-23X	D>140	L≤270

4. JFR-24x can be hidden in the extension tube, the recommendation of the tube diameter D and length L are shown in the table.

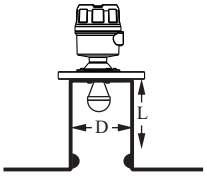


Diameter D (Inch)	Length L (mm)
2"	L≤100
4"	L≤200
5"	L≤300
6"	L≤400

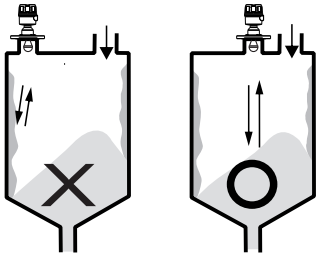
5. Installation recommendations are as follows :
   (1) Antenna installation angle to be perpendicular to the Horizontal.
   (2) JFR installation position with the drum wall suggestions Are as follows :
   Installation location A should be less than 1/6D
   Range with A relation is as follows :
   a.H<10m, A>300mm
   b.10m<H<20m, A >600mm
   c.H>20m, A>900mm



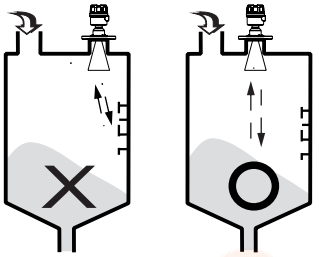
   (3) Extended tube is suggested to do the welding process from outside; welding process from inside, the bulges might affect the signal transmission. The joint part of extended tube cannot be less than “D”.



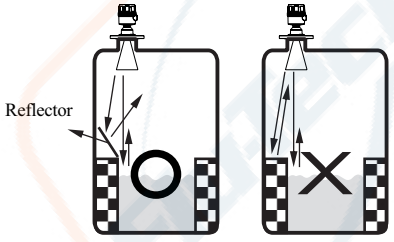
2. Radar installation should not be too close to the drum wall, avoid the drum wall attachment material reflection interference.



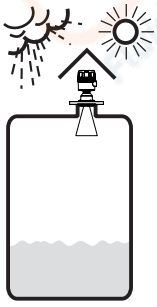
3. Radar installation not too close to the drum bracket to avoid reflection is incorrect



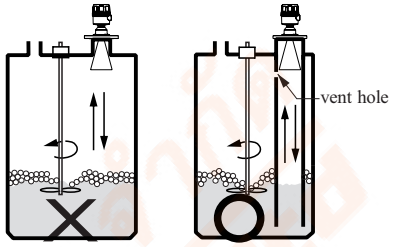
4. When obstructions inside the tank, tank be fitted with eflectors, steer clear of the error echo reflected to the receiver, causing radar miscalculation.



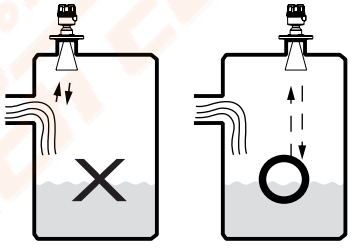
5. Outdoor installation should take shade or rain-proof measures.



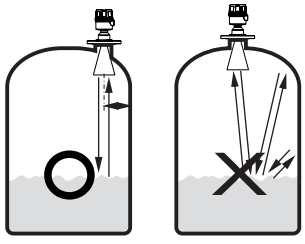
6. If drum internal agitator will have a strong vortex and foam, drum must increase waveguide, the upper waveguide drill vent holes to ensure the correctness of the measured value.

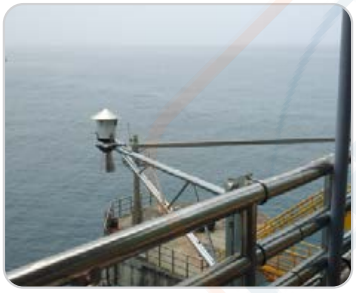


7. Installation should be avoided in the feed inlet position, avoid material interference or obstacles interference.



8. Installation should be avoided in the top center of the arch or round barrel will cause multiple echo reflections.





Power plant
port wave height edtection

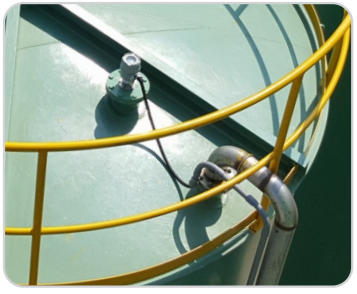
Oil Factory
Process Oil Detection

Government agencies
flood prevention and control

Pharmaceutical Factory
Boiler Liquid Detection

Feed industry
butter storage detection

Oil Factory
Soybean oil level detection



Plastic industry
chemical detection

Feeding plant
Corn storage tank detection

บริษัท ฟลูเทค จำกัด *845/3-4 หมู่ 3 ถ.เทพารักษ์ ต.เทพารักษ์ อ.เมือง จ.สมุทรปราการ 10270*

FLU-TECH CO.,LTD *845/3-4 Thepharak RD., T.Thepharak, A.Muang, Samutprakarn 10270 THAILAND*

Tel. 0 2384 6060, Fax 0 2384 5701, Email : pneumatic@flutech.co.th, www.flutech.co.th