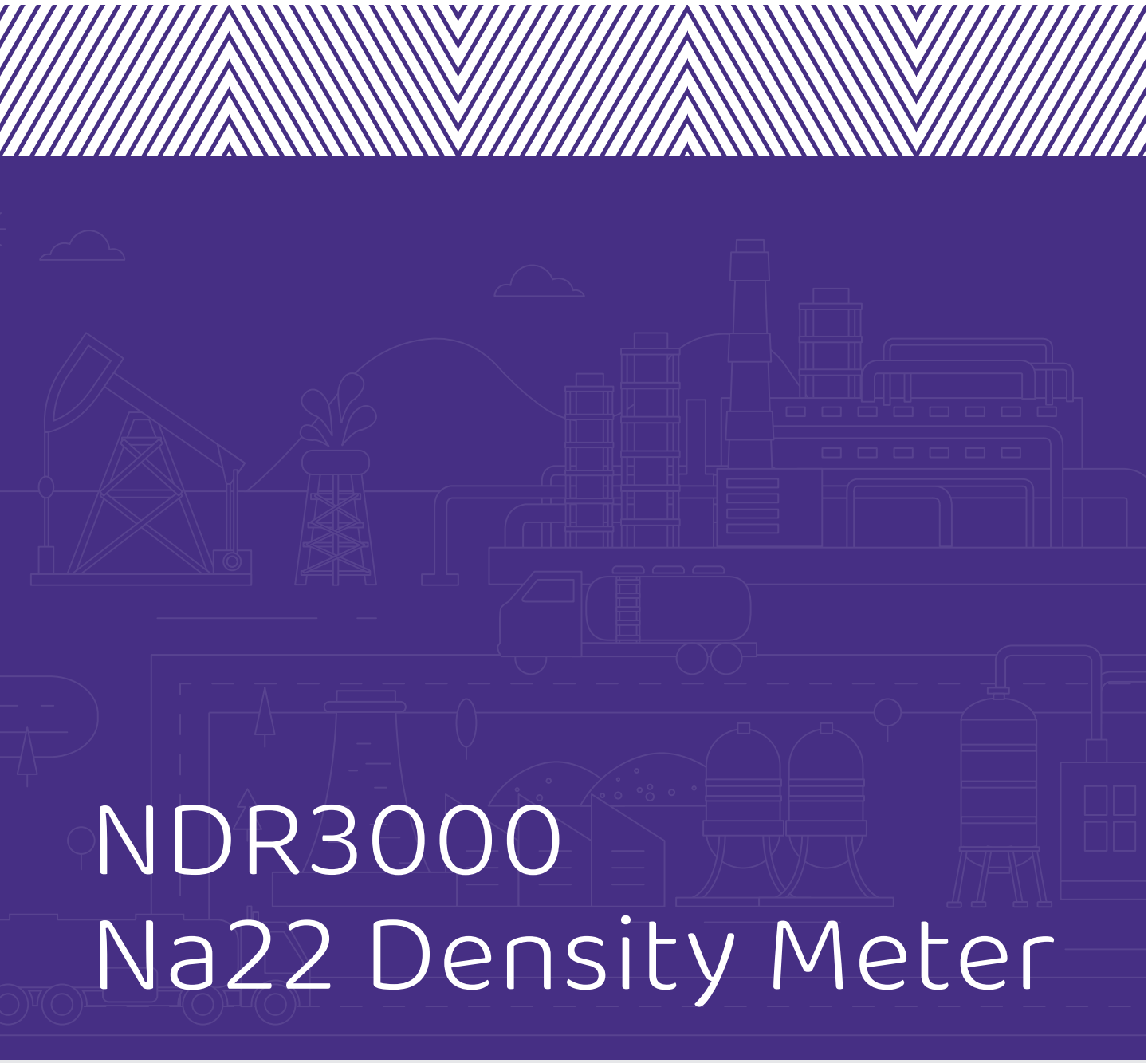
RETTAR



NDR3000
Na22 Density Meter

Assist in digital management of industrial materials

RETTAR

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Company Profile

RETTAR is an intelligent technology company that continuously achieves technological innovation in the field of industrial measurement with leading AI and radar technology. The company was founded in 2007, headquartered in Beijing, and originated from the Testing and Electronic Technology Research Institute of the Department of Automation at Tsinghua University. It has established a technology research and development center that serves global enterprises, owns 180+ technology patents and intellectual property rights, and has obtained multiple international certifications.

The company focuses on automated measurement and control products such as radar level meters and 3D radar scanners, and has independently developed and produced nearly a hundred products to meet the needs of customers in various industrial measurement scenarios. Through the innovative technology of the R&D center, the company tailors customized solutions for customers and is a technological innovator in the field of industrial automation measurement and control in China.

RETTAR has a wide range of products, including 3D radar scanners, high-frequency radar level meters, microwave level meters, density meters, flowmeters, average sensor, interface meters, tank side indicators, and intelligent management systems. Now, RETTAR has cooperated with nearly 8000 international customers, and its products and solutions are widely used in fields such as oil and gas, power, metallurgy, chemical industry, building materials, coal, grain, feed, food and beverage, pharmaceuticals, environmental protection, mining, cement, etc.

RETTAR

Company Qualifications



High-tech Enterprise Certificate



EU Trademark Certificate



Intellectual Property Pilot Unit



Invention Patent



Software Copyright



Product Measurement Certificate



ISO Certificate



Product Explosion Proof Certificate



Product Measurement Report



CE Certificate



Member of HART/FF Foundation



TÜV SIL Engineer Certificate

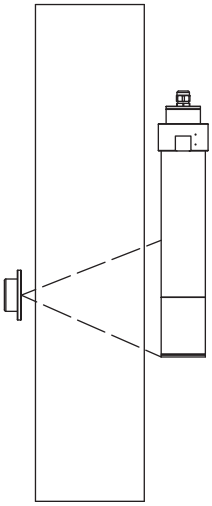






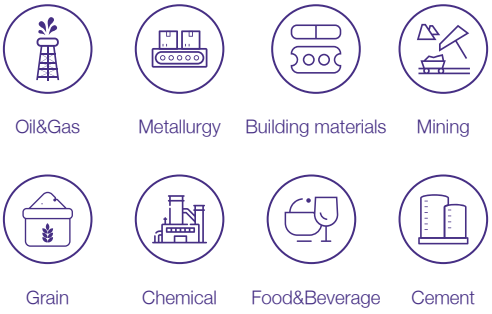
Principle

The use of exempt activity, environmentally friendly and harmless gamma radiation sources makes the use, transportation, and storage process convenient and does not threat to personal safety. The Na22 density meter is installed outside the pipeline or container and uses gamma rays with strong penetration ability for measurement. The Na22 radiation source has stable physical properties and is not affected by the external environment, enabling reliable, stable, and accurate measurement. Calculate the appropriate activity of the radiation source based on the measurement conditions (medium density, diameter of the pipeline or container, material and wall thickness of the pipeline or container). The radiation source in the radiation device emits a beam of gamma rays, and the detector receives the radiation rays. When the radiation rays act on the pipeline or container and the internal medium to be tested, they will be attenuated. Therefore, the detector calculates the density or concentration based on the attenuation of the detected radiation rays. Combined with energy spectrum detection and metrology technology, it can effectively suppress or shield the interference caused by background radiation, ensuring detection accuracy.



Application Fields

It can be applied in industries such as petrochemicals, metallurgy, mining, cement, food, wood, etc., especially suitable for complex, extreme, and harsh working conditions such as high temperature, high pressure, high dust, high toxicity, high corrosiveness, and abrasiveness.



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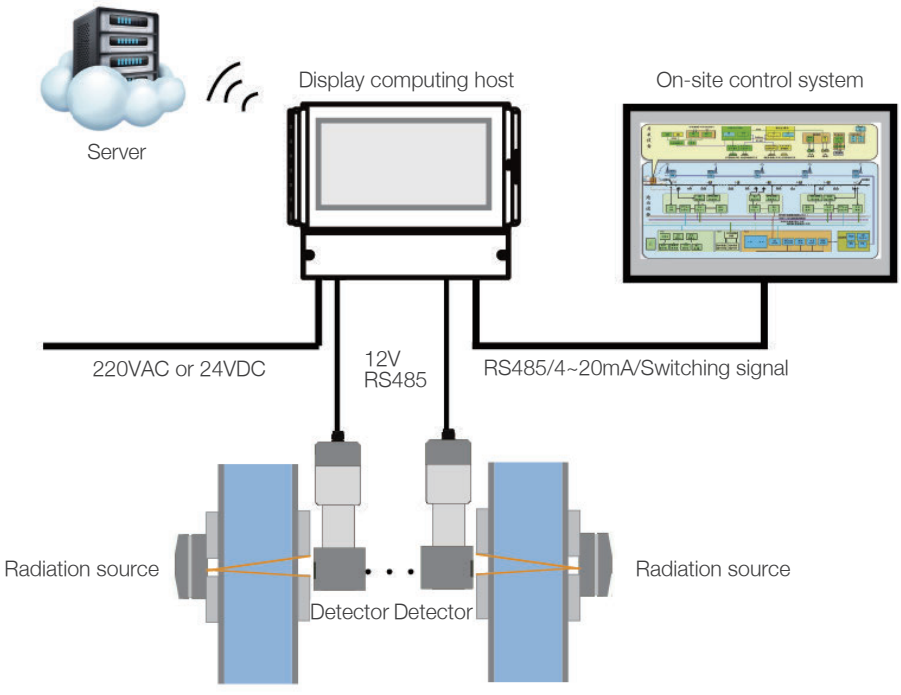
System Framework

Na22 density meter includes a radiation device (including a radiation source), a detector, a display computing host, and a installation bracket.

The radiation device (including radiation source) and detector are fixed and installed behind the container by the installation bracket, and the entire system is supplied with electricity from the mains supply of 220VAC or DC 24VDC. The radiation source inside the radiation device generates and emits gamma rays, which are received by the detector after being acted on by the container or pipeline and the medium to be measured to form radiation measurement information. The display computing host analyzes and processes the radiation measurement information formed by the detector to obtain the radiation spectrum curve.

Based on this, the density or concentration values can be obtained, and the measured values can be transmitted to the on-site control system through RS485, 4... 20mA, and switching signal.

A display computing host can connect up to 10 detectors, combine the data results detected by 10 detectors to form the final measurement results, output and present them. In addition, it can choose to configure a wireless module in the display computing host to upload the radiation measurement information to the cloud, which can be viewed, recorded, debugged, and controlled remotely, without the need for climbing stairs or tanks, and can be monitored, debugged, and controlled anytime and anywhere.



Product Features

- The detector is equipped with energy spectrum detection and metrology technology, able to distinguish the energy of radiation generated by background radiation and radiation emitted by radiation sources, and suppress or shield interference caused by background radiation.
- The detector can distinguish the energy of rays and form an energy spectrum curve based on the number of rays with different energies detected. The energy spectrum corresponding to useful energy rays is selected for processing.

- The display computing host and detector use RS485 communication to increase the number of cascaded detectors and avoid the occurrence of pulse stacking and loss of data in the form of pulse output. In addition, it has CRC digital verification and data error retransmission functions to improve communication anti-interference ability and detection measurement accuracy.
- It can be installed in almost any shape of pipeline or container.

- Equipped with a temperature compensation function, it detects temperature in real-time to compensate for temperature drift, ensuring calculation accuracy.
- Adopting exempt level Na22 gamma radiation sources is environmentally friendly and avoids complex government procedures.
- Installed on the outside of pipelines or containers, there is no need for slotting or drilling, which will not affect the continuity of production and save debugging time and cost.

- Measurement information can be equipped with real-time cloud access, and can be remotely debugged and observed anytime and anywhere using mobile devices (such as mobile phones, Pads, etc.).
- The detector and display computing host can not only be used for density detection, but also for level measurment and interface measure-ment.
- The display screen adopts a high-end dynamic effects UI, with strong human-machine interaction and bright colors.

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Technical Parameters

Radiation device	Radioactive isotope type	Na22
	Radiation type	Gamma ray
	Radiation angle	2π
	Radiation source activity	Na22＜27uci or 1000KBq/Exemption level
	Radiation activity of exemption certificates	＜1000KBq/Exemption level
	Housing material of radiation device	Lead+stainless steel
	Installation bracket	Required
	Installation bracket material	Stainless steel
	Installation method	General pipe bracket clamp-on, other customizable
	Process pressure	Unlimited(installed on the outside of containers or pipelines)
	Working temperature	-40~200°C(higher temperatures can be customized)
Detector	Detector type	NaI crystals, synthetic crystals
	Measuring range	0…3000kg/m^3(related to the length of the detection path)
	Heating device	Yes
	Working voltage	12VDC
	Accuracy	≤±1%
	Communication method	RS485
	Electrical connection	1/2NPT
	Grounding protection	Housing grounding
	Ingress protection	IP68
	Housing material	Stainless steel+lead

	Process temperature	-40℃~60℃
	Process pressure	Unlimited
	Explosion-proof type	EXd
	Installation bracket	Required
	Installation bracket material	Stainless steel
	Installation method	General pipe bracket clamp-on, other special customizable
Display computing host	Installation method	Pipe/container outer bracket clamp-on, wall fixing
	Installation position	Distribution room or installation site
	Display screen type	7-inch color touch screen display
	Display screen resolution	800*480
	Display screen brightness	200nit
	Output signal	4…20mA/Switching signal/RS485
	Output signal linearization	Programmable
	Radiation source attenuation compensation	Yes
	Temperature calibration	Yes
	Linearity	±1%
	Response time	Adjustable
	Working voltage	220VAC or 24VDC
	Output voltage	12VDC
	Ingress protection	IP65
	Housing material	PC
	Electrical connection	1/2NPT
	Grounding protection	Yes
	Explosion-proof type	None or EXd

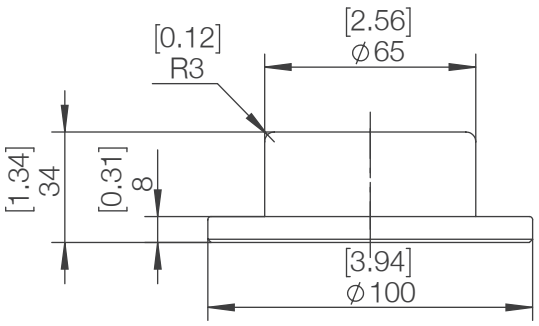
Components

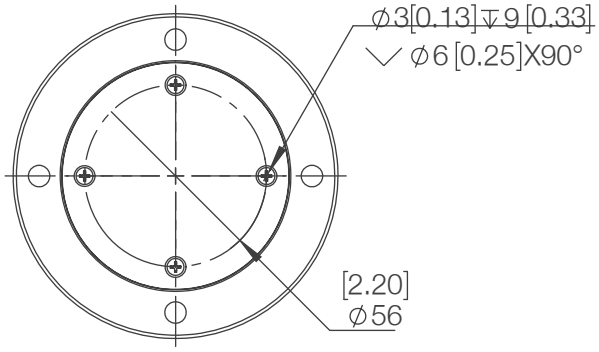
Radiation device(including radiation source):

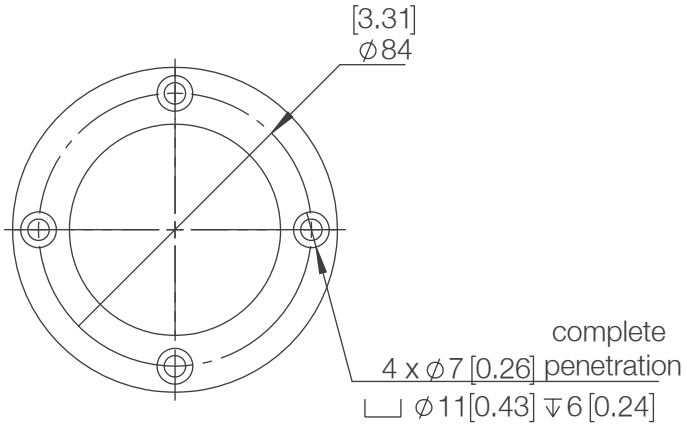
The radiation device is equipped with a Na22 radiation source and a lead shielding area, which allows the gamma rays generated by the radiation source to radiate through the non lead shielding area and be received by the detector.

Standard source box





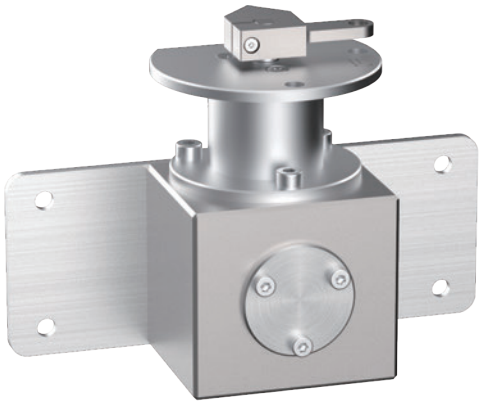


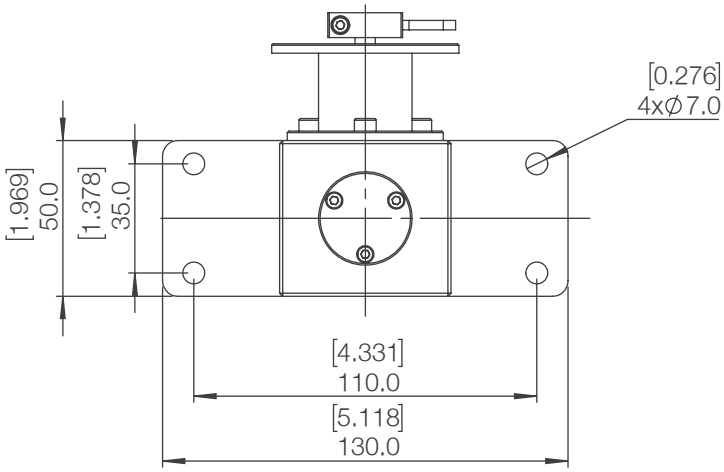


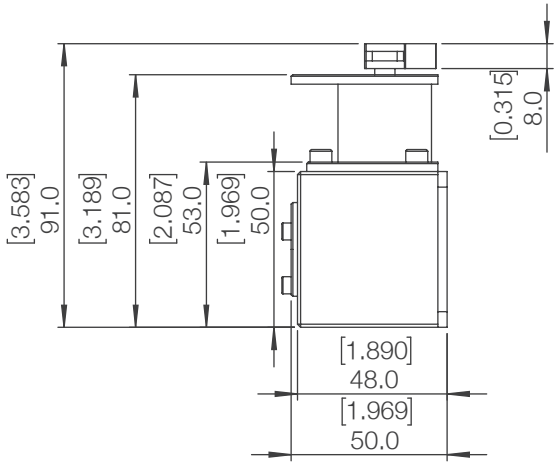
Weight: about 0.335kg

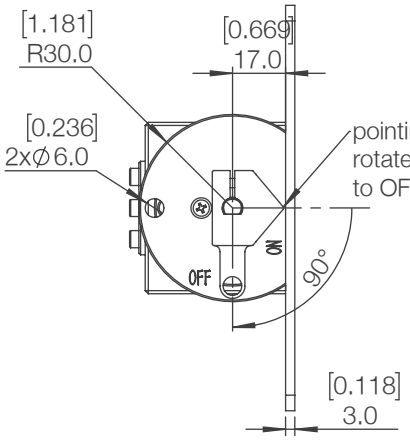
Note: The values marked in [ ] are in inches, and the rest are in mm

Completely environmentally friendly source box









pointing the handle arrow to ON indicates the open state
rotate clockwise by 90 ° and then point the handle arrow
to OFF to indicate the closed state

Weight: about 0.584kg

Note: The values marked in [ ] are in inches, and the rest are in mm

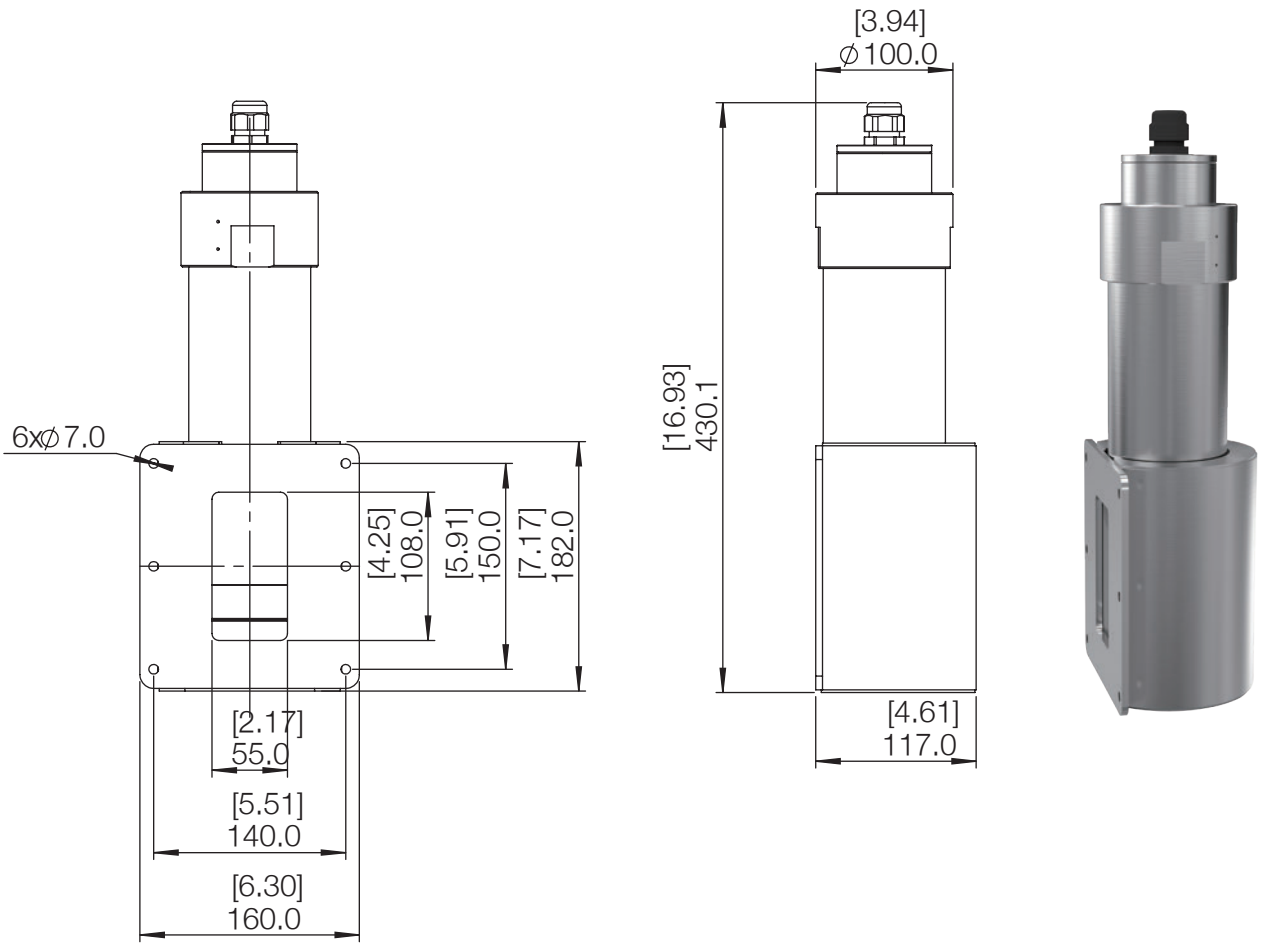
Detector:

Detector is used to receive gamma rays emitted by radiation devices and formed into radiation measurement information through pipeline/container and the medium under test. The detector in the detector uses NaI crystals or synthetic crystals. The larger the detector size, the higher the sensitivity during detection, thereby improving measurement accuracy under low radiation doses.

The bottom of the detector is equipped with a lead cover to shield external or environmental interference rays. In addition, the lead cover is also equipped with an opening to ensure that the opening of the lead cover is aligned with the gamma rays emitted by the radiation source inside the radiation device through the non lead shielding area.

Due to the limitations of existing production and manufacturing technologies on the size of NaI crystals with good performance, thus for large diameter pipe and small container, the synthetic crystals can replace it, and the specific crystal size depends on the on-site working conditions.

2-inch detector

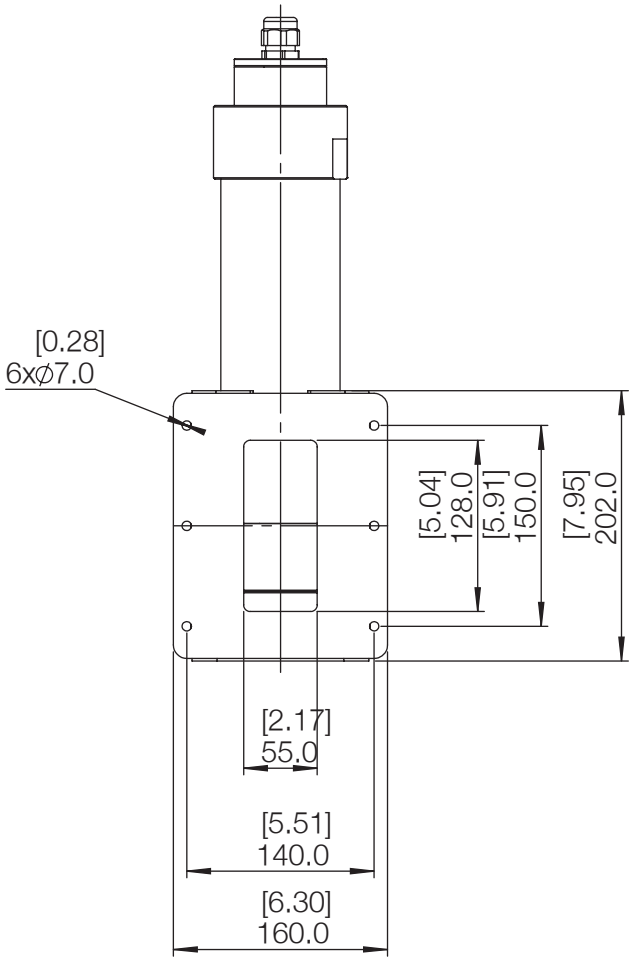


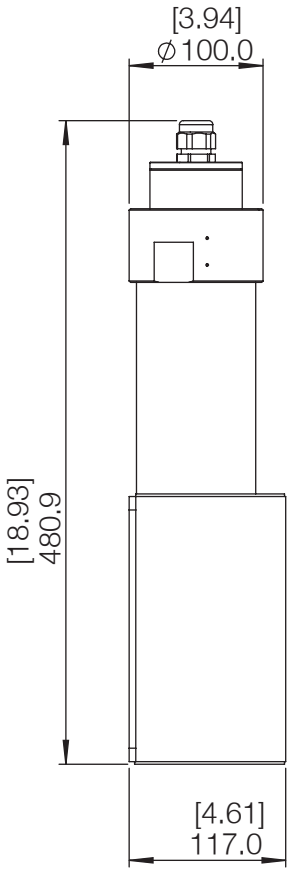
Weight: about 23.7kg

Note:The values marked in [ ] are in inches, and the rest are in mm

4-inch detector





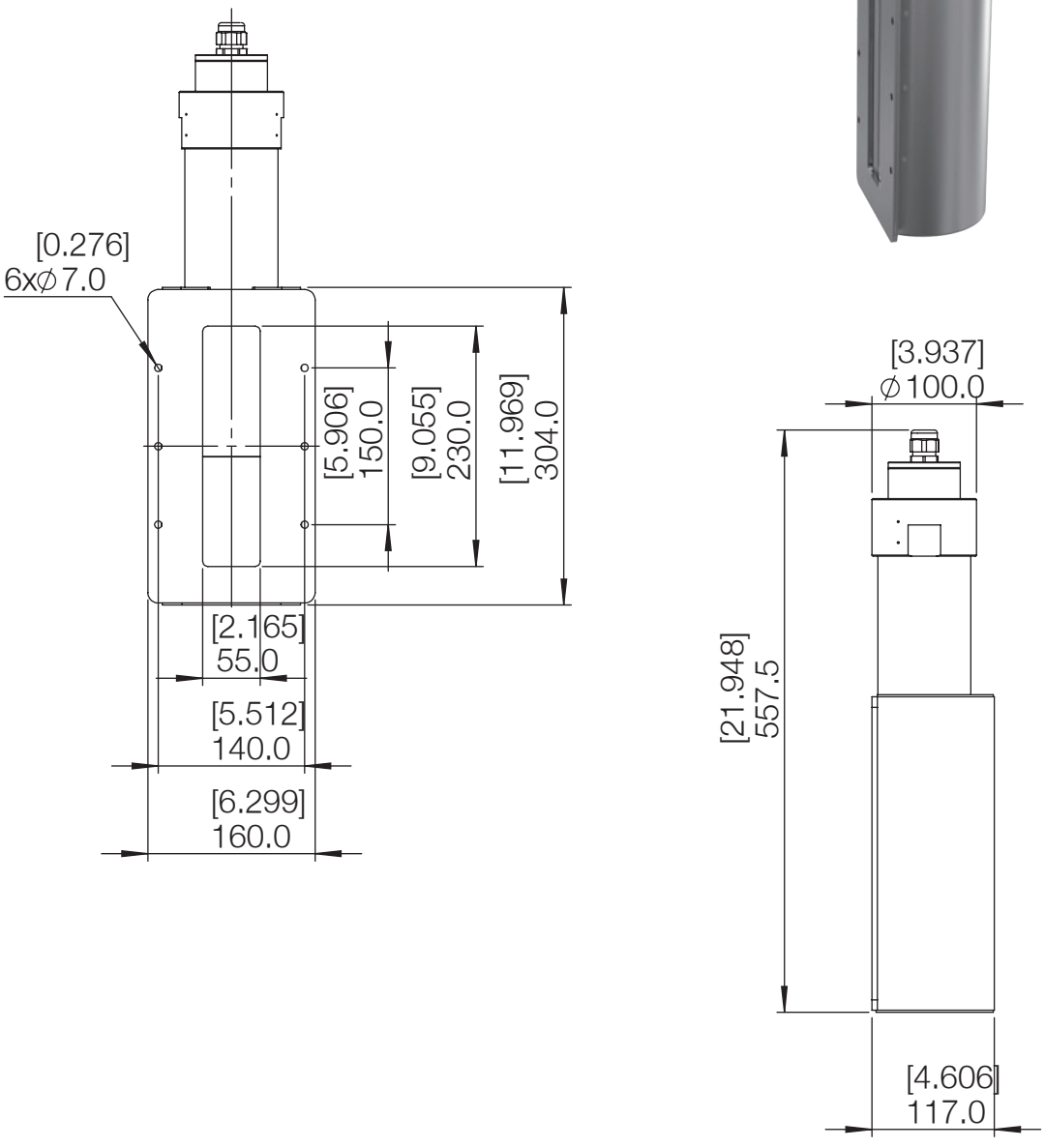


Weight: about 25.8kg

Note:The values marked in [ ] are in inches, and the rest are in mm

6-inch detector





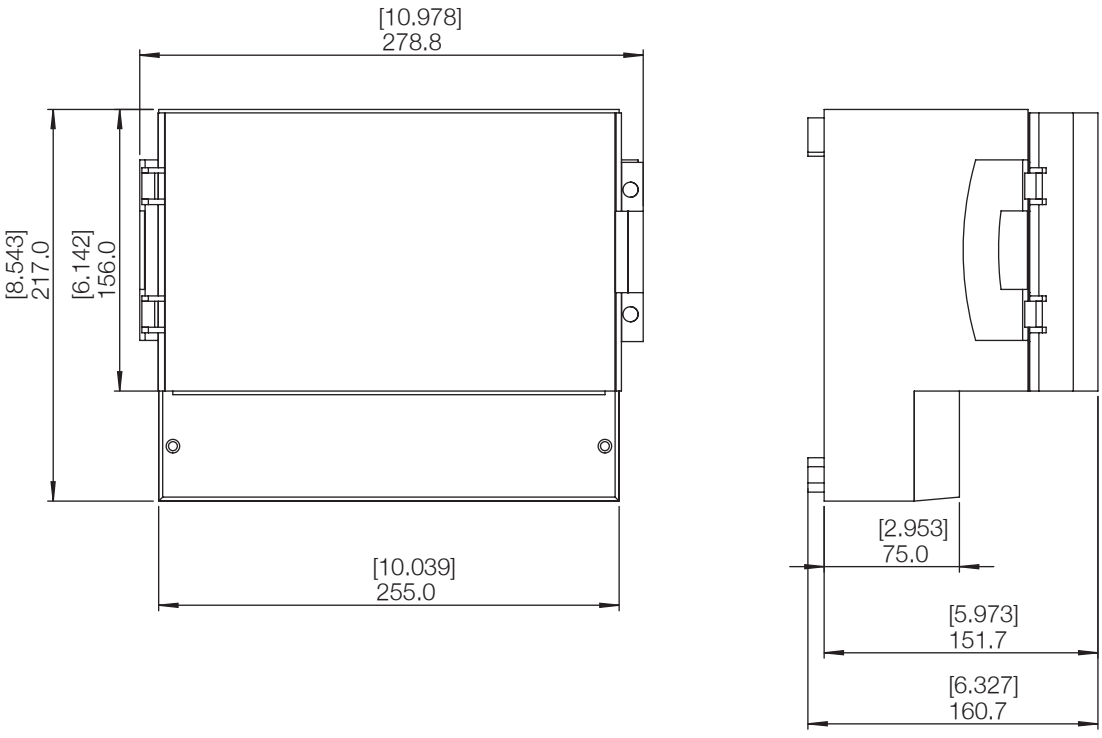
Weight: about 30.6kg

Note:The values marked in [ ] are in inches, and the rest are in mm

Display computing host:

The display computing host communicates with the detector through RS485, receives the radiation measurement information transmitted by the detector, analyzes, processes, and draws the energy spectrum curve, uses the energy spectrum curve to calculate the density/concentration value. In addition, the display computing host starts working after receiving external 220VAC or 24VDC power supply, and converts it to 12VDC to provide power to the detector.





Weight: about 0.335kg

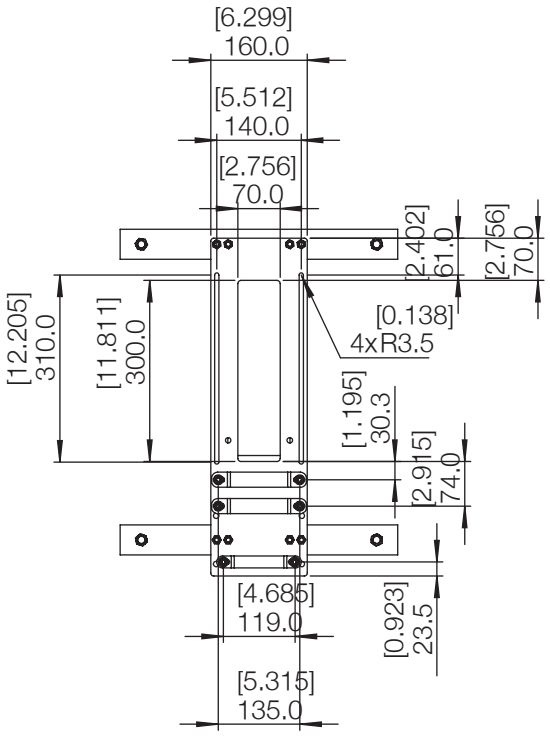
Note: The values marked in [ ] are in inches, and the rest are in mm

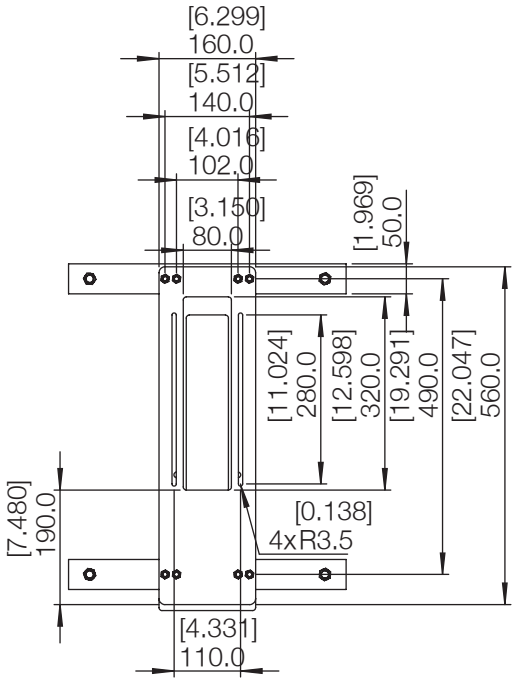
Installation bracket::

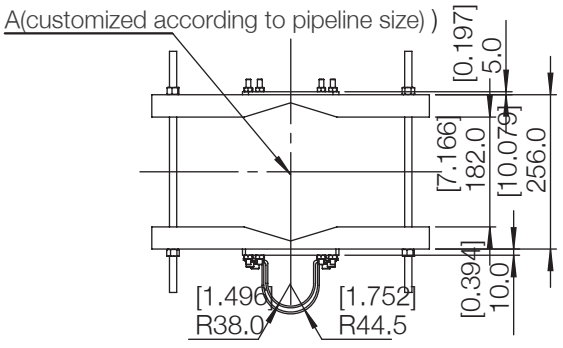
Installation bracket of detector and radiation device

1. Clamp-on installation bracket





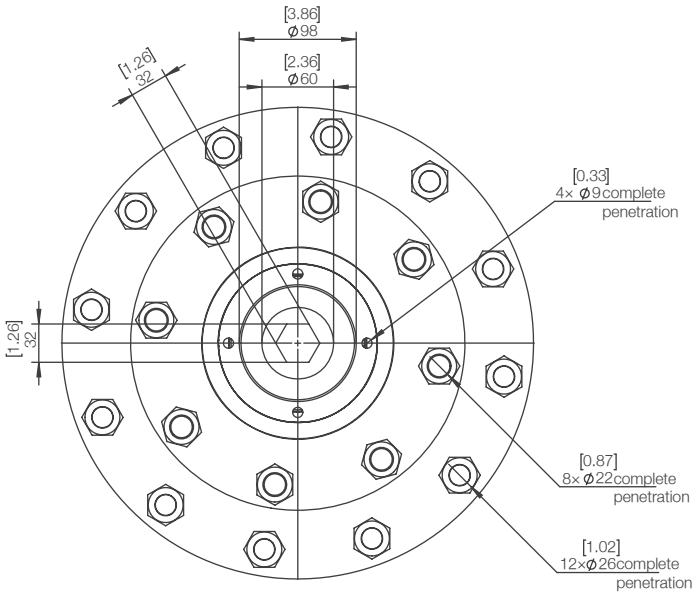




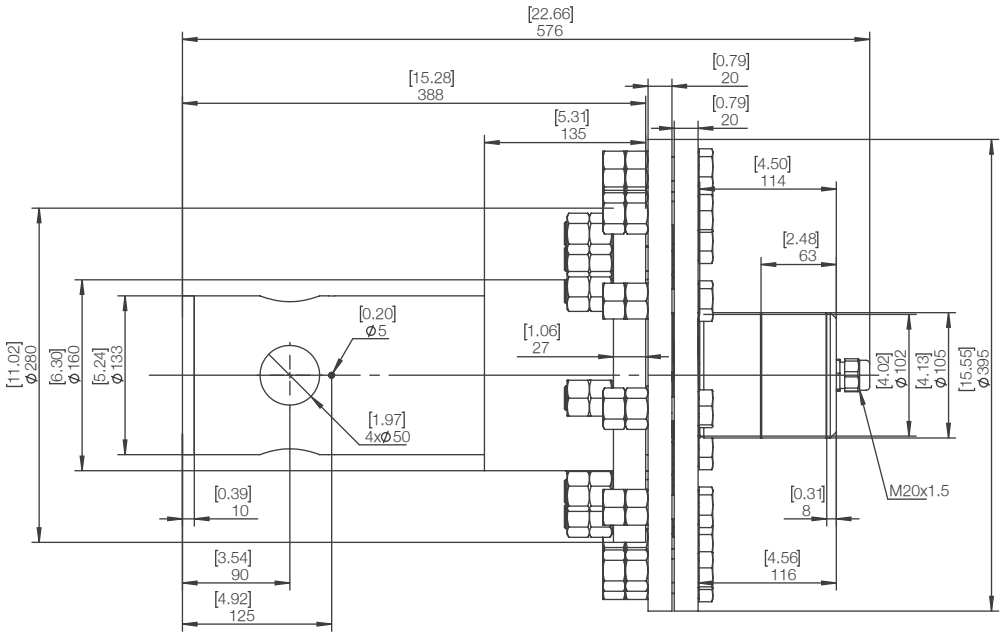
Weight: about 12kg

Note: The values marked in [ ] are in inches, and the rest are in mm

2. Plug-in installation bracket







Weight: about 11.1kg

Note: The values marked in [ ] are in inches, and the rest are in mm

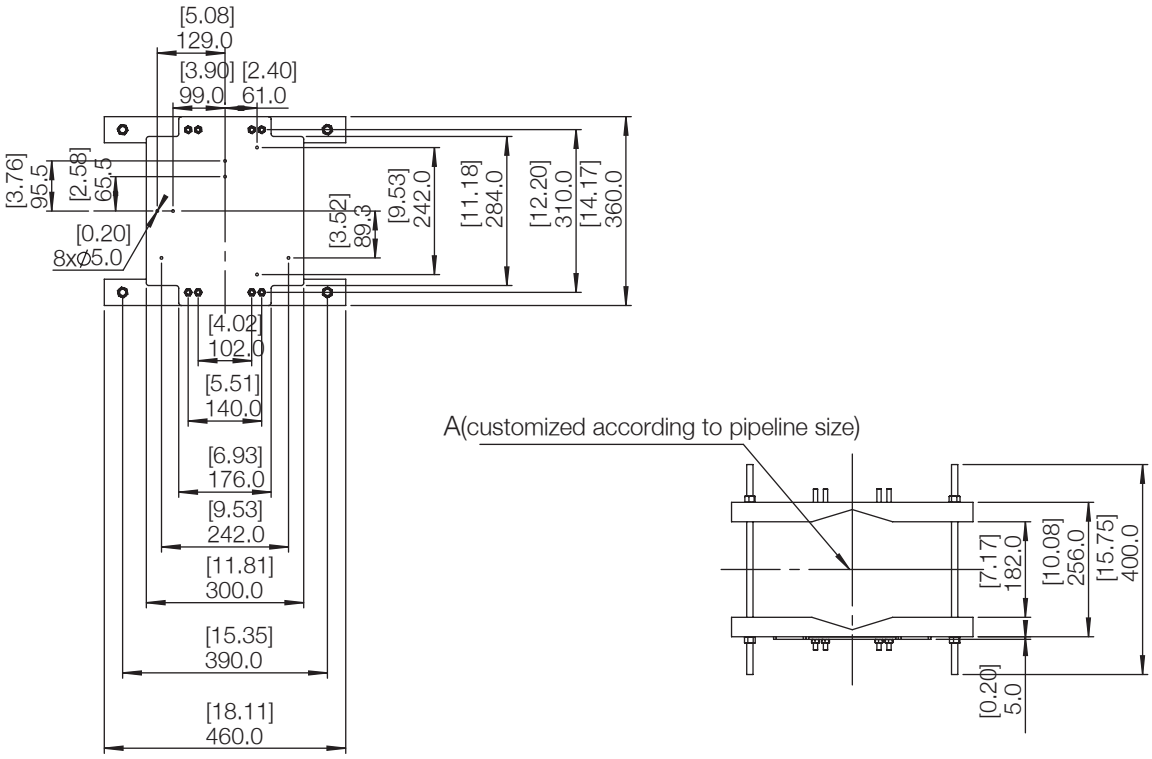
Installation bracket of diaplay computing host:

The display computing host can be installed on a pipeline or fixed on a wall.

When the display computing host is installed and fixed on the wall, simply install the display computing host on the installation backplane, which is fixed on the wall with bolts and nuts; when installing and fixing the display computing host on a pipeline, it is necessary to use an installation backplate and pipeline installation bracket. The installation backplate is fixed to the pipeline installation bracket, and the pipeline installation bracket is clamped to the pipeline. The installation backplate can rotate 90° to fix it to the pipeline installation bracket. Therefore, when installing the display computing host on a pipeline, it can be installed on a horizontal pipeline or a vertical pipeline for easy viewing.







Weight: about 8.12kg

Note: The values marked in [ ] are in inches, and the rest are in mm

Installation Method

Clamp-on installation method

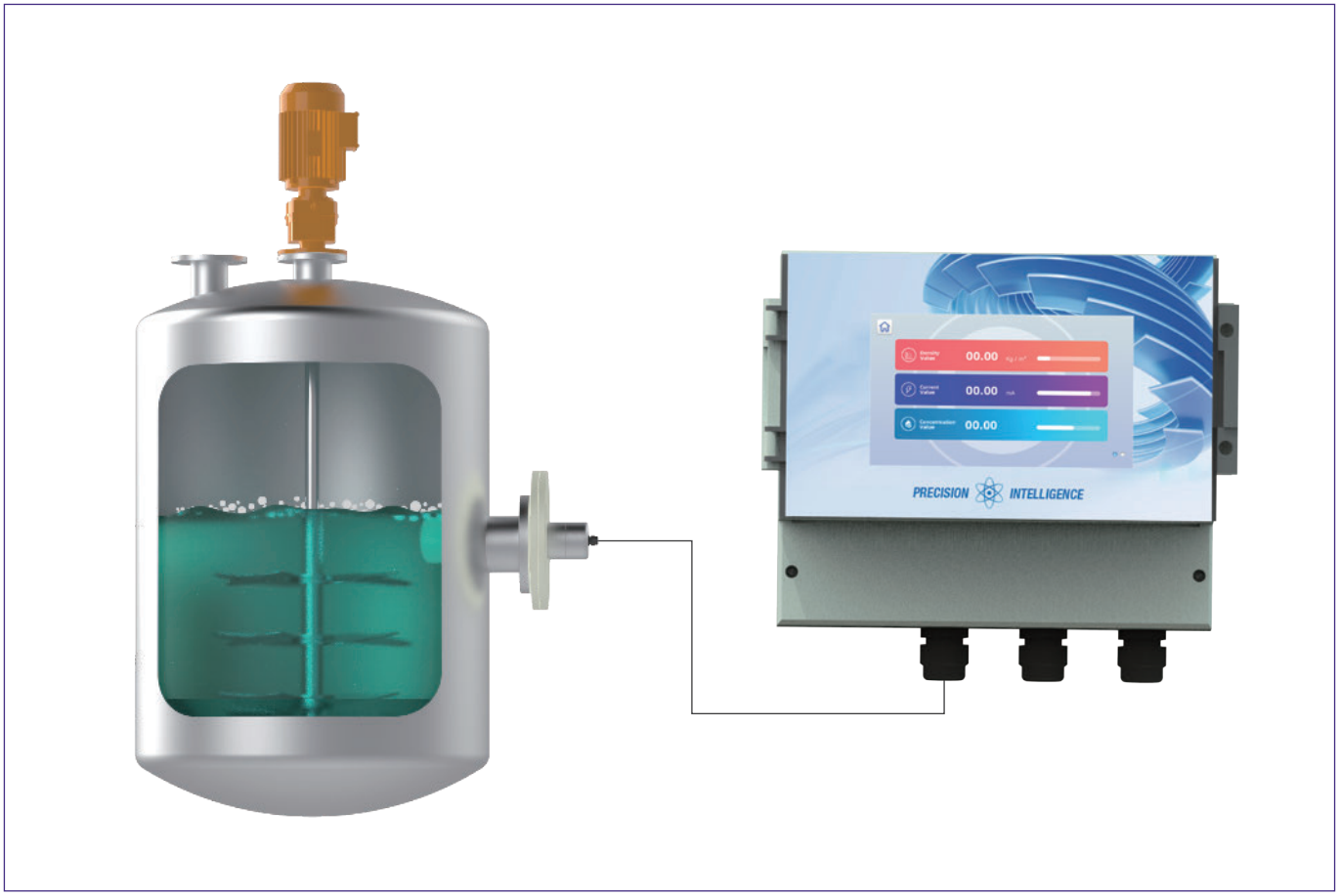
The radiation device and installation bracket have been assembled before the product is shipped. After arrival, the density meter detector, lead cover, and installation bracket need to be assembled together (the bracket has markings for the installation and positioning of the lead cover, just position the lead cover according to the markings before installing the detector). Then, select a suitable installation position on the pipeline or container, tighten the radiation device components and detector components onto the pipeline using four randomly equipped fully threaded screws and nuts. After installation, ensure that the brackets on both sides are parallel, and that the center position of the source box (adjustable) is aligned with the markings on the detector housing.



Plug-in installation method

Integrate the radiation device and detector into one and insert them into the container. The tail of the detector is equipped with an instrument flange, which is connected and fixed to the flange on the on-site container. The flange size must be ≥ DN150. There are

several through holes between the radiation device and the detector to facilitate the detection path between the radiation device and the detector to be filled with the test medium.



The above listed are common installation methods. If the above installation methods are not met, our technical personnel shall determine the installation method based on the diameter or shape of the on-site pipeline/container and the measurement conditions.

Precautions during installation

1. When installing outside the container or pipeline, ensure that the radiation device and detector are as close as possible to the container or pipeline.

2. When installing outside the container or pipeline, the installation position must ensure that the pipeline is always in a full state. When installing in a plug-in mode, it must ensure that the detection path between the radiation device and the detector is filled with the medium to be tested.

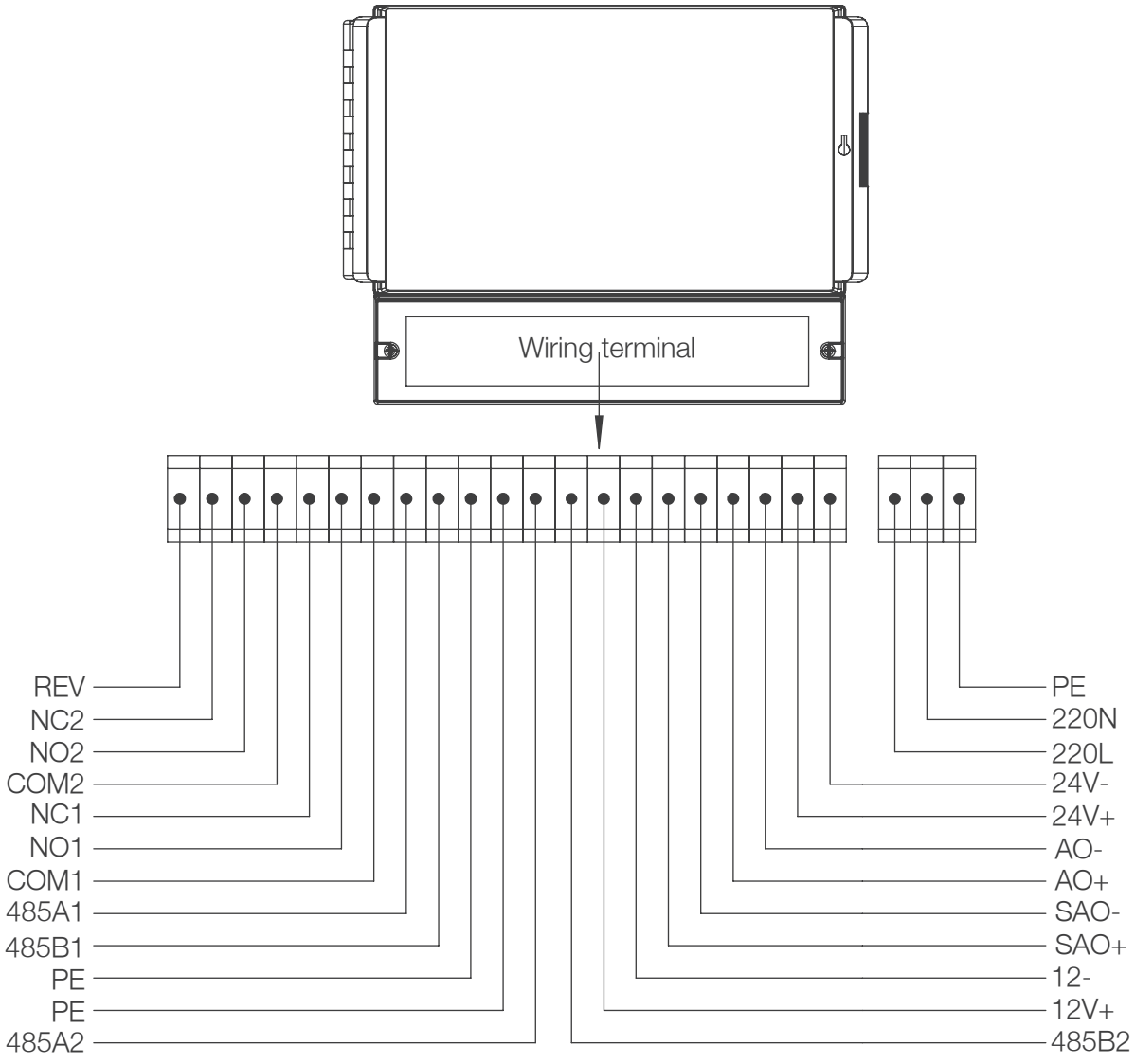
3. When installing in a vertical pipeline, try to make the medium to be tested flow from bottom to top and make the detector head is oriented downward whenever possible.

4. If the installation position can only be horizontal, the detection path should be as horizontal as possible, the impact of foam and sediment on the measurement.

5. Set a sampling point near the installation location for density calibration.

Electrical Wiring

Display computing host

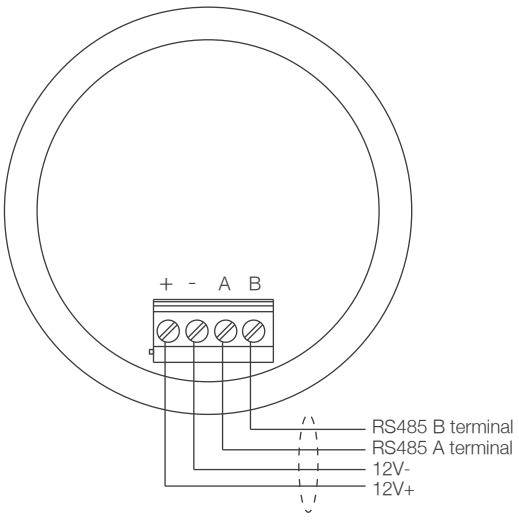


No.	Terminal name	Instruction	Note
1	PE	Ground	External supply voltage (choose one)
2	220N	Neutral wire	
3	220L	Live wire	
4	24V-	DC 24V-	External supply voltage (choose one)
5	24V+	DC 24V+	
6	AO-	Analog output negative	4…20mA analog output (passive)
7	AO+	Analog output positive	
8	SAO-	Analog output negative	4…20mA analog output (positive)
9	SAO+	Analog output positive	
10	12V-	Slave power supply12V-	Slave
11	12V+	Slave power supply12V+	
12	485B2	Slave communication RS485 B	

No.	Terminal name	Instruction	Note
13	485A2	Slave communication RS485 A	Slave machine
14	PE	Ground	Reserve
15	PE	Ground	
16	485B1	B terminal of RS485	RS485
17	485A1	A terminal of RS485	
18	COM1	Common terminal	Relay 1
19	NO1	Constant opening terminal	
20	NC1	Constant closing terminal	
21	COM2	Common terminal	Relay 2
22	NO2	Constant opening terminal	
23	NC2	Constant closing terminal	
24	REV	Reserve	Reserve

Note: The display computing host has two optional working voltages, but it does not mean that it can be arbitrarily connected to 220VAC or 24VDC at the installation site. When purchasing, it is necessary to clearly select one of the working voltages based on the actual situation on-site. RETTAR will configure it according to the selected working voltage before leaving the factory. After arriving at the site, power will be supplied according to the selected working voltage and wiring operations will be carried out at the corresponding terminal.

Detector



INDUSTRIAL MEASUREMENT INNOVATOR



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Lutong Hongyun Technology Park,
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