

Ultrasonic Inspection Technology

HEAT SEAL TESTER ULTRASONICA[®]

Toward Zero Seal Defect Claims



Powered by Yamaha's Sound Expertise

ULTRASONICA®

Non-Destructive, 100% automated Inspection of Heat Seal Defects in Food, Pharma, and Chemical Packaging.

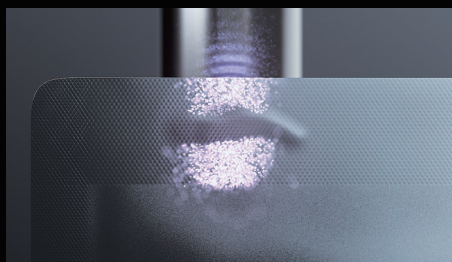
Heat seal defects such as internal delamination and air bubbles cannot be detected by visual or camera inspection, while conventional sampling and destructive testing fail to ensure full quality assurance—leaving a constant risk of market recalls and brand damage. Against this backdrop, ULTRASONICA®—an ultrasonic camera from Yamaha's sound expertise—was created. Proprietary airborne ultrasonic sensors and acoustic signal processing enable visualization of the internal condition of heat seals, allowing for non-destructive, non-contact, in-line 100% automated inspection. Quantify and visualize seal quality to enable truly objective inspection, clarify release criteria, and reduce the risk of defects reaching the market. With traceable data, ULTRASONICA® enhances audit readiness and quality accountability.



Accuracy

Defect Escape Prevention

Industry-first ultrasonic heat seal inspection with a line sensor. Powered by Yamaha's acoustic signal processing, it achieves exceptional sensitivity and visualizes previously undetectable defects—regardless of packaging color or material. Non-destructive, non-contact, in-line 100% automated inspection prevents defect escape.



Innovative Ultrasonic Camera

Stability

Intelligent Judgment Function

ULTRASONICA® features up to six inspection judgment functions, tailored to packaging types and product specifications, enable flexible detection of various seal defects. Combined multi-judgment functions suppress false positives, preventing unnecessary rejects and yield loss. With conveyor speeds of up to 60 m/min, it ensures stable quality control and efficient production even on high-speed lines.

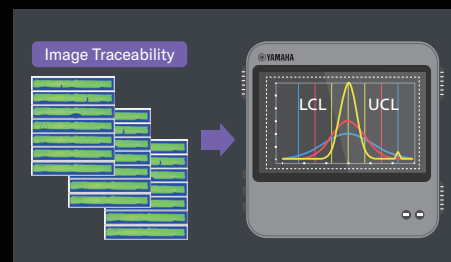


Flexible Judgment Functions

Reliability

Image-Based Quality Assurance

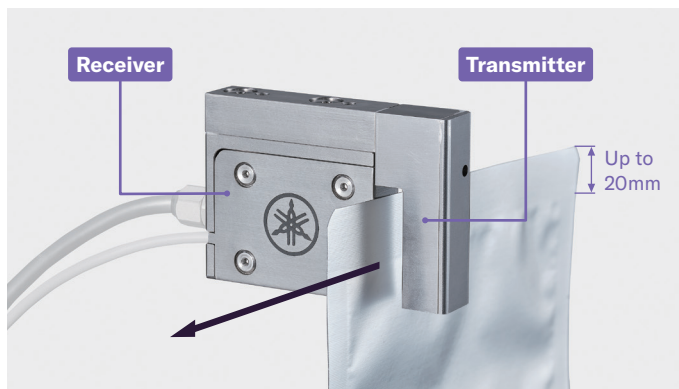
Ultrasonic technology clearly visualizes seal conditions as images, enabling intuitive identification of defect location, size, and shape—previously detected only through numerical data or graphs. All results are recorded as image data, ensuring full traceability. This supports robust quality assurance, builds customer trust, and enables root cause analysis and continuous improvement.



Visualization of Seal Quality

Visualizing Seal Conditions with Airborne Ultrasonic Technology

As packages pass through the ultrasonic sensor head, seal conditions up to 20 mm in width are visualized as images. Using an inspection principle based on variations in ultrasonic signal intensity, it detects packaging defects that are difficult to identify visually including in aluminum laminates and printed films.



Ultrasonic Sensor Head

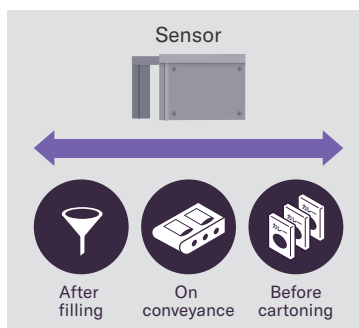


Judgment Screen & Inspection Images



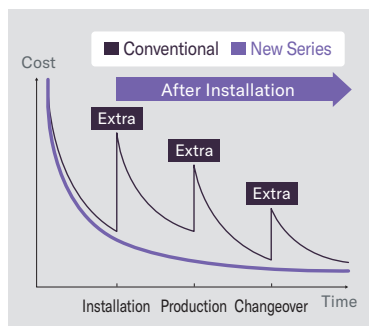
Easy Setup

- No specialized skills, experience, or certifications required
- Intuitive operation via touchscreen and user-friendly interface
- Easy recipe creation for configuring pass/fail criteria



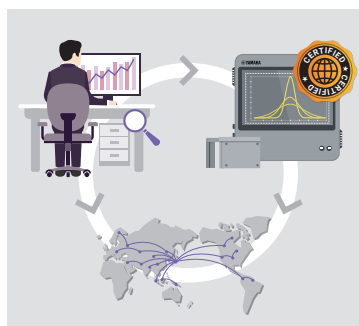
Flexible Installation

- Ultra-compact sensor fits into limited spaces
- High installation flexibility across various processes
- No major modifications required for layout changes



Stable Operation

- Reduced setup time contributes to stable production
- Low running costs with no periodic replacement parts
- Easy daily checks, setup, and maintenance

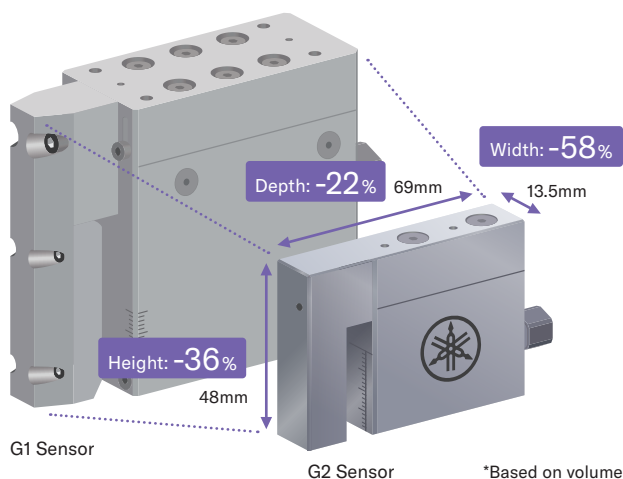


Data Utilization

- All packages can be recorded as numerical data
- Supports predictive maintenance of production equipment
- Monitors daily and monthly defect counts and trends

Smaller. More Advanced. — The New G2 Sensor

1/5 the size of previous models*



Improved Installability

Designed for integration into space-constrained packaging machines—such as compact pillow-type and rotary-type systems—we have pursued miniaturization.

Improved Usability

Lightweight sensor design and optional waterproofing (custom-build) simplify handling and cleaning, reducing routine maintenance effort.

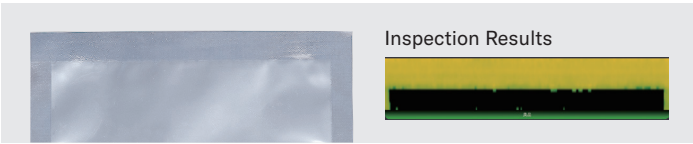
Improved Detectability

Enables detection of smaller defects, meeting higher quality standards. A lineup of high-end sensors provides optimal solutions to meet diverse user needs.

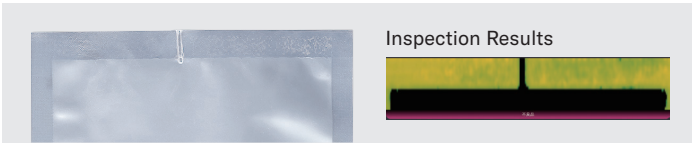
Supports Diverse Packaging Formats and Seal Defects

Detects a wide range of defect patterns occurring in production, including wrinkles, folds, incomplete seals, foreign material inclusion, and over-sealing.

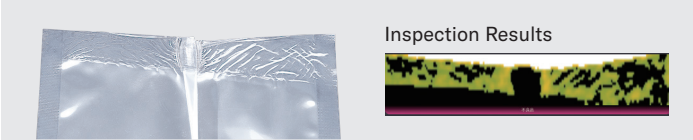
○ Good



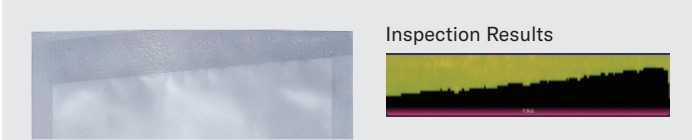
✗ Incomplete Sealing



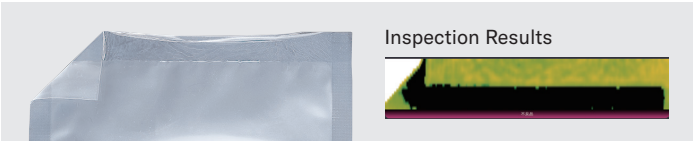
✗ Wrinkles / Creases



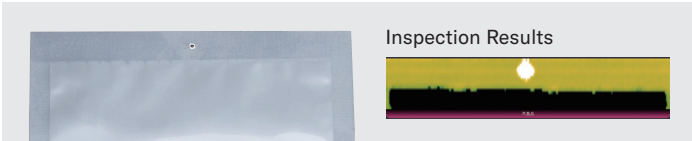
✗ Skewed / Misaligned



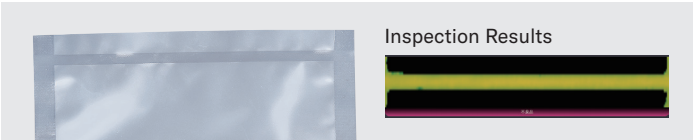
✗ Fold-In



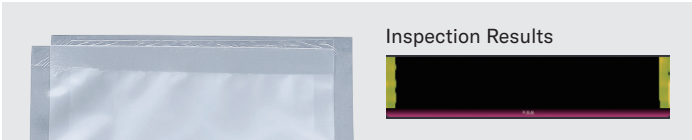
✗ Pinholes



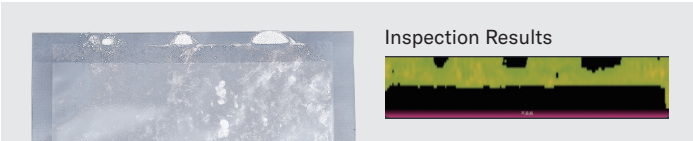
✗ Insufficient Width



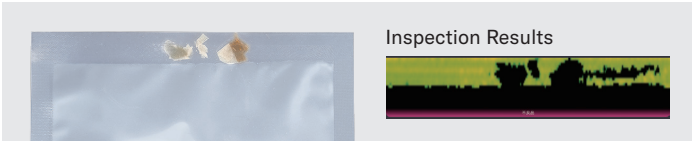
✗ Double Feeding



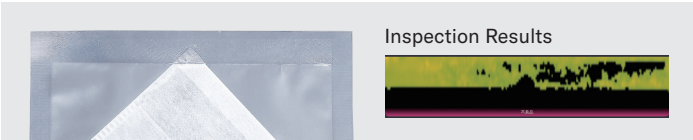
✗ Entrapment (Flour)



✗ Entrapment (Bonito Flakes)



✗ Entrapment (Nonwoven)



✗ Over-Sealing



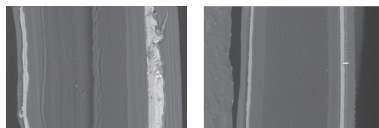
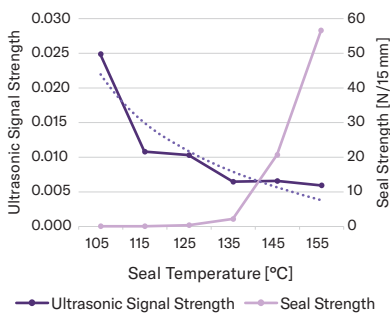
Ultrasonic image analysis identifies weak seal trends.

By analyzing variations in ultrasonic signal intensity, it helps prevent latent seal defects that may appear normal but can easily fail under impact.

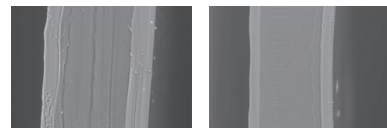
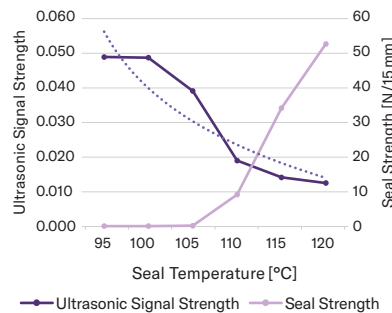
Distinguishing seals that appear intact but easily peel during transport has long been a challenge in packaging, as such defects cannot be identified visually and have been detected through sampling or destructive testing. In this study, aluminum and nylon pouches were evaluated by comparing tensile strength and the standard deviation of ultrasonic signal intensity across different sealing temperatures. A clear correlation was confirmed. These results demonstrate that ULTRASONICA® can continuously assess seal integrity and is effective in detecting weak seals.*

*Detection may not be possible depending on materials and conditions.

Aluminum Pouch



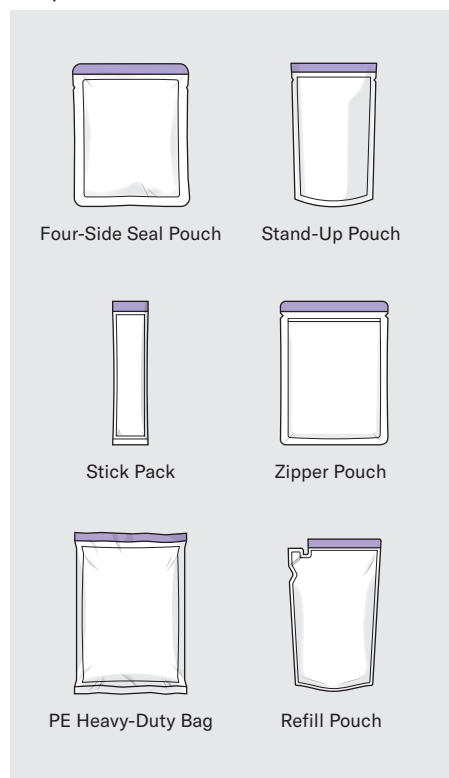
Nylon Pouch



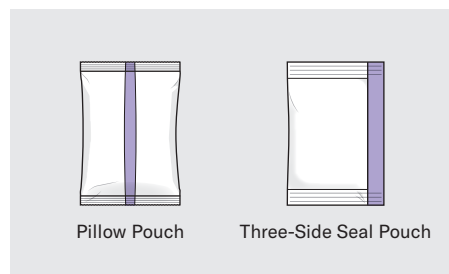
Supports Various Seal Positions and In-Machine Installation

Examples of Inspectable Packaging

• Top Seal

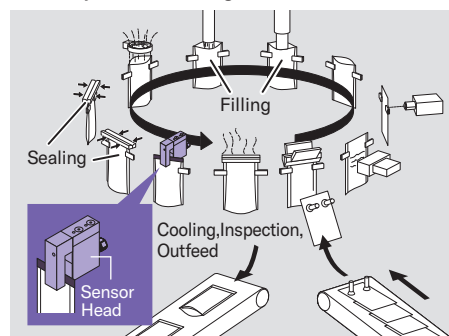


• Center Seal / Vertical Seal

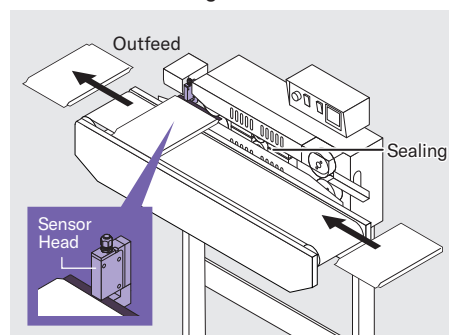


Examples of Applicable Processes

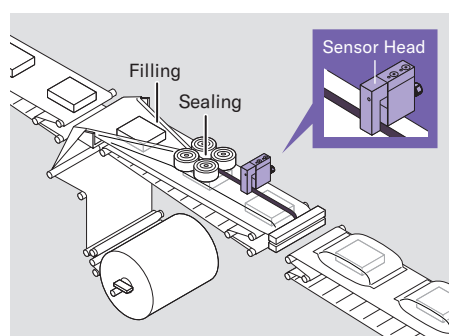
• Rotary Pouch Filling Machines



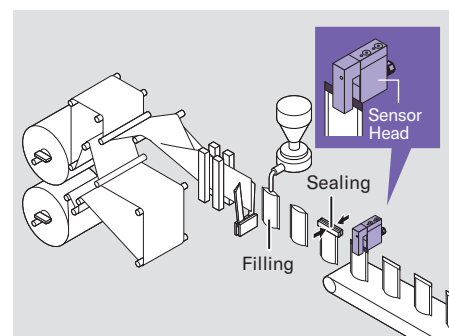
• Automatic Sealing Machine



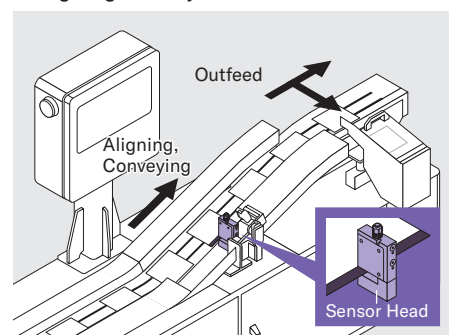
• Horizontal Form-Fill-Seal Machine



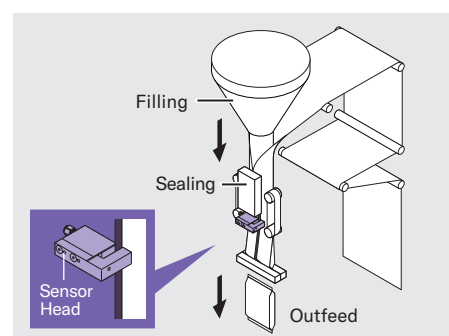
• Form-Fill-Seal Machines



• Aligning Conveyor



• Vertical Form-Fill-Seal Machine



Applicability by Packaging Type and Material

Inspection feasibility may vary depending on packaging specifications and conditions, even for the cases below as reference examples.

Inspectable	Examples
Plastic Films / Laminated	Transparent, white opaque, printed, light-shielding, and colored pouches, etc.
Metal-Based High-Barrier	Aluminum vapor-deposited, foil laminates, transparent barrier pouches, etc.
Paper, Nonwoven, and Fibers	Eco-friendly paper, nonwoven and mono-layer paper pouches, etc.
Non-Inspectable	Examples
Multi-Layer / Multi-Seal	Top/end & center overlaps, gusseted pouches, kraft/PE double-layer bags, etc.
Formed or Rigid Containers	Spouted pouches, tray/cup seals, blister packs, thermoformed containers, etc.
Without Seal Areas	Shrink, sleeve, and skin packaging, etc.

Performance

	G1 Sensor	G2 Sensor
Minimum Detectable Defect Size	Φ2.0mm air bubbles / voids*1	Φ1.0mm air bubbles / voids*2
Supported Seal Width	Max. 20mm*3	Max. 22mm*3
Supported Seal Length	Depends on workpiece passing speed and inspection conditions.*4	
Workpiece Clearance	< 2mm	
Workpiece Passing Speed	≤ 60m/min (1,000mm/s)	
Workpiece Passing Position Accuracy	Within ±1mm in the seal width direction	
Workpiece Passing Interval	≥ 150ms	

Specifications

	UE-02 Main Unit	Sensor Head
Material	Stainless steel	
Protection Rating	IP53 equivalent	IP5X equivalent*5
External Dimensions	440mm(W) x 440mm(H) x 170mm(D)	G1 Sensor: 88mm (W) x 75mm (H) x 32mm (D) G2 Sensor: 69mm (W) x 48mm (H) x 13.5mm (D)
Weight	Approx. 20kg	G1 Sensor: Approx. 2kg G2 Sensor: Approx. 0.2kg
Control PC	Windows 10 IoT Enterprise LTSC 2021	
Supported Languages	Japanese, English	
Input/output device	LCD touch panel display	
Storage device	Internal storage 256GB (Approximately 3,000,000 test results can be stored with standard usage)*6	
Cable	Power cable: 5m, Transmitter cable: 2m (sensor head side) + 5m (main unit side), Receiver cable: 2m (sensor head side) + 5m (main unit side)*7	
Interface	USB x2, Ethernet (RJ-45) x1, Encoder input x1 (D-sub 9pin, female), I/O: 16 IN/16 OUT (D-sub 37pin, female), RS-232C x1	
I/O Input Functions	External Trigger, Start Inspection, Stop Inspection, etc. (16 inputs)	
I/O Output Functions	Running, Inspecting, Error, Pass, Fail, Judgment complete, etc. (16 outputs)	
Supported encoder	Method: Incremental, Rating: Power supply voltage DC 5V, Output signal: - Standard Specifications: NPN open collector output, PNP open collector output, Complementary output - Differential option specifications: Differential line driver output	
Power Source	Single phase AC 100-200V 50Hz/60Hz 0.5kVA	
Recommended temperature	20°C to 24°C	
Recommended humidity	40% to 60% (no condensation)	

*1 Obtained with a sensor calibration film and may vary depending on material, line speed, and other inspection conditions.

*2 For the waterproof specification (optional), the minimum detectable defect size is Φ2.0 mm.

*3 Ultrasonic signal levels decrease near the sensor edges; approx. 1 mm from both ends is excluded from performance testing.

*4 An area of 2 mm from each edge of the workpiece is not inspectable.

*5 Waterproof protection (e.g., a cover) is required during water cleaning.

*6 Calculated based on: workpiece length 150 mm, conveying speed 1000 mm/s, sampling cycle 1 ms (150 samples; approx. 50 KB per record), and approx. 150 GB of available SSD capacity at shipment.

*7 The transmitter and receiver cables connect the main unit to the sensor head. The receiver cable is connected via an intermediate connector box between the main unit and the sensor head.

Free Testing of Your Samples

For customers considering our inspection system, we offer free sample testing to evaluate inspection performance in advance. Detection accuracy varies depending on packaging format, materials, and sealing conditions, so we recommend prior evaluation using actual samples. By sending both good and defective samples, you will receive a sample test report confirming the detectability of seal defects.

Introduction Process

Inquiry



Requirements Review



Sample Testing



Delivery & Training

Eligible Product for the
Japanese SME Labor-Saving
Investment Subsidy

Subsidy
rate: up to
50%

Winner of the Category Excellence
Award at the JAPAN PACK
AWARDS 2025.



Inquiry

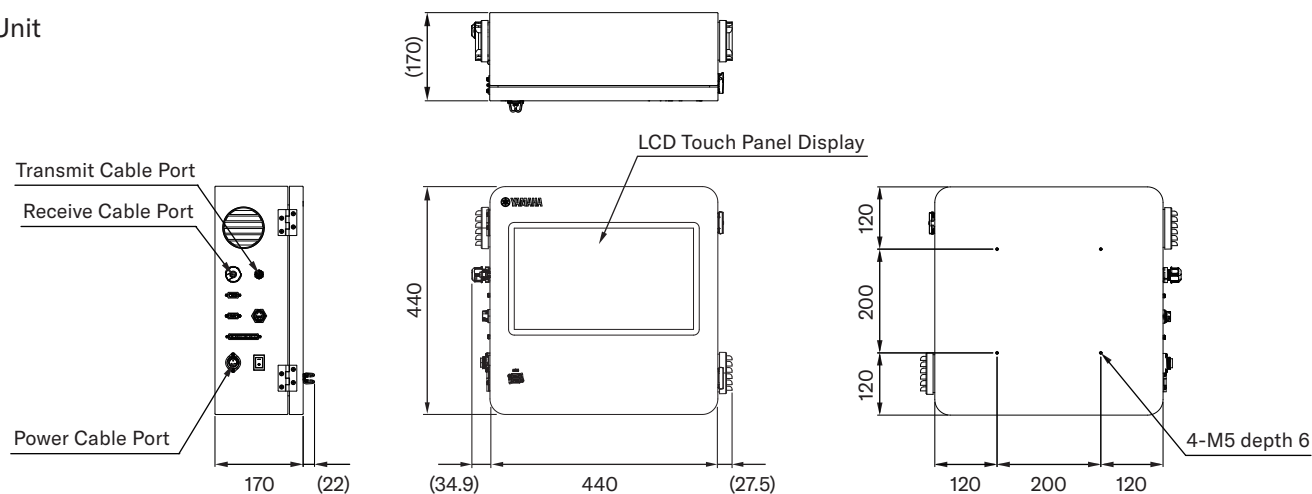
For sample testing requests, quotation inquiries, or any other questions about our products, please scan the QR code to contact us via the web form.

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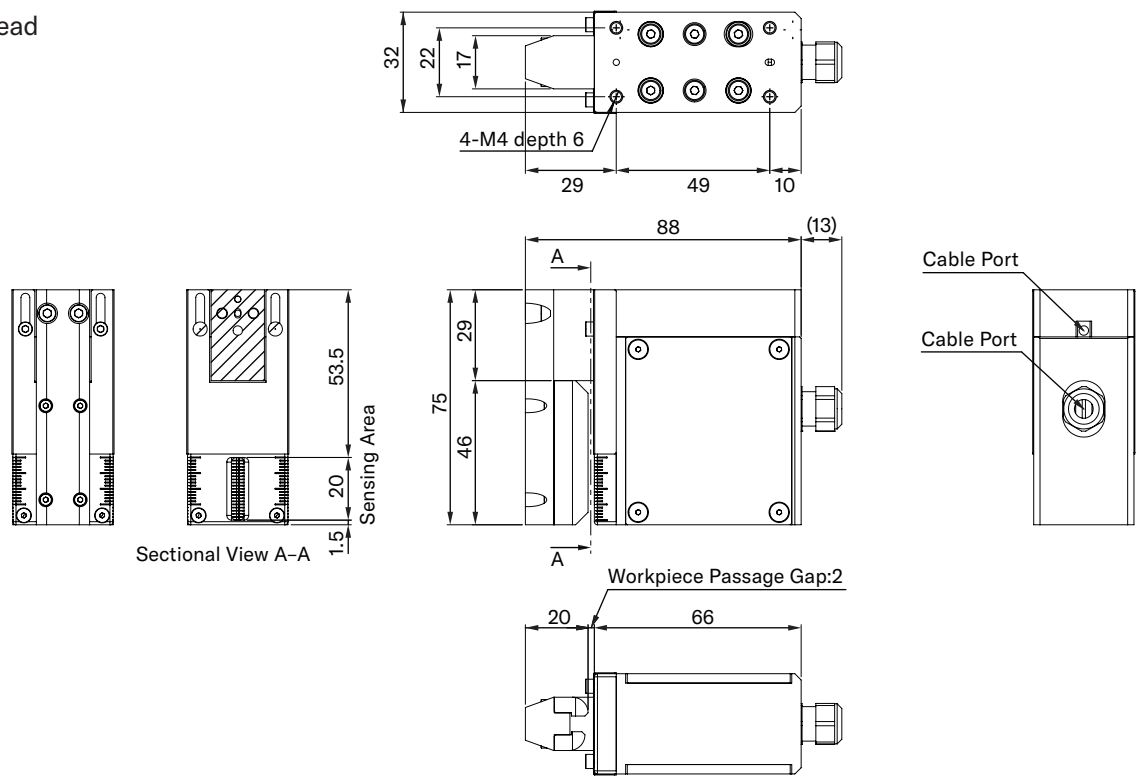


Web Form

Main Unit



G1 Sensor head



G2 Sensor head

