

TRANSERVO
Series

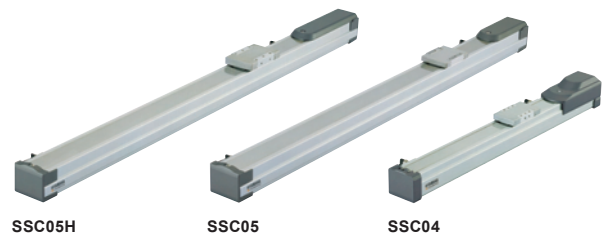
New Concept in Stepping Motor Single-Axis Robots

YAMAHA combined the best features of both stepping and servo motors. What they got was the TRANSERVO! A single-axis stepping motor robot that breaks from tradition and opens up a whole new approach in its field!

Standard type **P.055**



Clean type **P.315**



Robot positioner

<dedicated TRANSERVO>



TS-S

P.354

<for host model>



TS-X



TS-P

P.354

TRANSERVO easy selection table

Type	Size (mm)	Lead (mm)	Maximum payload (kg)		Maximum speed (mm/sec)	Stroke (mm)	Model	Detailed info page
			Horizontal	Vertical				
Standard type / Clean type	W49 × H59	12	2	1	600	50 to 400	Standard type: SS04 Clean type: SSC04	Standard type P.055 Clean type P.315
		6	4	2	300			
		2	6	4	100			
	W55 × H56	20	4	—	1000	50 to 800	Standard type: SS05 Clean type: SSC05	Standard type P.056 Clean type P.316
		12	6	1	600			
		6	10	2	300			
	W55 × H56	20	6	—	1000	50 to 800	Standard type: SS05H Clean type: SSC05H	Standard type P.057 Clean type P.317
		12	8	2	600 (Horizontal) 500 (Vertical)			
		6	12	4	300 (Horizontal) 250 (Vertical)			

This is why the TRANSERVO is terrific!

1 New control method combines the best features of servo and stepping motors!

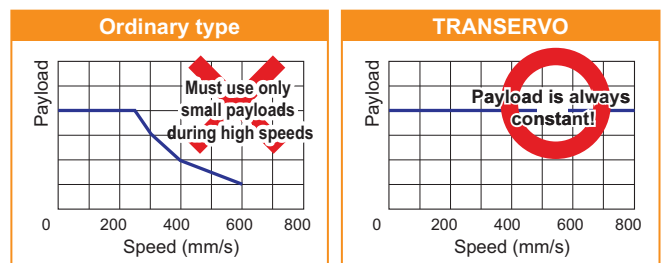
Stepping motors have great features such as a low cost and no tiny vibrations when it stops. Yet they also have drawbacks such as a drastic drop in torque at high speeds and heavy current consumption when it stops.

The TRANSERVO by YAMAHA eliminates all these problems by adopting an innovative vector control method. In effect, the TRANSERVO delivers the same functions and low cost of a servomotor while using a stepping motor.

Stepping motor	Servo Motors
<ul style="list-style-type: none"> • Simple design & low cost • No vibration when it stops 	<ul style="list-style-type: none"> • Smooth movement • Constant torque at all speed range
Combines the best features of both types!	
<ul style="list-style-type: none"> • High-pitched operating noise • Drop in torque at high-speed 	<ul style="list-style-type: none"> • Tiny vibrations when it stops • Cost is high

High-speed operation slashes production time!

The Transervo has a fixed torque regardless of speed and so can swiftly handle even heavy work payloads. Moreover up to now the upstream model had to be selected based on its high-speed zone but one model can now do it all so selecting the machine model is easy.



Energy saver! Perfect stop!

Control is basically the same as a servomotor so power consumption is kept to a minimum, which saves energy and helps cut down on CO₂ emissions. Also perfect stop can be achieved as the same as with ordinary stepping motors so choose this setting if needed.

2 Environmentally rugged resolver provides closed loop control

Of course "no step-out". The resolver used here for detecting the motor position is the same well-known and reliable resolver as used in our high-level robots. It offers stable position detection even in harsh environments containing dust or oil, etc. Moreover, it boasts a high resolving power of 20480 pulses per rotation.

Resolver

The resolver is a magnetic position detector. Its structure is simple with no electronic component and no optical elements. One great feature compared to ordinary optical encoders is that there are very few points where a failure might occur. Vast quantities of resolvers are used in fields like aviation and the automobile industry where reliability is essential and also because they are **highly tough in harsh environments with a low failure rate.**

3 Ideal 4-line circular-groove 2-point contact guide gives long service life

A newly developed module guide is employed, and a 4-line circular-groove 2-point contact guide, which has been used for high-level models, was built into a body that is just as compact as the previous models. Guide maintains a satisfactory rolling movement with minimal ball differential slip, even if a large momentum load is applied or the installation surface accuracy (flatness) is bad. Rugged design ensures that breakdowns from problems like abnormal wear will seldom occur.

2-line gothic-arch-groove 4-point contact guide

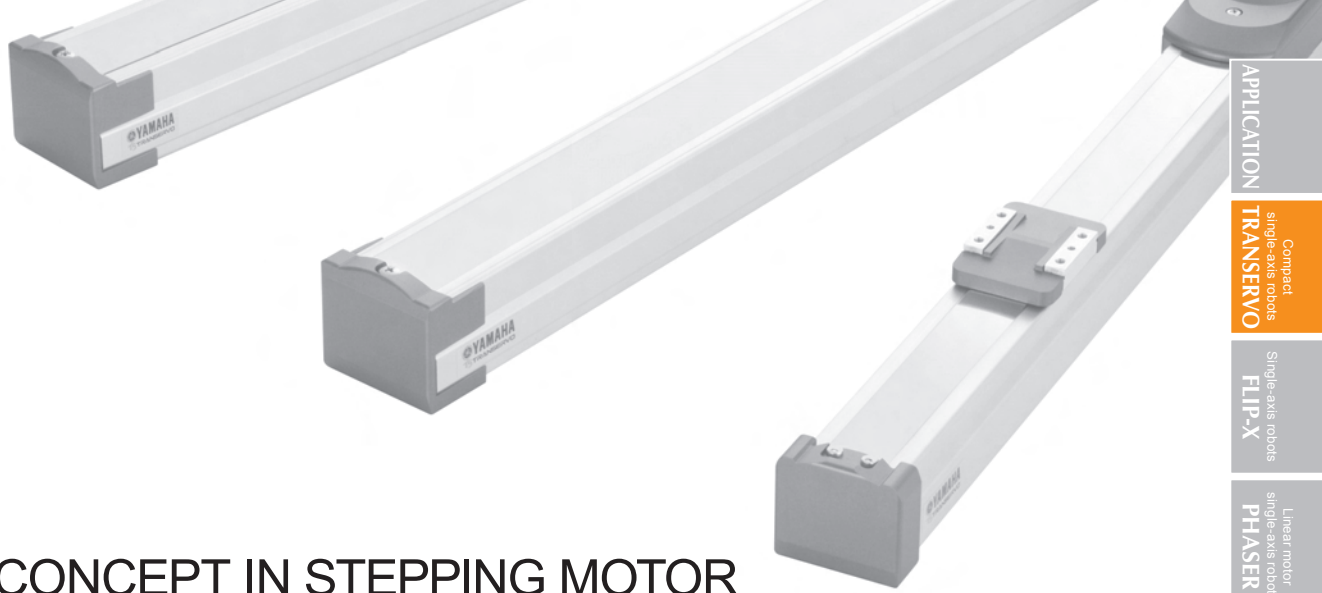
► **Ordinary model**

Large differential slip tends to occur when a large momentum load is applied or installation surface accuracy is poor.

4-line circular-arc-groove 2-point contact guide

► **TRANSERVO**

Utilizes a circular-arc-groove 2-point contact guide. Ball differential slip (spin) is minimal.



NEW CONCEPT IN STEPPING MOTOR
SINGLE-AXIS ROBOTS

TRANSEURO

SERIES

APPLICATION	Compact single-axis robots TRANSEURO
FLIP-X	Single-axis robots
PHASER	Linear motor single-axis robots
XY-X	Cartesian robots
YK-XG	SCARA robots
YP-X	Pick & place robots
CLEAN	
CONTROLLER	
INFORMATION	

CONTENTS

- TRANSEURO SPECIFICATION SHEET 054
- Robot ordering method description 054
- Robot ordering method terminology 054

TRANSEURO

- SS04 055
- SS05 056
- SS05H 057

TRANSERVO SPECIFICATION SHEET

Model	Lead (mm)	Payload (kg)		Stroke (mm) and maximum speed (mm/sec)														Detailed info page	
		Horizontal	Vertical	50	100	150	200	250	300	350	400	450	500	550	600	650	700		750
SS04	12	2	1	600														P.055	
	6	4	2	300															
	2	6	4	100															
SS05	20	4	—	1000														P.056	
	12	6	1	600															
	6	10	2	300															
SS05H	20	6	—	1000														P.057	
	12	8	—	600															
		—	2	500															
	6	12	—	300															
		—	4	250															
				933	833	733	633												
				560	500	440	380												
				280	250	220	190												
				933	833	733	633												
				560	500	440	380												
				280	250	220	190												
				280	250	220	190												

Robot ordering method description

In the order format for the YAMAHA single-axis robots TRANSERVO series, the notation (letters/numbers) for the mechanical section is shown linked to the controller section notation.

[Example]

● Mechanical ▶ SS05

- Lead ▷ 6mm
- Type ▷ Straight
- Brake ▷ Yes
- Origin position ▷ Standard
- Grease ▷ Standard
- Stroke ▷ 600mm
- Cable length ▷ 1m

● Controller ▶ TS-S

- Input /Output selection ▷ NPN

● Ordering Method

SS05-06SB-NN-600-1L-SNP

Mechanical section

Controller section

To find detailed controller information see the controller page. **TS-S ▶ P.354**

① Model	② Lead	③ Type	④ Brake	⑤ Origin position	⑥ Grease option	⑦ Stroke	⑧ Cable length	⑨ Controller	⑩ I/O
SS04	02 2mm	S Straight	B With brake	N Standard	N Standard grease		1L 1m	S TS-S	NP NPN
SS05	06 6mm		N With no brake	Z No-motor side	C Clean room grease		3L 3m		PN PNP
SS05H	12 12mm						5L 5m		CC CC-Link
	20 20mm								DN DeviceNet

Robot ordering method terminology

① Model	Enter the robot unit model.
② Lead	Select the ball screw lead.
③ Type	Show the robot type by the motor installation position. (Only the straight type is supported in 2009.)
④ Brake	Select Brake or No-brake. Horizontal specs: No-brake Vertical specs: With Brake
⑤ Origin position	Origin point position can be changed.
⑥ Grease option	Clean grease can be selected.
⑦ Stroke	Select the stroke for the robot operating range.
⑧ Cable length	Select the robot cable length for connecting the robot to the controller. 1L: 1m (standard) 3L: 3m 5L: 5m 10L: 10m
⑨ Controller	Controllers for Transervos are all TS-S.
⑩ I/O	Select the expansion board and network board for the TS-S controller. NP: NPN PN: PNP CC: CC-Link DN: DeviceNet

SS04

CE compliance

Ordering method

SS04		S						S	
Model	Lead	Type	Brake	Origin position	Grease option	Stroke	Cable length <small>Note 1</small>	Controller	I/O
	12: 12mm 6: 6mm 2: 2mm	S: Straight	B: With brake N: With no brake	N: Standard Z: Non-motor side	N: Standard grease C: Clean room grease	50 to 400 (50mm pitch)	1L: 1m 3L: 3m 5L: 5m 10L: 10m	S: TS-S	NP: NPN PN: PNP CC: CC-Link DN: DeviceNet

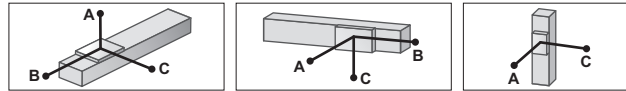
Note 1. The robot cable is flexible and resists bending.

Basic specifications

Motor	42 □ Step motor		
Repeatability <small>Note 1</small> (mm)	+/-0.02		
Deceleration mechanism	Ball screw φ8 (Class C10)		
Maximum motor torque (N·m)	0.27		
Ball screw lead (mm)	12	6	2
Maximum speed (mm/sec)	600	300	100
Maximum payload (kg)	Horizontal	2	4
	Vertical	1	4
Max. pressing force (N)	45	90	150
Stroke (mm)	50 to 400 (50mm pitch)		
Overall length (mm)	Horizontal	Stroke+216	
	Vertical	Stroke+261	
Maximum outside dimension of body cross-section (mm)	W49 × H59		
Cable length (m)	Standard: 1 / Option: 3, 5		

Note 1. Positioning repeatability in one direction.

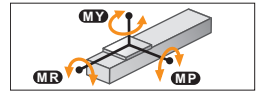
Allowable overhang Note



Horizontal installation (Unit: mm)				Wall installation (Unit: mm)				Vertical installation (Unit: mm)				
	A	B	C		A	B	C		A	B	C	
Lead 12	1kg	807	218	292	1kg	274	204	776	Lead 12	0.5kg	407	408
	2kg	667	107	152	2kg	133	93	611		1kg	204	204
Lead 6	2kg	687	116	169	2kg	149	102	656	Lead 6	1kg	223	223
	3kg	556	76	112	3kg	92	62	516		2kg	107	107
Lead 2	4kg	567	56	84	4kg	63	43	507	Lead 2	2kg	118	118
	4kg	869	61	92	4kg	72	48	829		4kg	53	53
	6kg	863	40	60	6kg	39	29	789				

Note. Distance from center of slider upper surface to carrier center-of-gravity at a guide service life of 10,000 km (Service life is calculated for 400mm stroke models).

Static loading moment

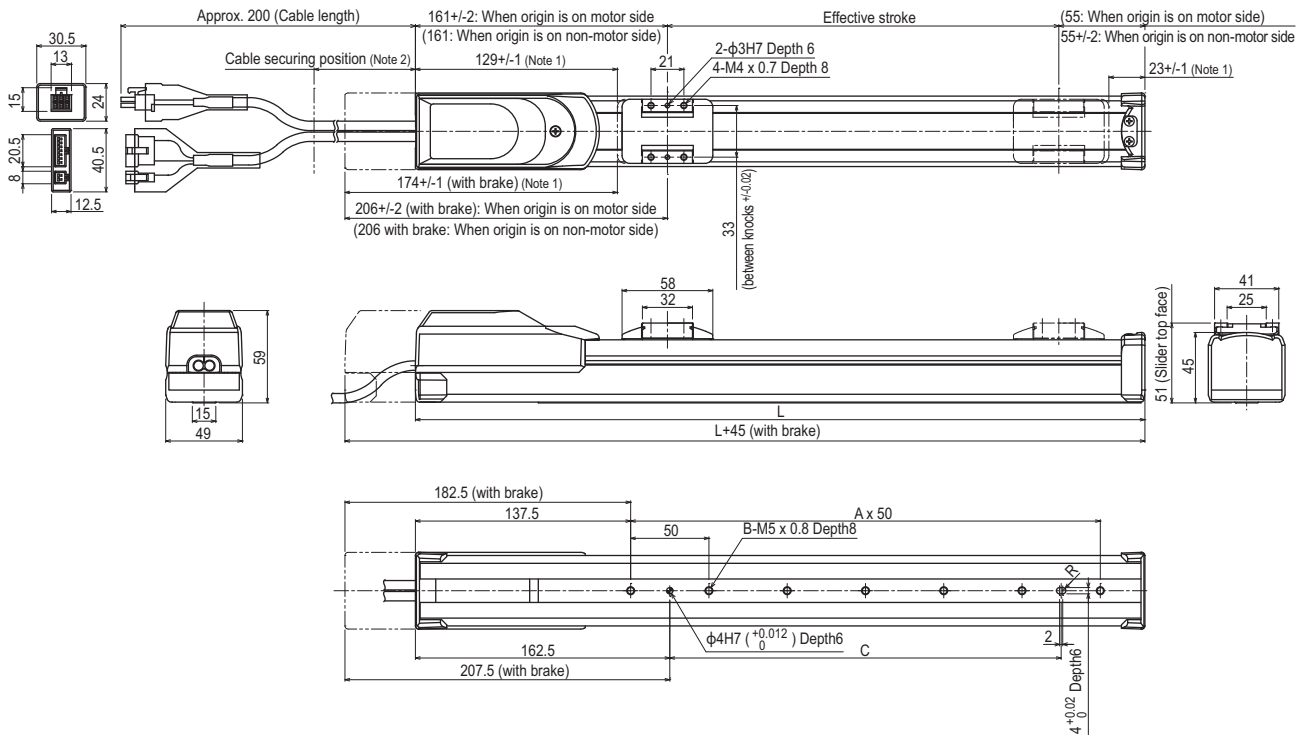


(Unit: N·m)		
MY	MP	MR
16	19	17

Controller

Controller	Operation method
TS-S	I/O point trace

SS04



Effective stroke	50	100	150	200	250	300	350	400
L	266	316	366	416	466	516	566	616
A	2	3	4	5	6	7	8	9
B	3	4	5	6	7	8	9	10
C	50	100	150	200	250	300	350	400
Weight (kg) <small>Note 4</small>	1.5	1.6	1.7	1.8	2.0	2.1	2.2	2.3

Note 1. Stop positions are determined by the mechanical stoppers at both ends.

Note 2. Secure the cable with a tie-band 100mm or less from unit's end face to prevent the cable from being subjected to excessive loads.

Note 3. The cable's minimum bend radius is R30.

Note 4. These are the weights without a brake. The weights are 0.2kg heavier when equipped with a brake.

Controller
TS-S ▶ 354

055

APPLICATION

CLEANERVO
Compact
single-axis robots

FLIP-X
Single-axis robots

PHASER
Linear motor
single-axis robots

XY-X
Cartesian
robots

YK-XG
SCARA
robots

YP-X
Pick & place
robots

CLEAN

CONTROLLER

INFORMATION

SS05

● High lead: Lead 20

● CE compliance

Ordering method

SS05

Model
Lead
20: 20mm
12: 12mm
6: 6mm

S

Type
S: StraightBrake Note 1
B: With brake
N: With no brakeOrigin position
N: Standard
Z: Non-motor sideGrease option
N: Standard grease
C: Clean room greaseStroke
50 to 800
(50mm pitch)Cable length Note 2
1L: 1m
3L: 3m
5L: 5m
10L: 10m

S

Controller
S: TS-SI/O
NP: NPN
PN: PNP
CC: CC-Link
DN: DeviceNetNote 1. Brake-equipped models can be selected only when the lead is 12mm or 6mm.
Note 2. The robot cable is flexible and resists bending.

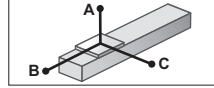
Basic specifications

Motor	42 □ Step motor	
Repeatability Note 1 (mm)	+/-0.02	
Deceleration mechanism	Ball screw ϕ 12 (Class C10)	
Maximum motor torque (N-m)	0.27	
Ball screw lead (mm)	20 12 6	
Maximum speed Note 2 (mm/sec)	1000 600 300	
Maximum payload (kg)	Horizontal	4 6 10
	Vertical	— 1 2
Max. pressing force (N)	Horizontal	27 45 90
	Vertical	— — —
Stroke (mm)	50 to 800 (50mm pitch)	
Overall length (mm)	Horizontal: Stroke+230 Vertical: Stroke+270	
Maximum outside dimension of body cross-section (mm)	W55 × H56	
Cable length (m)	Standard: 1 / Option: 3, 5	

Note 1. Positioning repeatability in one direction.

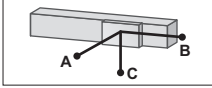
Note 2. When the stroke is longer than 650mm, resonance of the ball screw may occur depending on the operation conditions (critical speed). In this case, reduce the speed setting on the program by referring to the maximum speeds shown in the table below.

Allowable overhang Note



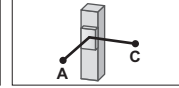
Horizontal installation (Unit: mm)

Lead	A	B	C
Lead 20	2kg: 413	139	218
4kg	334	67	120
4kg	347	72	139
6kg	335	47	95
Lead 12	4kg: 503	78	165
8kg	332	37	79
Lead 6	10kg: 344	29	62



Wall installation (Unit: mm)

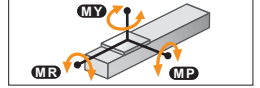
Lead	A	B	C
Lead 20	2kg: 192	123	372
4kg	92	51	265
4kg	109	57	300
6kg	63	31	263
Lead 6	4kg: 134	63	496
6kg	76	35	377
8kg	47	22	355



Vertical installation (Unit: mm)

Lead	A	B	C
Lead 12	0.5kg: 578	579	—
1kg	286	286	—
Lead 6	1kg: 312	312	—
2kg	148	148	—

Static loading moment

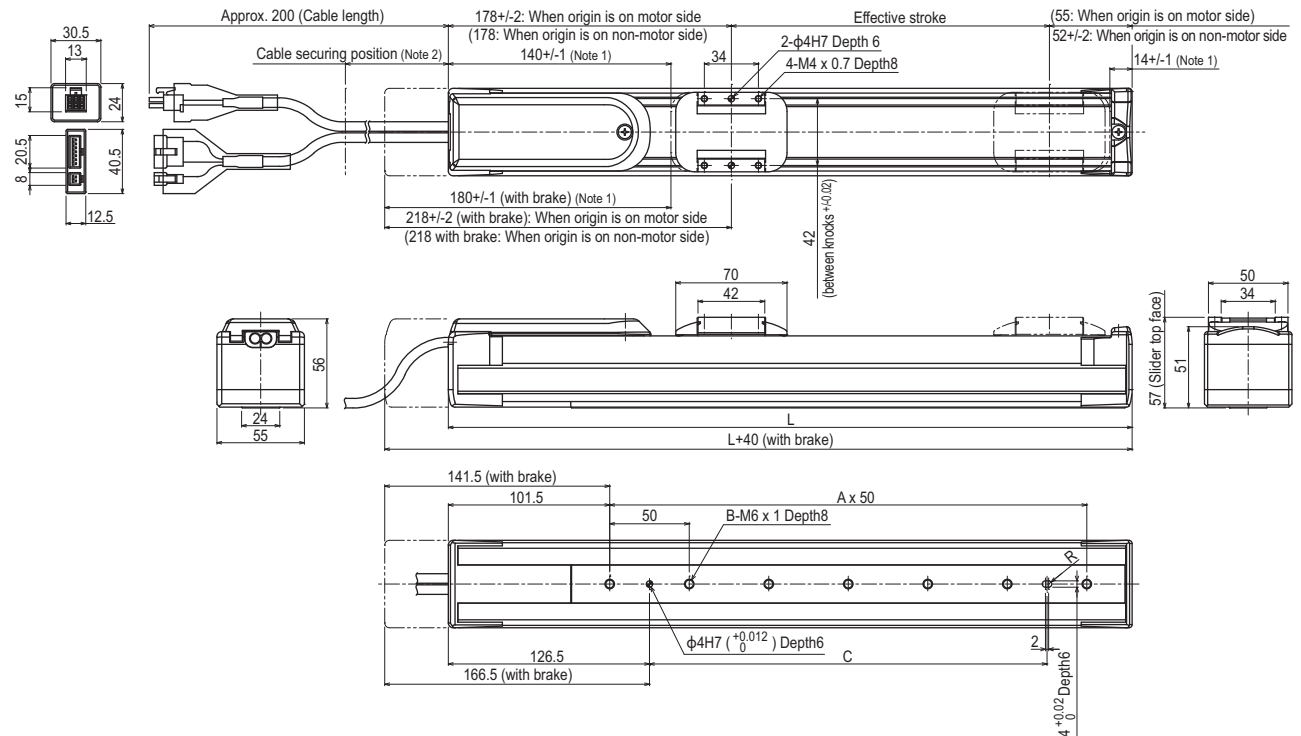


Static loading moment (Unit: N-m)		
MY	MP	MR
25	33	30

Controller

Controller	Operation method
TS-S	I/O point trace

SS05



Effective stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
L	280	330	380	430	480	530	580	630	680	730	780	830	880	930	980	1030
A	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
B	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
C	100	150	200	250	300	350	400	450	500	500	500	500	500	500	500	500
Weight (kg) Note 3	2.1	2.3	2.5	2.7	2.8	3.0	3.2	3.4	3.6	3.8	4.0	4.2	4.4	4.6	4.8	5.0
Maximum speed for each stroke Note 4 (mm/sec)	Lead 20	1000														
	Lead 12	600														
	Lead 6	300														
Speed setting	—															
	93%	83%	73%	63%												

Note 1. Stop positions are determined by the mechanical stoppers at both ends.

Note 2. Secure the cable with a tie-band 100mm or less from unit's end face to prevent the cable from being subjected to excessive loads.

Note 3. The cable's minimum bend radius is R30.

Note 4. These are the weights without a brake. The weights are 0.2kg heavier when equipped with a brake.

Note 5. When the stroke is longer than 650mm, resonance of the ball screw may occur depending on the operation conditions (critical speed). In this case, reduce the speed setting on the program by referring to the maximum speeds shown in the table at the left.

SS05H

High lead: Lead 20 CE compliance

Ordering method

SS05H		S						S	
Model	Lead	Type	Brake ^{Note 1}	Origin position	Grease option	Stroke	Cable length ^{Note 2}	Controller	I/O
	20: 20mm 12: 12mm 6: 6mm	S: Straight	B: With brake N: With no brake	N: Standard Z: Non-motor side	N: Standard grease C: Clean room grease	50 to 800 (50mm pitch)	1L: 1m 3L: 3m 5L: 5m 10L: 10m	S: TS-S	NP: NPN PN: PNP CC: CC-Link DN: DeviceNet

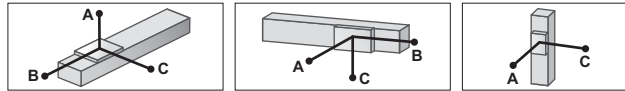
Note 1. Brake-equipped models can be selected only when the lead is 12mm or 6mm.
Note 2. The robot cable is flexible and resists bending.

Basic specifications

Motor	42 □ Step motor		
Repeatability ^{Note 1} (mm)	+/-0.02		
Deceleration mechanism	Ball screw φ12 (Class C10)		
Maximum motor torque (N·m)	0.47		
Ball screw lead (mm)	20	12	6
Maximum speed (mm/sec) ^{Note 2}	Horizontal	1000	600
	Vertical	-	500
Maximum payload (kg)	Horizontal	6	8
	Vertical	-	2
Max. pressing force (N)	36	60	120
Stroke (mm)	50 to 800 (50pitch)		
Overall length (mm)	Horizontal	Stroke+286	
	Vertical	Stroke+306	
Maximum outside dimension of body cross-section (mm)	W55 × H56		
Cable length (m)	Standard: 1 / Option: 3, 5		

Note 1. Positioning repeatability in one direction.
Note 2. When the stroke is longer than 650mm, resonance of the ball screw may occur depending on the operation conditions (critical speed). In this case, reduce the speed setting on the program by referring to the maximum speeds shown in the table below.

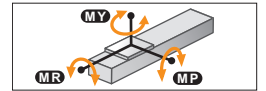
Allowable overhang ^{Note}



Horizontal installation (Unit: mm)				Wall installation (Unit: mm)				Vertical installation (Unit: mm)					
	A	B	C		A	B	C		A	C			
Lead 20	2kg	599	225	291	2kg	262	203	554	Lead 12	1kg	458	459	
	4kg	366	109	148	4kg	118	88	309		2kg	224	224	
	6kg	352	71	104	6kg	71	49	262		4kg	244	245	
Lead 12	4kg	500	118	179	4kg	146	96	449	Lead 6	2kg	113	113	
	6kg	399	79	118	6kg	85	55	334		Lead 6	4kg	113	113
	8kg	403	56	88	8kg	55	34	305			Lead 6	6kg	101
Lead 6	6kg	573	83	136	6kg	101	62	519	Lead 6			8kg	64
	8kg	480	61	100	8kg	64	39	413		Lead 6		10kg	43
	10kg	442	47	78	10kg	43	26	355			Lead 6	12kg	28
Lead 6	12kg	465	39	64	12kg	28	17	338	Lead 6			12kg	28

Note. Distance from center of slider upper surface to carrier center-of-gravity at a guide service life of 10,000 km (Service life is calculated for 600mm stroke models).

Static loading moment

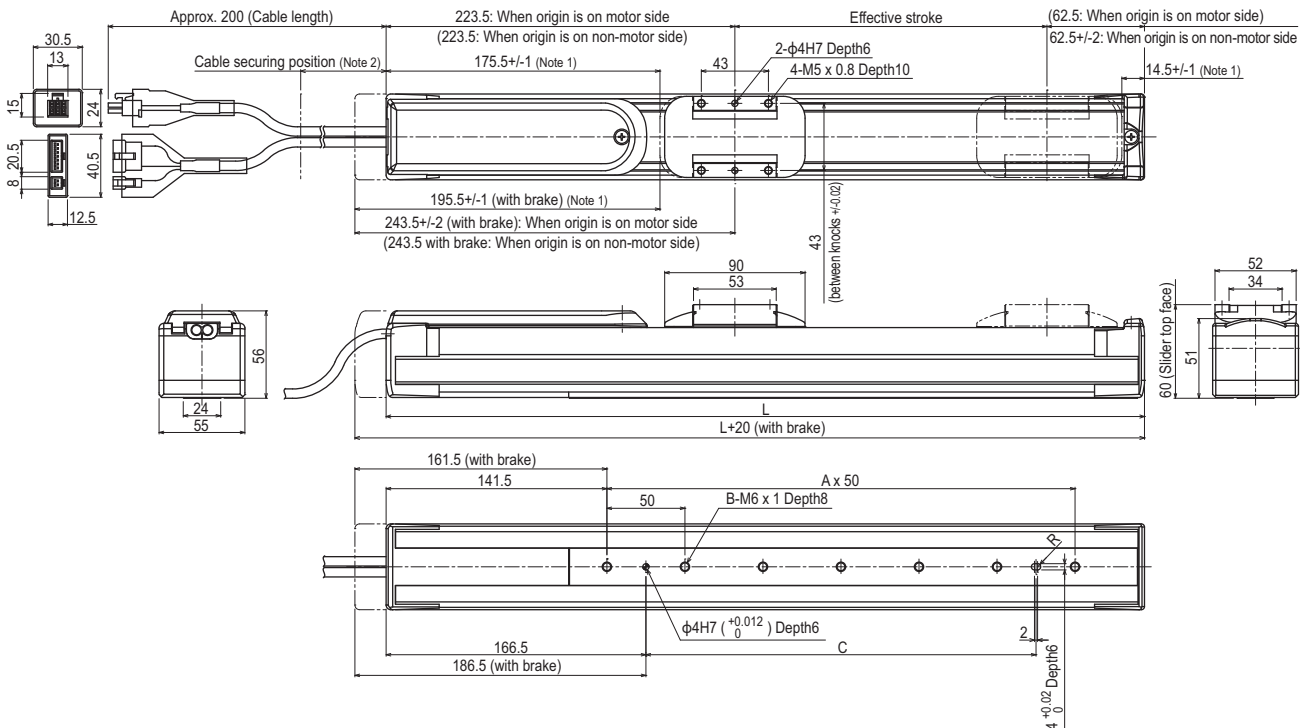


(Unit: N·m)		
MY	MP	MR
32	38	34

Controller

Controller	Operation method
TS-S	I/O point trace

SS05H



Effective stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800					
L	336	386	436	486	536	586	636	686	736	786	836	886	936	986	1036	1086					
A	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18					
B	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19					
C	100	150	200	250	300	350	400	450	500	500	500	500	500	500	500	500					
Weight (kg) ^{Note 4}	2.4	2.6	2.8	3.0	3.2	3.4	3.6	3.8	4.0	4.2	4.4	4.5	4.7	4.9	5.1	5.3					
Maximum speed for each stroke (mm/sec) ^{Note 4}	Lead20	1000																			
	Lead12 (Horizontal)	600																			
	Lead12 (Vertical)	500																			
	Lead6 (Horizontal)	300												280		250		220		190	
	Lead6 (Vertical)	250												220		190					

Note 1. Stop positions are determined by the mechanical stoppers at both ends.
Note 2. Secure the cable with a tie-band 100mm or less from unit's end face to prevent the cable from being subjected to excessive loads.
Note 3. The cable's minimum bend radius is R30.
Note 4. These are the weights without a brake. The weights are 0.2kg heavier when equipped with a brake.
Note 5. When the stroke is longer than 650mm, resonance of the ball screw may occur depending on the operation conditions (critical speed). In this case, reduce the speed setting on the program by referring to the maximum speeds shown in the table at the left.

APPLICATION
Compact single-axis robots
TRANSERVO
Single-axis robots
FLIP-X
Linear motor single-axis robots
PHASER
Cartesian robots
XY-X
SCARA robots
YK-XG
Pick & place robots
YP-X
CLEAN
CONTROLLER INFORMATION