

X-ray Inspection System

**AD-4991 Series**

PROTEX  
SERIES



Greater detection-level of inspection is now in your hands.

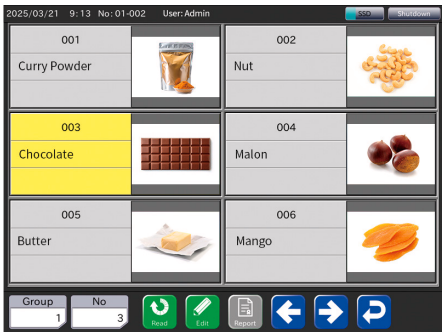
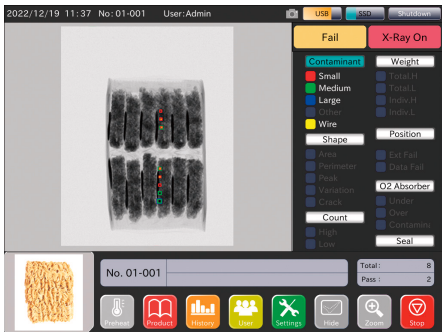


# A&D X-ray Inspection System



## Excellent contaminant inspection

As well as metal contaminants, the X-ray Inspection System can detect non-metal contaminants such as ceramic, glass, resin, and rubber. \*  
The system has a sharp display screen for viewing high-resolution images, so contaminant positions can be clearly identified via marks on the X-ray image.  
\* The maximum detection sensitivity varies depending on the inspected product.



## Product registration using images imported from USB flash drive

Product images can be quickly uploaded from a USB flash drive and a thumbnail image can be registered to each product.  
This makes identifying a product fast and simple.

## Automatic setting of X-ray output and sensitivity levels

X-ray output and detection-sensitivity can be automatically configured by simply passing the inspected products through the X-ray Inspection System several times.

## Simple inspection system designed for ease of use

Simple and intuitive operability is realized.  
Even first-time users can start inspection smoothly.

## Dependable quality

The easy-to-maintain structure supports long-term operation and is designed with operator safety in mind.

## Wide variety of functions

Contrast adjustment function using A&D's unique algorithm achieves greater level detection. Furthermore, in addition to contaminant inspection, extensive inspections can also be performed simultaneously.

# Features

## Contaminant inspection can be performed wherever the iron-based oxygen absorber is (option)

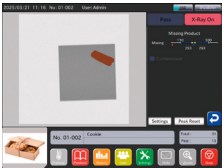
A&D exclusive

A&D's unique software for iron-based oxygen absorbers achieves contaminant inspection regardless of the position or orientation of the iron-based oxygen absorber. It is also possible to inspect for missing or excess iron-based oxygen absorbers.

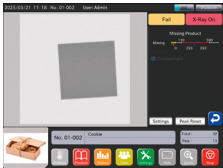
\* Optional software AD-4991-51 is required.

|                                           | Conventional                                                                               | A&D                  |
|-------------------------------------------|--------------------------------------------------------------------------------------------|----------------------|
| Contaminant inspection on oxygen absorber | Impossible                                                                                 | ✓Possible            |
| Contaminant inspection                    | False detection may happen depending on the oxygen absorber's orientation and/or position. | Less false detection |
| Missing or excess oxygen absorbers        | Impossible to inspect                                                                      | ✓Possible to inspect |

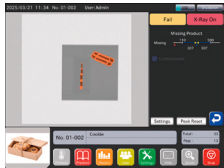
Example inspection screens



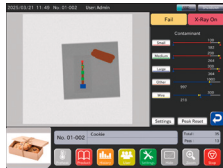
Oxygen absorber is present (Vertical)  
**Pass**



Oxygen absorber is missing  
**Fail**



Oxygen absorber is present (Horizontal)  
**Fail by contaminant inspection**



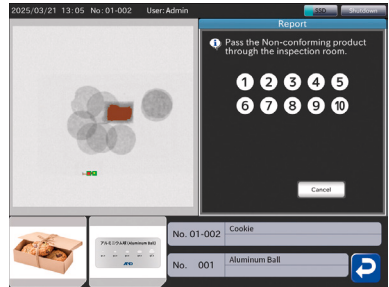
Oxygen absorber is present (Vertical)  
**Fail by contaminant inspection**

## Test Report Function

As well as inspection history and summary of inspection result, you can also output a Test Report from the X-ray Inspection System via USB.

Simply follow the guidance to automatically generate a PDF report of inspection conditions, product images, test piece images, X-ray images, etc.

\* A USB port is equipped as standard, but a USB flash drive is not included.



Example report creation screen

## Wide Variety of Communication Functions

The AD-4991 series has a wide variety of communication functions to support production-management.

[Equipped as standard]

- 1000BASE-T (for PostScript-compatible printers, Modbus TCP, inspection data output, and remote operation)
- RS-232C (for serial communication-compatible printers)
- RS-485 (for serial communication-compatible printers and Modbus RTU) \*1
- USB (for PostScript-compatible printers, inspection data output, and image importing) \*2

\*1 Modbus is a communication protocol developed by Modicon, Inc.

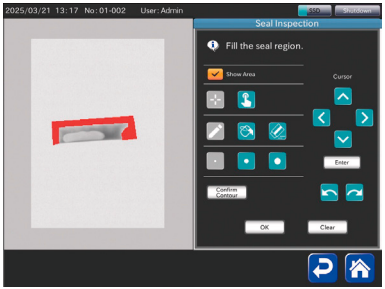
\*2 A USB flash drive is not included.

## Seal Inspection in package's seal area (option)

The X-ray Inspection System judges whether the contents are crushed in the packaging seal marked in Autoset.

The seal area can be set by freehand and complex seal shapes are also supported.

\* Optional Seal Inspection software AD-4991-53 is required.



Screen to set seal area



Detection of crushed item in seal area

## Sanitary structure for easier maintenance

The inspection room is waterproof equivalent to IP66 and can be washed with water. The conveyor belt and X-ray leakage shield curtain can be replaced without tools. In addition, the structure is designed so that X-rays cannot be irradiated unless the curtain is attached, making it safe to use the AD-4991 series even after maintenance.



## Full-body dust/water-proof equivalent to IP66 with the cooler option

Equipped with an easy-to-maintain Peltier cooler unit, supporting full-body dustproof and waterproof protection (equivalent to IP66).

The machines can be used in dusty environments and high operating temperatures up to 40 °C.

It is also possible to add the cooler to an AD-4991 series in use.

\* Requires optional cooler units AD-4991-2515-41 / AD-4991-3530-41 / AD-4991-4530-41.

\* Not compatible with AD-4991-2510 and AD-4991-6030.





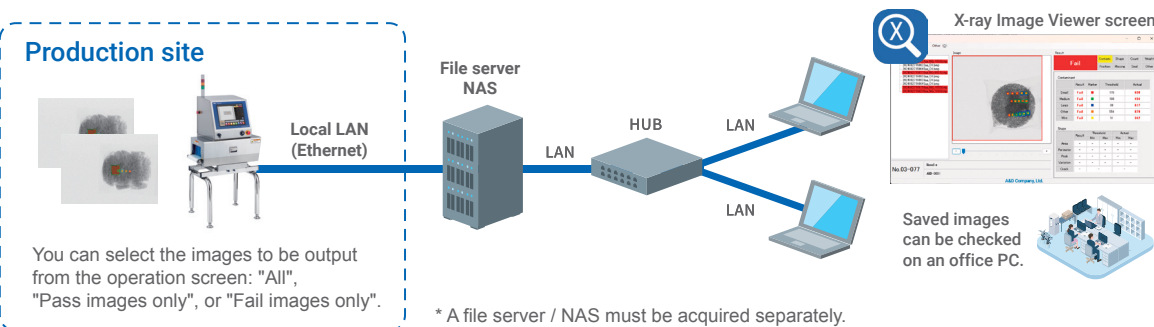
# Features

## Easy traceability management

### Output of Inspection Images via Ethernet (option)

Using the dedicated software, you can connect to a network drive such as a file server, PC, or NAS (Network Attached Storage) and save X-ray images.

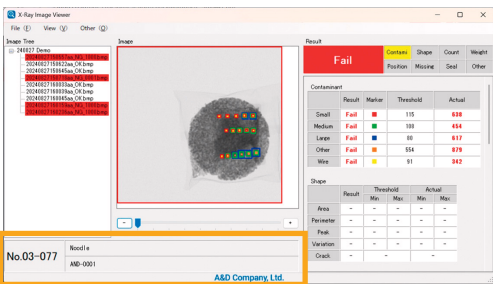
\* Optional Ethernet Image Output Software AD-4991-52 is required.



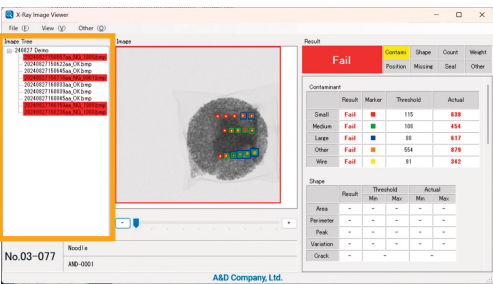
### "X-ray Image Viewer": Software to confirm and trace X-ray inspection result

This is free software with which you can check X-ray images taken and saved by this X-ray Inspection System on a PC.

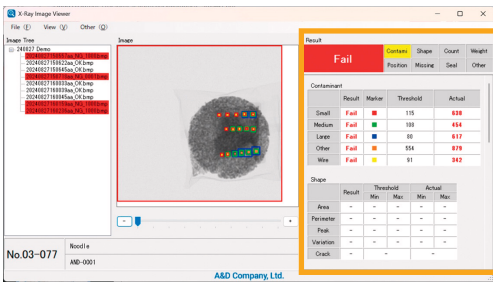
In addition to images, data such as judgement and detected values, can also be displayed.



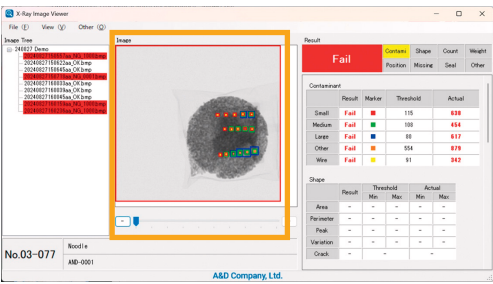
You can check the product name to be traced.



Fail judgements are displayed in red so you can see them at a glance.



You can ascertain the judgment value and setting status for each result.

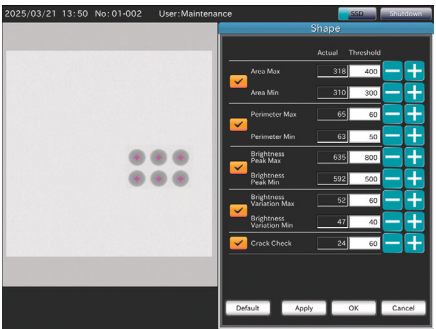


You can also check the judgment image and contaminant markings.

## Various inspections are available as standard

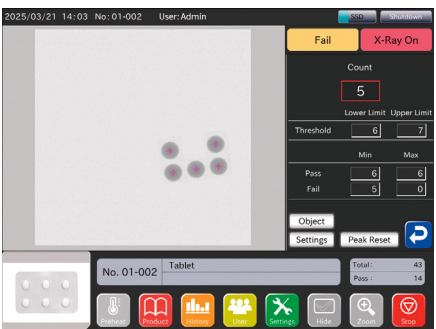
### Shape Inspection

Inspects for deformation, cracks, breaks, chips, etc.



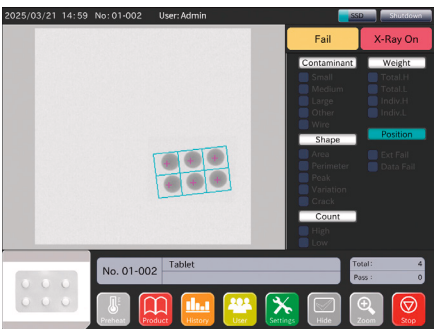
### Count Inspection

Inspects whether the quantity of inspected product is within the configured range.  
(Setting range: 1-100)



### Position Inspection

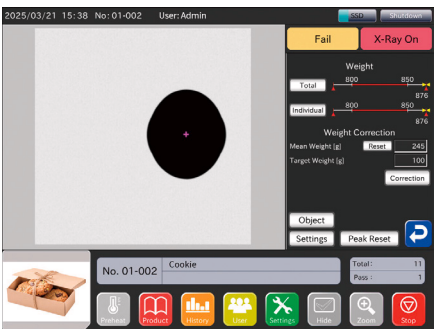
Inspects whether the inspected product is within the configured inspection area.



### Weight Estimation Inspection

Estimates the weight of the inspected product from the brightness of the X-ray image.

The number of overlapping inspected products of a certain thickness can also be found.

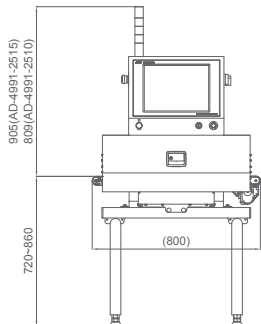
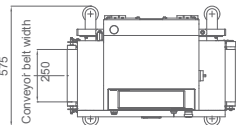


# Main standard specifications



(Photo: AD-4991-2515)

External view  
Unit: mm

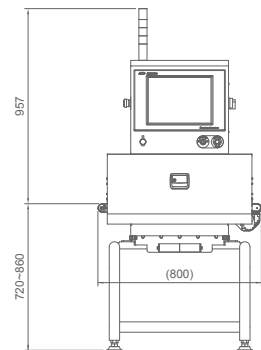
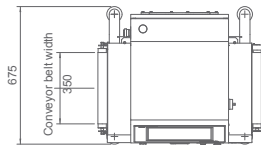


## AD-4991-2510 / AD-4991-2515

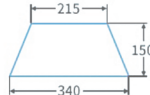
|                           | AD-4991-2510                                                     | AD-4991-2515                                                                         |
|---------------------------|------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| X-ray max. output         | 100 W (50 kV, 2 mA)                                              | 150 W (50 kV, 3 mA)                                                                  |
| System length             | 800 mm                                                           |                                                                                      |
| Conveyor speed            | 10-45 m/min                                                      | 10-70 m/min                                                                          |
| Conveyor belt width       | 250 mm                                                           |                                                                                      |
| Conveyor load capacity    | 5 kg                                                             | 5 kg (10-30 m/min)<br>4 kg (30-40 m/min)<br>3 kg (40-60 m/min)<br>2 kg (60-70 m/min) |
| Beam diagram (mm) *1      |                                                                  |                                                                                      |
| Weight                    | Approx. 90 kg                                                    | Approx. 105 kg (Standard)<br>Approx. 134 kg (with Cooler Option)                     |
| Max. power consumption *2 | Approx. 570 VA                                                   | Approx. 670 VA (Standard)<br>Approx. 1,270 VA (with Cooler Option)                   |
| Power supply *3           | 100-240 V AC +/- 10 %, Single-phase, 50/60 Hz, Class D grounding |                                                                                      |
| Dedicated option          | Belt                                                             | For Seal Inspection<br>AX-SLF1121-01<br>High Grip<br>AX-SLS6100-01                   |
|                           | Transfer Plate                                                   | AD-4991-25XX-13                                                                      |
|                           | Product Guide                                                    | AD-4991-25XX-14<br>(Applicable product width: 60-160 mm)                             |
|                           | Cooler                                                           | Not available<br>AD-4991-2515-41                                                     |
|                           | Number of saved images *4                                        | Approx. 26,000                                                                       |



External view  
Unit: mm



## AD-4991-3530

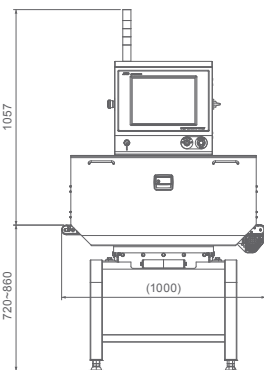
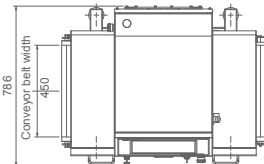
|                           |                |                     | AD-4991-3530                                                                          |
|---------------------------|----------------|---------------------|---------------------------------------------------------------------------------------|
| X-ray max. output *5      |                |                     | 300 W (75 kV 4 mA)                                                                    |
| System length             |                |                     | 800 mm                                                                                |
| Conveyor speed            |                |                     | 10-45 m/min                                                                           |
| Conveyor belt width       |                |                     | 350 mm                                                                                |
| Conveyor load capacity    |                |                     | Max. 5 kg                                                                             |
| Beam diagram (mm) *1      |                |                     |  |
| Weight                    |                |                     | Approx. 165 kg (Standard)<br>Approx. 195 kg (with Cooler Option)                      |
| Max. power consumption *2 |                |                     | Approx. 900 VA (Standard)<br>Approx. 1,500 VA (with Cooler Option)                    |
| Power supply *3           |                |                     | 100-240 V AC +/- 10 %, Single-phase,<br>50/60 Hz, Class D grounding                   |
| Dedicated<br>0.5          | Belt           | For Seal Inspection | AX-SLF1121-02                                                                         |
|                           |                | High Grip           | AX-SLS6100-02                                                                         |
|                           | Transfer Plate |                     | AD-4991-35XX-13                                                                       |
|                           | Product Guide  |                     | AD-4991-35XX-14<br>(Applicable product width: 40-280 mm)                              |
|                           | Cooler *5      |                     | AD-4991-3530-41                                                                       |
| Number of saved images *4 |                |                     | Approx. 13,000                                                                        |

\*1 The size of the product that can be inspected. For details, please check Inspection Area Dimensions on page 9.  
\*2 The maximum power consumption when a Rejector is connected.  
\*3 Power cable is not included. Please prepare a cable with a diameter of 6-12 mm.

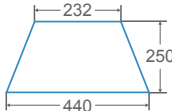


The photo includes the optional caster (AD-4991-4530-19)

External view  
Unit: mm

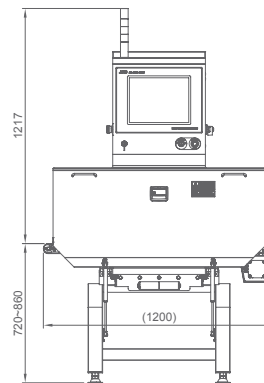
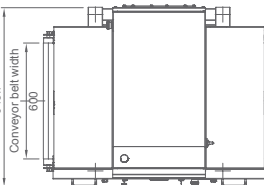


## AD-4991-4530

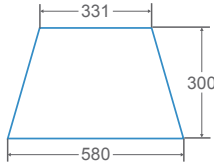
|                           |                | AD-4991-4530                                                                        |                     |
|---------------------------|----------------|-------------------------------------------------------------------------------------|---------------------|
| X-ray max. output *6      |                | 300 W (75 kV 4 mA)                                                                  |                     |
| System length             |                | 1,000 mm                                                                            |                     |
| Conveyor speed            |                | 10-40 m/min                                                                         |                     |
| Conveyor belt width       |                | 450 mm                                                                              |                     |
| Conveyor load capacity    |                | 10 kg (10-30 m/min)<br>8 kg (30-40 m/min)                                           |                     |
| Beam diagram (mm) *1      |                |  |                     |
| Weight                    |                | Approx. 225 kg (Standard)<br>Approx. 255 kg (with Cooler Option)                    |                     |
| Max. power consumption *2 |                | Approx. 1,000 VA (Standard)<br>Approx. 1,600 VA (with Cooler Option)                |                     |
| Power supply *3           |                | 100-240 V AC +/- 10 %, Single-phase,<br>50/60 Hz, Class D grounding                 |                     |
| Dedicated option          | Belt           | For Seal Inspection                                                                 | Made-to-build order |
|                           |                | High Grip                                                                           | Made-to-build order |
|                           | Transfer Plate |                                                                                     | Made-to-build order |
|                           | Product Guide  |                                                                                     | Made-to-build order |
|                           | Cooler *6      |                                                                                     | AD-4991-4530-41     |
| Number of saved images *4 |                | Approx. 8,000                                                                       |                     |



External view  
Unit: mm



## AD-4991-6030

|                           |                | AD-4991-6030                                                                          |                     |
|---------------------------|----------------|---------------------------------------------------------------------------------------|---------------------|
| X-ray max. output         |                | 300 W (100 kV 3 mA)                                                                   |                     |
| System length             |                | 1,200 mm                                                                              |                     |
| Conveyor speed            |                | 10-40 m/min                                                                           |                     |
| Conveyor belt width       |                | 600 mm                                                                                |                     |
| Conveyor load capacity    |                | 25 kg                                                                                 |                     |
| Beam diagram (mm) *1      |                |  |                     |
| Weight                    |                | Approx. 370 kg                                                                        |                     |
| Max. power consumption *2 |                | Approx. 1,250 VA                                                                      |                     |
| Power supply *3           |                | 200-240 V AC +/- 10 %, Single-phase, 50/60 Hz, Class D grounding                      |                     |
| Dedicated option          | Belt           | For Seal Inspection                                                                   | Made-to-build order |
|                           |                | High Grip                                                                             | Made-to-build order |
|                           | Transfer Plate |                                                                                       | Made-to-build order |
|                           | Product Guide  |                                                                                       | Made-to-build order |
|                           | Cooler         |                                                                                       | Not available       |
| Number of saved images *4 |                | Approx. 18,000                                                                        |                     |

\*4 Varies depending on actual usage conditions.  
\*5 When using the Cooler Option AD-4991-3530-41, the X-ray max. output will be 225W in an environment temperature of 35-40°C.  
\*6 When using the Cooler Option AD-4991-4530-41, the X-ray max. output will be 225W in an environment temperature of 30-35°C, and 150W in an environment temperature of 35-40°C.

# Main standard specifications

## Inspection Area Dimensions (Approximate product dimensions that can be inspected)

| Unit: mm     |        |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |   |
|--------------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---|
| Model        | Height | 0   | 10  | 20  | 30  | 40  | 50  | 60  | 70  | 80  | 90  | 100 | 110 | 120 | 130 | 140 | 150 | 160 | 170 | 180 | 190 | 200 | 210 | 220 | 230 | 240 | 250 | 260 | 270 | 280 | 290 | 300 |   |
| AD-4991-2510 | Width  | 240 | 228 | 217 | 206 | 195 | 184 | 173 | 162 | 151 | 140 | 129 | 118 | 107 | -   | -   | -   | -   | -   | -   | -   | -   | -   | -   | -   | -   | -   | -   | -   | -   | -   | -   |   |
| AD-4991-2515 |        | 240 | 233 | 227 | 221 | 215 | 209 | 203 | 197 | 191 | 185 | 179 | 173 | 167 | -   | -   | -   | -   | -   | -   | -   | -   | -   | -   | -   | -   | -   | -   | -   | -   | -   | -   |   |
| AD-4991-3530 |        | 340 | 331 | 323 | 315 | 306 | 298 | 290 | 281 | 273 | 263 | 256 | 248 | 240 | 231 | 223 | 215 | -   | -   | -   | -   | -   | -   | -   | -   | -   | -   | -   | -   | -   | -   | -   | - |
| AD-4991-4530 |        | 440 | 431 | 423 | 415 | 406 | 398 | 390 | 381 | 373 | 363 | 356 | 348 | 340 | 331 | 323 | 315 | 307 | 299 | 290 | 282 | 274 | 266 | 257 | 249 | 241 | 232 | -   | -   | -   | -   | -   | - |
| AD-4991-6030 |        | 580 | 571 | 563 | 555 | 546 | 538 | 530 | 522 | 513 | 505 | 497 | 488 | 480 | 472 | 464 | 455 | 447 | 439 | 430 | 422 | 414 | 406 | 397 | 389 | 381 | 372 | 364 | 356 | 348 | 339 | 331 |   |

## Common standard specifications

|                            |                                                          |                                                   |                                                                                                                      |
|----------------------------|----------------------------------------------------------|---------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| X-ray leakage amount       | Less than 1 μSv/h in an entire exterior wall of the body | Protection rating *3                              | Inside the inspection room:<br>Equivalent to IP66 (Standard)<br>Entire unit: Equivalent to IP66 (with Cooler Option) |
| Shield curtain             | Tungsten curtains                                        |                                                   |                                                                                                                      |
| Number of registered items | 1000 items (100 items x 10 groups)                       |                                                   |                                                                                                                      |
| External input *1 *2       | Non-voltage contact input: 8 points                      |                                                   |                                                                                                                      |
| External output *1         | Relay contact output: 8 points                           |                                                   |                                                                                                                      |
| Operating temperature *4   |                                                          | 0-35°C (Standard)<br>0-40 °C (with Cooler Option) |                                                                                                                      |
| Operating humidity         |                                                          | 30-85 % RH (with no condensation)                 |                                                                                                                      |

\*1 8 input points and 8 output points can be added with an option (AD-4991-01).

\*2 Non-voltage contact input: 6 points in AD-4991-6030

\*3 When using AD-4991-2515-41 / AD-4991-3530-41 / AD-4991-4530-41 , protection rating for the entire unit is equivalent to IP66.

\*4 When using AD-4991-2515-41 / AD-4991-3530-41 / AD-4991-4530-41 , operating temperature is 0-40°C.

# Options

## Option for main body \*

|                                                                                          |            |
|------------------------------------------------------------------------------------------|------------|
| Shape Inspection, Count Inspection, Position Inspection and Weight Estimation Inspection | Standard   |
| Software for Missing Inspection                                                          | AD-4991-51 |
| Software for Ethernet Output of Inspection Images                                        | AD-4991-52 |
| Software for Seal Inspection                                                             | AD-4991-53 |
| Software to limit X-ray output                                                           | AD-4991-54 |
| Additional external input/output (8 points each)                                         | AD-4991-01 |
| RS-485 Board (to expand conveyor control)                                                | AD-4991-03 |

\* Transfer Plate and Product Guide have dedicated models for each X-ray Inspection System model. Please refer to pages 7 and 8.

|                                     |                                                                                                                                |
|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| Signal Tower                        | Standard (Red/Orange/Green)<br>AS-LR4-E-B (Additional Blue)<br>AS-LR4-E-C (Additional White)                                   |
| Caster                              | AD-4971-01 (for AD-4991-2510/AD-4991-2515)<br>AD-4991-19 (for AD-4991-3530)<br>AD-4991-4530-19 (for AD-4991-4530/AD-4991-6030) |
| Fixed Type Adjuster Bolt            | AX-LP8020D (4 pieces per set)                                                                                                  |
| Anchor bracket for base unit        | AS-KC-1275-C-1 (1 piece per set)                                                                                               |
| EPDM Foot Pad                       | AX-1073030245 (4 pieces per set)                                                                                               |
| Anti-dust measures for AD-4991-2510 | Made-to-build order<br>(The intake vents are blocked to prevent dust from entering the interior.)                              |

## Curtain-less Design (Dedicated for AD-4991-2510 and AD-4991-2515)\*

\* Software to limit X-ray output (AD-4991-54) is required in Type 01.

### Type 01

- Pass-height 20-30 mm
- Thin product
- Same system length as standard.



### Type 02

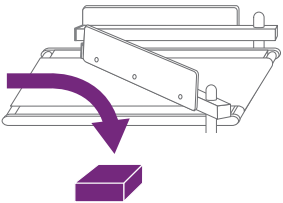
- Pass-height 120 mm
- Light product
- Rejector can be added.



# Rejector

## Flipper Type AD-4981 Series

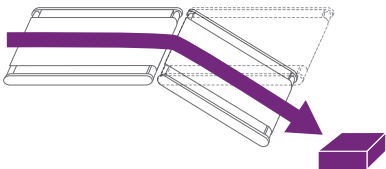
Arm swings to reject non-conforming products off the conveyor.



|                              | Box / Case                                                            | Tall bag                                                                                                    | Rejection direction<br>Max. 3 ways                                                                          |
|------------------------------|-----------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| Model                        | AD-4981-2057                                                          | AD-4981-2570                                                                                                | AD-4981-3585                                                                                                |
| Item code                    | AD-4981-2057<br>(Complete set of Arms on both sides, Conveyor & Base) | AD-4981-C2570 (Conveyor)<br>AD-4981-FR2570 (Right Arm)<br>AD-4981-FL2570 (Left Arm)<br>AD-4981-B79XX (Base) | AD-4981-C3585 (Conveyor)<br>AD-4981-FR3585 (Right Arm)<br>AD-4981-FL3585 (Left Arm)<br>AD-4981-B79XX (Base) |
| Conveyor belt width          | 200 mm                                                                | 250 mm                                                                                                      | 350 mm                                                                                                      |
| Max. screening capacity *1   | 120 pcs/min                                                           | 100 pcs/min                                                                                                 | 80 pcs/min                                                                                                  |
| Air supply *2                | 0.5 Mpa, 0.2 NL/time<br>Φ6 mm, Polyurethane tube                      |                                                                                                             | 0.5 Mpa, 0.4 NL/time<br>Φ6 mm, Polyurethane tube                                                            |
| Reject Confirmation (Option) | Made to build order                                                   | 1 direction: AD-4981-2570-34<br>2 directions: AD-4981-2570-35<br>3 directions: AD-4981-2570-36              |                                                                                                             |

## Conveyor Drop Type AD-4982 Series

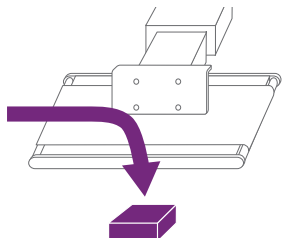
Non-conforming products are rejected down the conveyor by the movement of the conveyor.



|                              | Thin bag *3                                      | Sheet-like material                              | Rejection direction<br>Max. 2 ways               |
|------------------------------|--------------------------------------------------|--------------------------------------------------|--------------------------------------------------|
| Model                        | AD-4982-2035                                     | AD-4982-2540                                     | AD-4982-3550                                     |
| Item code                    | AD-4982-2035 (Conveyor)<br>AD-4982-11-79 (Base)  | AD-4982-C2540 (Conveyor)<br>AD-4982-11-79 (Base) | AD-4982-C3550 (Conveyor)<br>AD-4982-B3550 (Base) |
| Conveyor belt width          | 200 mm                                           | 250 mm                                           | 350 mm                                           |
| Max. screening capacity *1   | 150 pcs/min                                      | 100 pcs/min                                      | 60 pcs/min                                       |
| Air supply *2                | 0.5 Mpa, 0.3 NL/time<br>Φ6 mm, Polyurethane tube |                                                  | 0.5 Mpa, 0.9 NL/time<br>Φ6 mm, Polyurethane tube |
| Reject Confirmation (Option) | Made to build order                              |                                                  |                                                  |

## Pusher Type AD-4983 Series

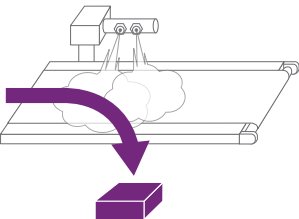
Non-conforming products are pushed off the conveyor.



|                              | Box                                                       | Heavy individually packaged product                                                                      | Rejection direction<br>Max. 2 ways |
|------------------------------|-----------------------------------------------------------|----------------------------------------------------------------------------------------------------------|------------------------------------|
| Model                        | AD-4983-3050                                              | AD-4983-5080 *4                                                                                          |                                    |
| Item code                    | AD-4983-3050<br>(Complete set of Conveyor, Pusher & Base) | AD-4983-C5080 (Conveyor) *4<br>AD-4983-B5080 (Base)<br>AD-4983-5080-25<br>(Reject-accumulation Conveyor) |                                    |
| Conveyor width               | 300 mm                                                    | 500 mm *4                                                                                                |                                    |
| Max. screening capacity *1   | 60 pcs/min                                                | 40 pcs/min                                                                                               |                                    |
| Air supply *2                | 0.5 Mpa, 2.6 NL/time<br>Φ8 mm, Polyurethane tube          | 0.6 Mpa, 4.33 NL/time<br>Φ8 mm, Polyurethane tube                                                        |                                    |
| Reject Confirmation (Option) | Made to build order                                       | AD-4983-5080-34 (Only for Pass-side)                                                                     |                                    |

## Air Jet Type AD-4984 Series

Air is blown to reject non-conforming products off the conveyor.



|                              | Light individually packaged product                          | High speed rejection | Rejection direction<br>Max. 3 ways |
|------------------------------|--------------------------------------------------------------|----------------------|------------------------------------|
| Model                        | AD-4984-2046                                                 |                      |                                    |
| Item code                    | AD-4984-2046 (Conveyor & Air Nozzle)<br>AD-4982-11-79 (Base) |                      |                                    |
| Conveyor belt width          | 200 mm                                                       |                      |                                    |
| Max. screening capacity *1   | 320 pcs/min                                                  |                      |                                    |
| Air supply *2                | 0.5 Mpa, 2.4 NL/time<br>Φ10 mm, Polyurethane tube            |                      |                                    |
| Reject Confirmation (Option) | Made to build order                                          |                      |                                    |

\*1 Actual screening capacity is dependent on the shape and/or the condition of the screened item and/or environment of the installation room.

\*2 Please prepare compressed air with an air tube (polyurethane tube) to be connected to the filter regulator of the Rejector.

\*3 Max. height of screened products is dependent on the shape of the conveyor downstream of the Conveyor Drop type Rejector.

\*4 Roller Conveyor type. This model is dedicated for AD-4991-4530 or AD-4991-6030.



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