**Thermo Scientific POWERx**
X-Ray Inspection Systems

- Horizontal and vertical beams
- Dual beam glass in glass detection
- Maximum penetration and speed

# industry leading contaminant
## detection and product inspection for any type of packaged product

The Thermo Scientific POWERx x-ray systems are designed to offer the highest level of quality assurance possible. They feature state-of-the-art x-ray sources, detectors and image analysis software.

**Thermo**
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# Thermo Scientific POWERx High-Power X-Ray Systems

Stringent food and beverage safety standards are placing escalating demands on producers for greater levels of contaminant detection and inspection capability. In the past, basic metal detectors met the need. Now, the POWERx X-ray systems far surpass the capability and sensitivity of metal detectors.

Thermo Scientific POWERx systems are designed to enable the highest level of quality assurance. They feature state-of-the-art X-ray design and image analysis software that optimizes sensitivity and probability of detection.

A wide range of models for upright and horizontal package orientations are available providing application flexibility from a single vendor with years of X-ray experience.

POWERx systems are rugged, reliable, and hygienic—designed to meet or exceed adverse environmental and cleaning requirements. Modular internal components and software have undergone rigorous testing to insure reliability. The system can be augmented with optional software modules for contaminant simulation, pharmaceutical regulation compliance and mass measurement.

POWERx systems are backed by Thermo Fisher Scientific's global service organization. Comprehensive service capabilities include a standard remote access feature allowing certified Thermo Fisher technicians to connect to your POWERx system and optimize performance at any time.

# Advanced Single-Beam Inspection for Upright Packages or Containers

The Thermo Scientific™ POWERx™ S single beam systems offer industry-leading detection capability for metal cans, plastic bottles or other upright packages such as boxes or pouches. In these applications the package can be scanned easily by one X-ray beam enabling complete foreign body detection.

**POWERx model S systems view upright containers from one angle, reliably finding contaminants anywhere inside the package**

## Model S230 Single Horizontal-Beam System

*Suitable for inspection of upright containers.*
Designed for high performance, yet economical inspection of small cans, boxes and pouches standing upright during production. Utilizes the same feature-rich image analysis software as all POWERx systems. Compact system size and integration with an existing conveyor makes installation fast and easy. Pharmaceutical version available.

*X-Ray Power*    *S230:  90 kV and 20 mA*
　　　　　　　　*S230LP:  90 kV and 10 mA*
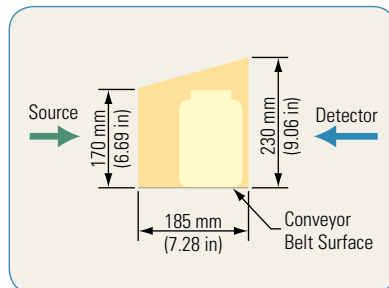
**POWERx S230 System Inspection Beam Geometry (side view)**

## Model S310 Tall Single Horizontal-Beam System

*Suitable for inspection of tall, upright containers.*
The same powerful features as the POWERx S230 system, featuring a larger x-ray beam and detector. Pharmaceutical version available.

*X-Ray Power*    *S310:  90 kV and 20 mA*
　　　　　　　　*S310LP:  90 kV and 10 mA*
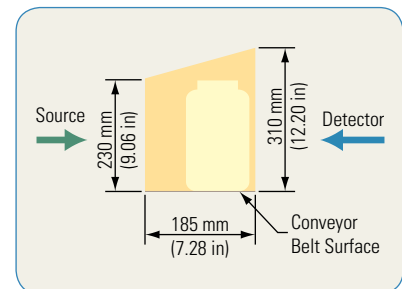
**POWERx S310 System Inspection Beam Geometry (side view)**

# Dual-Beam Inspection for 100% Detection Probability in Glass Containers

Detecting glass contaminants in glass containers with an X-ray system can be challenging. The Thermo Scientific POWERx D models utilize a patented (U.S. Patent 6005912) approach with two X-ray beams that scan each container from a different angle eliminating blind spots found in other systems. The dual-beam architecture will also reliably detect hard to find glass slivers.
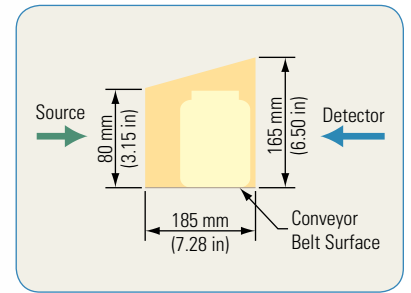


POWERx model D systems view glass containers from two angles finding contaminants in one view which are not visible in the other
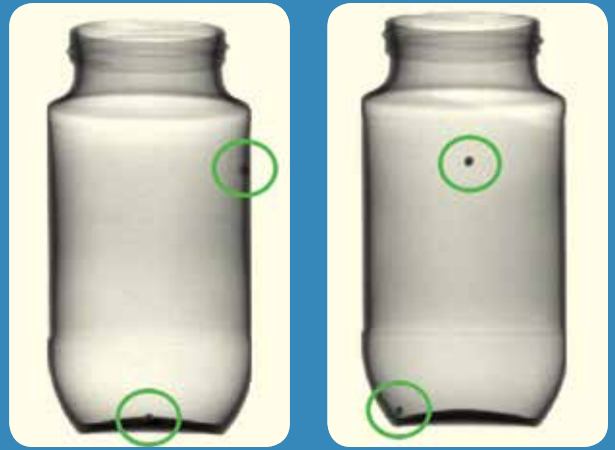
## Model D165 Short Dual Horizontal-Beam System

*Suitable for inspection of short, upright glass containers.*
Patented dual-detection system design detects glass in glass bottles and jars. The probability of detection of contaminants in the bottom and side of containers is 100%. With the dual-beam system it's also possible to detect thin, flat glass fragments or slivers. The D165 system utilizes the same feature-rich image analysis software as all POWERx systems. Pharmaceutical version available.

***X-Ray Power    D165: 2 x 90 kV and 2 x 10 mA***





**POWERx D165 System Inspection Beam Geometry (side view)**

## Model D195 Tall Dual Horizontal-Beam System

*Suitable for inspection of tall, upright glass containers.*
The same powerful features as the POWERx D165 system, only with a larger inspection window and sufficient power for heavy, dense packages. Pharmaceutical version available.

***X-Ray Power    D195: 2 x 90 kV and 2 x 20 mA***
***D195LP: 2 x 90 kV and 2 x 10 mA***
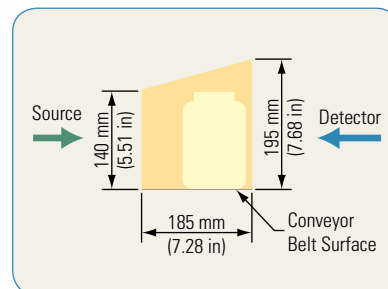




**POWERx D195 System Inspection Beam Geometry (side view)**

# The Power is in the Software

The Thermo Scientific POWERx software was designed with the user in mind. Its color-coded button interface makes it very intuitive and quick to learn. All POWERx models share many of the same system functions as well as a complete set of image processing and analysis tools. Operating and maintaining multiple systems across different production line types in a single factory is a snap.
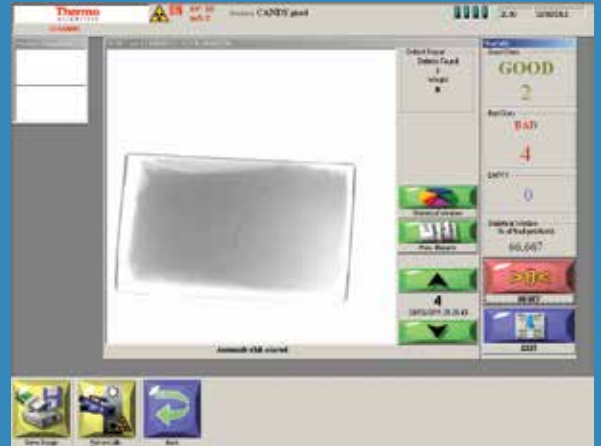
## Models C400 and C600 Full-Size Vertical-Beam Conveyor Systems

*Suitable for inspection of most typical sized packages.*
Available in two aperture sizes with a high power X-ray source for large, dense products Unique roll-out conveyor design for easy cleaning and maintenance. Capable of bulk product inspection in up to eight lanes.

*X-Ray Power      C600:  90 kV and 10 mA*
*C400:  90 kV and 10 mA*
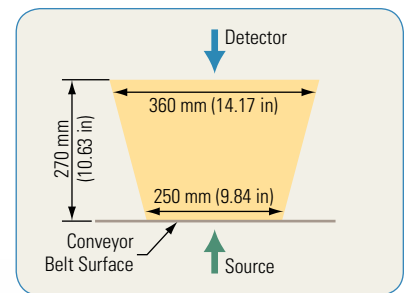
**POWERx C400 System Inspection Beam Geometry (side view)**
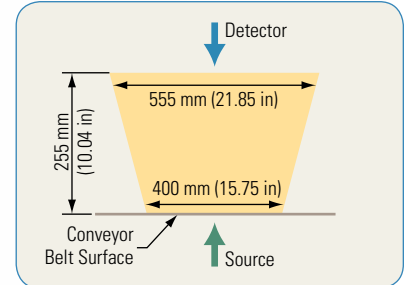
**POWERx C600 System Inspection Beam Geometry (side view)**

# Advanced Capabilities for Pharmaceutical Applications

**FDA 21 CFR Part 11 Capability**
All Thermo Scientific POWERx models are available with optional software to meet the requirements of 21 CFR 11 regarding security, storage and retrieval of electronic records for tracking and traceability. User access to the system is strictly controlled at multiple levels and meets the requirements for electronic signatures. Lot and Action databases are maintained for audit trail records and events tracking.

**IQ/OQ/PQQ Validation Packages**
Installation, Operations and Production Qualification documentation and support detailing the POWERx system specifications and test methods to support validation and cGMP compliance.

**Consulting Services**
Consulting by Thermo Fisher Scientific for guidance as to the safe and effective implementation of X-ray inspection systems for pharmaceutical production applications.

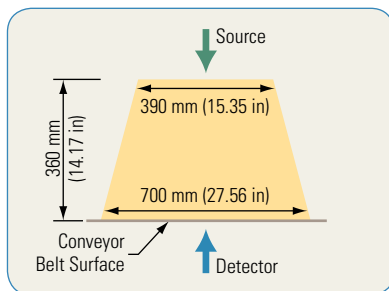# Model C800 Large Vertical-Beam Conveyor System

*Suitable for inspection of large packages or cases.*
Similar to the POWERx C400/C600 models, only designed with the largest possible aperture.

***X-Ray Power    C800:  90 kV and 10 mA***



**POWERx C800 System Inspection Beam Geometry (side view)**

Labels in figure: Source, 390 mm (15.35 in), 360 mm (14.17 in), 700 mm (27.56 in), Conveyor Belt Surface, Detector

# Available Options

## Software Options

- Virtual Contaminant Simulation: Assists in optimizing the probability of detection by simulating contaminant detection in stored images
- Checkweighing Feature (C models only): Mass measurement by correlation of X-ray density to weight*

*not compliant with the international R51 standard

## Hardware Options

- Customized radiation shielding and conveyors (S and D models)
- Product alignment rails (C models)
- Reject devices and bins, audible alarms and beacons
- Metal and glass test spheres
- UL or CSA safety certification
- Radiation survey meter
- Spare parts kit

## Specifications

### POWERx Model S and Model D X-ray Inspection Systems

**Application Specifications**

| | | | | |
|---|---|---|---|---|
| Inspectable Products | Packaged products including glass jars, bottles, cans, brick packs | | | |
| Product Width and Height (refer to beam diagrams for inspection area details) | S230: | 185 mm x 230 mm (7.28 in x 11.0 in) | D165: | 185 mm x 165 mm (7.28 in x 6.49 in) |
| | S310: | 185 mm x 310 mm (7.28 in x 13.0 in) | D195: | 185 mm x 195 mm (7.28 in x 7.67 in) |
| Conveyable Product Weight | Determined by external conveyor design | | | |
| Detection Sensitivity for Metal (Fe, non-Fe and SS) and Glass | Typical sensitivities range from 1 mm to 2 mm (0.04 in to 0.08 in) diameter metal and 2 mm to 4 mm (0.08 in to 0.16 in) diameter glass depending on product density, texture and packaging. In some products 0.5 mm (0.02 in) diameter metal and 1.0 mm (0.04 in) glass can be detected. | | | |
| Detection Sensitivity for Other Contaminants (stone, bone, plastic. et.al.) | Application testing is required; Results typically range from 2 mm to 5 mm (0.08 in to 0.20 in) | | | |
| Inspection Speed | ≤100 m/minute (≤328 ft/minute) | | | |
| Standard Reject Signal Rate | 2500 containers per minute (cpm); Faster rates available with external hardware | | | |

**Technical Specifications**

| | | | | |
|---|---|---|---|---|
| X-Ray Beams | S230 & S310:  Single | | | |
| | D165 & D195:  Dual (positioned at 90 degrees) | | | |
| X-Ray Power | S230 & S310: | ≤90 kV and ≤20 mA | D165: | 2 x ≤90 kV and 2 x ≤10 mA |
| | S230LP & S310LP: | ≤90 kV and ≤10 mA | D195: | 2 x ≤90 kV and 2 x ≤20 mA |
| | | | D195 LP | 2 x ≤90 kV and 2 x ≤10 mA |
| Conveyor Height | (measured from the floor to the bottom of the package being inspected) | | | |
| | S230 & S310:  775 to 900 mm (30.4 to 35.4 in) | | D165: | 916 to 1110 mm (36.0 to 43.7 in) |
| | | | D195: | 835 to 905 mm (32.9 to 35.6 in) |
| Software Algorithms | Colorimetric thresholds, shape analysis, photometric inspection; Application specific inspection routines possible at additional cost | | | |
| Human-Machine Interface | High contrast 15-in color LCD with touch screen | | | |
| Available Languages | English, French, Italian, German, Portuguese, Spanish, Polish | | | |
| Data Export and Interfaces | File formats: .mdb, .txt, .tif, .jpg, .bmp; USB and network interfaces | | | |
| Remote Access | Standard, includes software and hardware (modem or network interface) | | | |
| Machine Weight | S230 & S310:  1100 kg (2425 lb) | | D165: | 1200 kg (2646 lb) |
| | | | D195: | 1400 kg (3086 lb) |
| Construction | AISI 304 stainless steel, scotch bright finish | | | |
| Electrical Requirements (not including optional air conditioners) | 230 VAC ±10%, 50/60 Hz, single phase | | | |
| | S230 & S310:  28 A; LP option: 18 A | | D165: | 30 A |
| | | | D195: | 41 A; LP option: 39 A |
| Cooling | External water chiller (X-ray tube) and heat exchanger (cabinet) | | | |

**Environmental Specifications**

| | |
|---|---|
| Operating Temperature/Humidity | +5°C to +35°C (+41°F to +95°F); 20-80% non-condensing |
| Water and Dust Protection | IP 65, NEMA 4X |
| Air Supply Requirement | 6 bar (87 psi), required for X-ray shutters on some models |

**Conformance and Certifications**

| | |
|---|---|
| Radiation Safety | Certified to emission <0.5 µSv/h excluding input/output tunnels; FDA CFR21 part 1020.40 |
| Pharmaceutical Models | CFR 21 part 11 compliant; IQ/OQ/PQ validation available |

**Available Options**

| | |
|---|---|
| Hardware | Water chiller, shielding, rejecters, radiation safety meter |
| Software | Auto Set-Up, Virtual Contaminant Simulation, Pharmaceutical |
| Service | Installation, 24/7 technical support, service contracts, extended warranties |

# The Advantages of X-Ray Inspection

- Compliance To Requirements: Easily comply with your customer inspection mandates and/or government regulations
- Surpasses Metal Detector Capability: Detect more than just metal—find other dense foreign objects such as glass, stone, and some plastics
- Surpasses Metal Detector Sensitivity: Improve your detection sensitivity in applications where metallic packaging impacts the performance of metal detectors
- Verification: Verify assembly of your product (e.g., presence/absence, counting, breakage, placement) guaranteeing the highest quality level and a superior brand
- Conformance: Mass measurement software (optional) to maintain ideal product weight
- Traceability: Create and save detailed records for traceability and process improvement including information-rich images of rejected product

## POWERx Model C X-ray Inspection Systems

### Application Specifications

| | |
|---|---|
| Inspectable Products | Packaged products including bag-in-box, metallized pouches, tray and carton products, vacuum packed products; Bulk flow products |
| Product Width and Height | C300: 130 mm x 275 mm (10.8 in x 5.11 in)  C600: 255 mm x 555 mm (21.8 in x 10.03 in) <br> C400: 270 mm x 360 mm (14.2 in x 10.63 in)  C800: 360 mm x 700 mm (27.6 in x 14.17 in) <br> *(refer to beam diagrams for inspection area inspection area details)* |
| Conveyable Product Weight | ≤100 kg (≤220 lb) |
| Detection Sensitivity for Metal (Fe, non-Fe and SS) and Glass | Typical sensitivities range from 1 mm to 2 mm (0.04 in to 0.08 in) diameter metal and 2 mm to 4 mm (0.08 in to 0.16 in) diameter glass depending on product density, texture and packaging. In some products 0.5 mm (0.02 in) diameter metal and 1.0 mm (0.04 in) glass can be detected. |
| Detection Sensitivity for Other Contaminants (stone, bone, plastic. et.al.) | Application testing is required; Results typically range from 2 mm to 5 mm (0.08 in to 0.20 in) |
| Inspection Speed | ≤100 m/minute (≤28 ft/minute) |
| Inspection and Reject Lanes | Up to 8 |

### Technical Specifications

| | |
|---|---|
| Maximum X-Ray Power | C400: 90 kV, 10 mA  C600: 90 kV, 10 mA <br> C800: 90 kV, 10 mA |
| Conveyor Height | C400: 850 mm to 1050 mm (33.5 in to 39.8 in)  C600: 850 mm to 1050 mm (33.5 in to 39.8 in) <br> C800: 850 mm to 1050 mm (33.5 in to 39.8 in) |
| Conveyor Belt Width | C400: 405 mm (16.0 in)  C600: 585 mm (23.0 in) <br> C800: 850 mm (33.46 in) |
| Conveyor Length | C400: 2530 mm (99.6 in); includes reject system  C600: 2530 mm (99.6 in); includes reject system <br> C800: 2750 mm (108.3 in) |
| Software Algorithms | Colorimetric thresholds, shape analysis, photometric inspection; Application specific inspection routines possible at additional cost |
| Human-Machine Interface | High contrast 15-in color LCD with touch screen |
| Available Languages | English, French, Italian, German, Portuguese, Spanish |
| Data Import and Export | File formats: .mdb, .txt, .tif, .jpg, .bmp; USB and network interfaces |
| Remote Access | Standard, includes software and hardware (modem or network interface) |
| Machine Weight | C300: 600 kg (1323 lb)  C600: 850 kg (1874 lb) <br> C400: 800 kg (1764 lb)  C800: 1100 kg (2425 lb) |
| Construction | AISI 304 stainless steel, bead blast finish |
| Electrical Requirements | 230 VAC ±10%, 50/60 Hz, single phase  C300: 13 A <br> C400/C600/C800: 18 A |
| Cooling | External water chiller (X-ray tube) and heat exchanger (cabinet) |

### Environmental Specifications

| | |
|---|---|
| Operating Temperature/Humidity | +5°C to +35°C (+41°F to +95°F); 0-80% non-condensing |
| Water and Dust Protection Level | IP 65, NEMA 4X |
| Air Supply | 6 bar (87 psi) for rejecter only |

### Conformance and Certifications

| | |
|---|---|
| Radiation Safety | Certified to emission <0.5 μSv/h excluding input/output tunnels; FDA CFR21 part 1020.40 |
| Pharmaceutical Models | CFR 21 part 11 compliant; IQ/OQ/PQ validation available. |

### Available Options

| | |
|---|---|
| Hardware | Water chiller, shielding, rejecters, radiation safety meter |
| Software | Mass Measurement, Auto Set-Up, Virtual Contaminant Simulation, Pharmaceutical |
| Service | Installation, 24/7 technical support, service contracts, extended warranties |

# Services and Benefits

## Thermo Scientific PASS

The quality of your company's products and brand names are vital in today's market place. Any contamination or non-conformity incident can have a serious effect upon your consumer in the short term and your company in the long term.

Through the Thermo Scientific Product Assurance Services & Solutions (PASS) program, we can thoroughly test every suspected product for contaminants so that you can continue producing products that your consumers rely on! We will provide you with a fast response and quality assured method by using the most advanced, non-destructive inspection techniques for maximum product recovery. Little things like contaminants can add up to be a big problem. Let us test and recover your products so you can sleep a littler better at night! Learn more at www.thermoscientific.com/PASS
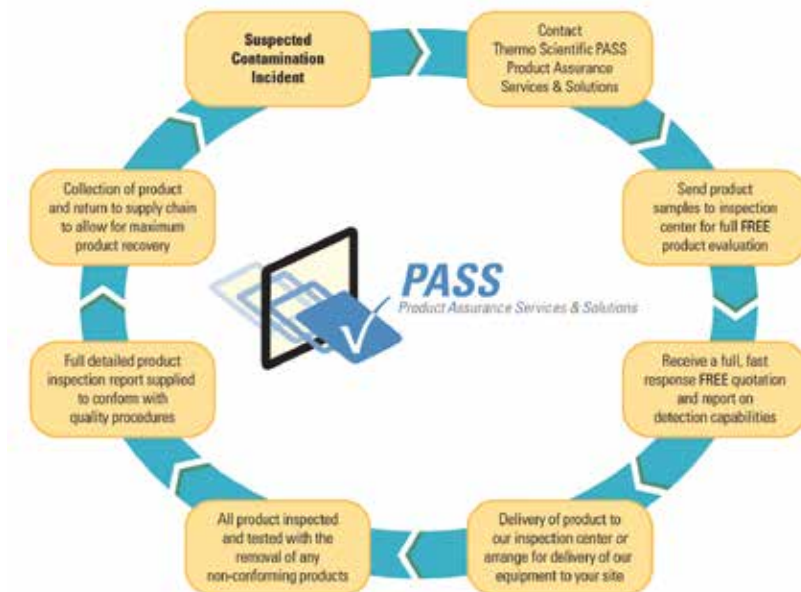


## Other Service Options

- Service Agreements
- Breakdown Visits
- On-Site Maintenance
- Depot Repair
- Training
- Calibration
- Certification
- Parts & Consumables
- Technical Support

All of our engineers are factory trained, and our manufacturing sites are ISO9001 registered and compliant. Learn more at www.thermoscientific.com/piservice

## A Comprehensive Product Offering for Product Inspection

- Checkweighers, metal detectors and X-ray inspection, visit www.thermoscientific.com/productinspection
- Thermo Scientific e scan In-Line Food Analyzer, visit www.thermoscientific.com/escan

## Financial Services

Thermo Fisher is able to offer attractive leasing terms on its products. Leasing can be a good way to expand or upgrade your production line without straining your cash flow. Any Thermo Scientific product can be quoted as a purchase or lease.

**thermoscientific.com/powerx**

| | | |
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