2024

MANUAL

产品说明书

AiW/ANL-4120MP/MC/MK

D-Band FMCW Smart Radar Level Transmitters
Operation Instruction

chinasimba.com | 中国. 福州盛博电子有限公司

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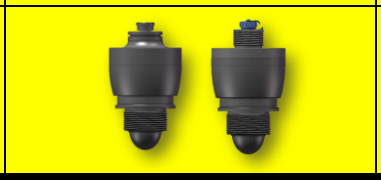
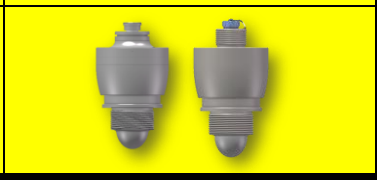
4120MP/MC/MK SPECIFICATIONS

AiW-4120MP/MC/MK

Product No	AiW-4120MP-R	AiW-4120MP-K	AiW-4120MP-A	AiW-4120MP-H	AiW-4120MC-R	AiW-4120MC-K	AiW-4120MC-A	AiW-4120MC-H	ANL-4120MK-R	ANL-4120MK-K	ANL-4120MK-A	ANL-4120MK-H
Installation method	Threaded				Threaded with Overfill proof(option)				Threaded with Overfill proof(option)			
Appearance Picture												
Parameter												
Measuring Frequency	122 to 123GHz Dynamic FM Sweep Bandwidth 1GHz (122GHz~123GHz: 1GHz) or 120 to 123GHz Dynamic FM Sweep Bandwidth 3GHz (120GHz~123GHz: 3GHz)/option (The adjustment FM range can be customized according to the ISM requirements of the customer's region)											
Instrument Range	(10/18/30m)			(10/18/40m)	(10/18/30m)			(10/18/40m)	(10/18/30m)			(10/18/40m)
Dead Band	<200mm(10m/18m range)			<300mm	<200mm(10m/18m range)			<300mm	<200mm(10m/18m range)			<300mm
Meas. Principle	FMCW Radar System				FMCW Radar System				FMCW Radar System			
Meas. Resolution	0.05m (Physical Resolution C/2B = 0.05m)				0.05m (Physical Resolution C/2B = 0.05m)				0.05m (Physical Resolution C/2B = 0.05m)			
Meas. Accuracy	±1mm (<10m range) / ±2mm (18m range) / ±4mm (30m range)				±1mm (<10m range) / ±2mm (18m range) / ±4mm (30m range)				±1mm(<10m range)/±2mm(18m range)/±4mm(30m range)			
Temperature Coefficient	±1ppm/°C				±1ppm/°C				±1ppm/°C			
Antenna Sensor Material	Polyoxymethylene (POM) / (PTFE Customized Option) **{The antenna is integrated with the housing}**				Polyoxymethylene (POM) / (PTFE Customized Option) **{The antenna is integrated with the housing}**				**Housing material: SS304/SS316 / Antenna material : PTFE**			
Beam Angle(α)	POM: 6°/ Gain 29dB; PTFE: <6°/ Gain 31dB				POM: 6°/ Gain 29dB; PTFE: <6°/ Gain 31dB				PEEK: 6°/ Gain 29dB; PTFE: <6°/ Gain 31dB			
Output	RS-485	IO-Link	4-20mA	mA/HART 7	RS-485	IO-Link	4-20mA	mA/HART 7	RS-485	IO-Link	4-20mA	mA/HART 7
Power Supply	9-38 V DC			16-40 V DC	9-38 V DC			16-40 V DC	9-38 V DC			16-40 V DC
Process Connection	G2 or G2-1/4 or 2-1/4 NPT(Customized Option) { Upper threaed G1/1 NPT or Bracket mounted }				G1-1/2 or 1-1/2 NPT(Customized Option) { Upper threaed G1/1 NPT or Bracket mounted }				G1-1/2 or 1-1/2 NPT(Customized Option) { Upper threaed G1/1 NPT or Bracket mounted }			
Process Temperature	-40 ... +120 °C				-40 ... +120 °C				-40 ... +200 °C			
Ambient Temperature	-40 ... +85 °C				-40 ... +85 °C				-40 ... +85 °C			
Operating Pressure	POM: -100 to +2500 KPa 'PTFE: -100 to +2300 KPa				POM: -100 to +2500 KPa 'PTFE: -100 to +2300 KPa				PEEK: -1 ~ 4MPa PTEF: -0.1 ~ 3.5MPa			
Display/Adjustment	Chinasimba Software: PCManager V1.x, MobileManager V1.x (v1.0.6(IOS)/v1.0.12(Android))											
Wireless communication	Bluetooth								Bluetooth			
Bluetooth Standard	Bluetooth 4.0								Bluetooth 4.0			
Bluetooth Range	25m								10m			
Output & Protocol	ModBus / SDI-12(Customized Option)	IO-Link	4-20mA	HART7 (Downward Compatible)	ModBus / SDI-12(Customized Option)	IO-Link	4-20mA	HART7 (Downward Compatible)	ModBus	IO-Link	4-20mA	HART7 (Downward Compatible)
Fault Output	**		22mA/4mA/20.5mA (option)		**		22mA/4mA/20.5mA (option)		**		22mA/4mA/20.5mA (option)	
Live Display	Mobile / iPad / PC											
Housing Material	POM material (PTFE Customized Option)								Housing material: SS304/SS316			
No.of Cable Entries	1 PVC Insulated cable (Aviation connectors)											
Explosion-proof grade	***		Exia		***		Exia		Exia			
Ingress Protection / CE	IP68 / CE											
Package Dimensions	267mm x 97mm x 97mm											
Benefit	Maintenance-free and durable. Measurement not affected by build-up or condensation. Measures lightest to the heaviest of bulk solids with absolute reliability. Suitable for solvents as well as aggressive liquids. User friendly adjustments (via Bluetooth) save installation time. Sensor active LED indication. Ergonomic and environment friendly design. Flexibility in output options. Suitable for hydrological applications (Lakes, Rivers, Reservoirs). The versatile design enables fit for purpose solutions and flexibility in use.								For example, the transmitter can be used in tanks and vessels with small process fittings, corrosive environments, and open air installations.			
Application	Liquid, Solid								Liquid, Solid, Powder, Paste			

NOTE:

CHINASIMBA provides a variety of CHINASIMBA products with various product options and configurations, including materials of construction that can be expected to perform well in a wide range of applications.

CHINASIMBA product information presented is intended as a guide for the purchaser to make an appropriate selection for the application.

It is the purchaser's sole responsibility to make a careful analysis of all process parameters (such as all chemical components, temperature, pressure, flow rate, abrasives, contaminants, etc.), when specifying product, materials, options, and components for the particular application.

CHINASIMBA is not in a position to evaluate or guarantee the compatibility of the process fluid or other process parameters with the product, options, configuration, or materials of construction selected.

For more information about our products, please refer to the website: https://www.chinasimba.com/products.htm

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Chinasimba Electronic Co., Ltd. hereby guarantees that its products are not defective in materials and workmanship and are in complete conformity with the above disclaimer.

INTRODUCTION

ANL/AiW-4120 radar level transmitter, the series of products (abbreviation: *4120 product*) is a multi-function radar solid/liquid level gauge based on the working principle of 122GHz FMCW radar, its maximum detection distance can reach 40 meters, the product series covers many industries, with good flexibility and applicability.
The **ANL**-series is suitable for solid process applications and the **AiW**-series is for liquid applications.

The *4120 product* has a wide dynamic signal gain scope and is able to measure poorly reflected material media better than ordinary 80GHz radar sensors, its main advantage is that it utilizes higher receiving sensitivity and higher-strength signals over pulse systems, allowing it to perform better in difficult situations where there may be turbulence, foam or excessive vapors, condensation on antennas etc.

The *4120 product* adopts a combination of FMCW, intelligent level prediction algorithm and cost-effective high-speed microprocessor technology, which makes it have the ability to complete high efficiency, high sensitivity and stability of signal processing, also achieves high measurement accuracy and reliability in small and fast-filling tanks and vessels.

Using Bluetooth wireless technology, the 4120 product enables to do safe and convenient on-site configuration and maintenance with mobile tools. With the help of the efficient and intuitive app GUI function of the mobile, it is possible to perform commissioning and operation tasks on-site, or to start living online remote product configurator function by calling a remote technical engineer for assistance.

By using these tools with built-in logic and continuous verification, the support engineers can remotely verify and test in the field at any time without impacting the production process.
The 4120 product is also equipped with an anti-spill cover accessory of anti-spill function, this spill detection capability is critical in the event of a leak in highly corrosive, toxic, or otherwise hazardous media.

ANL/AiW-4120$_{MP/MC/MK}$ Main features

The ANL/AiW-4120 smart radar Level Transmitter provides accurate continuous level measurements in a broad range of process applications. The versatile design enables fit for purpose solutions and flexibility in use.
It can be used in tanks and vessels with small process fittings, corrosive environments, and open-air installations. It is certified for use in hazardous locations and meets NAMUR recommendations.

- Conformal antenna design is easy to install, and the products are wear-free and environmentally friendly
- Shorter wavelength/better signal reflection, and small beam angle/enhanced energy concentration echo while avoiding destruction
- Smart features designed to make life easy, communicating via Bluetooth, advanced diagnostics and verification
- The diameter 60mm antenna has a larger effective area better signal reflection, which can effectively avoid the influence of condensation on measurement
- Small blind zone, especially suitable for small tanks
- High signal-to-noise ratio for high performance in unstable echo wave conditions
- Built-in temperature drift coefficient compensation according to the temperature change inside the device real-time

Safety instructions

Authorized personnel
All products system operations described in this document should only be operated by persons qualified to perform specific tasks in accordance with the relevant documentation, in particular its warning notices and safety instructions. Necessary personal protective equipment should always be worn on and when working with the product.

A qualified person is a person who, based on their training and experience, is able to identify risks and avoid potential hazards when using these products or systems.

Appropriate use
4120 products are a sensor for NC continuous level measurement. You can find detailed information about the area of application in chapter "**Product description**".
Operational reliability is ensured only if the instrument is properly used according to the specifications in the operating instructions manual as well as possible supplementary instructions.

Warning about incorrect use
Inappropriate or incorrect use of this product can give rise to application-specific hazards, e.g. vessel overfill through incorrect mounting or adjustment. Damage to property and persons or environmental contamination can result.
Also, the protective characteristics of the instrument can be impaired.

General safety instructions
This product, in compliance with conventional regulations and guidelines, conforms to today's leading state of the art. It is only allowed to start operation if it is technically sound and reliable. When using a product in an aggressive or corrosive medium, the operator should take appropriate measures to ensure that the product functions correctly if its failure would cause harm. The user shall comply with the safety instructions in this instruction manual, the installation standards of the country and the safety regulations and accident prevention regulations in force.
For safety and product assurance reasons, work outside the operating range specified in the instruction manual is only allowed to be carried out by persons authorized by the manufacturer. Unauthorized modification or alteration of equipment is expressly prohibited. For safety reasons, only accessories specified by the manufacturer are permitted.
To avoid hazards, users should follow the safety markings and instructions affixed to the meter.
The transmit power of radar sensors is very small, well below the internationally permissible limits. When used correctly, there are no health problems at all.
For the frequency band range of the measured frequency, please refer to the 4120 product specifications.

Disclaimer
We have reviewed the content of this publication to ensure consistency with the hardware and software described. Since errors cannot be completely ruled out, we cannot guarantee exact uniformity. However, the information in this publication is reviewed periodically, and any necessary corrections will be included in subsequent editions.

PRODUCT DESCRIPTION

Non-contacting radar technology

Non-contacting radar technology is ideal for a wide range of applications as it is maintenance-free, has a top-down installation that reduces the risk of leakages, and is unaffected by process conditions such as density, viscosity, temperature, pressure, and PH.
ANL/AiW-4120 products use the radar FMCW distance measurement principle to work, the radar transmitter transmits a continuously changing modulated frequency radar signal through the antenna, when the transmitted wave signal encounters the object medium, the radar wave signal is reflected back, called the **echo wave signal**.
When the echo signal arrives at the radar and is received by the antenna, there is a frequency difference between the frequency value of the radar transmitted signal and the frequency value of the echo signal received by the radar. The magnitude of this frequency difference is proportional to the distance of the object from the radar, so the frequency difference corresponds to the measuring distance value.
ANL/AiW-4120 level gauge calculates the distance between the radar and the surface of the material according to the frequency difference of the echo signal of the material. It adopts the method of discrete Fourier Transform (DFT) signal analysis, which is the core of distance measurement, and studies the spectrum and variation law of echo signal by transforming the signal from the time domain to the frequency domain.

Radar distance resolution

Distance measuring resolution refers to the minimum distance between two objects that are close to each other, and the radar can tell that they are at different locations. In layman's terms: distance measuring resolution refers to the distance between two objects that are far apart, and the ability of a radar level gauge to distinguish that this is two objects and not one and measure their distance.
In other words: if the distance between two objects is less than the level of the radar's range measurement resolution, then the radar can measure a distance value that is not equal to the distance of either object, but the composite value of the distance values of the two objects.
The distance measurement resolution depends on the frequency resolution of the discrete Fourier transform operation F_{res} : $F_{res} = 1/T$, Here T is the sampling time of the discrete Fourier transform operation. The corresponding distance of the frequency resolution F_{res} is the distance measurement resolution of the radar. S_{res}
So, what is the range resolution of the ANL/AiW-4120 radar?
It can be calculated by the following formula: $S_{res} = C_0 / 2B$ Where:

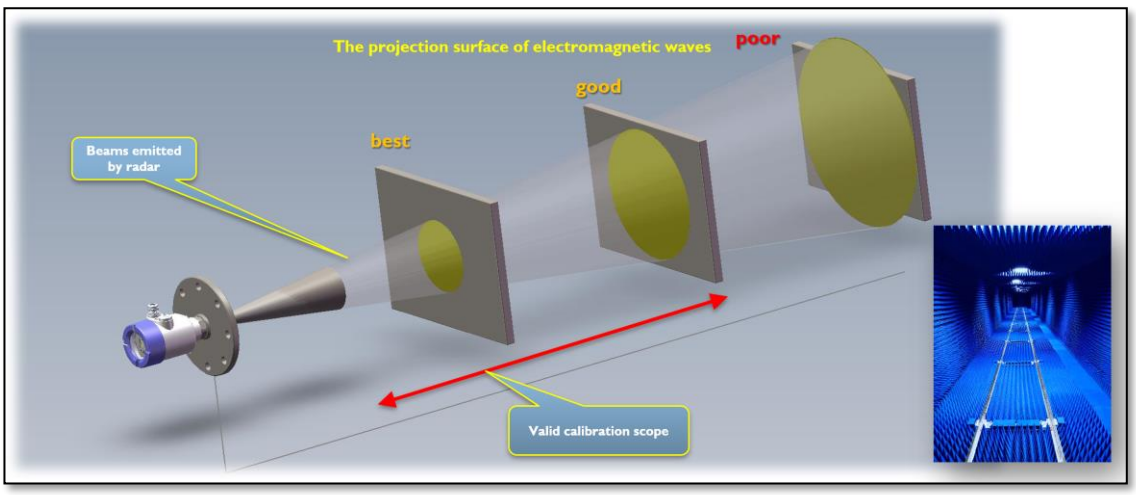
C_0 is the speed of light C_0 = 299792458m/s,

B is the swept bandwidth of the FM radar, in **Hz**,

and the swept bandwidth of the ANL-4120 product has 1GHz or 3GHz two configurations.

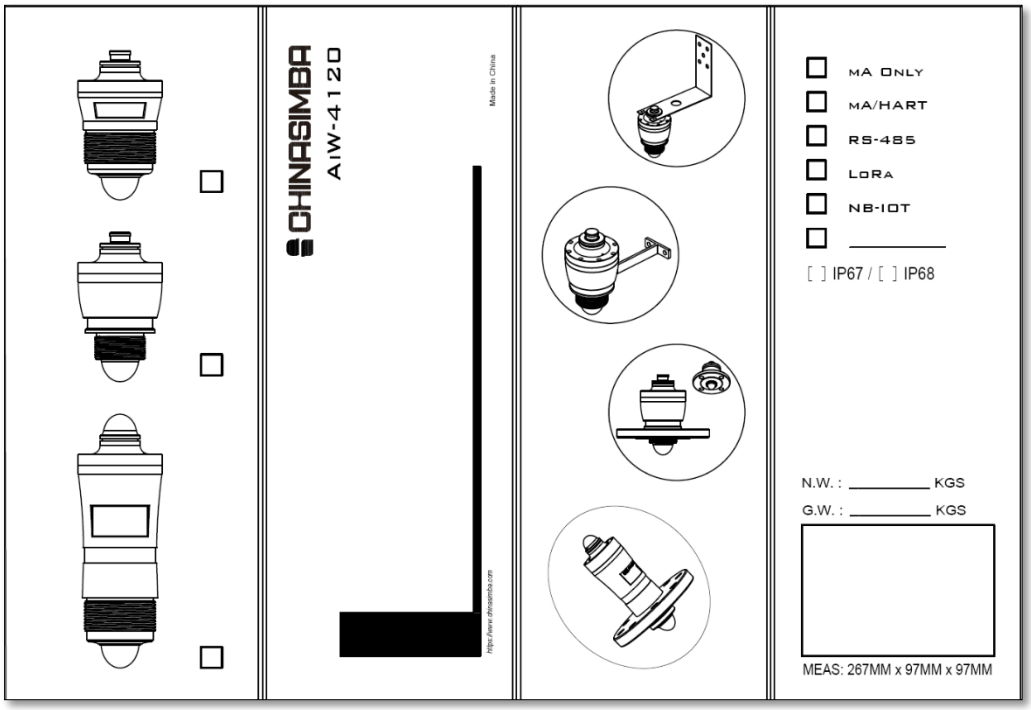
Measurement accuracy

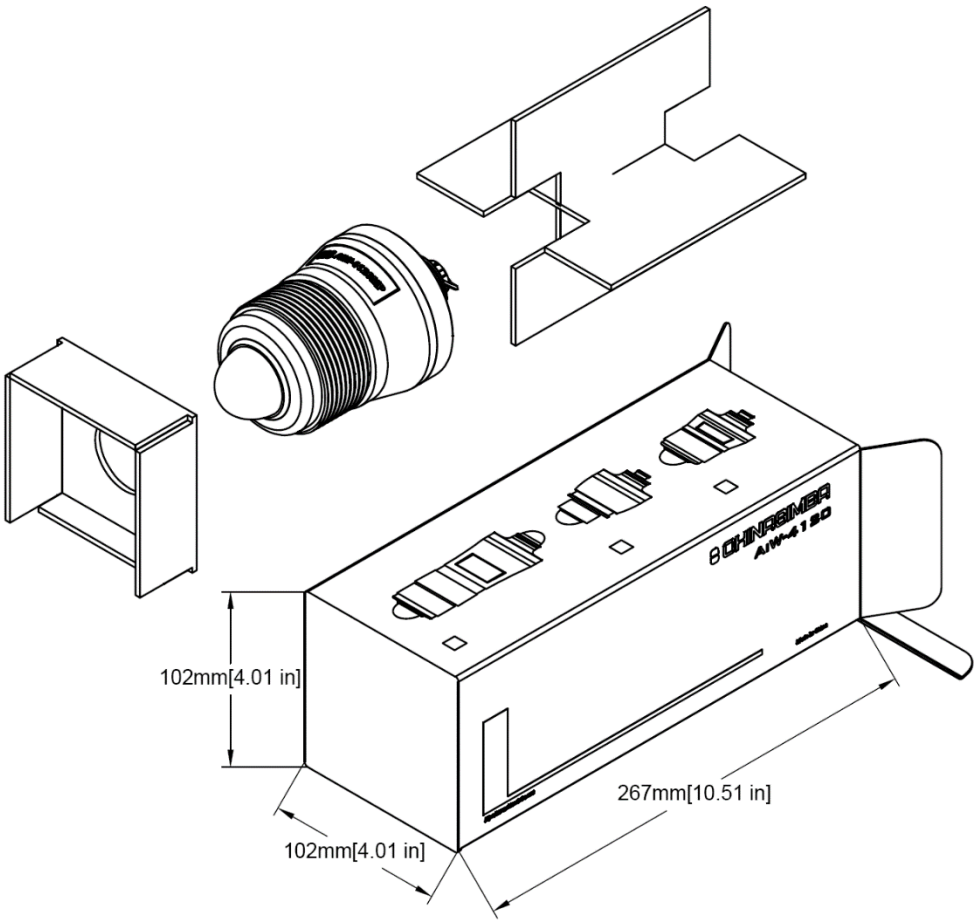
The meaning of radar measurement accuracy is the ability of radar level gauge to recognize and detect changes in the distance if there is a reflective surface of an object that has moved a very small distance. The measure of the smallest distance that can be resolved to move is called accuracy.
To verify the accuracy of the radar level gauge, it is necessary to select the appropriate size of the reflective surface according to the beam angle of the radar antenna (as shown in the figure below), and if possible, the measurement accuracy can be verified and calibrated in a standardized microwave anechoic chamber.



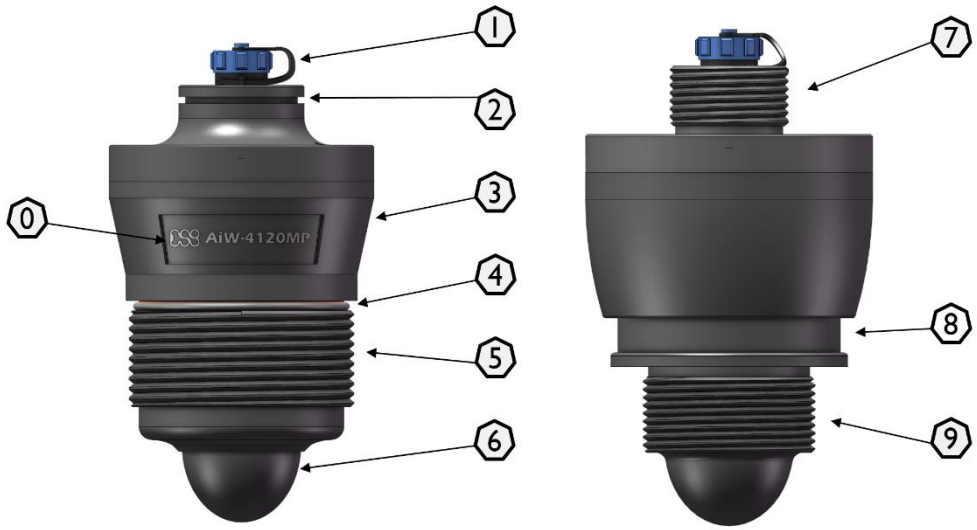
Packaging, transport and storage

4120 products were protected by packaging during transport. Its capacity to handle normal loads during transport is assured by a test based on ISO-4180.
The packaging consists of environment-friendly, recyclable cardboard and PE foam. Dispose of the packaging material via specialized recycling companies.



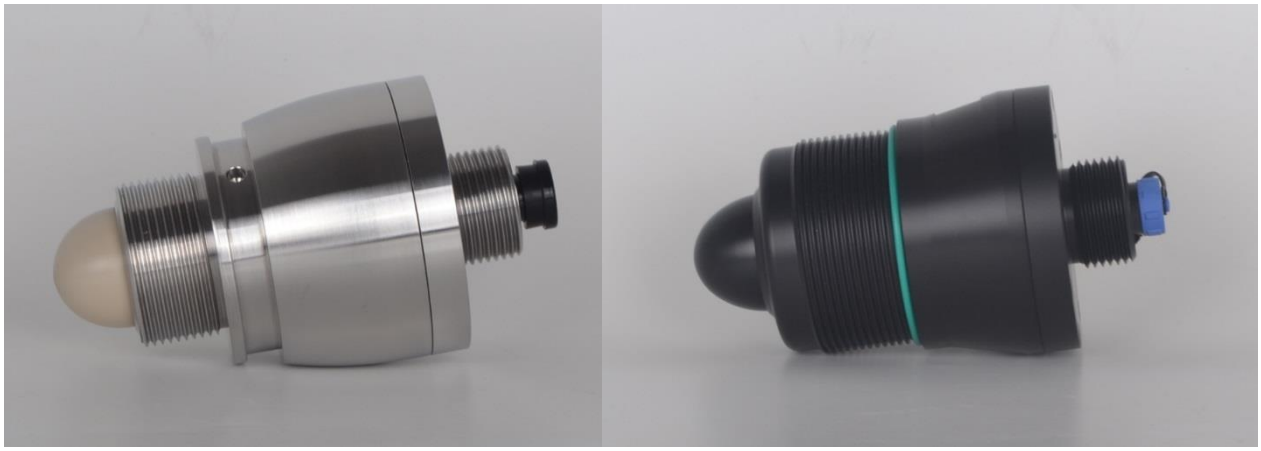


Constituent parts



AiW-4120MP/MC/MK Components	
0	Type label 1
1	Cable interface aviation plug
2	Bracket bayonet
3	Electronics housing, POM/PTFE/SST
4	Process seal
5	Process fitting, G2-1/4 for 4120MP/MP60/MK60
6	Radar antenna
7	Upper mounting threads G1
8	Type label 2
9	Process fitting, G1-1/2 for 4120MC/MK

Physical appearance



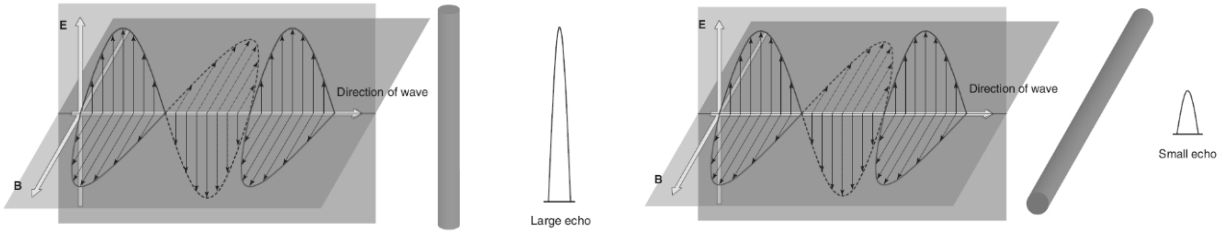
INSTALLATION CONSIDERATIONS

The ANL/AiW-4120 radar transmitter is designed for ANSI 61010-1 compliant and extended application environments. Can be used both indoors and outdoors.
Therefore, before installation, make sure that all components of the transmitter product you use are suitable for the existing process conditions.
Mainly concerns are: active measurement components, process accessories, process seals and material exposed to tank atmosphere, etc.
Process conditions include: process pressure, process temperature, chemical properties of the medium, wear and mechanical influences.
NOTE: For corrosive process conditions, choose ANL/AiW-4120 product with a PTFE housing.

Effect of electromagnetic wave polarization on radar measuring

When electromagnetic waves propagate in space, they have an electrical vector ***E*** and a magnetic vector ***B*** that are in phase but perpendicular to each other. The direction of propagation of the wave is perpendicular to the electric and magnetic vectors.
Polarization is an intrinsic property of electromagnetic waves, which refers to the directional trajectory curve of the electric vector E of electromagnetic waves, and the direction of its vibration is called the direction of polarization, which is a property of microwave polarization. The direction of linear polarization is determined by the direction of the signal coupler of the microwave module of the radar level transmitter. Linear polarization has either horizontal or vertical polarization, depending on the antenna or the relative orientation of the antenna.
Linear polarization, it's common in the level transmitters for industrial radars. To minimizes the effects of false echoes in the internal structure of the process vessel, which can be reflected from probes, tank welds or agitators and baffles, the linear polarization exhibited by radar products is very important in radar solid/liquid level measurement. In some applications, the effect of false echoes inside the container can be significantly reduced by rotating the radar on the connecting flange or boss.

If a metal or high-dielectric object is oriented in the same plane as the electric vector of the polarized microwave, the radar level transmitter will receive a large echo. If the same object is oriented at right angles to the plane of the electric vector, the received echo will have a smaller amplitude, as shown in the figure:



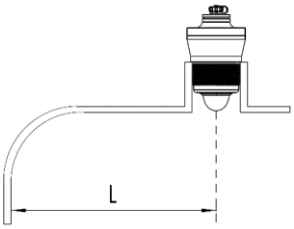
Note: if we rotate the radar level gauge housing on the measuring, then the direction of polarization changes, thus can avoiding interference deflection of the measured value by false echoes.
Keep in mind when installing or making changes to your radar level gauge:

- When the direction angle of the polarization ***E*** of the radar transmitting antenna encounters a plane obstacle and a vertical column, it will cause a huge spurious reflection, and these obstacles will produce a large radar echo signal, and when the direction angle of the polarization ***E*** of the radar transmitting antenna encounters a circular obstacle, the scattered echo on the surface is just a false signal of small amplitude.
- In order to reduce spurious reflections, the optimal echo signal (the lowest false echo amplitude) is first obtained by rotating the radar product, and then a false echo curve is created via the mobile app menu.

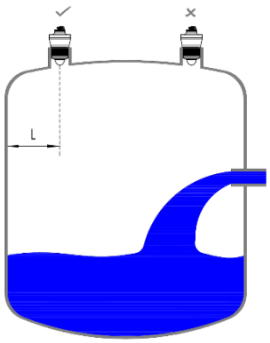
Effect of electromagnetic diffraction on measurements

Usually we focus on the beam angle of the radar level transmitter, which is related to the radar antenna. This may give the impression that the radar antenna can focus the entire electromagnetic energy in the direction the beam is pointing.
But this is not the case, in fact, although the antenna is designed to produce a directional beam, the antenna also radiates some energy in all directions, in addition to most of the radiated power on the main lobe, there is also weaker energy radiated to the other lobes. This phenomenon is caused by diffraction.
Therefore, if the radar product is installed close to the tank wall or other tank obstructions, noise problems will arise in the measurement echo signal.

Min. Distance between the installation location and the tank/vessels wall



When the radar transmitter is looking for a suitable installation position, it is necessary to carefully examine the condition of the storage tank(vessels), and the minimum distance (***L***) between the installation point of the ANL/AiW-4120 radar transmitter and the tank(vessels) wall needs to be greater than 20cm, and the recommended distance value is 1/2 of the tank(vessels) radius.
When installing the ANL/AiW-4120 radar transmitters, consider the following guidelines:



• The transmitter should be mounted on the top surface of the tank with a clear and unobstructed space in the lower part of the tank for optimal measurement performance.

• The transmitter should be installed as little as possible close to the tank wall.

• Do not install the transmitter in the center of the tank/silo.

• Do not install near or above the inlet flow of the tank.

• Do not install the transmitter on the manhole cover.

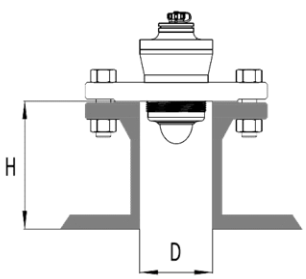
• Do not place the transmitter directly above the side well door.

• Multiple ANL/AiW-4120 radar level transmitters can be used on the same tank(vessels) without interfering with radar signals.

Nozzle requirements

In order for the ANL/AiW-4120 radar level transmitter wave to propagate without interference, the size of the tube (nozzle) should be kept within the specified range given in the table below.
The inside of the pipe/tube needs to be smooth to avoid poor welding, rust or deposits.

Nozzle diameter (D)	Maximum nozzle height (H)
50mm	150mm
60mm	200mm
80mm	300mm
100mm	400mm
150mm	600mm



Beam angle and beam width

In the area of the tank(vessels) and the bottom of the tank irradiated by the antenna beam of the radar transmitter, there should be as few other tank structures as possible: beams, pipes, welds, etc.

The installation of the standard specification is:

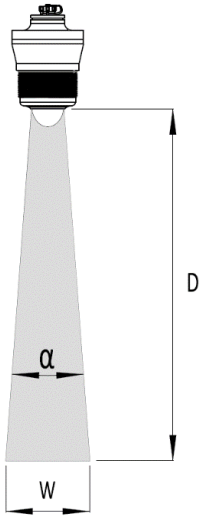
The minimum distance between the radar transmitter and the tank wall is not less than (<***W/2***), where ***W*** is the diameter of the irradiated circle projected by the radar level transmitter antenna beam to the bottom of the tank, the larger the tank, the larger the projection circle, which should be calculated according to the height of the tank container (***D***).

The ANL/AiW-4120 serial product has an antenna beam angle of <6° (α)

To calculate the radiation width of the radar transmitter antenna beam angle at the bottom of the tank container at different heights, it can be approximated according to the following calculation formula:

$$W = \pi \times \alpha \times D$$

If the radar level transmitter is mounted too close to the container tank wall, a strong interference signal may be generated. Deposits, rivets or welded joints can also generate interfering signals, and their echoes are superimposed on the real echoes of the material. Therefore, a sufficient distance must be maintained between the installation position of the radar transmitter and the tank(vessels) wall.

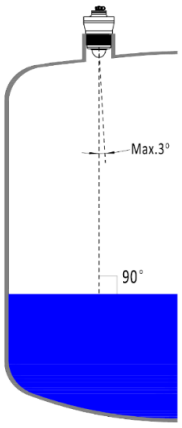


Horizontal inclination and azimuth orientation adjustment

The ANL/AiW-4120 radar level transmitter should be installed vertically to ensure that the surface of the product has a good echo, the maximum inclination is recommended to be 3°, pay attention to check whether the flange pipe surface is horizontal, when it is not horizontal enough, it is necessary to take necessary measures to adjust.

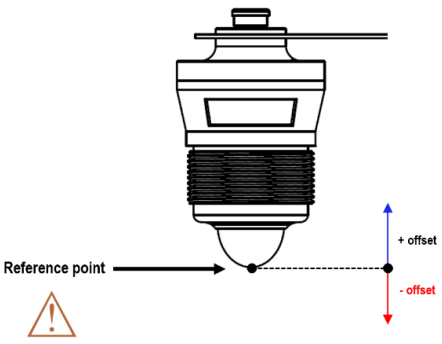
This is especially in liquid applications, large height tank applications are particularly important, the radar transmitter is as perpendicular to the surface of the liquid medium as possible to obtain the best measurement results.

For solid applications, it is recommended to align the radar transmitter antenna beam at the discharge port area of the tank for the best measurement results.



Adjust the reference point (datum) of the distance measurement

For the ANL/AiW-4120 radar level transmitter, when it is delivered from the factory, the distance reference point (datum) is set on the central lower surface of the antenna lens, which is the starting point of the distance measurement range, and at the same time, it is also the reference point for the minimum or maximum adjustment. (Min./Max. adjustment)



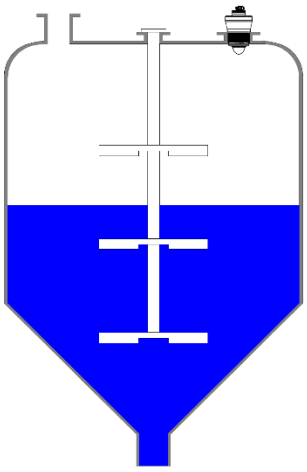
Warning：

The distance reference point is the coordinate starting point of the distance display value of the ANL/AiW-4120 radar level transmitter. When this parameter is modified, it will affect the values of other level transmitter parameters, such as accuracy, fill level, current output, etc.

This value can be modified by using the Distance Biases parameter on the Service Menu of mobile App.

Agitator or foam application

When there is an agitator in the tanks(vessels), automatic false echo suppression (set up) should be carried out in the case of agitator movement. This will ensure that interfering reflections from the blades at different locations of the agitator are saved together. When the tank(vessel) container is filled, stirred and other processes, dense foam may form on the surface of the material medium, which greatly dampens the emitted signal.



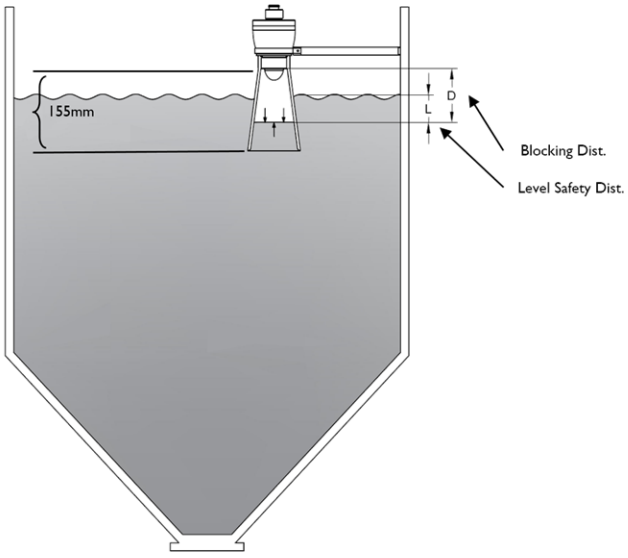
If agitation produces foam or waves, the parameters should be configured using a special menu. Please find the parameter configuration for liquids/foams in the mobile app menu items of the ANL/AiW-4120 radar level transmitter.

NOTE：
If the foam causes measurement errors, we recommend customers to use large-aperture antenna products (such as **ANL-4120MP60** specification radar), or professional version process radar level transmitters products series (ANL9080, ANL9127 series products).

With spill cover (optional function)

The AiW-4120 product with spill prevention is equipped with an overflow hood, which has the ability to prevent material spillage, and is able to detect in real time when the liquid level reaches the very top of the tank vessel and trigger an alarm, which is commonly referred to as overflow capability. This function is essential to prevent the leakage of highly corrosive, toxic or otherwise dangerous media.

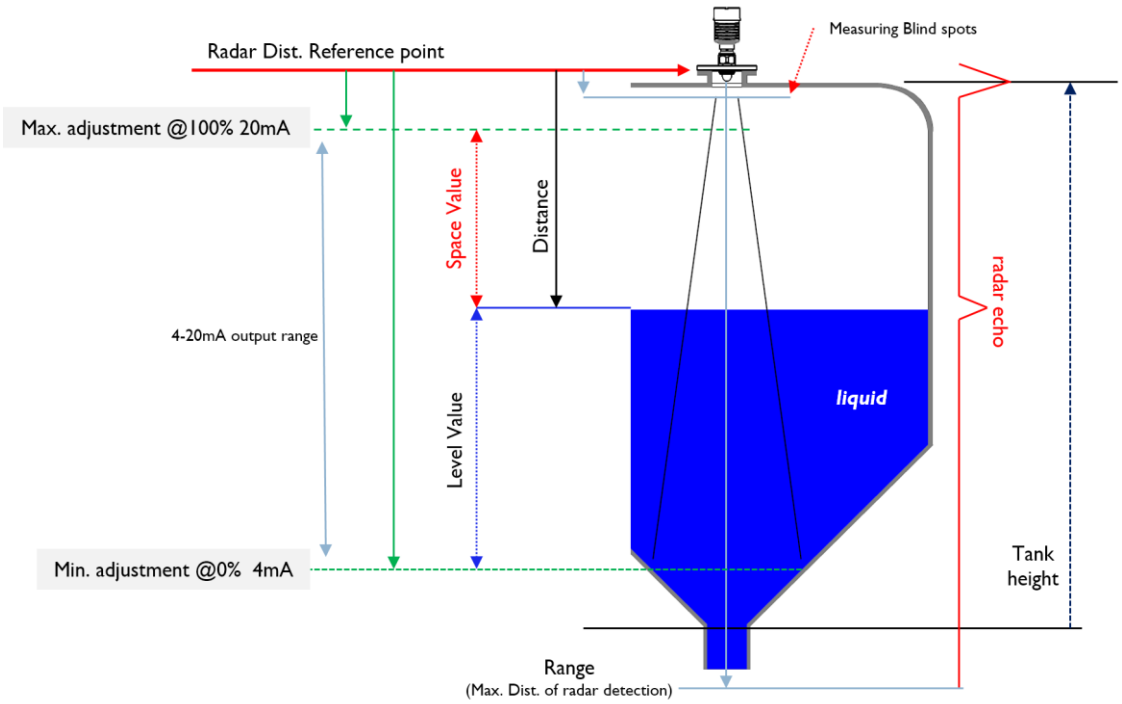
If the AiW-4120 radar product is equipped with an overflow function, the blocking distance of the liquid level in the tank is usually 140mm(***D***), and the radar will calculate and estimate the liquid level rise speed and the liquid level alarm safety distance (configurable).
Please find the parameter configuration for Overfill in the menu item of the AiW-4120 radar level transmitter.



Warning：
The anti-spill function is an optional function of the AiW-4120 radar level transmitters, and the order is required to configure the anti-spill cover and the corresponding product specification version.
The correctness of the parameter configuration of the anti-overflow function directly affects the normal operation of this function.

FUNCTIONAL ESSENTIALS EXPLAINED

Measurement parameters meaning



Note: The zero coordinate of the distance value displayed by the radar is at the reference point.

The dielectric constant of the material being measured

When using a radar level transmitter product for level measurement, it is important to understand the electromagnetic wave reflection characteristics (dielectric constant) of the measured material, which is important for us to select the correct and appropriate radar level product model and its specification.

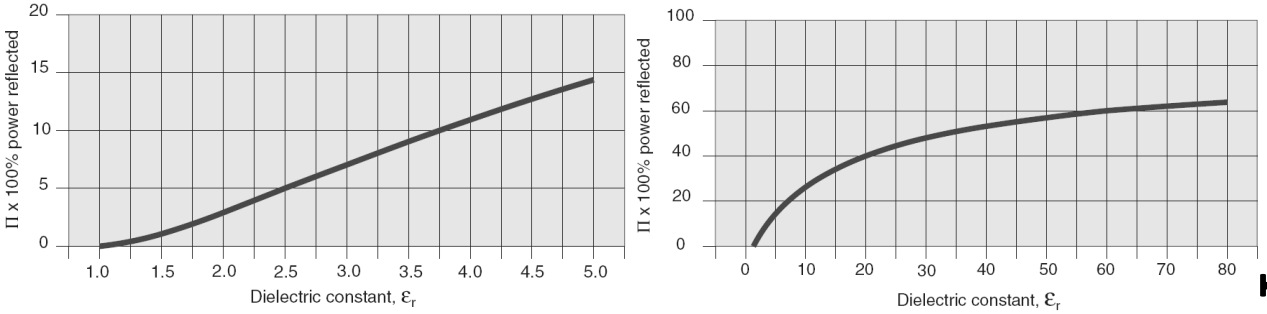
The electromagnetic waves emitted by the ANL/AiW-4120 radar product have the same characteristics as light. If the measured material is electrically conductive, then when the radar emitted wave hits the surface of the material, the electric field ***E*** of the electromagnetic wave will be short-circuited. The resulting current on the surface of the material causes radar waves to be reflected off the surface, so it is easy for radar level transmitter to detect relatively large echoes from the surface of the conductive material.

For example, in brewing applications, radar level transmitter can easily measure conductive aqueous liquids, such as acids and caustics, and other conductive materials such as acids and caustics, as well as for molten metal or saturated grain waste materials.

However, if the measured (liquid/solid) materials are non-conductive, their dielectric constant (relative dielectric constant $\boldsymbol{\varepsilon_r}$) value becomes an important consideration for radar measurements.

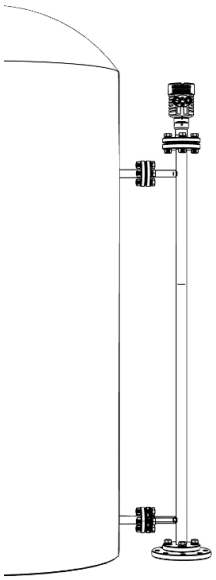
For example, toluene material ($\boldsymbol{\varepsilon_r}$ =2.0~2.4), it will only reflect 4.46% of the radar electromagnetic echo wave signal, and the echo is very small. Acetone ($\boldsymbol{\varepsilon_r}$ =20.0) will reflect 40% of the radar electromagnetic echo wave signal.

The reflection of radar electromagnetic waves depends on the dielectric constant of the material being measured. The diagram below shows the key factors that must be taken into account when selecting a radar antenna:



Measurements are taken inside straight and bypass pipes

In the process industry, due to radar product design or radar's antennas capabilities, normal radar level transmitters are not suitable for installing directly inside the tank. In these application cases, the use of measuring tubes (bypass tubes or risers inside containers) is a commonly used alternative to radar installations.



The reasons for using bypass tubes and straight pipes (risers/waveguides) are as follows:

1. For highly agitated liquid surfaces: Stationary risers ensure that radar measurements are made on calm surfaces without scattering echo signals.
2. For low-dielectric liquids such as liquefied natural gas/petroleum gas (LNG/LPG): The riser enhances the signal of the radar waves, resulting in maximum signal strength from liquids with low levels of echo reflected energy.
3. For toxic and hazardous chemicals: Riser installation makes it possible to measure with a small radar lens antenna. This allows the radar to be mounted on a full-caliber ball valve or to observe the position of the riser for measurement. Radar products can also be isolated from the process conditions inside the tank, facilitating product maintenance.
4. For small vessels: Radar products with small aperture lens antennas are ideal for measurements in process vessels with very small risers or bypasses, such as vacuum tanks.
5. For foam-distillation tubes, foam is usually prevented from affecting the measurement.

Warning：

When ANL/AiW-4120 radar level transmitters are used for measurement applications in tubes (waveguides), keep in mind that special configuration parameters should be used. This is because the speed of electromagnetic waves in the measuring tubes (waveguide) is significantly slower compared to the speed of electromagnetic waves in free space. The degree of slowdown depends on the size of the inner diameter of the tube and the operating frequency of the radar product.

NOTE:

Each radar level product's operating frequency has a critical minimum inner diameter value of the tubes (waveguide) D_{min}*, which is the minimum inner diameter size that can be level measured in the tubes using this radar. The higher the operating frequency of the radar, the smaller the minimum diameter of the measuring tube that can be used.*
For the ANL/AiW-4120 radar level transmitters (frequency 122GHz), Critical minimum inner diameter value $D_{min} \approx 3$ *mm.*

Information:

Conventional process industry radar level transmitters used in the measurement of straight tubes (waveguides), the measurement accuracy will be seriously deteriorated, and the accuracy error will be reduced by 20~50% (with distance).
This is due to the fact that the propagation of electromagnetic waves in the tubes will produce multiple modal forms, resulting in level inconsistencies caused by constant random shifts in the strength of the echo signal.

In order to achieve high measurement accuracy in straight tubes (waveguide) measurement applications, ANL-9081, a straight tube measurement radar level transmitter using a special circularly polarized wave transmission pattern is required.

ANL-9081 80GHz FMCW radar straight tube level transmitter

Application for flow measurement (optional function)

For mobile applications, the AiW-4120 radar level transmitter is positioned upstream or on the inlet side, in the center of the sink and perpendicular to the surface of the liquid, at the location of the downhole or venturi tank. The minimum distance between the radar transmitter and the maximum height of the orifice or sink is 300~250mm, so that the best measurement accuracy can be achieved.

Drains/Predefined curves

Different forms of drainage channels should be calculated according to the nature and type of flow using different formulas.
The following is a curve of the calculation formula saved in the AiW-4120 radar level transmitter for use:

- Palmer-Bowlus flume: $Q = k \times Level^{1.86}$
- Venturi, trapezoidal weir, rectangular flume: $Q = k \times Level^{1.5}$
- V-Notch, triangular over fall: $Q = k \times Level^{2.5}$

Dimensions (ISO standard)

When selecting these curves, the dimensions of the flume must be known and entered via the assistant. As a result, the accuracy of the flow measurement is higher than with the specified curves.

- Rectangular flume (ISO 4359)
- Trapezoidal flume (ISO 4359)
- U-shaped flume (ISO 4359)
- Triangular over fall thin-walled (ISO 1438)
- Rectangular flume thin-walled (ISO 1438)
- Rectangular weir broad crown (ISO 3846)

Flow calculation formula

If the flow formula of your flume is known, you should select this option, as the accuracy of the flow measurement is highest here:

- Flow formula: $Q = k \times Level^{exp}$

Warning：

Flow measurement is an optional feature of the AiW-4120 radar level transmitter and is required to be equipped with an overfill shield and the corresponding product specification version.

PHYSICAL SPECIFICATION

Power supply

The ANL/AiW-4120 radar level transmitter operates on max. 40/38 Vdc transmitter terminal voltage and max. 22.5 mA (max. 36 Vdc in Intrinsically Safe installations).

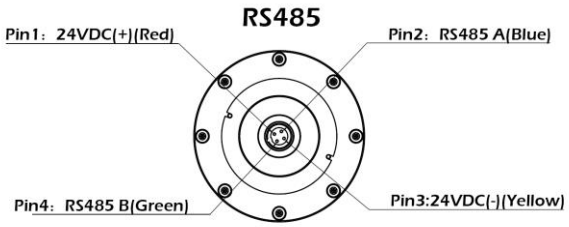
Electrical connections

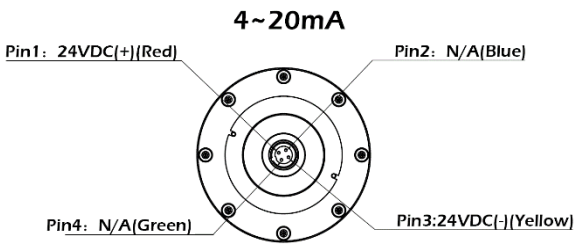
Use 24-16 AWG wire (0.20-1.5 mm2). Twisted pairs and shielded wiring are recommended for environments with high EMI (electromagnetic interference).
Fine stranded conductors shall be equipped with a ferrule.
One Cable/Circular Connector Φ13.8mm Specifications: (SP1312/IP68) / (SA1212/IP67) / (M12 IO-link cable)

Housing material

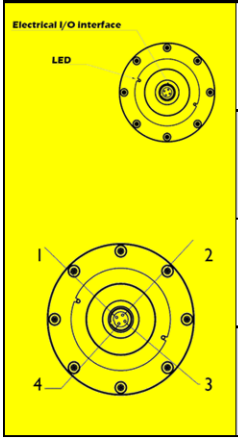
The shell material of the product is polyoxymethylene (POM), and the anti-corrosion shell material is polytetrafluoroethylene (PTFE). The radar antenna is a spherical conformal lens formed by the curved surface of the housing material.

RS485/4-20mA Wiring diagram





Wiring Connection 接线图

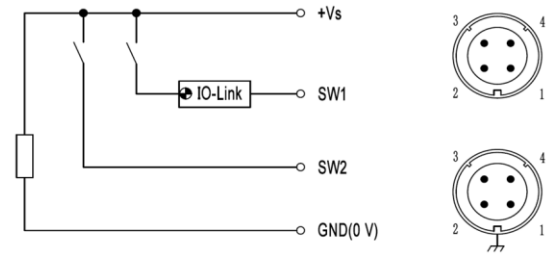


PORT		PIN	Color		Signal	
	mA only mA HART (2-Wire)	1	Red		V+	24V
		2	Blue		NA	
		3	Yellow		V-	0V
		4	Green		NA	
	mA HART (4-Wire)	1	Red		V+	24V
		2	Blue		mA+	+ Active 4-20 mA analog output
		3	Yellow		V-	0V
		4	Green		mA-	- Active 4-20 mA analog output
	RS485	1	Red		V+	24V
		2	Blue		485-A	RS485+ communication line
		3	Yellow		0V	0V
		4	Green		485-B	RS485- communication line
	IO-LINK	1	Red		V+	24V
		2	Blue		OUT2	Digital output
		3	Yellow		V-	0V
		4	Green		OUT1/IO-LINK	Digital output or IO-Link mode

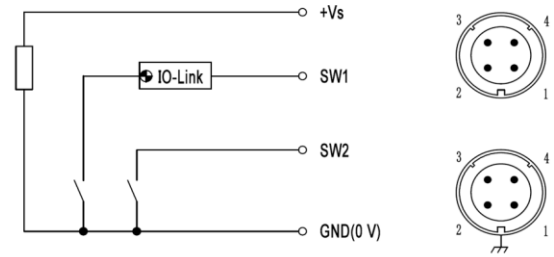
IO-LINK Wiring Diagram

ANL/AiW-4120 IO-Link interface with SW1/SW2

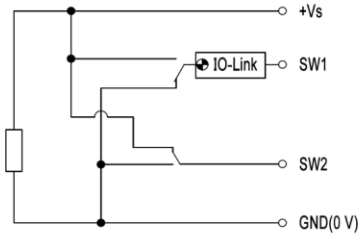
OUTPUT: 可编程 IO-Link / PNP

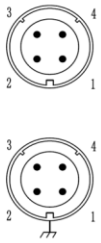


OUTPUT:可编程 IO-link / NPN



OUTPUT:可编程IO-link / Digital (Push-Pull)

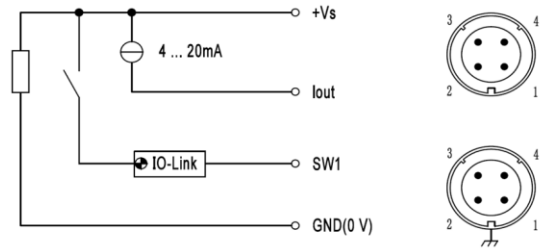




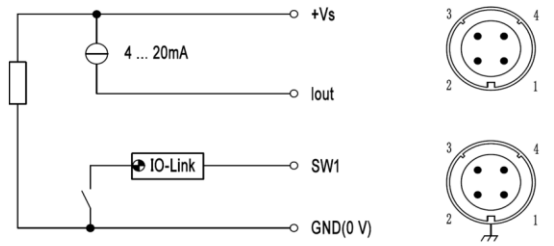
Function 功能	Pin 引脚定义
+Vs	1
SW2 (DI/DO)	2
GND (0V)	3
SW1 (IO-Link)	4

ANL/AiW-4120 IO-Link interface with SW1 / 4-20mA

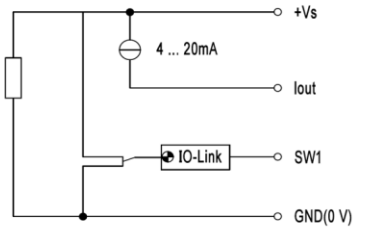
OUTPUT:可编程 IO-link / PNP + 4 ... 20mA

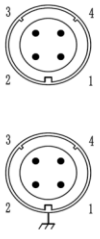


OUTPUT:可编程 IO-link / NPN + 4 ... 20mA



OUTPUT:可编程 IO-link / Digital (Push-Pull) + 4 ... 20mA





Function 功能	Pin 引脚定义
+Vs	1
Iout (4-20mA out)	2
GND (0V)	3
SW1 (IO-Link)	4

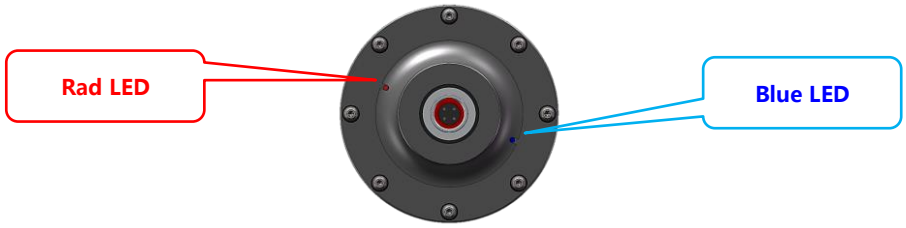
Ingress Protection

IP67 Aviation plug

IP68 Aviation plug

M12 IO-link Aviation plug

LED indicator (mA/HART, Modbus)

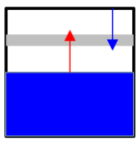


Blue LED	Heartbeat indication, heartbeat cycle 4 seconds
	During the Bluetooth wireless communication period, the LED enters a fast flashing state.
Rad LED	Lights up when an alarm is output (4-20mA, 4-20mA/HART versions)
	Lights up when relay is activated (RS485/modbus version)

LED indicator (IO-Link)

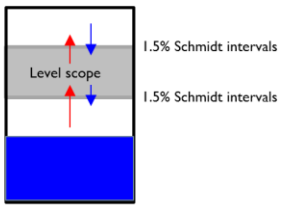
Adaptive trigger SW1/SW2 (Adaptive triggering)

Liquid level line alarm, low level alarm or high level alarm, upper and lower line alarm margin 3%



Window trigger SW1/SW2 (Window triggering)

Liquid level interval alarm, out-of-bounds alarm or interval alarm, upper and lower line alarm margin 1.5%



Analog output 4...20mA (Current output) ➔ 0~100%

LED1 Run instructions

- Running: Works normally
- Flashing: I/O

LED2 Status indication

SW1	SW2	LED Color
0	0	
I action	0	
0	I action	
I action	I action	
Error	Error	
IO-LINK fault		

DISPLAY AND CONFIGURATION

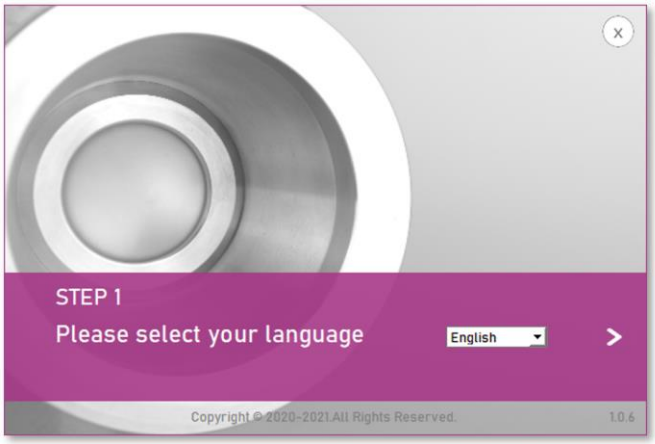
Diagnostics tools

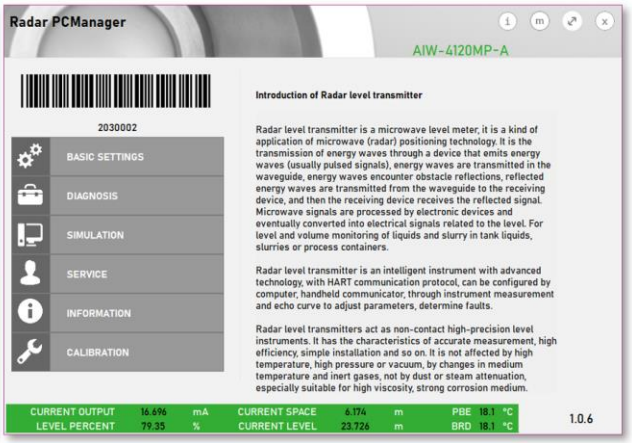
There are two ways to debug and configure ANL/AiW-4120 product diagnostics:
1. Wireless Mode: Connect mobile phone or iPad via Bluetooth to **CHINASIMBA® RadarMobileManager** APP.
2. Connection mode: Connect to a PC using an adapter via HART/RS485 to **CHINASIMBA® AiW-Radar** software.

NOTE: *The content described in this document is based on the diagnostic software version:*
RadarMobileManager V1.1.7
AiW-Radar V1.1.1

Smart Diagnostics Suite: *RadarPCManager*

CHINASIMBA® RadarPCManager is a software package for commissioning and maintaining process ANL/AiW-4120 radar level transmitters. Check https://www.chinasimba.com support page to make sure you have the latest version of **RadarPCManager** software.
How to get AiW-Radar software more information, contact the relevant product vendor.





Smart Diagnostics Suite: *RadarMobileManager*

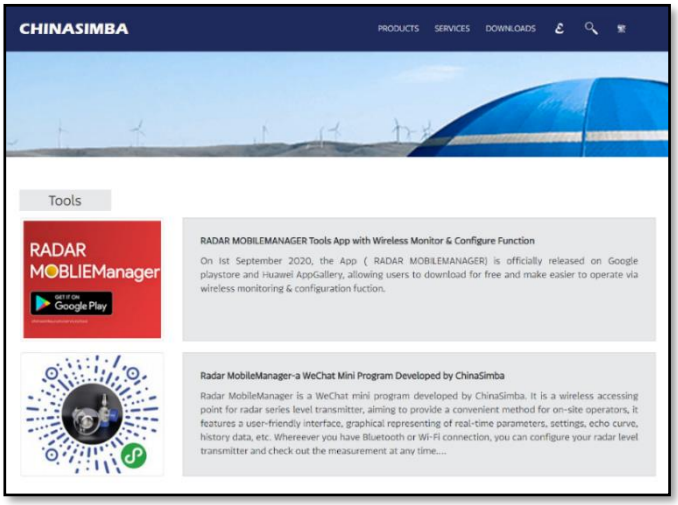
The ANL/AiW-4120 connects with smart devices via Bluetooth. After running the RadarMobileManager APP, the smart mobile will automatically search for all 4120 transmitter devices in the area and will list the valid 4120 radar level transmitter devices in the area.
In the list of 4120 devices, you can select one 4120 transmitter device that you want to connect to, the Bluetooth connection is a peer-to-peer device connection.
The **RadarMobileManager** App can be found in the App Store (**Android/IOS/HarmonyOS/WeChat**), downloading and installing. This is a free app and you can also contact the ANL/AiW-4120 radar level transmitter products vendors.

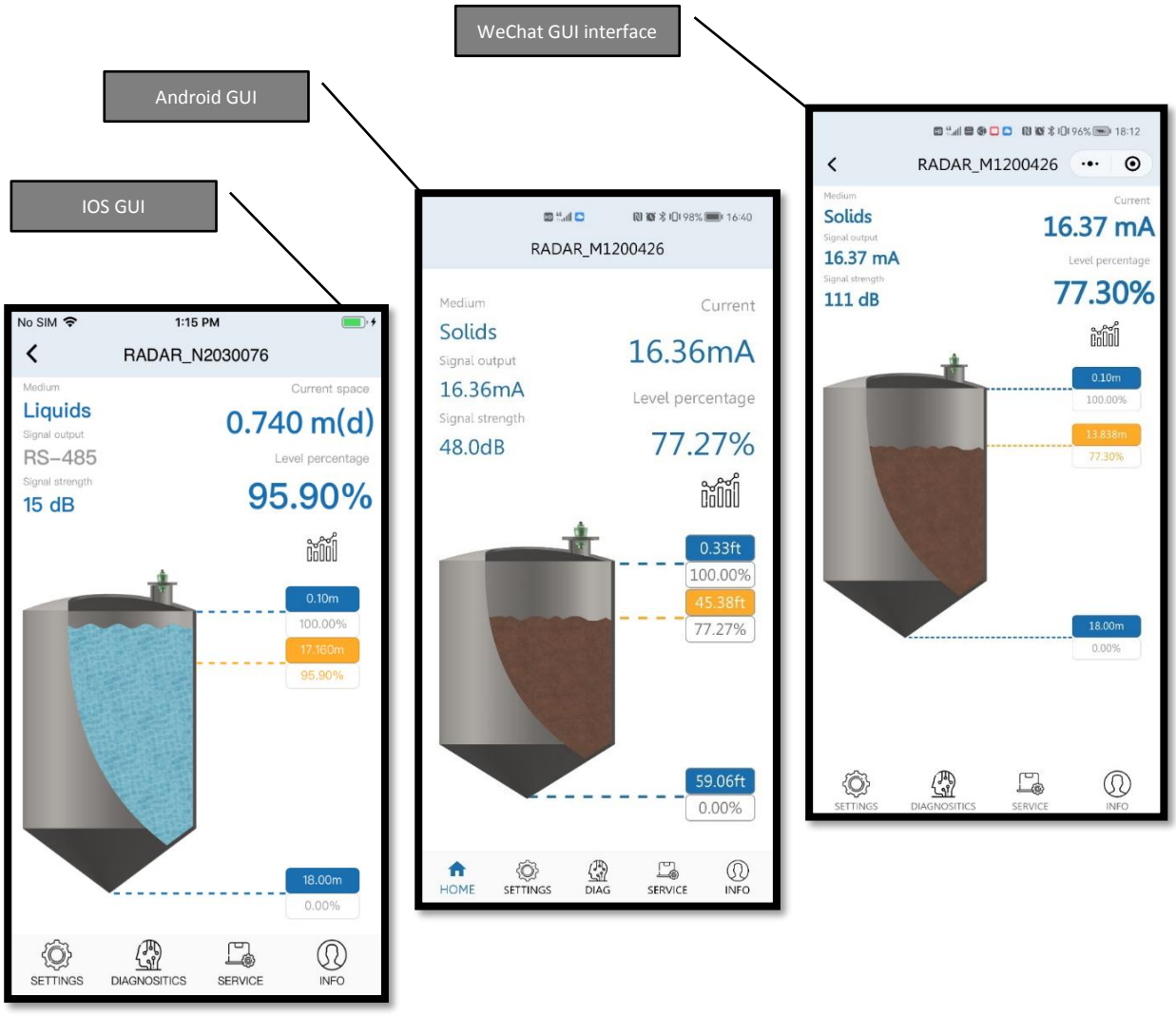
SET UP WITH THE MOBILE APP

Basic GUI interface

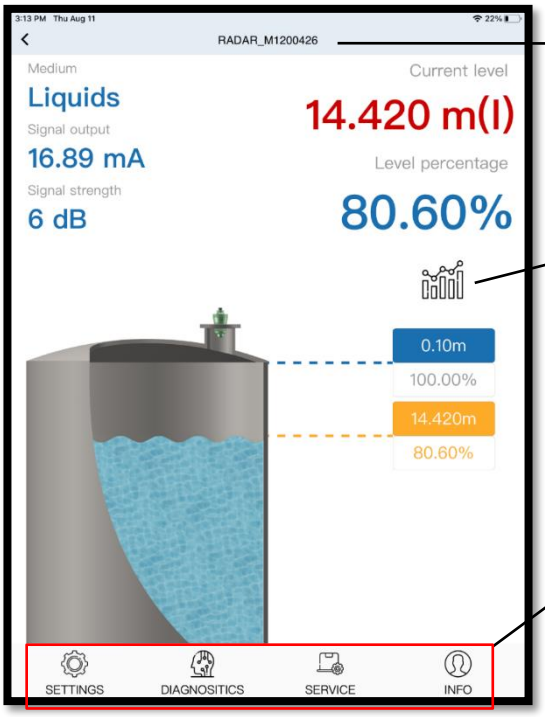
The ANL/AiW-4120 radar level transmitters support different types of mobile phone systems (iPad, etc.), and the application software can be downloaded free of charge from the App Store on different platforms.
https://www.chinasimba.com/services/tools.html

NOTE: The first time you running the RadarMobileManager app, the mobile device and ANL/AiW-4120 radar level transmitter must be verified once. Once the first correct authentication is complete, subsequent connections will no longer require authentication queries.





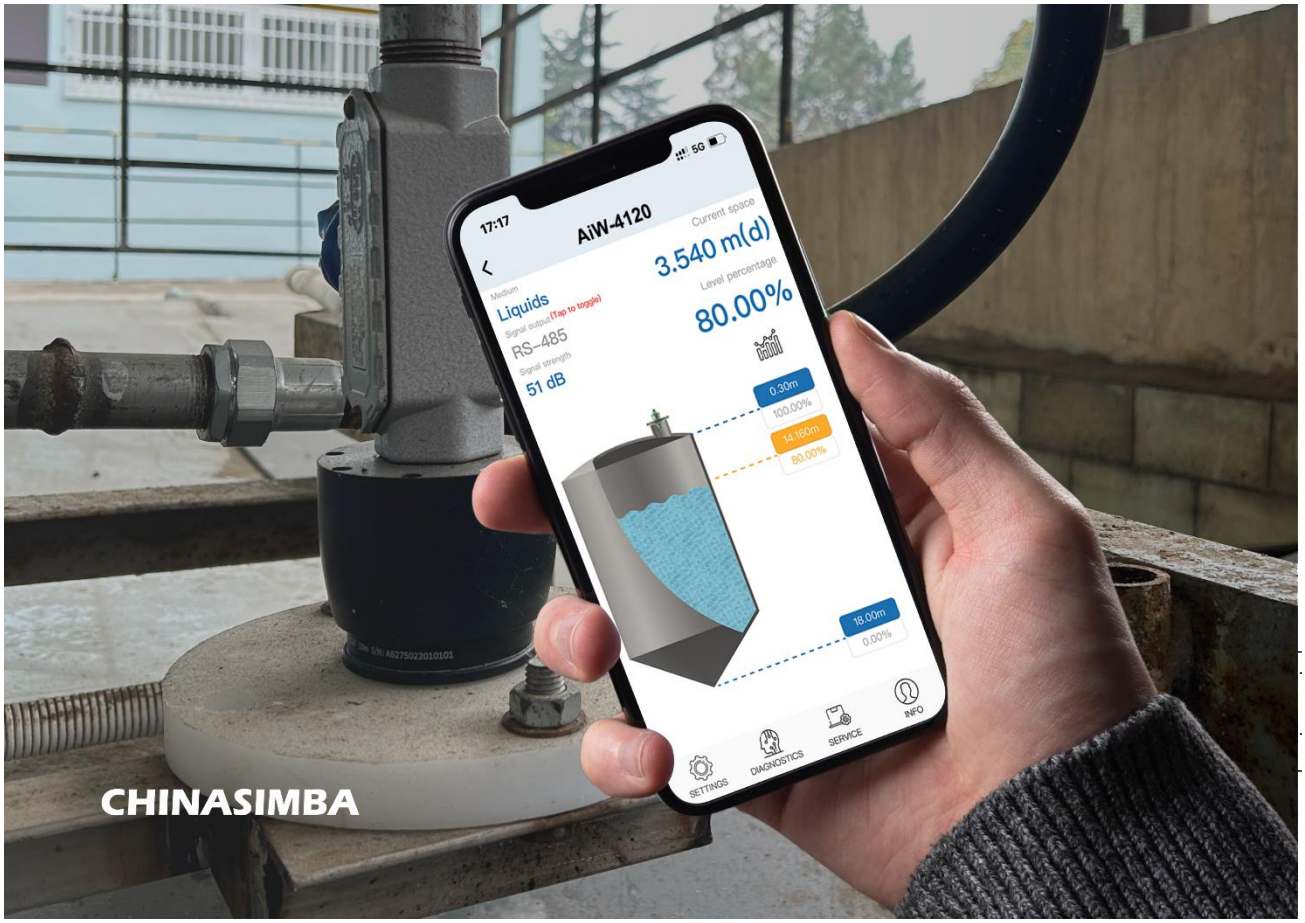
GUI Icon description



Transmitter tag

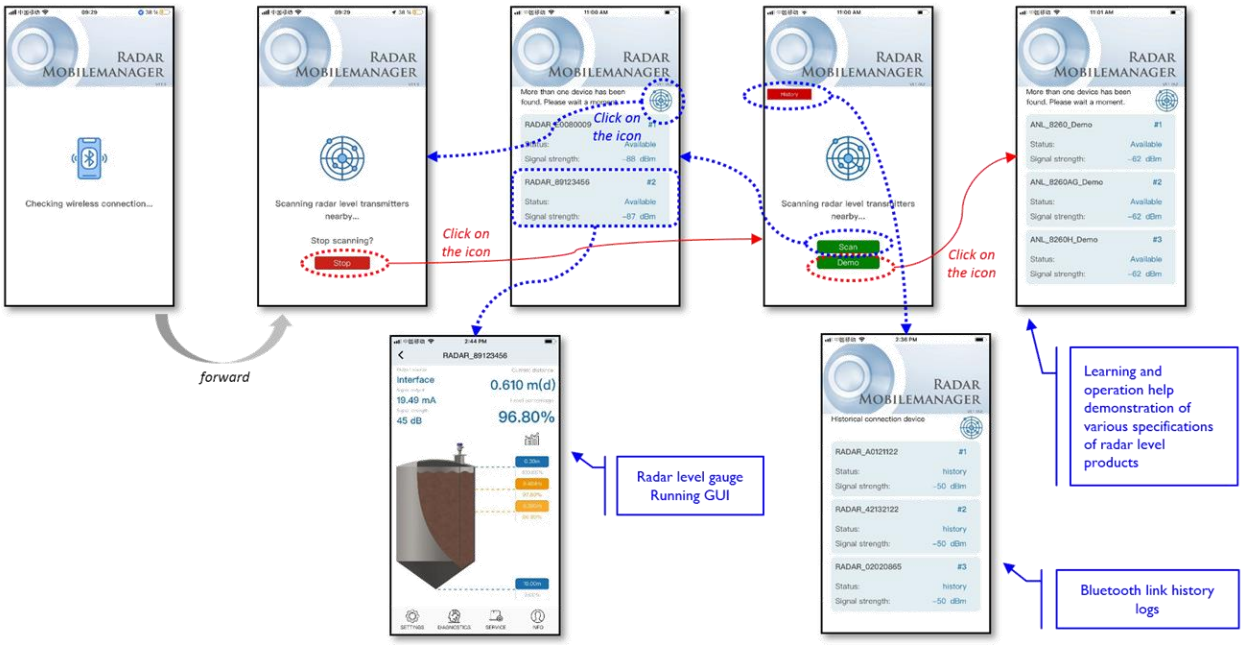
Curve icon
Click on it to enter the echo GUI

Parameter menu icon
Diagnostics menu icon
Service menu icon
Product information icon



Download/Setup/launch RadarMobileManager

Before launching the app on your mobile device, make sure that the Allow Location Access of your device is "**When using the App**" to turn on the setting, and the Bluetooth function is "**On**". Between the mobile phone and the ANL/AiW-4120 radar level transmitters, they are paired one-to-one communication.
When there are multiple radar level transmitter devices, they need to be connected separately one by one, first disconnect from the existing radar level transmitter to stop the Bluetooth communication with it, then choose another one to connect. (as shown in the figure below)

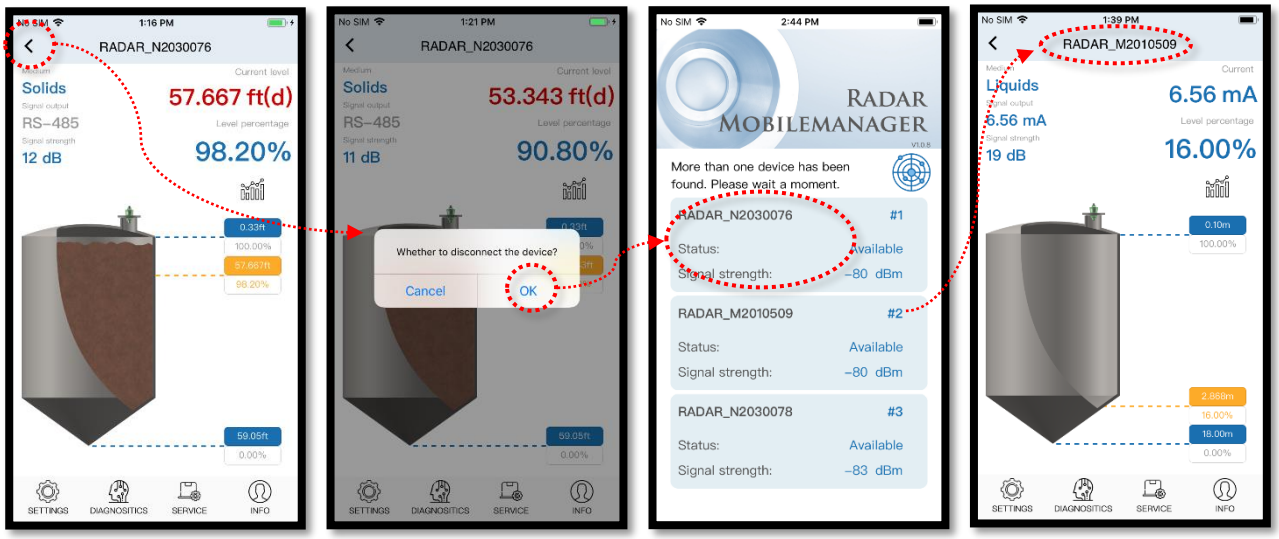


Note: *If mobile Bluetooth connection fails or the radar level transmitter device cannot be found, you can troubleshoot it by following these steps:*

- *Checking the mobile device has being Bluetooth function turned on, the radar level transmitter is powered on, and the blue LED light on the device is flashing (once every 4 seconds)*
- *Check the mobile device is discoverable with Bluetooth enabled and the location function is turned on.*
- *Check that the **RadarMobileManager** app is authenticated on the first running.*
- *If the fault is not troubleshooting to check the mobile network signal is too weak, or try to restart the mobile phone or contact the after-sales technical engineer.*

Exit the current connection to connect another radar transmitter

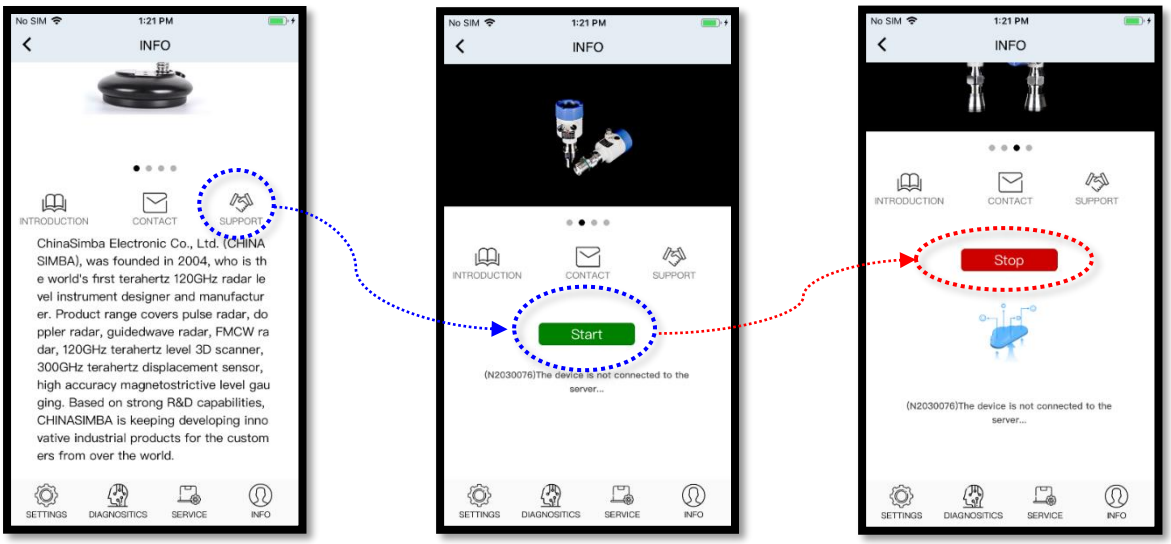
Click the back icon at the upper right corner of the screen to return to the device list GUI screen, then select a radar level transmitter device that you need to be connected in the device list.
For example:
As shown in the figure below, exit the **RADAR_N2030076** (device tag) connection, and then click the #2 icon to select **RADAR_M2010509** connection.



Running a remote/online/real-time technical support service

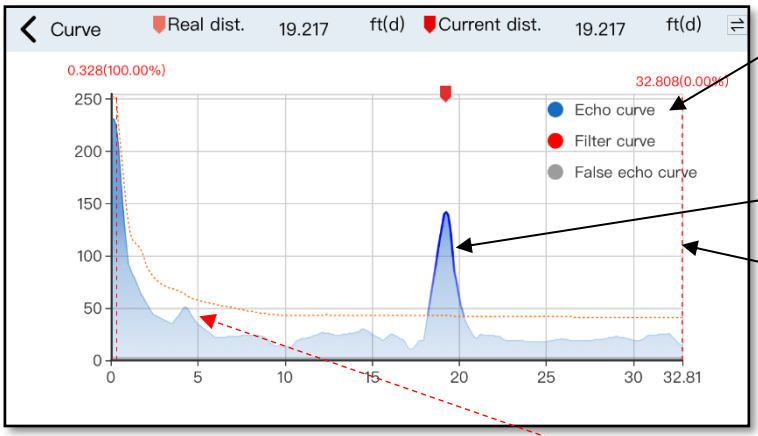
If you encounter difficulties in debugging the ANL/AiW-4120 radar level transmitter on site and want to get remote technical support from the product manufacturer immediately, you can click the remote assistance icon (as shown below) on your mobile phone to get remote online technical support. The remote support engineer will directly help you complete the real-time adjustment of the transmitter parameters through the Internet cloud service.

Warning: *When you click the **Support** icon, then click "**start**" icon and holding the mobile device awake, the remote online support function will be turned on. Thereafter, the radar level transmitter diagnostic commissioning will be taken over remotely by the plant support engineer. When you click the "**Stop**" icon, you can turn off remote online support at any time.*
***Note:** Before starting this service, you need to contact the manufacturer's support engineer to make an appointment.*



During this period, the remote technical support engineer takes over the control and commissioning of the radar level transmitter

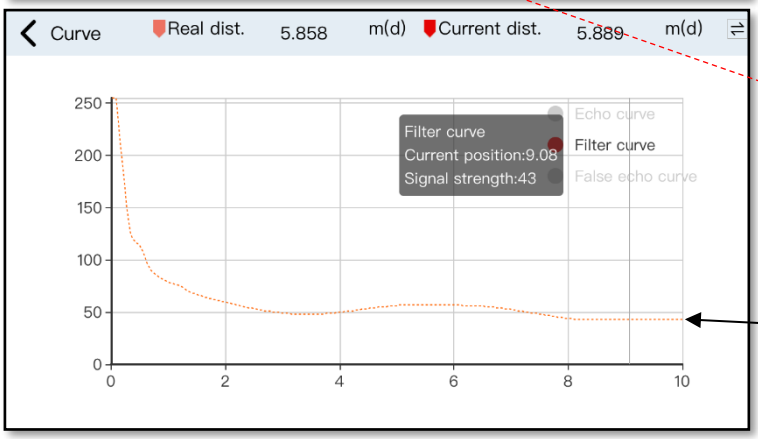
View the Echo/Filter/False signal waveform



Echo curve icon
Filtered curve icon
False echo curve icon
click the icon to off/on corresponding curve

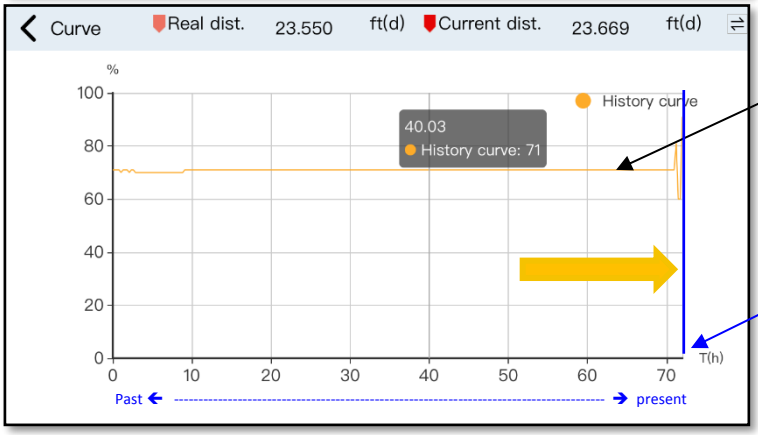
Echo signal curve

0%,100% demarcations



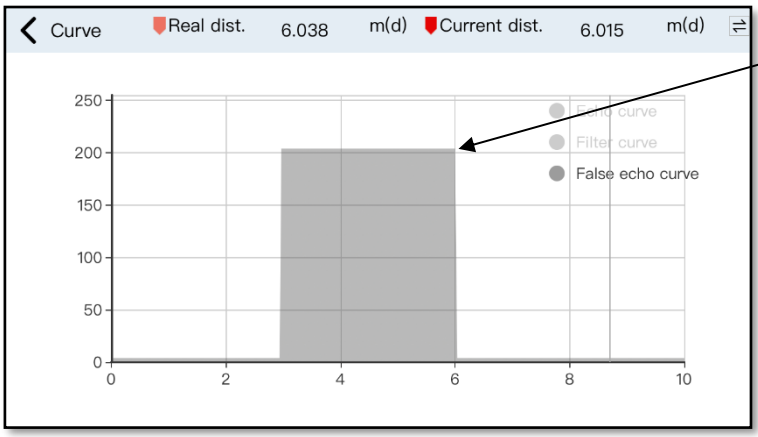
NOTE:
The filter curve shields the background noise in the echo signal, so that the radar does not identify echoes whose signal strength is lower than below the filter curve.
For example, the arrow indicates this small echo.

Noise filter curves



The Historical trend record curve, it's a radar running level (%) log, which records the trend in the past 72 hours.

The point in time



False echo rejection scope

NOTE:
Creating or plotting a false echo rejection curves, just to draw straight lines in segments.

Determine the coordinate parameters of 2 points, draw the false echo shielding interval, and then draw the next interval, and finally form the desired shielding shape.

MENU TABLE

4-20mA / RS485 version

Version3.0.3

item	Menu Icons	Menu Issue English	Option English	值域 Val Range	缺省值 Default value	显示条件 Avaliable / Illustrate
1	设置 (SETTINGS) (Базовые настройки)	**Medium**	Liquids		液体 Liquids	
			Solids			
			Micro DK			物料性质=液体/微介电常数 (Only for Liquid or Micro DK medium)
		Level change rate	Slow		慢 Slow	
			Middle			
			Fast			
		Agitated surface	ON/OFF		OFF	物料性质=液体 (Only for Liquid medium)
		Foaming	ON/OFF		OFF	物料性质=液体 (Only for Liquid medium)
		Large angle repose	ON/OFF		OFF	物料性质=固体 (Only for Solid medium)
		Powder/Dust	ON/OFF		OFF	物料性质=固体 (Only for Solid medium)
		Low DK	ON/OFF		OFF	物料性质=液体/固体(Only for Liquid or Solid medium)
		Empty span				物料性质=微介电常数 (Only for Micro DK medium)
		DK Val.				物料性质=微介电常数 (Only for Micro DK medium)
		Meas. Algorithms	TBF		TBF	物料性质=微介电常数 (Only for Micro DK medium)
			PEP			
		Echo ALG.	First large echo(F)		大首波 First large echo	
			Largest(L)			
			Area(A)			
			(F) above TVT			
			Best of (F) and (L)			
			Last Echo			
		Min. adjustment %		0..100%①	0%	
		Min. adjustment		0..18m(d)②	18m(d)	
		Max. adjustment %		0..100%①	100%	
		Max. adjustment		0..18m(d)②	0.6m(d)	
		Range		0..10/18/30m(d)③	18m(d)	
		Near blanking		0..18m(d)⑤	0.8m(d)	
		Damping		0..120s	6s	
		Sensor tag		0..9 a..z A..Z④	SENSOR	
2	诊断 (DIAGNOSTICS) (Диагностика)	**Device Temp.**			31℃	
		Min. space			100m(d)	
		Max. space			0m(d)	
		Meas. reliability			51dB	
		Meas. status			OK	
		LOGO			AIW-4120MP	
		Serial No.			1234567	
		MFG date			11/20/2021	
		SW version			1.0.0	
		Simulating value		3.9..22mA		HART 设备类型 (Only for HART function)
3	服务 (SERVICE) (Сервис)	**Reset**	Basic settings		恢复基本设置 Basic reset	
			Factory settings			
		Display	Space		空高 Space	
			Level			
			Current			
		Auto gain CTL	ON/OFF		OFF	
		Echo intensity level		0..9	0	
		Material Inc. rate		0.001..99m/min	0m/min	
		Material Dec. rate		0.001..99m/min	0m/min	
		False echo setup	Create new		新建 New building	
			Update			
			Edit			
			Delete			
		Start Dist.		0..18m⑤	0m	
		End Dist.		0..18m⑤	0m	
		Start magnitude		0..255	0	
		End magnitude		0..255	0	
		Unit of Meas.	m(d)		m(d)	
			ft(d)			
		Output mode	4-20mA		4-20mA	HART 设备类型 (Only for HART function)
			20-4mA			
		Failure mode	No change		无变化 No change(Hold)	
			20.5mA			
			22mA			
			4mA			
		Min current	3.9mA		3.9mA	
			4mA			
		Dist. adjustment		-10..10m(d)	0m(d)	
		Device address		0..247	1	仅用于RS-485 规格的设备类型 (Only for RS485 function)
		Envelope level		0..100%	0%	
		Echo threshold		0..99	50	
		Meas. reliability		0..99	0	
		Relay status	ON/OFF		OFF	继电器已装配 (Only for relay function avaliable)
		Downward threshold		0..100%	0%	
		Upward threshold		0..100%	0%	
		Action delay time		0..600s	0s	
		Overflow alarm	ON/OFF		ON	版本1.0.8起 (Since version 1.0.8)
		Overflow alarm delay		0..65535s	10s	版本1.0.8起 (Since version 1.0.8)
		Connection password status	ON/OFF		OFF	连接设备(for PC APP only)
		Change password				连接设备(for PC APP only)

Annotation:

(1) The high adjustment percentage is greater than the low adjustment percentage.
(2) The low adjustment value is greater than the high adjustment value, the low adjustment value cannot exceed the range, and the range is 18m by default.
(3) The range range cannot be lower than the high adjustment value/low adjustment value/dead zone, and the maximum range will change dynamically according to different devices, and the current maximum value of 18m is an example.
(4) The maximum length of the sensor label is 15 letters.
(5) Range, currently 18m.
(6) False echo setting parameters in the pop-up window.
(7) Parameters are read-only and modification is prohibited.
(8) When the automatic gain is turned on, the setting is prohibited.
(9) Used to switch the main interface to display data, the device does not have this command.
(10) After the "connection password status" is turned on, the APP needs to enter the password to connect to the Bluetooth device, and the initial password is 123456. "Change Connection Password" is used to modify the password of the connected

4-20mA / HART version

Version3.0.3

item	Menu Icons	Menu Issue English	Option English	值域 Val Range	缺省值 Default value	显示条件 Avaliable / Illustrate
1	设置 (SETTINGS) (Базовые настройки)	**Medium**	Liquids		液体 Liquids	
			Solids			
			Micro DK			物料性质-液体/微介电常数 (Only for Liquid or Micro DK medium)
		Level change rate	Slow		慢 Slow	
			Middle			
			Fast			
		Agitated surface	ON/OFF		OFF	物料性质-液体 (Only for Liquid medium)
		Foaming	ON/OFF		OFF	物料性质-液体 (Only for Liquid medium)
		Large angle repose	ON/OFF		OFF	物料性质-固体 (Only for Solid medium)
		Powder/Dust	ON/OFF		OFF	物料性质-固体 (Only for Solid medium)
		Low DK	ON/OFF		OFF	物料性质-液体/固体(Only for Liquid or Solid medium)
		Empty span				物料性质-微介电常数 (Only for Micro DK medium)
		DK Val.				物料性质-微介电常数 (Only for Micro DK medium)
		Meas. Algorithms	TBF		TBF	物料性质-微介电常数 (Only for Micro DK medium)
			PEP			
		Echo ALG.	First large echo(F)		大首波 First large echo	
			Largest(L)			
			Area(A)			
			(F) above TVT			
			Best of (F) and (L)			
			Last Echo			
		Min. adjustment %		0..100%④	0%	
		Min. adjustment		0..18m(d)②	18m(d)	
		Max. adjustment %		0..100%④	100%	
		Max. adjustment		0..18m(d)②	0.6m(d)	
		Range		0..10/18/30m(d)⑤	18m(d)	
		Near blanking		0..18m(d)⑤	0.8m(d)	
		Damping		0..120s	6s	
		Sensor tag		0..9 a..z A..Z④	SENSOR	
2	诊断 (DIAGNOSTICS) (Диагностика)	**Device Temp.**			31℃	
		Min. space			100m(d)	
		Max. space			0m(d)	
		Meas. reliability			51dB	
		Meas. status			OK	
		LOGO			AIW-4120MP	
		Serial No.			1234567	
		MFG date			11/20/2021	
		SW version			1.0.0	
		Simulating value		3.9..22mA		HART 设备类型 (Only for HART function)
3	服务 (SERVICE) (Сервис)	**Reset**	Basic settings		恢复基本设置 Basic reset	
			Factory settings			
		Display	Space		空高 Space	
			Level			
			Current			
		Auto gain CTL	ON/OFF		OFF	
		Echo intensity level		0..9	0	
		Material Inc. rate		0.001..99m/min	0m/min	
		Material Dec. rate		0.001..99m/min	0m/min	
		False echo setup	Create new		新建 New building	
			Update			
			Edit			
			Delete			
		Start Dist.		0..18m⑤	0m	
		End Dist.		0..18m⑤	0m	
		Start magnitude		0..255	0	
		End magnitude		0..255	0	
		Unit of Meas.	m(d)		m(d)	
			ft(d)			
		Language			中文 Chinese	
			English		English	
		Output mode	4-20mA		4-20mA	HART 设备类型 (Only for HART function)
			20-4mA			
		Failure mode	No change		无变化 No change(Hold)	
			20.5mA			
			22mA			
			4mA			
		Min current	3.9mA		3.9mA	
			4mA			
		Dist. adjustment		-10..10m(d)	0m(d)	
		Device address		0..247	1	RS485 设备类型 (Only for RS485 function)
		Noise suppression	Filter1		滤波器1 Filter 1	
			Filter2			
			Filter3			
			Filter4			
			Filter5			
		Envelope level		0..100%	0%	
		Echo threshold		0..99	50	
		Meas. reliability		0..99	0	
		Relay status	ON/OFF		OFF	继电器已装配 (Only for relay function avaliable)
		Downward threshold		0..100%	0%	
		Upward threshold		0..100%	0%	
		Action delay time		0..600s	0s	
		Connection password status	ON/OFF		OFF	连接设备(for PC APP only)
		Change password				连接设备(for PC APP only)
4	信息 (Information) (Информация)					

Annotation:

(1) The high adjustment percentage is greater than the low adjustment percentage.
(2) The low adjustment value is greater than the high adjustment value, the low adjustment value cannot exceed the range, and the range is 18m by default.
(3) The range range cannot be lower than the high adjustment value/low adjustment value/dead zone, and the maximum range will change dynamically according to different devices, and the current maximum value of 18m is an example.
(4) The maximum length of the sensor label is 15 letters.
(5) Range, currently 18m.
(6) False echo setting parameters in the pop-up window.
(7) Parameters are read-only and modification is prohibited.
(8) When the automatic gain is turned on, the setting is prohibited.
(9) Used to switch the main interface to display data, the device does not have this command.
(10) After the "connection password status" is turned on, the APP needs to enter the password to connect to the Bluetooth device, and the initial password is 123456. "Change Connection Password" is used to modify the password of the connected Bluetooth device.

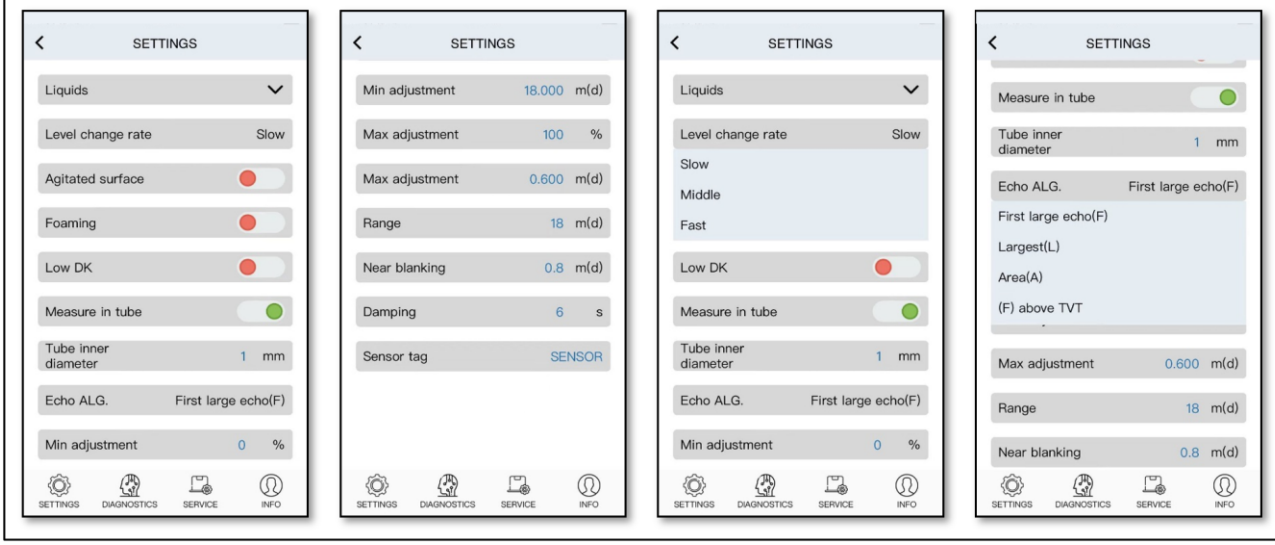
IO-LINK version

Version3.0.3

item	Menu Icons	Menu Issue English	Option English	值域 Val Range	缺省值 Default value	显示条件 Avaliable / Illustrate
1	设置 (SETTINGS) (Базовые настройки)	**Medium**	Liquids Solids Micro DK		液体 Liquids	物料性质=液体/微介电常数 (Only for Liquid or Micro DK medium)
		Level change rate	Slow Middle Fast		慢 Slow	
		Agitated surface	ON/OFF		OFF	物料性质=液体 (Only for Liquid medium)
		Foaming	ON/OFF		OFF	物料性质=液体 (Only for Liquid medium)
		Large angle repose	ON/OFF		OFF	物料性质=固体 (Only for Solid medium)
		Powder/Dust	ON/OFF		OFF	物料性质=固体 (Only for Solid medium)
		Low DK	ON/OFF		OFF	物料性质=液体/固体(Only for Liquid or Solid medium)
		Empty span				物料性质=微介电常数 (Only for Micro DK medium)
		DK Val.				物料性质=微介电常数 (Only for Micro DK medium)
		Meas. Algorithms	TBF PEP		TBF	物料性质=微介电常数 (Only for Micro DK medium)
		Echo ALG.	First large echo(F) Largest(L) Area(A) (F) above TVT Best of (F) and (L) Last Echo		大首波 First large echo	
		Min. adjustment %		0..100%①	0%	
		Min. adjustment		0..18m(d)①	18m(d)	
		Max. adjustment %		0..100%①	100%	
		Max. adjustment		0..18m(d)①	0.6m(d)	
		Range		0..10/18/30m(d)①	18m(d)	
		Near blanking		0..18m(d)①	0.8m(d)	
		Damping		0..120s	6s	
		Sensor tag		0..9 a..z A..Z②	SENSOR	
2	诊断 (DIAGNOSTICS) (Диагностика)	**Device Temp.**			31°C	
		Min. space			100m(d)	
		Max. space			0m(d)	
		Meas. reliability			51dB	
		Meas. status			OK	
		LOGO			AIW-4120MP	
		Serial No.			1234567	
		MFG date			11/20/2021	
		SW version			1.0.0	
		Simulating value		3.9..22mA		OUT2功能=输出电流(OUT2 function is for Current output)
3	服务 (SERVICE) (Сервис)	**Reset**	Basic settings Factory settings		恢复基本设置 Basic reset	
		Display	Space Level Current		空高 Space	
		Auto gain CTL	ON/OFF		OFF	
		Echo intensity level		0..9	0	
		Material Inc. rate		0.001..99m/min	0m/min	
		Material Dec. rate		0.001..99m/min	0m/min	
		False echo setup	Create new Update Edit Delete		新建 New building	
		Start Dist.		0..18m①	0m	
		End Dist.		0..18m①	0m	
		Start magnitude		0..255	0	
		End magnitude		0..255	0	
		Unit of Meas.	m(d) ft(d)		m(d)	
		Language	English		English	
		Output mode	4-20mA 20-4mA		4-20mA	OUT2功能=输出电流(OUT2 function is for Current output)
		Failure mode	No change 20.5mA 22mA 4mA		无变化 No change(Hold)	
		Min current	3.9mA 4mA		3.9mA	
		Dist. adjustment		-10..10m(d)	0m(d)	
		Noise suppression	Filter1 Filter2 Filter3 Filter4 Filter5		滤波器1 Filter 1	
		Envelope level		0..100%	0%	
		Echo threshold		0..99	50	
		Meas. reliability		0..99	0	
		Relay status	ON/OFF		OFF	继电器已装配 (Only for relay function avaliable)
		Downward threshold		0..100%	0%	
		Upward threshold		0..100%	0%	
		Action delay time		0..600s	0s	
		Transistor function	PNP NPN		PNP	
		OUT1 mode	Deactivated Single point Window Two-point		禁用 Deactivated	
		OUT1 switching point 1		0..18m①	0m	OUT1模式=单点/窗口/两点(OUT1 mode is for Single point,Window or Two-point)
		OUT1 switching point 2		0..18m①	0m	OUT1模式=窗口/两点(OUT1 mode is for Window or Two-point)
		OUT1 logic	NO NC		NO	OUT1模式=单点/窗口/两点(OUT1 mode is for Single point,Window or Two-point)
		OUT1 switching delay		0.000s~600s	0s	OUT1模式=单点/窗口/两点(OUT1 mode is for Single point,Window or Two-point)
		OUT1 reset delay		0.000s~600s	0s	OUT1模式=单点/窗口/两点(OUT1 mode is for Single point,Window or Two-point)
		OUT1 hysteresis		0..18m①	0m	OUT1模式=单点/窗口(OUT1 mode is for Single point or Windowt)
		OUT2 function	Switching output 2 Current output		开关输出 Switching output 2	
		OUT2 mode	Deactivated Single point Window Two-point		禁用 Deactivated	OUT2功能=开关输出(OUT2 function is for Switching output 2)
		OUT2 switching point 1		0..18m①	0m	OUT2功能=开关输出(OUT2 function is for Switching output 2)
		OUT2 switching point 2		0..18m①	0m	OUT2功能=开关输出(OUT2 function is for Switching output 2)
		OUT2 logic	NO NC		NO	OUT2功能=开关输出(OUT2 function is for Switching output 2) OUT2模式=单点/窗口/两点(OUT2 mode is for Single point,Window or Two-point)
		OUT2 switching delay		0.000s~600s	0s	OUT2功能=开关输出(OUT2 function is for Switching output 2)
		OUT2 reset delay		0.000s~600s	0s	OUT2功能=开关输出(OUT2 function is for Switching output 2)
		OUT2 hysteresis		0..18m①	0m	OUT2功能=开关输出(OUT2 function is for Switching output 2)
		Signalling illuminated LED	Switching output Custom		开关输出 Switching output	
		Switching output	Red Green Blue No signalling		红 Red	LED灯指令=开关输出(Signalling illuminated LED is for Switching output)
		Switching output flashing	ON/OFF		OFF	
		Operating status	Red Green Blue No signalling		红 Red	
		Operating status flashing	ON/OFF		OFF	
		Failure	Red Green Blue No signalling		红 Red	
		Failure flashing	ON/OFF		OFF	
		Color selection	1 2 3		1	LED灯指令=自定义(Signalling illuminated LED is for Custom)
		Upper limit range 1		0..18m①	0m	
		Colour selection range 1	Red Green Blue No signalling		红 Red	LED灯指令=自定义(Signalling illuminated LED is for Custom)
		Flashing range 1	ON/OFF		OFF	
		Upper limit range 2		0..18m①	0m	
		Colour selection range 2	Red Green Blue No signalling		红 Red	LED灯指令=自定义(Signalling illuminated LED is for Custom) 自定义颜色个数=2/3(Color selection is for 2 or 3)
		Flashing range 2	ON/OFF		OFF	
		Upper limit range 3		0..18m①	0m	
		Colour selection range 3	Red Green Blue No signalling		红 Red	LED灯指令=自定义(Signalling illuminated LED is for Custom) 自定义颜色个数=3(Color selection is for 3)
		Flashing range 3	ON/OFF		OFF	
		Connection password status	ON/OFF		OFF	连接设备(for PC APP only)
		Change password				连接设备(for PC APP only)

SETTINGS MENU NAVIGATION

AiW-4120 for Liquids setting menu



AiW-4120 for Liquids setting menu

Menu item: Level change rate (solid/liquid)

If the material in the tank is changing up and down rapidly, especially for the measurement of powders. When the emptying rate or filler speed > 0.1 m/min, it needs to be set according to this process condition. This parameter adjusts the radar device measuring speed to accommodate the rate of material change.
Level change rate value setup：

Slow: if material emptying rate or filler speed >0.1M/min
Middle: if material emptying rate or filler speed >1.0M/min
Fast: if material emptying rate or filler speed >10.M/min

When the liquid inside the tank is agitated or the blades interfere with the radar beam during the filling process. It is especially important to set this parameter.

Menu item: Large angle repose (solid)

When the solid material in the tank has a large angle of inclined stack angle or concave angle during the filling process and emptying process, this parameter needs to be enabled, for example, in the measurement application of highly viscous solid/granular and stony materials.

Menu item: Agitated surface (liquid)

If the surface of the liquid material in the tank fluctuates violently, such as boiling water or turbulent current, the parameter needs to be enabled.

Menu item: Powder/Dust (solid)

If there is a large amount of dust or fugitive dust or vapor in the tank, then the parameter needs to be activated.

Menu item: Foaming surface (liquid)

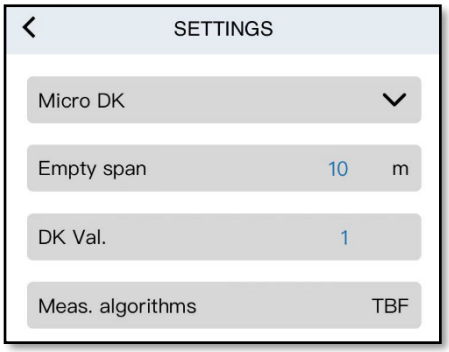
If there is a thin layer of foam on the surface of the liquid in the tank, the parameter needs to be enabled.
***Note**: Thick foam layers will seriously affect the accuracy and stability of radar measurements, and the AiW-4120 product is not suitable for applications with very thick foam. For thick foam measurement applications, ANL9080 or ANL9107 series are recommended.*

Menu item: Low D_K (solid/liquid)

If the dielectric constant of the material medium is in 2.0~6.0 scope, it is defined as a low (dielectric constant) **D_K** material. **Low D_K** materials will cause the radar receiving a less reflected echo.
In this case, it needs to be enabled this parameter.

Menu item: Medium➔ Micro D_K (liquid)

If the dielectric constant of the material medium is in 1.2~1.8/<2.0 scope, it is defined as a Micro (dielectric constant) **D_K** material. **Micro D_K** materials will cause the radar barely receiving an echo, the reflected echo will be extremely weak. In this case, the radar level transmitter needs to be using a special method to measuring medium level.



AiW-4120 radar level transmitters have two built-in special measurement methods: Prediction Echo Projection Shift Measuring (**PEP**) and Tank Bottom Following Echo Measuring (**TBF**).
When the liquid material **D_K** is less than 1.8, the radar needs to be configured to one of the built-in special measurement methods. (e.g. liquid nitrogen penetration measurement application)

NOTE:
It is important to provide accurate tank height (Empty span) and micro-dielectric constant (DK Val) values, as this will affect the accuracy of the measurement, so please provide as accurate data as possible.

Menu item: Meas. Algorithms (solid/liquid)

The Meas. algorithm selection is to guide the radar level transmitters software to identify the real echo strategy, so that it can correctly identify the real material surface echo (especially if there are many false echo waves in the tank or the secondary echo signal of the tank). For different tanks, silos, vessels and installation locations, we need to choose the right Meas. algorithm so that the radar level transmitters can complete the measurement reliably.

option	Description
First large echo(F)	It is proposed to select the first strongest echo, when there are several strong echoes.
Largest(L)	It is proposed to choose one of the strongest and best echoes. (i.e., echoes where the signal is always stable)
Area(A)	It is proposed to select an echo with the widest waveform and the largest coverage area. (i.e., signals with high echo energy)
(F) above TVT	It is intended to choose the small echo that appears first. (i.e., echoes on top of the filter curve)
Best of (F) and (L)	It is proposed to choose the most stable and reliable echo. (i.e., **F** and **L** have the largest statistical probability values)
Last Echo	It is proposed to choose the last echo.

Menu item: Damping

Damping refers to the physical phenomenon in which an oscillating or vibrating system delays the dissipation of energy over time, and damping employs logarithmic attenuation to reduce signal noise. When the current input variable (echo distance) changes, the radar level transmitter output must follow the update and change accordingly. The amount of time it takes for the radar level transmitter's output to reach 63.2% of the final stable value when the input variable value is abruptly changed. (i.e. damping time)
When the radar level transmitter is operating, if it is not possible to stably capture the true echo signal and bounce back and forth, it is necessary to adjust the damping time factor (damping time), and the echo peak time is equal to half of the damping oscillation period.

Menu item: Range

The radar level transmitter has a maximum measuring range, which is the absolute range parameter of the device. In practice, it can be adjusted to the desired range according to actual needs, e.g. the range can be configured to the height range of the tank (not more than the absolute range).
Note: Range is the maximum distance from the reference point, within which any echo should be considered valid.

Menu item: Near blanking

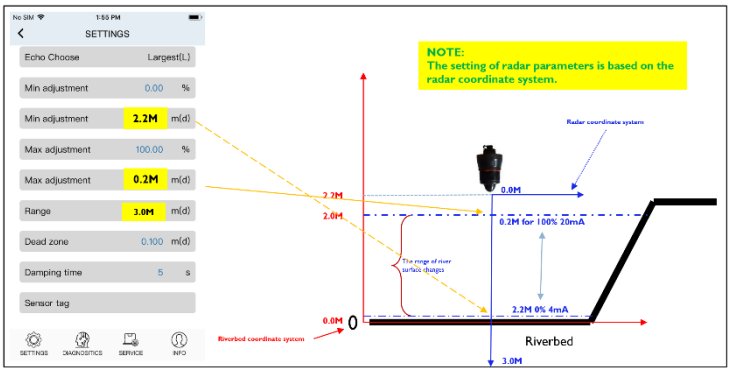
In order to get the correct measurement result, it is necessary to set the scale range of the radar level transmitter, and when there is a fixed obstacle near the distance of the radar level transmitter surface to interfere with the measurement and the height does not reach the obstacle, the blind zone setting function can be used to avoid measurement errors.
Near blanking (dead zone): The range in front of the device (referenced from the flange down surface) within which any echoes will be ignored.

Menu item: Max./Min. adjustment

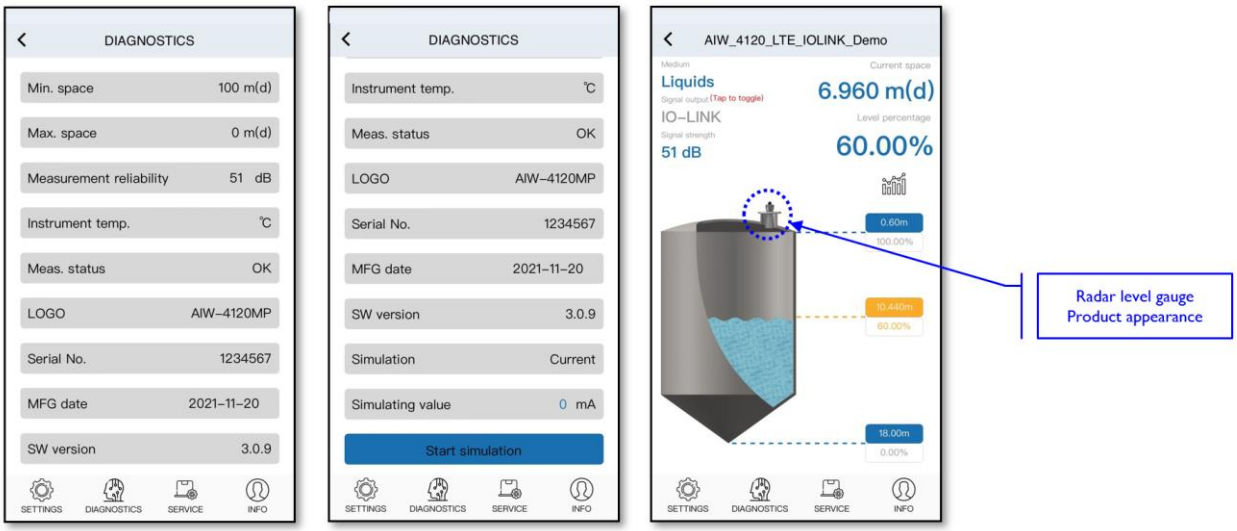
Set the effective measuring range of the radar level transmitter for level measurement. When the material level variation scope is in this range, the radar level transmitter outputs the corresponding percentage value (in the form of 4-20mA current).

However, when the material changes beyond this range, an alarm will be triggered and an alarm current signal will be output. (20.5mA /or 22mA, etc. See Menu: Failure Modes)

The setting of Max. adjustment and Min. adjustment parameters is to determine the linear correspondence between the distance position and the percentage value, and the data of 2 points is entered to determine.



DIAGNOSTICS MENU NAVIGATION



The diagnostic menu is used to check and judge the operational health of the radar level transmitter, and the 4-20mA version also has an output current check (simulation) function.

INFO item: Max./Min. space

Logging the Max. and Min. space values of the radar level transmitter, which have occurred so far when it was turned on and running until now.

INFO item: Meas. reliability

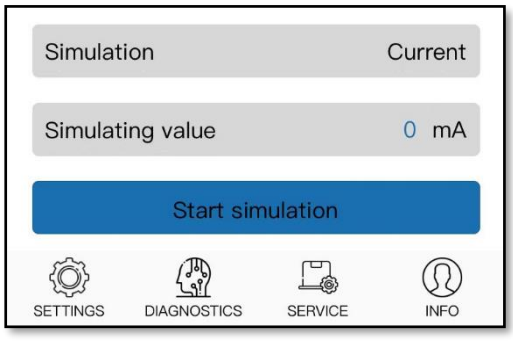
The reliability of the radar echo signal in the current running radar level transmitter. Generally, the reliability value is <10dB, which means that the echo signal is weak, between 10dB~40dB indicates that it is an acceptable echo signal, and the value >40dB (maximum: 150dB) indicates that the echo signal is very good.

INFO item: Device Temp.

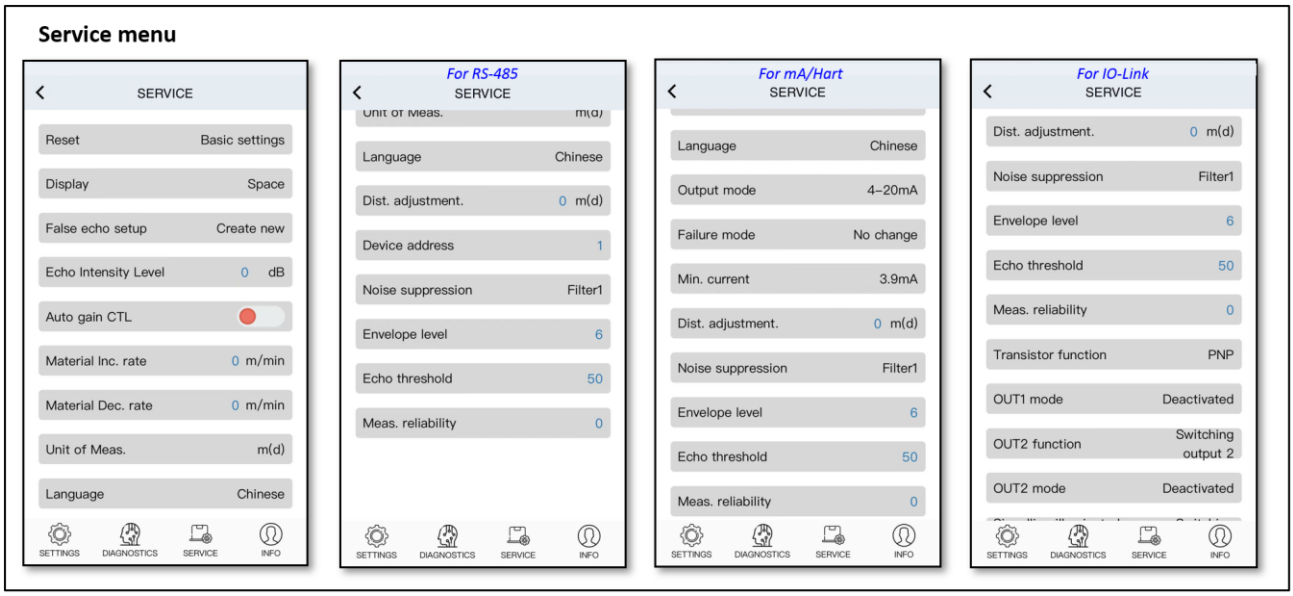
Logging the inside main circuit board and/or the microwave port current temperature of the running radar level transmitter.

INFO item: Simulating Value (for mA or mA/HART version)

Running the 4-20mA output current to check (simulation) function.



SERVICE MENU NAVIGATION

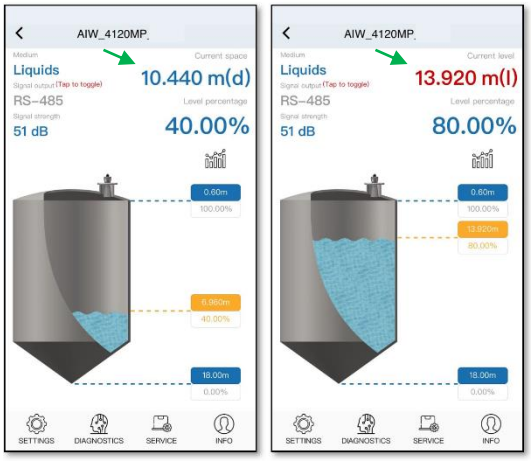


Menu item: Reset

Basic settings: Reset the parameters of the menu: Settings Menu items to the factory initial value.
Factory settings: Reset the parameters of menu: Settings Menu & Service Menu items to the factory initial value.

Menu item: Display

Configuring the physical quantities and units displayed on the main GUI interface. (e.g. as shown in the image on the right)



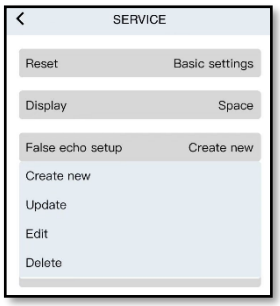
Menu item: Auto gain CTL

Enables radar self-adjusting signal gain, when the reliability val. of the radar echo signal is less than 40dB. Factory setting is ON.

Warning:

*When the **Auto gain CTL** function is enabled, the **Echo intensity level** function will be disabled.*
*In applications with agitation or turbulent processes, it is not recommended to turn on the **Auto gain CTL**.*

Menu item: False echo setup

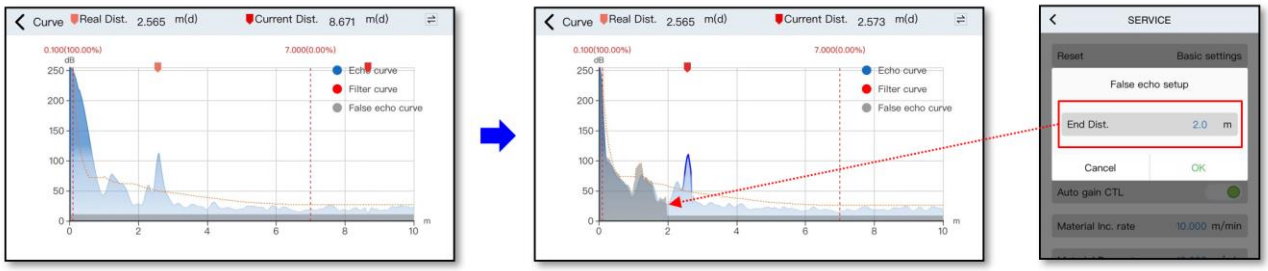


In radar level measurement applications, it is common to encounter echo reflections (known as false echoes) from structural parts in the tanks(vessels), which can interfere with radar recognizing the real echo of medium level.

In order to ensure radar level transmitter measuring correctly, it is necessary to shield and suppress some false echoes (that is, the shape and position of the false echo will be marked in the echo curve).
Item: Fake Echoes Setup including: '**Create new, Update, Edit, Delete**'.

False echo: Create new

Establish a false echo noise shielding zone from distance *0.0M* to a specified distance point, the setting is suitable for shielded multi-clutter echo noise at the near the radar antenna area.
When the setting is completed, the radar level transmitters software system will establish a shielding zone based on the noise statistics of the signal in this area. (as shown in the figure on the right)
Example*:* Establish a [0.0...2.0m] distance zone

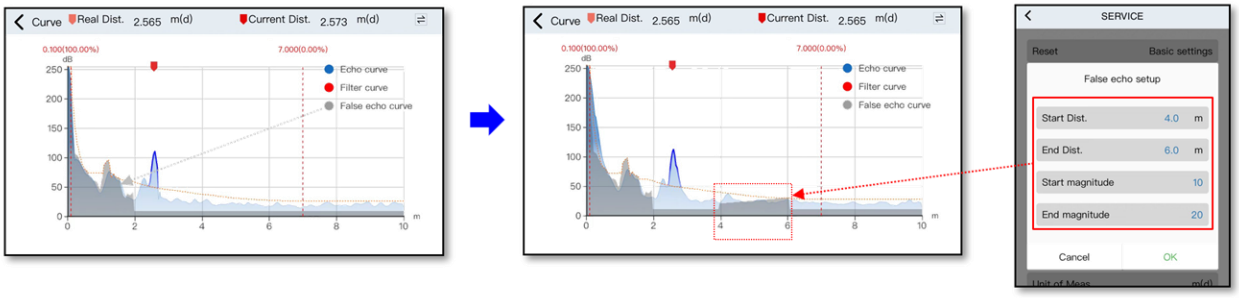


False echo: Update

Creating a newly false echo zone which from distance *0.0M* to a specified distance point too, then merge operate the previous false echo zone. (it created by the 'False echo: Create new' setup before)
When the setting is completed, the radar level transmitters software system will reconstruction a shielding zone based on the newly noise statistics of the signal in this area, then merge operate the previous false echo zone.

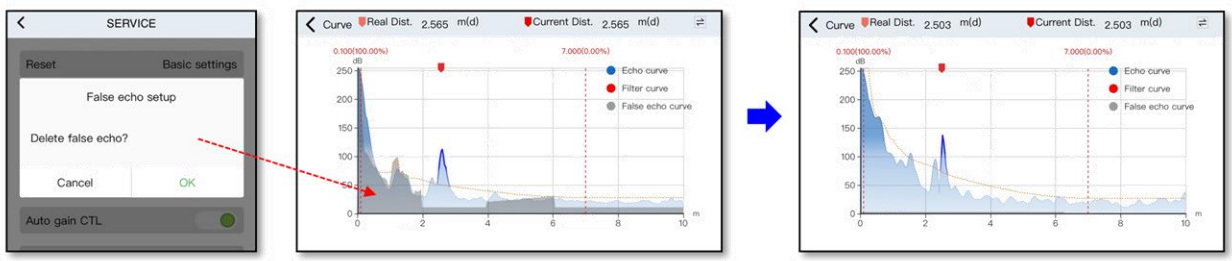
False echo: Edit

At any Distance zone [*(Start Dist., Start magnitude), (End Dist. End magnitude)*] within the radar level transmitters' range, to establishes a false echo interval. By Setting several *'Edit's*, you can define different shapes of false echo shielded shapes.
Example*: edit a new false echo zone: {(2.0m,10dB), (6.0m, 20dB)}*



False echo: Delete

Clear all saved false echo interval in the radar level transmitters.

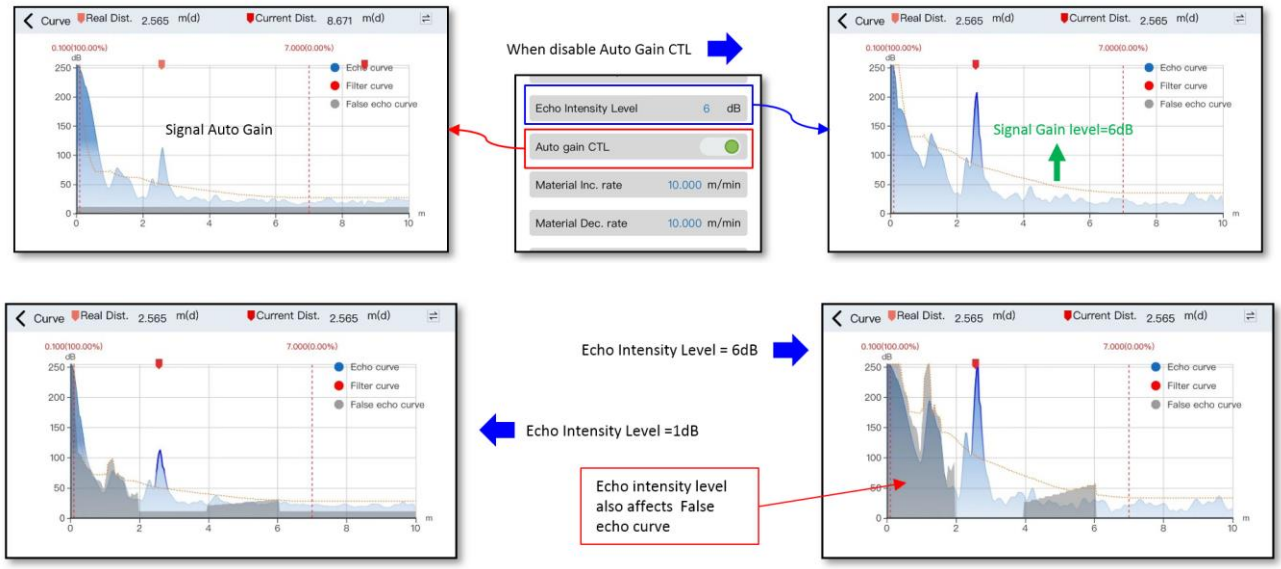


Menu item: Echo intensity level (dB)

The echo intensity level is the gain factor that adjusts the echo signal. Factory setting is 0dB. *(Val. range: 0...9dB, form Weak to Strong)*

NOTE: *Before to setting the **echo intensity level** function, make sure to close the **Auto gain CTL** function.*

Example:



Menu item: Envelope level

This parameter is CFAR threshold coefficient, it will adjust the position of the Filter curve line, the factory setting is 6% (depending on the product model). If the real echo signal is too small and will be not finding this real echo when it is submerged under the Filter curve line, then the **Envelope level** parameter can be reduced to make the real echo signal visible.

Example:

Menu item: Echo threshold

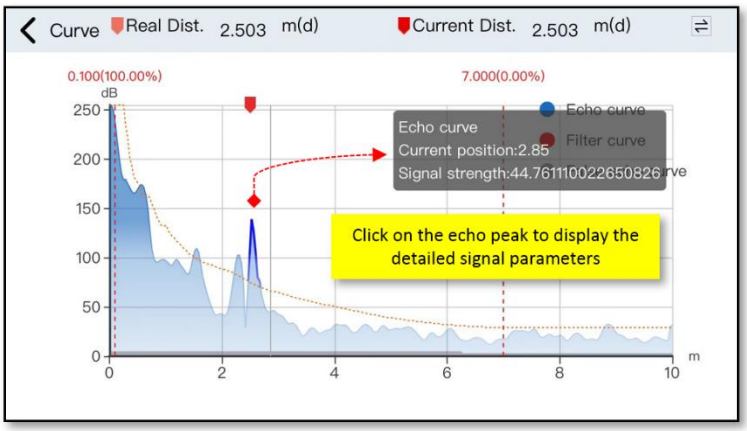
Setting Echo threshold (Scope: 0…99, Factory setting is 50%, It is a signal-to-noise ratio weighting factor). When there are multiple strong echoes during the radar level transmitters measuring process, the radar will analyses the echo feasibility & credibility index according to the Echo threshold evaluation parameters, then determining which is the possible real reflection echoes from the medium surface, and which are the noise echoes (the peak of the echo amplitude that is less than Echo threshold x SNR) can be discarded.

(e.g. when there are secondary reflection echoes in tank etc.)

Menu item: Meas. reliability

The echo reliability threshold, which is real echo signal reliability and stability evaluation factor, is used by the radar level transmitter firmware to determine the stability parameter index of the echo signal, and the internal algorithm of the radar will self-adjust the energy and sensitivity of the radar transceiver signal according to this index.

Meas. reliability Factory setting 0, range 0...99



Warning: *it is recommended that the user does not need to modify this technical parameter.*

Menu item: Output mode

Setting transmitter current output 4-20mA ➔ 0~100%, or 20-4mA ➔ 0%~100%

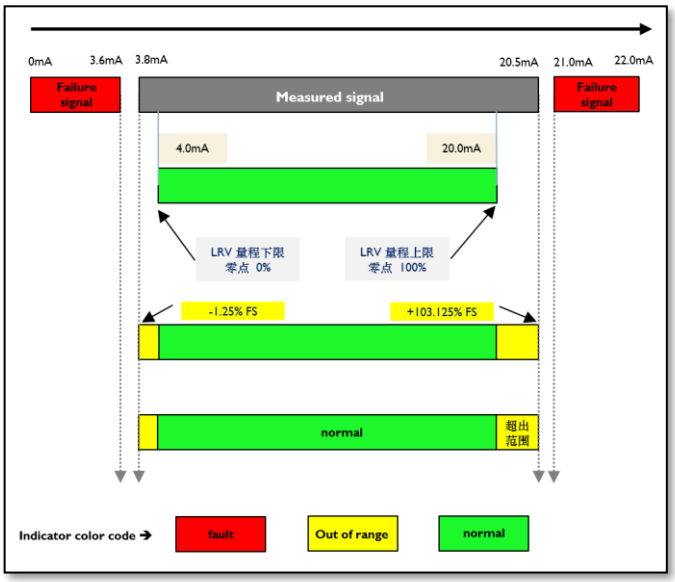
Menu item: Failure mode

When an alarm or fault state occurs in the radar level transmitter, specify an output value of the loop current. When the measured level value is out of the 0~100% range, or overflow out of bounds (@alarm state), or when the radar does not find an echo (called ***lost echo state***), the mA current output will be set by this parameter, and the radar level transmitter will output the corresponding value.
The mA current output scope: *'No change', 20.5mA, 20mA, and 4mA*.
'No change' indicates that the current output remains unchanged at the current value.

Menu item: Min. current

The Min. current parameter is the minimum value that limits the radar level transmitter output current, which can be configured by the user according to the application environment (default: 4mA)

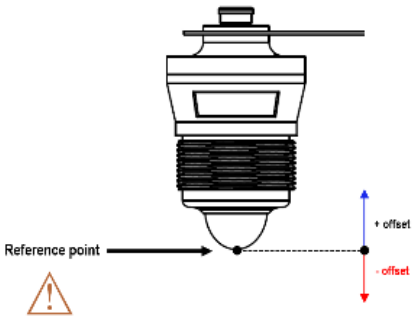
If the radar level transmitter needs to compatible with the **NAMUR** NE43 protocol, to be set to 3.6mA or 3.8mA, as the percentage output value (<0.00%) is allowed to be negative.



NOTE: NE 43 *defines that a current signal consists of a measurement signal and a fault signal:*
Measured signal current range: 3.80mA~20.50mA
The current range of the fault signal is divided into two parts:
- *High fault current: > = 21.000mA*
- *Low fault current: =< 3.600mA*
- *0.0mA indicates that the supply cable is disconnected, the transmitter is missing, and the power supply fails*

Menu item: Dist. Adjustment

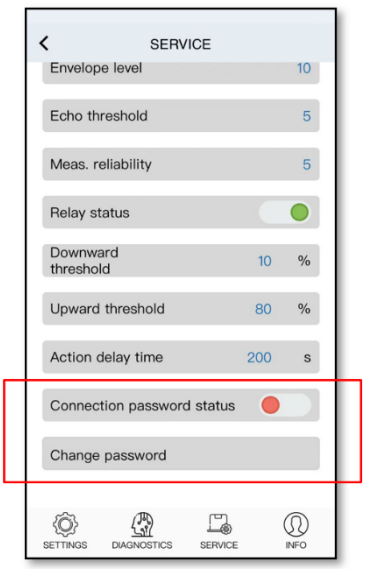
Adjust the distance reference point position.
For the ANL/AiW-4120 products, the factory setting: the reference point is set at the position of the apex of the antenna lens by default.



Menu item: Connection password

This function set a Bluetooth connection password for a radar level transmitter, and when the connection password status is turned on, the mobile device needs this password to connect to the radar level transmitters.
The initial password for the Bluetooth connection: 123456

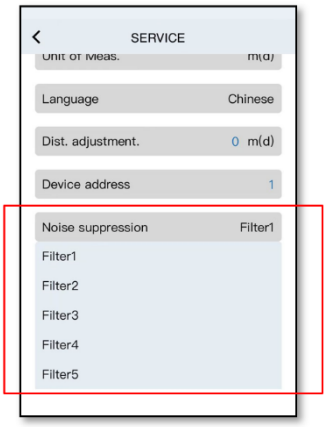
NOTE: *KEEP A RECORD OF THE PASSWORD. Otherwise, you will not be able to communicate with this device without entering the correct connection password next time.*



Warning:
If you forget the password, you will no longer be able to connect to the radar level transmitter and you will need to contact the seller to solve the problem.

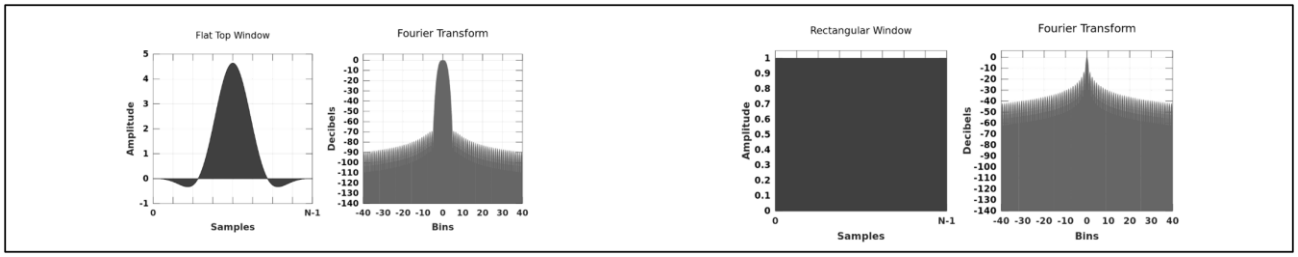
Menu item: Noise suppression (only for mA/HART Pro. version)

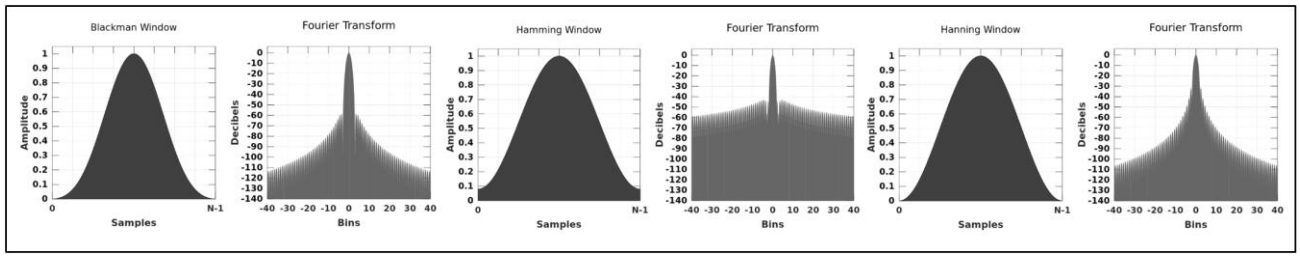
Noise suppression setting a window sequence is a finite impulse response (**FIR**) filter in structure. In radar level transmitters measuring applications, depending on the material and radar echo characteristics, the required window function type needs to be configured.



A window function provides a weighted selection of a portion of a time waveform for fast Fourier transform (FFT) analysis of the ANL-4120 radar level transmitters.

Range	Description	Factory setting
Filter1	Hanning Window	*
Filter2	Hamming Window	
Filter3	Blackmam Window	
Filter4	Flat top Window	
Filter5	Rectangle Window	





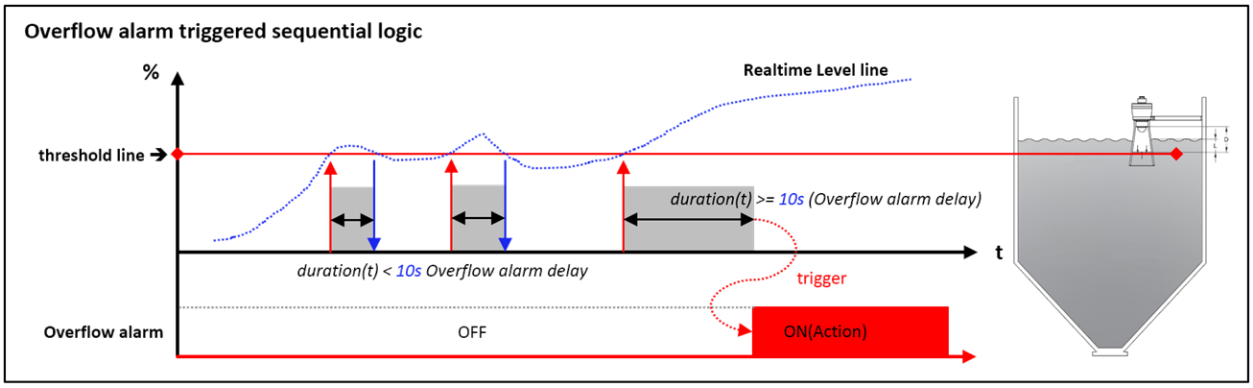
Warning:

This setting is suitable for professional users, and general users are advised to configure it with caution.

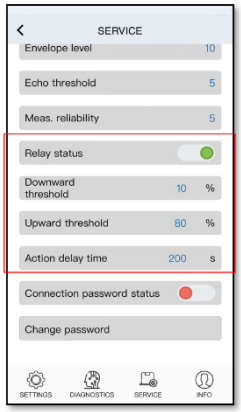
Menu item: Overflow setup (option, for with Spill proof function)

Overflow setting parameters:

item	Range	Factory setting
Overflow alarm	ON(Action) / OFF	OFF
Overflow alarm delay	0..65535s	10s



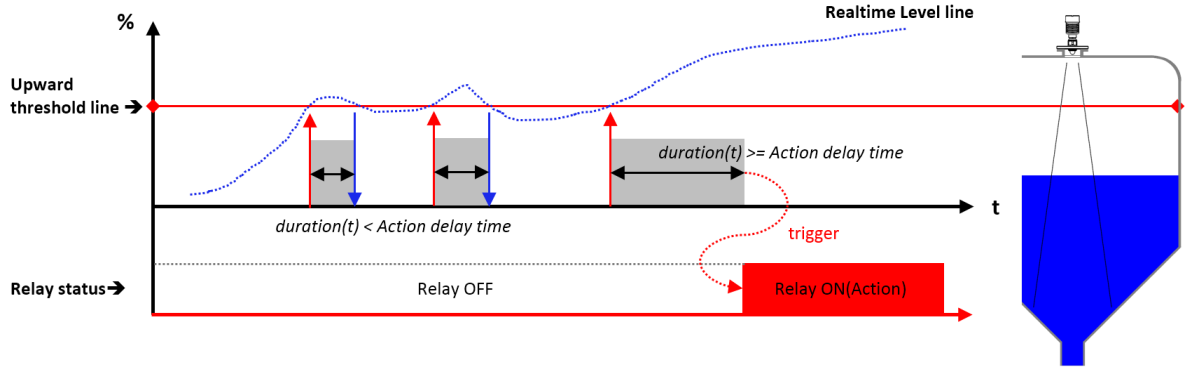
Menu item: Relay setup (option, only for with Relay function)



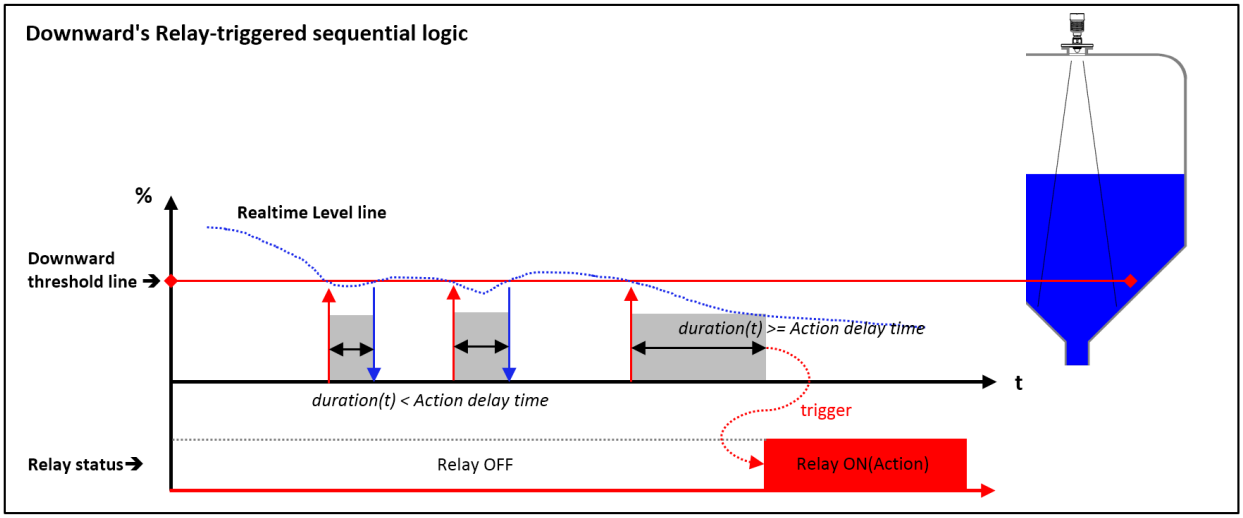
Relay setting parameters:

item	Range	Factory setting
Relay status	ON(Action) / OFF	OFF
Downward threshold	0..100%	0%
Upward threshold	0..100%	0%
Action delay time (Trigger the timer)	0 ... 600 s	0 s

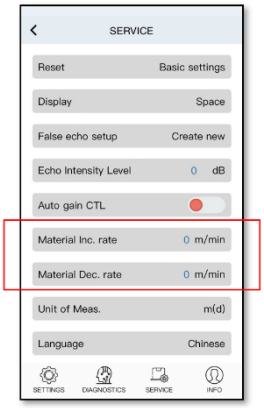
Upward's Relay-triggered sequential logic



Downward's Relay-triggered sequential logic



Menu item: Material Inc./Dec. rate

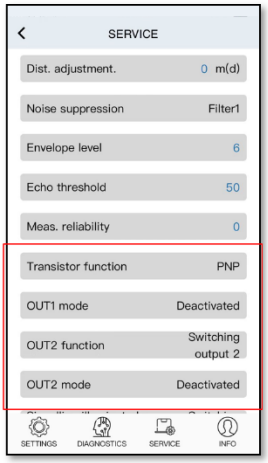


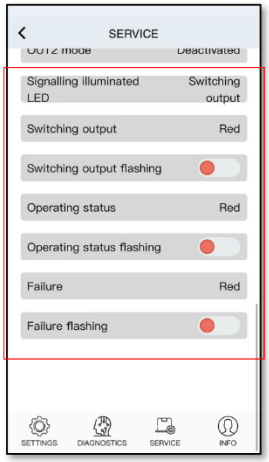
Setting the level change rate, which provides level dynamic prediction for the ANL/AiW-4120 radar level transmitters.

item	Range	Factory setting
Material Inc. rate (Medium filling rate)	0.001 ... 99.0 m/min	0.000 m/min
Material Dec. rate (Medium emptying rate)	0.001 ... 99.0 m/min	0.000 m/min

Menu item: Transistor function (only for IO-Link version)

Setting SW1/2 out type PNP/NPN.
Factory setting PNP.





Menu item: OUT1/2 Mode (only for IO-Link version)

OUT MODE	OUT 1		OUT 2	
	Range	Factory setting	Range	Factory setting
OUT1 mode OUT1 switching point 1/2	Deactivated/Single point/Window/Two-point 0 ...18M	Deactivated (0.0 M, 0.0 M)		
OUT1 logic OUT1 switching delay	NO / NC 0.000s ~ 600s	NO 0.0s		
OUT1 reset delay OUT1 Schmidt hysteresis	0.000s ~ 600s 0 ...18M	0.0s 0.0 M		
OUT2 function			Switching output 4-20mA Current output	Switching output
OUT2 mode OUT2 switching point 1/2			Deactivated/Single point/Window/Two-point 0 ...18M	Deactivated (0.0 M, 0.0 M)
OUT2 logic OUT2 switching delay			NO / NC 0.000s ~ 600s	NO 0.0s
OUT2 reset delay OUT2 Schmidt hysteresis			0.000s ~ 600s 0 ...18M	0.0s 0.0 M

Menu item: Signaling illuminated LED (only for IO-Link version)

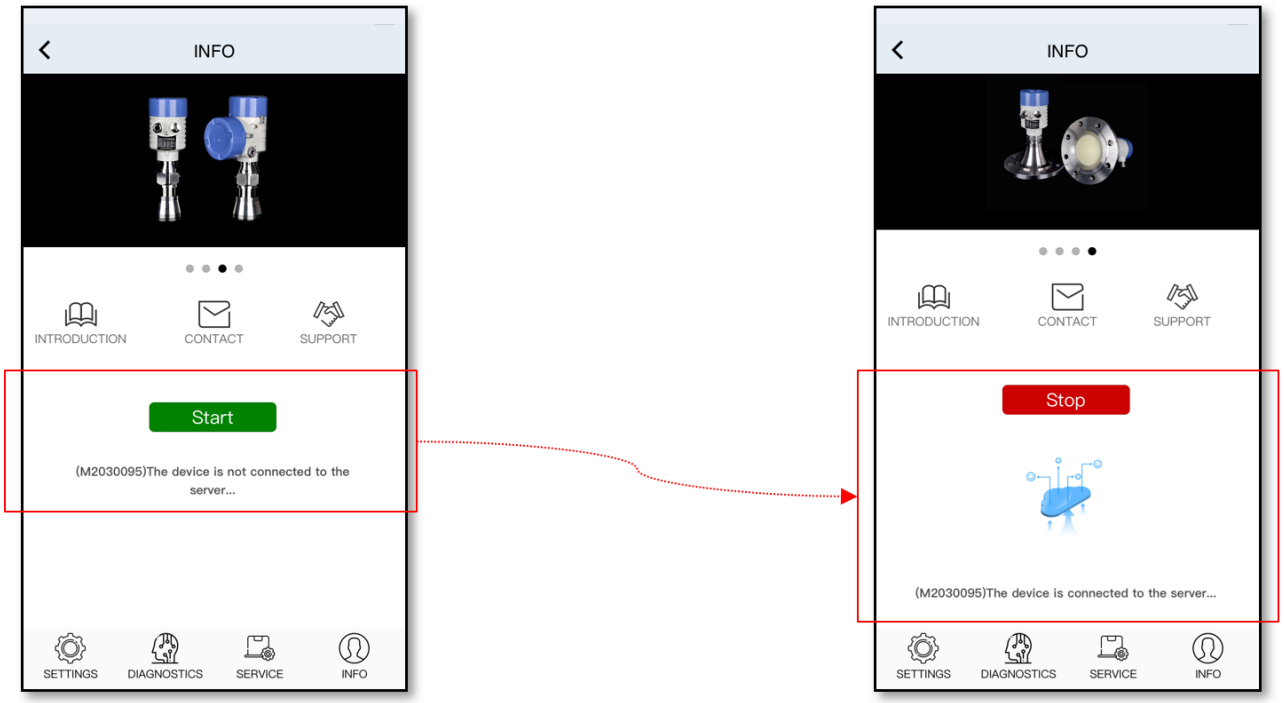
Signaling illuminated LED	Switching output (Factory setting)		Custom	
	Range	Factory setting	Range	Factory setting
Switching output	Red /Green /Blue /No signaling /Flashing	Red / Flashing OFF		
Operating status	Red /Green /Blue /No signaling /Flashing	Red / Flashing OFF		
Failure	Red /Green /Blue /No signaling /Flashing	Red / Flashing OFF		
Color selection range			1 / 2 / 3	1
Color selection range 1 Upper limit range 1			Red /Green /Blue /No signaling /Flashing 0 ...18M	Red / Flashing OFF 0.0 M
Color selection range 2 Upper limit range 2			Red /Green /Blue /No signaling /Flashing 0 ...18M	Red / Flashing OFF 0.0 M
Color selection range 3 Upper limit range 3			Red /Green /Blue /No signaling /Flashing 0 ...18M	Red / Flashing OFF 0.0 M

INFORMATION MENU NAVIGATION

How to turn on a remote technical service connection

In the process of commissioning the radar transmitter in the field, if the user encounters problems or difficulties that cannot be solved. The remote debugging function can be turned on, and a remote technical engineer can directly modify and debug the parameters of the equipment. If the user needs this on-site real-time technical assistance service, click the technical support icon on the right side of the screen to open the mobile network cloud service connection, and the remote technical engineer can directly debug the parameters of the field equipment.

Warning: *Before initiating this assistance, the user needs to contact the manufacturer's technical support engineer in advance to make an appointment. When remotely connecting to radar equipment, the on-site mobile phone (as a communication relay terminal) needs to remain awake from work. Once commissioning is complete, the on-site user can terminate the connection process. (as shown in the figure below)*

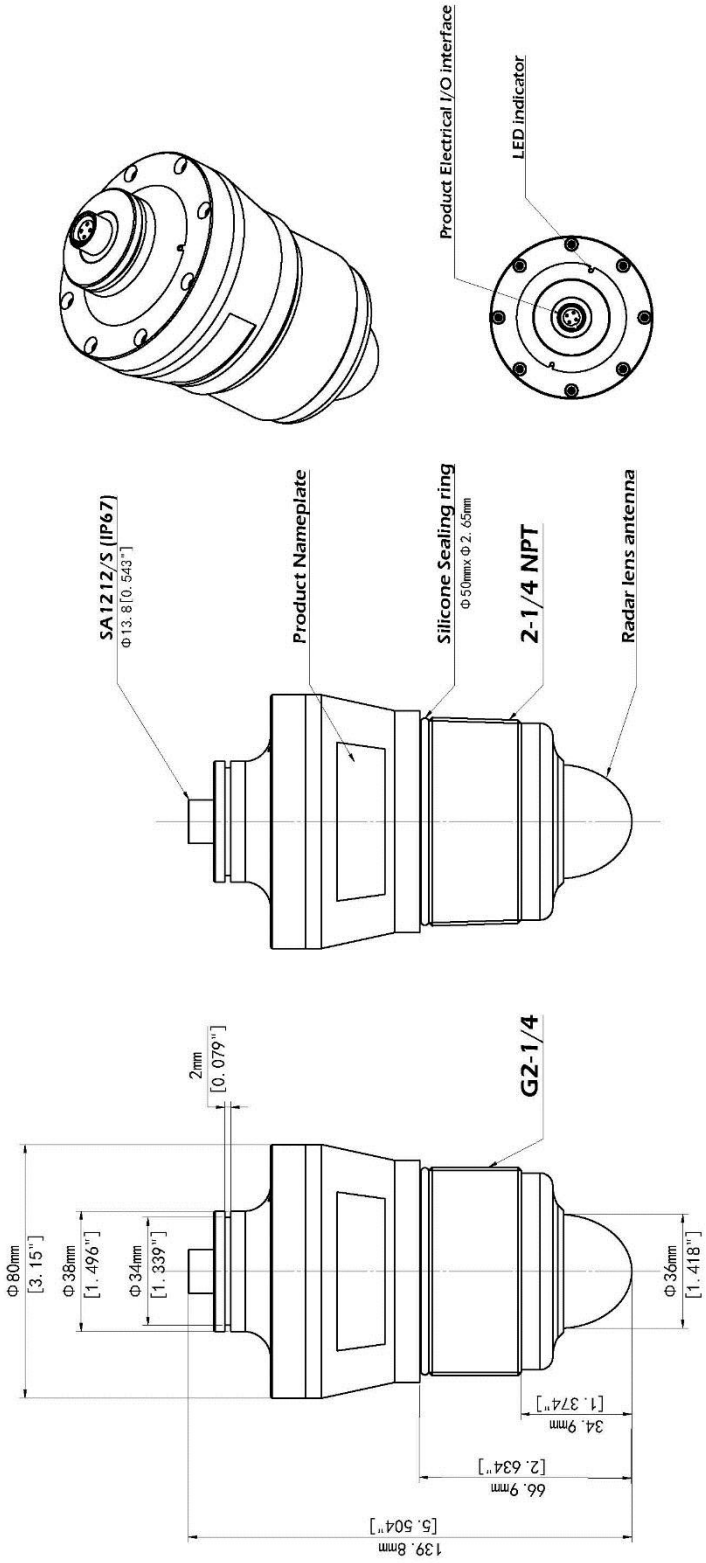


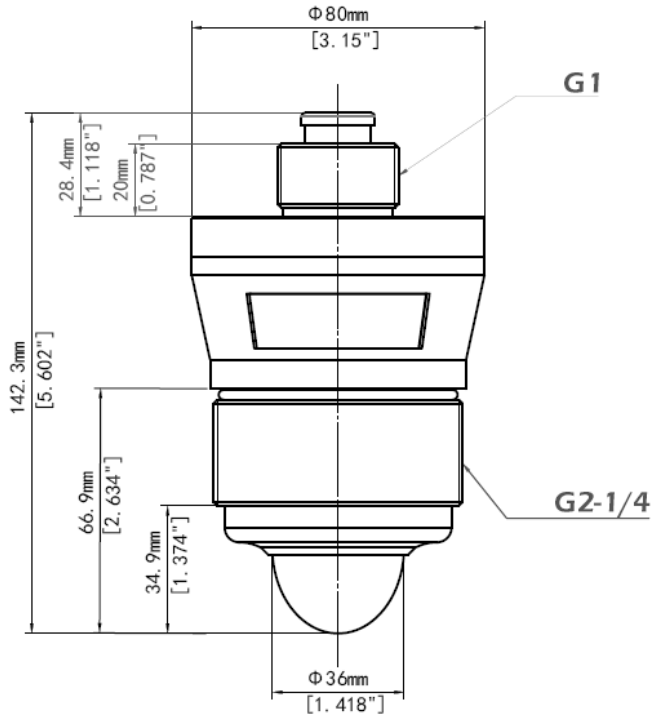
SYSTEM RUNNING FAULT CODES

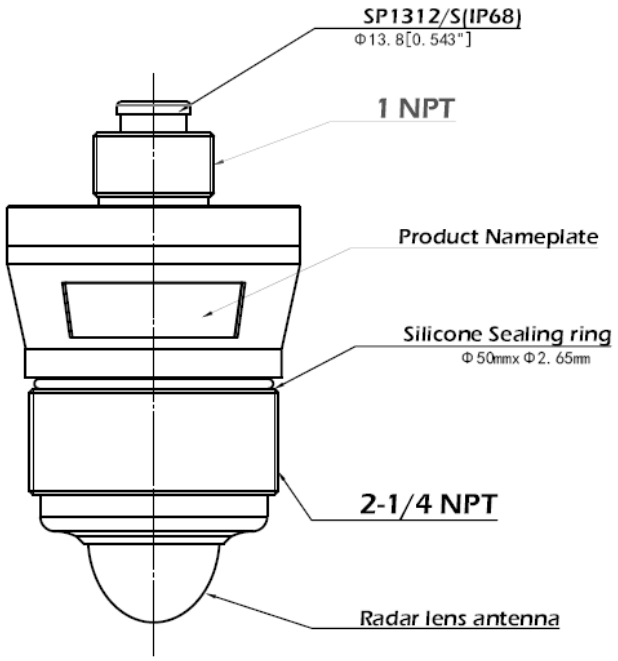
故障显示代码表 System_Running_Fault_Code Table			
NOTE: 如果同时发生多项运行故障，显示模块按故障的严重程度进行排序显示。 If multiple running faults occur at the same time, the LCD display module will sort and display according to the severity of the faults.			帮助信息 Help Information
严重故障 Critical Fault	Err15	产品硬件系统数据通信异常 The signal communication of the product hardware circuit is abnormal	设备部分功能损坏，需要联系厂家。 The function of the device is partially damaged, and the manufacturer needs to be contacted.
	Err11/Err12	产品硬件系统关键电压异常 The voltage of the key circuit in the hardware system is abnormal.	预计设备可能损坏，需要联系厂家。 It is expected that the equipment may be damaged and the manufacturer needs to be contacted.
	Err18	产品射频部件工作状态异常 The running state of the radio frequency components has a random failure phenomenon.	设备存在较严重的随机性干挠或损伤(过压/运行温度错过允许范围/雷击/强电磁干挠等)，联系技术支持人员。 There may be serious random interference or damage to the device (overvoltage / operating temperature missing the allowable range / lightning strike / strong electromagnetic interference, etc.), contact technical support engineer.
	Err25	射频传感器信号存在干挠 There is interference signal in the RF sensor signal.	设备存在干挠或系统参数错误 联系技术支持人员。 If the device is slightly dry or the system parameters are wrong, contact technical support engineer.
	Err14	雷达回波信号可靠性低于标准要求 The reliability of the radar echo signal is lower than the standard value.	设备参数设置错误，需要重新配置参数，或联系技术支持人员。 The device parameters are set incorrectly, you need to reconfigure the parameters, or contact technical support engineer.
	Err17	运行日志数据读写校验错误 Running log data read/write checksum error.	设备运行存在干挠引发错误，运行数据保存部分丢失，联系技术支持人员。 There is an error caused by interference during the operation of the equipment, and the saved part of the operation data is lost. Contact the technical support engineer.
	Err16	产品内部电路板温度值超出范围 The temperature value of the internal circuit board of the product is out of range.	设备温度超出许可范围，检查运行环境温度是否超出允许范围。 The device temperature is out of the allowable range, check whether the operating ambient temperature is out of the allowable range.
轻微故障 Minor Fault	Err13	HART/RS485/BT/Lora 通信协议出现随机错误 Random errors with HART/RS485/BT/Lora communication protocol	设备与外部的通讯数据发生错误，可能由通讯线路引起或连接线脱落故障。 There is an error in the communication data between the device and the outside, which may be caused by the communication line or the connection line is disconnected.
	Err22	系统数据密钥读写异常 System_Data_Encryption_Key read/write exception.	系统数据保护密码丢失，联系技术支持人员。 If the system data protection password is lost, contact the technical support engineer.
	Err23	软件固件数据读保护错误 Software firmware data read protection failed	系统软件代码固件被篡改，联系技术支持人员。 System software code firmware has been tampered with, contact technical support.
	Err24	显示模块数据通信错误 Display module data communication error	显示器部件存在故障，联系技术支持人员。 Faulty display unit, contact technical support.

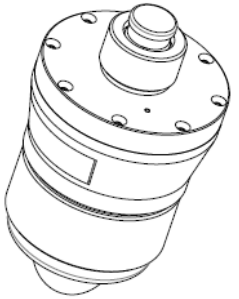
DIMENSIONAL DRAWINGS

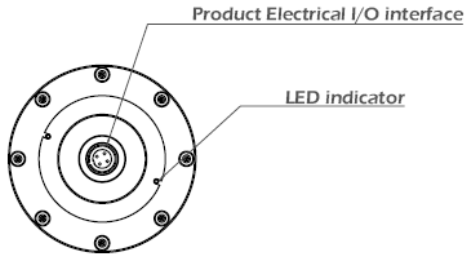
ANL/AIW-4120MP (G2-1/4)



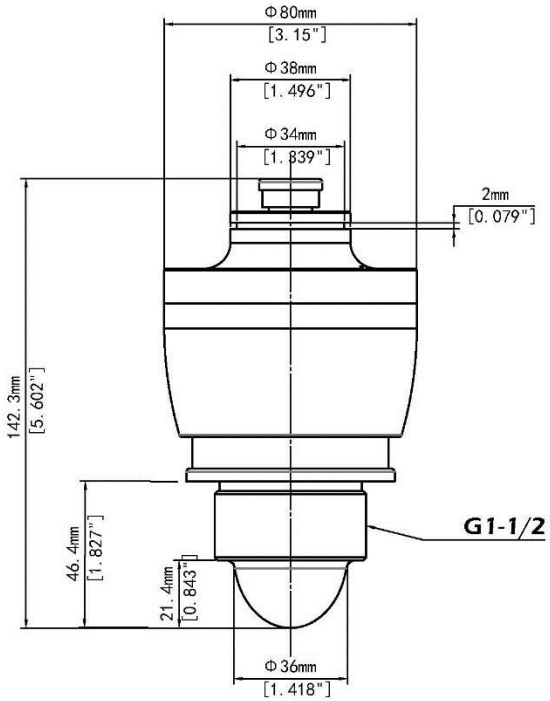

Φ80mm
[3. 15"]
G1
28. 4mm
[1. 118"]
20mm
[0. 787"]
142. 3mm
[5. 602"]
66. 9mm
[2. 634"]
34. 9mm
[1. 374"]
G2-1/4
Φ36mm
[1. 418"]

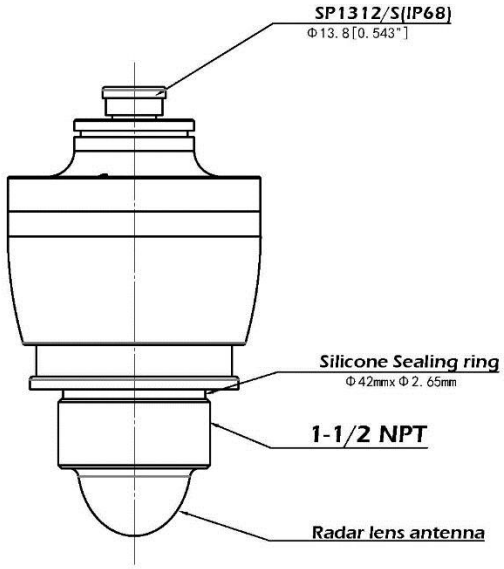

SP1312/S(IP68)
Φ13. 8[0. 543"]
1 NPT
Product Nameplate
Silicone Sealing ring
Φ50mmx Φ2. 65mm
2-1/4 NPT
Radar lens antenna

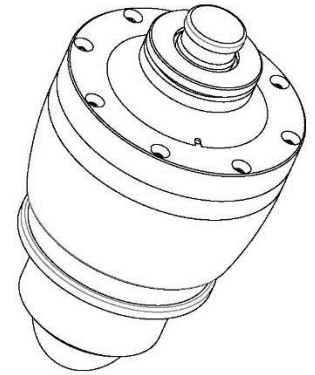


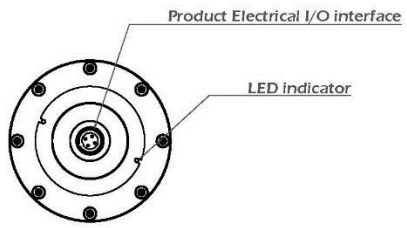

Product Electrical I/O interface
LED indicator

ANL/AIW-4120MC (G1-1/2)



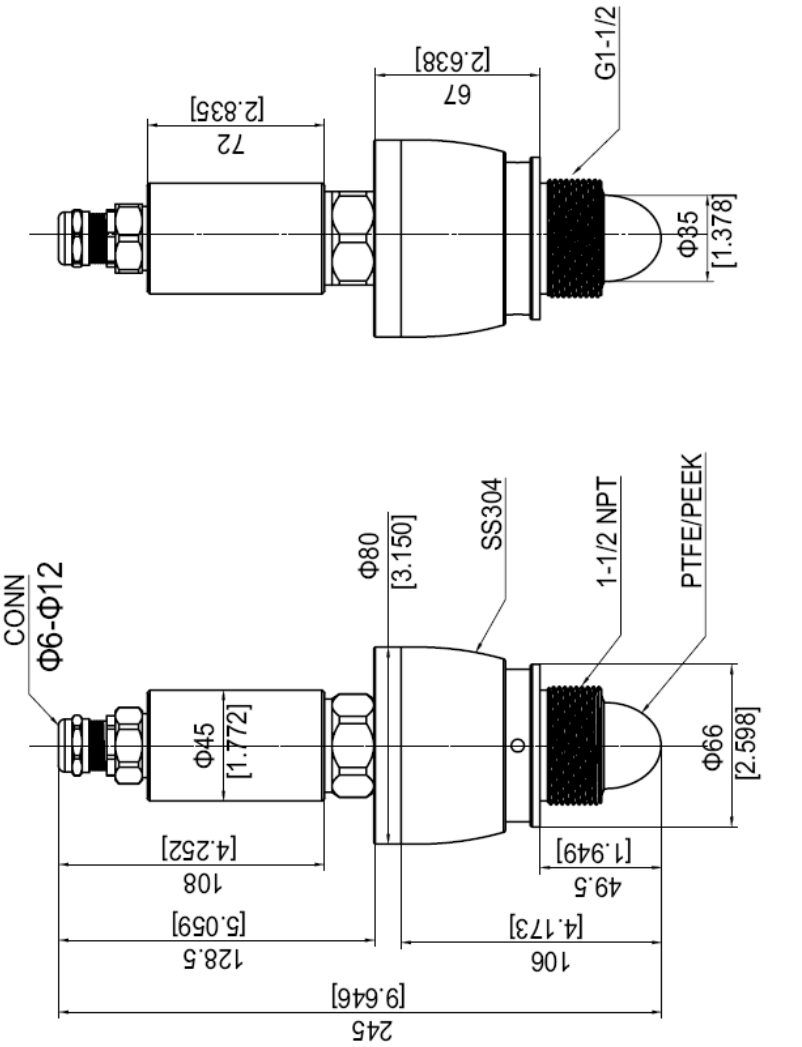




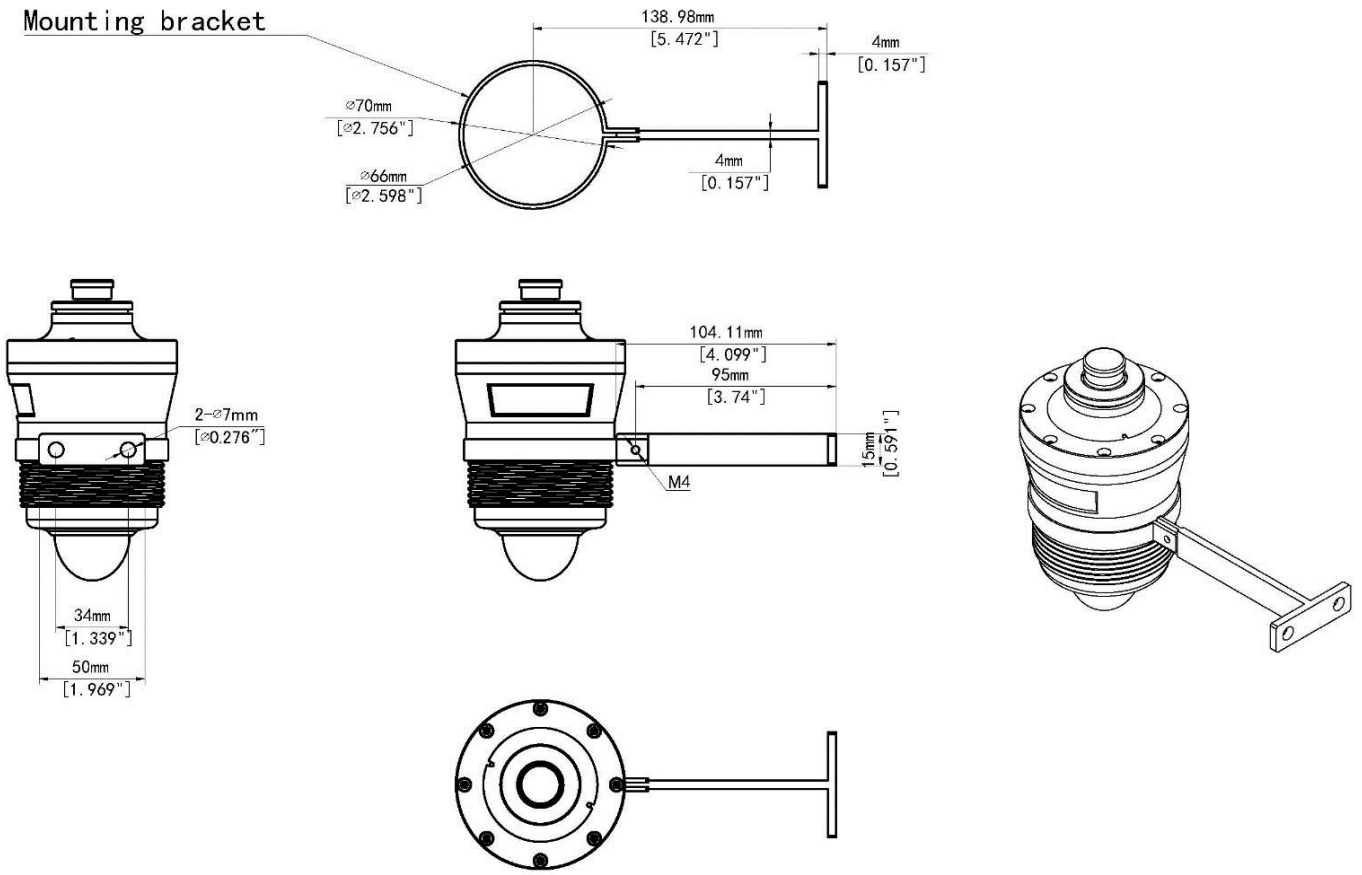


AIW-4120MC (G1//G1-1/2)

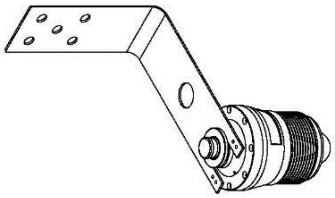
AIW-4120MX (G1//G1-1/2)

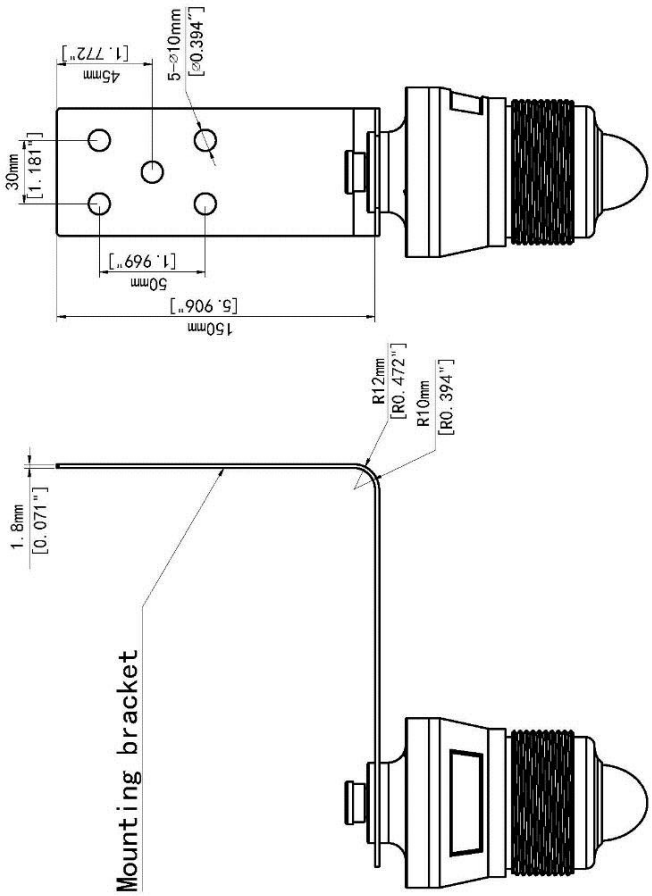


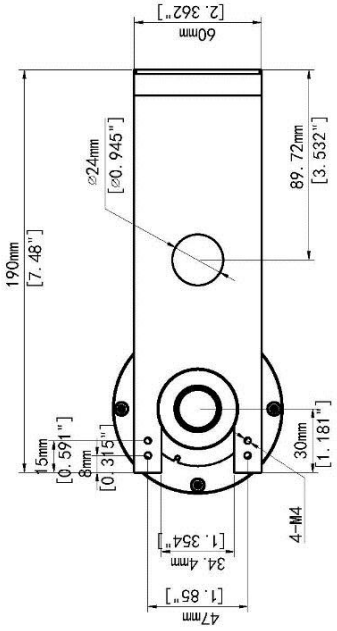
Mounting bracket X1



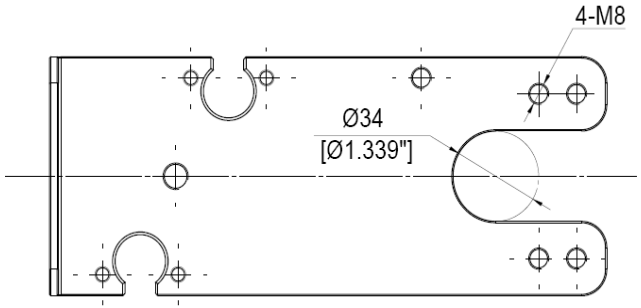
Mounting bracket X2

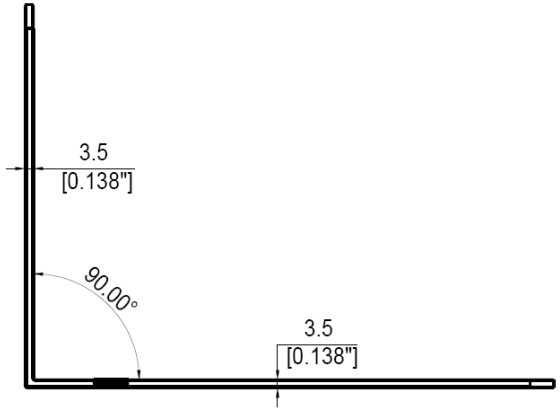


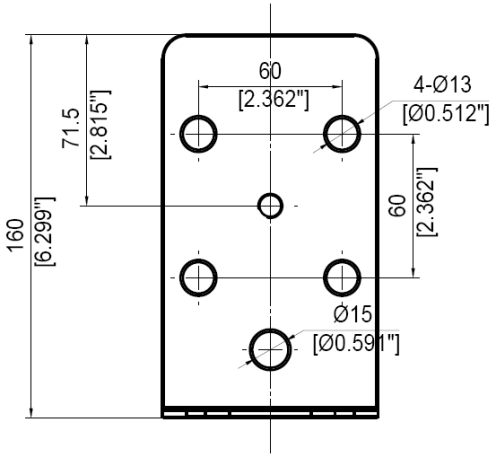


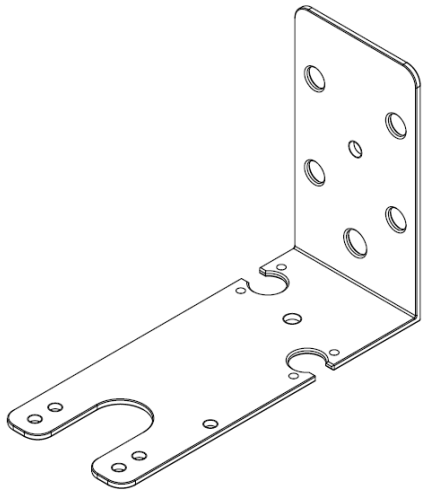


Mounting bracket X4

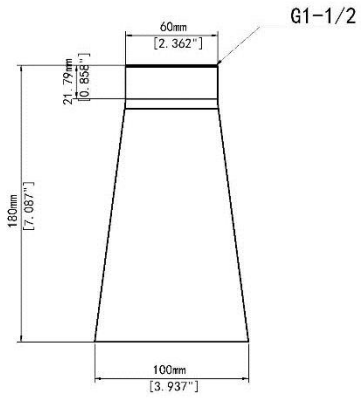


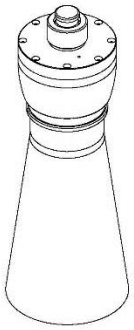


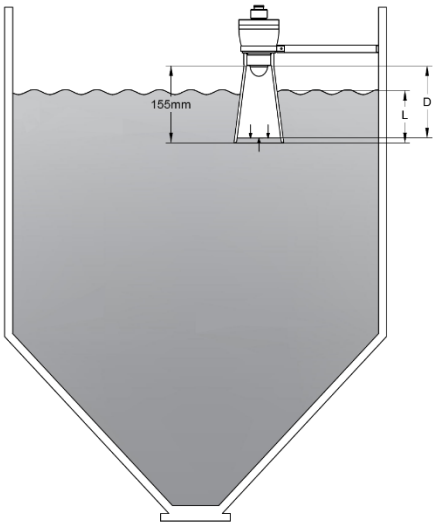




Spill cover X3 (AiW-4120MC/MK)







ORDERING INFORMATION

The ordering code contains detailed information about the specifications of each ANL/AiW-4120 radar level transmitter products.
Please note that the annual subscription code is subject to change, please contact your regional sales representative to confirm.

Here's an example of a typical ordering code:

AiW-4120MC	*-R-G-N*
1	**2**

1. Required model components (choices available on most)
2. Additional options (variety of features and functions that may be added to products)

AiW-4120 Liquid Application Version

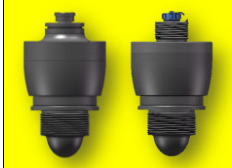
Ordering Codes ANL-4120MP Liquid version 订货编码

AiW-4120MP	1	2	3	4	5	6	NOTE
LIQUID VERSION	R						RS485 WITH MODBUS
	D						SDI-12 CUSTOMIZED
	K						IO-LINK
	A						4-20MA ONLY
	H						4-20MA / HART7
		G					UNDER THREADED CONNECTION G2-1/4
		N					UNDER THREADED CONNECTION 2-1/4 NPT
			R				UPPER REED CONNECTION ϕ34MMX2
			T				UPPER THREADED CONNECTION G1
				10M			RANGE 10M
				18M			RANGE 18M
				30M			RANGE 30M
				40M			RANGE 40M FOR HART VERSION ONLY
					S		HOUSING MATERIAL POM
					P		HOUSING MATERIAL PTFE
							NA

Sample :

AiW-4120MP-R-G-R-10M-S	LIQUID VERSION, RS485, G2-1/4, UP REED, RANGE 10M, POM HOUSING

Ordering Codes ANL-4120MC Liquid version 订货编码

AiW-4120MC	1	2	3	4	5	6	NOTE
LIQUID VERSION	R						RS485 WITH MODBUS
	D						SDI-12 CUSTOMIZED
	K						IO-LINK
	A						4-20MA ONLY
	H						4-20MA / HART7
		G					UNDER THREADED CONNECTION G1-1/2
		N					UNDER THREADED CONNECTION 1-1/2 NPT
			R				UPPER REED CONNECTION ϕ34MMX2
			T				UPPER THREADED CONNECTION G1
				10M			RANGE 10M
				18M			RANGE 18M
				30M			RANGE 30M
				40M			RANGE 40M FOR HART VERSION ONLY
					S		HOUSING MATERIAL POM
					P		HOUSING MATERIAL PTFE
						F	WITH OVERFILL FUNCTION

Sample :

AiW-4120MC-A-G-R-10M-S	LIQUID VERSION, 4-20MA, G1-1/2, UP REED, RANGE 10M, POM HOUSING

ANL-4120 Solid Application Version

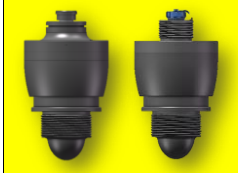
Ordering Codes ANL-4120MP Solid version 订货编码

ANL-4120MP	1	2	3	4	5	6	NOTE
SOLID VERSION 	R						RS485 WITH MODBUS
	D						SDI-12 CUSTOMIZED
	K						IO-LINK
	A						4-20MA ONLY
	H						4-20MA / HART7
		G					UNDER THREADED CONNECTION G2-1/4
		N					UNDER THREADED CONNECTION 2-1/4 NPT
			R				UPPER REED CONNECTION Φ34MMX2
			T				UPPER THREADED CONNECTION G1
				10M			RANGE 10M
				18M			RANGE 18M
				30M			RANGE 30M
				40M			RANGE 40M FOR HART VERSION ONLY
					S		HOUSING MATERIAL POM
					P		HOUSING MATERIAL PTFE
							NA

Sample：

ANL-4120MP-H-G-T-40M-S	SOLID VERSION, 4-20MA/HART, G2-1/4, UP THREADED G1, RANGE 40M, POM HOUSING

Ordering Codes ANL-4120MC Solid version 订货编码

ANL-4120MC	1	2	3	4	5	6	NOTE
SOLID VERSION 	R						RS485 WITH MODBUS
	D						SDI-12 CUSTOMIZED
	K						IO-LINK
	A						4-20MA ONLY
	H						4-20MA / HART7
		G					UNDER THREADED CONNECTION G1-1/2
		N					UNDER THREADED CONNECTION 1-1/2 NPT
			R				UPPER REED CONNECTION Φ34MMX2
			T				UPPER THREADED CONNECTION G1
				10M			RANGE 10M
				18M			RANGE 18M
				30M			RANGE 30M
				40M			RANGE 40M FOR HART VERSION ONLY
					S		HOUSING MATERIAL POM
					P		HOUSING MATERIAL PTFE
							NA

Sample：

ANL-4120MC-A-G-R-10M-S	SOLID VERSION, 4-20MA, G1-1/2, UP REED, RANGE 10M, POM HOUSING

Starred offer(s) ★ represent the most common option and can be the fastest delivery time.
Non-star products require additional lead time.

https://chinasimba.com/

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本企业已通过 ISO9001:2015-2022 质量管理体系认证