

# Single Axis Actuator

## Single Axis Actuator SX Stroke / Load Ratings / Allowable Moment

Stroke			(mm)														
Type	Lubrication Unit MX/Equipped	Block	Base Overall Length L (mm)														
			75	80	100	125	150	175	200	250	300	350 (340)*	400 (390)*	450 (440)*	500 (490)*	550 (540)*	600 (590)*
SX15 PA-019	-	Long 1 pc.	26.9	-	51.9	76.9	101.9	126.9	151.9	-	-	-	-	-	-	-	-
	MX	Long 1 pc.	-	-	43.9	68.9	93.9	118.9	143.9	-	-	-	-	-	-	-	-
SX20 PA-021	-	Long 1 pc.	-	16.5	36.5	-	86.5	-	136.5	186.5	236.5	-	-	-	-	-	-
	MX	Long 1 pc.	-	-	-	-	76.5	-	126.5	176.5	226.5	-	-	-	-	-	-
SX26 PA-025	-	Long 2 pc.	-	-	-	-	-	-	79.5	129.5	179.5	-	-	-	-	-	-
	MX	Long 1 pc.	-	-	17	-	67	-	117	167	217	267	317	-	-	-	-
SX30 PA-029	-	Long 1 pc.	-	-	-	29	54	-	104	154	204	254	304	354	404	454	504
	MX	Long 1 pc.	-	-	-	54.5	79.5	-	129.5	179.5	229.5	279.5	329.5	379.5	429.5	479.5	529.5
SX45 PA-033	-	Long 1 pc.	-	-	-	-	-	-	90	140	190	240	290	340	390	440	490
	MX	Long 1 pc.	-	-	-	-	65.5	-	115.5	165.5	215.5	265.5	315.5	365.5	415.5	465.5	515.5
SX45 PA-033	-	Long 2 pc.	-	-	-	-	-	-	-	116	166	216	266	316	366	416	466
	MX	Long 1 pc.	-	-	-	-	17	-	67	117	167	217	267	317	367	417	467
SX45 PA-033	-	Short 1 pc.	-	-	-	-	-	-	-	-	-	210.4	260.4	310.4	360.4	410.4	460.4
	MX	Long 1 pc.	-	-	-	-	-	-	-	-	-	247.9	297.9	347.9	397.9	447.9	497.9
SX45 PA-033	-	Short 2 pc.	-	-	-	-	-	-	-	-	-	194.4	244.4	294.4	344.4	394.4	444.4
	MX	Long 1 pc.	-	-	-	-	-	-	-	-	-	231.9	281.9	331.9	381.9	431.9	481.9
SX45 PA-033	-	Long 2 pc.	-	-	-	-	-	-	-	-	-	88.8	138.8	188.8	238.8	288.8	338.8
	MX	Short 2 pc.	-	-	-	-	-	-	-	-	-	163.8	213.8	263.8	313.8	363.8	413.8

\*Effective stroke is indicated in dimensions with a margin of 2.5 mm each from the ends.  
\*Value in ( ) is the stroke for SX45.

Type	Block	Rail			Ball Screw						Bearing (fixed side)/Axial Direction	
		Basic Dynamic Load Rating Ca (N)	Basic Static Load Rating Co (N)	Radial Clearance (μm)	Basic Dynamic Load Rating Ca (N)	Basic Static Load Rating Co (N)	Shaft Dia. (mm)	Lead (mm)	Root Dia. (mm)	Ball Center Dia. (mm)	Basic Dynamic Load Rating Ca (N)	Allowable Static Load Poa (N)
SX1502	Long	2072	3701	-3~0	208	265	5	2	4.534	5.15	678	415
SX2001	Long	3277	6199	-3~0	482	642	6	1	5.3	6.15	730	461
SX2005					822	1026		5	4.918	6.3		
SX2602	Long	6522	11871	-4~0	1712	2251	8	2	6.4	8.3	1637	1205
SX2605					1600	2097		5	6.46	8.3		
SX2610					782	961		10	6.46	8.3		
SX3005	Long	9732	17218	-4~0	1831	2389	10	5	8.2	10.3	2702	2197
SX3010					1129	1386		10	8.2	10.3		
SX3005	Short	6305	9271	-4~0	1831	2389	10	5	8.2	10.3	2702	2197
SX3010					1129	1386		10	8.2	10.3		
SX4510	Long	18450	32441	-6~0	4167	5945	15	10	11.7	15.5	4355	4106
SX4520					2499	3381		20	11.7	15.5		
SX4510	Short	11826	17175	-6~0	4167	5945	15	10	11.7	15.5	4355	4106
SX4520					2499	3381		20	11.7	15.5		

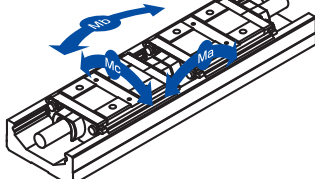
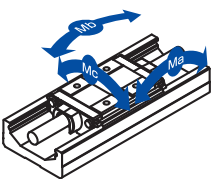
\*Rail load ratings are indicated per block.

### Allowable Moment

Moment loads can be applied in all three directions.

Single Block

Double Block



Ma : Pitch Moment

Mb : Yaw Moment

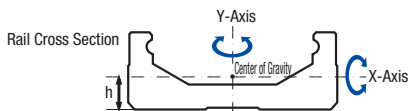
Mc : Roll Moment

Type	Block Qty.	Block type	Allowable Static Moment (N·m)		
			Ma	Mb	Mc
SX15	1	Long	13	13	41
	2		27	27	93
SX20	1	Long	353	353	186
	2		70	70	225
SX26	1	Long	902	902	450
	2		126	126	387
SX30	1	Long	1515	1515	774
	2		63	63	208
SX30	1	Short	579	579	417
	2		291	291	972
SX45	1	Long	3945	3945	1944
	2		145	145	515
SX45	1	Short	1444	1444	1029
	2				

\*Double Block Type values are those when two blocks contact with each other.  
The table above lists reference values in static state.  
For actual life calculations, please use our Technical Calculation Software.

### Rail Rigidity

Rails with Lower Center of Gravity and High Rigidity



Type	Cross Sectional Moment of Inertia (mm <sup>4</sup> )		Center of Gravity (mm)	Mass (kg/100mm)
	Ix	Iy	h	W
SX15	1.0×10 <sup>3</sup>	1.7×10 <sup>4</sup>	3.4	0.13
SX20	3.2×10 <sup>3</sup>	5.2×10 <sup>4</sup>	4.4	0.22
SX26	1.0×10 <sup>4</sup>	1.4×10 <sup>5</sup>	6.1	0.37
SX30	2.5×10 <sup>4</sup>	3.1×10 <sup>5</sup>	7.8	0.60
SX45	8.8×10 <sup>4</sup>	10.4×10 <sup>5</sup>	11.0	1.10

Ix: Cross Sectional Moment of Inertia around X-axis / Iy: Cross Sectional Moment of Inertia around Y-axis

### Material

Components	Base (Rail)		Block	Motor Bracket	Support Side Bearing with Housing	Cover	Stopper	Precision Ball Screw (Ground)
	SX15	SX20/26/30/45						
<b>M</b> Material	Stainless Steel	Carbon Steel	SCM Material	ADC12	5052 Aluminum Alloy	6063 Aluminum Alloy	NBR Nitrile Rubber	SCM415 Alloy Steel (JIS)
<b>S</b> Surface Treatment	Low Temperature Black Chrome Plating		Low Temperature Black Chrome Plating	Black Baked Paint Finish	Black Anodize	Black Anodize	-	-
<b>H</b> Hardness	-	Induction Hardened HRC58~64	HRC58~62	-	-	-	-	HRC58~62

# Single Axis Actuator SX Total Mass / Moment of Inertia

## Total Mass

(kg)

Type	Block	Base Overall Length L (mm)														
		75	80	100	125	150	175	200	250	300	350 (340)*	400 (390)*	450 (440)*	500 (490)*	550 (540)*	600 (590)*
SX15	Long 1 pc.	0.13	-	0.17	0.22	0.29	0.35	0.38	-	-	-	-	-	-	-	-
SX15C	Long 1 pc.	0.18	-	0.22	0.28	0.35	0.41	0.45	-	-	-	-	-	-	-	
SX20	Long 1 pc./2pcs.	-	0.40	0.45	-	0.58	-	0.70/0.79	0.83/0.92	0.96/1.05	-	-	-	-	-	
SX20C	Long 1 pc./2pcs.	-	0.51	0.56	-	0.69	-	0.81/0.97	0.94/1.10	1.07/1.23	-	-	-	-	-	
SX26	Long 1 pc./2pcs.	-	-	0.87	-	0.95	-	1.16	1.37/1.57	1.58/1.78	1.79/1.99	2.00/2.20	-	-	-	
SX26C	Long 1 pc./2pcs.	-	-	1.07	-	1.15	-	1.36	1.57/1.89	1.78/2.10	1.99/2.31	2.20/2.52	-	-	-	
SX30	Long 1 pc./2pcs.	-	-	-	1.30	1.47	-	1.81	2.14	2.48/2.79	2.81/3.12	3.15/3.46	3.49/3.79	3.82/4.13	4.16/4.47	4.49/4.80
	Short 1 pc./2pcs.	-	-	-	1.18	1.35/1.53	-	1.68/1.86	2.02/2.20	2.35/2.53	2.69/2.87	3.02/3.21	3.36/3.54	3.70/3.88	4.03/4.21	4.37/4.55
SX30C	Long 1 pc./2pcs.	-	-	-	1.75	1.92	-	2.25	2.59	2.92/3.49	3.26/3.83	3.60/4.16	3.93/4.50	4.27/4.83	4.60/5.17	4.94/5.51
	Short 1 pc./2pcs.	-	-	-	1.50	1.67/1.98	-	2.00/2.32	2.34/2.66	2.67/2.99	3.01/3.33	3.35/3.66	3.68/4.00	4.02/4.33	4.35/4.67	4.69/5.01
SX45	Long 1 pc./2pcs.	-	-	-	-	-	-	-	-	-	5.77/6.69	6.37/7.29	6.97/7.90	7.57/8.50	8.18/9.10	8.78/9.70
	Short 1 pc./2pcs.	-	-	-	-	-	-	-	-	-	5.37/5.91	5.98/6.51	6.58/7.11	7.18/7.71	7.78/8.31	8.39/8.92
SX45C	Long 1 pc./2pcs.	-	-	-	-	-	-	-	-	-	6.59/8.09	7.23/8.73	7.86/9.36	8.49/9.99	9.13/10.63	9.76/11.26
	Short 1 pc./2pcs.	-	-	-	-	-	-	-	-	-	5.94/6.78	6.57/7.41	7.20/8.04	7.84/8.68	8.47/9.31	9.10/9.94

\*Value in ( ) is the stroke for SX45.

## Additional Mass of Lubrication Unit MX-equipped Type

Type	Additional Mass (kg)
SX15(C)	0.002
SX20(C)	0.004
SX26(C)	0.007
SX30(C)	0.011
SX45(C)	0.024

## Moment of Inertia

(10<sup>-4</sup>kg · cm<sup>2</sup>)

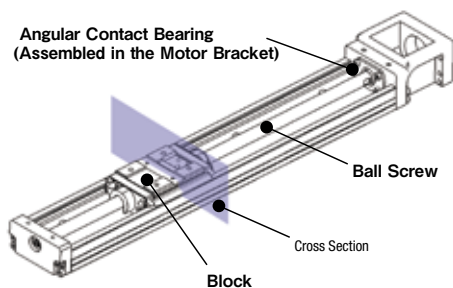
Type	W/ or w/o Lead & Cover	Block	Base Overall Length L (mm)															
			75	80	100	125	150	175	200	250	300	350 (340)*	400 (390)*	450 (440)*	500 (490)*	550 (540)*	600 (590)*	
SX15	02/02C	Long 1 pc.	23/23	-	24/24	25/25	26/26	27/27	28/28	-	-	-	-	-	-	-		
	01/01C	Long 1 pc.	-	47/47	49/49	-	53/53	-	58/58	-	-	-	-	-	-	-		
SX20	01/01C	Long 2 pc.	-	-	-	-	-	-	58/58	-	-	-	-	-	-	-		
	05/05C	Long 1 pc.	-	-	54/59	-	59/63	-	63/68	68/73	73/77	-	-	-	-	-		
SX26	02/02C	Long 1 pc.	-	-	140/141	-	155/156	-	169/170	184/185	198/199	-	-	-	-	-		
	05/05C	Long 1 pc.	-	-	-	-	166/173	-	180/188	194/202	209/216	223/231	238/245	-	-	-		
SX30	05/05C	Long 2 pc.	-	-	-	-	-	-	207/222	222/237	236/251	251/266	-	-	-	-		
	10/10C	Long 1 pc.	-	-	-	-	204/234	-	219/249	233/263	248/278	262/292	277/307	-	-	-		
SX30	05/05C	Long 1 pc.	-	-	-	436/452	454/471	-	491/507	528/544	565/581	602/618	638/655	675/692	712/729	749/765	786/802	
	05/05C	Long 2 pc.	-	-	-	-	-	-	-	584/617	621/654	658/691	695/728	732/764	768/801	805/838		
SX30	05/05C	Short 1 pc.	-	-	-	428/436	446/455	-	483/492	520/528	557/565	594/602	630/639	667/676	704/713	741/750	778/787	
	05/05C	Short 2 pc.	-	-	-	-	474/475	-	494/512	531/548	568/585	605/622	642/659	679/696	716/733	753/770	789/807	
SX30	10/10C	Long 1 pc.	-	-	-	-	513/579	-	550/616	587/653	624/690	661/727	698/764	735/800	772/837	808/874	845/911	
	10/10C	Long 2 pc.	-	-	-	-	-	-	702/833	739/870	776/907	812/944	849/981	886/1018	923/1054			
SX30	10/10C	Short 1 pc.	-	-	-	-	482/516	-	518/553	555/590	592/626	629/663	666/700	703/737	740/774	777/811	813/848	
	10/10C	Short 2 pc.	-	-	-	-	591/596	-	564/633	601/670	638/707	675/743	712/780	749/817	785/854	822/891	859/928	
SX45	10/10C	Long 1 pc.	-	-	-	-	-	-	2528/2674	2723/2869	2918/3064	3113/3259	3308/3454	3503/3649				
	10/10C	Long 2 pc.	-	-	-	-	-	-	-	-	-	2762/3053	2957/3249	3152/3444	3347/3639	3543/3834	3738/4029	
SX45	10/10C	Short 1 pc.	-	-	-	-	-	-	-	-	-	2429/2507	2624/2702	2820/2897	3015/3092	3210/3287	3405/3482	
	10/10C	Short 2 pc.	-	-	-	-	-	-	-	-	-	2565/2720	2760/2915	2955/3110	3150/3305	3345/3500	3540/3695	
SX45	20/20C	Long 1 pc.	-	-	-	-	-	-	-	-	-	-	3242/3825	3437/4020	3632/4215	3827/4410	4022/4605	4217/4800
	20/20C	Long 2 pc.	-	-	-	-	-	-	-	-	-	-	4179/5344	4374/5539	4569/5734	4764/5929	4959/6124	5154/6319
SX45	20/20C	Short 1 pc.	-	-	-	-	-	-	-	-	-	-	2847/3157	3042/3352	3237/3547	3432/3742	3627/3937	3823/4132
	20/20C	Short 2 pc.	-	-	-	-	-	-	-	-	-	-	3389/4008	3584/4203	3779/4399	3974/4594	4169/4789	4364/4984

\*Value in ( ) is the stroke for SX45.

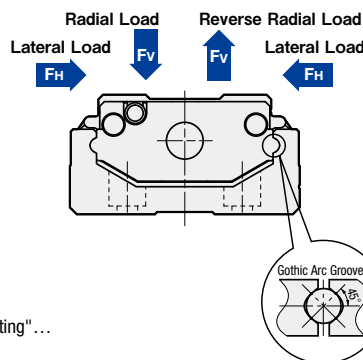
## Load Directions

The Rails employ Double Row Gothic Arch Grooves, and are compact and low-profile.

Outline View



Enlarged Double Row Gothic Arc Grooves Sectional View



- Rail
- Equal basic load rating in all four directions: radial, reverse radial and lateral directions... For values, see "Load Rating"...
- Ball Screw
- Preload is applied to precision ground ball screw... Integrating structure of the block and ball screw nut allows axial loads to be applied...
- For Basic Load Rating in axial directions, see "Load Rating"...
- Bearing (Fixed Side)
- Angular bearings are integrated in the motor bracket, allowing loads in the axial direction to be applied... For Basic Load Rating in axial directions, see "Load Rating"...

## Single Axis Actuator SX Maximum Travel Speed / Accuracy Standards

### Maximum Travel Speed

■ Max. Velocity (mm/sec)

Type	Lead (mm)	Base Overall Length L (mm)															
		75	80	100	125	150	175	200	250	300	350	400	450	500	550	600	
SX15	2	330	-	330	330	330	330	330	-	-	-	-	-	-	-		
	5	-	-	694	-	694	-	694	694	633	-	-	-	-	-		
SX20	1	-	190	190	-	190	-	190	-	-	-	-	-	-	-		
	5	-	-	694	-	694	-	694	694	633	-	-	-	-	-		
SX26	2	-	-	290	-	290	-	290	290	290	-	-	-	-	-		
	5	-	-	-	-	521	-	521	521	521	521	446	-	-	-		
SX30	5	-	-	-	-	1040	-	1040	1040	1040	1040	890	-	-	-		
	10	-	-	-	-	830	-	830	830	830	830	830	830	830	740	600	500
SX45	10	550	550	550	550	550	550	550	550	550	550	550	550	550	550	550	550
	20	1110	1110	1110	1110	1110	1110	1110	1110	1110	1110	1110	1110	1110	1110	1110	1110

\*Values in the table are calculated on basis of critical speed and DN value of ball screws.  
Note that these are not guaranteed data considering motor rotational speed, operating conditions, etc.

### Application Example of SX

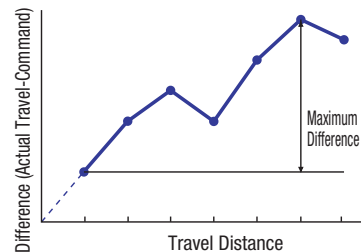
■ Accuracy Standards Table

Accuracy Standard Items	SX15		SX20		SX26		SX30 (L≤400)		SX30 (L≥450)		SX45	
	High Grade	Precision Grade	High Grade	Precision Grade	High Grade	Precision Grade	High Grade	Precision Grade	High Grade	Precision Grade	High Grade	Precision Grade
Positioning (mm)	0.04	0.02	0.06	0.02	0.06	0.02	0.06	0.02	0.1	0.025	0.1	0.025
Positioning Repeatability (mm)	±0.004	±0.003	±0.005	±0.003	±0.005	±0.003	±0.005	±0.003	±0.005	±0.003	±0.005	±0.003
Backlash (mm)	0.01	0.002	0.01	0.003	0.01	0.003	0.02	0.003	0.02	0.003	0.02	0.003
Parallelism (mm)	0.02	0.01	0.025	0.01	0.025	0.01	0.025	0.01	0.035	0.015	0.035	0.015
Starting Torque (N·cm)	0.8		1.2		2		4		4		10	

### Accuracy Standards

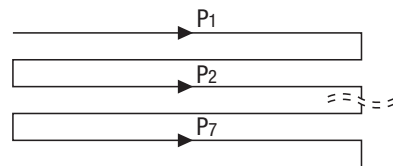
#### · Positioning Accuracy

Positioning is performed from a reference position incrementally in one direction and measured.  
Measurement values are the maximum difference between actual travel distance and commanded distance.  
See Accuracy Standards Table for design values.



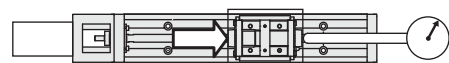
#### · Positioning Repeatability

Repeat positioning and measurement seven times at the same point in a specified direction.  
1/2 of the maximum difference with "±" in front is defined as the measurement value.  
See Accuracy Standards Table for design values.



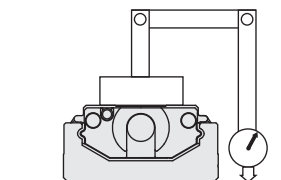
#### · Backlash

Loads are applied to the block from the reference position and then released.  
The difference between the reference position and returned value is the measurement value.  
See Accuracy Standards Table for design values.



#### · Running Parallelism

A dial indicator is set on the block to the reference surface.  
Measurements are taken while travelling along with the rail mounted on the reference surface.  
The maximum difference taken by the measurement is the measurement value.  
See Accuracy Standards Table for design values.



# Notes for Using Single Axis Actuator SX / Low Particle Generation Grease Specifications

## Maintenance

- Routine Inspections:**  
 Perform the inspection once per 3 to 6 months.  
 Check for proper lubrication conditions, clean-up and grease refill.  
 Check on mounting screws for looseness.
- Lubrication:**  
 The recommended lubricants are shown as below.  
 SX15, SX20, SX26 Series → Showa Shell Sekiyu-made Alvania Grease S No.2  
 SX30, SX45 Series → Showa Shell Sekiyu-made Alvania Grease EP2  
 Low Particle Grease Type → NSK LG2  
 Recommended greasing cycle is per 6 months or 1,000km under normal operating conditions.  
 \*Lubrication intervals, however, depend on usage conditions and environments.

## Cautions for Operating Environments

Ensure that it is used at an ambient temperature of 50°C or less. It is recommended to provide mechanical stoppers to prevent overrun.

## Allowable Rotational Speed

Size-specific allowable rotational speed is indicated below.

Part Number	Lead	Base Overall Length	Allowable Rotational Speed (min <sup>-1</sup> )
SX15	2	75~200	6000
SX20	1	80~200	6000
	5	100~300	
SX26	2	100~300	6000
	5/10	150~350	6000
		400	5350
SX45	10	340~590	3300
	20	340~590	3330

Part Number	Lead	Base Overall Length	Allowable Rotational Speed (min <sup>-1</sup> )
SX30	5	125~450	4920
		500	4440
		550	3600
	10	600	3000
		150~450	4980
		500	4440
		550	3600
		600	3000

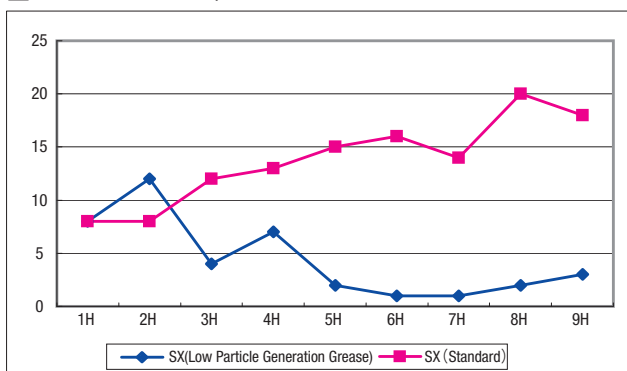
## About Single Axis Actuator SX Low Particle Grease

The products are shipped with low particle grease applied for high cleanliness environments. LG2 (Made by NSK Ltd.) generates less particles and exhibits excellent corrosion resistance. For part number selections, please see each product page.

## Low Particle Grease Performance Table

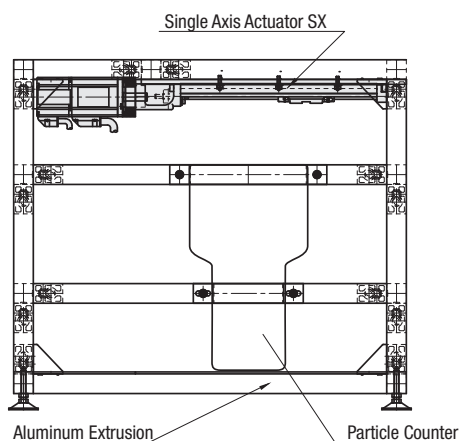
Item	Conditions	Unit	Measurement Method	LG2 (Made by NSK Ltd.)	
Grease Performance	Thickener	-	-	Lithium Type	
	Base Oil	-	-	Mineral Oil + Synthetic Hydrocarbon Oil	
	Base Oil Kinetic Viscosity	40°C	mm <sup>2</sup> /s	JIS K2220 5.19	30
	Worked Penetration	-	-	JIS K2220 5.3	207
	Dropping Point	-	°C	JIS K2220 5.4	200
	Evaporation	99°C×22hr	wt%	-	1.40%
	Oil Separation	100°C×24hr	wt%	JIS K2220 5.14	0.80%
	Operating Temp.	In Air	°C	-	-10~80

## Particle Generation Comparison



Measuring Time	1H	2H	3H	4H	5H	6H	7H	8H	9H
SX (Low Particle Grease)	8	12	4	7	2	1	1	2	3
SX (Standard)	8	8	12	13	15	16	14	20	18

## Particle Generation Test Evaluation Equipment - Overview



### <Evaluation Conditions>

Clean Room Class 100 (in a clean room)  
 Room Temperature: 24°C±2°C Humidity: 45%±5%  
 (Particle Counter Name)  
 Hand-held Particle Counter KR-12A (Rion Co., Ltd.)  
 Tested Actuator: SX2001-B1-A2040-200  
 Motor Speed: 3000rpm

Clean Room Class 100/ISO Class 5  
 The measurement results meet the conditions above.  
 \*These are not guaranteed values but reference values.  
 Values considerably vary depending on operating environment.