



X-RAY PIPELINE CRAWLER - TORONXPC™ SERIES

The ToronXPC™ Series is a family of self-propelled, battery-powered X-ray pipeline crawlers designed for internal, circumferential weld inspection of oil and gas transmission pipelines, water mains, and industrial piping systems. Each model in the series houses a 360° panoramic cone-beam X-ray tube directly on the crawler platform, enabling full-circumference single-exposure radiographic imaging without rotating the exposure head or repositioning external equipment — dramatically reducing inspection cycle time compared to external radiography setups.

The series spans five models — ToronXPC™-1000A through 1000E — covering pipe diameters from 159 mm (6.3 in) up to 1,400 mm (55 in) and steel wall penetration from 12 mm up to 42 mm, making the ToronXPC™ family the complete X-ray pipeline crawler solution for small-bore distribution lines through large-diameter transmission mainlines. All models share a common platform architecture: a programmable, remotely triggered exposure system; ± 3 –5 mm positioning accuracy; a maximum crawling distance of 5 km per deployment; and an operating temperature envelope of -40 °F to 158 °F (-40 °C to 70 °C) for year-round field operation in any climate.

The ToronXPC™ series is fully compliant with the radiographic testing (RT) methodology requirements of ASME B31.3, API 1104, AWS D1.1, and ISO 17636, and is engineered to meet the stringent demands of pipeline inspection contractors, oil and gas operators, and third-party NDT service providers working to international weld quality codes.

APPLICATIONS

Applications of X-Ray Pipeline Crawlers

- Oil and gas transmission and distribution pipeline construction — circumferential girth weld inspection during new pipeline installation
- Pipeline rehabilitation and integrity management programs — in-service weld examination and corrosion assessment on existing pipeline infrastructure
- Water and wastewater main construction — RT weld inspection of large-bore steel water transmission mains

- Petrochemical and refinery piping — process piping girth weld quality verification during plant construction and turnaround
- Power generation — boiler drum and steam line girth weld inspection in thermal and nuclear power plants
- Shipbuilding and offshore construction — structural and pressure piping weld inspection in confined or restricted-access locations
- Pipeline construction quality control — pre-burial RT inspection to API 1104 and ASME B31.8 acceptance criteria
- Third-party NDT inspection services — radiographic inspection as a service on infrastructure, industrial, and energy sector projects



FEATURES

Features of Torontech ToronXPC™ - Series X-Ray Pipeline Crawlers

- **Five-Model Series — Complete Pipe Diameter Coverage:** The ToronXPC™ series covers pipe diameters from 159 mm (6.3 in) to 1,400 mm (55 in) across five dedicated models, ensuring that the correct crawler geometry and X-ray tube power level are matched to every pipeline diameter — from small-bore distribution mains to large-diameter transmission lines.
- **360° Panoramic Cone-Beam X-Ray Exposure:** All models are equipped with a panoramic cone-beam X-ray tube that delivers a full 360° circumferential exposure angle, enabling single-shot full-circumference weld radiography. This eliminates the multiple repositioning steps required by external or semi-panoramic methods and dramatically reduces total inspection time per weld.
- **High-Voltage X-Ray Tube — Up to 300 kV:** The 100A model delivers up to 300 kV output voltage for penetration of up to 42 mm of steel — the highest power in the series — while smaller models provide matched power levels (100–200 kV) for their respective pipe diameter and wall thickness ranges, ensuring optimal image quality at every application.
- **Outside-Pipe Remote Exposure Control:** Exposure initiation and timing can be controlled from outside the pipe, keeping all personnel outside the radiation exclusion zone during energization. The 24-second pre-exposure delay provides additional time for zone clearance before X-ray emission begins.
- **Continuously Adjustable Exposure Time (1–300 s):** The exposure duration is continuously adjustable across the full 1–300 second range, giving radiographic technicians full control over exposure parameters to accommodate different film speeds, digital detector sensitivities, wall thicknesses, and source-to-detector distances without hardware changes.
- **±3–5 mm Weld Centerline Positioning Accuracy:** Precise onboard positioning ensures the X-ray source is placed within ±3 mm (100E model) or ±5 mm (100A–D models) of the target weld centerline — meeting the geometric

accuracy requirements of ASME Section V, API 1104, and ISO 17636 for valid panoramic radiographic exposures.

- **Up to 5 km Single-Deployment Crawling Range:** All models support a maximum single-deployment crawling distance of 5 km on a full battery charge, enabling inspection of long pipeline strings — including multiple welds in a single entry — without the need to retrieve and recharge the crawler between welds.
- **Two-Wheel and Four-Wheel Drive Options (100A and 100B):** The heavy-duty 100A and 100B models feature selectable two-wheel drive (up to 27° grade) and manually activated four-wheel drive (up to 40° grade), providing the traction necessary to inspect inclined pipeline segments including hillside crossings, river crossings, and above-grade ramps.
- **Wide Crawling Speed Range — 12 to 18 m/min:** The crawler drive system operates across a speed range of 12–18 m/min (100E) or 15–18 m/min (100A–D), enabling rapid transit between weld locations to maximize inspection throughput while maintaining controlled, smooth deceleration and precise positioning at each weld station.
- **Extreme-Environment Operating Range — –40 °F to 158 °F:** Rated for operation across an ambient temperature range of –40 °F to 158 °F (–40 °C to 70 °C) and relative humidity up to 90%, the ToronXPC™ series is built for all-season field deployment in the most demanding pipeline construction and integrity management environments — from Arctic tundra to desert and tropical conditions.
- **Robust, Field-Ready Mechanical Construction:** All models are designed for the physical demands of pipeline construction environments — the crawler structure withstands the loads of repeated pipe entry and retrieval, contamination from weld scale and pipe debris, and the mechanical stresses of traversing internal pipe geometry at operating speed.

THEORY & METHOD

What is an X-Ray Pipeline Crawler?

An X-ray pipeline crawler is a specialized device used to inspect the interior of pipelines. Utilizing advanced X-ray technology, these crawlers can detect defects, cracks, corrosion, and other anomalies within the pipeline structure. This non-

destructive testing method is essential for maintaining the safety and efficiency of pipeline systems.

Why Choose Torontech ToronXPC™ - Series X-Ray Pipeline Crawlers?

- **Innovative Technology:** Our ToronXPC™ Series X-ray pipeline crawlers are equipped with the latest technology to provide high-resolution images, ensuring accurate detection of pipeline issues.
- **Constant Tube Current Control System:** This independently designed system completely solves issues related to battery power reduction and poor film resolution found in traditional pipeline crawlers.
- **Siemens S7-700 PLC:** Our crawlers are integrated with the Siemens S7-700 type programmable PLC, offering high integration, large memory capacity, and a high level of safety and security.
- **Advanced Magnetism Positioning Method:** This positioning system enhances precision and reliability, making our ToronXPC-Series X-ray pipeline crawlers highly efficient.
- **Four-Wheel Drive System:** All models come with a four-wheel drive system that allows the pipeline crawlers to crawl up an angle of up to 40 degrees.
- **High Penetration X-Ray Source:** The X-ray source of up to 300kV can penetrate pipes with up to 42mm wall thickness.
- **Cost-Effective Solutions:** We offer a range of affordable options without compromising on quality, making pipeline inspection accessible to all.
- **Versatility:** Suitable for different pipe diameters, our X-ray pipeline crawlers can be used across various industries and applications.
- **Reliability:** Built with robust materials and designed for durability, our crawlers ensure long-term performance and minimal downtime.
- **Easy to Use:** User-friendly interfaces and intuitive controls make our X-ray pipeline crawlers easy to operate, reducing the need for extensive training

Main Functions of ToronXPC™ - Series X-Ray Pipeline Crawlers

- **Forward Positioning Exposure:** Ensures accurate inspection while moving forward, with no exposure when moving backward.
- **Smooth Drive Motor Operation:** Features slow start and slow down stop functions to prevent sudden movements and ensure smooth operation.
- **Comprehensive Fault Detection:** Equipped with fault detection during crawling and exposure, including water, resistance, power failure (overcurrent and overvoltage), component overheating detection, undercurrent, and overcurrent. The crawler can reverse immediately after detecting a fault, providing real-time protection.
- **Adjustable Exposure Time:** Exposure time can be adjusted outside the pipeline, allowing for precise control and flexibility.

Torontech's ToronXPC™ Series X-ray pipeline crawlers are the ideal solution for efficient and accurate pipeline inspection. With a focus on innovation, cost-effectiveness, and reliability, our crawlers are trusted by industries worldwide. Ensure the integrity and safety of your pipelines with our cutting-edge ToronXPC™ Series X-ray pipeline crawlers.

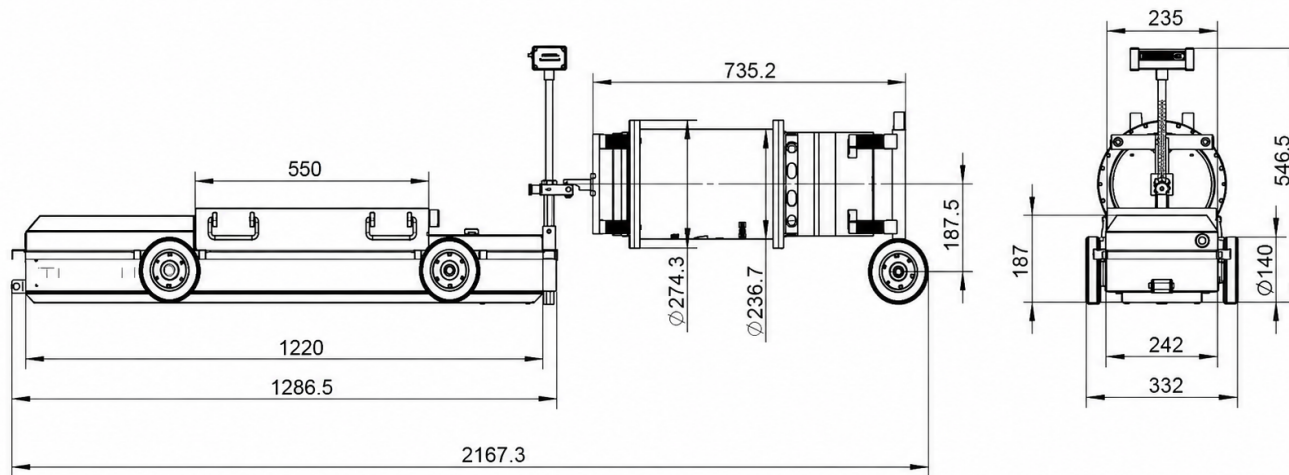
TECHNICAL SPECIFICATIONS

Technical Specifications of Torontech ToronXPC™ - Series X-Ray Pipeline Crawlers

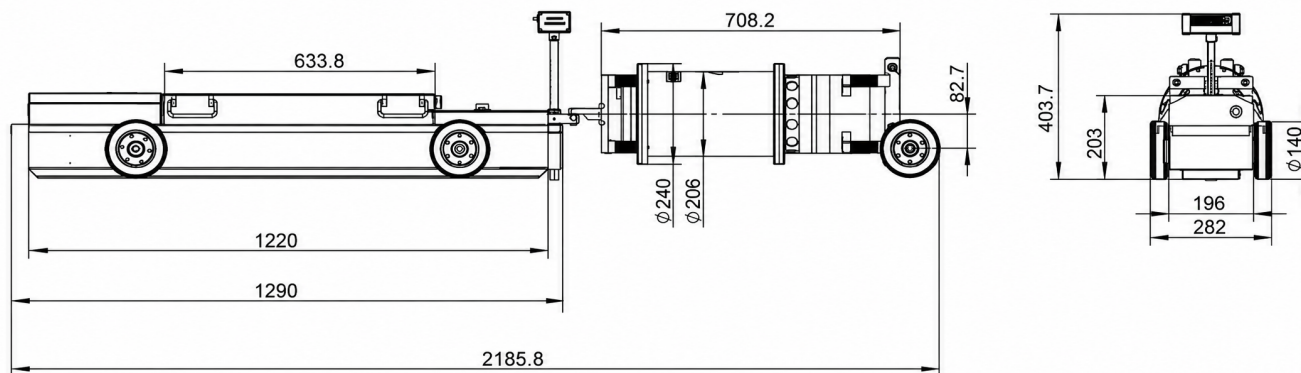
All five ToronXPC™ models are tabulated below for direct comparison. Select the model whose pipe diameter range and X-ray penetration capability match your application.

Item	ToronXPC™ 1000A	ToronXPC™ 1000B	ToronXPC™ 1000C	ToronXPC™ 1000D	ToronXPC™ 1000E
Pipe Diameter Range	Φ 700-1400 mm (27.55-55.11 in)	Φ 380-1016 mm (14.96-40 in)	Φ 273-710 mm (10.74-27.95 in)	Φ 219-510 mm (8.62-20.07 in)	Φ 159-219 mm
Max. Penetration (A3 Steel)	42 mm	30 mm	24 mm	16 mm	12 mm

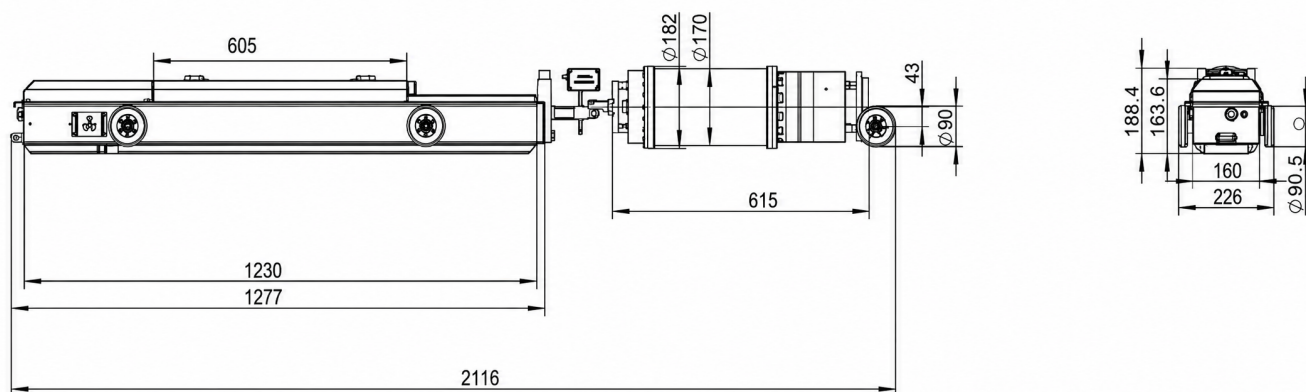
Item	ToronXPC™ 1000A	ToronXPC™ 1000B	ToronXPC™ 1000C	ToronXPC™ 1000D	ToronXPC™ 1000E
Max. Output Voltage	300 kV	250 kV	200 kV	200 kV	100 kV
Max. Output Current	3 mA	3 mA	3 mA	3 mA	3 mA
Focal Size	1.0 × 2.5 mm	1.0 × 2.4 mm	1.0 × 2.0 mm	1.0 × 2.5 mm	1.0 × 2.0 mm
Beam	360° × 30°	360° × 30°	360° × 38°	360° × 35°	360° × 38°
Environment Temperature	-40°C ~ 70°C	-40°C ~ 70°C	-40°C ~ 70°C	-40°C ~ 70°C	-40°C ~ 70°C
Relative Humidity	≤90%	≤90%	≤90%	≤90%	≤90%
Energy Capacity of Battery	110V, 22 Ah	110V, 22 Ah	110V, 10 Ah	110V, 10 Ah	96V, 7 Ah
Motor Power	250W (Continuous)	250W (Continuous)	150W (Continuous)	150W (Continuous)	100W (Continuous)
Delay Before Exposure	24 s	24 s	24 s	24 s	24 s
Exposure Time	1-300 s (Continuously Adjustable)				
Crawling Ability	Two-wheel: ≤27° Four-wheel (Manual): ≤40°	Two-wheel: ≤27° Four-wheel (Manual): ≤40°	≤27°	≤27°	≤27°
Location Accuracy	±5 mm	±5 mm	±5 mm	±5 mm	±5 mm
Crawling Distance	5 km	5 km	5 km	5 km	5 km
Crawling Speed	15-18 m/min	15-18 m/min	15-18 m/min	15-18 m/min	12-14 m/min
Turning Radius	≥7D	≥7D	≥7D	≥7D	≥10D
Total Weight	154.3 kg	125.3 kg	75 kg	50 kg	± 40 kg



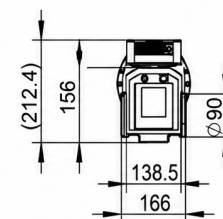
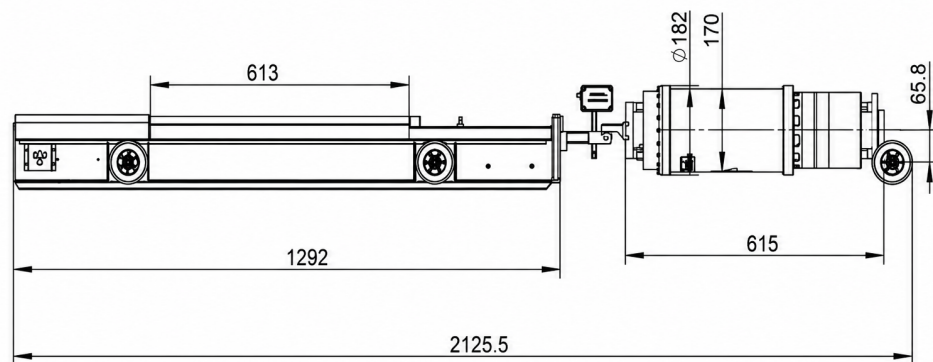
ToronXPC™ 1000A



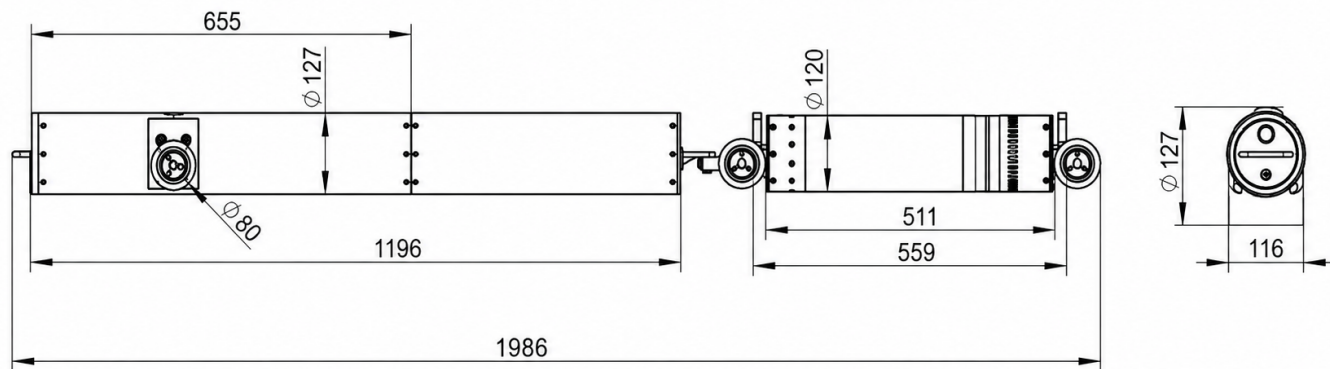
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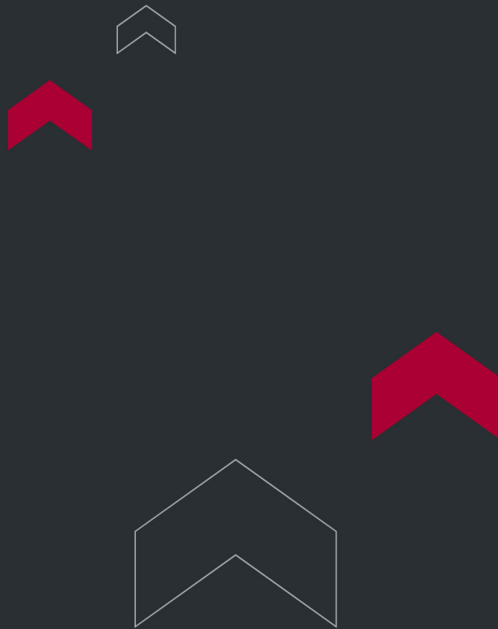
ToronXPC™ 1000C



ToronXPC™ 1000D



ToronXPC™ 1000E



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