Ultrasonic Liquid Level Sensor DF520

Datasheet_NB-IoT Version

V1.4

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Disclaimer

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1 Overview

The DF520 is one kind of ultrasonic liquid level sensor, which can detect the liquid level by outside bottom installation without drilling holes.

The tank thickness can be up to 10mm. (For special thickness, please contact with CNDingtek for confirmation.) The resolution is 1mm or 0.1%FS (the bigger value). The measurement ranges from 0-10 meters. It can be used for kinds of tanks, including iron, aluminium alloy, plastic and etc. It is applicable for automotive, oil station, chemical storage, LPG tank, and other industrial tanks to realize realtime monitoring of storage, online inventory management, statistics and estimation of production.

DF520 Ultrasonic Liquid Level Sensor is build through the NB-IoT module. it transmit the status via NB-IoT sim card to base station,then via internet network to network server to application server. Finally user can monitor the status remotely.

It is optional for different frequency, such as Full frequency band(B1(2100MHz2), B3(1800MH2), B5(850MHz), B8(900MHz), B20[800MHz]]) and B28(700 MH2) and etc.

There is one version with inner battery as well as with external power supply. The battery version can work for the projects where power supply is not so easy.

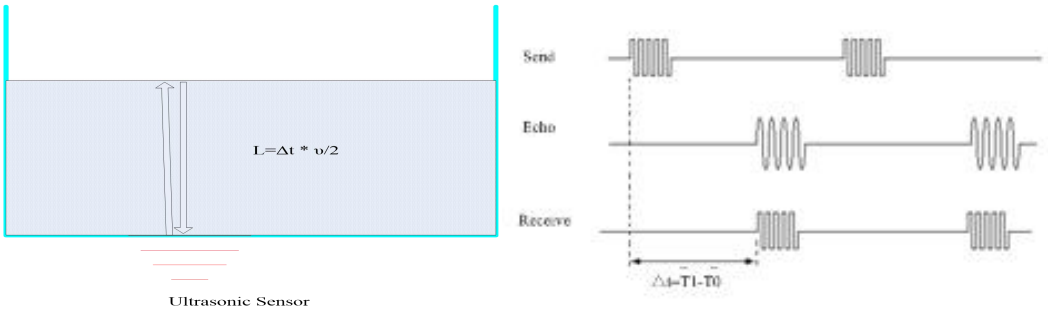
It is opened for customized design (OEM/ODM) on hardware or software.

2 Specification

Overview	Dimension	Transducer ø30, Controller box 80*78*30mm
	Color	Black
Detector	Principle	Ultrasonic
	Detection Range	30~ 10000mm
	Blind area	0-30mm

	Accuracy	3mm or 0.3%FS, the bigger one
	Resolution	1mm or 0.1%FS, the bigger one
	Driving Frequency	2Mhz
Controller	MCU	STM32, 32bit ARM® core controller
Radio	Module	NB-IoT
	Frequency	B1,B3, B5, B8, B20, B28
Power	Option I: external power supply	6-13.8V DC
	Option II: inner battery	ER26500 8000mAh 3.6VDC, non-recharged. Every day 4 times upload, battery can work for more than 3 years. (depend on NB signal, environment and etc.)
Environment	Operating Temperature	-20 ~ +70℃
	Storage Temperature	-40 ~ +85℃
	Protection Level	IP66
Media	liquid	Diesel,gasoline, water, LPG, Ethanol, and other liquids
Mounting	Bottom glue fasten	Transducer stick to tank bottom by glue.

3 System Diagram



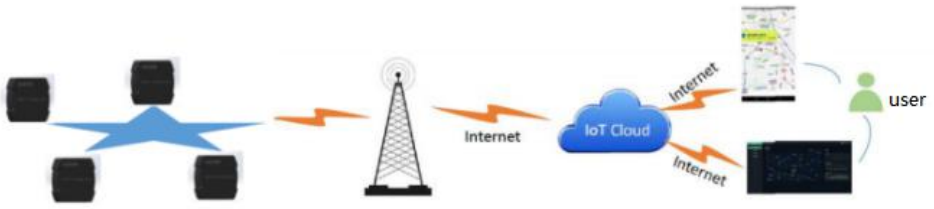
4 Wire Definition for External power supply version

Wire	Function for external power supply version	Remark
Red	Power+	6~13.8VDC
Black	GND	Power GND, RS232 GND
Yellow	RXD	RS232 RX for led display or pc com port debug
Green	TXD	RS232 TX for led display or pc com port debug

Notes: If there is labels on sensor for pin definition, please act as the labels.

For inner battery version, no need to connect with cable.

5 Network Diagram



Through the built-in NB-IoT wireless module, it transmits data to the base station through the NB-IoT network, and the network server and application server that transmit data by the Internet. Finally, the user can monitor the status of the container, online management and other intelligent management according to the Web or APP.

6 Package List

Part List			
NO.	Item	Quantity	Remark
1	Controller Box	1	Drive ultrasonic transducer and upload signal
2	Ultrasonic Transducer	1	Transducer attached to bottom of container
3	Band (tie)	1	Fasten transducer and cable
4	Abrasive Paper	1	Clean the coating of installation point
*5 *	*Couplant (vaseline)*	-	*Put between the transducer and container While finding the installation point*
*6**	*Glue*	-	*Put between transducer and container for real installation after installation point found. Applicable for aluminium alloy, steel, plastic tank. Recommend one component RTV Silicon Adhesive 703 or Loctite 380.*

*: The couplant and glue is forbidden to delivery for airplane shipping or express shipping. So we do not offer them in the standard package.

Please purchase at local market. The couplant (vaseline) is easy to find at medical store.

It is applicable if you can find one of the RTV silicon adhesive 703, or loctite 380. (if you can not find the recommend glue, you can choose other glues, and their freezing

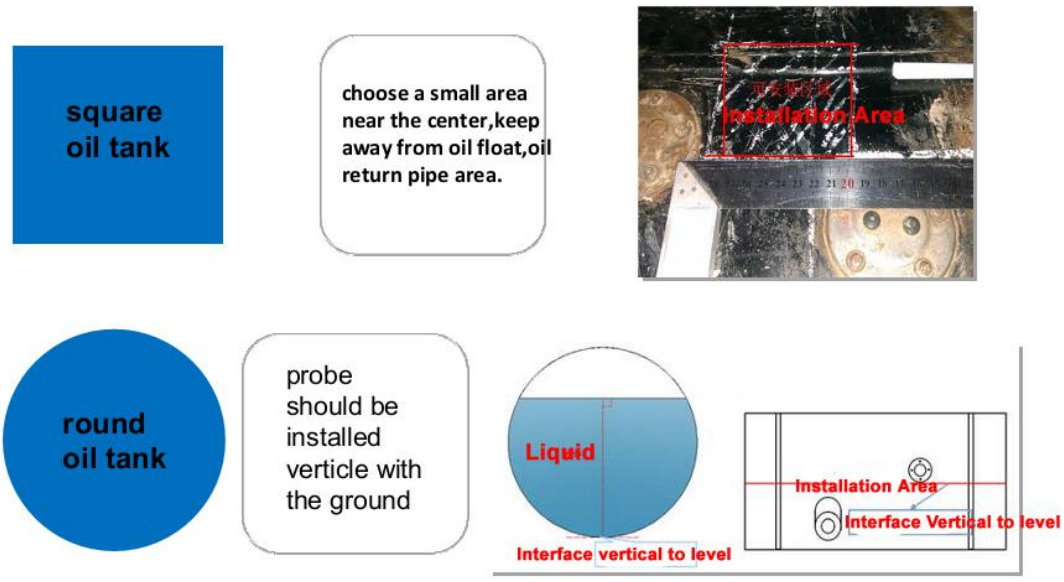
time is less than 10 minutes)

7 Installation

7.1 Preparation & Cleaning

Before installation, please make sure the tank is horizontal so that the sensor can be perpendicular to the liquid level. Otherwise, the sensor maybe can not get correct value or even no value output.

For good result of installation, it is recommended to keep the liquid more than 10cm height. Because the sensor blind area is 3cm.



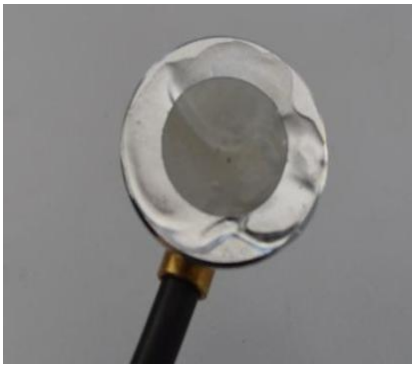
Select one flat area on bottom of the container, and clean the dirt on the flat area to make it smooth. If paint cover on the steel tank, please use the abrasive paper to remove the paint cover. After cleaning, there is no any part between the transducer and the bottom shell of the container.

7.2 Finding Installation Position

Connect the power supply with the controller box as well as the transducer. Power

on it. At the beginning, you can check the data on network server or application server.

Put couplant on the surface of transducer. Then put it on the cleaning area where you want to install the sensor.




Monitor he data value on network server or application server, and move the sensor slowly. Please check the level value with the real level height. If it is matched, then this point is the good position for installation.

If you can not find the position with value matched with the real level value, please check the couplant to make sure air is prevent from the sensor and tank bottom. The failed reason maybe the material of the container, the thickness of the container, the frame in the container, the dust in the bottom of the container.

Please remove the couplant on container and transducer surface before move to next step.

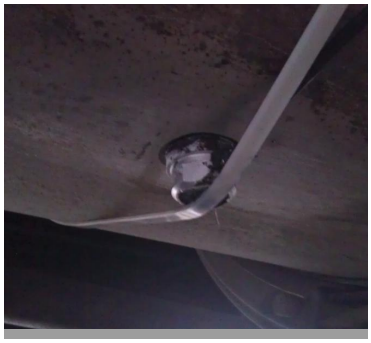
7.3 Installation with glue

Glue is applicable for steel tank as well as aluminium alloy or plastic tank.

Put glue on the transducer surface, stick them on the position you remarked at previous step. Monitor the status value on server, make sure it is the correct level of liquid, fasten the transducer with the container. Keep it while the glue solid the transducer.

Install the transducer protection part and fasten the transducer with the tie. Make sure to use tie to fasten the transducer. If only glue, maybe it will fail after some time

because of the weight and vibration.



7.4 Routing wire

Use insulative tape to protect the connecting part of the transducer and the extended cable as well as the signal, power connection part.

Fasten the cable around the device or vehicle, make sure to avoid the heat part.

8 Protocol

The communication protocol is confidential is only open for customer who has purchase the device and sign the NDA(non-disclosure agreement) file with CNDingtek.

Please contact our sales team service@dingtek.com if you want to integrate the protocol with your own system.

Notes: The protocol maybe update without notification. Please contact with us for the latest protocol.

9 Package

25*21*8cm

10 Video Link

https://youtu.be/ME3nFbgAs48 test of RS485 version DF520

https://youtu.be/XSQ28iMmMIo installation of transducer with RTV one component silicon

11 FAQ

Question: After some time, the sensor is not data or data greatly change at short time, what is the reason?

If the installation is not so fix, or the glue is not so strong, it will defect after some time. If air come into the gap between the transducer and the tank shell, it will result in fail. As a result, the sensor will do not output data or output data suddenly change greatly.

Question: Can we use this sensor for more than 10 meters tank?

No, this sensor is designed for 0-10 meters range. If more than this range, please contact with our service team to evaluate.

Question: Does this sensor tested with ATEX certificate?

No, this sensor is qualified with CE EMC, RTTE (GSM/GPRS), and RoHS certificates. But it is without ATEX certificate now. We are planning for the ATEX certificate, but not ready now. Please contact with our sales representative for the latest news.

Question: Can you offer the OEM version for us? Without CNDingtek logo?

Yes, it is applicable for us. Please contact with our sales representative on this issue.

Question: Can this sensor work for plastic tank? Glass tank?

Yes, we tested with plastic tank, aluminium tank, iron tank, glass tank, it worked.

Question: Can we use glue other than the AB epoxy?

Yes, you can try. But make sure the glue is good performance for vibration.

Question: Why can't read the correct level?

1>Check if the coupling agent or glue is used to remove the air between the probe and the container; because the probe cannot work in the air;

2> The bottom of the container is too thick, more than 1cm; the sensor can work on a container with a thickness of 1cm;

3> The bottom of the container is multi-layer material; the sensor cannot work on the bottom of the multi-layer material container.

12 After Sales

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