Compact Roundness Measurement

ROUNDTEST RA-10

Catalog No. E15019

Compact new roundness tester combines outstanding cost/performance ratio with full measurement capabilities
We have a reason for proposing you introduce roundness measuring machines to your business.

Verification of geometrical tolerances, including roundness, is a must in today's quality-conscious environment. Roundness measuring machines with the ability to perform product verification in conformity with ISO, JIS and other standards are indispensable to any quality control system that aspires to implementing high-grade quality assurance. Heightened awareness of production quality and higher quality goods will help enhance your corporate image with the buying public.

Roundness verification attempted using basic measuring tools involves the following drawbacks:

- Measurement is not conducted by a radius method conforming to the standards, for which a reference axis is necessary.
- Measurement verification that meets the accuracy required by the drawings cannot be performed.
- Recorded profiles cannot be obtained.

Once roundness measuring machines are introduced into quality control:

- Reduction of nonconforming parts will translate into lower overall cost of manufacture.
- Product quality will improve and the time-to-market for new product will be reduced.
- Corporate image will be enhanced.

**Definition of Roundness**

Roundness of a profile or contour (C) is the difference in radius (f) of two concentric circles that enclose C when the separation of these circles is a minimum, and is indicated as ‘roundness xx mm’ or ‘roundness xx μm’.
High-Precision Roundness Measurement

Simple, beginner-friendly operation

- The key layout is large and simple so is easy to view and easy to understand.
- One-shot setup recall function: Complex setups are stored in advance, ready for recall when required by one-key operation.
- Zero-setting function: The detector’s level can be set to zero (0) with one single key press. This relieves the user from the chore of meticulously positioning the detector.
- The operation handles for vertical direction (Z axis) and radial direction (X axis) adjustments have been positioned on the slider for best operability.
- Because setups can only be altered in administrator mode, the machine operator can be prevented from inadvertently changing settings.

High accuracy even though a low-end machine

Despite being a low-priced model, the turntable with air bearings offers rotational accuracy as high as (0.04+6H/10000)μm, thus assuring a precision that compares well to that of high-end models.

Large LCD panel displays measurement results and recorded profiles in an easy-to-view fashion

The built-in high-grade thermal printer prints out measurement results and recorded profiles on demand

Compact design means small installation space

The machine calls for only a small installation space as its compact body integrates the measuring unit, electronics and printer.

Options that further enhance usability

Use of a part setting jig exactly fitting the object being measured eliminates the need for the centering and leveling adjustments which would otherwise be required prior to measurement. An X-axis stop in the radial direction allows the detector to be positioned easily according to the object to be measured, eliminating the task of fine positioning when measurement is repeated.

* For details on the options, see pages 3 and 8.

Four easy steps to measurement

1. Clamp the workpiece to the jig.
2. Bring the detector into contact with the workpiece.
3. Press the [CONDITION (setup recall)] button, as needed.
4. Press the [START] button.

*Combined use of the zero-setting function and X-axis stop (Optional) will result in securing even higher efficiency when identical workpieces are measured repetitively.

*If measurement is always conducted using the last setup, there is no need to recall this because the machine always starts up with the same settings that were effective immediately before the machine was powered down last time.
Main Measuring Unit

Detector
- Allows simple positioning of the workpiece due to its wide measuring range of ±100μm.

Part setting jig (Optional)
- Can be selected to best suit the workpiece, which can be clamped/released in a single action. High re-gripping accuracy eliminates the need for centering and leveling.

High-precision air bearings
- The highest accuracy in its class, (0.04+6HV/10000)μm, has been achieved.

Built-in printer
- Prints measurement results.

Space-saving design
- The compact body integrating the measuring unit, electronics and printer poses no problem in installing the machine.

High-precision air bearings provide highly accurate measurement
- Turntable axis stability is the most critical specification of a roundness measuring machine since this axis provides the datum from which the stylus deflection is measured for every type of analysis. For this reason the RA-10 is equipped with specially designed air bearings that assure high rotational accuracy to guarantee high-precision measurements. As these bearings are inherently non-contacting they are free of any degradation arising from normal use, so the machine retains high accuracy even when used for an extended period of time.

Z-axis ABS scale (Optional)
- When the ABS scale is fitted, positioning in the Z-axis (vertical) direction is performed with higher accuracy.

X-axis stop (Optional)
- Allows fast positioning of the stylus after the workpiece is clamped so that measurement can be started immediately without the need for a delicate positioning operation. This greatly increases work efficiency on batch work.

Slider
- Carries the manual operation knobs positioned together for convenient X- and Z-axis stylus position adjustment.

Large LCD panel
- Clearly displays measurement results and recorded profiles.

Simple operation panel
- Large-sized buttons allow easy recall of stored measurement setups and help prevent input errors.

Measurement results can be sent to the built-in printer or exported for external processing and storage
- Measurement results and recorded profiles can be sent to the high-grade built-in thermal printer or exported via the SPC and RS-232C output functions or text file output function to USB memory.

Sample print by built-in printer

Graph of rotational accuracy versus height above table surface.

- Measurement height (mm)
Control Panel

**Measurement screen / Result screen switching**
Switches between measurement screen and analysis result screen at one touch of a button.

**Printer control**
While automatic print is available, setting can also be made to print desired results only, thus resulting in the saving of paper resources.

**Zero Set button**
A potent tool for establishing optimum positioning of the detector.

**Setup button**

**Large LCD screen**
Displays measurement results and recorded profiles in an easy-to-understand manner.

**Supports 16 languages**
Japanese, English, German, French, Italian, Spanish, Portuguese, Korean, Traditional Chinese, Simplified Chinese, Czech, Polish, Hungarian, Turkish, Swedish, Dutch

**Setup Recall**
Frequently used measurement setups can be stored in advance, ready to be called up by one touch of a button.

**Setup definition**

**Measuring range switching**

**Simplified communication program for ROUNDTEST RA-10**
The Roundtest RA-10 has a USB interface, enabling data to be transferred to a spreadsheet or other software.

---

**Useful functions help setting up prior to measurement**
When a high-resolution range measurement is needed, for which accurate positioning is required, the Zero Set button allows the detector to be set at the optimum position. The machine delivers the measurement results for a workpiece after automatically correcting for eccentricity and inclination.

**Measurement data editing function**
Any part of a profile that is not to be included in the calculation can be automatically excluded from the measurement data. Therefore notches in the profile can be ignored, or data produced by scratches can be deleted while observing recorded profiles on the screen.

**Limaçon function compensates for eccentricity**
A displacement offset between the turntable axis and that of the part under measurement results in distortion of the measured form (limaçon error) and consequentially produces an error in the calculated roundness value. The larger the eccentricity, the larger is the error in calculated roundness.

The RA-10 supports accurate measurement with a limaçon error correction function, which is provided to correct such errors arising from eccentricity.

**Notes:**
1. The limaçon error correction is effective only when measuring a workpiece of larger diameter than that of the tip of the probe.
2. If the effect obtained with the limaçon error correction function is not sufficient, use the optional alignment table (to be purchased separately) to establish precise centering of the workpiece.
### Types of Analysis with the RA-10

<table>
<thead>
<tr>
<th>Feature Characteristic</th>
<th>Characteristic Symbol</th>
<th>Measurement Method</th>
<th>Sample Result Screen</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form</td>
<td>Roundness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><img src="image" alt="Roundness" /></td>
<td>Roundness (M2C) of a profile is the difference in radius of two concentric circles that enclose the profile when the separation of these circles is a minimum.</td>
</tr>
<tr>
<td>Flatness</td>
<td></td>
<td></td>
<td><img src="image" alt="Flatness" /></td>
<td>Flatness of a profile is the distance between two planes enclosing the profile when this distance is a minimum.</td>
</tr>
<tr>
<td>Location</td>
<td>Concentricity</td>
<td></td>
<td><img src="image" alt="Concentricity" /></td>
<td>Concentricity of a profile is twice the shortest distance between the center of the profile and the datum.</td>
</tr>
<tr>
<td></td>
<td>Coaxiality</td>
<td></td>
<td><img src="image" alt="Coaxiality" /></td>
<td>Coaxiality of the axis of a profiled surface is twice the shortest radial distance between the axis and the datum at the measured positions.</td>
</tr>
<tr>
<td>Runout</td>
<td>Circular runout (radial)</td>
<td></td>
<td><img src="image" alt="Circular runout" /></td>
<td>Circular runout (radial) of a profile is the radial distance between two circles enclosing the profile and concentric with the datum when this distance is a minimum.</td>
</tr>
</tbody>
</table>
Optional Accessories

Interchangeable Styli

12AAL021  Standard stylus
   (stylus tip: ø1.6 carbide ball)

12AAL022  Stylus for notched workpieces
   (stylus tip: ø3 carbide ball)

12AAL023  Stylus for grooves
   (stylus tip: R0.25 sapphire)

12AAL024  Stylus for corners
   (stylus tip: R0.25 sapphire)

12AAL025  Stylus for extra small holes
   (stylus tip: ø0.5 carbide ball)

12AAL026  Stylus for small holes
   (stylus tip: ø0.8 carbide ball)

12AAL027  Stylus for small and deep holes
   (stylus tip: ø1.6 carbide ball)

12AAL028  Cranked stylus
   (stylus tip: ø0.5 carbide ball)

12AAL029  Cranked stylus
   (stylus tip: ø1 carbide ball)

12AAL030  Stylus for filtering asperities
   (machining marks)

12AAL031  Disk stylus

12AAL032  M2 tapped shank for CMM styli

12AAL033  M2 tapped shank for CMM styli

12AAL034  M2 tapped shank for CMM styli

Unit: mm

Example:

Note: This stylus cannot be used for OD/ID measurement.

Compatible with CMM styli with M2 threaded shank.

Compatible with CMM styli with M2 threaded shank.

Compatible with CMM styli with M2 threaded shank.

* ■ portion shows stylus except for the cranked stylus and stylus for flat surface.
* ( ) dimension shows a distance from the tip end of stylus or the center of tip ball to the connecting surface of detector.
* Customized special interchangeable stylus are available on request. Please contact any Mitutoyo office for more information.
Various Clamping Jigs
For direct mounting on the turntable

Centering chuck
When measuring a small-sized workpiece, the chuck provides good operability and the knurled ring allows the workpiece to be clamped easily.

V-block jig A [Semi-custom product]
The cylindrical surface of the workpiece is held against the V-block and secured with the screw-type clamp. This is a semi-custom-made product (ø10 to ø100mm) that is shipped out after adjusting the position of the V-block according to the workpiece size. This jig allows workpieces of the same size to be measured without having to center each one.

V-block jig B [Semi-custom product]
The cylindrical surface of the workpiece is held against the V-block and secured with the screw-type clamp. This is a semi-custom-made product (ø10 to ø100mm) that is shipped out after adjusting the position of the V-block according to the workpiece size. This jig allows workpieces of the same size to be measured without having to center each one.

OD/ID mating jig [Semi-custom product]
These jigs are specially made to locate plain sections of a workpiece so that loading/unloading is very quick. Workpiece centering is automatically provided by just one initial centering operation on the jig, when first installed, so measurement can be started as soon as the jig is loaded with a workpiece. No clamping is used so the workpiece must be heavy enough to remain stable during measurement. * An OD/ID master mating part to match the workpiece diameter is required separately ([available to special order (max. ø30mm)].

Alignment table
When installed on the turntable, this accessory enables the user to efficiently perform centering and leveling adjustments in synchronization with the adjustment Navi DAT.

Options that can be installed on the alignment table
Centering chuck (knurled ring operated)
When measuring a small-diameter workpiece, the chuck provides good operability and the knurled ring allows the workpiece to be clamped easily.

Collet chuck
Provides high clamping repeatability due to the use of optional precision collets. (See table below.)

Individual collets*
These collets are acquired to match the workpiece diameter range required.

OD/ID mating jig [Semi-custom product]
These jigs are specially made to locate plain sections of a workpiece so that loading/unloading is very quick. Workpiece centering is automatically provided by just one initial centering operation on the jig, when first installed, so measurement can be started as soon as the jig is loaded with a workpiece. No clamping is used so the workpiece must be heavy enough to remain stable during measurement. * An OD/ID master mating part to match the workpiece diameter is required separately ([available to special order (max. ø30mm)].

Alignment table
When installed on the turntable, this accessory enables the user to efficiently perform centering and leveling adjustments in synchronization with the adjustment Navi DAT.

Options that can be installed on the alignment table
Centering chuck (knurled ring operated)
When measuring a small-diameter workpiece, the chuck provides good operability and the knurled ring allows the workpiece to be clamped easily.

Collet chuck
Provides high clamping repeatability due to the use of optional precision collets. (See table below.)

Individual collets*
These collets are acquired to match the workpiece diameter range required.

OD/ID mating jig [Semi-custom product]
These jigs are specially made to locate plain sections of a workpiece so that loading/unloading is very quick. Workpiece centering is automatically provided by just one initial centering operation on the jig, when first installed, so measurement can be started as soon as the jig is loaded with a workpiece. No clamping is used so the workpiece must be heavy enough to remain stable during measurement. * An OD/ID master mating part to match the workpiece diameter is required separately ([available to special order (max. ø30mm)].

Alignment table
When installed on the turntable, this accessory enables the user to efficiently perform centering and leveling adjustments in synchronization with the adjustment Navi DAT.

Options that can be installed on the alignment table
Centering chuck (knurled ring operated)
When measuring a small-diameter workpiece, the chuck provides good operability and the knurled ring allows the workpiece to be clamped easily.

Collet chuck
Provides high clamping repeatability due to the use of optional precision collets. (See table below.)

Individual collets*
These collets are acquired to match the workpiece diameter range required.

OD/ID mating jig [Semi-custom product]
These jigs are specially made to locate plain sections of a workpiece so that loading/unloading is very quick. Workpiece centering is automatically provided by just one initial centering operation on the jig, when first installed, so measurement can be started as soon as the jig is loaded with a workpiece. No clamping is used so the workpiece must be heavy enough to remain stable during measurement. * An OD/ID master mating part to match the workpiece diameter is required separately ([available to special order (max. ø30mm)].

Alignment table
When installed on the turntable, this accessory enables the user to efficiently perform centering and leveling adjustments in synchronization with the adjustment Navi DAT.

Options that can be installed on the alignment table
Centering chuck (knurled ring operated)
When measuring a small-diameter workpiece, the chuck provides good operability and the knurled ring allows the workpiece to be clamped easily.

Collet chuck
Provides high clamping repeatability due to the use of optional precision collets. (See table below.)

Individual collets*
These collets are acquired to match the workpiece diameter range required.

OD/ID mating jig [Semi-custom product]
These jigs are specially made to locate plain sections of a workpiece so that loading/unloading is very quick. Workpiece centering is automatically provided by just one initial centering operation on the jig, when first installed, so measurement can be started as soon as the jig is loaded with a workpiece. No clamping is used so the workpiece must be heavy enough to remain stable during measurement. * An OD/ID master mating part to match the workpiece diameter is required separately ([available to special order (max. ø30mm)].

Alignment table
When installed on the turntable, this accessory enables the user to efficiently perform centering and leveling adjustments in synchronization with the adjustment Navi DAT.

Options that can be installed on the alignment table
Centering chuck (knurled ring operated)
When measuring a small-diameter workpiece, the chuck provides good operability and the knurled ring allows the workpiece to be clamped easily.

Collet chuck
Provides high clamping repeatability due to the use of optional precision collets. (See table below.)

Individual collets*
These collets are acquired to match the workpiece diameter range required.

OD/ID mating jig [Semi-custom product]
These jigs are specially made to locate plain sections of a workpiece so that loading/unloading is very quick. Workpiece centering is automatically provided by just one initial centering operation on the jig, when first installed, so measurement can be started as soon as the jig is loaded with a workpiece. No clamping is used so the workpiece must be heavy enough to remain stable during measurement. * An OD/ID master mating part to match the workpiece diameter is required separately ([available to special order (max. ø30mm)].

Alignment table
When installed on the turntable, this accessory enables the user to efficiently perform centering and leveling adjustments in synchronization with the adjustment Navi DAT.

Options that can be installed on the alignment table
Centering chuck (knurled ring operated)
When measuring a small-diameter workpiece, the chuck provides good operability and the knurled ring allows the workpiece to be clamped easily.

Collet chuck
Provides high clamping repeatability due to the use of optional precision collets. (See table below.)

Individual collets*
These collets are acquired to match the workpiece diameter range required.

OD/ID mating jig [Semi-custom product]
These jigs are specially made to locate plain sections of a workpiece so that loading/unloading is very quick. Workpiece centering is automatically provided by just one initial centering operation on the jig, when first installed, so measurement can be started as soon as the jig is loaded with a workpiece. No clamping is used so the workpiece must be heavy enough to remain stable during measurement. * An OD/ID master mating part to match the workpiece diameter is required separately ([available to special order (max. ø30mm)].

Alignment table
When installed on the turntable, this accessory enables the user to efficiently perform centering and leveling adjustments in synchronization with the adjustment Navi DAT.
The Roundtest RA-10 has a USB interface, enabling data to be transferred to a spreadsheet or other software. We also provide a program that lets you create inspection record tables using a Microsoft Excel* macro.

### Required environment:
- **OS**: Windows XP-SP3
  - Windows 7
- **Spreadsheet software**: Microsoft Excel 2010
  *Windows OS and Microsoft Excel are products of Microsoft Corporation.*

The optional USB cable is also required.
- **USB cable for RA-10 series**
  Order No. 12AAH490

### Other accessories

**X-axis stop**
Allows the user to return the detector rapidly and easily to a fixed position on the X axis.

**SD scale for Z axis***
Scale unit for accurate positioning of the slider in the Z-axis direction (ABS scale used).

**Vibration damping stand**

<table>
<thead>
<tr>
<th>Order No.</th>
<th>12AAH320</th>
<th>12AAH318</th>
<th>211-013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass</td>
<td>65g</td>
<td>450g</td>
<td></td>
</tr>
</tbody>
</table>

*Shipped out attached to the RA-10 machine, or will be installed on site by Mitutoyo service personnel.

**Vibration damping stand**
Diaphragm type air spring
- **External size**: 615 x 515 x 51mm
- **Max. loading**: 150kg

* Shipped out attached to the RA-10 machine, or will be installed on site by Mitutoyo service personnel.
# Specifications

## Main unit

<table>
<thead>
<tr>
<th>Model</th>
<th>RA-10</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Turntable</strong></td>
<td></td>
</tr>
<tr>
<td>Bearing type</td>
<td>Air bearing</td>
</tr>
<tr>
<td>Rotational accuracy (radial)</td>
<td>(0.04+6H/10000)μm</td>
</tr>
<tr>
<td>Rotational accuracy (axial)</td>
<td>(0.04+6X/10000)μm</td>
</tr>
<tr>
<td>Rotation speed</td>
<td>6rpm</td>
</tr>
<tr>
<td>Effective table diameter</td>
<td>ø150mm</td>
</tr>
<tr>
<td>Maximum turntable loading</td>
<td>10kg</td>
</tr>
<tr>
<td>Maximum probing diameter</td>
<td>ø100mm</td>
</tr>
<tr>
<td>Maximum workpiece diameter</td>
<td>ø320mm</td>
</tr>
<tr>
<td><strong>Vertical column (Z axis)</strong></td>
<td></td>
</tr>
<tr>
<td>Vertical travel</td>
<td>117mm</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum probing height</td>
<td>152mm from the turntable top</td>
</tr>
<tr>
<td>Maximum probing depth</td>
<td>100mm (minimum ID: ø30mm) using the standard stylus</td>
</tr>
<tr>
<td><strong>Horizontal arm (X axis)</strong></td>
<td></td>
</tr>
<tr>
<td>Horizontal travel</td>
<td>–25mm to 50mm</td>
</tr>
<tr>
<td><strong>Detector</strong></td>
<td></td>
</tr>
<tr>
<td>Measuring force</td>
<td>100mN (±30%)</td>
</tr>
<tr>
<td>Standard stylus</td>
<td>12AAL021</td>
</tr>
<tr>
<td>Measuring range</td>
<td>±1000μm</td>
</tr>
<tr>
<td>Measuring direction</td>
<td>Two directional (IN/OUT switchable)</td>
</tr>
<tr>
<td><strong>Electronic unit</strong></td>
<td></td>
</tr>
<tr>
<td>Measuring range</td>
<td>±1000μm, ±100μm, ±10μm</td>
</tr>
<tr>
<td>Magnification</td>
<td>×5, ×10, ×20, ×50, ×100, ×200, ×500, ×1,000, ×2,000, ×5,000, ×10,000, ×20,000, ×50,000, ×100,000, ×200,000</td>
</tr>
<tr>
<td>Filter type</td>
<td>Phase corrected: 2CRPC75, 2CRPC50</td>
</tr>
<tr>
<td></td>
<td>Not phase corrected: 2CR75, 2CR50</td>
</tr>
<tr>
<td>Cutoff value</td>
<td>15μpr, 50μpr, 150μpr, 500μpr</td>
</tr>
<tr>
<td></td>
<td>15-150μpr, 15-500μpr, 50-500μpr</td>
</tr>
<tr>
<td>Number of measuring sections</td>
<td>1-section to 5-section: Roundness, Coaxiality, Flatness</td>
</tr>
<tr>
<td></td>
<td>1-section to 3-section: Circular runout (radial)</td>
</tr>
<tr>
<td></td>
<td>2-section: Concentricity</td>
</tr>
<tr>
<td>Reference circle for evaluation</td>
<td>LSCI, MZCI, MICI, MCCI</td>
</tr>
<tr>
<td>Evaluation capability</td>
<td>Roundness, Coaxiality, Concentricity, Flatness, Circular runout (radial)</td>
</tr>
<tr>
<td>Data output</td>
<td>RS-232C I/F, SPC, USB stick memory</td>
</tr>
<tr>
<td>Display</td>
<td>LCD 117.2 × 88.4mm</td>
</tr>
<tr>
<td>Printer</td>
<td>Thermal line printer, optional external printer</td>
</tr>
<tr>
<td>Display languages</td>
<td>Japanese, English, German, French, Italian, Spanish, Portuguese, Korean, Traditional Chinese, Simplified Chinese, Czech, Polish, Hungarian Turkish, Swedish, Dutch</td>
</tr>
<tr>
<td><strong>Others</strong></td>
<td></td>
</tr>
<tr>
<td>Power supply</td>
<td>AC100 to 240V, 50/60Hz</td>
</tr>
<tr>
<td>Power consumption</td>
<td>32–36W</td>
</tr>
<tr>
<td>Air pressure</td>
<td>0.39MPa</td>
</tr>
<tr>
<td>Air consumption</td>
<td>30L/min (minimum)</td>
</tr>
<tr>
<td>Mass</td>
<td>26kg</td>
</tr>
</tbody>
</table>

*1: Top position will vary depending on any attachments installed.  
*2: No attachments installed.

## Standard accessories

<table>
<thead>
<tr>
<th>Order No.</th>
<th>Name</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>350366</td>
<td>Magnification adjusting film</td>
<td>2 pcs.</td>
</tr>
<tr>
<td>611755-04</td>
<td>Gauge block (35mm, JIS Grade 2)</td>
<td>1 pc.</td>
</tr>
<tr>
<td>118A8941</td>
<td>Level</td>
<td>1 pc.</td>
</tr>
<tr>
<td>12AAL021</td>
<td>Standard stylus</td>
<td>1 pc.</td>
</tr>
<tr>
<td>12BAJ340</td>
<td>Printer paper*</td>
<td>2 rolls</td>
</tr>
<tr>
<td>—</td>
<td>Receptacle</td>
<td>1 pc.</td>
</tr>
<tr>
<td>—</td>
<td>Hose band</td>
<td>1 pc.</td>
</tr>
<tr>
<td>—</td>
<td>Power cable</td>
<td>1 pc.</td>
</tr>
<tr>
<td>—</td>
<td>Leveling spanner</td>
<td>1 pc.</td>
</tr>
<tr>
<td>—</td>
<td>Philips screwdriver</td>
<td>1 pc.</td>
</tr>
<tr>
<td>—</td>
<td>Key wrench 0.9, 2 and 4</td>
<td>1 pc. (0.9), 2 pcs. (2), 1 pc. (4)</td>
</tr>
<tr>
<td>—</td>
<td>Machine cover</td>
<td>1 pc.</td>
</tr>
<tr>
<td>—</td>
<td>User’s manual</td>
<td>1 copy</td>
</tr>
</tbody>
</table>

*12AAH181: Optional printer paper set (10 rolls)
Dimensions

■ External dimensions

: Measuring area

■ Turntable top view

Four concentric grooves: W1x0.5 (ø32, ø60, ø88, ø116)

■ Installation floor plan

: Power inlet

: Air inlet

Wall
Specifications are subject to change without notice.

Note: All information regarding our products, and in particular the illustrations, drawings, dimensional and performance data contained in this pamphlet, as well as other technical data are to be regarded as approximate average values. We therefore reserve the right to make changes to the corresponding designs, dimensions and weights. The stated standards, similar technical regulations, descriptions and illustrations of the products were valid at the time of printing. Only quotations submitted by ourselves may be regarded as definitive.