



**Electronic SYSTEMS spa**  
ELECTRONIC MEASURING SYSTEMS

CAPITALE SOCIALE € 520.000 I.V.  
I-28015 MOMO (NOVARA - ITALIA) S.R. 229 - Km 12,200  
<http://www.electronicssystem.it> - e-mail: [Info@electronicssystem.it](mailto:Info@electronicssystem.it)

**UNITED STATES NUCLEAR  
REGULATORY COMMISSION  
WASHINGTON D.C.**

**To the kind attention of Mr. David Tiktinsky**

Senior Project Manager Regulatory Guidance Branch  
Division of Industrial and Medical Nuclear Safety  
Office of Nuclear Material safety and safeguards

Momo, 15<sup>th</sup> May 2003

**Dear Mr. David Tiktinsky,**

following up your requests dated April 22<sup>nd</sup>. 2003, we are glad to submit you the following variations according to the points mentioned in your enclosure.

A complete revised application dated 12<sup>th</sup>. March 2003 (as per your request) will be sent apart per courier not later than Tuesday 20<sup>th</sup>. May 2003. We do hope you can consider the date of dispatch of this envelope, since we do not want to run the risk to be late with your deadline.

In this way, we hope to meet all your requirements and are looking forward to receiving your favorable approval.

Regards,

Antonella Giuberchio  
R.S.P.O.

Paolo Calciati  
Radiological Safety Division  
Electronic SYSTEMS SpA Italy

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R.E.A. n.167486 - C.C.I.A.A. DI NOVARA - UFFICIO DEL REGISTRO DELLE IMPRESE - TRIB. DI NOVARA N. 13351 - COD. FISC. 00526370036 - PART. IVA 01409930037  
MECC. NO 010386 - V.A.T. CODE 01409930037



## Integrations to our previous application

List of the requested answers according to the points mentioned in your enclosure dated 22<sup>nd</sup>. April 2003. The whole revised application will be following per courier.

### Pos. 1 Description/Construction

#### Pos. 1.1

Enclosed we provide a new cover letter where we state clearly that we are seeking from NRC a license for radiation safety registration of the device model **ISOSINT** to import radioactive sources both of *Krypton 85* and *Strontium 90* in the United States of America. At the same time we have corrected the date listed on the application to reflect the exact date the application was submitted by *MontesinoTechnologies, Inc.*

In any case a new version of the whole revised application will be also sent to you per courier.

#### Pos. 1.2

The model number of the device we are requesting to be registered is **ISOSINT**. The name "Scanner – SINTEL 9000" defines only the model number of one of the various possible scanner systems where the device could be installed on.

#### Pos. 1.3

As requested we have revised engineering drawings **US 1001** and **US 1002** and indicated the overall dimensions of the gauge (see enclosure); we provide also the revised engineering drawing n. **US 1009** where we have eliminated the name *Slim duplex 1700* and modified with the right name **SINTEL 9000** according to the lists of enclosures (ref. Page 4 our application) (see enclosure); concerning the engineering drawing n. **US 1004** we have sent you a drawing for *Strontium 90* and not *Krypton 85*; in any case, we provide also the missing drawing **US 1004A**.

Regarding "ALUMINIUM ANTICORAL" please note that the USA - UNI identification number is **USA 6062 – UNI 3571 (NAMED ANTICORODAL 100)**

#### Pos. 1.4

The safety lock is a simple stainless steel lock. The lock is clearly shown on DWG. **US 1004** (on top of the page). The safety lock avoids tampering of the source holder to be removed by unauthorized personnel. The shutter control group in open and closed positions are shown on **US 1005** (open) and **US 1006** (closed); set-point of the shutter control group is performed at *Electronic Systems S.p.A.* laboratory by rotating the safety locks (**US 1005 - US 1020**) so that the shutter will be opened and closed completely. The safety locks (**US 1005 - US 1020**) are then fixed in that right positions with screws at the base plate without any possibility to move or remove them from those positions. The ON-OFF switches are simple mechanical switches pressed by the mechanical component shown on drawing **US 1012**; the mechanical action is performed by the pneumatic cylinder with return spring (**US 1005**). There exist another control group similar to the one just described, used to move a little sample of material under the radioactive beam (when the shutter is in open position); the mechanical action is performed by a pneumatic cylinder with return spring; then, there are 2 ON-OFF switches to communicate the position of the sample at the control unit. The ON-OFF switches are pressed by the mechanical movement of the control lever (**US1012**).

### Pos. 2.0 Radiological safety

#### Pos. 2.1

We suppose that the worker assigned to the production line intervenes immediately and that such an intervention should take place in the radiation field, and also that, an incredible and improbable electrical failure and black-out would require operating with the shutter open; in such an event, the maximum dose that the operator concerned could receive to the extremities is strictly related to the time that the hands are exposed to the direct beam.



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Taking into account the maximum recorded level of the average radioactive source (2,3 mSv/h) - referred to a krypton 85 source - 14.8 GBq - and hypothesizing exposure of the extremities under the radiating beam for 20', the maximum equivalent dose absorbed would be 0,76 mSv operating in contact with the gauge, with the opening at 12 mm.

Taking into account the maximum recorded level of the average radioactive source (2,5 mSv/h) - referred to a Strontium 90 source - 50 mCi - and hypothesizing exposure of the extremities under the radiating beam for 20', the maximum equivalent dose absorbed would be 0,833 mSv/h operating in contact with the gauge, with the opening at 25 mm.

As already said, the dose that can be absorbed per year by an operator directly depends on work and measure head installation conditions.

If we presume that the worker stays at a distance of 30 cm from the measure head when this is in motion with the shutter open as long as 2000 hours p.a. consecutively and consider measure head moving time, the head would be near the operator for a lapse of time corresponding to 1/5 of total = 400 hrs/year; therefore, the following values would result:

Kr-85: dose at 30 cm:  $0.11 \mu\text{Sv/h} \times 400 \text{ hrs/year} = 44 \mu\text{Sv/year} (< 1 \text{ mSv/year})$ .

Sr-90: dose at 30 cm:  $2.4 \mu\text{Sv/h} \times 400 \text{ hrs/year} = 960 \mu\text{Sv/year} (< 1 \text{ mSv/year})$ .

### 3. Radiation profile

#### 3.1

Attached you will find the "Radiation profile" data sheets prepared for both Kr-85 and Sr-90, considering distances of 5, 30, and 100 cm with the shutter open and closed.

#### 3.2 (Relating Section 3.3.6)

We confirm that the date of May 1997 shown in the "radiation profile" data sheets corresponds to the date when the isodose tests were carried out and is not the calibration date of the instrument used.

The instrument used (ion chamber VICTOREEN 450 B) is checked and calibrated every two years, as provided for by the Italian Law.

Last calibration of the instrument was made in June 2001 (see certificates attached) and will remain valid until June 2003.

### Pos. 4 Prototype Testing

#### Pos. 4.1

Please see paragraph 3.3.4 and 3.3.5 respectively related to Testing of prototypes and quality control. The device we are requesting to be registered is **completely equal** to the devices for which we have already obtained registration. Please find below a list of authorizations obtained in USA about this device:

- **EPSILON POLYOLEFIN CORPORATION** New Jersey LICENSE N. 29-30446-01 (25<sup>TH</sup>. Februar 1999)
- **VIFAN USA INC.** Tennessee LICENSE N. R-32012-J02 (10<sup>TH</sup>. June 1999)
- **AGRU AMERICA INC.** South Carolina LICENSE N. 596 (25<sup>TH</sup>. August 1998)

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MECC. NO 010386 - V.A.T. CODE 01409930037



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### Pos. 5 Quality Assurance

#### Pos. 5.1

This document is part of our quality assurance and quality control program. If a translated copy is really necessary, it will be sent to you per courier before the deadline

#### Pos. 5.2

Herewith we provide a copy of the our current ISO 9001 certificates

### Pos. 6 Documentation Accompanying Device

#### Pos. 6.1

Enclosed we are sending you a copy of the finalized operating ad safety instructions that will normally accompany the device.

### Pos. 7 Labeling

#### Pos. 7.1

Please see Paragraph n. 3.3.3 page 22, where it is described how the label is attached (US 1036); as required see enclosed drawing with mechanical dimensions and materials. Concerning location please see drawing US 1009 where it is shown where the labels are placed on.

&&&

### Enclosures

Herewith we are sending you only the revised or missing documents. A complete revised application dated 12<sup>th</sup>. March 2003 (as per your request) will be sent apart per courier.

#### Pos. 1.1

Copy of the new cover letter with the type of license we are seeking from the NRC

#### Pos. 1.3

Copy of the revised engineering drawings: **US 1001 - US 1002 - US 1004 - US 1004A - US 1009**

#### Pos. 3.1

Copy of the requested Radiation profiles for Kr-85 and Sr-90

#### Pos. 3.2

Copy of the Calibration instrument certificates

#### Pos. 5.1

if you requested in any case a copy of the quality assurance and quality control program will be sent to you before the deadline

#### Pos. 5.2

Copy of the current ISO 9001 certificates

#### Pos. 6.1

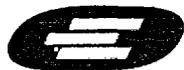
Copy of the finalized operating ad safety instructions

#### Pos. 7.1

Copy of the revised drawing **US 1036** with English language label

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**Electronic SYSTEMS spa**  
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fax: 0039 - [0] 321 926655

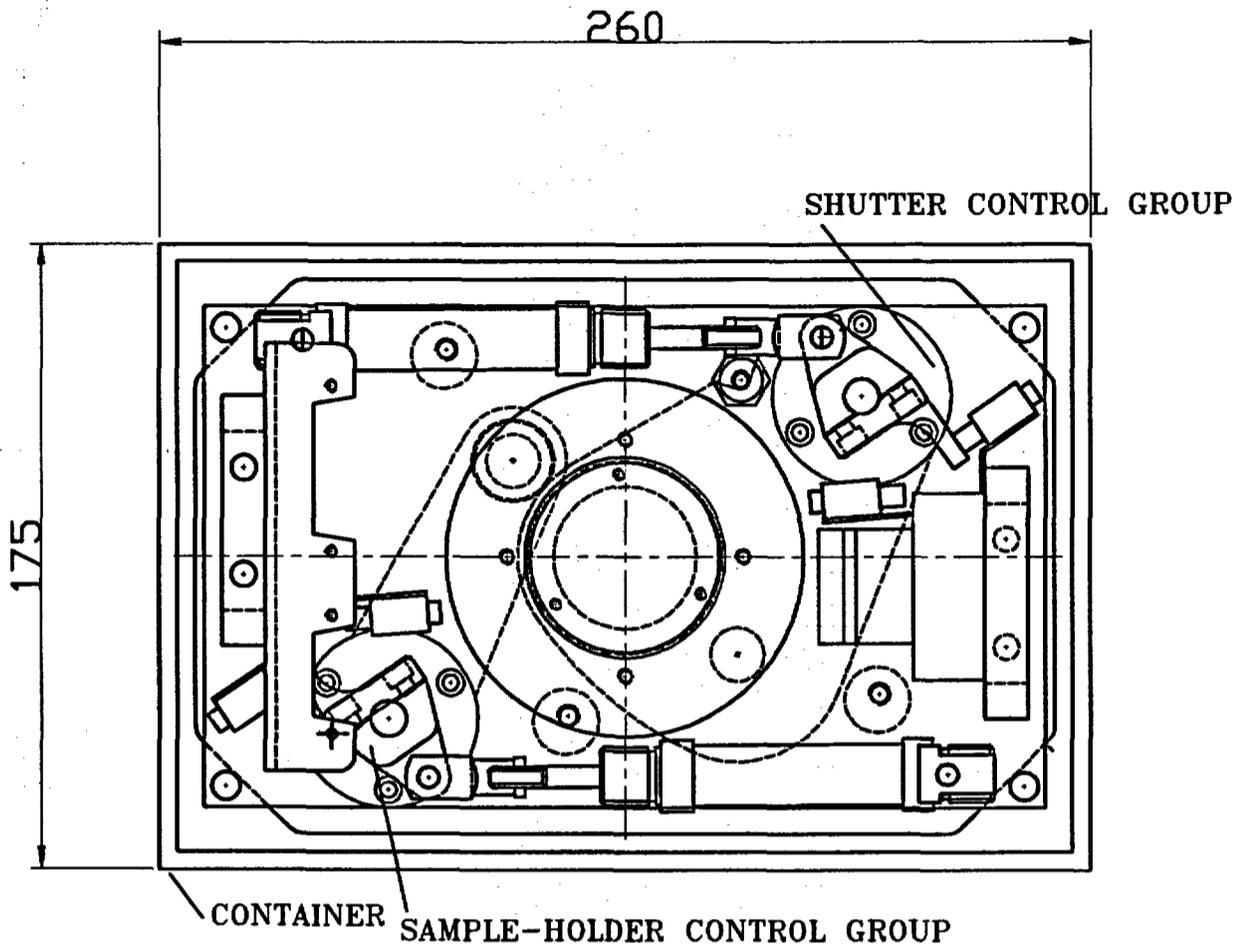
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## **β GAUGE DEVICE**

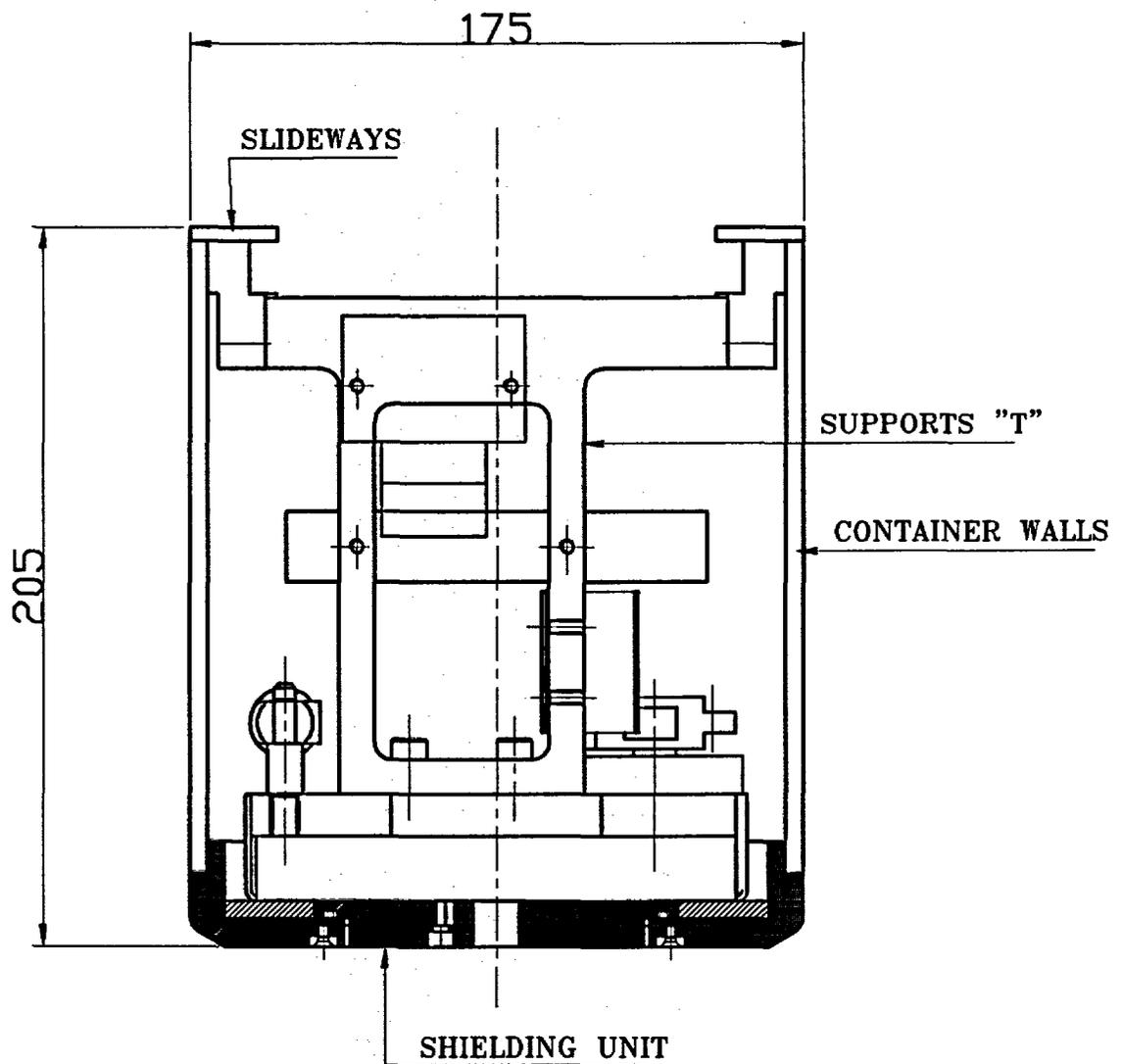
**APPLICATION FOR REGISTRATION  
OF RADIATION DEVICE MODEL ISOSINT  
FOR RADIOACTIVE SOURCES Kr. 85 AND Sr. 90**

**UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON DC. 20555 - 0001  
UNITED STATES OF AMERICA**

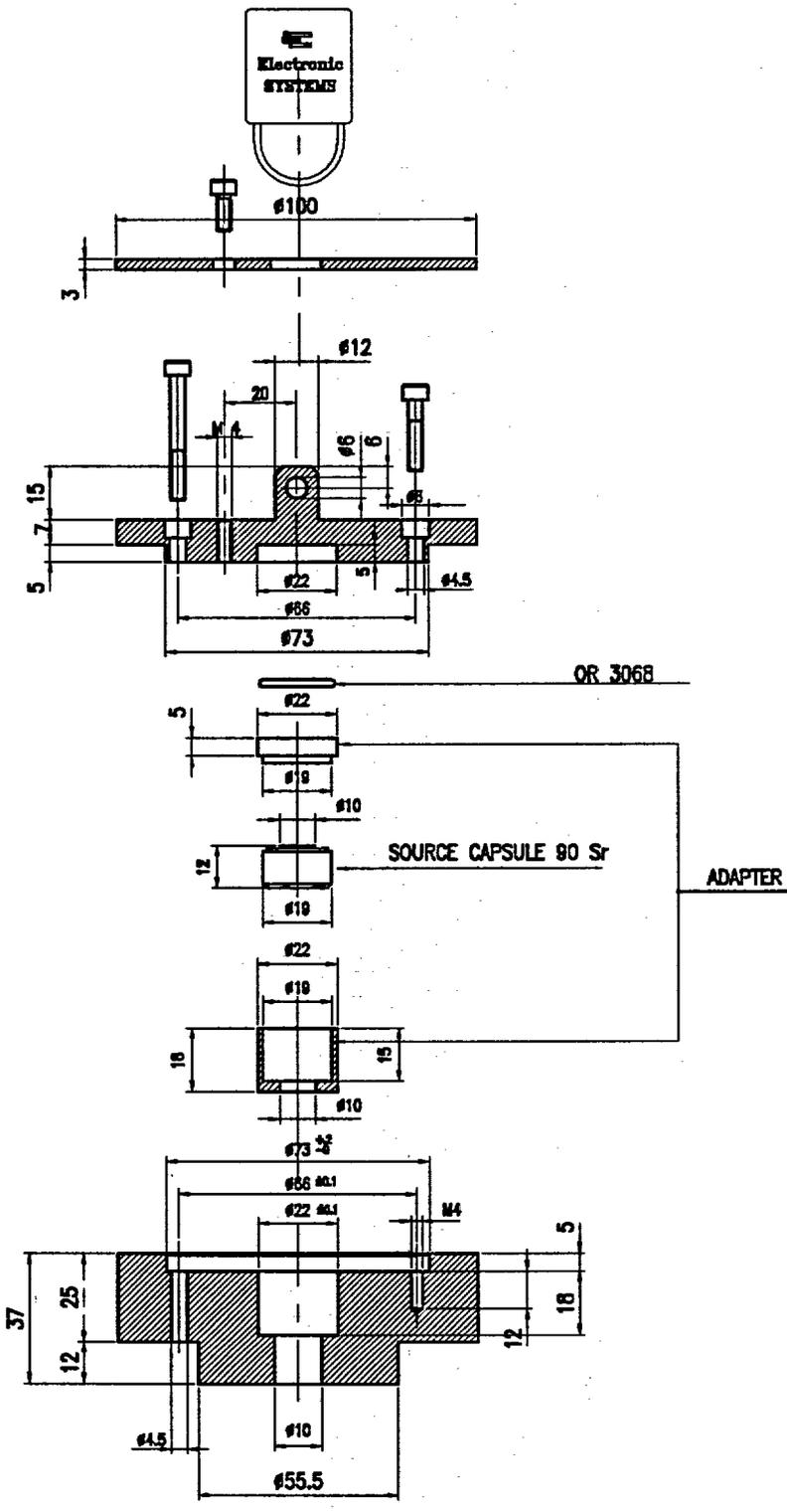
Momo (NO) ITALY - 12<sup>th</sup>. March 2003



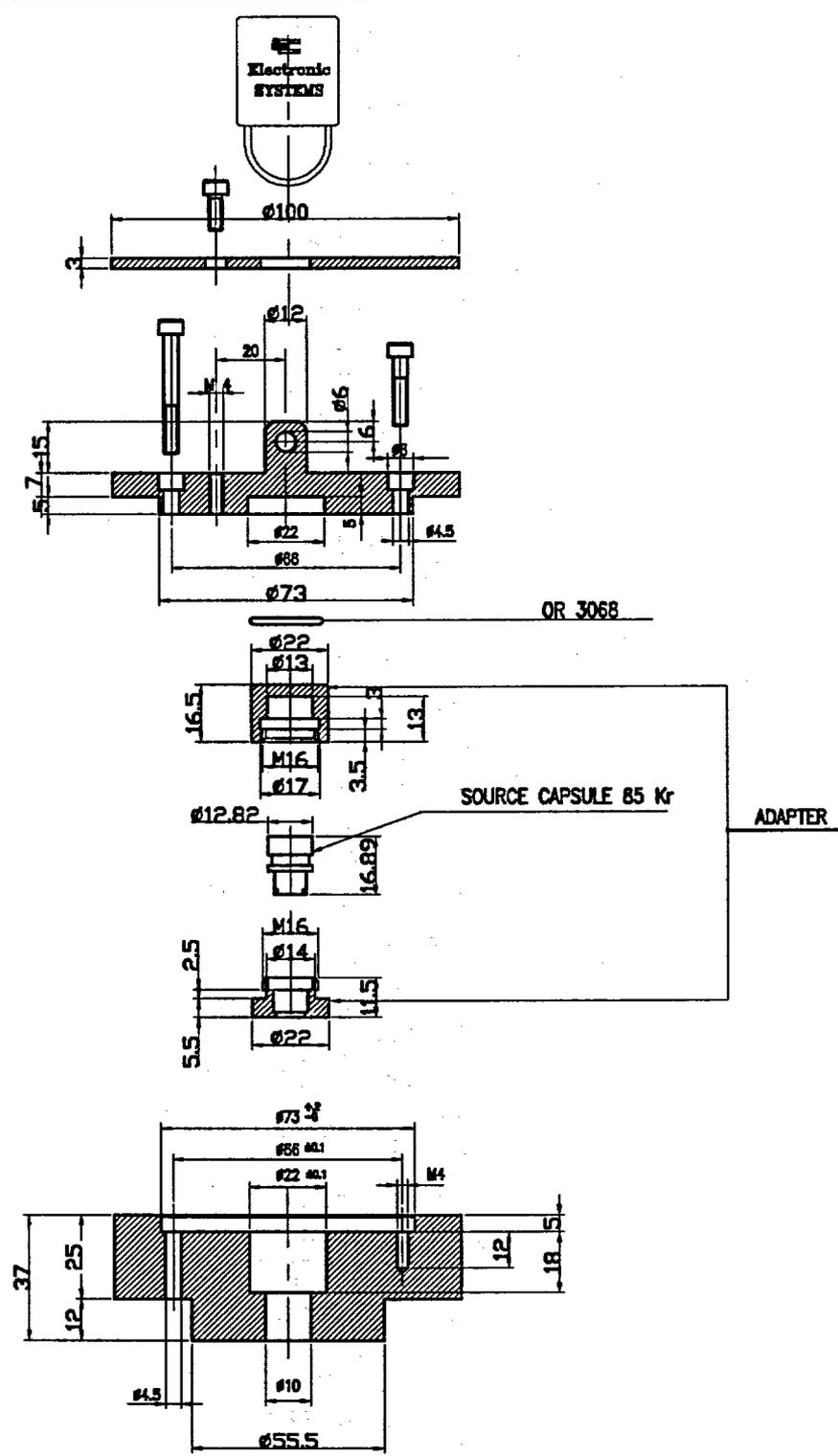
SURF.TREAT.						
THERM.TREAT.						
MATERIALS		MACHINE SCANNER - SINTEL9000				
DES.	TM	DESCRIPTION <b>ISOSINT PLAN VIEW</b>				
CHECKED	TM					
APPROVED	TF					
HD ARCHIVE						
 <b>Electronic SYSTEMS</b> S.p.a.				SCALE	DATE	F.TO
				1:2	12.03.03	A4
			DWG.NO	<b>U.S. 1001</b>		REV.
						-



SURF.TREAT.				
THERM.TREAT.				
MATERIALS		MACHINE SCANNER - SINTEL9000		
DES.	TM	DESCRIPTION <b>ISOSINT TRANSVERSAL SECTION</b>		
CHECKED	TM			
APPROVED	TF			
HD ARCHIVE				
 <b>Electronic SYSTEMS</b> S.p.a.		SCALE	DATE	F.TO
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				-

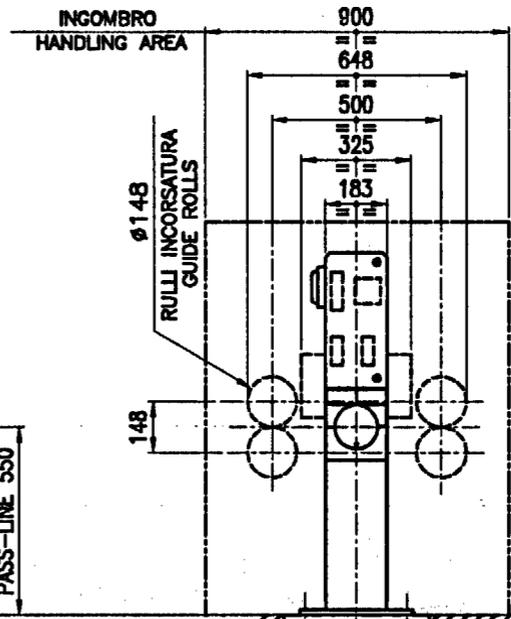
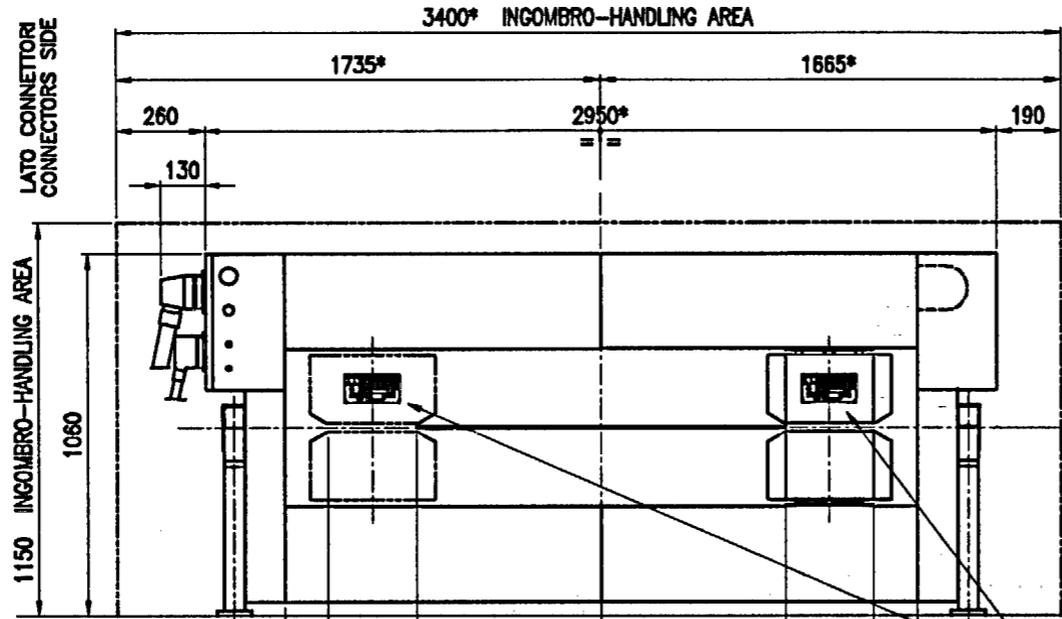


SURF.TREAT.				
THERM.TREAT.				
MATERIAL		MACHINE SCANNER - SINTEL9000		
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CHECKED	TM			
APPROVED	TF			
HD ARCHIVE				
 <b>Electronic SYSTEMS</b> S.p.a.		SCALE	DATE	F.TO
		DWG.NO DISEGNO	1:2	12.03.03
			<b>U.S. 1004</b>	REV. -



REV.	C	.	.	.	DATA
	B	.	.	.	
	A	.	.	.	
					DESCRIZIONE DELLE MODIFICHE
					DISEGNATORE

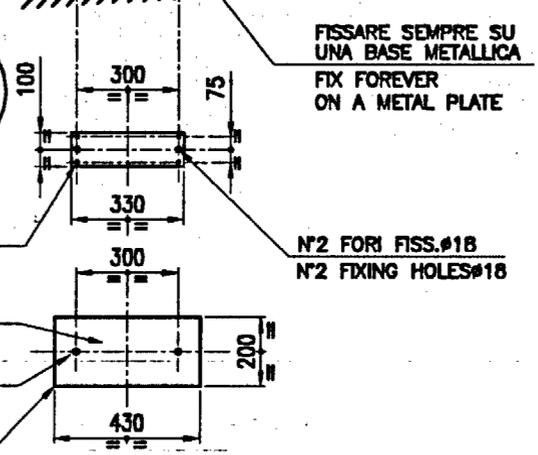
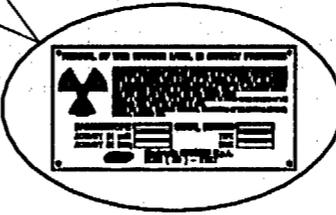
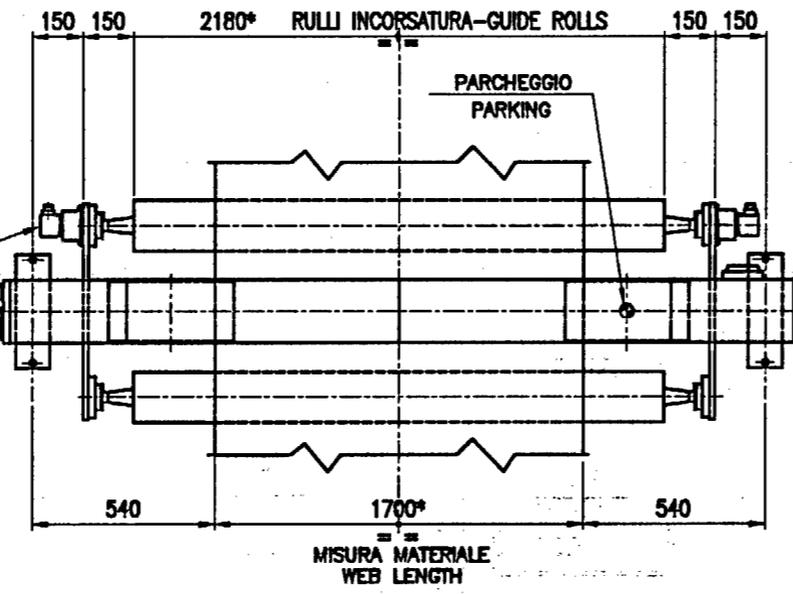
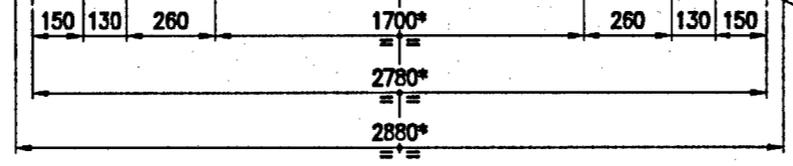
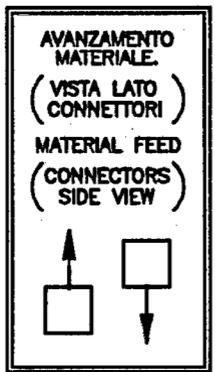
SURF.TREAT.				
THERM.TREAT.				
MATERIAL		MACCHINE SCANNER SINTEL 9000		
DES.	TM	DESCRIPTION ISOSINT EXSPLODED VIEW FOR Kr 85		
CHECKED	TM			
APPROVED	TF			
HD ARCHIVE				
		SCALE	DATE	F.TO
		1:2	12.03.03	A4
	DWG. NO DISEGNO	1004/A		REV. -



**TIPO INCORSATURA. (VISTA LATO CONNETTORI)**  
**FEEDING MATERIAL TYPE. (CONNECTORS SIDE VIEW)**

A	
B	
C	
D	

**I RULLI DI INCORSATURA SONO A RICHIESTA.**  
**FEEDING GUIDE ROLLS ON REQUEST.**



**PIASTRA SUPPORTO SCANSORE DA ANNEGARE A PAVIMENTO (OPTIONAL)**  
**SCANNER SUPPORT PLATE TO BE FIXED INTO THE FLOOR (OPTIONAL)**

\* QUOTE FUORI SCALA - DIMENSIONS OUT OF SCALE

**PESO WEIGHT 500 Kg.**

 <b>Electronic SYSTEMS S.p.A.</b>	DESCRIZIONE: <b>SINTEL 9000</b>	DATE: <b>12.03.03</b>	DES. <b>FS</b>
		SCALE: <b>1:15</b>	CHECKED: <b>FS</b>
			APPROVED: _____
			REV. _____
		DWG. N° <b>U.S. 1009</b>	DATE

DESIGNATORE	
DESCRIZIONE DELLE MODIFICHE	
REV.	DATE
G	
B	
A	



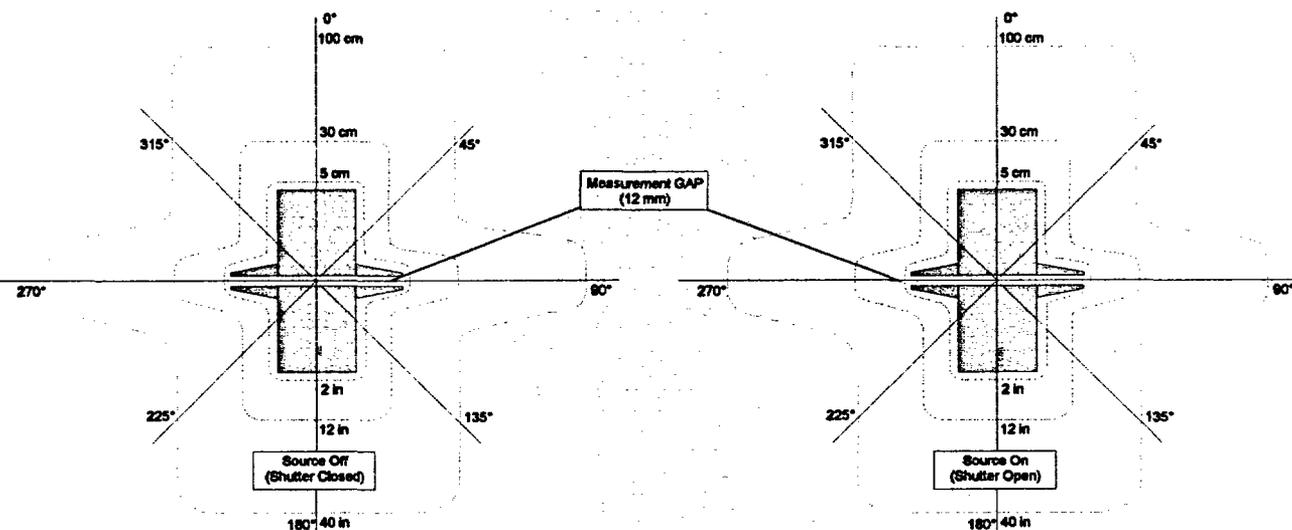
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S.S. 229 - km 12,200  
28015 MOMO (NO) - Italy

### RADIATION PROFILE -

Model : recognized source RS 2003 - Source: Strontium 90

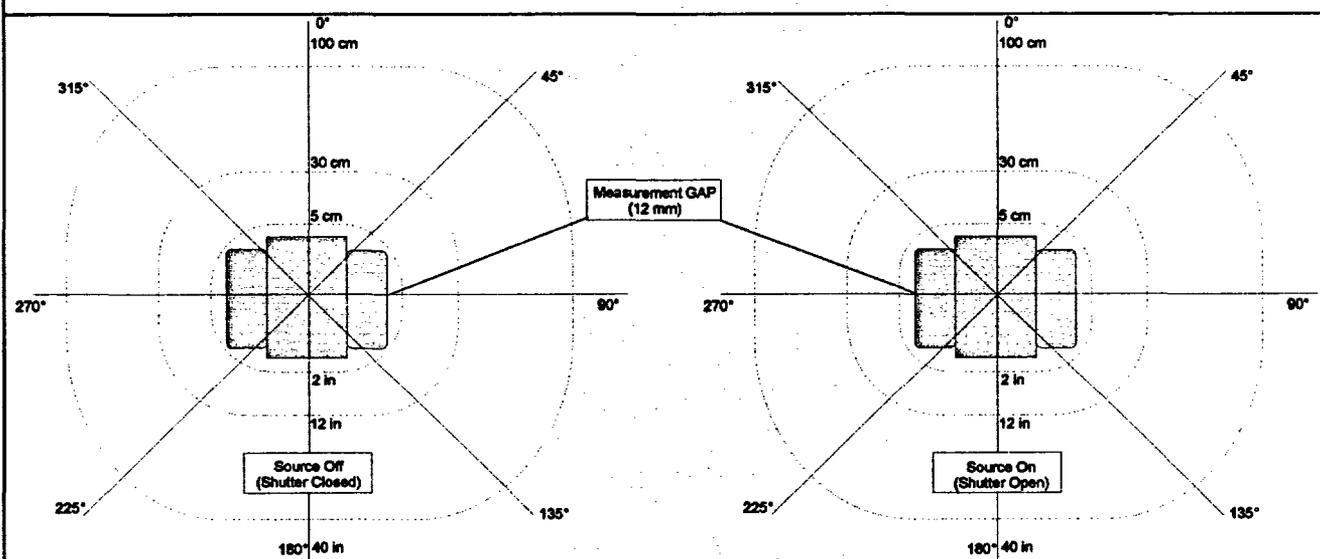
Activity : □ 400 mCi / 14.8 GBq; □ 200 mCi / 7.4 GBq;

□ 100 mCi / 3.7 GBq; ☒ 50 mCi / 1.85 GBq



Source Housing - viewed from side

cm.	Shutter Closed - Dose Rate in $\mu\text{Sv/h}$								Shutter Open - Dose Rate in $\mu\text{Sv/h}$								cm.
	0°	45°	90°	135°	180°	225°	270°	315°	0°	45°	90°	135°	180°	225°	270°	315°	
5	BG		10.5		BG		10.5		BG		28.0		BG		28.0		5
30	BG		0.45		BG		0.45		BG		2.4		BG		2.4		30
100	BG		BG		BG		BG		BG		BG		BG		BG		100



Source Housing - viewed from top

cm.	Shutter Closed - Dose Rate in $\mu\text{Sv/h}$								Shutter Open - Dose Rate in $\mu\text{Sv/h}$								cm.
	0°	45°	90°	135°	180°	225°	270°	315°	0°	45°	90°	135°	180°	225°	270°	315°	
5	BG		10.5		BG		10.5		BG		28.0		BG		28.0		5
30	BG		0.45		BG		0.45		BG		2.4		BG		2.4		30
100	BG		BG		BG		BG		BG		BG		BG		BG		100

BG = Background; NA = Not Applicable

Momo, 25 April 2003

Written by	Checked by	Approved by



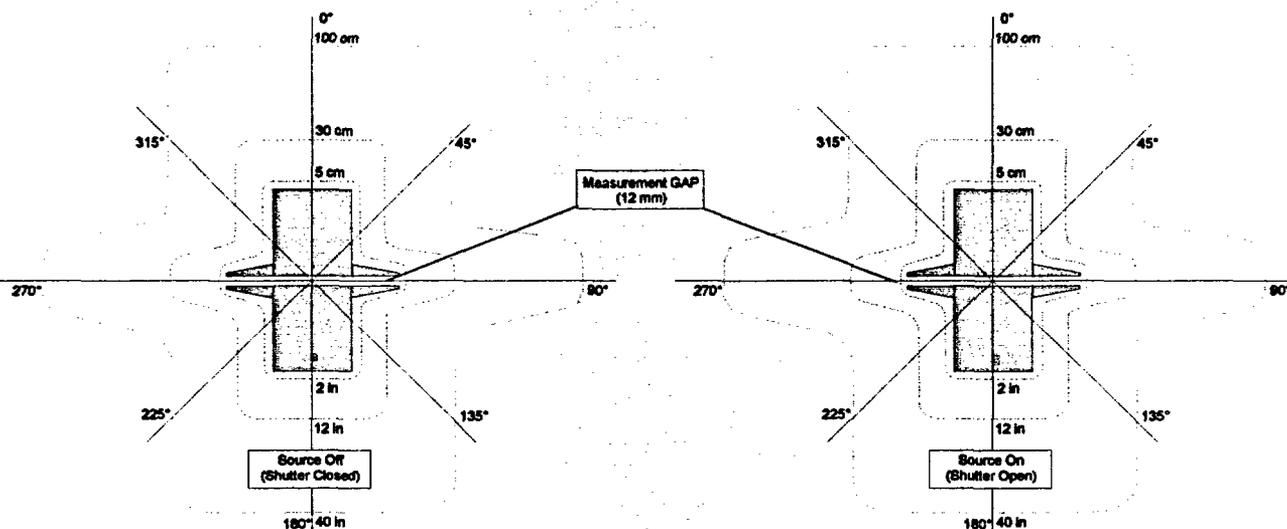
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S.S. 229 - km 12,200  
28015 MOMO (NO) - Italy

### RADIATION PROFILE -

Model : recognized source RS 2003 - Source: Krypton 85

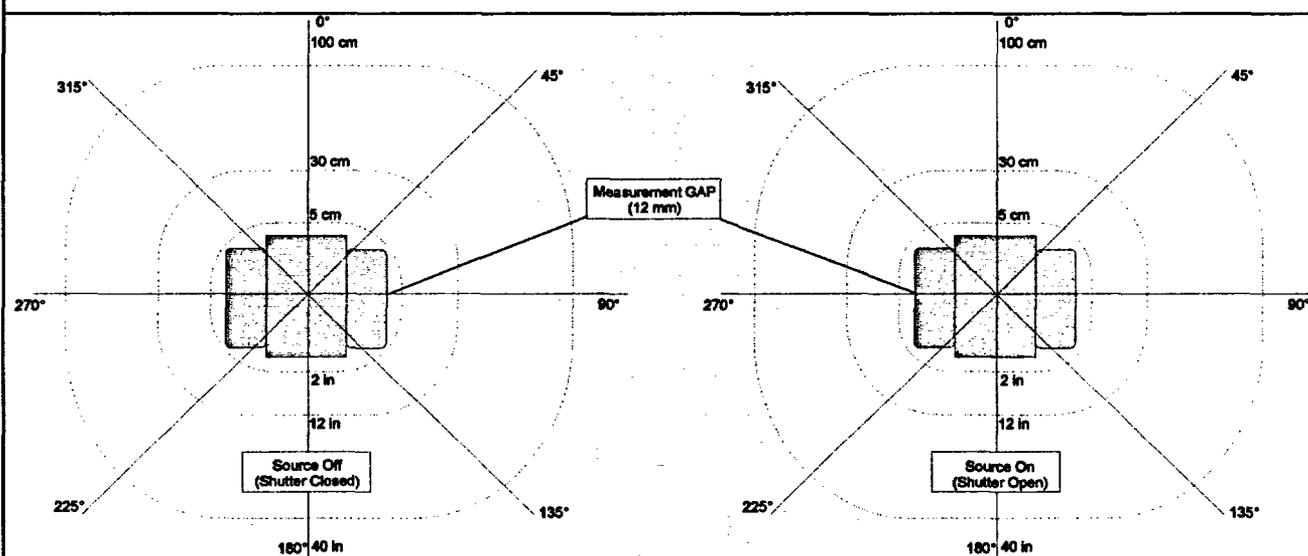
Activity : ☒ 400 mCi / 14.8 GBq; ☐ 200 mCi / 7.4 GBq;

☐ 100 mCi / 3.7 GBq; ☐ 50 mCi / 1.85 GBq



Source Housing - viewed from side

cm.	Shutter Closed - Dose Rate in $\mu\text{Sv/h}$								Shutter Open - Dose Rate in $\mu\text{Sv/h}$								cm.
	0°	45°	90°	135°	180°	225°	270°	315°	0°	45°	90°	135°	180°	225°	270°	315°	
5	BG		0.26		BG		16.0		BG		17.0		BG		16.0		5
30	BG		BG		BG		BG		BG		0.12		BG		0.11		30
100	BG		BG		BG		BG		BG		BG		BG		BG		100



Source Housing - viewed from top

cm.	Shutter Closed - Dose Rate in $\mu\text{Sv/h}$								Shutter Open - Dose Rate in $\mu\text{Sv/h}$								cm.
	0°	45°	90°	135°	180°	225°	270°	315°	0°	45°	90°	135°	180°	225°	270°	315°	
5	BG		0.26		BG		16.0		BG		17.0		BG		16.0		5
30	BG		BG		BG		BG		BG		0.12		BG		0.11		30
100	BG		BG		BG		BG		BG		BG		BG		BG		100

BG = Background; NA = Not Applicable

Momo, 25 April 2003

Written by	Checked by	Approved by

**SIT****SERVIZIO DI TARATURA IN ITALIA**  
Calibration Service in Italy**JIC**

SIT è uno dei firmatari dell'Accordo Multilaterale della European cooperation for the Accreditation (EA) per il mutuo riconoscimento dei certificati di taratura.  
SIT is one of the signatories to the Multilateral Agreement of EA for the mutual recognition of calibration certificates.

**CENTRO DI TARATURA** N. 65/R  
Calibration Centre

istituito da  
established by  
ENEA



Via Emilia Ponente, 390  
48014 Castel Bolognese (RA) - Italy  
Tel. ++39/0546/656375 - Fax ++39/0546/656353  
E-mail: comecer@comecer.com - http://www.comecer.com

Pagina di 1 di 2

CERTIFICATO DI TARATURA N. 2159/S/06/01 Page of.....  
Certificate of Calibration No.

- Data di emissione **28.06.2001**  
date of issue  
- destinatario **FRANCO CIOCE**  
addressee  
- richiesta  
application  
- in data  
date  
  
Si riferisce a  
referring to  
- oggetto  
item  
- costruttore **RADIOMETRO**  
manufacturer  
- modello **VICTOREEN**  
model  
- matricola **450-SI**  
serial number  
- data della misura **1370**  
date of measurements  
- registro di laboratorio **28.06.2001**  
laboratory reference

Il presente certificato di taratura è rilasciato in base all'accreditamento SIT N. 65/R concesso dall'Istituto Metrologico Primario competente in attuazione della legge n. 273/1991 che ha istituito il Sistema Nazionale di Taratura (SNT). Tale Istituto, nei campi di misura ed entro le incertezze precisate nell'accreditamento stesso, garantisce:  
- il mantenimento della riferibilità degli apparecchi usati dal Centro a campioni nazionali delle unità del Sistema Internazionale della Unità (SI);  
- la correttezza metrologica delle procedure di misure adottate dal Centro.

This certificate of calibration is issued in accordance with the accreditation SIT No. 65/R guaranteed by the relevant Primary Metrological Institute in enforcement of the law No. 273/1991 which has established the National Calibration System. The Institute, for the measurement ranges and within the uncertainties stated in the approval, guarantees:  
- the maintenance of the traceability of the apparatus used by the Centre to national standards of the International System of Units (SI);  
- the metrological correctness of the measurement procedures adopted by the Centre.

I risultati di misura riportati nel presente Certificato sono stati ottenuti applicando le procedure riportate alla pagina seguente insieme ai campioni di prima linea che iniziano la catena di riferibilità e ai rispettivi certificati validi di taratura.

The measurement results reported in this Certificate were obtained following the procedures reported in the following page together with the first line standards which begin the traceability chain and their valid certificates of calibration.

Le incertezze di misura dichiarate in questo documento sono espresse come due volte lo scarto tipo (corrispondente, nel caso di distribuzione normale, a un livello di confidenza di circa 95%).

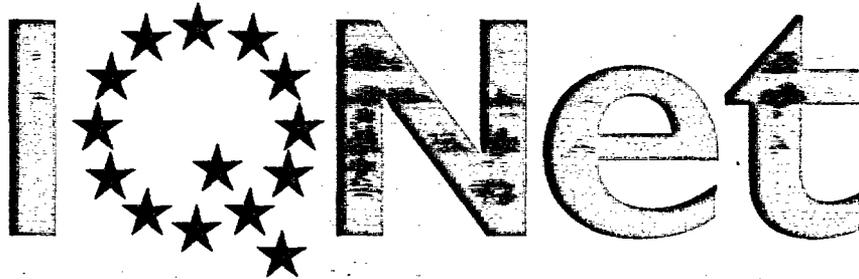
The measurement uncertainties stated in this document are estimated at the level of twice the standard deviation (corresponding, in the case of normal distribution, to a confidence level of about 95%).

p. Il Responsabile del Centro  
Head of the Centre  
Fabrizio Briccetti

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THE INTERNATIONAL CERTIFICATION NETWORK

# CERTIFICATE

IQNet and SQS  
hereby certify that the organization

**Electronic Systems S.p.A.**  
**IT-28015 Momo (NO)**

*Certified area*

**Whole company**

*Field of activity*

**Research and development of measurement tools,  
control and automation systems  
Design and manufacturing of measurement tools,  
control and automation systems**

has implemented and maintains a

**Management System**

which fulfils the requirements of the following standard

**ISO 9001:2000**

*Scope No: 19*

Issued on: 20.10.2001  
Validity date: 19.10.2004

**Registration Number: 20225-01**



*Dr. Fabio Roversi*  
**President of IQNet**

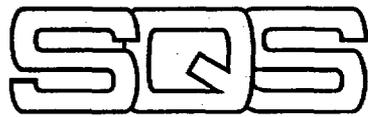
*Theodor Zahner*  
**Managing Director SQS**



Members of IQNet (registered association):

AENOR Spain AIB-Vinçotte International Belgium APCER Portugal CISQ Italy CQS Czech Republic  
DQS Germany DS Denmark ELOT Greece FCAV Brazil FONDONORMA Venezuela HKQAA Hong Kong  
ICONTEC Colombia IRAM Argentina JQA Japan KEMA Netherlands KFQ Korea MSZT Hungary  
NCS Norway NSAI Ireland OQS Austria PCBC Poland PSB Singapore SFS Finland SII Israel  
SIQ Slovenia SQS Switzerland

IQNet is represented in the USA by the following members: AIB Vinçotte International, CISQ, DQS, KEMA and NSAI



**The Swiss Association  
for Quality and Management Systems**

SQS herewith certifies that the company named below has an appropriate management system which meets the requirements of the international standard for quality management and quality assurance (ISO 9001) and issues the company



**Electronic SYSTEMS spa**  
ELECTRONIC MEASURING SYSTEMS

**IT-28015 Momo (NO)**

the

**SQS Certificate ISO 9001:2000**

on the basis of the audit result

Certified area

**Whole Company**

Field of activity

**Research and development of measurement tools,  
control and automation systems**

**Design and manufacturing of measurement tools,  
control and automation systems**

CH-3052 Zollikofen, 20 October 2001

This SQS Certificate is valid up to and including 19 October 2004

Scope number 19

Registration number 20225-01

Managing Director SQS

President SQS

T. Zahner

Prof. Dr. H. D. Seghezzi



SCES 002, 023

Member of  
**IQNet**

## Copy of the requested operating and safety instructions

Momo, .....

Messrs.

Company:	
Address:	
ZIP code-City	
Attention:	

### Radionuclide Characteristics

	<b>Radioactive Material</b>	
installed radionuclides		<b>Kr- 85 (Krypton – gas)</b>
amount of radioactivity at a specified reference date	..... mCi (..... MBq) on ..... See test report)	..... mCi (..... MBq) on ..... See test report)
source identification code		
manufacturer	<b>AEA TECHNOLOGY</b>	<b>AEA TECHNOLOGY</b>

**Physical monitoring of population and labor protection against ionogenic radiation.**

#### BASIC WEIGHT GAUGE

model ..... serial no. ....

#### Definitions (of general interest and with reference to administrative and technical regulations)

- 1) **ionogenic radiation**: radiation consisting of photons or particles capable of determining ion formation either directly or indirectly.
- 2) **activity (A)**:  $dN$  quotient divided by  $dt$ , where  $dN$  is the number of spontaneous nuclear transformations of a radionuclide that occur during the time  $dt$ .
- 3) **becquerel (Bq)** : special name referring to the S.I. unit of measure for activity.

**$1 \text{ Bq or } 1 \text{ s}^{-1} \text{ (one disintegration per second)}$**

Conversion factors to be used when activity is expressed in Curie (Ci) are as follows:

**$1 \text{ Ci} = 3.7 \times 10^{10} \text{ Bq (exactly)}$   
 $1 \text{ Bq} = 2.7027 \times 10^{-11} \text{ Ci}$**

- 4) **dose absorbed (D)** :  $dE$  quotient divided by  $dm$ , where  $dE$  is average energy released by ionogenic radiation into the matter in a volumetric element, and  $dm$  is the mass of the matter contained into the volumetric element.
- 5) **gray (Gy)** : special name referring to the S.I. unit of measure for the dose absorbed

**$1 \text{ Gy} = 1 \text{ Joule} \times \text{Kg}^{-1}$**

Conversion factors to be used when the dose absorbed is expressed in rad are as follows:

**$1 \text{ rad} = 10^{-2} \text{ Gy}$   
 $1 \text{ Gy} = 100 \text{ rad}$**

- 6) **radiation source** : apparatus that generates ionogenic radiation (*radiogenic machine*) or radioactive material, even if enclosed into equipment, or devices in general whose activity, radionuclide concentration, or radiation emission cannot be neglected in view of radio-protection.
- 7) **sealed source** : source composed of radioactive materials firmly integrated into solid and actually inactive matters, or sealed into an inactive container offering sufficient resistance to avoid, under normal conditions of use, leakage of radioactive materials exceeding the values established by the applicable proper technical norms.
- 8) **exposure** : all exposure types, both internal and external, of people to ionogenic radiation.
- 9) **sievert** : special name referring to the S.I unit of measure for the dose. If change factor product is 1:  
 $1 \text{ Sv} = 1 \text{ Joule} \times \text{Kg}^{-1}$

When the equivalent dose is expressed in rem, the following relations apply:

$1 \text{ rem} = 10^{-2} \text{ Sv}$ $1 \text{ Sv} = 100 \text{ rem}$
--

- 10) **dose limits** : limits established for the doses in case of exposure of exposed workers, apprentices, students and persons of the public.  
 Dose limits apply to the sum of the doses received following external exposure over the period considered and doses deriving from introduction of radionuclides in the same period.

**Characteristics of the radiation source and source-holder; operating principle.**

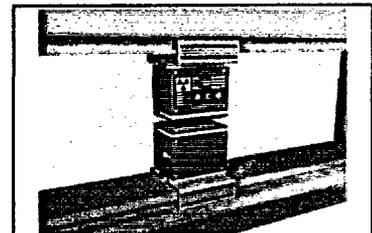
Electronic SYSTEMS S.p.A. always and exclusively uses sealed-type radiation sources in its measure systems.  
 In its measure systems, Electronic SYSTEMS S.p.A. normally uses sources that can be manufactured by:

- AEA TECHNOLOGY

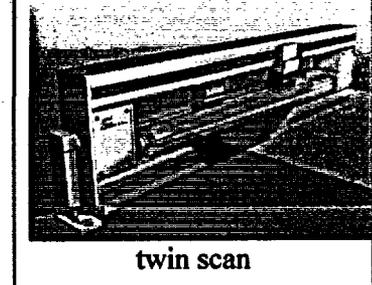
Main features are shown in the table below:

<b>AEA Technology</b>	
Radionuclide	<b>Kr 85</b>
Radiation source type	<b>KAC 1088...</b>
Chemical and physical form	<b>gas</b>
ISO rating of the sealing	<b>C.43232</b>

<b>AEA Technology</b>	
Radionuclide	<b>Sr 90</b>
Radiation source type	<b>X.117</b>
Chemical and physical form	<b>solid</b>
ISO rating of the sealing	<b>C.64343</b>



mod. sintel



twin scan

The supplier is requested to supply all radiation sources complete with their respective sealing certificates (**TEST-REPORT**). The sealing certificate will be handed over upon delivery of the source at the installation site.

Instant stop buttons that immediately halt measure head movement and cause the shutter to close, are located on both the scanner desk and warning light column.

Electronic SYSTEMS skilled technicians carefully place the radiation sources into their respective shielded source-holders, each of which is composed of the following elements:

outer structure	<ul style="list-style-type: none"> <li>• aluminum container</li> <li>• lead source-holder and shutter</li> </ul>	
control systems	<ul style="list-style-type: none"> <li>• open shutter RLS</li> <li>• closed shutter RLS</li> </ul>	
with ON / OFF type work positions, such as	<ul style="list-style-type: none"> <li>• shutter open (measure)</li> <li>• shutter closed (garage)</li> </ul>	
positions are shown on the source-holder and on the line side by means of graphic indications and/or color warning lamps	<ul style="list-style-type: none"> <li>• red (the shutter is open)</li> </ul>	
	<ul style="list-style-type: none"> <li>• green (the shutter is closed)</li> </ul>	

Should the "open shutter" red warning lamp fail, the system automatically performs the following safety procedures:



- immediate shutter closure
- activation of the "closed shutter" indication (green lamp "ON")
- alarm warning through a screen prompt

Source-holder shutter operation is enabled when the electrical control signal and compressed air supply are both present.

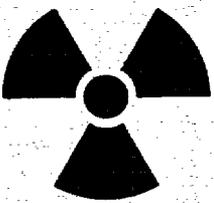
When the *open shutter* solenoid valve is energized, compressed air is injected into the cylinder and the *shutter* moves to the "open" position.

When the solenoid control valve is de-energized, a return spring brings the *shutter* back to the "closed" position.

Should any fault occur in the power circuits and/or air supply lines, the source-holder *shutter* automatically returns to the "closed" position.

The following information is always marked on the source-holder:

**CAUTION**



**RADIOACTIVE MATERIAL**

**REMOVAL OF LABEL IS PROHIBITED**

INSTALLATION, RELOCATION AND INITIAL RADIATION SURVEYS OF DEVICES CONTAINING RADIOACTIVE MATERIALS, AND MAINTENANCE, REPAIR, LEAK TESTING, INSTALLATION AND REPLACEMENT OR DISPOSAL OF SEALED SOURCES CONTAINING RADIOACTIVE MATERIAL USED IN THIS DEVICE SHALL BE PERFORMED ONLY BY AUTHORIZED PERSONS.

OPERATION OF THIS DEVICE SHALL BE IMMEDIATELY SUSPENDED UNTIL ANY NECESSARY REPAIRS HAVE BEEN MADE IF THERE IS ANY INDICATION OF POSSIBLE FAILURE OR OF DAMAGE TO THE SHIELDING OR CONTAINMENT OF RADIOACTIVE MATERIAL, OR THE ON-OFF MECHANISM OR INDICATOR.

ISOTOPE	<input type="text"/>	SERIAL N.	<input type="text"/>
ACTIVITY	<input type="text"/> mCi	MOD.	<input type="text"/>
ACTIVITY	<input type="text"/> MBq	DATE	<input type="text"/>

Electronic SYSTEMS S.p.A. - MOMO (NO) - ITALY

- ionogenic radiation danger sign;
- type of the radionuclide installed, its activity and reference date;
- E.S. construction data;
- list of forbidden actions.

See documentation attached.

## **Precautionary measures to be taken to prevent undue exposure**

1. thickness gauge maintenance shall be carried out with the radiation source disconnected and by personnel holding a radiological hazard certification;
2. the personnel of your Company shall inform the person in charge about whatever fault that might occur to the scanner;
3. the personnel of your Company shall not remove the protection and warning systems from the scanner without previous authorization;
4. the personnel of your Company shall not carry out operations or maneuvers that may affect the safety of bystanders;
5. the personnel of your Company shall scrupulously comply with protection and safety standards;
6. any changes in the conditions of use that involve a change of the associated risk shall be agreed upon with the Qualified Engineer in charge beforehand;
7. it is forbidden to unauthorized people to touch or approach the measure heads containing the radioactive sources;
8. workers involved in this activity shall inform their Manager or person in charge of any dangerous conditions that they may come to know;
9. when the scanner is not in use, it shall be kept inoperative (garage) with the shutter closed.
10. the workers shall:
  - immediately inform their Employer, Manager or person in charge of any inadequacies in the safety and protection means as well as of any other dangerous conditions that they may come to know;
  - not remove nor change the safety, warning, protection and measure devices and means without authorization;
  - never carry out operations or maneuvers on their own initiative that do not pertain to them or that may impair protection and safety;
11. the above mentioned norms shall be made available for consultation in the places usually attended by the workers.

---

## **Precautions**

We manufacture our source-holder units also with the precise intent of protecting the workers and population against ionogenic radiation hazard.

Radiancy values reached (with the shutter closed or open) are such to allow the workers to be classified as "not exposed to ionogenic radiation hazard" under normal working conditions, without detriment to the presence of other radiation sources already installed and used (smoke detectors, lightning rods, ECD devices, RX tubes, etc.).

*However, we deem it opportune to point out the following:*

- subordinate workers or equivalent (contractors, apprentices, students) must be forbidden from handling the detector source-holder assembly and all actions on the source-holder, if required, must be carried out exclusively by Electronic SYSTEMS technicians;
- barriers made of suitable material (metal plate, etc.) must be installed to create a physical limit (no trespassing) during system operation;
- such barriers will also constitute an appropriate physical boundary to the Zone under control and/or surveillance;
- contact your Qualified Engineer in charge for all administrative requirements;
- contact us directly at our offices for all operating requirement in the person of :

A. Giuberchio      tel. +39 - 0321 - 928210; 928220; 928230 - fax +39 - 0321 - 926855  
e-mail: [sales@electronicsystems.it](mailto:sales@electronicsystems.it)

Electronic SYSTEMS will be glad to provide any further explanation you may require.

REMOVAL OF THIS WARNING LABEL IS STRICTLY PROHIBITED °

ALL OPERATIONS, WHICH INVOLVE THE HANDLING OF THIS MEASURING DEVICE, MUST BE EXCLUSIVELY PERFORMED BY AUTHORIZED PERSONNEL OR BY THE RADIATION PROTECTION OFFICER NAMED BY THE COMPANY, WHICH IS OWNER OF THE SHUTTER, OR DAMAGE OF THE SHIELDING AND OF THE RADIOACTIVE SOURCE-HOLDER OR IN CASE OF MALFUNCTION OF THE INDICATOR LIGHTS, THE MEASUREMENT GAUGE MUST BE IMMEDIATELY STOPPED, UNTIL ALL THE NECESSARY REPAIRS HAVE BEEN MADE AND THE SYSTEM HAS BEEN STARTED AGAIN.  
 WITHOUT A SPECIFIC REASON, IT IS STRICTLY FORBIDDEN TO REMAIN IN THE PROXIMITY OF THE MEASURING HEAD, WHEN THE SHUTTER IS OPEN.  
 DURING THE NORMAL OPERATING CONDITIONS, THE INTENSITY OF THE RADIATION DOSES IS, HOWEVER, EXTREMELY LOW.



RADIOISOTOPE SERIAL NUMBER  
 ACTIVITY IN mCi TYPE  
 ACTIVITY IN MBq DATE

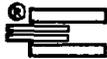
Electronic SYSTEMS S.p.a.  
 MOMO ( No ) - ITALY



Ø2,5

90

190

SURF.TREAT.				
THERM.TREAT.				
MATERIALS . ALLUMINIUM		MACHINE SCANNER - SINTEL9000		
DES. TM	DESCRIPTION			
CHECKED TM	RADIOACTIVE SOURCE LABEL			
APPROVED TF				
HD ARCHIVE				
 Electronic SYSTEMS S.p.a.		SCALE 1:1	DATE 12.03.03	F.TO A4
		DWG.NO U.S. 1036		REV. -