



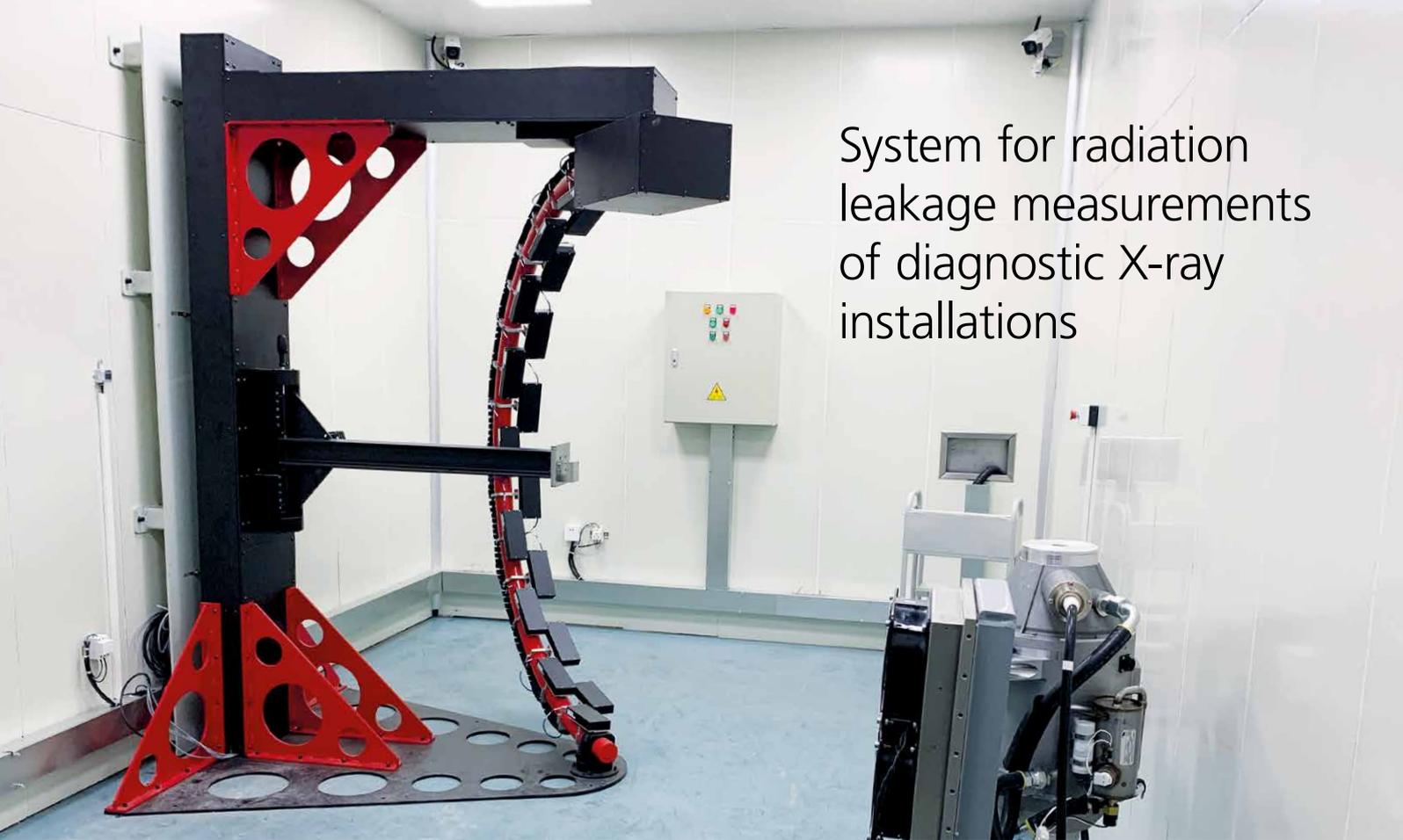
XLS

INDUSTRIAL SOLUTION

PLANNING • DEVELOPMENT • IMPLEMENTATION • SUPPORT

X-Ray Leakage Measurement

System for radiation leakage measurements of diagnostic X-ray installations



XLS

X-Ray Leakage System

Construction and functionality of a X-ray leakage system

Manufacturers of diagnostic X-ray Tubes must ensure that the leakage radiation emitted by the tube outside the useful beam does not exceed certain levels provided by law or by standards such as IEC 60601-1-3.

A very beneficial way to fulfill these requirements is to measure the amount of leakage radiation emitted by an X-ray tube by arranging a sufficient number of sensitive ionization chambers on a semicircular arch of 1m radius as it is done with the XLS X-ray leakage system.

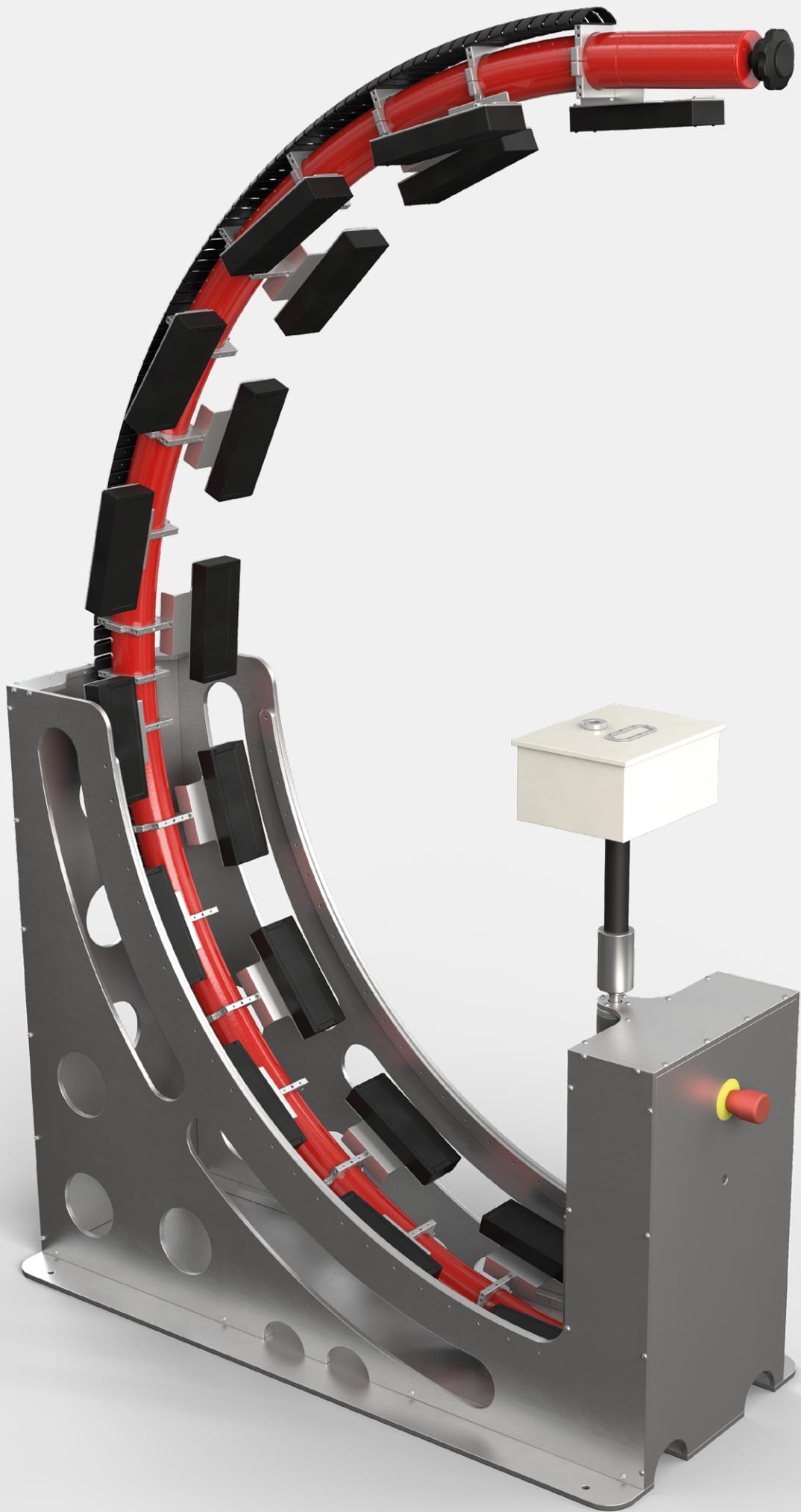
The X-ray tube to be tested is positioned on a rotatable table in the center of the semicircular arch. The table with the X-ray tube mounted on it is continuously rotated by 360°, while the leakage detection system monitors the dose rates of all detectors and records the radiation levels of the entire hemisphere around the X-ray tube.

After the 360° rotation, a complete hemisphere around the X-ray tube has been checked in less than two minutes.

The XLS Measuring unit measures dose and dose rate or charge and current of all 18 chambers simultaneously. The maximum and minimum measuring results are displayed together with the channel numbers.

The chamber calibration factors are stored in the device and can be read and modified via interface. The rectangular plane-parallel XLS ionization chamber is used for the XLS X-ray leakage system. The central electrode has an active area of 20 cm x 5 cm. The chamber response is approx. 10 $\mu\text{C}/\text{Gy}$.

PTW can provide customized solutions including measuring unit, ionization chambers, connection cables, rotation unit, C-arc and software.





System for 360° testing in one shot for mono block tubes

- ▶ Space-saving system that fits in every production
- ▶ Adapter for different test items



Testing of high performance tubes

- ▶ Perfect system for CT tubes and X-ray tubes with external cooling
- ▶ Complete test of the test object with one rotation



Small system ideal for collimator tests

- ▶ Integrated X-ray tube
- ▶ Easy change of the location in the production area
- ▶ Compact and very stable design
- ▶ Little need for space
- ▶ Ergonomic handling at working height



For special space conditions

- ▶ Low height and light weight
- ▶ No change of tubes on the test system
- ▶ Dock directly from the cart

Technical Specifications

X-ray leakage system

Power supply	115 V / 230 V, (50...60) Hz, 10 A
Software: Client	Windows 10, 2x RS232 interface, Internet connection, Intel i5-core 2GHz, 4GB RAM, 1GB free SSD space
Software: Server	Windows 10 or Linux, processor min. 1 core, 4GB RAM, 10GB free SSD space
Software: Database	MS SQL Server 2017 or Leak-SoftDB (hosted by external partner)
Dimension of smallest XLS solution	Ø 2350 mm, height 1050 mm
Dimension of standard XLS	L 2150 mm, H 2700 mm, W 1620 mm

Electrometer

Measuring quantities and units	Dose [Gy]; dose rate [Gy/h] [Gy/min] [Gy/s] charge [C]; current [A]
Electrical safety class	IEC 60601-1
Settling time	< 2 s
Accuracy of current and charge measurement	< ± 1 %
Long-term stability	< ± 1 % per year
Linearity	< ± 1 %
Accuracy of current measurement	± 1 %

Ionization chamber type 34055

Chamber type	Flat chamber with central-electrode
Power supply	
Measuring quantities	Air kerma, air kerma rate
Radiation quality	N100
Reference quality	
Measuring volume	300 cm ³
Response	Approx. 14.4 µC/Gy
Leakage current	≤ ± 10 fA
Maximum dose rate at continuous radiation (99.9% saturation)	13.2 mGy/s
Maximum dose per irradiation pulse (99.9% saturation)	32.9 µGy
Ion collection time at 400V	3.8 ms
Polarity effect	≤ 1 %
Directional dependence	≤ ± 3 % for tilting up to ± 10° around the chamber axis ≤ ± 3 % for tilting up to ± 10° perpendicular the chamber axis
Energy dependence	≤ ± 10 (50 ... 150) kV
Stabilization time	The difference between the response after 15 minutes and the response after 30, 45 minutes and 1 hour is less than ± 1 %.
Post irradiation leakage	After irradiation signal drop to < 1 % in 10 s

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