PARS ISOTOPE company

Industrial Radiometric Products

Nucleonic Control Systems
Industrial Radioisotopes

PARSISOTOPE-INDUSTRIAL

INTRODUCTION

Today in the era of nuclear science and technology, mankind is lives in a completely different world to his ancestors. The livelihood and welfare of humans are now intermingled with technology and its achievements. to further the better use of nuclear technology, PARS ISOTOPE Co has been founded and it specializes in the following activities:

"Production and development of various radioisotopes, and the associated equipment and services in the fields of medicine and industry"

The company has so far tried to supply viable products/services by employing the state-of-the-art technology, professional manpower, the highest qualitative standards and has committed itself to technically updated science and culture of radiation application both at local and global markets.

Based on human and national values as well as international standards, our company's approach in this business is to treat our consumers as being the most precious wealth. Moreover,The company also tries to fulfill empowering related plants, consumers satisfaction and realizing Company's progress according to its following key motto:

"A New Horizon of Industry"

There are many fields of activities adopted by the PICo. as follows:

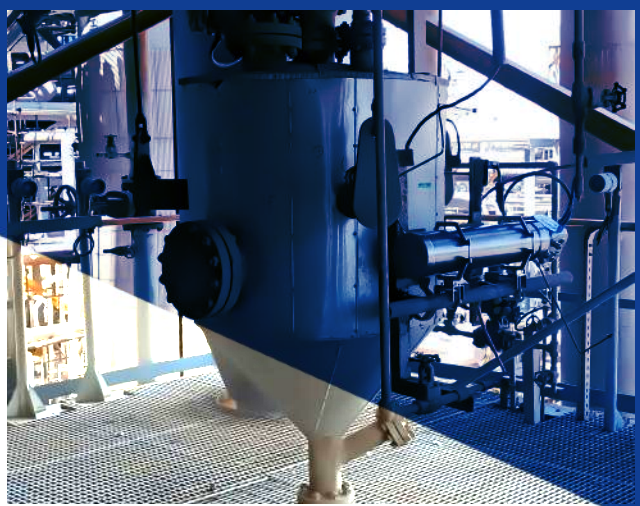
- Production and procurement of medical and industrial radioisotopes
- Production and development of diagnostic and therapeutic radiopharmaceuticals
- Improvement and optimization of radioisotope production methods
- Manufacturing of nuclear measurement devices
- Designing and manufacturing of personal and environmental dosimetry systems

CONTENTS

NUCLEONIC CONTROL SYSTEMS

Nucleonic Level Gauge

Nucleonic level gauges made by Pars Isotope Company are used in various industries such as oil and gas, chemical, wood and paper, casting, mining, steel and cement. Measurement made by this device ranges from centimeter to several meters. Measurement of level and density carried out by radiometric instrumentation systems at high temperature fluctuations, high pressure or dusty environments with vibration, as well as foam and bubbles or corrosive and abrasive media, poses no problem for level measurement systems. In fact, under certain measurement environmental conditions, radiometric measurement is not affected.



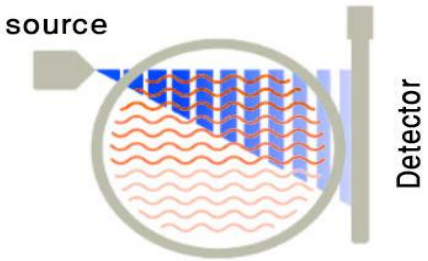
Measurement technology

basically, a radiometric measurement system consists of a radioactive source that emits gamma rays and a detector that is able to detect those rays. As the gamma ray passes through the tank, it is attenuated. The beam attenuation can be measured to calculate the amount of material inside the tank.

In addition to highly accurate and online high speed measurement, this measuring method is unique due to its independence of the pressure, temperature, speed, viscosity, color or the chemical properties of the material inside the tank. This leads to a high level of reliability and obviates the need for service and maintenance in difficult operational and environmental conditions.

Advantages of level radiometric technology

- High reliability in harsh working conditions (high sensitivity, accuracy and fast response)
- Easy and fixed installation without tank changes
- Easy service and maintenance
- Easy operation and communication in accordance with the world modern systems
- Smart to line condition changes and error reporting



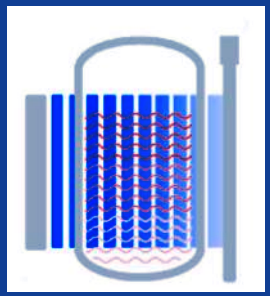
Source and shield

Pars Isotope Company, in addition to having the expertise and experience in designing and manufacturing radiometric measurement systems, is able to produce industrial sources exclusively along with its equipment. This complete package, together with installation, set-up and consulting services, offers satisfactory results to its customers. Furthermore, high productivity and competitive prices can be benefited by using a wide range of point and rod sources, various radioisotopes such as Co-60 or Cs-137 and containers made of different materials (such as lead, tungsten). In addition, it provides maximum safety by using double-walled capsules for the production of sources that have been tested in accordance with ISO 2919 / C43232 and are heat resistant up to 400°C.

For each project, our engineers calculate the required source activity based on simulation codes and observing ALARA safety principles. The following table shows the amount of radiation exposure in some situations compared with radiometric measurements.

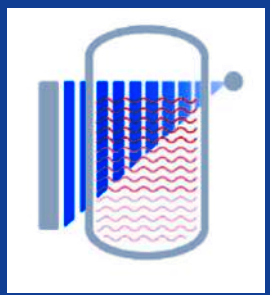
In order to have an optimal system by considering the measurement accuracy, geometry and dimensions of the installation site, besides the economic aspects and other requirements of the factory, the ideal combination of detector and source can be provided.

Exposure to normal radiations	Dose
whole body computerized tomography	10-20 mSv
Flight over the Atlantic Ocean	0.06 mSv
Annual natural radiation Exposure	2.1 mSv/a
Radiometric measurement (Empty tank)	0.001 mSv / h



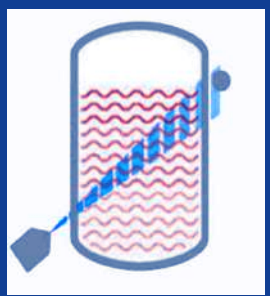
Rod Detector/Rod Source

- Can be installed on conical tanks
- Ideal for high fluctuations and high pressure
- Maximum sensitivity for minimum source activity



Point Detector/Rod Source

- High accuracy in the measuring range
- Not affected by annoying radiation
- Optimal adjustment to measurement geometry

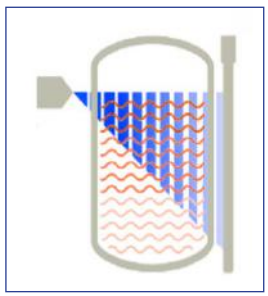


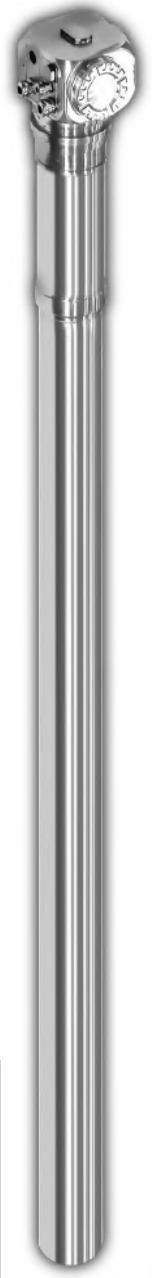
Point Detector/Point Source

- Short measurement range
- Less space is taken up
- Easy to move and install
- Cost-effective

Rod Detector / Point Source

- Considerably cost-effective
- Wide measurement range





Continuous radiometric level gauge model PILT10

- Appropriate choice with standard use
- Easy installation
- Able to separate the interfering beams and avoid saturation in wide calibration intervals
- Highly reliable

PILT10

TECHNICAL DATA & FACTS REGARDING THE CONTINUOUS LEVEL MEASUREMENT SYSTEMS

Detector operating data

Power supply	110 … 240 VAC, ±10 %, 50 … 60 Hz, 3 VA, 24 VDC (18 … 32 VDC), 3 W
Cable connections	1x2 Phoenix, 1x4 Phoenix
Maximum cable length	1 mm²: 1000 m
Wire cross-section	0.5 … 1.5 mm²
Housing material	Stainless steel ISO 1.4301 / AISI 316
Water cooling	Option (can also be retrofitted), max. 6 bar
Cascading	up to 2 detectors

Weights

Scintillator size (polymer) Ø x length [mm]	Weights without Cooling system (Kg)	Weights with Cooling system (Kg)
40 x 400	19	29.5
40 x 800	28	42
40 x 1200	30	47
40 x 1600	31.5	53
40 x 2000	33	58

Collimator	Optional, lead, painted Frontal or lateral radiation to reduce background radiation
or Lead has been Casted in Steel	
Ambient temperature	-20 … +60°C
Operation and storage	Observe possible temp. Restrictions for Ex-protection!

Detector certificates & tests

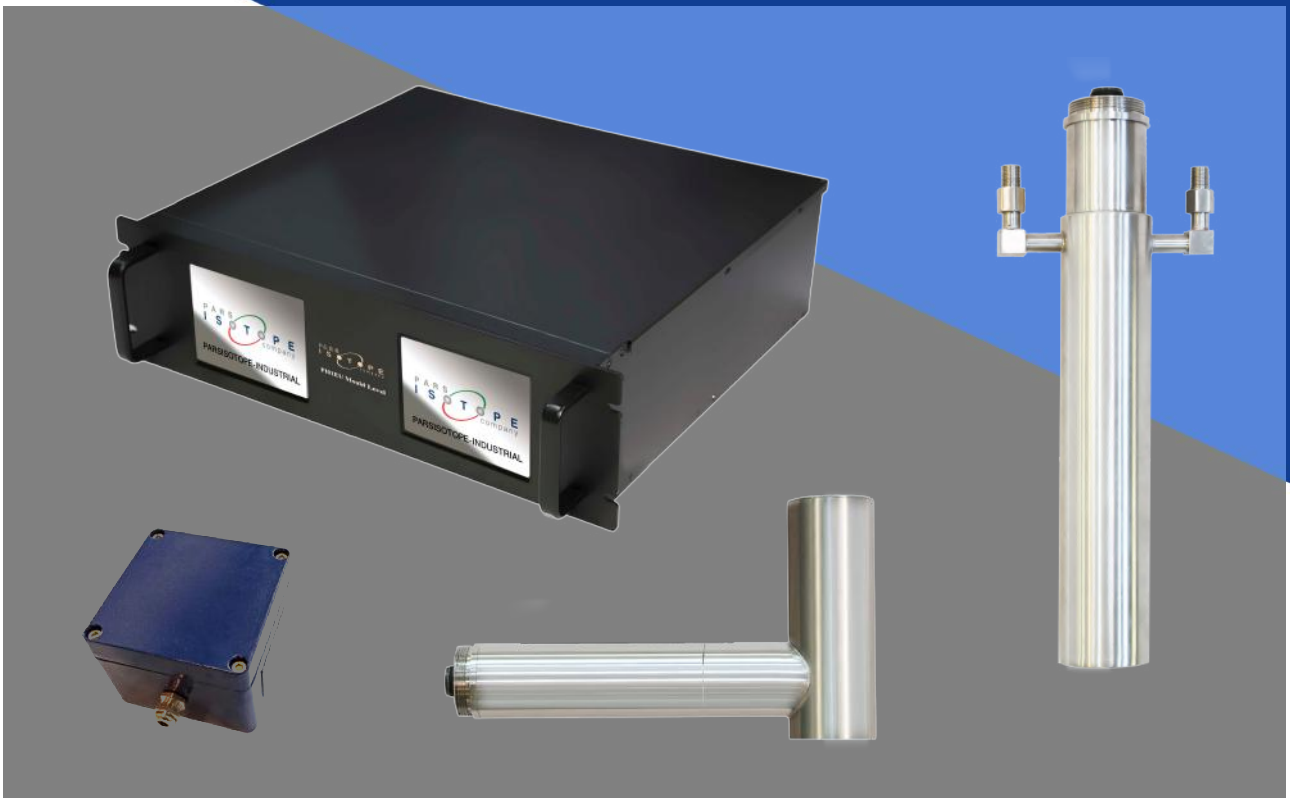
IP protection	IP67
Explosion protection	ATEX: Ex db IIC T6 Gb

Signal inputs and outputs

Signal output	4 - 20 mA HART potential-free, active or passive max. impedance: 500 Ω (active)
Interfaces	RS485
Accuracy	±1%

Mold Level Measurement

Radiometric measuring of molten metal in the mold is the dominant technology for measuring the level in continuous casting. This technology is 50 years old and is a safe and accurate method and allows optimal control of the casting process.



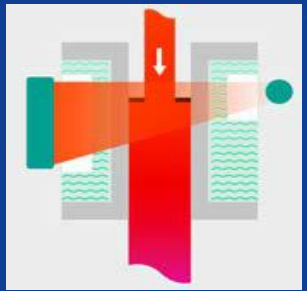
Measurement technology

Gamma radiation is attenuated when it goes through the mold and this attenuation is measured by the detector. The amount of radiation reduction depends on the level of molten material in the mold, the higher the level of molten metal in the mold, the less radiation reaches the detector. This measurement technology is independent of external factors such as dust, vibration, etc.

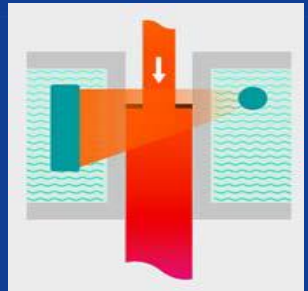
Advantages of using radiometric technology in mold level measurement

- so reliable and accurate
- Can be used for all types of cast
- Increases the productivity and quality of the product
- Optimizes costs and prevents caused by damages visual control of the operator

Methods for installation of radiometric mold level measurement



External arrangement without water jacket



Internal arrangement

Internal arrangement with dip tube

Radiometric mold level measurement - model PIMD10

Accurate and fast measurement of the molten material inside the casting mold is the basis of high quality steel production. One of the most important reasons for using mold level measurement in the world is to achieve a reliable method to prevent material overflow from the mold.

Nucleonic level gauges of molten materials made by Pars Isotope Company are used in steel and iron factories to continuously measure the melting level of molds for ingot, slab and rebar productions.

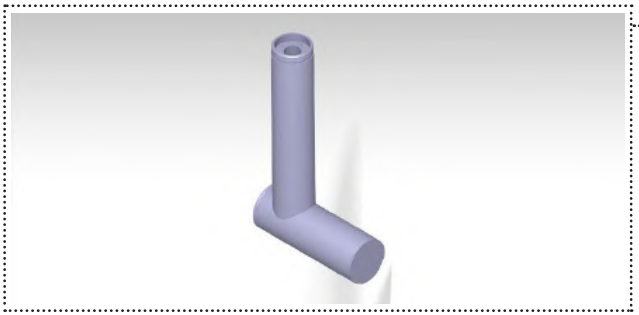
This device has a processor or a control unit with model number PIMP10, which is placed in a rack in the control room and a detector produced according to the customer's demand and the shape of the mold and is then installed on the casting mold.

Radiometric mold level measurement made by Pars Isotope Company has two independent channels in one control unit. Each channel has a separate connection and can be installed independently on two different lines.

The power supply of the processor is 110-230 VAC and for the detector, a 12V DC made by the processor . The device has an output of 4-20 mA, HART.

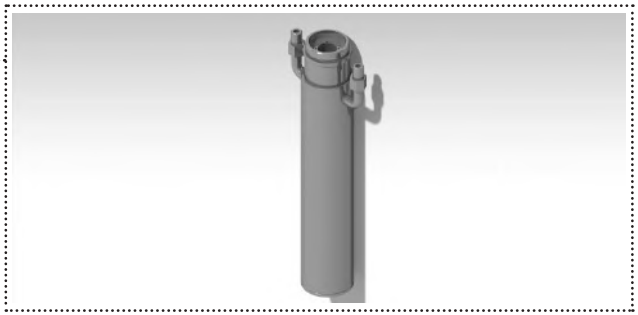
One of the unique advantages of this equipment is accurate measurement and fast and adjustable response in accordance with different casting lines with variable melting speed, which produces reliable results for operators and managers.

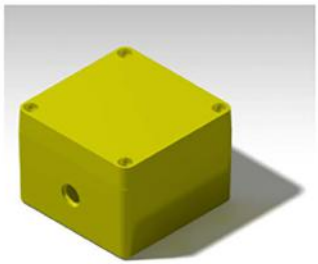
This model of molten material detector is of two types, i.e. hammer and rod with model number PIMD10.



Hammer Detector

Rod Detector
With Cooling



Frame	19" Rack, 3 U Operating unit with 5-inch color display and touch screen	
Evaluation Weight	Approx. 5.2 kg	
Degree of protection	Junction Box IP67	Detector IP67
Operating temperature	-40°C ... +50°C	
Evaluation Processor Dimension	425×132.5×298.5 mm  PIMP10	
Junction box Dimension	120×120×85 mm  PIMJ10	

Supply voltage	Evaluation 110 to 230V AC	Detector +12V DC from Evaluation
Output	4 ... 20 mA,**HART** for level active/ Max. impedance 500Ω 4 ... 20 mA for temperature	
Output for error signaling	Relay for Max. level Relay for min. level Relay for system error	
Digital input	Empty fitting Full fitting	
Core cross-section for the screw terminals	0.75 mm^2 to 2 mm^2	
Recommended cable between junction box and evaluation unit	Signal cable, 4×1 mm^2 + 1×RG59, shielded	
Max. cable length between detector and junction box(High temperature cable)	On order: PICIS(Straight) 9m, 15m, 20m PICIE (Elbow) 9m, 15m, 20m	
Max. cable length between junction box and evaluation unit	100m	
Accuracy	1%±	
Ambient, storage and transport temperature	-20°C ... +60°C	

High temperature cable

This cable is used to connect the mold level measurement device and the junction box. The most important features of this cable are:

- High impact resistance
- Flexibility
- Temperature tolerance up to about 200 ° C (The last 2 meters of the cable connected to the device has fireproof cover)
- Corrosion resistant socket connecting the cable to the device (136L - steel)

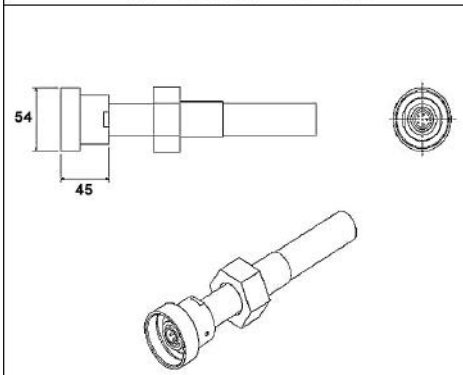
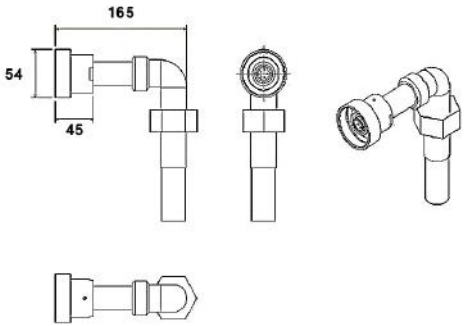
High temperature cable used in devices produced by Pars Isotope

The cable consists of three pieces of AWG20 wire and a RG142 coaxial cable, placed in a hydraulic hose and is used to transfer information from the mold level measuring device to the processor case (Evaluation Unit).

These cables are routinely produced in two models: Straight with PICIS model and Elbow with PICIE model in 9, 15 and 20 meters, and can be ordered in other dimensions as well.

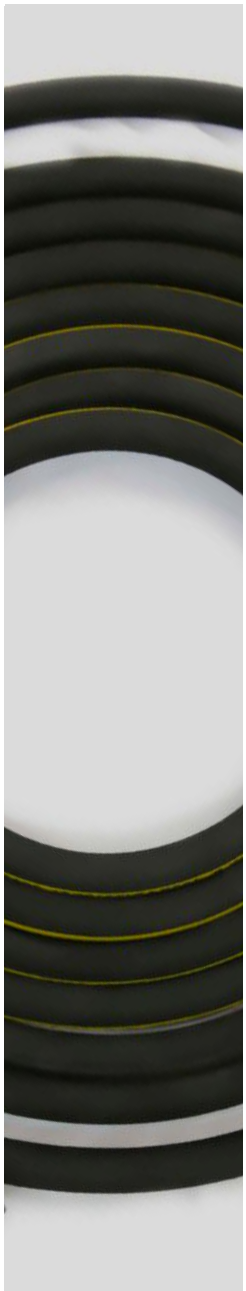
Connection cable: Connection possibilities

(All dimensions in mm)

Plug Protect plug-in connection	Plug Protect plug-in connection angled at 90°
	
Minimum distance behind plug in connection from wall is 35 cm.	Minimum distance behind plug in connection from wall is 17 cm.

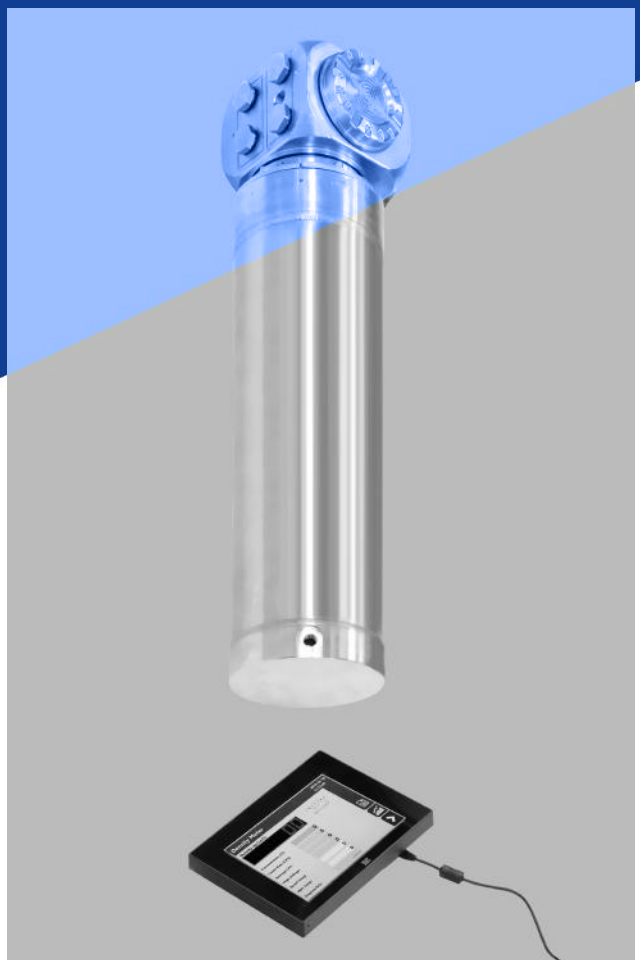
Connection cable: Technical data

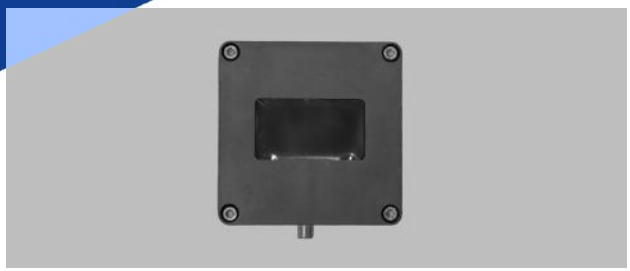
Connections	Connections at the detector: Plug Protect with straight plug or plug angled at 90° At the terminal box: 5-pin military connector
Cross section	RG142 & 3-wire (3 x 0.75 mm²)
Material	Internal cable: Core insulation and cable jacket: Silicon Heat protection hose: The inner tube is made of oil resistant synthetic rubber. The reinforcement consists of 2 up to 6 high tensile steel wire layers. The outer tube is made of special synthetic rubber which adds to the unique qualities of the hose.
Temperature	Internal cable: Ambient temperature: -50°C to +200°C Heat protection hose: 100°C permanent up to 120°C for short periods.
Resistance	Internal cable: absolute ozone-resistant and weather-proof highly resistant to acids, alkalies, solvents, oil and petrol Heat protection hose: resistant to ageing and chemicals UV-resistant, ozone-resistant and weather-proof, oil and petrol
Lengths	Total cable length: 9 m, 15 m, 20 m



Nucleonic densitometer

Nucleonic densitometer systems are a type of measuring device that measures the desired parameters by radiometric and non-contact methods. One of the unique advantages of this equipment compared to other instrumentation systems is its independence of the shape and dimensions of the pipe or tank. Actually, in online measurements, it is the most accurate method of calculating density. By applying rapidly-growing nucleonic technology in various industries around the world, it is sometimes possible to obtain information that is not available in any other non-radiometric way, such as measuring fluids in the form of slurry, for which there is no alternative method in a wide range.





Measurement technology

Radiometric measurements are methods that consist of a radioactive source and a detector. The radioactive source transmits gamma rays and the detector receives the rays. Following the Beer-Lambert law and considering the number of initial radiations and those reach the detector, the smallest changes in the material passing through the pipe or tank can be computed.

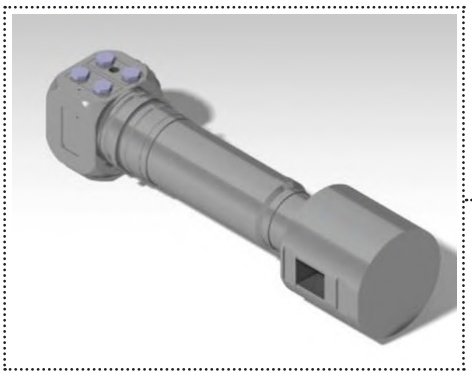
Advantages of using radiometric technology

- No contact and no need for sampling
- Online measurement
- No mechanical and moving parts
- Easy installation without the need to change the production line
- Stability of measurement without the need for periodic calibration
- Easy maintenance
- High sensitivity, accuracy and fast response

Radiometric densitometer model PISD10

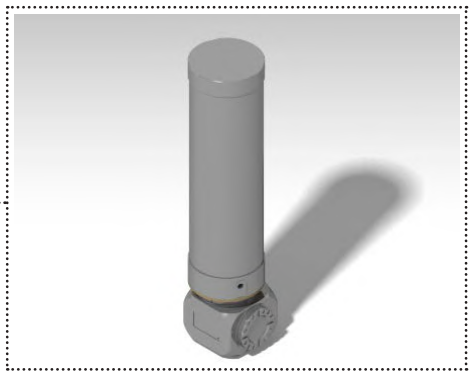
Pars Isotope Company specializes in manufacturing radiometric densitometers with scintillator detectors. These devices are typically produced in length of 5cm, 20cm and 40cm and can support RTD. Depending on the accuracy required by the customer, this equipment is made and presented in different designs and has beam generator, advanced statistical algorithms, noise removal techniques, background radiation reduction, as well as the ability to work in two-phase fluids with high accuracy.

After processing the information and applying effective compensators on the density of the passing fluid, it is sent to the control room with very high accuracy and reliability. This equipment can be installed in automatic loops and the quality of final products can be improved and placed in the permitted interval. It also controls the amount of costly raw materials used in the initial consumption and prevents obstruction of pipes and damage to valuable equipment such as pumps and other elements during the production process.



Equipped with attenuating collimator

Equipped with cooling system



Applications

- Densitometry of materials with product temperature changes up to ±30.
- Can be use in oil and petrochemistry, extraction and refining industry.
- Cement
- Chemicals
- Wood, paper, glass and rubber production
- Foodstuff and sanitary detergents
- Water and wastewater treatment
- Various industries compatible with detection methods in which gamma ray is used.
- Steel industries
- Non-ferrous metals

Installation requirements for radiometric densitometer device

• If possible, the densitometer device should be installed on vertical pipes with the direction of fluid flow from bottom to top.

• For installation on horizontal pipes, the beam path should also be arranged horizontally to reduce the effect of air bubbles and sediments.

• The sampling place should not be more than 20 meters away from the installation place of the device.

• The distance between the place of density measurement and the bend of the pipes should be ≥ 3 * diameter of the pipe.

• The distance between the density measuring place and the pumps should be ≥ 10 * pipe diameter.

Unique feature as a limit Switch

Depending on the customer's needs and the type of installation, the core densitometer can also act as a point level switch or switch and in the detection range between 5 cm to 20 cm, is able to send a 4-20 mA signal or HART commissining to the control room.

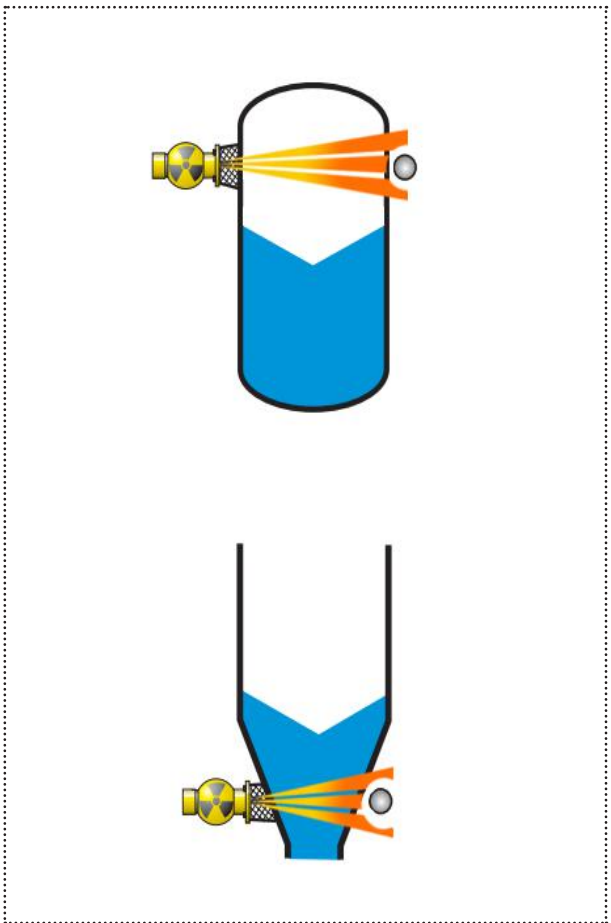
By default, all radiometric densitometers manufactured by Pars Isotope Company can be used as point level switches or switches, and can be used only by using software settings and depending on their installation on the pipe or tank. have a performance change.

To use the device in level measurement mode, the following points should be noted:

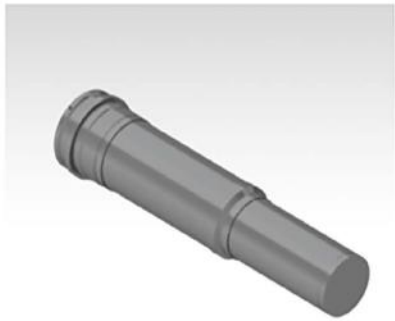
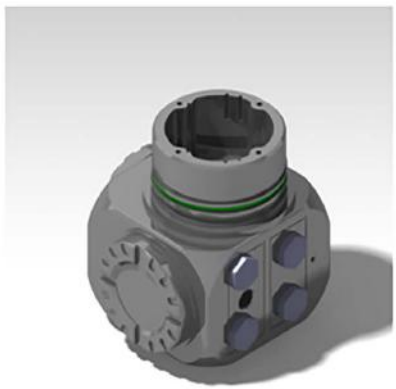
• The device must be installed horizontally, at the desired surface height.

• The outlet angle of the spring container must be exactly in accordance with the measuring range of the sensitive area of the device.

• The spring container and the detector should be installed as close as possible to the tank.



Display device installation in level measurement mode

Operating Temperature	-extended temperature ranges with metallic cable glands: -40 ... +60°C -extended temperature ranges with water cooling system: -40 ... 120°C
Housing material	Pipe: Stainless steel ISO 1.4301/AISI 316  Head (Stainless steel ISO 1.4301/AISI 316 or AL 7075) 
Environmental Testing	On Request (Salt Spray/ Vibration / Temperature...)

Water cooling system

- Optional, stainless steel ISO 1.4301/AISI 316
- Water pressure up to 6 bar (it Depends on Ambient Temperature.)

Ambient temperature T_A = 75 °C (167 °F)

Inlet temperature °C (°F)	Measuring range in mm (in)						
	50 (1.97)	200 (7.87)	400 (15.7)	800 (31.5)	1200 (47.2)	1600 (63)	2000 (78.7)
20 (68)	30 l/h	30 l/h	30 l/h	41 l/h	55 l/h	70 l/h	84 l/h
25 (77)	30 l/h	30 l/h	30 l/h	45 l/h	61 l/h	77 l/h	93 l/h
30 (86)	30 l/h	30 l/h	33 l/h	50 l/h	68 l/h	86 l/h	104 l/h
35 (95)	30 l/h	30 l/h	38 l/h	59 l/h	80 l/h	101 l/h	122 l/h
40 (104)	30 l/h	30 l/h	47 l/h	72 l/h	98 l/h	124 l/h	149 l/h

Ambient temperature T_A = 100 °C (212 °F)

Inlet temperature °C (°F)	Measuring range in mm (in)						
	50 (1.97)	200 (7.87)	400 (15.7)	800 (31.5)	1200 (47.2)	1600 (63)	2000 (78.7)
20 (68)	30 l/h	30 l/h	38 l/h	59 l/h	80 l/h	101 l/h	122 l/h
25 (77)	30 l/h	30 l/h	42 l/h	64 l/h	87 l/h	110 l/h	133 l/h
30 (86)	30 l/h	30 l/h	47 l/h	73 l/h	98 l/h	124 l/h	150 l/h
35 (95)	30 l/h	30 l/h	54 l/h	84 l/h	113 l/h	143 l/h	173 l/h
40 (104)	33 l/h	33 l/h	66 l/h	101 l/h	137 l/h	173 l/h	210 l/h

Ambient temperature T_A = 120 °C (248 °F)

Inlet temperature °C (°F)	Measuring range in mm (in)						
	50 (1.97)	200 (7.87)	400 (15.7)	800 (31.5)	1200 (47.2)	1600 (63)	2000 (78.7)
20 (68)	30 l/h	30 l/h	45 l/h	70 l/h	94 l/h	119 l/h	144 l/h
25 (77)	30 l/h	30 l/h	50 l/h	77 l/h	104 l/h	131 l/h	158 l/h
30 (86)	30 l/h	30 l/h	55 l/h	85 l/h	115 l/h	146 l/h	176 l/h
35 (95)	32 l/h	32 l/h	64 l/h	98 l/h	133 l/h	168 l/h	203 l/h
40 (104)	38 l/h	38 l/h	75 l/h	116 l/h	157 l/h	199 l/h	240 l/h

- Tube connection R1/4"
- Sealing with O-ring (FKM)

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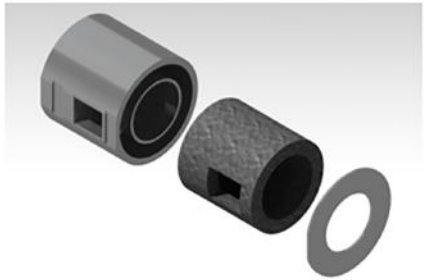
<tr><td>Collimator</td><td colspan="3">Optional, lead, painted Frontal or lateral radiation to reduce background radiation. or Lead has been Casted in Steel
  </td></tr>
<tr><td rowspan="2">Weights</td><td>Scintillator size (polymer)
Ø x length [mm]</td><td>without Cooling (kg)</td><td>with Cooling (kg)</td></tr>
<tr><td>50×50
40×200
40×400</td><td>16
17.5
19</td><td>24
26.5
29.5</td></tr>
<tr><td rowspan="2">Dimensions(Diameter/ Length)</td><td>Scintillator size (polymer)
Ø x length [mm]</td><td>without Cooling (mm)</td><td>with Cooling (mm)</td></tr>
<tr><td>50×50 (NAI)
40×200
40×400</td><td>approx. 119/622
approx. 119/772
approx. 119/972</td><td>approx. 145/636
approx. 145/786
approx. 145/986</td></tr>
<tr><td>Protection rating</td><td colspan="3">IP67/ Ex db IIC T6 Gb</td></tr>
</table>

Supply voltage:	- Detector: 110 to 240 VAC 50/60Hz, 3VA +24VDC, 3W - display: 9VDC from detector
Mounting	Clamping
Adjustment	Local Display Pars Isotope Desktop Software
Output signal:	4 … 20 mA, HART active/Passive Max Impedance:500Ω
Connection Between Detector and display	RS485
Core cross-section for the screw terminals:	0.75 mm^2 to 2 mm^2
Recommended Cable between detector and control room(4…20mA),HART:	Signal cable, 2×1 mm^2, Twisted pair, shielded
Recommended Power Cable between detector and control room:	Power cable, 2×1.5mm^2
Recommended Cable between detector and display:	On order IFM cable: - EVT051 - EVT098 - EVT099
Accuracy	±0.1%
Approvals	Ex db IIC T6 Gb
Ambient, storage and transport temperature:	-20°C … +60°C
Operating Temperature	- extended temperature ranges with metallic cable glands: -40 … +60°C - extended temperature ranges with water cooling system: -40 … 120°C
Housing material	(Optional: Stainless steel ISO 1.4301/AISI 316 / Aluminium 7075)

Radiation source container

A lead container with steel cover designed to hold the radioactive source that can emit radiations at appropriate angles in level and density radiometric measuring, which is an important component of radiometric measurement systems.

Features of radioactive containers for radioactive sources made by Pars Isotope Company

- Optimal design with the lowest weight and maximum shielding
- Spherical design
- Safe and easy replacement of sources
- Easy installation
- Different emission angles for optimal conformity and performance
- Manual ON/OFF switch
- Visible switch status

Spherical source container for point sources
model PIBS10, PIBS11

This model can be ordered in two sizes for stronger sources.
Since industries use rod sources with different size and activity, our company can produce cylindrical source container for such sources. this is produced under model PIBC10.
Due to the variety of molds used in steel factories, this container can be ordered in dimensions and sizes according to the specifications of the source required by the customer.

Attenuation factor and half value layers				
	PIBS10		PIBS 11	
	^{60}Co	^{137}Cs	^{60}Co	^{137}Cs
Attenuation factor F_S	37	294	181	3100
Number of half-value layers	5.2	8.2	7.5	11.6

Maximum activity of the radiation source			
		^{60}Co	^{137}Cs
Radiation source container	PIBS10	max. 0.74 GBq (20 mCi)	max. 22.2 GBq (600 mCi)
	PIBS11	max. 3.7 GBq (100 mCi)	max. 185.0 GBq (5000 mCi)

Position	The emission channel is located in a distance of 9.5 mm (0.37 in) from the center of the mounting flange. It has the same direction as the ring eyelet of the radiation source container. The emission channel is marked on the covering plate of the mounting flange.
Angle of emission	According to feature of the product structure: • 5° • 20° • 40°
attenuation of the useful beam	approx. 0.3 half-value layers (FS = 1.2)
Weight	PIBS10: approx. 42 kg (92,61 lbs) PIBS11: approx. 86 kg (189,63 lbs)
Ambient temperature	-40°C ...+200°C


INDUSTRIAL
RADIATION
SOURCES

Point sources

Cobalt-60 point source

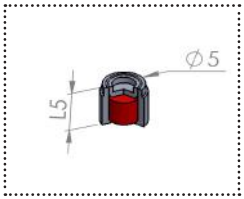
This radioisotope is produced in the reactor and has a half-life of 5.3 years.

The target material is cobalt-59, which is irradiated by thermal neutron in the reactor and converted to cobalt-60. This radioactive material is loaded in standard capsules according to the requested activity. these capsules are argon-arc welded. After passing the leak tests, a certificate is issued for each sources.

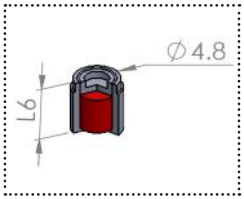
The application of these sources is mainly in level, density, and thickness measurement.

The recommended working life for this product is 10 years.

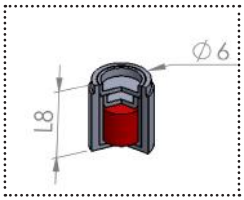
Cobalt-60 point sources can be produced in the following models:



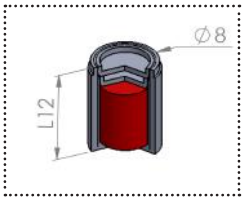
1. 5×5 capsule (PI-SS-1-C1):
Capsule type: cylindrical
Activity range: 1μCi-100mCi
Encapsulation: single-encapsulation
Capsule classification: C33334



2. 4.8×6 capsule (PI-SS-1-C2):
Capsule type: cylindrical
Activity range: 1μCi-100mCi
Encapsulation: single-encapsulation
Capsule classification: C33334



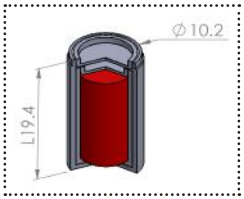
3. 6×8 capsule (PI-SS-1-C3):
Capsule type: cylindrical
Activity range: 1μCi-1Ci
Encapsulation: double-encapsulation
Capsule classification: C33334



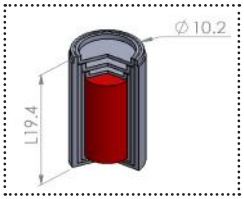
4. 8×12 capsule (PI-SS-1-C4):
Capsule type: cylindrical
Activity range: 1μCi-2Ci
Encapsulation: double-encapsulation
Capsule classification: C33334

5. 8×24.3 capsule (PI-SS-1-C5):
Capsule type: cylindrical
Activity range: 1μCi-2Ci
Encapsulation: single-encapsulation
Capsule classification: C33334

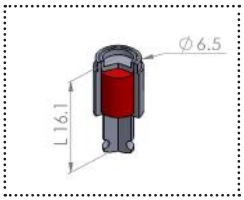
6. 10.2×19.4 Capsule (PI-SS-1-C6):
Capsule type: cylindrical
Activity range: 1μCi-2Ci
Encapsulation: single-encapsulation
Capsule classification: C33334



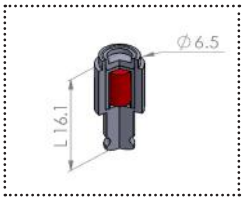
7. 10.2×19.4 Capsule (PI-SS-2-C6):
Capsule type: cylindrical
Activity range: 1μCi-2Ci
Encapsulation: double-encapsulation
Capsule classification: C33334



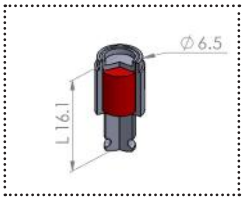
8. 10.2×19.4 capsule (PI-SS-3-C6):
Capsule type: cylindrical
Activity range: 1μCi-2Ci
Encapsulation: triple-encapsulation
Capsule classification: C33334



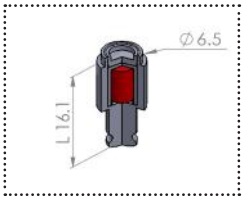
9. 16.1×6.5 Capsule (PI-SS-1-N1):
Capsule type: nipple
Activity range: 1μCi-1Ci
Encapsulation: single-encapsulation
Capsule classification: C33334



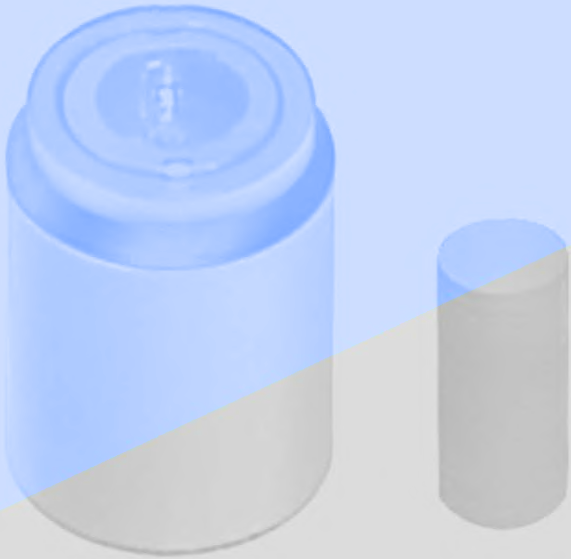
10. 16.1×6.5 Capsule (PI-SS-2-N1):
Capsule type: nipple
Activity range: 1μCi-1Ci
Encapsulation: double-encapsulation
Capsule classification: C33334



11. 16.1×6.5 Capsule (PI-SS-1-N1):
Capsule type: thread nipple
Activity range: 1μCi-1Ci
Encapsulation: single-encapsulation
Capsule classification: C33334



12. Capsule 16.1×6.5 (PI-SS-2-N1):
Capsule type: thread nipple
Activity range: 1μCi-1Ci
Encapsulation: double-encapsulation
Capsule classification: C33334



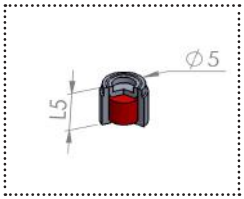
Cs-137 point source

This radioisotope is a fission product and has a half-life of about 30 years.

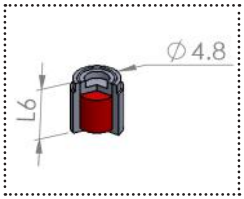
In the production of this product, the Cs-137 radioactive solution is stabilized in ceramic absorbents with a specific absorption capacity and then loaded in standard capsules that have successfully passed ISO2919 tests. these capsules are argon-arc welded.

These sources can be used in point and continuous level gauging, continuous density measurement and equipment calibration in oil, gas, petrochemical, steel industries, etc. The recommended working life for this product is 10 years.

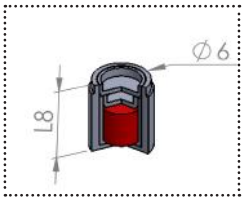
Caesium-137 point sources can be produced in the following models:



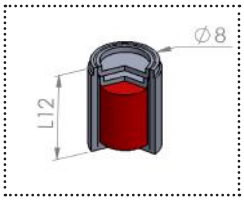
1. 5×5 capsule (PI-SS-1-C1):
Capsule type: cylindrical
Activity range: 1μCi-13mCi
Encapsulation: single-encapsulation
Capsule classification: C33334



2. 4.8×6 capsule (PI-SS-1-C2):
Capsule type: cylindrical
Activity range: 1μCi-13mCi
Encapsulation: single-encapsulation
Capsule classification: C33334



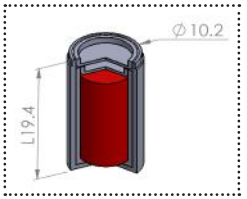
3. 6×8 capsule (PI-SS-1-C3):
Capsule type: cylindrical
Activity range: 1μCi-13mCi
Encapsulation: double-encapsulation
Capsule classification: C33334



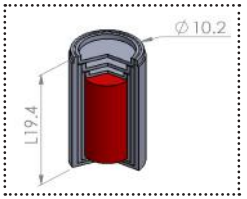
4. 8×12 capsule (PI-SS-1-C4):
Capsule type: cylindrical
Activity range: 1μCi-13mCi
Encapsulation: double-encapsulation
Capsule classification: C33334

5. 8×24.3 capsule (PI-SS-1-C5):
Capsule type: cylindrical
Activity range: 1μCi-13mCi
Encapsulation: single-encapsulation
Capsule classification: C33334

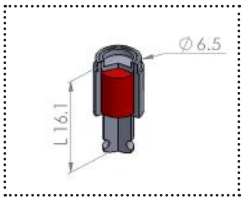
6. 10.2×19.4 Capsule (PI-SS-1-C6):
Capsule type: cylindrical
Activity range: 1μCi-13mCi
Encapsulation: single-encapsulation
Capsule classification: C33334



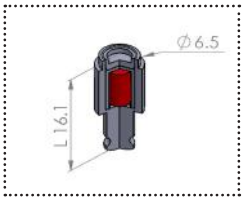
7. 10.2×19.4 Capsule (PI-SS-2-C6):
Capsule type: cylindrical
Activity range: 1μCi-13mCi
Encapsulation: double-encapsulation
Capsule classification: C33334



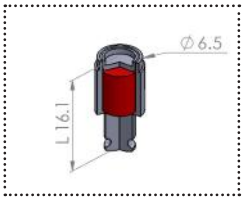
8. Capsule 10.2×19.4 (PI-SS-3-C6):
Capsule type: cylindrical
Activity range: 1μCi-13mCi
Encapsulation: triple-encapsulation
Capsule classification: C33334



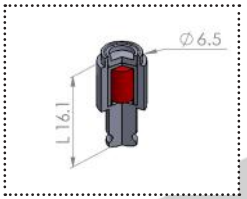
9. Capsule 16.1×6.5 (PI-SS-1-N1):
Capsule type: nipple
Activity range: 1μCi-13mCi
Encapsulation: single-encapsulation
Capsule classification: C33334



10. 16.1×6.5 Capsule (PI-SS-2-N1):
Capsule type: nipple
Activity range: 1μCi-13mCi
Encapsulation: double-encapsulation
Capsule classification: C33334



11. 16.1×6.5 Capsule (PI-SS-1-N1):
Capsule type: thread nipple
Activity range: 1μCi-13mCi
Encapsulation: single-encapsulation
Capsule classification: C33334



12. 16.1×6.5 Capsule (PI-SS-2-N1):
Capsule type: nipple
Activity range: 1μCi-13mCi
Encapsulation: double-encapsulation
Capsule classification: C33334

Ir-192 point source

This radioisotope is produced in the reactor and has a half-life of 74 days.

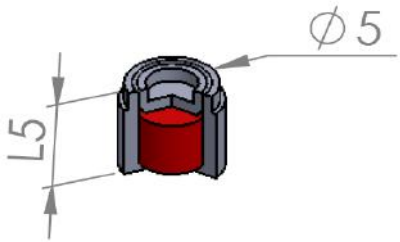
In the production of this radioisotope, iridium-191 plates are converted to iridium-192 radioisotope after irradiation in the reactor.

The radioactive plates are loaded according to the requested activity and then welded in standard capsules which has successfully passed ISO2919 tests.

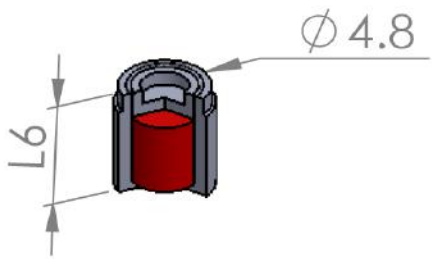
This source can be used in radiographic examinations of high-thickness parts in various industries such as oil, gas, steel, etc.

The recommended working life for this product is 6 months.

Iridium- 192 point sources can be produced in the following models:



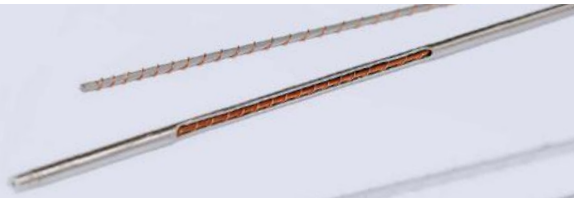
1. 5×5 capsule (PI-SS-1-C1):
Capsule type: cylindrical
Activity range: 20Ci-150Ci
Encapsulation: single-encapsulation
Capsule classification: C43313



2. 4.8×6 capsule (PI-SS-1-C2):
Capsule type: cylindrical
Activity range: 20Ci-150Ci
Encapsulation: single-encapsulation
Capsule classification: C43313

Rod sources

Cobalt-60 rod source



These sources can be produced in both wired and ceramic forms.

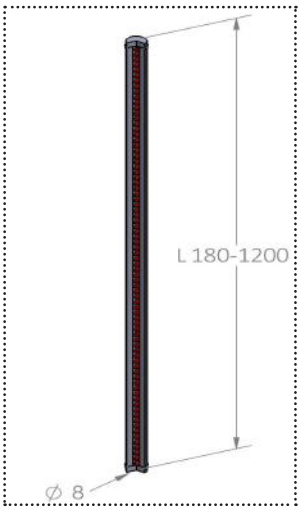
In the wired model, cobalt-59 wire is converted to cobalt-60 after irradiation in the reactor, then wrapped around the metal core following specific steps according to the calculated activity distribution. This assembly is placed in a standard capsule which has successfully passed ISO2919 test. these capsules are argon-arc welded.

In the ceramic model, cobalt-60 radioactive solution is stabilized on the ceramics according to the distribution of activity and placed inside the aluminium sheath. subsequently, this aluminium sheath is loaded and welded inside the standard capsule.

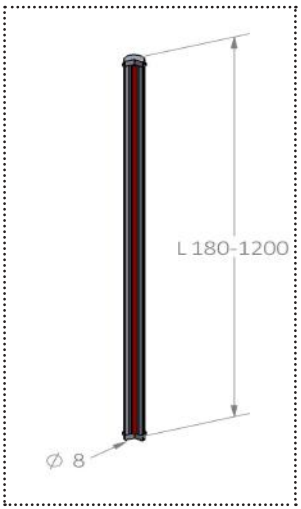
These sources are used in oil, gas, petrochemical and steel industries for continuous level measurement of materials inside tanks and molds.

The recommended working life for this product is 10 years.

cobalt-60 rod sources can be produced in the following models:

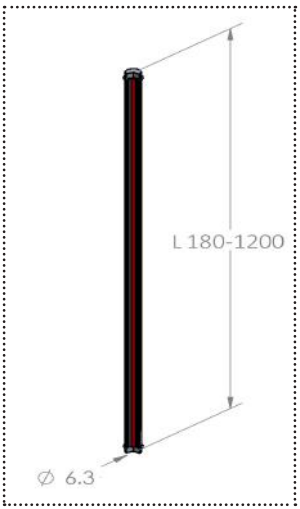


1. Steel capsule - diameter 8 (PI-SS-1-R1):
Capsule type: rod
Activity range: 0.1mCi-50mCi
Encapsulation:single-encapsulation
Capsule classification: C33334 (3)



2. Steel capsule - diameter 8 (PI-SS-2-R1):
Capsule type: rod
Activity range: 0.1mCi-50mCi
Encapsulation: double-encapsulation
Capsule classification: C33334 (3)

3. Steel capsule - diameter 6.3 (PI-SS-1-R2):
Capsule type: rod
Activity range: 0.1mCi-50mCi
Encapsulation: single-encapsulation
Capsule classification: C33334 (3)



4. Steel capsule - diameter 6.3 (PI-SS-2-R2):
Capsule type: rod
Activity range: 0.1mCi-50mCi
Encapsulation: double-encapsulation
Capsule classification: C33334 (3)

Cs-137 Rod source

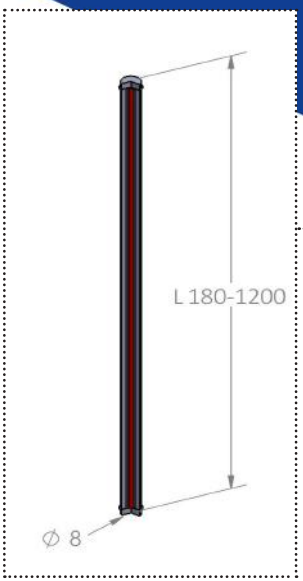
These sources can be produced in ceramic form.

Caesium-137 radioactive solution is stabilized on the ceramics according to the distribution of activity and placed inside the aluminium sheath. subsequently, this aluminium sheath is loaded and welded into a standard capsule that has successfully passed ISO2919 test. these capsules are argon-arc welded.

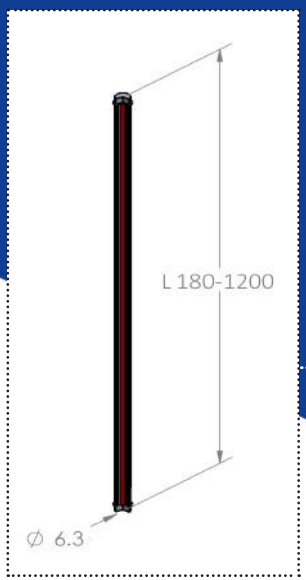
These sources are used in oil, gas, petrochemical and steel industries for continuous level measurement of materials inside tanks and molds.

The recommended working life for this product is 10 years.

Cs-137 rod sources can be produced in the following models:



1. Steel capsule - diameter 8 (PI-SS-2-R1):
Capsule type: rod
Activity range: 0.1mCi-13mCi
Encapsulation: Double-encapsulation
Capsule classification: C33334 (3)



2. Steel capsule diameter 6.3 (PI-SS-2-R2):
Capsule type: rod
Activity range: 0.1mCi-13mCi
Encapsulation: double-encapsulation
Capsule classification: C33334 (3)

Calibration sources

As the name implies, the activity and the dimensions of these sources are defined precisely to calibrate measuring systems and nuclear equipment. The importance of these sources is considered from the perspective that some kind of input of all nuclear activities passes through the reference and calibration sources, so that the accuracy in the production of these sources causes more accurate calibration of nuclear equipment and the accuracy of other activities depends on the data extracted from them.

These sources are classified into three important categories:

A) Point calibration sources

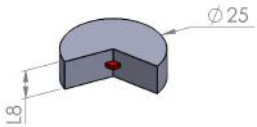
In this type of sources, the radioactive solution is stabilized in ceramic absorbents in specific and small dimensions and then is loaded in standard resin capsules.

1- Point disk calibration sources:

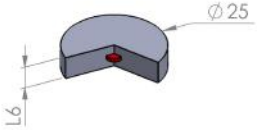
These sources are in the shape of a disk with different diameters and thickness, which can be customised to the standard dimensions. The related products to these sources are as follows:

1-1 Cs-137:
Source model: point
Material, capsule code: Resin, (PI-Re-1-D1, PI-Re-1-D2)
Activity range: 100 nCi-100µCi
Capsule classification: C22212

1-2 Co-60:
Source model: point
Material, capsule code: Resin, (PI-Re-1-D1, PI-Re-1-D2)
Activity range: 100 nCi-100µCi
Capsule classification: C22212



PI-Re-1-D1



PI-Re-1-D2

1-3 Co-57:
Source model: point
Material, capsule code: Resin, (PI-Re-1-D1, PI-Re-1-D2)
Activity range: 100 nCi-100µCi
Capsule classification: C22212

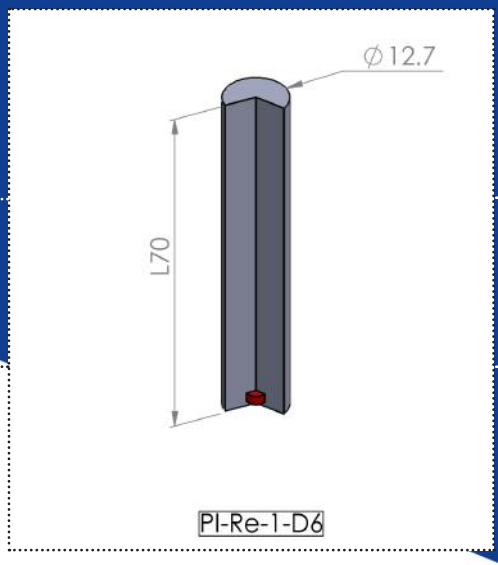
1-4 Ga-68:
Source model: point
Material, capsule code: Resin or Plexiglas, (PI-Re-1-D1, PI-Re-1-D2)
Activity range: 100 nCi-100µCi
Capsule classification: C22212

* The activity of all the above sources can be provided with a tolerance of ±10% and uncertainty of ±5%.

2- Rod point calibration source:

Theses sources are in the shape of a rod with different diameters and heights, which can be customised to the standard dimensions. The related products to these sources are as follows:

2-1 Cs-137:
Source model: rod
Material, capsule code: Resin, (PI-Re-1-D6)
Activity range: 100 nCi-100µCi
Capsule classification: C22212



2-3 -Co-57:
Source model: rod
Material, capsule code: Resin, (PI-Re-1-D6)
Activity range: 100 nCi-100µCi
Capsule classification: C22212

2-2 -Co-60:
Source model: rod
Material, capsule code: Resin, (PI-Re-1-D6)
Activity range: 100 nCi-100µCi
Capsule classification: C22212

2-4 Ga-68:
Source model: rod
Material, capsule code: Resin, (PI-Re-1-D6)
Activity range: 100 nCi-100µCi
Capsule classification: C22212

* The activity of all the above sources can be provided with a tolerance of ±10% and uncertainty of ±5%.

3- Specific point calibration:

Sources that can be produced according to customer needs, such as Plexiglas, aluminium or steel well logging calibration sources in the form of discs and cubes.

B) Standard solutions

These sources contain chemical solutions of different radioisotopes with various volumes and activities.

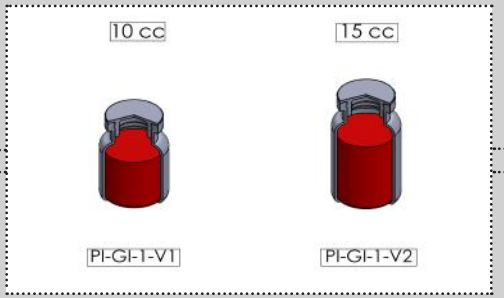
Mixed sources with different radioisotopes can also be provided in this way.

In these sources, the volume is determined based on the customer's request, and the activity of all sources can be provided with a tolerance of ±10% and uncertainty of ±5%.

These sources can be provided as follows:

1- Cs-137:
Source model: glass vial
Capsule code: PI-GI-1-V1, PI-GI-1-V2
Activity range: 100 nCi-100µCi

2 -Co-60:
Source model: glass vial
Capsule code: PI-GI-1-V1, PI-GI-1-V2
Activity range: 100 nCi-100µCi



3 -Co-57:
Source model: glass vial
Capsule code: PI-GI-1-V1, PI-GI-1-V2
Activity range: 100 nCi-100µCi

4- Ga-68:
Source model: glass vial
Capsule code: PI-GI-1-V1, PI-GI-1-V2
Activity range: 100 nCi-100µCi

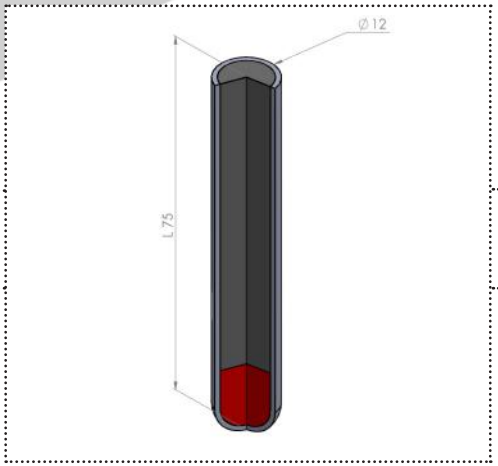
C) Volumetric and linear calibration sources

In this model of sources, radioactive material is distributed in a certain volume or length. In special cases, the volume and shape of the source can be determined according to the customer's request in the standard range.

These sources include volumetric sources of cobalt-60, cobalt-57, Caesium-137 and gallium-68 with a tolerance of ±10% and uncertainty of ±5%.

1- Cs-137:
Source model: volumetric
Capsule code: PI-Pe-1-D7
Activity range: 100 nCi-100µCi

2 -Co-60:
Source model: volumetric
Capsule code: PI-Pe-1-D7
Activity range: 100 nCi-100µCi

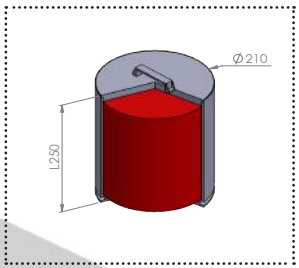


3 -Co-57:
Source model: volumetric
Capsule code: PI-Pe-1-D7
Activity range: 100 nCi-100µCi

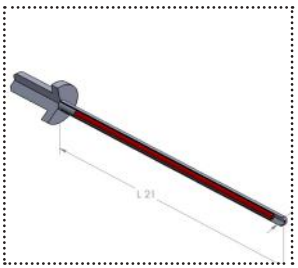
4- Ga-68:
Source model: volumetric
Capsule code: PI-Pe-1-D7
Activity range: 100 nCi-100µCi

Calibration sources for PET scan imaging

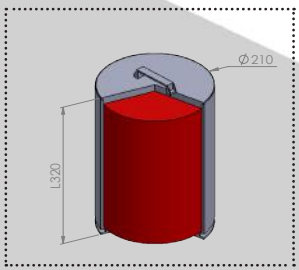
Other volumetric and linear sources include germanium-68 sources. The volumetric model of these sources are known as Germanium-68 Phantom, which is used for daily calibration of PET scan imaging devices, and its linear type with 2 and 3 wall capsules used for periodic calibration and adaptation of CT and PET imaging devices. These sources are available in the following models:



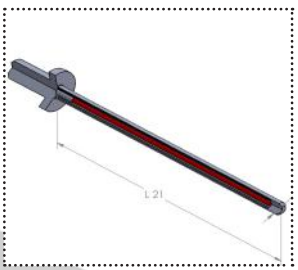
1- Short Ge-68 Phantom:
Source model: volumetric
Material and capsule code:
polyethylene and PI-Pe-1-F1
Activity: 1 mCi
Capsule classification: C22212



3- Linear Ge-68 source, diameter 3.2:
Source model: linear
Capsule material and code:
Steel and PI-SS-2-L1
Activity: 2mCi
Capsule classification: C22212



2- Tall Ge-68 Phantom:
Source model: volumetric
Material and capsule code:
polyethylene and PI-Pe-1-F2
Activity: 2 mCi
Capsule classification: C22212



4- Linear Ge-68 source, diameter 4:
Source model: linear
Capsule material and code:
Steel and PI-SS-3-L2
Activity: 500µCi
Capsule classification: C22212

A NEW HORIZON OF INDUSTRY

CERTIFICATE OF CONFORMITY

Certificate of Conformity

Product:
Radiometric Level Measuring Gauge

Model:
PI—CSD
PIMD

Manufacturer:
Pars Isotope Co.
Address: No.88, 23rd West Street, Azadegan Boulevard,
South Sheykh Bahayi Street, Tehran , Iran.

Meets all the requirements of the following standard(s) and certification scheme:
IEC 60982:1989
Certification Scheme Type 5

Certificate No. : C-1127
Date of Issue: 15/03/2022
Date of Expiration: 14/03/2025

CERTIFICATE OF CONFORMITY

Certificate of Conformity

Reviewed Documents:
* Product test instructions according to IEC 60982:1989
* User manual of Radiometric Level Measuring Gauge
* Control plans for inputs, the production phase and the final product of radiation equipment
* Documents and records related to the conditions of the test, including measuring equipment and etc.
* Other documents and records mentioned in the product standard(s) and certification scheme type 5.

Tests:
* Statistical fluctuations test
* Radioactive decay test
* Time constant test by electronic and physical simulation methods
* Settling time test by electronic and physical simulation methods
* Long term drift test by electronic and physical simulation methods
* Short term drift test by electronic and physical simulation methods
* Switching points test by electronic and physical simulation methods

Conformity Assessment Reports:
* Document Review Report No. DRR-1127-01
* Product Test Reports No. PTR-1127-60982-01/00 and PTR-1127-60982-02/00
* Factory Surveillance Report No. FSR-1127-01

Conformity Assessment Dates:
Documents have been reviewed on 24/05/2021 and 04/07/2021,
samples have been tested on 11/08/2021, 16/08/2021, 06/09/2021,
and the factory has been inspected on 11/10/2021

CERTIFICATE OF CONFORMITY

Certificate of Conformity

Product Specification:

Product name:	Continues radiometric level measuring gauge	Melted rod radiometric level measuring gauge
Model:	PI---CSD	PIMD
Detector model:	Scintillator	Scintilla
Detector Material:	Plastic	NaI & C
Detector Length:	5-200 cm	5 cm
Power Supply:	110 – 220 V_{AC}/50 Hz 24 V_{DC}	110 – 220 V_{AC}/50 Hz 24 V_{DC}
Input Power:	15 VA	15 VA
Maximum Cable Length:	1000 m (120 Ω)	1000 m (120 Ω)
Enclosure Material:	Stainless Steel	Stainless Steel
Analog Output Signal Current:	4 – 20 mA	4 – 20 mA
Maximum Output Signal Impedance:	500 Ω	500 Ω
Digital Output Signal:	Optional	Optional
Communication Between Device And Transmitter:	RS485	RS485
Local Display:	Exists	Exists

Certification Scope:
This certificate certifies all Radiometric Level Measuring Gauges manufactured based on the aforementioned specifications and Product Identification (PID-PAI-002/00) during certificate validity period.The tests mentioned on the third page of this certificate have been performed on samples of products with the following serial numbers: C20104 & MD21102. In addition, the Certification Body periodically witnesses tests mentioned in the product standard(s),conducts unnoticed factory surveillances, and audits the quality management system (if necessary)

Exceptions:
This certificate covers only performance tests.

CERTIFICATE OF CONFORMITY

Certificate of Conformity

Product:
Radiometric Density Gauge

Model:
PI—CSD

Manufacturer:
Pars Isotope Co.
Address: No.88, 23rd West Street, Azadegan Boulevard,
South Sheykh Bahayi Street, Tehran , Iran.

Meets all the requirements of the following standard(s) and certification scheme:
IEC 60692:1999
IEC 61326-1:2012
Certification Scheme Type 5

Certificate No. : C-1017
Date of Issue: 07/05/2021
Date of Expiration: 06/05/2024

CERTIFICATE OF CONFORMITY

Certificate of Conformity

Reviewed Documents:

* Product test instructions according to IEC 60692:1999
* User manual of Radiometric Density Gauge
* Control plans for inputs, the production phase and the final product of radiation equipment
* Risk identification and evaluation of working with radiation gauges
* Documents and records related to the conditions of the test, including measuring equipment and etc.
* Other documents and records mentioned in the product standard(s) and certification scheme type 5

Tests:

* Radioactive decay test
* Recovery time test
* Linearity test
* Mean Response time test
* Mean settling time test
* EMC compatibility test
* supply Voltage changes test
* Ambient temperature tests
* Humidity test
* Instability tests including statistical fluctuations, instability electrical, radiometric noise and reproducibility test

Conformity Assessment Reports:

* Document Review Report No. DRR-1017-01
* Product Test Report No. PTR-1017-01
* Factory Surveillance Report No. FSR-1017-01

Conformity Assessment Dates:

Documents have been reviewed on 24/05/2021 and 04/07/2021, samples have been tested on 11/08/2021, 16/08/2021, 06/09/2021, and the fa

Accredited Certification Body
PCB محصول
Reg No. 121

Accredited lab in Electrical, Oil, Gas, Telecommunications, IT, Renewable Energy and Medical Industries

E.P.I.L.
Energy & Power Industries Laboratories Co.(J.S.)

ISO IEC 17025 Accredited Lab and Inspection Body

LQF-510-02

GENERAL INFORMATION

Product Information

Equipment Under Test	: LEVEL DENSITY METER
Model	: PI05SD(5 cm),PI40D(40 cm), PI160LT(160 cm), PI200LT(200 cm)
Rating	: Rated voltage: 24 Vdc/ 220 VAC Rated current: 125 mA/ 0.047 A Rated power: 3 W/ 10 W Rated frequency: 50 Hz
Ambient Temperature	: -20°C to +60°C
Protection Ingress	: IP67
Type of Protection	: Ex db IIC T6 Gb

Client Information

Manufacturer	: PARS ISOTOPE Co.
Contact Person	: Mr. Shabani
Factory Address	: No.88, West 23rd St.Azadegan Blvd. South Sheykh Bahaie Ave. Tehran, Iran
Tel	: +98-21-88337023
Fax	: +98-21-88337024

Test Results and Descriptions:

See page
See page
See page
See page
See page

Office: Uni

CERTIFICATE OF CONFORMITY

Certificate of Conformity

Product:
Sealed Radioactive Sources

Model:
Industrial Radiography Point Sources
Point Sources used in Gamma Gauges
Rod Sources used in Gamma Gauges
Rod Calibration Sources
Disc Calibration Sources

Manufacturer:
Pars Isotope Co.
Address: No.88, 23rd West Street, Azadegan Boulevard, South Sheykh Bahayi Street, Tehran , Iran.

Meets all the requirements of the following standard(s) and certification scheme:
ISO 2919:2012
Certification Scheme Type 5

Certificate No. : C-1147
Date of Issue: 06/03/2022
Date of Expiration: 05/03/2025

Accredited Certification Body
PCB محصول
Reg No. 121

Accredited lab in Electrical, Oil, Gas, Telecommunications, IT, Renewable Energy and Medical Industries

E.P.I.L.
Energy & Power Industries Laboratories Co.(J.S.)

EPIL TEST REPORT

Project No.: *H1-50012*
Equipment Under Test: *LEVEL DENSITY METER*

Manufacture	*: PARS ISOTOPE Co.*
Model(s)	*: PI05SD(5 cm),PI40D(40 cm), PI160LT(160 cm), PI200LT(200*
Ingress Protection	*: IP67*
Type of protection	*: db*
Gas group	*: IIC*
Temperature class	*: T6*
Ambient temperature	*: -20°C to +60°C*
EPL	*: Gb*
Category	*: 2G*

Tested according to: EN 60079-0:2012/A11:2013, EN 60079-1:20
Applicant: *PARS ISOTOPE Co.*
Issue Date: *09.17.2019*
No. of pages: *68*

Prepared by: Test Engineer
B.Hamidifard

Verified by: Technical Manager
S. Jamshidi

Approved by:
Chief executive officer

A NEW HORIZON OF INDUSTRY

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