

**X-ray multi-projection scanner for luggage inspection МRS7**

****

**Passport**

**NTVS.412321.001 PS**

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X-ray multi-projection scanner for luggage inspection МRS7 NTVS.412321.001 (hereinafter referred to as “scanner”) is intended for X-ray scanning of cargo and detection in automatic mode objects prohibited for carrying in hand luggage by recognizing their images, as well as determining the effective atomic number and density of the substance.

The installation complies with GOST R IEC 61326-1-2014, GOST IEC 61010-1-2014, SanPiN 2.6.1.2369-08, NRB-99/2009, OSPORB-99/2010.

1. **TECHNICAL SPECIFICATIONS**

The main technical characteristics of the scanner are given in table 1.

*Table 1.* Main technical characteristics of the scanner.

|  |  |  |
| --- | --- | --- |
| **Parameter** | **Value** | **Unit** |
| Single-phase voltage | 187–242 | V |
| Voltage frequency | 50 ± 3 | Hz |
| Power consumption (up to) | 1,5 | kW |
| Overall dimensions (without taking into account the live rolls and monitor)  (up to) | 3600 x 943 x 1630 | mm |
| Mass (up to) | 1200 | kg |
| Sizes of the tunnel (at least) | 550 х 650 | mm |
| Overall dimensions of the controlled cargo: |  |  |
|  width (up to) | 540 | mm |
|  height (up to) | 640 | mm |
|  length  | not limited and viewed on a monitor by fragments (2 m tomography) |  |
| The probability of detection of the target substance in the baggage : |  |  |
|      for a mass of 50 g | 80 | % |
|      for a mass of 200 g | 90 | % |
| Probability of false detection (up to) | 10 | % |
| Image analysis time (up to) | 5 | s |
| Speed of the conveyor at a load of 150 kg (up to) | 0,20 | m/s |
| Maximum uniformly distributed load (up to) | 150 | kg |
| Height of the conveyor plane from the floor level (up to) | 760 | mm |
| Steel penetration at U a = (140 - 145) kV and Ia = 1   mA (at least) | 30 | mm |
| Extreme contrast sensitivity provides detection of a single copper wire with a diameter (up to) | 0,09 | mm |
| Resolution | 40 | AWG |
| Space resolution (up to) | 1,6 | mm |
| The number of grayscale colors provided by the monitor ( at least ) | 256 |  |
| Digital zoom | 500 | % |
| Maximum anode voltage | 160 | kV |
| Maximum anode current | 1,5 | mA |

The scanner provides operation for 24 hours a day. It records the number of control cycles (baggage counter), the total operating time, the number of switching-on and the operating time of the X-ray generator. The standard time spent on maintenance of the scanner does not exceed 3% of the operating time.

The installation allows to control objects during forward and reverse movement of the conveyor belt, as well as to carry out an emergency stop of the conveyor belt at any stage of control. The scanner can be operated by one operator.

The scanner design involves the lower location of the source of x-ray radiation. All the device sizes allows bringing them into the doorway with a width of not more than 1 m.

The mean time between failures is at least 6000 hours.

The design of the scanner allows for diagnostics and repairs in place of use.

The average time to restore the scanner is not more than two hours.

The scanner design provides protection against exposure to X-ray radiation by protecting the inspection tunnel with lead and X-ray protective curtains.

The scanner is equipped with fuses, stopping the supply of electric current in case of exceeding the operational loads or the occurrence of a malfunction.

The scanner provides:

- Forming on the monitor screen an image of the inspected cargo without “dead zones” regardless of the location of the cargo on the conveyor belt,

- Access to seven images obtained from different angles,

- Automatic self-calibration,

- Automatic self-diagnosis,

- Delimitation of operator access,

- obtaining negative and positive images, changing the brightness, contrast and gamma correction of the image,

- Fivefold increase in a fragment of the image, dynamic selection of the enlarged fragment,

- Analysis of the composition of the cargo by tomography methods,

- Analysis of the composition of the cargo at an effective atomic number,

- Object shape analysis,

- Display of the date, time and cargo number,

- The ability to display on the monitor up to twenty previous images,

- Database capacity for storing captured images of at least 100,000,

- Export of images in TIFF format, the ability to record the received images on a flash drive,

- Automatic and forced training of x-ray source.

The scanner provides the finding of a substances group by the effective atomic number (Zeff) and painting them on the monitor screen in the following colors:

- Yellow - light elements (zero <Zeff. <10),

- Green - medium-heavy elements (10 <Zeff. <18),

- Blue - heavy elements (18 <Zeff. <40),

- Gray (as requested by the customer) - non-translucent objects and their areas (Zeff.> 40), the intensity of the color conveys the thickness of the material.

The scanner provides a selection (with colored frame) substances prohibited for transportation.

The scanner provides a selection (with colored frame) objects that are prohibited for transportation.

The scanner provides an alarm:

- On and off the power,

- On and off the x-ray generator,

- On and off the conveyor.

The scanner is equipped with emergency shutdown devices for X-rays and a conveyor emergency stopping. They are located on the control panel and at the entrance and exit of the inspection tunnel.

The noise level generated by the scanner does not exceed 58 dB.

The equivalent radiation dose rate at the operator’s workplace and at a distance of 100 mm from the installation case does not exceed 2.5 μSv / h.

The radiation dose that is received by the cargo during a single check not does not exceed 0.5 µSv.

Climatic operation conditions of the scanner:

- Ambient air temperature from - 5 to + 40 ° С;

- Relative humidity up to 80% at a temperature of + 25 ° С (without moisture condensation);

- Atmospheric pressure 84.0 - 106.7 kPa (630 - 800 mm Hg. Art.);

- Dust concentration in the air is not more than 1 mg / m3.

The scanner provides protection against accidental contact of personnel with current-carrying parts of electrical circuits. The scanner provides degree of protection IP20 according to GOST 14254-96 and protection class I according to GOST 12.2.007.0-75.

The scanner complies with the fire safety regulations in accordance with GOST 12.2.007.0-75; scanner systems use wires with low smoke and non-toxic insulation.

1. **DELIVERY SET**

Contents of delivery of the MPC7 corresponds to table 2.

*Table 2.* Contents of delivery of the MPC7.

|  |  |  |
| --- | --- | --- |
| **Name** | **Designation** | **Quantity** |
| Inspection unit | NTVS.412321.001.000 | 1 |
| Console |  | 1 |
| LCD monitor |  | 1 |
| Test object |  | 2 |
| Cable set |  | 1 |
| Set of spare parts according to the spare parts sheet | NTVS.412321.001 | 1 |
| A set of operational documents | NTVS.412321.001 | 1 |

It is allowed to equip other types of devices that do not degrade the technical characteristics of the scanner.

**3. SERVICE LIFE, STORAGE AND WARRANTY**

Full service life of the scanner is at least 8 years.

The warranty period of the unit is 12 months from the date of commissioning; the warranty storage period is 6 months.

The manufacturer guarantees that the scanner complies with the requirements of the technical specifications of NTVS.412321.001 TU provided the consumer follows the conditions of transportation, storage, mounting and operation.

Mounting, commissioning, maintenance and repair must be carried out by specialists of the manufacturer or specialists of other enterprises that have permission to carry out these works. The specialists of these enterprises must have valid certificates issued by the manufacturer. The organization that produces mounting, commissioning, maintenance and repair must be licensed to work with ionizing radiation sources (generating). The personnel connected with above-mentioned work must have Group III for electrical safety (or higher) and comply with the requirements of SanPiN 2.6.1.2369-08.

During the warranty period, employees of organizations that will be recruited to perform any work on the scanner must undergo instruction at the manufacturer and have valid certificates. The organization carrying out the work must conclude an agreement with the manufacturer prior to the commencement of work.

**4. CERTIFICATE OF PACKING**

X-ray multi-projection scanner for luggage inspection МRS7 (serial number ) is packaged in accordance with the requirements specified in the current technical documentation.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 *position signature decryption signature*

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 *year, month, date*

**5. CERTIFICATE OF ACCEPTANCE**

X-ray multi-projection scanner for luggage inspection МRS7 (serial number ) was manufactured and adopted in accordance with the mandatory requirements of state standards, current technical documentation and is recognized as suitable for operation.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 *year, month, date*

**6. MOVEMENT OF THE SCANNER DURING OPERATION**

**6.1.** Reception and transmission of the scanner

Reception and transmission of the installation must be recorded in Table 3.

*Table 3*. Reception and transmission of the installation.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Date** | **Scanner status** | **Reason (name,****number and date of the document)** | **Enterprise, position and signature**  | **Notes** |
| **passed**  | **accepted** |
|  |  |  |  |  |  |

**6.2. Information about attachment** **of the scanner during operation**

Information about attachment of the installation during operation must be indicated in Table 4.

*Table 4*. Information about fixing the installation during operation.

|  |  |  |  |
| --- | --- | --- | --- |
| **Name of scanner** | **Position, name,** **signature of the** **responsible person** | **Reason (name, number and date of the document)** | **Notes** |
| attachment | detachment |
| X-ray multi-projection scanner for luggage inspection МRS7 |  |  |  |  |

**6.3 Restrictions on transportation**

The scanner can be transported by any type of transport in accordance with the rules for the carriage of the cargo for this type of transport.

The packing of the packaged scanner on the vehicle must be done in such a way as to prevent its displacement.

The scanner must be transported according to section 5 of GOST 15150 69, namely: in closed transport at an ambient temperature from minus 50 to plus 50 ° С and relative humidity up to 98% at a temperature plus 25 ° С.

The impact of transport shaking with a frequency of 80-120 beats per minute and acceleration up to 30 m/s2, which does not affect the operation of the installation, is allowed.

**7. INFORMATION ON ADVERTISING**

Claims for the scanner that does not comply with regulatory documents on quality, completeness, and requirements for packaging, packaging and labeling must be presented in strict accordance with the legislation of the Russian Federation.

If any discrepancies are found, the recipient (consumer) must notify the manufacturer in writing. The organization carrying out the repair is obliged to send a specialist within seven working days to check the operating conditions of the installation and carry out its repair.

Representatives of the organization carrying out the repair of the scanner, upon successful completion of the repair, are required to issue a repair certificate and provide all materials to the manufacturer.

Claims are sent to the manufacturer at:

**309927, Belgorod region, Krasnogvardeysky district, village Malobykovo, st. Belaya Vezha, d. 1. Tel .: 8 (4722) 777-194, e-mail: info@brc.efko.ru.**

Additional information about the company is available on the website: **http://biruch.ru.**

All claims must be recorded in table 7.

*Table 7*. Information on advertising.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Date** | **Summary of a claim** | **Name and the signature of the responsible person** | **Measures taken** | **Name and the signature of the responsible person** |
|  |  |  |  |  |

**8. REPAIR**

Information on the scanner performed must be indicated in Table 8.

*Table 8.* Information about the repair of the scanner.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name of the repair organization** | **Working hours** | **Reason for entering repair** | **Information about the repair** | **Name and the signature of the responsible person****Quality Control Mark** |
| since the beginning of operation | after the last repair |
|  |  |  |  |  |  |

Information on installation acceptance and warranty after repairs are made must be indicated in table 9.

*Table 9*. Information on installation acceptance and warranty after repairs.

|  |  |  |
| --- | --- | --- |
| Name of the repair company | The scanner was adopted in accordance with the mandatory requirements of state standards and current technical documentation and was recognized as suitable for operation.The executor of the repair guarantees the quality of the repair, provided the consumer observes the requirements of the current operational documentation. Warranty period of operation\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*name of repaired*\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*component parts*\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ months | The representative of the repair company \_\_\_\_\_\_\_\_\_\_ *personal signature*\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*transcript signature*\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ *year, month, date* |

**9. STORAGE**

The scanner must be stored in conditions not rigidly described in Section 2 of GOST 15150-69, namely: in unheated storage in macro-climatic areas with a temperate and cold climate at ambient temperatures from minus 50 to plus 50 ° С and relative humidity up to 98% at a temperature of + 25 ° C.

Storage information for the scanner must be listed in Table 10.

*Table 10.* Scanner storage information*.*

|  |  |  |  |
| --- | --- | --- | --- |
| **Date** | **Storage** **conditions** | **Storage type** | **Note** |
| storage acceptance | removal from storage |
|  |  |  |  |  |

**10. ACCOUNTING OF TECHNICAL SERVICE**

Records of the maintenance of the installation must be made in Table 11.

*Table 11.* Information about the maintenance of the scanner.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Date** | **Type of maintenance** | **Working hours** | **Reason (name, number and date of the document)** | **Position, surname and signature** | **Note** |
| since last maintenance | since the beginning of operation | completed the work | checked |
|  |  |  |  |  |  |  |  |

**11. INFORMATION ON DISPOSAL**

The scanner is to be written off and disposed as the limit condition is reached, when its repair becomes impossible.

Before sending for recycling the following items must be dismantled:

- X-ray emitters;

- X-ray rubber;

- lead plating.

X-ray emitters are sent to the manufacturer.

Lead, X-ray rubber and the rest of the scanner are sent to specialized enterprises for the reception and processing of recycled materials.

**12. INFORMATION ABOUT THE CONTENT OF PRECIOUS METALS**

Precious metals in the manufacture and operation of the scanner are not used.