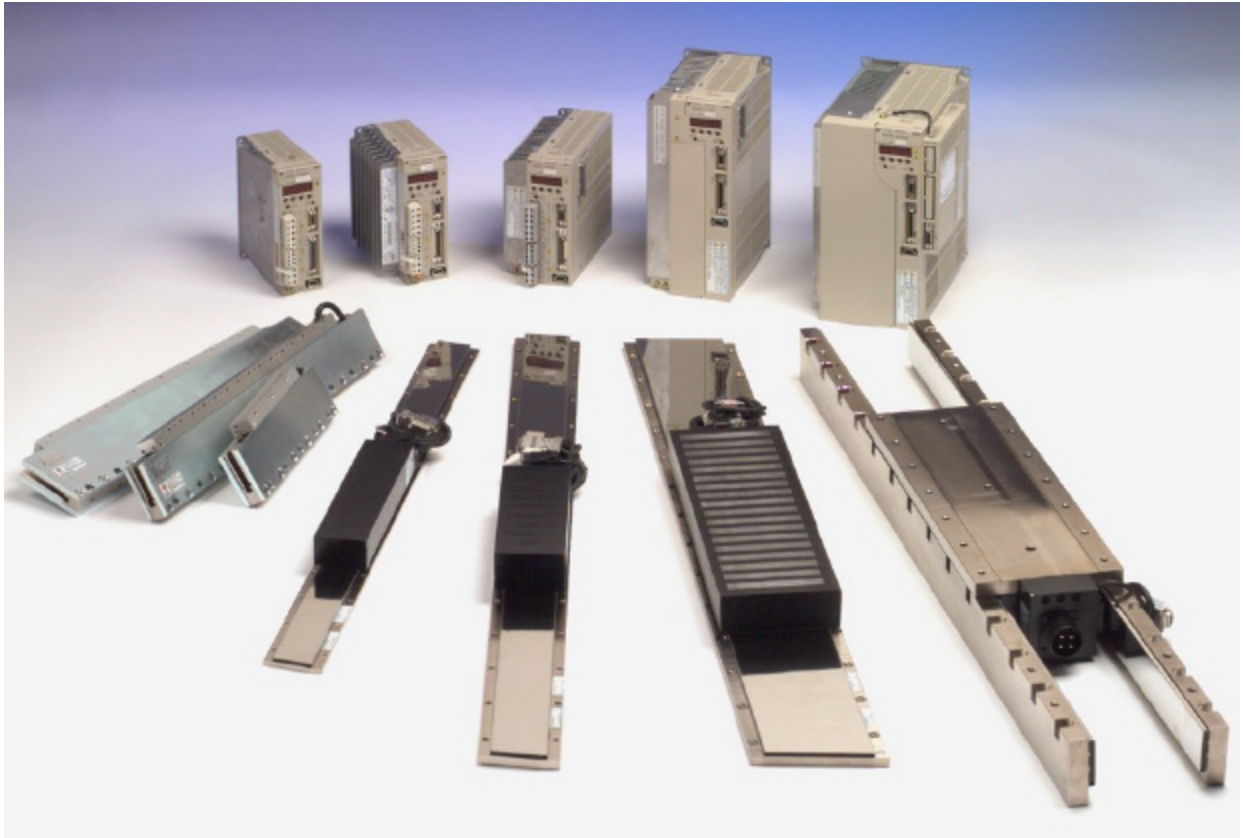


Linear Σ Series

Linear Servo Motor

Installation Manual





Responsible Section: Motor Tech. Dept., Linear Mechatronics Tech. Section

Other than installing the linear servomotor to a machine (Connection of driver, host controller and adjustment etc.), please refer to the following manuals or specification manuals.

- **Linear S Series SGL /SGDD User 's Manual
Design and Maintenance: SIZ-S800-39.1**
- **Linear S-II Series SGL /SGDH User 's Manual
Design and Maintenance: SIZ-S800-39.2**
- **S-II Series SGM H/SGDH User 's Manual
Servo Selection & Data Sheet: SI-S800-32.1
Design and Maintenance: SI-S800-32.2**
- **AC Servo Amplifier SGDH- EY213
Manufacture Specifications: DE040178**
- **Linear S Series Setup Manual: DE0402288**
- **Linear Servo Motor Safety Information: TOBPC23080000**
- **Linear Servo-Drive and Linear S Series Magnet Track Instruction
Manual:
TOB-C238-1**



Contents

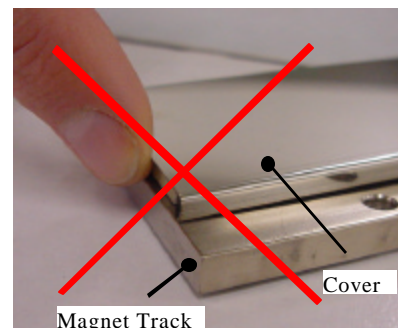
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1 Introduction

<Caution>

- ❑ **I you are wearing an electronic medical equipment of a pacer etc. must not approach the magnet track.**
It might malfunction.
- ❑ **Be careful with the magnetic attraction power of the magnet track when opening bale.**
Not doing so may result in injury.
The magnet track might be damaged.
- ❑ **Do not allow a magnetic object such as iron to approach the magnet track.**
Doing so may result in injury
- ❑ **Do not allow a clock, magnetic card, and electronic equipment such as floppy disks and measuring apparatuses to approach the magnet track.**
They might malfunction, and break down.
- ❑ **Be careful with the magnetic attraction power and confirm there are no magnetic object such as iron, before the magnet track installation.**
Not doing so may result in injury.
The magnet track might be damaged.
- ❑ **When you transport the magnet track with a magnet cover protector, please do not hold the cover. (Refer to the Photograph)**
Doing so may result in injury with the edge of the cover.
The cover might be transformed.





2 Installation Procedure of Coreless Type

2.1 Magnet Track Installation

The magnet track is constructed with the bonded magnet to both steel boards.
(Refer to the Figure 1).

Any foreign objects (especially magnetic substance) are not allowed between these magnets.

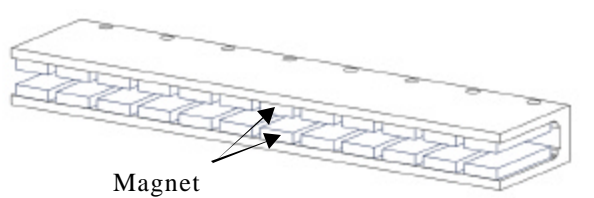


Figure 1

1. Place the magnet track on the installation base face (there are two faces). (Refer to Figure 2). Be careful with your hands. It is easy to get caught by the base face of the machine base.

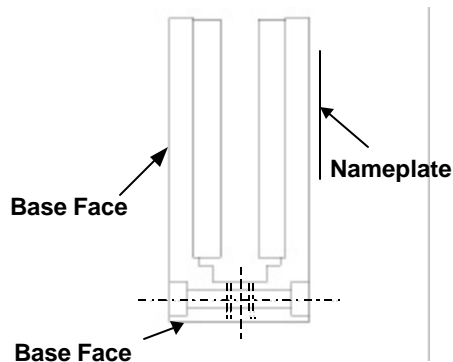


Figure 2

2. Fix the magnet track with a screw by pressing it to the base face of machine side.

Table 1. Recommended Tightening Torque for a Magnet Track

Magnet Track Type: SGLGM-	Screw Type:	Tightening Torque: (N.cm)
30	M4	360 to 500
40	M5	720 to 1010
60		
90	ZM6	1220 to 1710

Condition: Hexagon socket head screw (Strength Section: 10.9)



3. The magnet tracks after the first one are temporarily put on the remote place by 30mm or more on the extension of the first magnet track. Next, fix by pressing second magnet track to the first one with screw. Be careful with fingers etc. An attraction force generates between the assembled magnet tracks. (Refer to Figure 3)

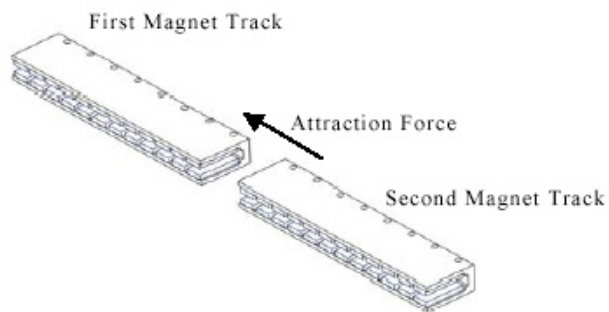
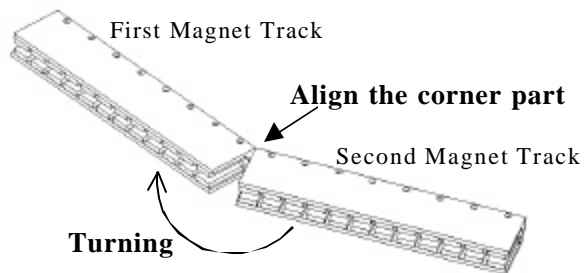


Figure 3

(Note)

Since the attraction force of magnet track type “SGLGM-90” etc. is large, turn and interlink the second magnet track after attaching the corner parts of screw hole side of the magnet track liaison side mutually once. The method is recommended for a larger thrust magnet track.





2.2 Moving Coil Installation

The moving coil is configured from aluminum base and coil protected with resin. When an impact is added to the resin, it could cause the damage of products, and injury. Be careful with handling.

1. Insert the resin part of the moving coil between the magnet tracks previously installed. (Refer to Figure 4)
Then, install the moving coil to the movable table supported by the linear guide.
Check that the space between the moving coil resin and the magnet track magnet in a specified size. (Refer to Figure 2)

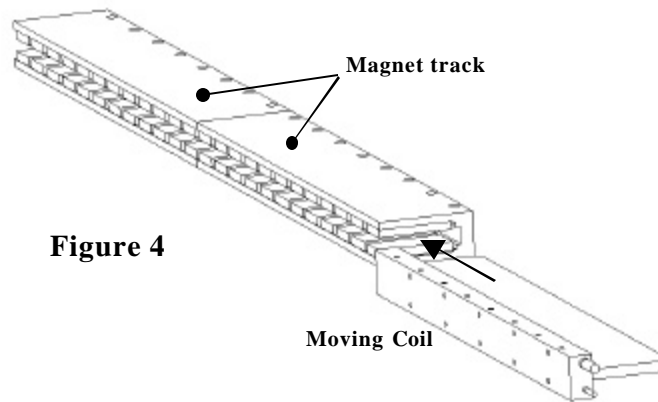
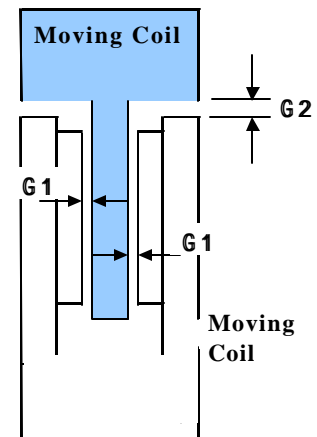


Figure 4

Table 2. Position of Moving Coil & Magnet Track

Moving Coil Type: SGLGW-	Size	
	G1 (mm)	G2 (mm)
30A050	0.85 ± 0.3	1 ± 0.3
30A080	0.95 ± 0.3	1 ± 0.3
40A***	0.8 ± 0.3	1 ± 0.3
60A***	0.8 ± 0.3	1 ± 0.3
90A***	1.1 ± 0.3	2 ± 0.3



2. Move the moving coil to the entire magnet track several times. Then, check whether there is no contact to the magnet track and no foreign object inside of the magnet track.

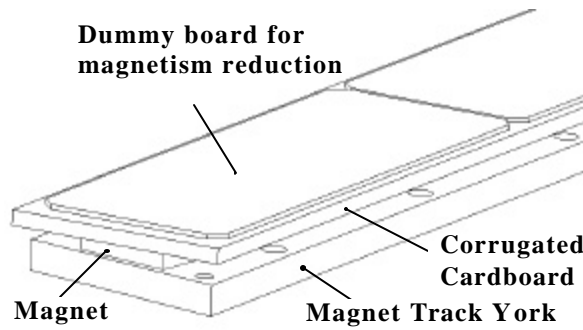


3 Installation procedure for F Type w/Core

3.1 Magnet Track Installation

The magnet track is installed wrapped by plural pieces of rectangle steel plate. Inside of it, the magnet surface is covered by corrugated cardboard. (Refer to Figure 5)

This steel plate is a dummy board to reduce the influence of the magnetism giving to surroundings. When detaching the dummy board, be careful with your fingers and handle with care for not damaging the magnet and magnet cover protector.



- (1) Detach the dummy board and the corrugated cardboard for the magnetism reduction of the magnet track surface.
- (2) Adjust the guideline instruction sign (Approx. 4) side of the magnet track to a reference planeside of the machine base, and put on the base side. (Refer to Figure 6). Be careful with your fingers.

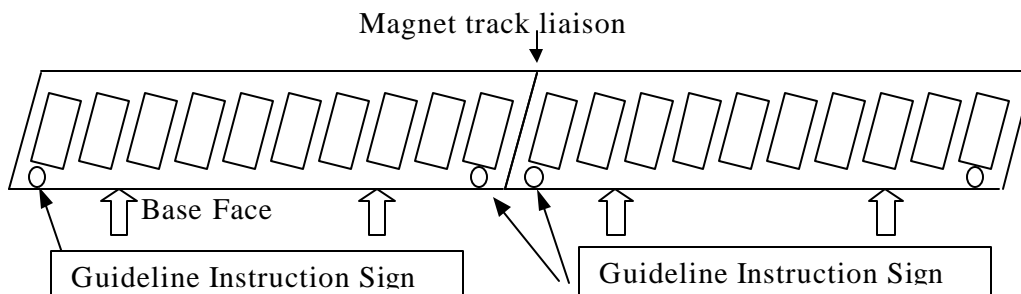


Figure 6



- Fix the magnet track with a screw while pressing it to the machine side base face. (Refer to Table 3)

Table 3. Recommended Magnet Track Tightening Torque

Magnet Track Type: SGLFM-	Screw Type:	Tightening Torque: (N cm)
20	M4	360 to 500
35		
50	M5	720 to 1010
1Z	M6	1220 to 1710

Condition: Hexagon socket head screw (Strength Section: 10.9)

(Note)

A strong attraction force generates from the magnet of the magnet track. Work very carefully when you use a steel screw and steel wrench. Exact size of the screw head in the table below must be used.

Magnet Track Type: SGLFM-	Screw Type:	Screw Head Height: K	
20	M4	4.2mm or Less	Figure7
35			
50	M5	5.2mm or Less	Figure 8
1Z	M6	6.7mm or Less	

Condition: Hexagon socket head screw (Strength Section: 10.9)

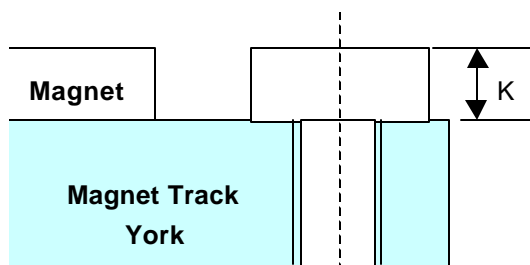


Figure 7

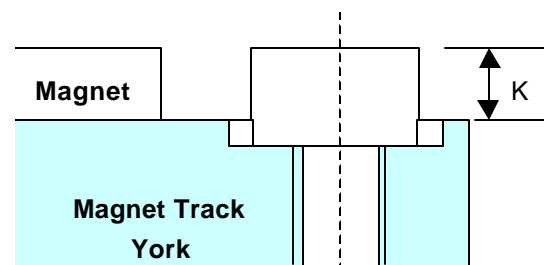


Figure 8



- The magnet track after the first one is temporarily put on the remote place by 30mm or more on the extension of the first magnet track. The direction of the magnet track must be matched (Guideline instruction sign: (Approx. 4concave). (Refer to Figure 6 on previous page)
Then, fix the couple of magnet track (first one and second one) with a screw while pressing. Be careful with fingers etc. at this time, the attraction force generates between magnet tracks. (Refer to Figure 9)

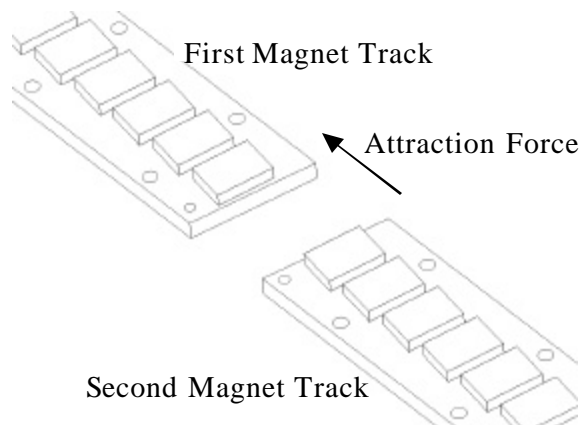


Figure 9

(Note)

It is safer to install the moving coil before installing the magnet track after the first one. Refer to next page “3.2 Moving Coil Installation” for details.



3.2 Moving Coil Installation

The moving coil is configured from aluminum, or steel base, magnet core part and coil protected with resin. When an impact is added to the resin, it could cause the damage of products, and injury. Be careful with handling.

1. Mount the moving coil to the movable table supported by the linear guide on the extended location of the magnet track previously installed. (Refer to Photo 1)
Check that the space between the moving coil and magnet track is a specified distance. (Refer to Table 4)

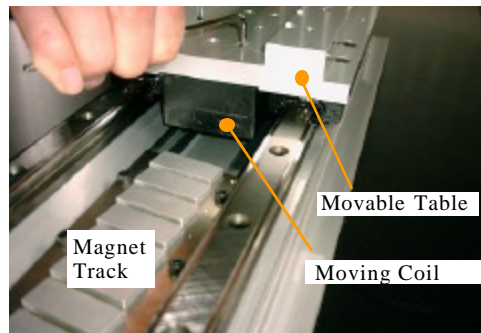
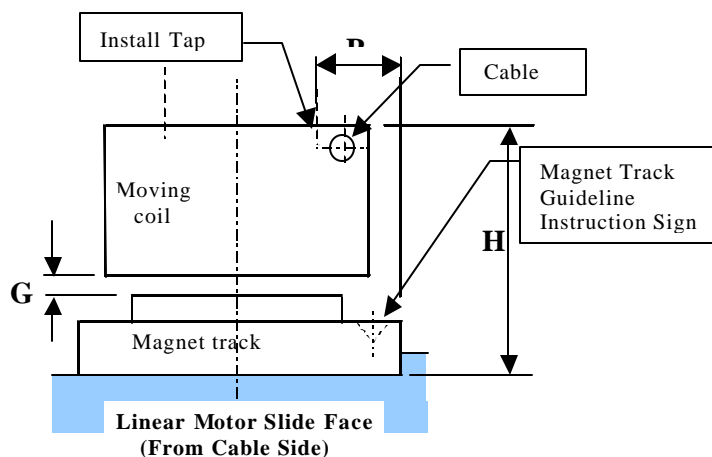


Photo 1

Table 4. Location of Moving Coil & Magnet Track

Moving Coil Type: SGLFW-	Size		
	H (mm)	P (mm)	G (mm)
20A A	45 ± 0.1	22 ± 0.2	1 ± 0.3 (*1)
35A A		21 ± 0.2	
50A A	58 ± 0.1	25.8 ± 0.2	
1ZA A		27 ± 0.2	

(*1)...Without Magnet Protect Cover



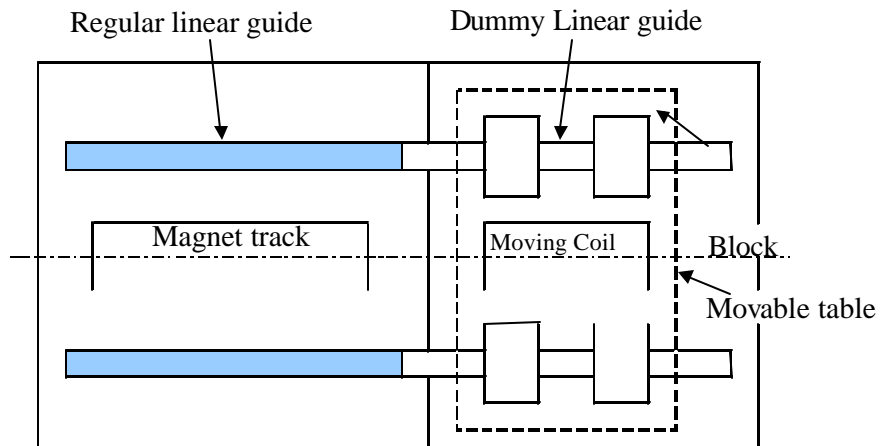


(Note)

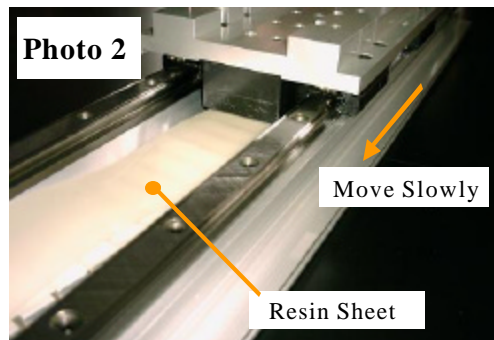
Fix only one magnet track first, when there are two or more magnet trucks. And then, install the moving coil in an available space.

The construction must be able for the temporarily installation of the dummy linear guide on the extension of the magnet track when there is only one magnet track, and the linear guide cannot be extended to the place where the moving coil installation work is done.

[Outline Drawing of Dummy Linear Guide Installation]



2. Attach a thin non-magnetism (resin is recommended) sheet (thickness: approx. 0.5mm) to the gap between the moving coil and magnet track, and then move the moving coil to the magnet track slowly. (Refer to Photo 2)



(Note)

When the moving coil attaches to the edge of the magnet track, the magnesium of the magnet track generates. So be careful with your hands and tools.

Such a sheet is not necessary when it is surely evaluated that the gap length is proper. [Refer to Table 4 in 3.2(1)].

3. Move the moving coil to the entire magnet track back and force several times and verify whether there is contact to the magnet track. Verify whether the gap is uniform in any place, with non-magnetic (brass or stainless steel are recommended).



3.3 Others

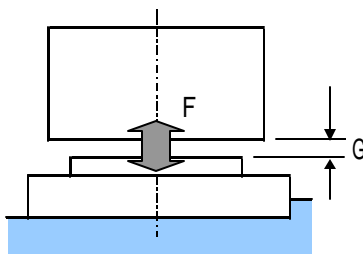
This linear motor is constructed that the moving coil is facing to the magnet track. Therefore, the magnetic attraction power (calculation value) shown in Table 5 generates on the moving coil. So when the device is designed, this attraction force must be considered.

Table 5. Magnet Attraction Force (Calculation Value)

Moving Coil Type: SGLFW-	Gap: G (mm)	Attraction Force: F (N)
20A090Að	0.7mm	410
20A120Að		600
35A120Að		1100
35A230Að		2100
50A200Að		2700
50A380Að		5200
1ZA200Að		5300
1ZA380Að		10400

Condition

- Gap G: Magnetic Gap Value & -0.3mm to the design value
 - Attraction Force F: Peak Force
- *Other than above conditions, please contact design section





4 Installation Procedure of T Type with Core

4.1 Magnet Track Installation

The magnet track is contained with two magnet track yorks fixed with aluminum spacer for the transportation. Never remove the transportation spacer until the magnet track is temporarily fixed to the device.

1. Put the magnet track gently on both sides of the positioning steps of the machine with spacer for transportation installed (Refer to Photo 3). This positioning steps part size is set to be the size W2 in Table 6.

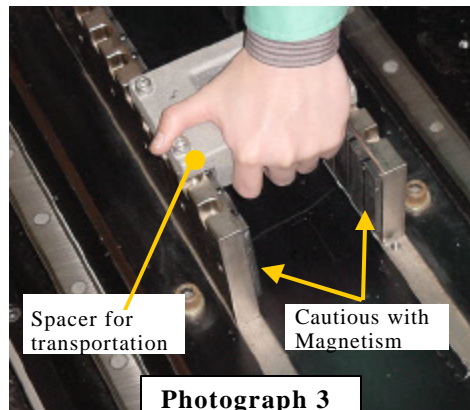
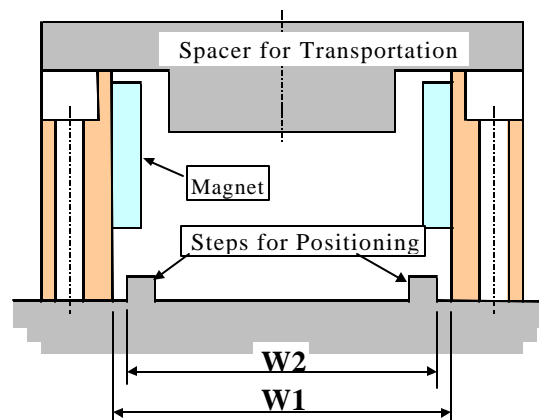


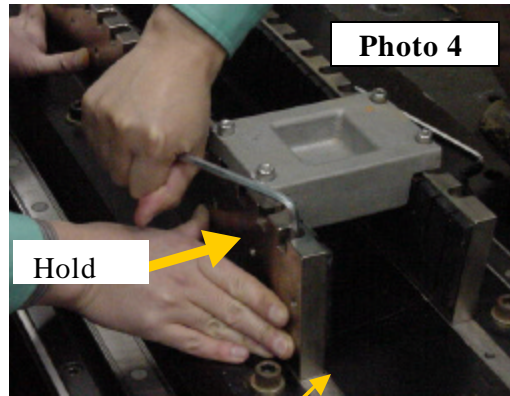
Table 6. Magnet Track Installation Size

Magnet Track Type: SGLTM-	W1 (mm) [YE Factory Setting]	W2 (mm) [Recommended Value of Machine Base]
20 ǝ ǝ ǝ	71.5 ± 1	70 ± 0.15
35 ǝ ǝ ǝ		
40 ǝ ǝ ǝ	113 ± 1	111.8 ± 0.15
80 ǝ ǝ ǝ		





2. Tighten the installation screw to one of magnet track yolk temporarily. Then, fully tighten the magnet track yolk to step positioning while firmly pressing (Refer to Photo 4 and Table 4).



Steps for Positioning

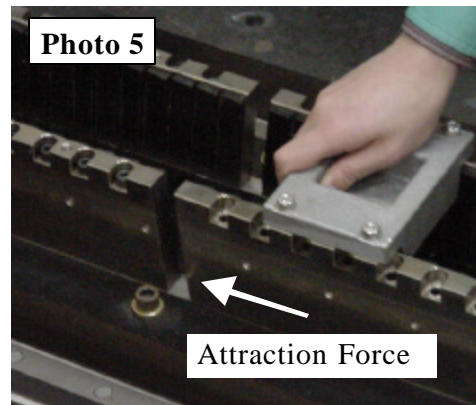
Table 7. Recommended Tightening Torque for Magnet Track

Magnet Track Type: SGLTM-	Screw Type:	Tightening Torque (Ncm)
20 ̄ ̄ ̄ ̄ ̄	M6	1220 to 1710
35 ̄ ̄ ̄ ̄ ̄		
40 ̄ ̄ ̄ ̄ ̄	M8	2970 to 4150
80 ̄ ̄ ̄ ̄ ̄		

Condition:

- Machine Side Material: Steel
- Hexagon socket head screw (Strength Section: 10.9)

3. After detaching the spacer screw for the transportation of the magnet track yolk side which installed first, fully tighten the other magnet track yolk to step positioning while firmly pressing (Refer to Table 7). At this time, the magnet track yolk must not swerve in the direction of the moving coil progress.
4. Detach the spacer for transportation completely. If there is a screw hole for the magnet track installation in the place where spacer for transportation has adhered, screw the parts also.
5. Put the magnet track after the first are temporarily on the remote place by 30mm or more on the extensions of magnet tracks. Next, press the magnet track to the first assembled magnet track. At this time, an attraction force will be generated between the assembled magnet tracks. Be careful with fingers etc. (Refer to Photo 5). Same procedure is applied for the installation after the second one.



(Note)

It is safer to install the moving coil before installing the magnet track after the first one. Refer to next page "Mount of 4.2 moving coils" for details.



4.2 Moving Coil Installation

The moving coil is configured from aluminum, or steel base, magnet core part and coil protected with resin. When an impact is added to the resin, it could cause the damage of products, and injury. Be careful with handling.

1. Mount the moving coil to the movable table supported by the linear guide on the extended location of the magnet track previously installed (Refer to Photo 6). Check that the space between the moving coil and magnet track is a specified distance. (Refer to Table 8)

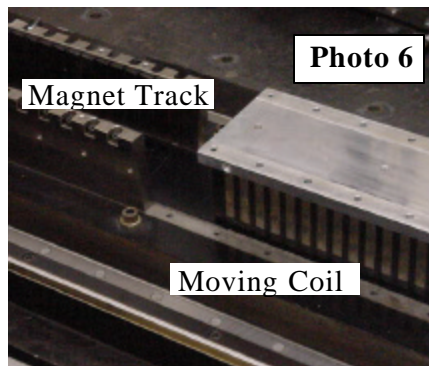
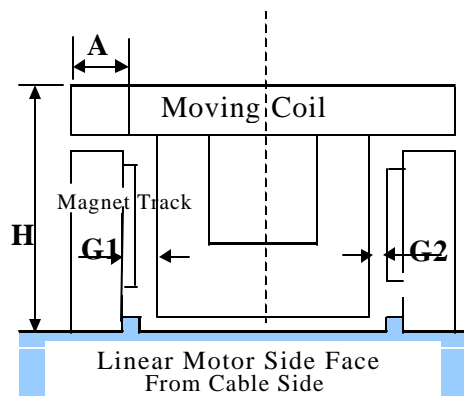


Table 8. Location of Moving Coil & Magnet Track

Moving Coil Type: SGLTW-	Size		
	H (mm)	A (mm)	G1 & G2 (mm)
20AøøøAø	55 ± 0.3	15 ± 0.1	1 ± 0.3
35AøøøAø	70 ± 0.3		(*1)
40AøøøAø	83 ± 0.3	19.1 ± 0.1	1.4 ± 0.3
80AøøøAø	120 ± 0.3		(*1)

(*1): Without Magnet Protection Cover

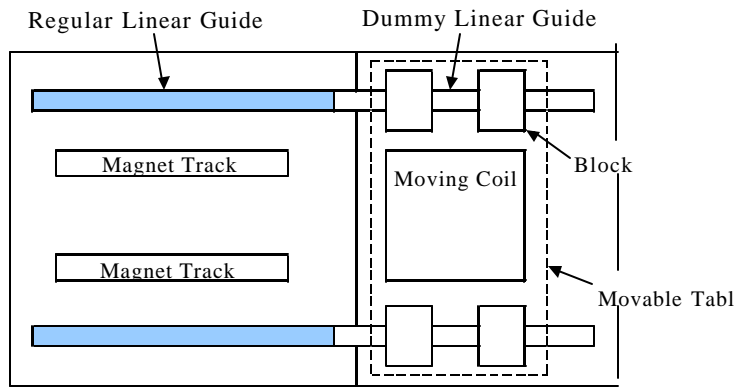


(Note)

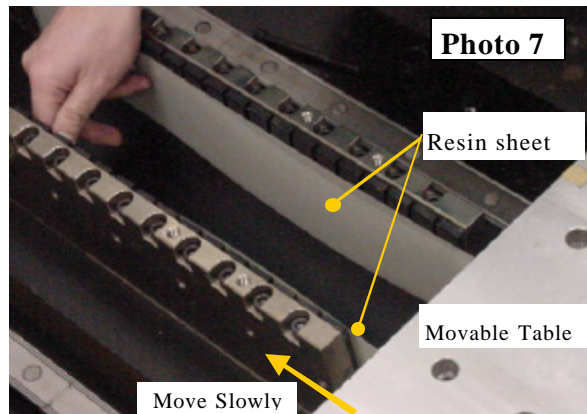
Fix only one magnet track first, when there are two or more magnet tracks. And then, install the moving coil in an available space. The construction must be able for the temporarily installation of the dummy linear guide on the extension of the magnet track when there is only one magnet track, and the linear guide cannot be extended to the place where the moving coil installation work is done.



[Outline Drawing of Dummy Linear Guide Installation]



2. Attach a thin non-magnetism (resin is recommended) sheet (thickness: approx. 0.5mm) to the gap between the moving coil and magnet track, and then move the moving coil to the magnet track slowly. (Refer to Photo 7)



(Note)

When the moving coil attaches to the edge of the magnet track, the magnetism of the magnet track generates. So be careful with your hands and tools.

Such a sheet is not necessary when it is surely evaluated that the gap length is proper. [Refer to Table 8 in 4.2(1)].

3. Move the moving coil to the entire magnet track back and forth several times and verify whether there is contact to the magnet track. Verify whether the gap is uniform in any place, with non-magnetic (brass or stainless steel are recommended). (Guideline for the gap value: Design value $\pm 0.3\text{mm}$)



4.3 Others

This linear motor is constructed and arranged the magnet tracks on both sides of the moving coil. As for this construction, the magnetic attraction Force, which generates on the moving coil when the gap length with the magnet track on the moving coil and both sides is quite equal, is counterbalanced.

It is difficult to equate the above-mentioned two gap lengths due to the accuracy of the motor, the device accuracy of the customer end, and the assembly error, etc. when the motor is installed. The attraction force (calculated value) shown in Table 9 below is generated in that case. Consider this attraction force when you design the device.

Table 9. Magnetic Attraction Force (Calculation Value)

Moving Coil Type: SGLTW-	Gap: G1 (mm)	Gap: G2 (mm)	Attraction Force: F1 (N)	Attraction Force: F2 (N)	Difference Between F1 & F2: F (N)
20A170Ađ	1.3	0.7	760	1030	270
20A320Ađ			1510	2040	530
20A460Ađ			2260	3050	790
35A170Ađ	1.3	0.7	1330	1800	470
35A320Ađ			2650	3570	920
35A460Ađ			4000	5400	1400
40A400Ađ	1.7	1.1	4700	5900	1200
40A600Ađ			7000	8700	1700
80A400Ađ	1.7	1.1	9200	11400	2200
80A600Ađ			13600	16900	3300

Condition:

- Gap G1 & G2: Magnet gap value, and +0.3mm & -0.3mm to the design value
- Attraction Force F1 & F2: Peak Force
- *Other than above conditions, please contact design section

