User's Manual

Supmea

Radar Level Transmitter

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U-SUP-RD1000-EN1

Preface

Thank you for purchasing the optical dissolved oxygen controller. Please read this manual carefully before operating and using it correctly to avoid unnecessary losses caused by false operation.

Note

- Modification of this manual's contents will not be notified as a result of some factors, such as function upgrading.
- We try our best to guarantee that the manual content is accurate, if you find something wrong or incorrect, please contact us.
- This product is forbidden to use in explosion-proof occasions.

Version

U-SUP-RD1000-EN1

Safety Precautions

In order to use this product safely, be sure to follow the safety precautions described.

About this manual

- Please submit this manual to the operator for reading.
- Please read the operation manual carefully before applying the instrument. On the precondition of full understanding.
- This manual only describes the functions of the product. The company does not guarantee that the product will be suitable for a particular use by the user.

Precautions for protection, safety and modification of this product

- To ensure safe use of this product and the systems it controls, Please read carefully the operation manual and understand the correct application methods before putting into operation, to avoid unnecessary losses due to operation mistakes. If the instrument is operated in other ways not described in the manual, the protections that the instrument give may be destroyed, and the failures and accidents incurred due to violation of precautions shall not be borne by our company.
- When installing lightning protection devices for this product and its control system, or designing and installing separate safety protection circuits for this product and its control system, it needs to be implemented by other devices.
- If you need to replace parts of the product, please use the model specifications specified by the company.
- This product is not intended for use in systems that are directly related to personal safety.Such as nuclear power equipment, equipment using radioactivity, railway systems, aviation equipment, marine equipment, aviation equipment and medical equipment.If applied, it is the responsibility of the user to use additional equipment or systems to ensure personal safety.

- Do not modify this product.
- The following safety signs are used in this manual:

Hazard, if not taken with appropriate precautions, will result in serious personal injury, product damage or major property damage.

Warning:Pay special attention to the important information linked to product or particular part in the operation manual.

- Confirm if the supply voltage is in consistent with the rated voltage before operation.
- Don’t use the instrument in a flammable and combustible or steam area.
- To prevent from electric shock, operation mistake, a good grounding protection must be made.
- Thunder prevention engineering facilities must be well managed: the shared grounding network shall be grounded at is-electric level, shielded, wires shall be located rationally, SPD surge protector shall be applied properly.
- Some inner parts may carry high voltage. Do not open the square panel in the front except our company personnel or maintenance personnel acknowledged by our company, to avoid electric shock.
- Cut off electric powers before making any checks, to avoid electric shock.
- Check the condition of the terminal screws regularly. If it is loose, please tighten it before use.
- It is not allowed to disassemble, process, modify or repair the product without authorization, otherwise it may cause abnormal operation, electric shock or fire accident.
- Wipe the product with a dry cotton cloth. Do not use alcohol, benzine or other organic solvents. Prevent all kinds of liquid from splashing on the product. If the product falls into the water, please cut off the power

immediately, otherwise there will be leakage, electric shock or even a fire accident.

- Please check the grounding protection status regularly. Do not operate if you think that the protection measures such as grounding protection and fuses are not perfect.
- Ventilation holes on the product housing must be kept clear to avoid malfunctions due to high temperatures, abnormal operation, shortened life and fire.
- Please strictly follow the instructions in this manual, otherwise the product's protective device may be damaged.

- Don’t use the instrument if it is found damaged or deformed at opening of package.
- Prevent dust, wire end, iron fines or other objects from entering the instrument during installation, otherwise, it will cause abnormal movement or failure.
- During operation, to modify configuration, signal output, startup, stop, operation safety shall be fully considered. Operation mistakes may lead to failure and even destruction of the instrument and controlled equipment.
- Each part of the instrument has a certain lifetime, which must be maintained and repaired on a regular basis for long-time use.
- The product shall be scrapped as industrial wastes, to prevent environment pollution.
- When not using this product, be sure to turn off the power switch.
- If you find smoke from the product, smell odor, abnormal noise, etc., please turn off the power switch immediately and contact the company in time.

Disclaimer

- The company does not make any guarantees for the terms outside the scope of this product warranty.
- This company is not responsible for damage to the instrument or loss of parts or unpredictable damage caused directly or indirectly by improper operation of the user.

No.	Name	Quantity	Note
1	Radar Level Transmitter	1	
2	Manual	1	
3	Certificate	1	

After opening the box, please confirm the package contents before starting the operation.If you find that the model and quantity are incorrect or there is physical damage in appearance, please contact us.

Content

Chapter 1 Production Introduction

1.1. Introduction

（76~81）GHz frequency modulated continuous wave (FMCW) radar product (also called millimeter wave radar), using millimeter wave band with higher frequency than Ku-band radar, long-distance imaging and multi-spectral imaging in remote target detection and strong smoke and dust environment. It has important applications, and can detect smaller targets than microwave radar and achieve more precise positioning, with higher resolution and stronger confidentiality.

As a 78GHz band radar used in the industrial measurement field, It has the incomparable advantages of other ordinary microwave pulse radars and guided wave radars. The extremely narrow beam and penetrating ability are more effective. Adapt to ultra-complex working conditions without compromising measurement performance.

1.2. Scope of application

1.2.1. Medium

In general, the dielectric constant of the measured medium is required to be greater than 2, so that it can have a good reflection section.

1.2.2. Radar Level Transmitter ambient temperature

The ambient temperature range of the Radar Level Transmitter is: -20℃～+70℃.It is recommended to use the instrument protection box in the northern area. In areas with strong direct sunlight, it is recommended to install the instrument in a cool place or use a sun visor, so as to avoid excessive temperature in the instrument caused by exposure to the sun, and to provide good ventilation and heat dissipation.

Chapter 2 Technical Parameters

Table 1 Technical Parameters

Measuring range	Liquid leve: 5m,10m,15m,20m,30m Material level: 5m,10m,15m,20m
Measurement error	1‰FS
Migration	±9.9m
Signal output	（4～20）mA、HART、Modbus
Power supply	DC 24V (22V~30V)
Ambient temperature	-20℃～+70℃
Ambient humidity	（0%～95%）RH
Protection level	IP66
Display	128×64 LCD
Electrical Interface	M20×1.5（F）
Weight	1.2kg
Size	Diameterϕ96mm×Height221mm
Mounting hole thread	G2

Chapter 3 Installation

3.1. Radar level transmitter shape structure

Radar level transmitter shape structure figure is shown as in Figure 1.

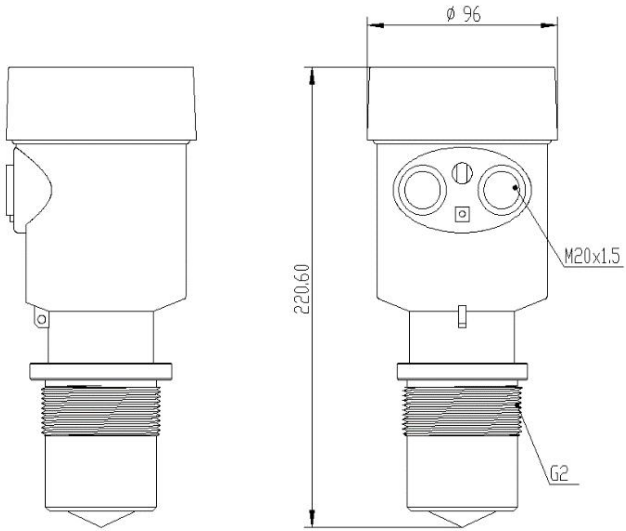
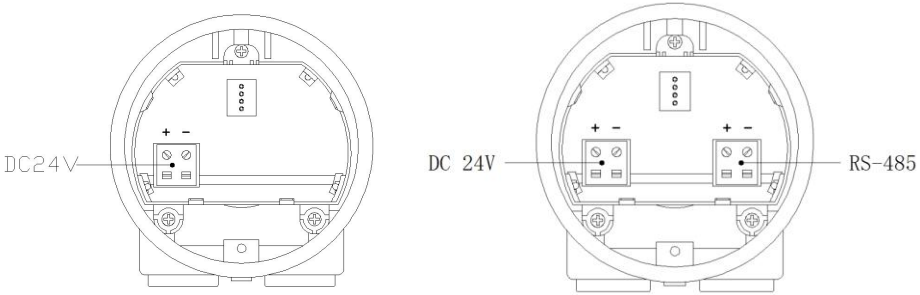


Figure 1 Radar shape structure

3.2. Radar Level Transmitter interface

Radar Level Transmitter interface figure is shown as in Figure2.



2-wire interface figure 4-wire interface figure

Figure 2 Radar Level Transmitter interface figure

Chapter 4 Radar Level Transmitter installation and Debugging

4.1. Preparation before installation

- Understand the internal structure and pipeline arrangement of the storage tank, and obtain information such as the diameter and range of the tank.
- Tools needed: flat-blade screwdriver (3*75mm), wire stripper (7mm²), hand knife, pipe wrench, DC 24V power supply.
- After the tools are ready, unpack the product and check the packing list to determine whether the materials are complete.

4.2. Radar Level Transmitter installation location selection

Avoid installing the radar in a central location or close to the edge of the container, otherwise it is likely to produce false readings.

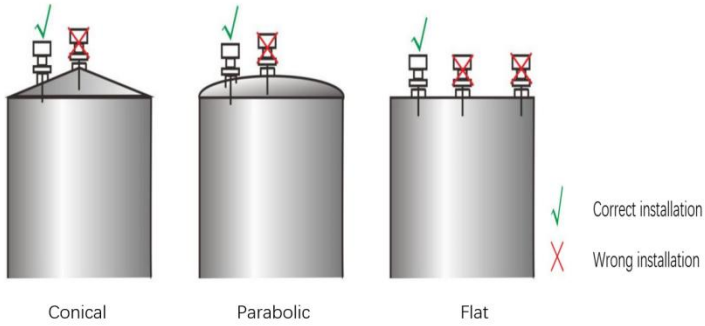


Figure 3 Radar installation location diagram

- Avoid false wave diagram

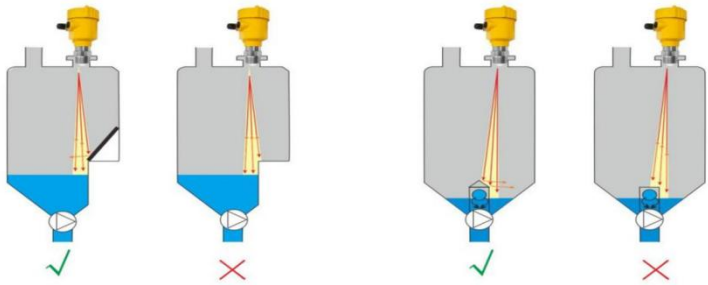


Figure 4 False wave diagram

- Treatment of stairs and grille tanks

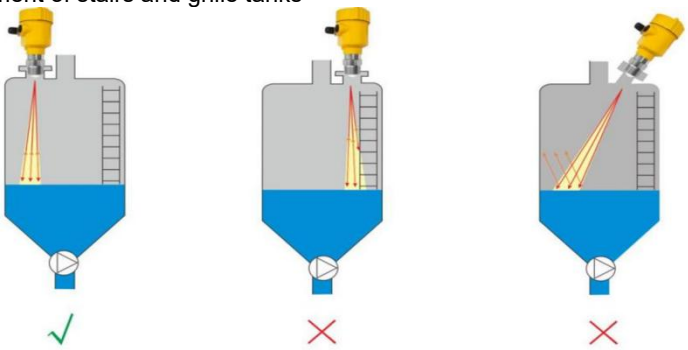


Figure 5 Treatment of stairs and grille tanks diagram

- Treatment of wall hanging and grille tanks

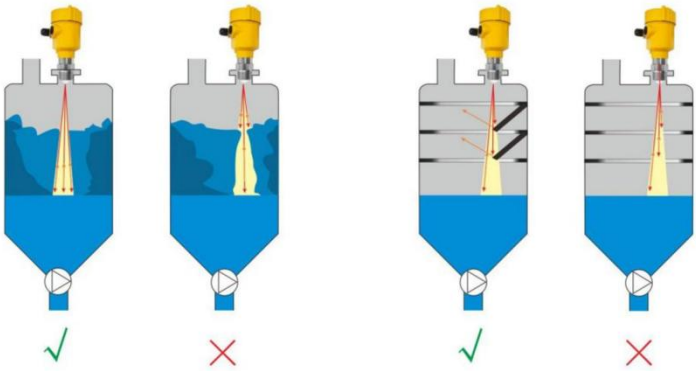


Figure 6 Treatment of wall hanging and grill tanks diagram

4.3. Software configuration instructions

4.3.1. Instrument connection

The power cord is connected to the DC 24V terminal of the instrument, please pay attention to the positive and negative poles, and do not connect them wrongly.

4.3.2. Set instrument parameters

Facing the display window of the instrument, press the "OK" button, the meter will display "Main menu" , as shown in the figure below：

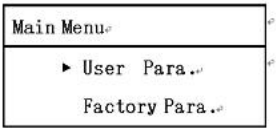


Figure 7

Press the "OK" button to enter the "User Para".

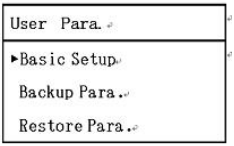


Figure 8

Press "OK" button to enter "Basic Setup".

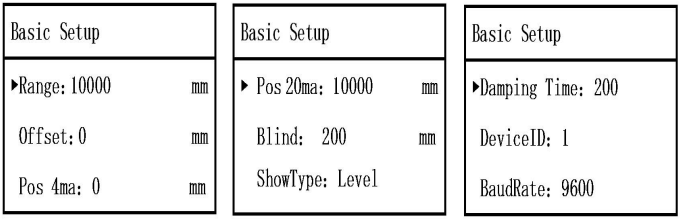


Figure 9

Set the "Range" according to the working conditions, press "OK", after the range value is reversed, use the "Upshift"and"Downshift" button to input the range value, and then press the "OK" button to confirm.

Press "Downshift" button to select "Offset", press "OK" to reverse the migration value, enter the migration value, and press "OK" to confirm.

The same steps can be used to modify "Pos:4mA"/"Pos:20mA"/"Blind"/"Damping Time". After the modification, press the "Backspace" key to return to the "User Para" interface.

When the display type is set to level,the main interface shows the actual level value. When the display type is set to Ullage, the main interface displays the Ullage measured by the radar. Set the display type as required.

4mA and 20mA must be within the range. The relationship between the 4mA position, 20mA position and the range is shown in the figure below:

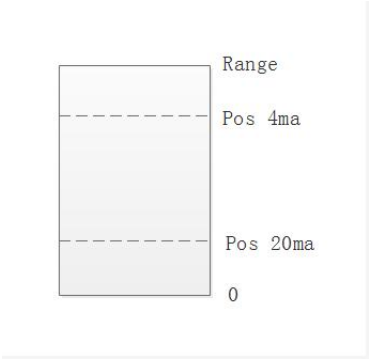


Figure 10

If the level lower than 4mA, the main interface shows that the level is 0, and if the level higher than 20mA, the main interface shows that the level is 20mA.

Chapter 5 Radar debugging parameter description

5.1. Parameter setting man-machine interface

The radar uses a key mode for parameter setting, and the key functions are shown in Figure 11.

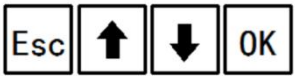


Figure 11 Key mode figure

Keyfunction：

Table 3

Key	Function
Esc	Back / Enter echo wave interface
↑	Up shift/ Increase key
↓	Down shift / Decrease key
OK	Ok key / Enter setting parameter interface

5.2. LCD main interface of Radar Level Transmitter description

Figure 12 LCDmain interface of Radar Level Transmitter figure.

Table 4

①	Work instructions	Flashing reminder when working
②	Level display	Level value（m/mm/cm/fi/ft）
③	Error code	00：No error（Does not show error） 01：No target detected 02：Level value jumped 08：Communication error
④	Temperature	Display the temperature value when the temperature display function is turned on.

5.3. LCD Wave interface of Radar Level Transmitter description

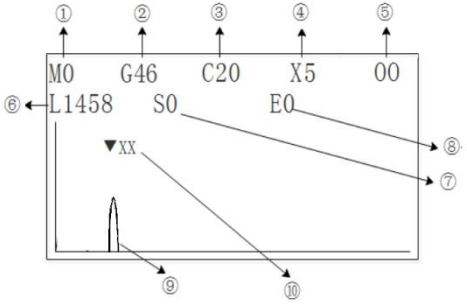


Figure 13 LCD wave interface of Radar Level Transmitter figure.

Table 5

①	Gain mode（0：Automatic 1：Fixed）
②	Gain
③	Filter Coefficient（greater than 0 less than 100）
④	Signal to Noise ratio（1-99）
⑤	Error code
⑥	Real time measurement value（Ullage，Unit：mm）

⑦	The starting position of the waveform display Sxxxxx（Unit：mm）
⑧	The ending position of the waveform display Sxxxxx（Unit：mm） Exxxxx（Unit：mm）
⑨	Waveform
⑩	Wave Location

5.4. Radar Level Transmitter parameter menu

5.4.1. User parameter menu description

Table 6

User Para	Basic setup	Range
		Offset
		Show Type
		Pos:4mA
		Pos:20mA
		Blind
		Damping Time
		Device ID
		Baud Rate
	Backup Para	
	Restore Para	

5.4.2. User Parameter setup scope and definition

- Basic setup：

Range（500~50000）mm：Depends on the working conditions; indicates the farthest distance that the radar can measure.

Offset（-9999~9999）mm：Depends on the working conditions.

Show Type：display level value/ullage value.

(Pos:4mA): level corresponding to 4mA current output，unit: mm。

(Pos:20mA)：level corresponding to 20mA current output，unit: mm。

Blind： The value range is 230mm to the measuring range, which can be set according to specific working conditions.

Damping time： In order to improve the stability of the measured output value, a larger [Damping time] can be set to stabilize the measured value and increase the anti-interference ability. For example, if the damping time is 10, the measured level changes step by step at time t, and the measured output value will follow the actual position of the measured object after 10 seconds.

Device ID：The address of the slave during 485 communications, that is, the address of the local machine (value range: 1-99, the default value is 1).

Baud rate：The baud rate of this machine during 485 communications is 9600 by default.

- Backup Parameter：

After the working parameters are backed up, if you forget the original working parameters after manually modifying the parameters and forget the original working parameters, you can "Restore Parameter" in the menu.

- Restore Parameter：

Used to restore the backed up user parameters.

Chapter 6 Maintenance and Repair

- Please pay attention to keep the Radar Level Transmitter clean, try to be waterproof, moisture-proof, corrosion-proof and avoid violent collisions and blows from other objects.
- Please avoid direct sunlight to the main body of the Radar Level Transmitter, stay away from heat sources and pay attention to ventilation. If the ambient temperature exceeds the rated temperature, appropriate cooling protection measures should be taken.
- When the ambient temperature is too low, an instrument protection box or other protective devices can be used for anti-freezing protection, and pay attention to keeping the radar level transmitter dry.
- The radar level transmitter should be checked regularly.(The detection cycle is determined by the user according to the specific situation)

Chapter 7 Fault handling

Table 7

Appearance	Reason	Solution
No display	Power supply error	Check whether the DC 24V voltage and current meet the requirements.
	Wiring error	Check if the wiring is correct.
Value unstable	Too much fluctuation	Change the installation position of the radar or reduce the fluctuation of the object to be measured.
	Weak Signal	Try angle calibration or rotate the radar installation position.
	Strong electromagnetic interference	Connect the instrument to the ground or shield.

Chapter 8 Warranty & After-sales Service

We promise to the customer that the hardware accessories provided during the supply of the instrument have no defects in material and manufacturing process. From the date of the purchase, if the user's notice of such defects is received during the warranty period, the company will unconditionally maintain or replace the defective products without charge, and all non customized products are guaranteed to be returned and replaced within 7 days.

Disclaimers:

- During the warranty period, product faults caused by the following reasons are not in the scope of Three Guarantees service
- Product faults caused by improper use by customers.
- Product faults caused by disassembling, repairing and refitting the product.

After-sales service commitment:

- We promise to deal with the customer's technical questions within 2 hours.
- For the instruments returned to the factory for maintenance, we promise to issue the test results within 3 working days and the maintenance results within 7 working days after receiving them.

Chapter 9 Communication

The instrument provides standard RS485 serial communication interface and adopts international standard Modbus RTU.

9.1. Read data: 0x03

Table 8

Register address	Logical access address	Name	Data type	Description
0002H	0001H	Level value	16 bit uinsigned integer	Unit: mm
0003H	0002H	Range	16 bit uinsigned integer	Unit: mm
0004H	0003H	Migration	16 bit signed integer	Unit: mm
0005H	0004H	Baud rate	16 bit uinsigned integer	Unit:bps
0006H	0005H	Device address	16 bit uinsigned integer	Value:1-255

9.2. Write data: 0x10

Table 8

Register address	Logical access address	Name	Data type	Description
0003H	0002H	Range	16 bit uinsigned integer	Unit: mm
0004H	0003H	Migration	16 bit signed integer	Unit: mm
0005H	0004H	Baud rate	16 bit uinsigned integer	Unit:bps
0006H	0005H	Device address	16 bit uinsigned integer	Value:1-255