

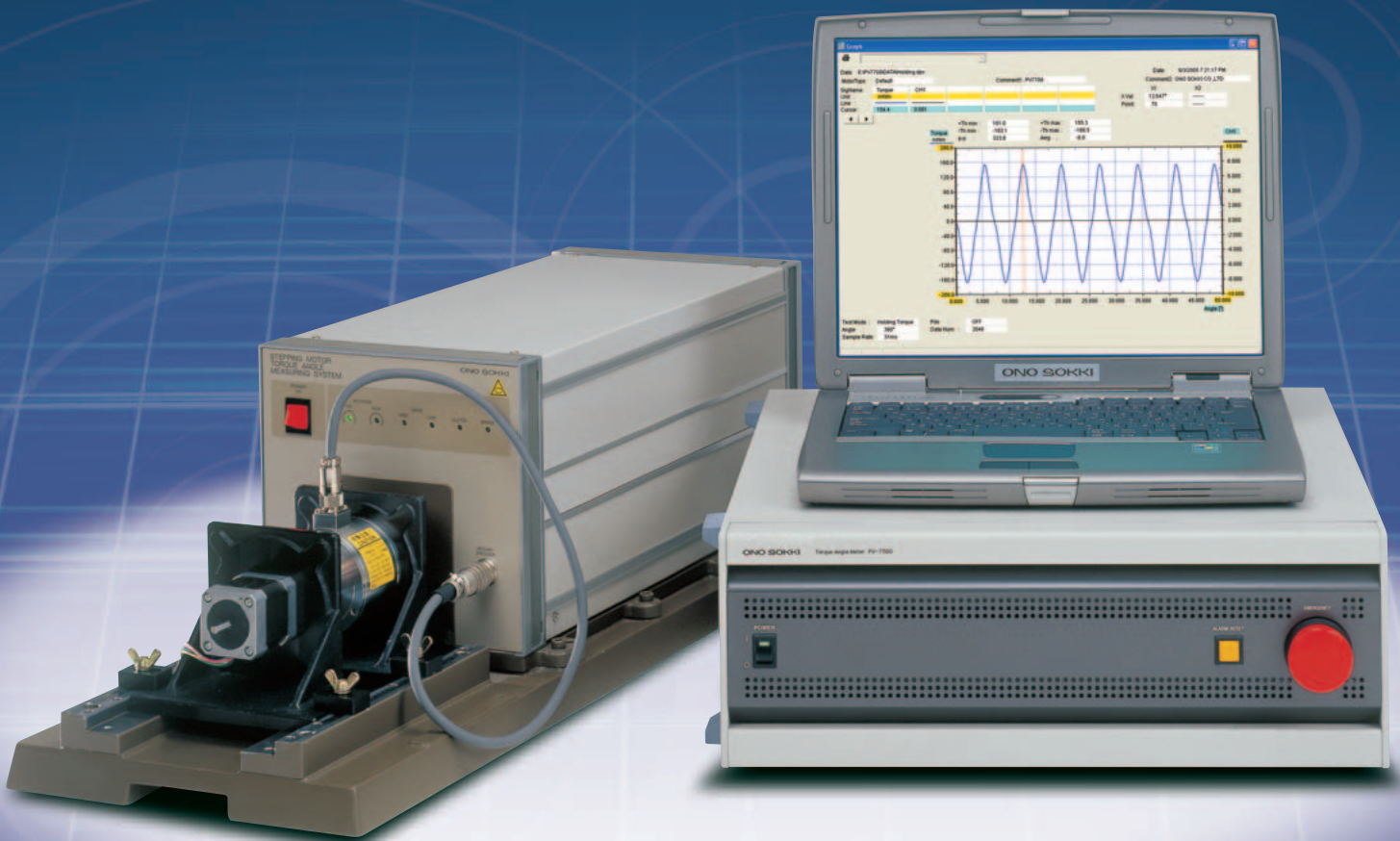
Stepping Motor Station Pro

PV-7700 System

**Old Model
(Reference only)**

The PV-7700 Stepping Motor Station Pro is a single-device system that enables the comprehensive measurement of seven important stepping motor characteristics, namely the θ -T characteristic, holding torque, detent torque, pull-in torque, pull-out torque, damping characteristic, and angular accuracy. When the PV-7700 is connected to a PC, simple operations enable automatic measurement and display of the results in a graph format.

The measurement data can be easily incorporated into word-processing and spreadsheet software, and is extremely useful when evaluating motors.



ONO SOKKI

Stepping Motor Performance Determined from Torque and Angle

PV-7700 system

1 Measurement of seven important torque and angle characteristics with one device

Dynamic torque characteristics : Pull-in torque, pull-out torque
 Static torque characteristics : θ -T, holding torque, detent torque
 Angle characteristics : Damping characteristic, angular accuracy

2 Easy-to-use detector

The detector is a magnetic phase-differential torque detector, which eliminates the need to perform a calibration operation each time you use it. All you have to do is align the motor with the guide rails and then mount it using the L-shaped mounting fixture. A two-channel detector slot is provided as standard. If additional channels are required, the number of channels can be increased to a maximum of four, without any need to change the wiring.

3 Automatic measurement

Automatic measurement is enabled just by clicking the start button in your measurement application. The torque and angle characteristics are displayed in a graph format. Auto data save and auto graph printing functions are also provided.

4 High-accuracy measurement

Torque : $\pm 0.5\%$ of the detector's full scale
 Angle : $\pm 0.01^\circ$

5 Data output that is easy to use with Excel and Word applications

Graphs can be output using the Clipboard function, and numeric data output directly to an Excel worksheet.

6 Various types of stepping motors supported

The torque detector can be selected from a wide line-up of models ranging from 0.01 N-m to 20 N-m. The PV-7700 system can be used with various motor drivers owing to the versatility of the high pulse output.

Configuration / Block Diagram

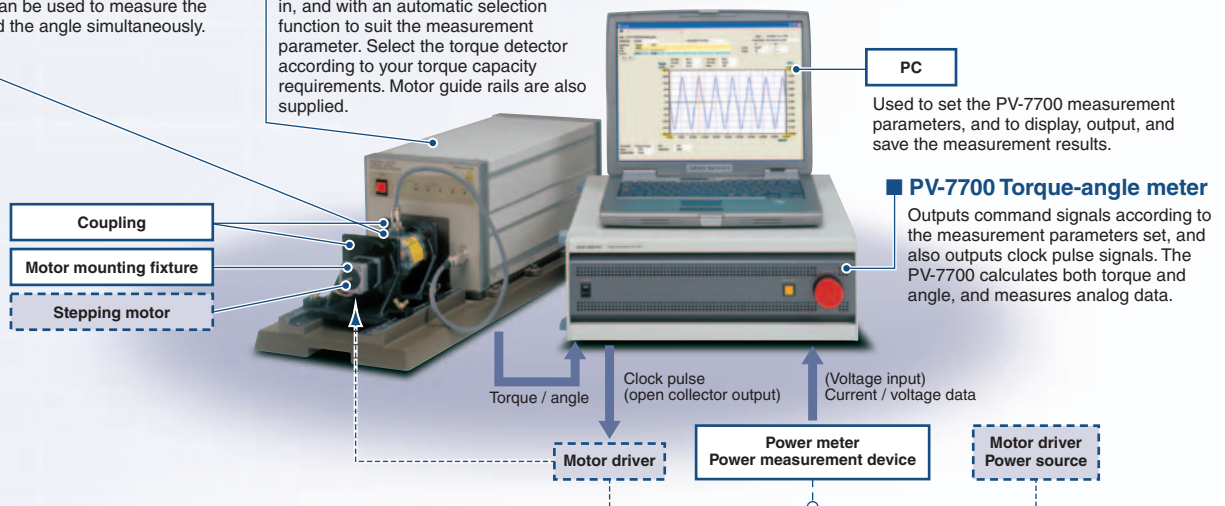
Options Supplied by customer

RK Series Angle Detectors

When a single-shaft motor is positioned as shown in the figure, a dual-shaft detector can be used to measure the torque and the angle simultaneously.

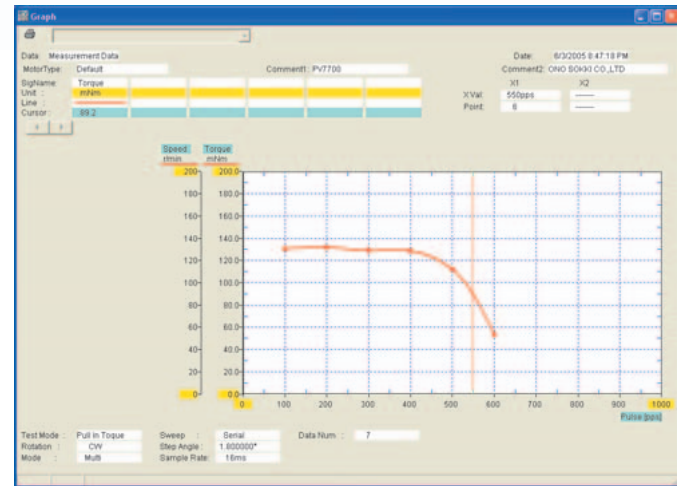
PK Series Torque Detectors

The PK Series torque detectors come with a brake, clutch and drive motor built in, and with an automatic selection function to suit the measurement parameter. Select the torque detector according to your torque capacity requirements. Motor guide rails are also supplied.



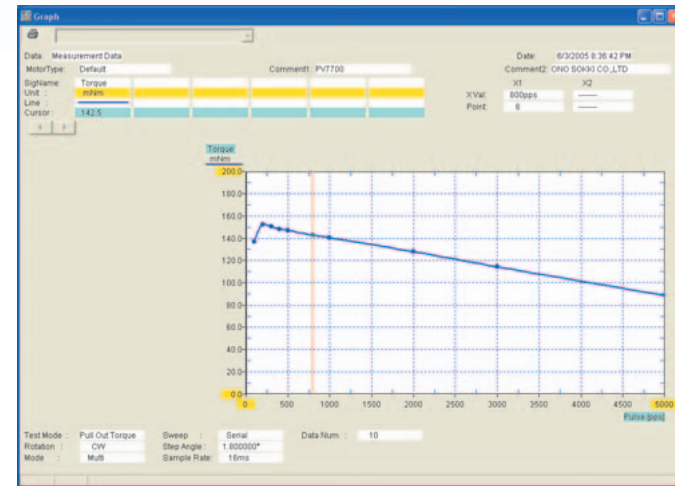
An Introduction to the Measurement Functions (Data Display Examples)

An angle detector is required for Examples ③ through ⑦.



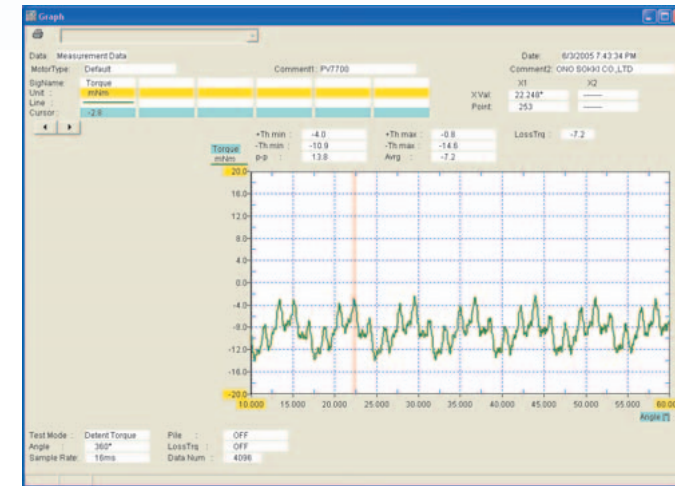
① Pull-in Torque

Up to 50 measurement points can be set, while the output clock setting can range from 1 pps to 800 kpps. This function measures the synchronous rotating torque at the frequency set for each of the points while automatically reducing the braking force. The measured results are displayed as a curve using spline interpolation between the data points on the graph. The pull-in torque curve can be displayed on the same screen as the pull-out torque curve.



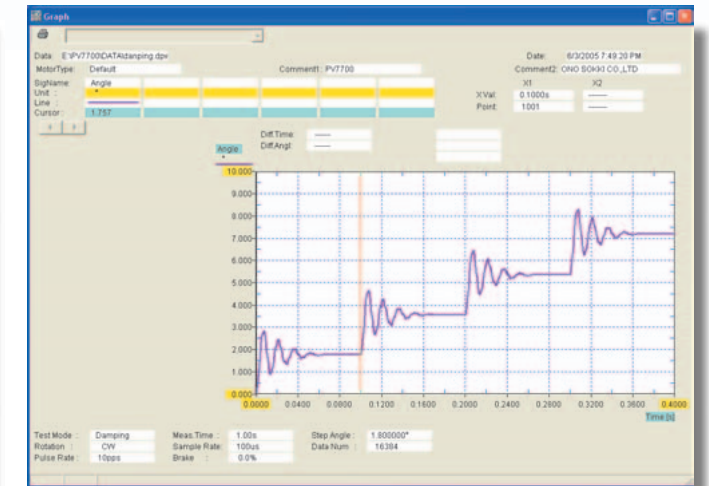
② Pull-out Torque

This function measures the synchronous pull-out torque at each of the measurement frequencies while automatically increasing the braking force. The number of measurement points and the output clock setting range are the same as those for the pull-in torque. An acceleration (slow-up) setting for the output clock can also be made. The measured results are displayed as a curve using spline interpolation between the data points on the graph.



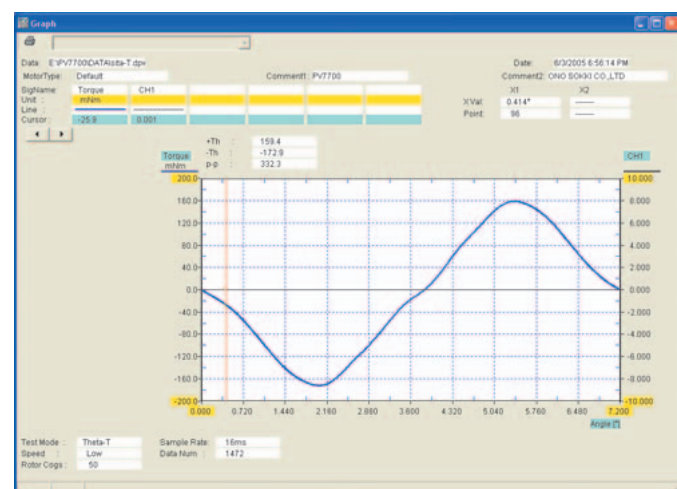
⑤ Detent Torque (Holding Torque without Excitation)

This function measures the angle and torque over one complete rotation (360°) while the motor is not excited. The PK detector measures the torque while rotating the shaft at a slow rotation rate of approx. 1 r/min. The maximum and minimum values of both the peaks and the valleys are displayed.



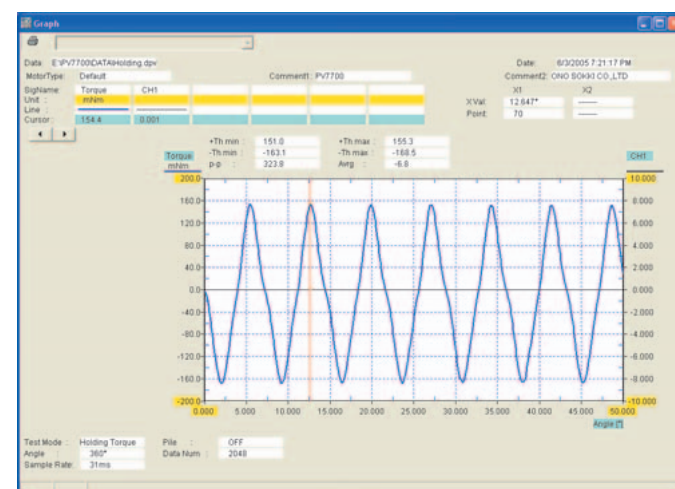
⑥ Damping Characteristic (Step-response Characteristic)

This function measures transient response characteristics using an angle detector. The sampling rate can be set anywhere in the range from 10 μs to 1 ms, and the number of samples up to 16384 (depends on the sampling rate used). Cursor operations can also be used to display the angle difference and the time difference between any two points. A PK Series detector can also be connected and used to apply the desired load.



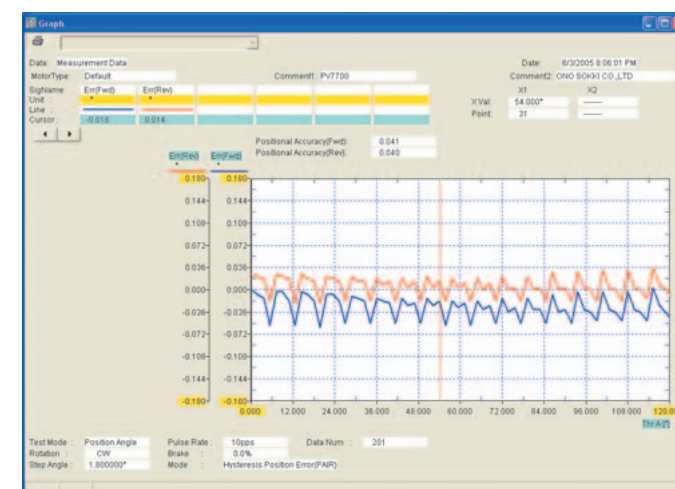
③ θ-T Characteristic (Angle vs. Torque Characteristic)

This function measures the angle and torque for the specified range. Measurement is performed on an excited motor without pulse input. The PK detector measures the angle vs. torque characteristic while rotating the shaft at an extremely slow rotation rate of approximately 0.06 r/min. The display can also be changed so that the stable point is at the center.



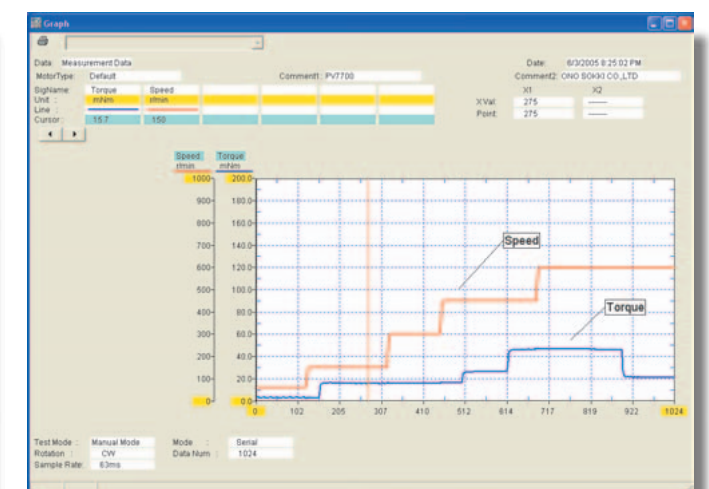
④ Holding Torque (Maximum Static Torque during Excitation)

This function measures angle and torque over one complete rotation (360°) while the motor is excited. The PK detector measures the torque while rotating the shaft at a slow rotation rate of approx. 1 r/min. The maximum and minimum values of both the peaks and the valleys are displayed.



⑦ Angular Accuracy

This function enables the measurement of stationary angle error, step angle error, and hysteresis error. Each error value is automatically calculated and displayed. High-speed measurement at a feed speed of 1 to 50 pps is enabled. If an RK Series detector is used, highly accurate measurement ($\pm 0.01^\circ$) can be performed.



⑧ Manual Mode

This mode enables continuous operation and measurement according to the output clock and load specified using the PK detector key input functions. Any of the input values can be changed during operation. The sampling rate can be set anywhere in the range from 4 ms to 1 s, and the number of samples up to 1024.

STEPPING MOTOR STATION Pro PV-7700 system

PV-7700 System Main Specifications

Specifications

● PV-7700 Torque-Angle Meter

Measurement parameters	Torque, angle, analog input signals		PK detector interface	Two channels (two further channels can be added as an option.)								
Measurement accuracy	Torque : $\pm 0.5\%$ of full scale (1-s average value)	Angle : $\pm 0.01^\circ$ (when an RK Series angle detector is used)	Computer (for connecting to the PV-7700)	Sold separately OS (operating system) : Windows XP Professional Edition Interface required : USB (2.0) x 1, CD-ROM drive Recommended specifications : Pentium 4 CPU or higher; at least 512 MB memory								
Sampling time	4 ms to 1 s (10 μ s to 1 ms when Damping measurement is performed)		Operating temperature range	0 to +40°C								
Measurement functions	1. Pull-in torque 2. Pull-out torque 3. θ (theta)-T characteristic 4. Holding torque 5. Detent torque 6. Damping characteristic 7. Angular accuracy		Power supply	100 to 240 VAC $\pm 10\%$, 50/60 Hz								
Torque signal input section	Output signal from a phase-differential detector		Power consumption	70 VA or less (at 100 VAC)								
Angle signal input section	<table border="1"> <tr> <td>Angle</td> <td>RK Series detector signal</td> </tr> <tr> <td>Input impedance</td> <td>Approx. 10 Ω</td> </tr> <tr> <td>Input frequency range</td> <td>0 to 250 kHz</td> </tr> <tr> <td>Input signal amplitude range</td> <td>Approx. 11 μAp-p</td> </tr> </table>		Angle	RK Series detector signal	Input impedance	Approx. 10 Ω	Input frequency range	0 to 250 kHz	Input signal amplitude range	Approx. 11 μ Ap-p	Outer dimensions	420(W) x 149(H) x 450(D) mm excluding protrusions
Angle	RK Series detector signal											
Input impedance	Approx. 10 Ω											
Input frequency range	0 to 250 kHz											
Input signal amplitude range	Approx. 11 μ Ap-p											
Analog signal input section	± 10 VDC, 4 channels, 16-bit A/D converter		Weight	Approx. 10 kg								
Motor driver interface	Output configuration : Open collector (24 VDC, within 32 mA) Output signal : Rotational direction signal, clock pulse Excitation on/off command signal Power supply output for the interface (switched between 5 V and 12 V) Clock frequency : 1 Hz to 800 kHz		Accessories	Power cable, USB cable, connector for motor driver signal output, PV-7700 application software								

● PK Series Torque Detectors

Model name	Detector capacity	Moment of inertia	Brake power	Detector shaft diameter
PK-102A	10 mN·m	10 gcm ²	13 W	3 mm
PK-202A	20 mN·m	10 gcm ²	13 W	3 mm
PK-502A	50 mN·m	14 gcm ²	13 W	5 mm
PK-103A	100 mN·m	27 gcm ²	25 W	5 mm
PK-203A	200 mN·m	27 gcm ²	25 W	5 mm
PK-503A	500 mN·m	147 gcm ²	35 W	8 mm
PK-104A	1 N·m	147 gcm ²	35 W	8 mm
PK-204A	2 N·m	546 gcm ²	50 W	8 mm
PK-504A	5 N·m	1.7 kgcm ²	60 W	14 mm
PK-105A	10 N·m	6.6 kgcm ²	120 W	14 mm
PK-205A	20 N·m	6.6 kgcm ²	120 W	14 mm

* When the θ -T characteristic, holding torque, or detent torque is measured, the relationship between the step angle of the motor under test and the rigidity of the torque detector may prevent accurate measurement even when the torque is within the rated value.

● RK Series Angle Detectors

Model name	RK-820	RK-830
Detection method	Optical phase-differential system	Optical phase-differential system
Shaft configuration	Dual shaft	Dual shaft
Diameter of detector shaft	5 mm for both ends	12 mm for the motor side 8 mm for the PK detector side
Moment of inertia	17 gcm ²	29 gcm ²
Allowable torque range*	50 mN·m or less	500 mN·m or less

* This is the allowable range when an angle detector is used between the torque detector and the motor.

* When the θ -T characteristic, holding torque, or detent torque is measured, the friction torque measurement value of the angle detector is added.

Angle detection accuracy	: $\pm 0.01^\circ$
Angular resolution	: 5000 P/R; multiplied to 100,000 P/R within the PV-7700
Operating temperature range	: 0 to +40°C
Power supply	: Supplied from the PV-7700
Accessories	: L-shaped mounting fixture, signal cable Note : Couplings are not supplied

Rpm measurement range	: 0 to 3000 r/min 0 to 2000 r/min (PK-504A, 105A, 205A)
Torque detection method	: Magnetic phase-differential system
Torque measurement accuracy	: $\pm 0.5\%$ of full scale
Internal drive speed	: 0.06 r/min or 1 r/min, selectable
Braking	: Powder brake system
Operating temperature range	: 0 to +40°C
Power supply	: 100 to 240 VAC $\pm 10\%$, 50/60 Hz
Power consumption, outer dimensions, weight	: These specifications differ for each model.
Accessories	: Power cable, signal cable

● Options Sold Separately

● PV-0771 Torque analog output

This option is built into the PV-7700.
Output format: Voltage, 0 to ± 10 V
Response characteristic: 16 ms to 1 s

● PV-0772 Additional detector interface

This option is built into the PV-7700.
Two channels are added to the detector's connector.

● L-shaped fixture for mounting the motor

Please specify the machined hole dimensions required for mounting the motor.

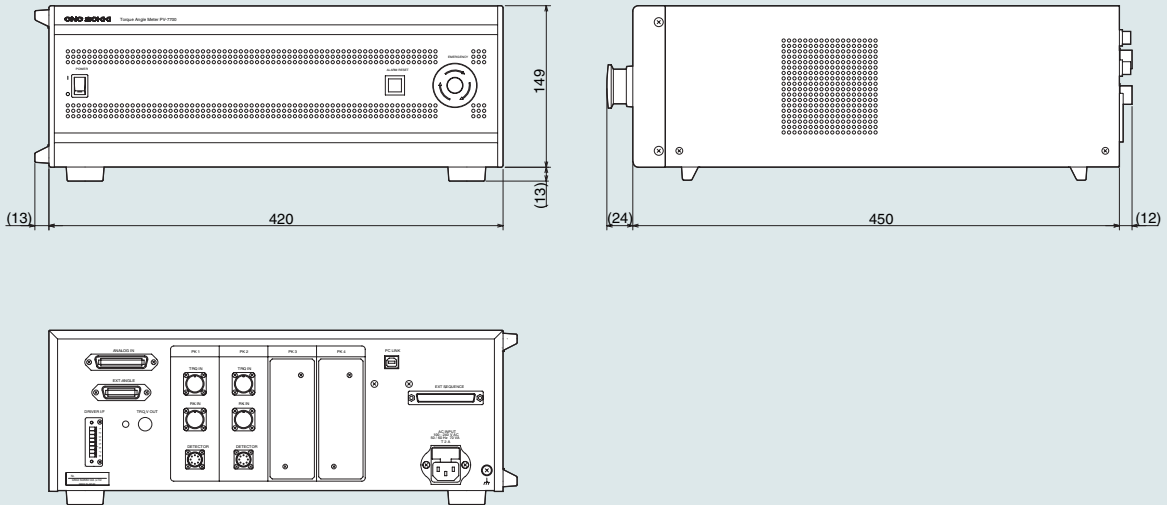
● Couplings

Couplings are used to connect the motor, angle detector, and torque detector. Please specify the required hole diameters.

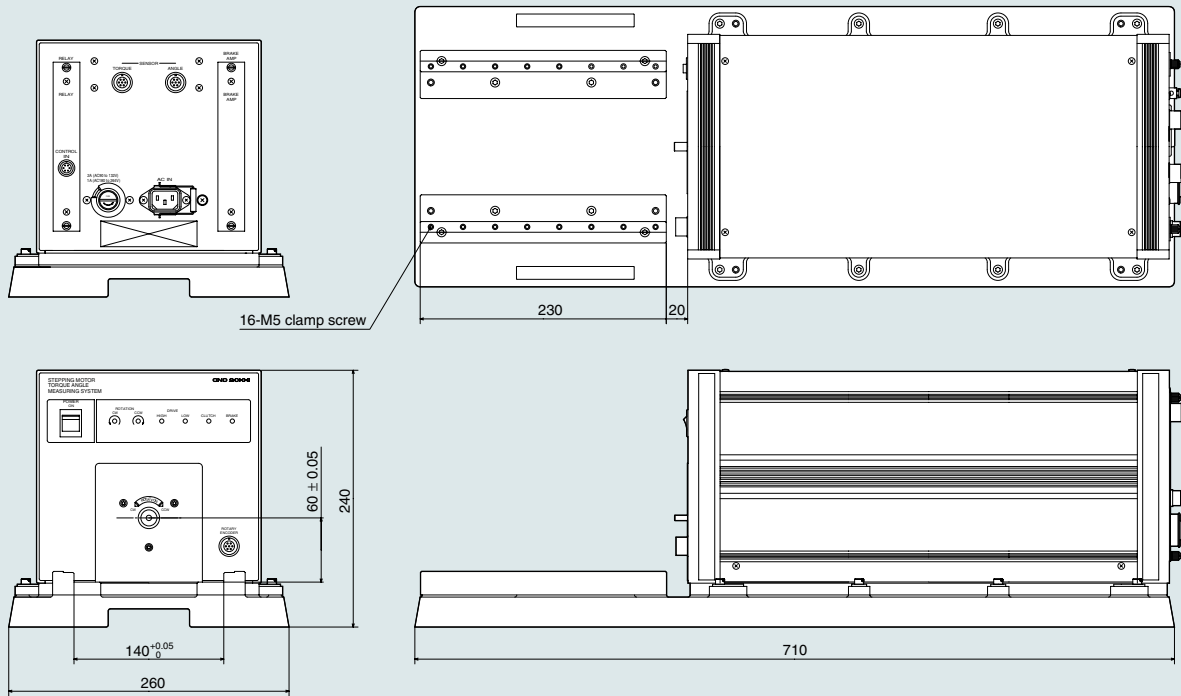
● Belt-transmission angle detector mechanism

This mechanism is designed to be used with an RK Series angle detector when the torque capacity exceeds 500 mN·m. The angle detector itself is not provided with the mechanism.

• PV-7700



• PK Series (the dimensions are different for the PK-504A, 105A, and 205A models)



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ONO SOKKI

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