Linear Motor Table

LT

CAT-57113

PATENT PENDING

ISO 14001 Certified

IKO Linear Motor Table

LT

Two series can be meet application

High acceleration / deceleration, quick response
High positioning and speed stability

High-speed operation up to the maximum speed of 3 m/s !
Stroke length up to 2760 mm !

Long Stroke series LT···L

selected to needs!

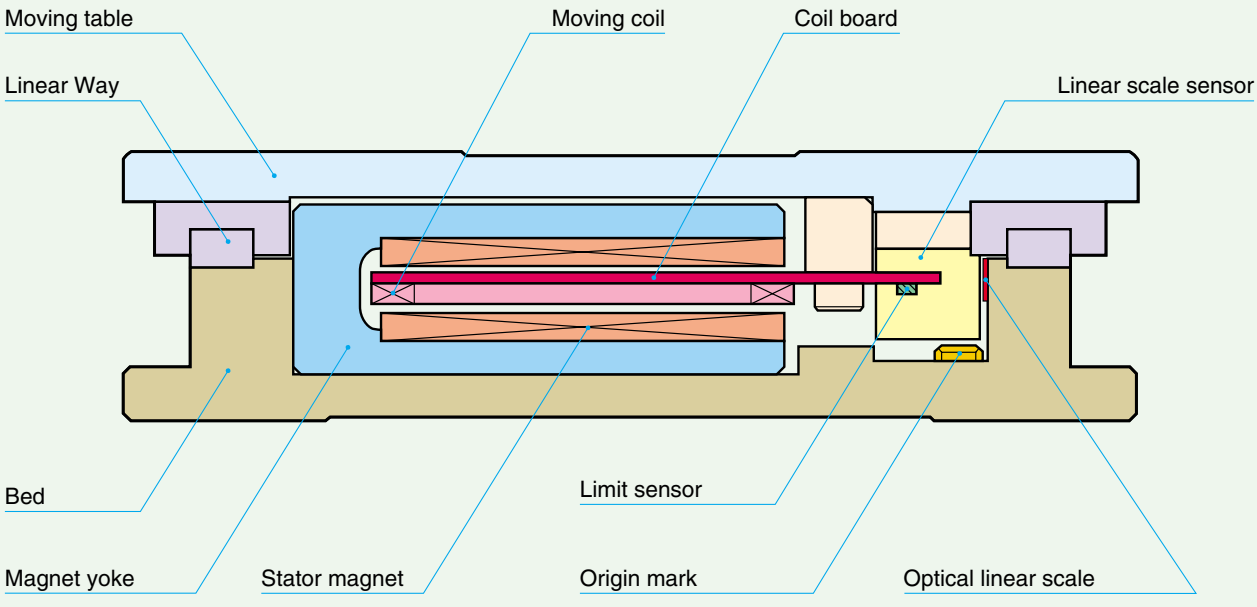
Maximum thrust of 450 N and table height of only 40 mm ! (In case of LT150CG)

Compact series LT···C

1N=0.102kgf=0.2248lbs.
1mm=0.001m=0.03937inch

IKO Linear Motor Table
LT

IKO Linear Motor Table LT is a direct-drive positioning table, consisting of a moving table and bed of aluminum alloy, in which an AC linear servo-motor and an optical linear scale are compactly integrated.
Compact and lightweight LT···C series with the minimum sectional height of 30 mm and high-rigidity LT···L series with a long stroke of up to 2760 mm are prepared. So an optimal model can be selected meeting the requirement for each application.
IKO Linear Motor Table LT employs a C-shaped magnet yoke, and a coil board is sandwiched between two stator magnets. High thrust as well as high speed / quick response positioning can thus be achieved.
IKO Linear Motor Table LT is best suited for equipment and devices used in semiconductor and liquid crystal industry, and also for measuring instruments, assemblers, material transfer machines, and other applications where high speed operation is required.



Structure of Linear Motor Table LT

IKO Linear Motor Table LT *Five* Superior Features

1 High acceleration/deceleration and quick response !

The moving table of aluminum alloy is ultra-lightweight. With its high thrust, the table achieves high acceleration/deceleration and quick response positioning.

2 Quiet and smooth motion !

IKO Linear Way is incorporated as the table guide. Also, a C-shaped magnet yoke is used to cancel out the attractive magnetic forces generated inside the table, minimizing the magnitude of applied force on the guide. Quiet and smooth motion is thus achieved. Long Stroke series (LT···L) employs Linear Way E of low-decibel specification.

3 No cogging !

The moving coil incorporated in the moving table is a coreless type. So cogging is avoided even in a low-speed range and smooth operation without vibration is achieved.

4 Superior rest stability !

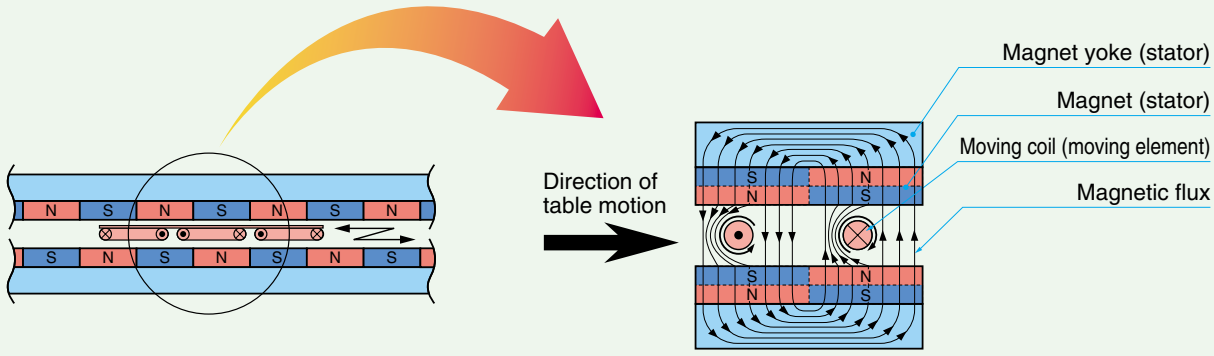
A leading edge servo-technology is used to achieve superior rest stability. The table can thus be used as a high-precision positioning mechanism for image processors and other equipment.

5 Superior speed stability !

Superior speed stability is achieved, with a speed variation of ±2% at a low speed of 10 mm/s and ±0.3% at 100 mm/s.

Principle of operation of Linear Motor Table LT

Linear Motor Table LT incorporates a field coil and an optical linear scale sensor in the moving table, and a C-shaped yoke with a set of magnets facing to each other and an optical linear scale in the stator. As shown in the figure below, a magnetic flux in the vertical direction is generated by the set of magnets facing to each other. When a rotating magnetic flux is generated around the coil due to a coil current, a force is applied to the coil in the horizontal direction. (Fleming's left-hand rule)
A unidirectional thrust can be continuously obtained by switching the coil current direction according to the vertical flux direction, so that the moving part can keep moving in one direction. Acceleration control by current level and position control by position signal from the optical linear scale are made for travel and accurate positioning.



1N=0.102kgf=0.2248lbs.
1mm=0.001m=0.03937inch

Two Series for Selection – Dimension, Thrust, Speed, and Stroke –

Series	Sectional dimensions mm	Speed/thrust specification	Maximum thrust N	Maximum speed m/s	Moving table specification	Stroke length mm
Compact series LT···C	LT100C	High thrust specification LT100CG	150	2.0	Single table	200～1000
					Twin tables /T2	230～830
		Medium thrust specification LT100CM	45	2.0	Single table	200～1000
					Twin tables /T2	230～830
	LT150C	High thrust specification LT150CG	450	2.0	Single table	400～1200
					Twin tables /T2	350～950
		Medium thrust specification LT150CM	130	2.0	Single table	400～1200
					Twin tables /T2	350～950
Long stroke series LT···L	LT130L	High thrust and high speed specification LT130LG	150	3.0	Single table	240～2760
					Twin tables /T2	500～2540
	LT170L	High thrust specification LT170LG	450	2.0	Single table	680～2720
					Twin tables /T2	420～2460
		High speed specification LT170LV	190	3.0	Single table	680～2720
					Twin tables /T2	420～2460

Features of Compact series LT···C

Compact

This series incorporates a set of miniature type linear motion rolling guides Linear Way L and an ultra small size optical linear scale to achieve a very compact size.

Low sectional height and high thrust

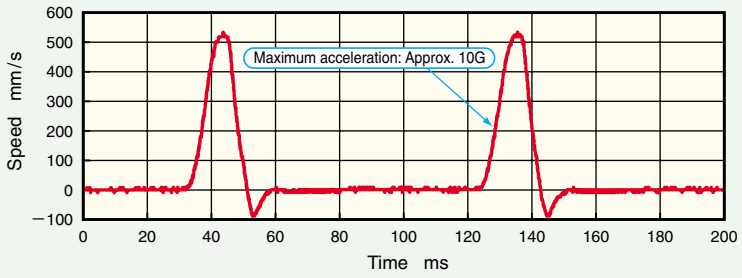
With a sectional height of only 40 mm, a maximum thrust of 450N is achieved.

High acceleration/deceleration and quick response

The moving table is ultra-light weight, weighing only about 1.5 kg. With high thrust, the table achieves high acceleration/deceleration of up to 10G.

Measurement data at high acceleration/deceleration operation

- Test sample
  LT150CGS
- Measuring conditions
  Loaded mass: None
  Moving distance: 5mm (2 times)



Features of Long Stroke series LT···L

Super long stroke

Incorporating Linear Way E of butt-jointing track rails specification and, also by virtue of linear motor drive, this type achieves a long stroke of up to 2760 mm.

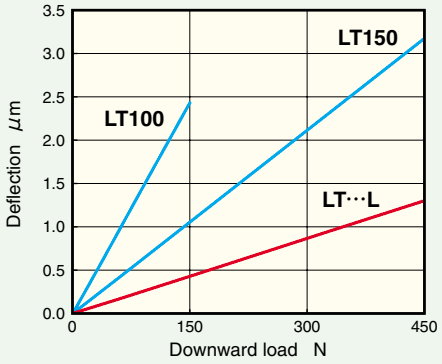
High speed

High speed operation can be performed up to 3 m/s.

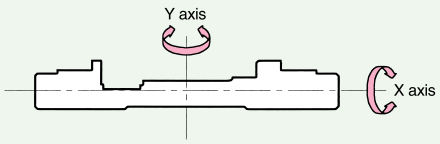
High rigidity

By adopting Linear Way E as the linear motion rolling guide, and mounting it on a thick bed, a high rigidity table structure is provided.

Elastic deformation characteristic



Moment of inertia of sectional area of bed



Model	Moment of inertia of sectional area mm⁴	
	I_X	I_Y
LT130L	3.8×10^4	281×10^4
LT170L	7.6×10^4	749×10^4

Low noise

By adopting low-decibel specification Linear Way E, smooth and quiet motion is achieved. This table can contribute to the creation of a low-decibel environment.

1N=0.102kgf=0.2248lbs.
1mm=0.001m=0.03937inch

Identification Number and Models

Linear Motor Table LT is available in two series, namely, compact C series and long stroke L series. Each of these series include two types of table width. Furthermore, thrust/speed specification can be selected in accordance with the operating conditions. Specifications such as twin table specification of which two moving tables can be controlled independently, and table cover specification are also prepared. These models can be selected considering their respective characteristics to meet the requirements in a wide range of applications. An example of identification number of Linear Motor Table LT is shown below.

Example of identification number

LT 100 C G F–430/5 D T2

Model code	
LT···C	Compact series
LT···L	Long stroke series

Table width		
100	Width : 100mm	Applicable to LT···C.
150	Width : 150mm	
130	Width : 130mm	Applicable to LT···L.
170	Width : 170mm	

Thrust/speed specification	
G	High-thrust (high-speed) specification
M	Medium-thrust specification
V	High-speed specification

Note : M is applicable to LT···C.
V is applicable to LT170L.

Shape of moving table	
S	Standard
F	Flanged

Stroke length (mm)

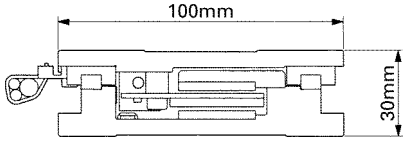
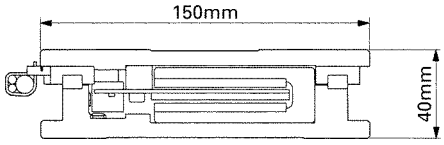
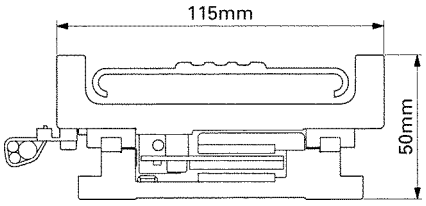
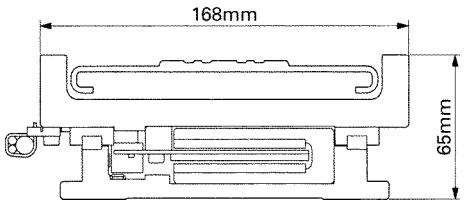
Resolution	
5	0.5 μm
10	1.0 μm

Cover specification	
No symbol	Without cover
D	With cover

Note : D is applicable to flanged moving tables only.

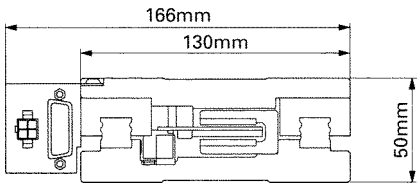
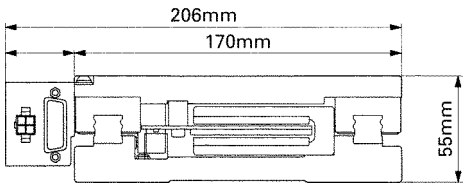
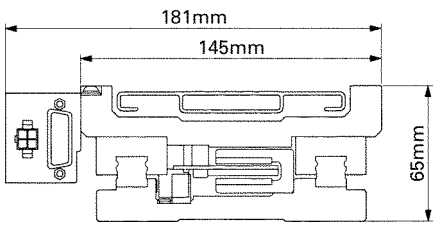
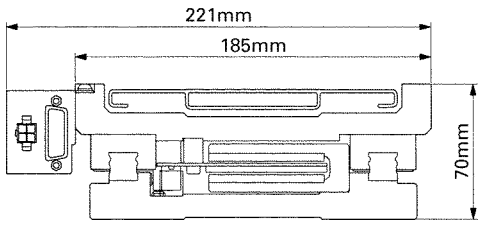
Moving table specification	
No symbol	Single table
T2	Twin tables

Table 1 Models of Linear Motor Table LT···C

Specification \ Model		LT100CG	LT100CM	LT150CG	LT150CM
		High-thrust specification 150N	Medium-thrust specification 45N	High-thrust specification 450N	Medium-thrust specification 130N
Without cover	Single table ／5 ／10 Twin tables ／5T2 ／10T2				
With cover(1)	Single table ／5D ／10D Twin tables ／5DT2 ／10DT2				
Applicable driver		TDL1-4000		TDL1-7000	
Reference page		19～22		23～26	

Note(1) : Table with cover specification is applicable to flanged moving tables only.

Table 2 Models of Linear Motor Table LT···L

Specification \ Model		LT130LG	LT170LG	LT170LV
		High-thrust/high-speed specification 150N	High-thrust specification 450N	High-speed specification 190N
Without cover	Single table ／5 ／10 Twin tables ／5T2 ／10T2			
With cover(1)	Single table ／5D ／10D Twin tables ／5DT2 ／10DT2			
Applicable driver		TDL1-4000	TDL1-7000	
Reference page		27～30	31～34	

Note(1) : Table with cover specification is applicable to flanged moving tables only.

1N=0.102kgf=0.2248lbs.
1mm=0.001m=0.03937inch

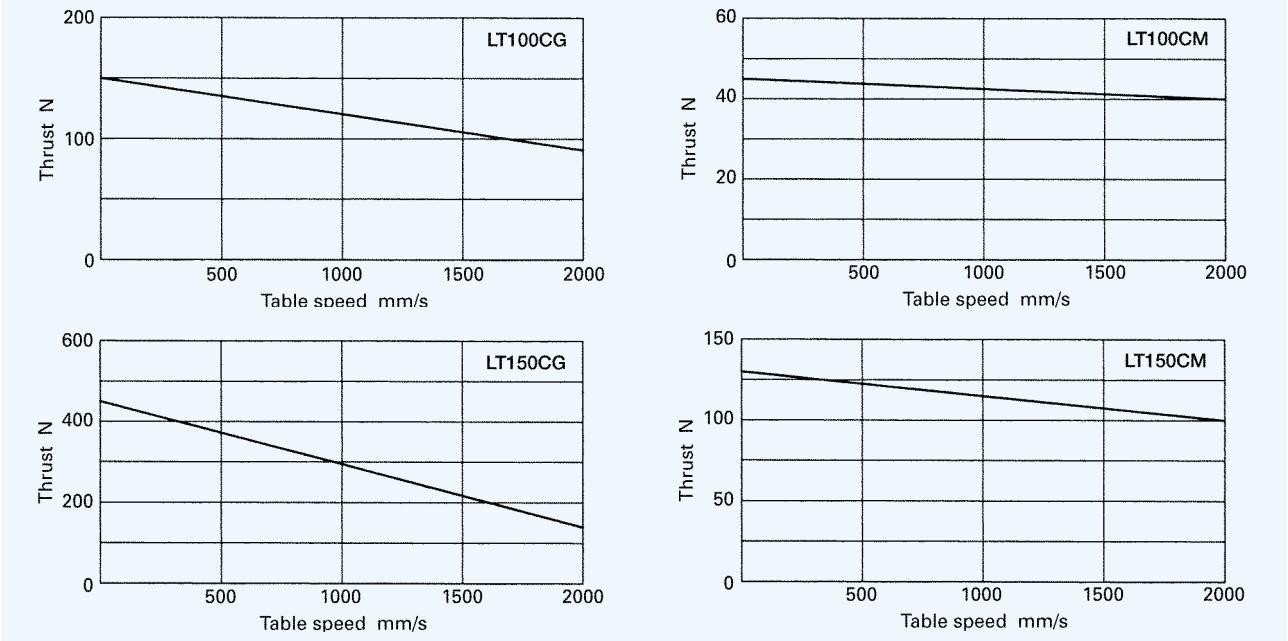
Specifications and Performance

Table 3 Table performance of LT···C

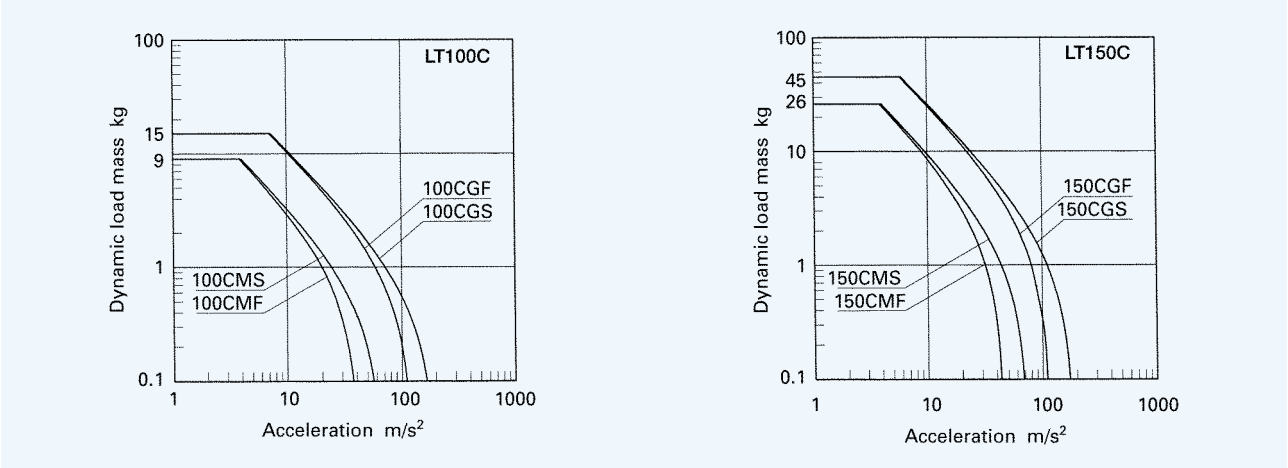
Item \ Model		LT100CG	LT100CM	LT150CG	LT150CM
Maximum thrust(1)	N	150	45	450	130
Rated thrust	N	15	4.5	60	18
Maximum load mass	kg	15	9	45	26
Resolution	μm	0.5 or 1.0 (can be selected)			
Maximum speed	m/s	2.0(2)			
Repeatability	μm	±0.5/±1.0(3) (4)			

Note(1) : The duration of maximum thrust is one second max.
(2) : This speed may not be reached depending on the maximum output frequency of the controller used.
(3) : In case a resolution of 0.5μm is selected, the repeatability is ±0.5μm.
(4) : These values are applicable when the temperature of Linear Motor Table LT has reached the stable state.

●Thrust characteristics



●Dynamic load mass



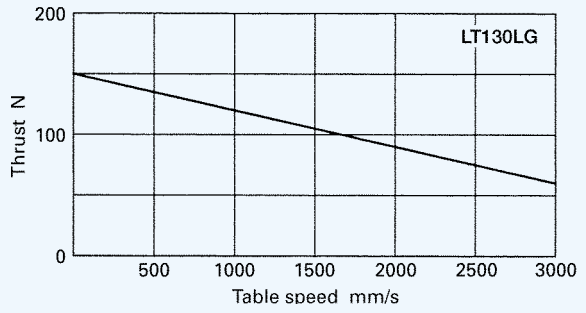
Remark : These values are calculated for the thrust when the table speed is 1,000mm/s.

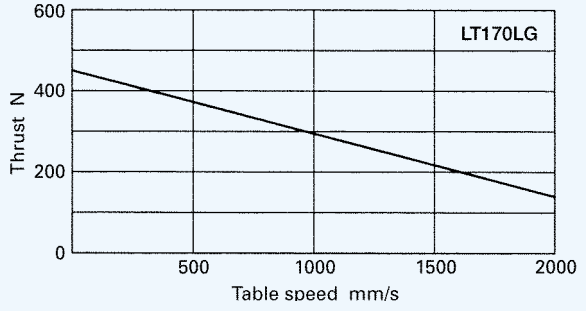
Table 4 Table performance of LT···L

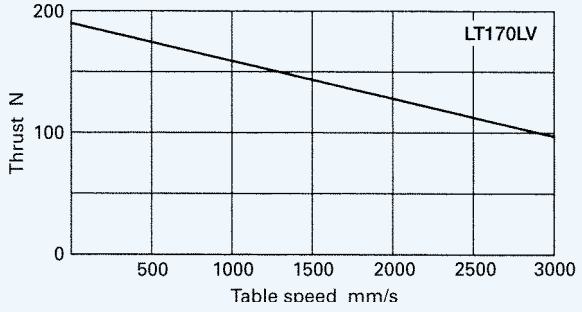
Item \ Model		LT130LG	LT170LG	LT170LV
Maximum thrust(1)	N	150	450	190
Rated thrust	N	15	60	25
Maximum load mass	kg	15	45	28
Resolution	μm	0.5 or 1.0 (can be selected)		
Maximum speed	m/s	2.0/3.0(2)(3)	2.0(2)	2.0/3.0(2)(3)
Repeatability	μm	±0.5/±1.0(3)(4)		

Note(1) : The duration of maximum thrust is one second max.
(2) : This speed may not be reached depending on the maximum output frequency of the controller used.
(3) : In case a resolution of 0.5μm is selected, the maximum speed is 2.0m/s and the repeatability is ±0.5μm.
(4) : These values are applicable when the temperature of Linear Motor Table LT has reached the stable state.

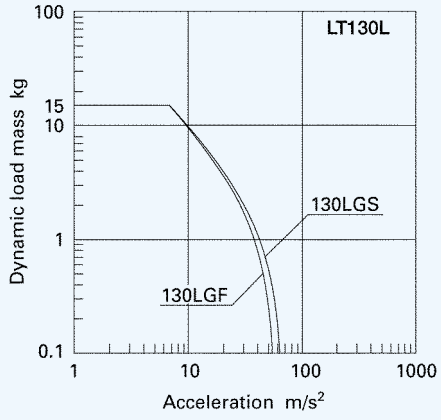
●Thrust characteristics

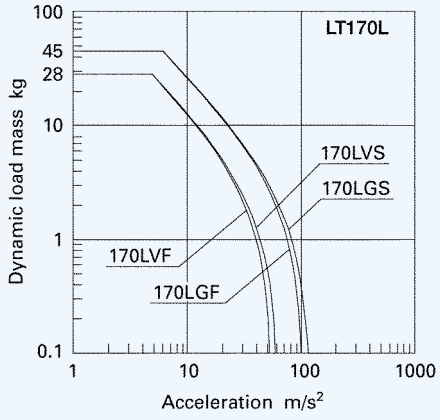






●Dynamic load mass





Remark : These values are calculated for the thrust when the table speed is 1,000mm/s.

1N=0.102kgf=0.2248lbs.
1mm=0.001m=0.03937inch

System Configuration

Table 5 System configuration of single table (when using a programmable controller)

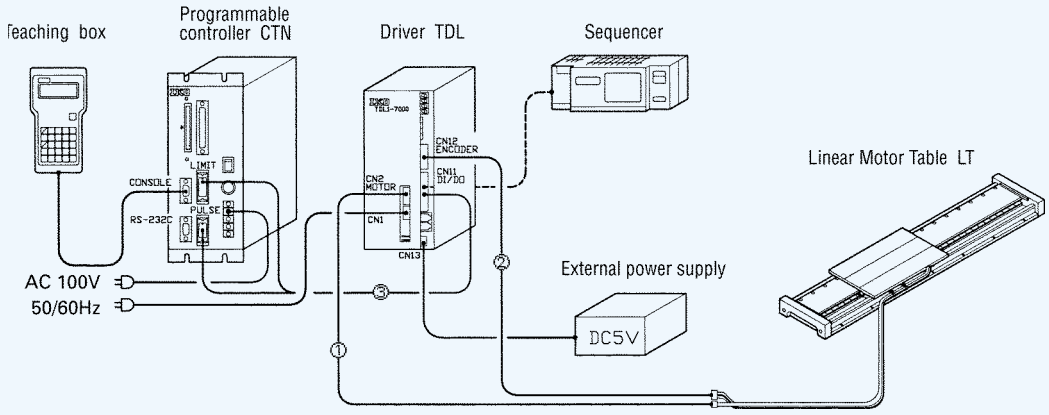


Table	Driver	①Motor relay cord(1)	②Limit/Encoder relay cord(1)	③Pulse/Limit cord(2)	Programmable controller	Teaching box
LT100C LT130L	TDL1-4000	TAE2083-MC03	TAE2085-EC03	TAE1051-LD	CTN130G	TAE1016-TB
				TAE1052-LD	CTN140G	TAE1025-TB
				TAE1053-LD	CTN150S	TAE1048-TB
LT150C LT170L	TDL1-7000	TAE2084-MC03		TAE1051-LD	CTN130G	TAE1016-TB
				TAE1052-LD	CTN140G	TAE1025-TB
				TAE1053-LD	CTN150S	TAE1048-TB

Note(1) : The motor relay cord and the limit/encoder relay cord are 3m long (standard).
(2) : The pulse/limit cord is 1.5m long.
Remark : In LT130L and LT170L, the relay cords are directly connected to the connectors of the moving table.

Table 6 System configuration of single table (when using a PC)

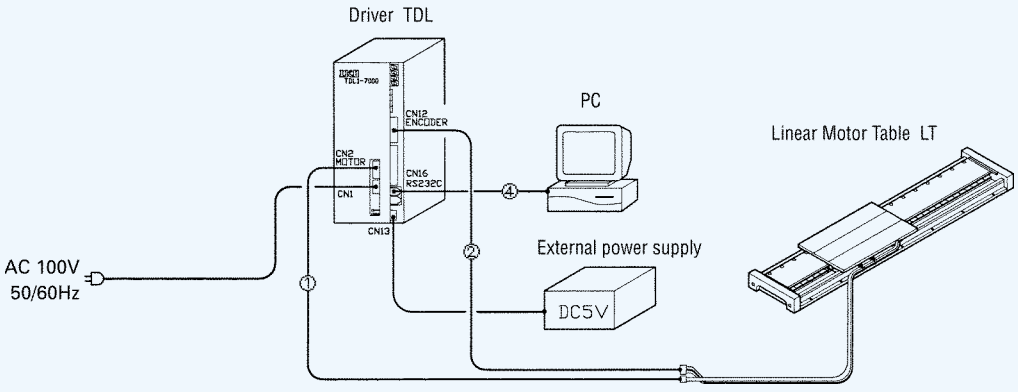


Table	Driver	①Motor relay cord(1)	②Limit/Encoder relay cord(1)	④RS232C cord(2)
LT100C LT130L	TDL1-4000	TAE2083-MC03	TAE2085-EC03	TAE2089RSP (Dsub 25-pin)
LT150C LT170L	TDL1-7000	TAE2084-MC03		TAE2090RSD (Dsub 9-pin)

Note(1) : The motor relay cord and the limit/encoder relay cord are 3m long (standard).
(2) : The RS232C cord is 2m long.
Remark : In LT130L and LT170L, the relay cords are directly connected to the connectors of the moving table.

Table 7 System configuration of twin tables (when using a programmable controller)

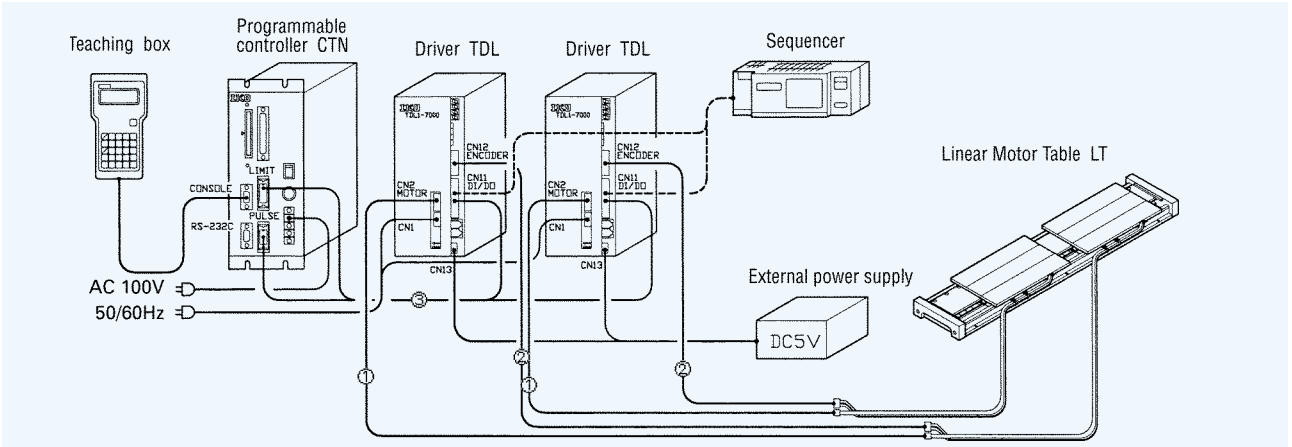


Table	Driver	①Motor relay cord(1)	②Limit/Encoder relay cord(1)	③Pulse/Limit cord(2)	Programmable controller	Teaching box
LT100C/T2 LT130L/T2	TDL1-4000 ×2	TAE2083-MC03 ×2	TAE2085-EC03 ×2	TAE1054-LD	CTN230G	TAE1016-TB
				TAE1055-LD	CTN240G	TAE1025-TB
LT150C/T2 LT170L/T2	TDL1-7000 ×2	TAE2084-MC03 ×2		TAE1054-LD	CTN230G	TAE1016-TB
				TAE1055-LD	CTN240G	TAE1025-TB

Note(1) : The motor relay cord and the limit/encoder relay cord are 3m long (standard).
(2) : The pulse/limit cord is 1.5m long.
Remark : In LT130L and LT170L, the relay cords are directly connected to the connectors of the moving table.

Table 8 System configuration of twin tables (when using a PC)

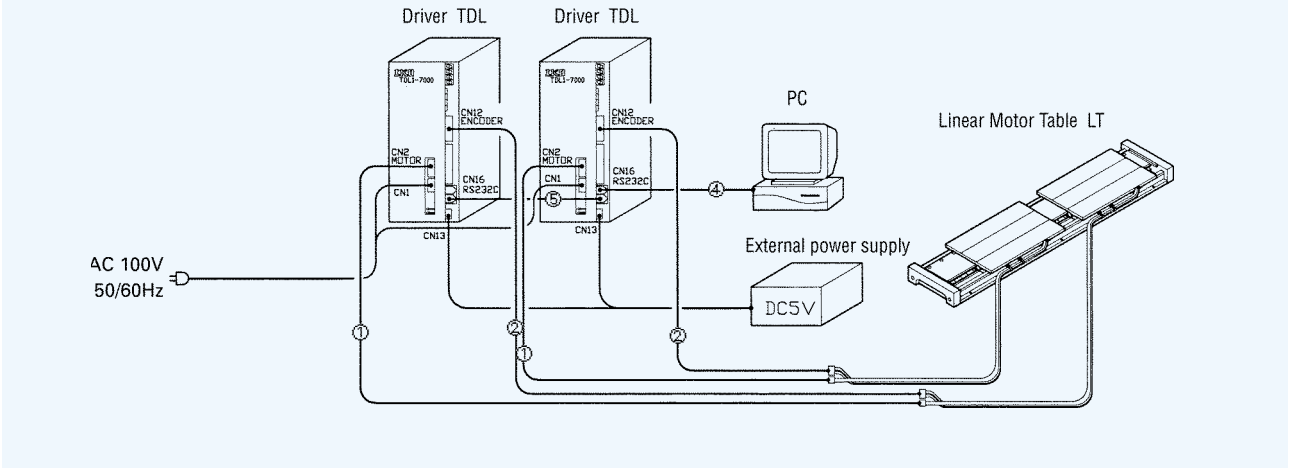


Table	Driver	①Motor relay cord(1)	②Limit/Encoder relay cord(1)	④RS232C cord(2)	⑤Inter-axial cable(3)
LT100C/T2 LT130L/T2	TDL1-4000 ×2	TAE2083-MC03 ×2	TAE2085-EC03 ×2	TAE2089RSP (Dsub 25-pin) TAE2090RSD (Dsub 9-pin)	TAE2099-LC
LT150C/T2 LT170L/T2	TDL1-7000 ×2	TAE2084-MC03 ×2			

Note(1) : The motor relay cord and the limit/encoder relay cord are 3m long (standard).
(2) : The RS232C cord is 2m long.
(3) : The inter-axial cord is 0.3m long.
Remark : In LT130L and LT170L, the relay cords are directly connected to the connectors of the moving table.

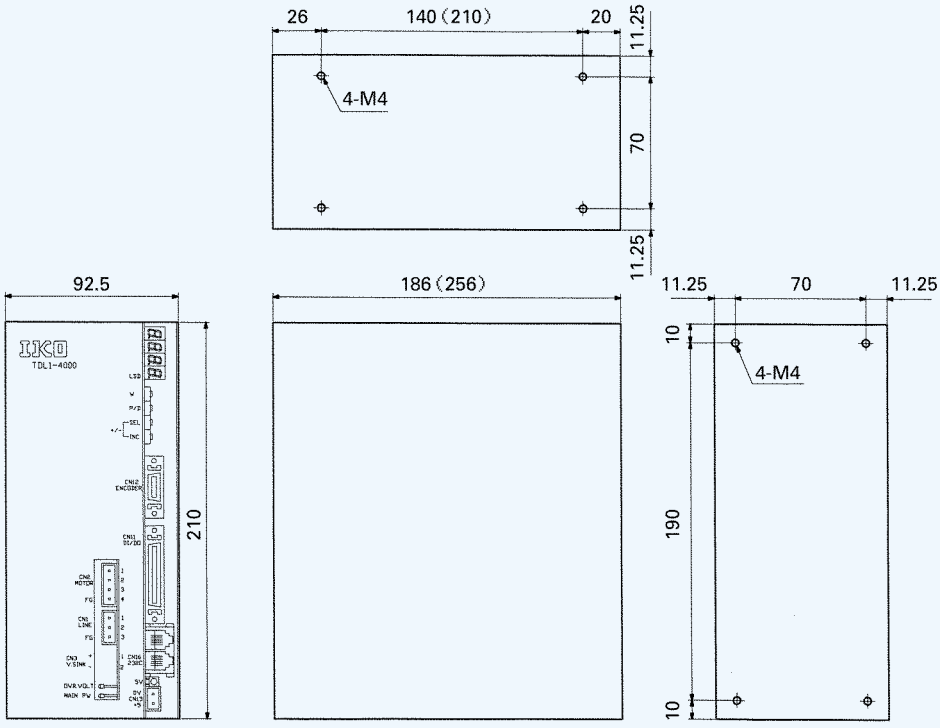
1N=0.102kgf=0.2248lbs.
1mm=0.001m=0.03937inch

Exclusive Driver for Linear Motor Table LT

Table 9 Specifications of Exclusive Driver for Linear Motor Table LT

unit : mm

TDL1-4000
TDL1-7000



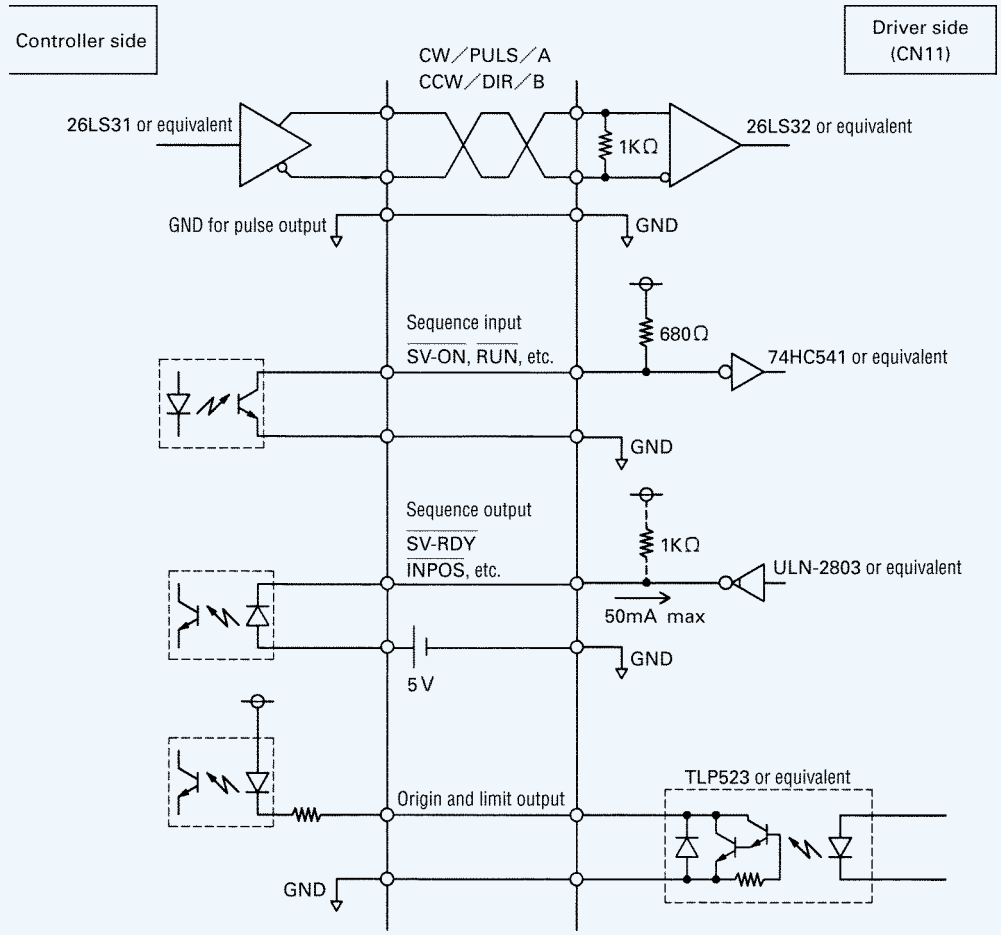
The values in parentheses indicate the dimensions of TDL1-7000.

Item	Specification
Main power supply	AC90～110V 50／60Hz
Control power supply DC+5V	4.75 to 5.25 V/1.3 A including encoder power supply (250mA)
Output limitations	Current feedback, overheat (motor and driver), thrust control, servo off, dynamic brake, forward rotation disabled, reverse rotation disabled
PWM carrier frequency	25kHz
Ambient temperature	0～40℃
Radiator fin temperature	70℃max (overheat cut type)
Encoder input method	Two-phase incremental encoder (line driver)
Response speed	2.0m／s max (for resolution 0.5 μm), 3.0m／s max (for resolution 1.0 μm)
Sequence input signal	Servo on, forward rotation disabled, reverse rotation disabled, gain low, dynamic brake, reset, operate
Origin signal	Origin, pre-origin
Sequence output signal	Servo ready, in position, alarm code 0 to 2
Parameter key	4 keys (digit selection, increase, data/parameter, write)
Data display	LED 7-segments 4-digits, output current/parameter/error code, etc.
Parameter items (EEPROM)	Resolution, gain, in position width, acceleration filter, electronic gear
Vibration and impact	Vibration 0.5G, (single) impact 5G
Mass (Ref.)	TDL1-4000：2.2kg／TDL1-7000：3.2kg

Table 10 Specifications of I/O connector (CN11)

Pin No.	Signal name	Function	Pin No.	Signal name	Function
1～5	—	Disabled	29 (30)	$\overline{\text{INPOS}}$	In position output
6	Reserved		31 (32)	$\overline{\text{A-CODE0}}$	Alarm output The type of alarm is known by which of A-CODE 0 to 2 indicates L level.
7	CW+／PULS+／A+	+ direction pulse/ position command pulse/A phase	33 (34)	$\overline{\text{A-CODE1}}$	
8	CW−／PULS−／A−		35 (36)	$\overline{\text{A-CODE2}}$	
9	CCW+／DIR+／B+	− direction pulse/ direction command signal/B phase	37	P-ORG	Pre-origin signal output for return to origin
10	CCW−／DIR−／B−		38	Reserved	
11 (12)	$\overline{\text{SV-ON}}$	Servo ON at L level, motor free at H level	39	CWL	+ direction motion limit signal output
13 (14)	$\overline{\text{FOR-OFF}}$	Forward rotation disabled at L level	40	Reserved	
15 (16)	$\overline{\text{REV-OFF}}$	Reverse rotation disabled at L level	41	CCWL	− direction motion limit signal output
17、18	—	Disabled	42	Reserved	
19 (20)	$\overline{\text{GAINL}}$	Gain low	43	$\overline{\text{ORG}}$	Origin reference signal output for return to origin
21 (22)	$\overline{\text{DBK}}$	Dynamic brake activated at L level	44	Reserved	
23 (24)	$\overline{\text{RES}}$	Alarm reset at the fall to L level	45	GND	GND for sensor signal
25 (26)	$\overline{\text{RUN}}$	Follow-up motion to CW/CCW input at L level	46	GND	GND for CW/CCW input
27 (28)	$\overline{\text{SV-RDY}}$	Servo ready output	47～50	—	Disabled

Input/output circuit



Remark : The numbers in parentheses in the column of pin No. indicate the pin numbers of the return GND.

1N=0.102kgf=0.2248lbs.
1mm=0.001m=0.03937inch

Programmable Controller

Table 11 Main specifications of programmable controller

Model		Programmable input type		Point memory type
		CTN130G CTN230G CTN430G	CTN140G CTN240G	CTN150S
		High-function type	Compact type	
Appearance				
Number of control axes		1, 2 and 4 axes	1 and 2 axes	1 axis
Power supply voltage		AC85～132V	DC24V±10%	DC24V±10%
Maximum output frequency		1.5Mpps	200kpps	2.5Mpps
Pulse output system		CW/CCW pulse or direction command/forward or reverse pulse		
		Line driver	Line driver	Line driver
Maximum command value		±99999999 pulses	±999999 pulses	±2147483648 pulses
Acceleration/deceleration method		Straight line, S-shaped	Straight line	Straight line, S-shaped, cycloid
Command input system		Absolute command or incremental command		
Program capacity		2000 steps	1000 steps	64-point memory (not programmable)
General-purpose input and output (I／O)	Input	20 points	8 points (CTN140G) 20 points (CTN240G)	None
	Output	12 points	7 points (CTN140G) 12 points (CTN240G)	None
Linear and arc interpolation		○ (CTN230G, CTN430G)	×	×
General-purpose input/output add-ons		○	×	×
Memory card		○	×	×
RS-232C operation		○	○	○
Position correction of linear scale		○	×	×
Remarks		The programmable input type executes programs entered by a teaching box or PC in order of steps. Programming can be performed either by an optional teaching box or PC or by simple teaching.		The point memory type does not provide programming function. Stored points are switched over and executed with external devices such as a sequencer or PC.
		High-function type with a 100V AC power supply input. High speed output at 1.5Mpps maximum. A series of multi-axis controllers up to four axes.	A type to be incorporated into compact electric devices with a 24V DC power supply input.	

Remark : ○ indicates that the function is provided. X indicates that the function is not provided.

Thrust and Dynamic load mass

■What is a thrust?

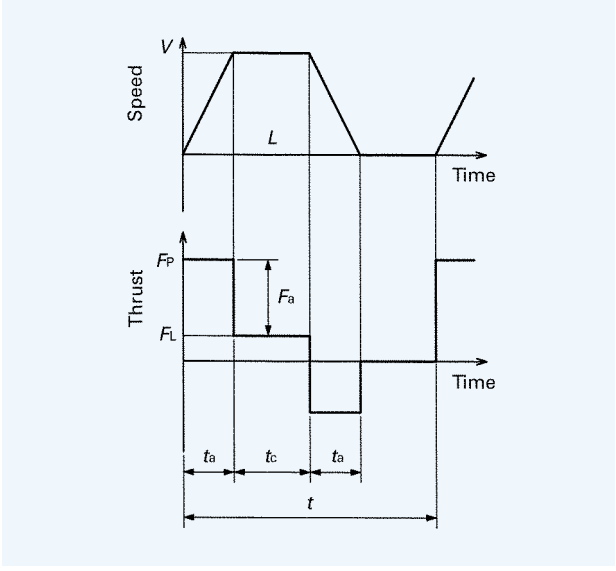
A thrust is a force in the moving direction exerted by the moving coil as shown in the figure (page 4) illustrating the Principle of Operation.
The thrust becomes the maximum when the table is at rest, and decreases as the table speed increases.
The thrust required for acceleration or deceleration must be examined referring to the graph of thrust characteristics on pages 9 and 10.

■What is an effective thrust?

An effective thrust is the effective value of the thrust required in a given operation pattern.
When this value exceeds the rated thrust of Linear Motor Table LT, the motor may overheat or seize. Therefore, make sure that, in principle, the calculated effective thrust does not exceed the rated thrust. Also, note that the operation limit may depend on the operating environments, etc.
In general, the effective thrust (F_{rms}) is obtained as follows. (For a calculation example, see page 17.)

$$F_{rms}=\sqrt{\frac{F_P^2\times t_a+(F_P-2\times F_L)^2\times t_a+F_L^2\times t_c}{t}}$$

where, F_P is the force required for acceleration/deceleration. F_L is the force due to running resistance. The running resistance consists of the friction of linear motion rolling guide incorporated in Linear Motor Table LT, the pulling resistance of cord, etc.



■What is a dynamic load mass?

A dynamic load mass is the mass of the maximum load (weight) that can be placed on the table with which the table can accelerate or decelerate at the required rate. The acceleration or deceleration of Linear Motor Table LT becomes smaller, as the mass on the table becomes larger. Therefore, when examining an operation pattern, the relationship between the mass of the load and acceleration/deceleration must be considered.
The graphs showing the relationship between the dynamic load mass and acceleration on pages 9 and 10 are given for the thrust of Linear Motor Table LT at a speed of 1,000 mm/s. For example, the acceleration/deceleration under the load of 10 kg is about 24 m/s^2 max., in the case of LT150CG.

1N=0.102kgf=0.2248lbs.
1mm=0.001m=0.03937inch

Examination of Operation Pattern

■Calculating an acceleration/deceleration time

The thrust required for driving Linear Motor Table LT reaches its peak during acceleration.
The thrust required during acceleration cannot exceed the output thrust of Linear Motor Table LT. The limit acceleration time is therefore calculated by the following formula.

- **Frictional resistance of the rolling guide** F_f

  $F_f = \mu (W_L + W_T) g$ (N)

  where, the minimum value of F_f is set as follows :
  2.5N for LT100C.
  5.0N for LT150C.
  6.0N for LT130L.
  6.0N for LT170L.

- **Force due to running resistance** F_L

  $F_L = F_f + F_C$ (N)

- **Force due to acceleration** F_a

  $F_a = (W_L + W_T) \cdot \frac{V}{t_a}$ (N)

- **Thrust required for acceleration** F_P

  $F_P = F_a + F_L$ (N)

- **Limit acceleration time** t_a

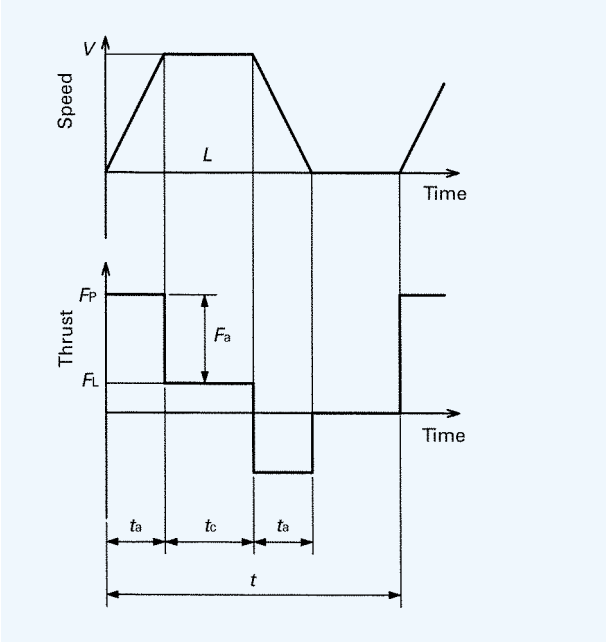
  $t_a = \frac{(W_L + W_T) \cdot V \cdot k}{F_M - F_L}$ (s)

where,
μ : Friction coefficient of the rolling guide 0.01
W_L : Mass of the load, kg
W_T : Mass of the moving part, kg
F_C : Pulling resistance of the cord, N
F_M : Thrust of Linear Motor Table LT, N
Maximum thrust at travel speed V (See pages 9 and 10.)
t_a : Acceleration time, s
V : Travel speed, m/s
g : Gravitational acceleration, 9.8m/s^2
k : Safety factor (1.3)

The pulling resistance differs depending on the cord mass and the pulling method. Assume an appropriate resistance value for calculation.

■Example of examination of operation pattern

Depending on the operation rate of Linear Motor Table LT, the effective thrust may exceed the rated thrust of the motor, and the motor may overheat or seize leading to a breakdown or injury. Before operating this table, make sure that the effective thrust does not exceed the rated thrust of the motor.
An example of examination of an operation pattern is given for the case of LT150CGS.
Assume an operation pattern as shown below considering the limit acceleration time.



Items

Mass of the load	W_L	10.0 (kg)
Mass of the moving table	W_T	1.5 (kg)
Stroke setting	L	0.75 (m)
Maximum speed	V	1.5 (m/s)
Time	t_a	0.2 (s)
	t_c	0.3 (s)
	t	1.0 (s)
Friction coefficient	μ	0.01
Pulling resistance of the cord	F_C	1.0 (N)

Step 1: Calculating the thrust required for acceleration (or deceleration)

❶Frictional resistance of the rolling guide F_f

$F_f=\mu(W_L+W_T)g$

$=0.01\times(10.0+1.5)\times9.8\fallingdotseq1.1 < 5.0$ (N)

Let $F_f=5.0$

❷Force due to running resistance F_L

$F_L=F_f+F_C=5.0+1.0=6.0$ (N)

❸Force due to acceleration F_a

$$F_a=(W_L+W_T)\cdot\frac{V}{t_a}$$

$$=(10.0+1.5)\times\frac{1.5}{0.2}=86.25\ (N)$$

❹Thrust required for acceleration F_P

$F_P=F_a+F_L$

$=86.25+6.0=92.25$ (N)

To simplify the calculation, assume that the thrust during deceleration is F_P as well.
Check if $F_P\times1.3$ (safety factor) is below the thrust characteristic curve on page 9.

If this value is above the curve, re-examine the maximum speed, acceleration (deceleration) time, and other factors of the operation pattern.
In the example pattern, it is shown that the thrust value is below the thrust characteristic curve as follows.

F_M (maximum thrust at 1.5m/s)=approx. 220
$F_P\times1.3$ (safety factor)$=92.25\times1.3\fallingdotseq119.93 < F_M$

Step 2: Calculating an effective thrust

The effective thrust F_{rms} can be determined as follows.

$$F_{rms}=\sqrt{\frac{F_P^2\times t_a+(F_P-2\times F_L)^2\times t_a+F_L^2\times t_c}{t}}$$

$$=\sqrt{\frac{92.25^2\times0.2+(92.25-2\times6.0)^2\times0.2+6.0^2\times0.3}{1.0}}\fallingdotseq54.78\ (N)$$

Make sure that F_{rms} does not exceed the rated thrust of the motor. If the rated thrust is exceeded, re-examine the maximum speed, acceleration (deceleration) time, and other factors of the operation pattern. In the example pattern, continuous operation is possible.

Cautions for Use

◆Linear Motor Table LT is a precision machine. Therefore, handle it with great care and do not apply an excessive load or strong impact on it.
◆Use this product in a clean environment free from water, oil, dust, etc.
◆Make sure that the mounting base is free from dirt and harmful protuberances.
◆The flatness of mounting base for Linear Motor Table LT must be less then 30μm.
◆Linear Motor Table LT contains a strong magnet. If a ferromagnetic body is placed close to the table, it may be pulled.
◆In design, take necessary measures to avoid external forces that may constrain the table.
◆The linear motion rolling guide assembled in Linear Motor table LT is lubricated with grease. So make sure to keep dirt or any foreign matter from entering into the table.
◆Linear Motor Table LT is machined, assembled, and adjusted with high precision. Therefore, never disassemble or remodel the table.
◆The magnetic circuit inside Linear Motor Table LT is a closed circuit. However, a slight magnetic flux leakage exists and may influence a device sensitive to magnetism used in the neighborhood. In such instances, please consult IKO.
◆In case the table is installed on a wall, cables must be placed underneath.
◆Linear Motor Table LT cannot be used in a vertical position.

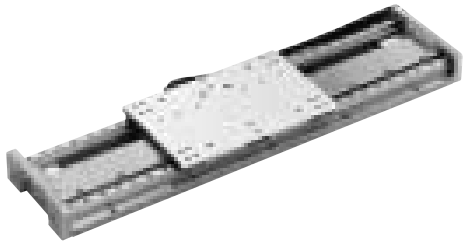
◎The appearance, specifications, and other details of the product are subject to change without prior notice for improvement.

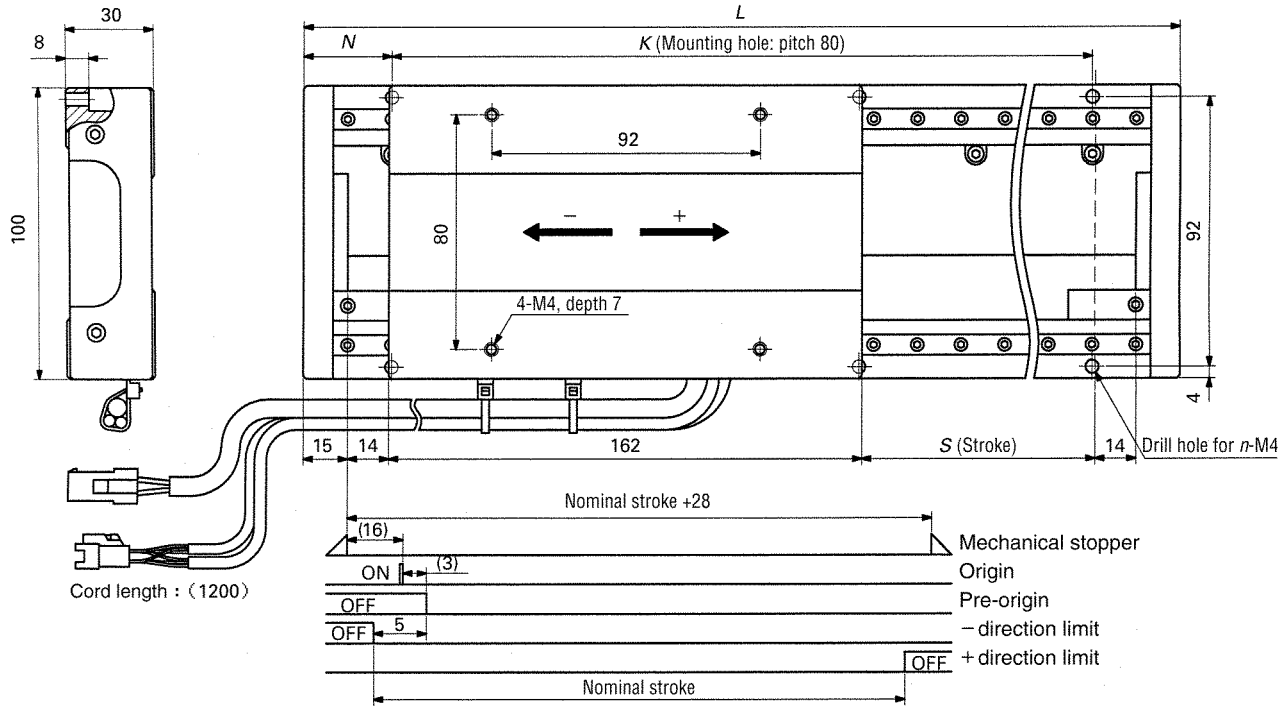
1N=0.102kgf=0.2248lbs.
1mm=0.001m=0.03937inch

Compact series • LT100C

Single table
LT100CGS
LT100CMS

Maximum thrust : 150N (high-thrust specification)
45N (medium-thrust specification)





Identification number	Stroke length S(1) mm	Overall length L mm	Mounting hole in bed N mm	Mounting hole in bed K mm	Mounting hole in bed n (Number of holes)	Total mass of table kg	Mass of moving table kg
LT100CGS— 200／ 5 LT100CGS— 200／10 LT100CMS— 200／ 5 LT100CMS— 200／10	200	420	50	320	10	4.9	0.58
LT100CGS— 400／ 5 LT100CGS— 400／10 LT100CMS— 400／ 5 LT100CMS— 400／10	400	620	30	560	16	6.9	
LT100CGS— 600／ 5 LT100CGS— 600／10 LT100CMS— 600／ 5 LT100CMS— 600／10	600	820	50	720	20	9.0	
LT100CGS— 800／ 5 LT100CGS— 800／10 LT100CMS— 800／ 5 LT100CMS— 800／10	800	1020	30	960	26	11.1	
LT100CGS—1000／ 5 LT100CGS—1000／10 LT100CMS—1000／ 5 LT100CMS—1000／10	1000	1220	50	1120	30	13.1	

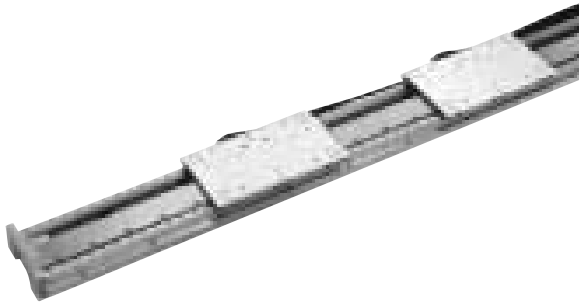
Note(1) : For models with stroke lengths other than those shown in the table, please consult IKO.

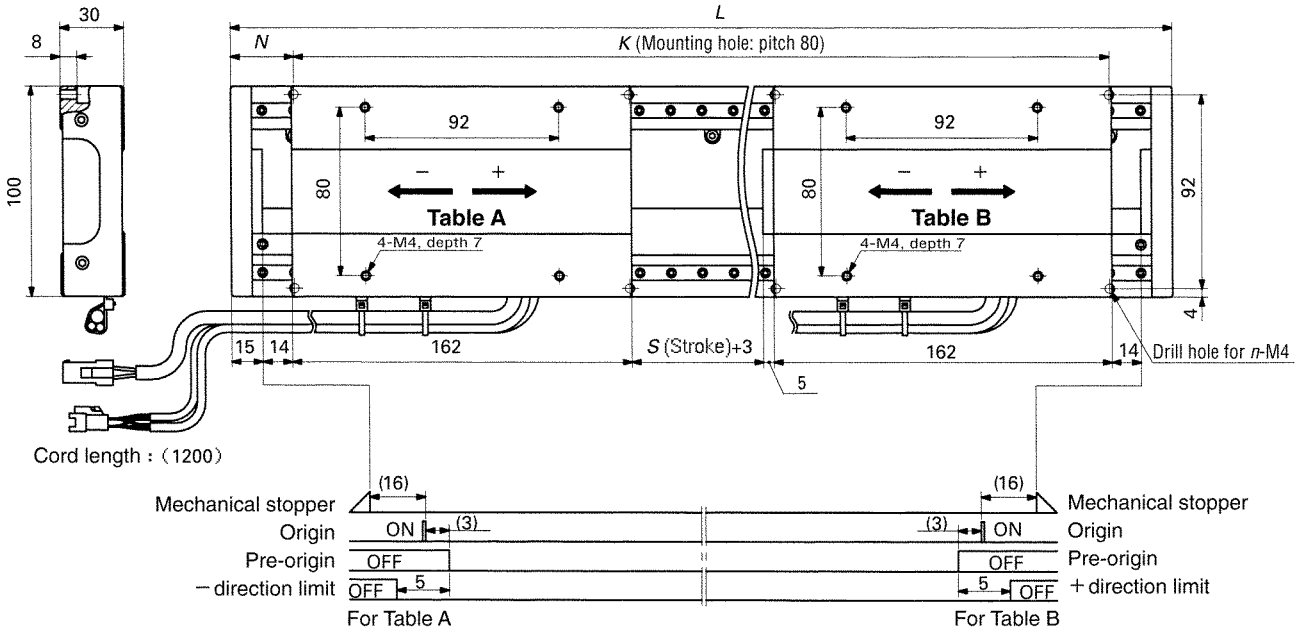
Compact series • LT100C

Twin tables

LT100CGS／T2
LT100CMS／T2

Maximum thrust : 150N (high-thrust specification)
45N (medium-thrust specification)





Identification number	Stroke length S(1) mm	Overall length L mm	Mounting hole in bed N mm	Mounting hole in bed K mm	Mounting hole in bed n (Number of holes)	Total mass of table kg	Mass of moving table kg
LT100CGS－230／ 5T2 LT100CGS－230／10T2 LT100CMS－230／ 5T2 LT100CMS－230／10T2	230	620	30	560	16	7.5	0.58
LT100CGS－430／ 5T2 LT100CGS－430／10T2 LT100CMS－430／ 5T2 LT100CMS－430／10T2	430	820	50	720	20	9.6	
LT100CGS－630／ 5T2 LT100CGS－630／10T2 LT100CMS－630／ 5T2 LT100CMS－630／10T2	630	1020	30	960	26	11.7	
LT100CGS－830／ 5T2 LT100CGS－830／10T2 LT100CMS－830／ 5T2 LT100CMS－830／10T2	830	1220	50	1120	30	13.7	

Note(1) : For models with stroke lengths other than those shown in the table, please consult IKO.

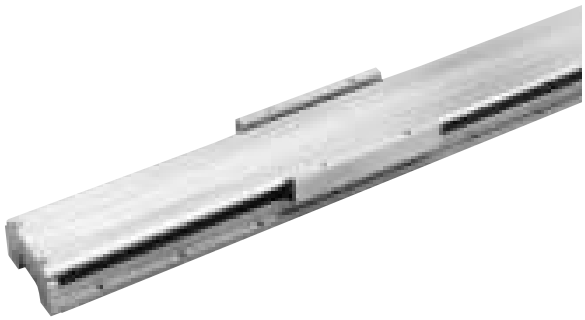
1N＝0.102kgf＝0.2248lbs.
1mm＝0.001m＝0.03937inch

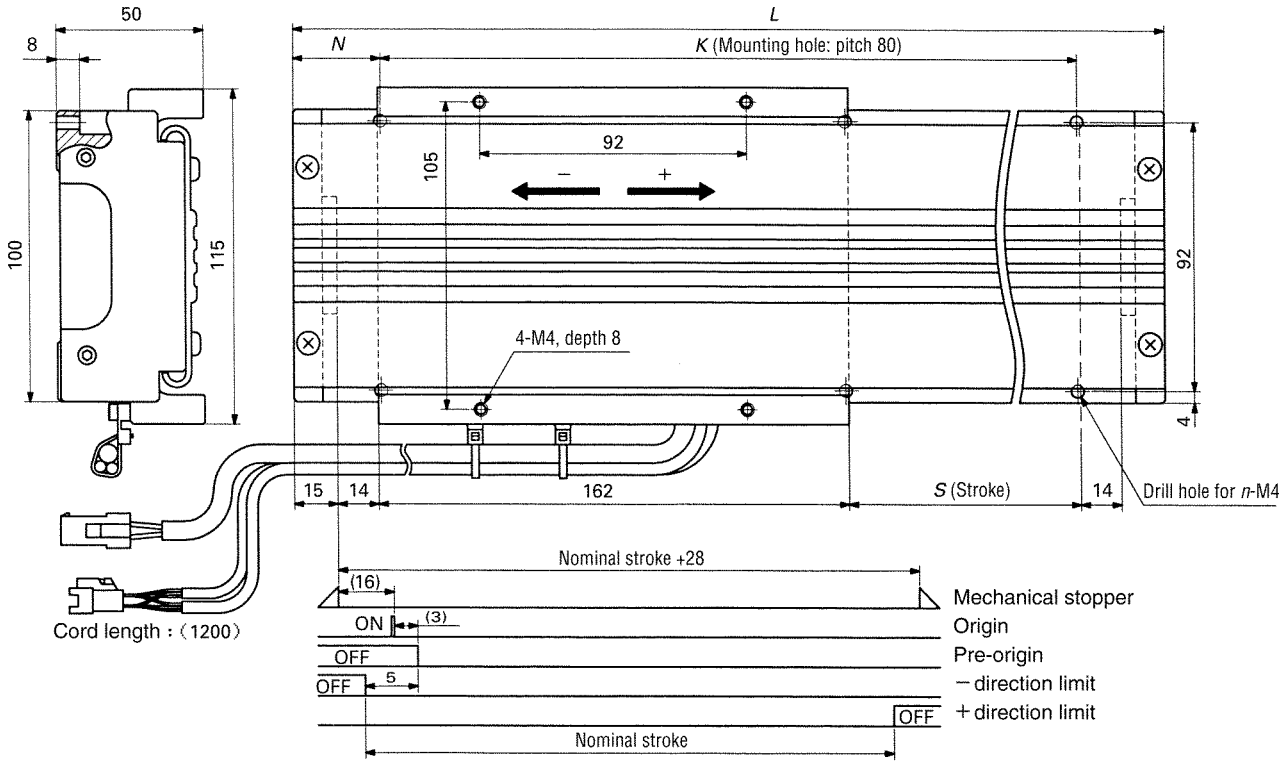
Compact series • LT100C

Single table with cover

LT100CGF／D
LT100CMF／D

Maximum thrust : 150N (high-thrust specification)
45N (medium-thrust specification)





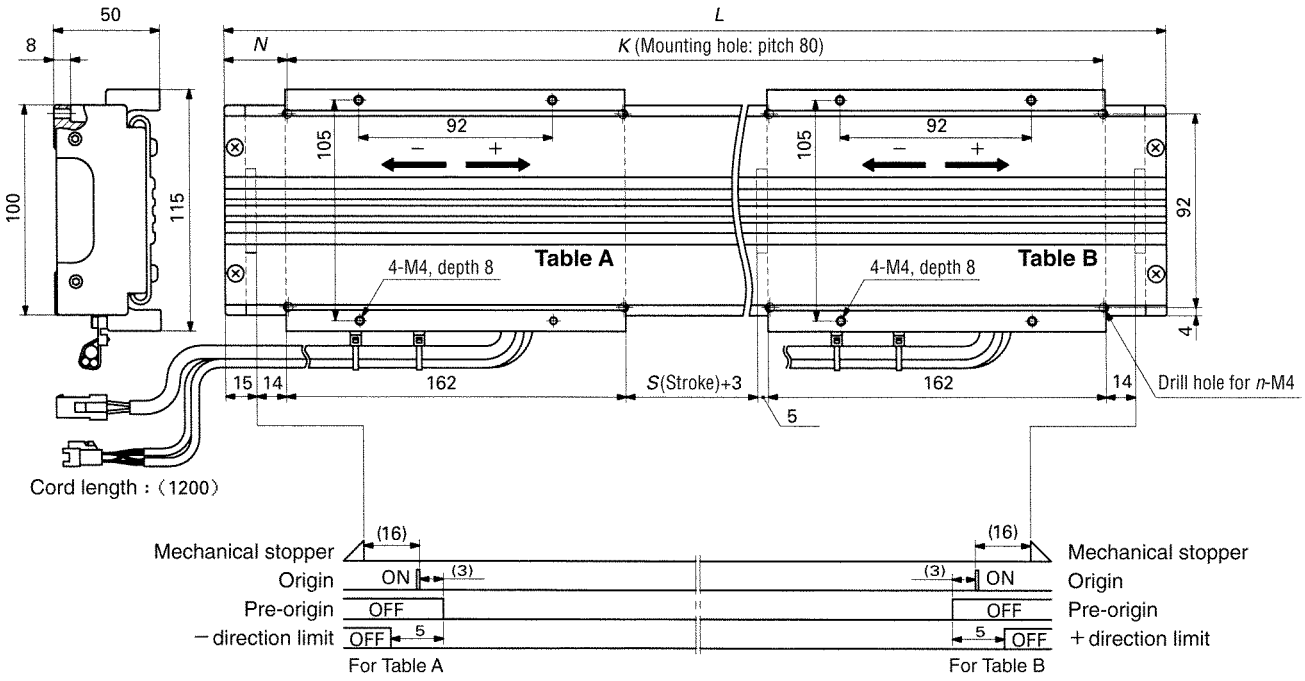
Identification number	Stroke length S(1) mm	Overall length L mm	Mounting hole in bed N mm	Mounting hole in bed K mm	Mounting hole in bed n (Number of holes)	Total mass of table kg	Mass of moving table kg
LT100CGF— 200／ 5D LT100CGF— 200／10D LT100CMF— 200／ 5D LT100CMF— 200／10D	200	420	50	320	10	5.6	0.93
LT100CGF— 400／ 5D LT100CGF— 400／10D LT100CMF— 400／ 5D LT100CMF— 400／10D	400	620	30	560	16	7.8	
LT100CGF— 600／ 5D LT100CGF— 600／10D LT100CMF— 600／ 5D LT100CMF— 600／10D	600	820	50	720	20	10.0	
LT100CGF— 800／ 5D LT100CGF— 800／10D LT100CMF— 800／ 5D LT100CMF— 800／10D	800	1020	30	960	26	12.2	
LT100CGF—1000／ 5D LT100CGF—1000／10D LT100CMF—1000／ 5D LT100CMF—1000／10D	1000	1220	50	1120	30	14.4	

Note(1) : For models with stroke lengths other than those shown in the table, please consult IKO.

Twin tables with cover

LT100CGF／DT2
LT100CMF／DT2

Maximum thrust : 150N (high-thrust specification)
45N (medium-thrust specification)



Identification number	Stroke length S(1) mm	Overall length L mm	Mounting hole in bed N mm	Mounting hole in bed K mm	Mounting hole in bed n (Number of holes)	Total mass of table kg	Mass of moving table kg
LT100CGF－230／ 5DT2 LT100CGF－230／10DT2 LT100CMF－230／ 5DT2 LT100CMF－230／10DT2	230	620	30	560	16	8.7	0.93
LT100CGF－430／ 5DT2 LT100CGF－430／10DT2 LT100CMF－430／ 5DT2 LT100CMF－430／10DT2	430	820	50	720	20	10.9	
LT100CGF－630／ 5DT2 LT100CGF－630／10DT2 LT100CMF－630／ 5DT2 LT100CMF－630／10DT2	630	1020	30	960	26	13.2	
LT100CGF－830／ 5DT2 LT100CGF－830／10DT2 LT100CMF－830／ 5DT2 LT100CMF－830／10DT2	830	1220	50	1120	30	15.4	

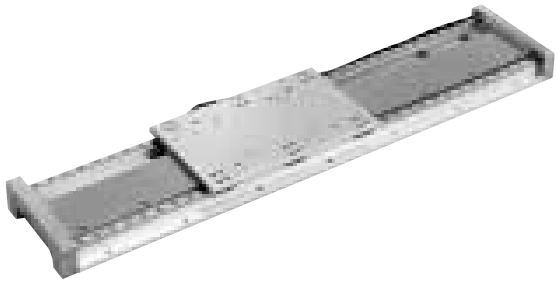
Note(1) : For models with stroke lengths other than those shown in the table, please consult IKO.

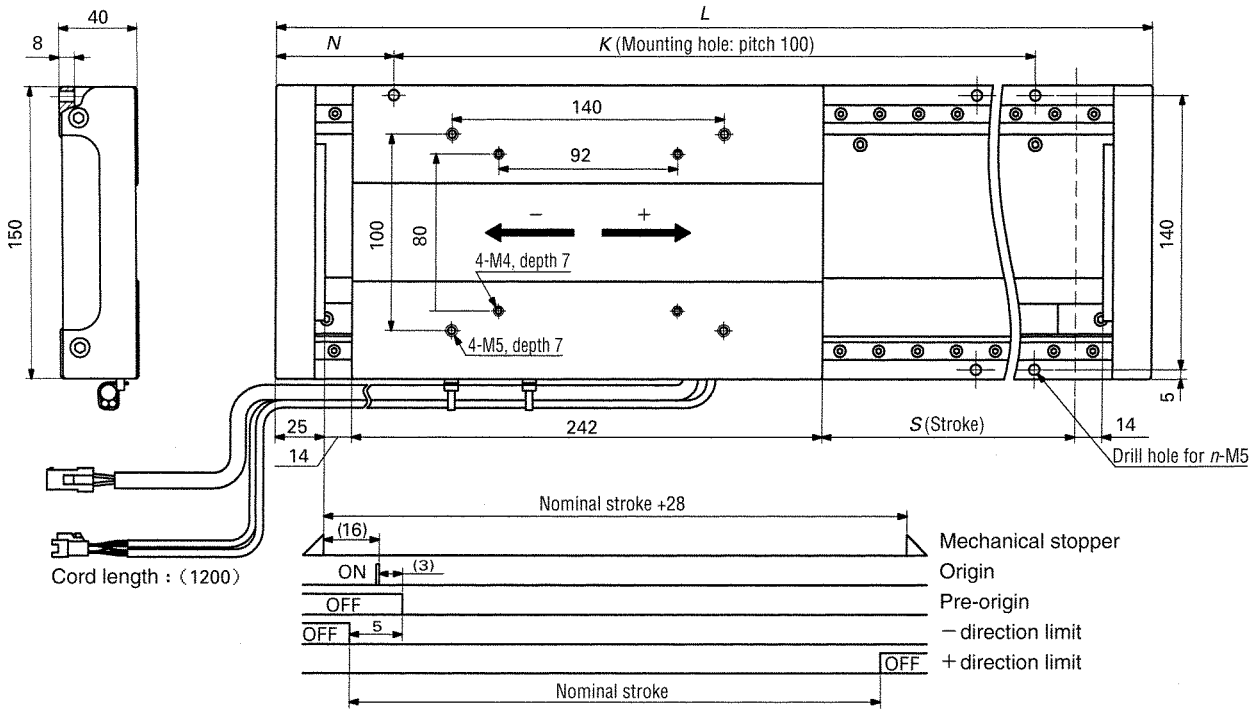
1N=0.102kgf=0.2248lbs.
1mm=0.001m=0.03937inch

Compact series • LT150C

Single table
LT150CGS
LT150CMS

Maximum thrust : 450N (high-thrust specification)
130N (medium-thrust specification)





Identification number	Stroke length S(1) mm	Overall length L mm	Mounting hole in bed N mm	Mounting hole in bed K mm	Mounting hole in bed n (Number of holes)	Total mass of table kg	Mass of moving table kg
LT150CGS— 400／ 5 LT150CGS— 400／10 LT150CMS— 400／ 5 LT150CMS— 400／10	400	720	60	600	14	12.4	
LT150CGS— 600／ 5 LT150CGS— 600／10 LT150CMS— 600／ 5 LT150CMS— 600／10	600	920	60	800	18	15.5	
LT150CGS— 800／ 5 LT150CGS— 800／10 LT150CMS— 800／ 5 LT150CMS— 800／10	800	1120	60	1000	22	18.6	1.5
LT150CGS—1000／ 5 LT150CGS—1000／10 LT150CMS—1000／ 5 LT150CMS—1000／10	1000	1320	60	1200	26	21.6	
LT150CGS—1200／ 5 LT150CGS—1200／10 LT150CMS—1200／ 5 LT150CMS—1200／10	1200	1520	60	1400	30	24.7	

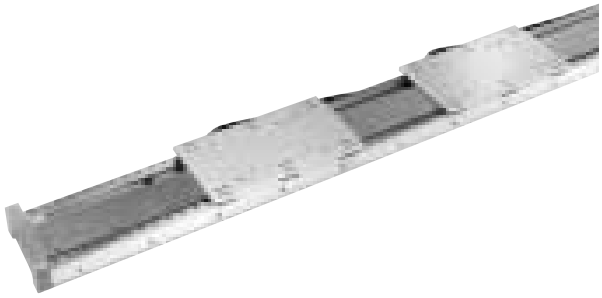
Note(1) : For models with stroke lengths other than those shown in the table, please consult IKO.

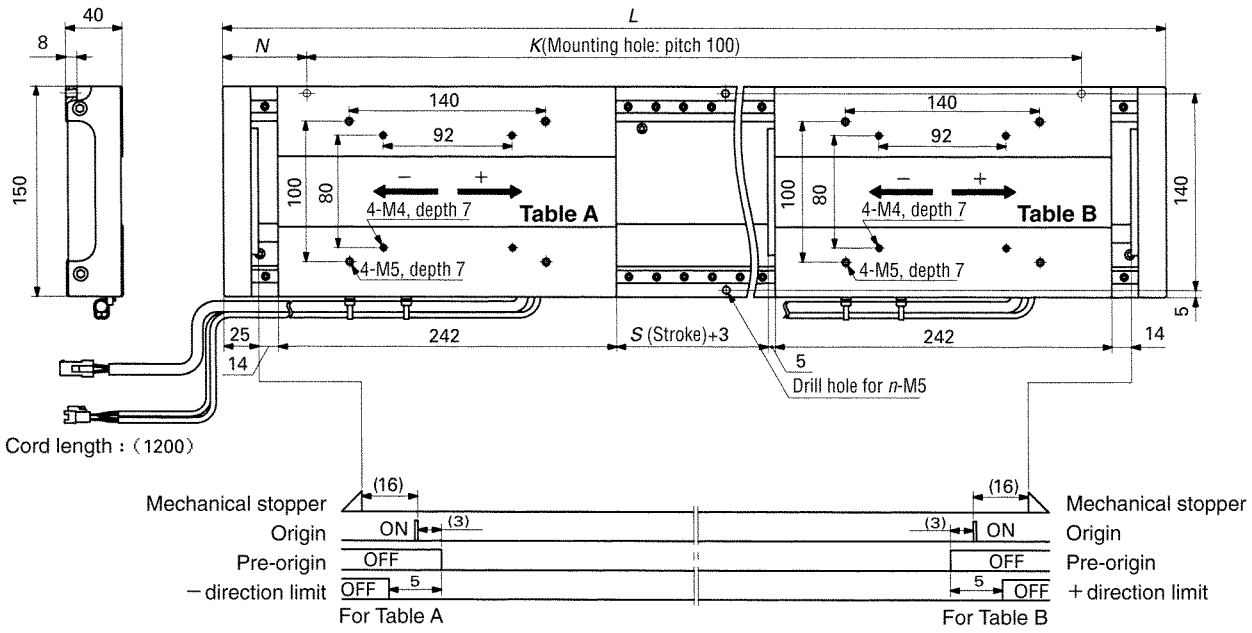
Compact series • LT150C

Twin tables

LT150CGS／T2
LT150CMS／T2

Maximum thrust : 450N (high-thrust specification)
130N (medium-thrust specification)





Identification number	Stroke length S(1) mm	Overall length L mm	Mounting hole in bed N mm	K mm	n (Number of holes)	Total mass of table kg	Mass of moving table kg
LT150CGS－350／ 5T2 LT150CGS－350／10T2 LT150CMS－350／ 5T2 LT150CMS－350／10T2	350	920	60	800	18	17.0	1.5
LT150CGS－550／ 5T2 LT150CGS－550／10T2 LT150CMS－550／ 5T2 LT150CMS－550／10T2	550	1120	60	1000	22	20.1	
LT150CGS－750／ 5T2 LT150CGS－750／10T2 LT150CMS－750／ 5T2 LT150CMS－750／10T2	750	1320	60	1200	26	23.1	
LT150CGS－950／ 5T2 LT150CGS－950／10T2 LT150CMS－950／ 5T2 LT150CMS－950／10T2	950	1520	60	1400	30	26.2	

Note(1) : For models with stroke lengths other than those shown in the table, please consult IKO.

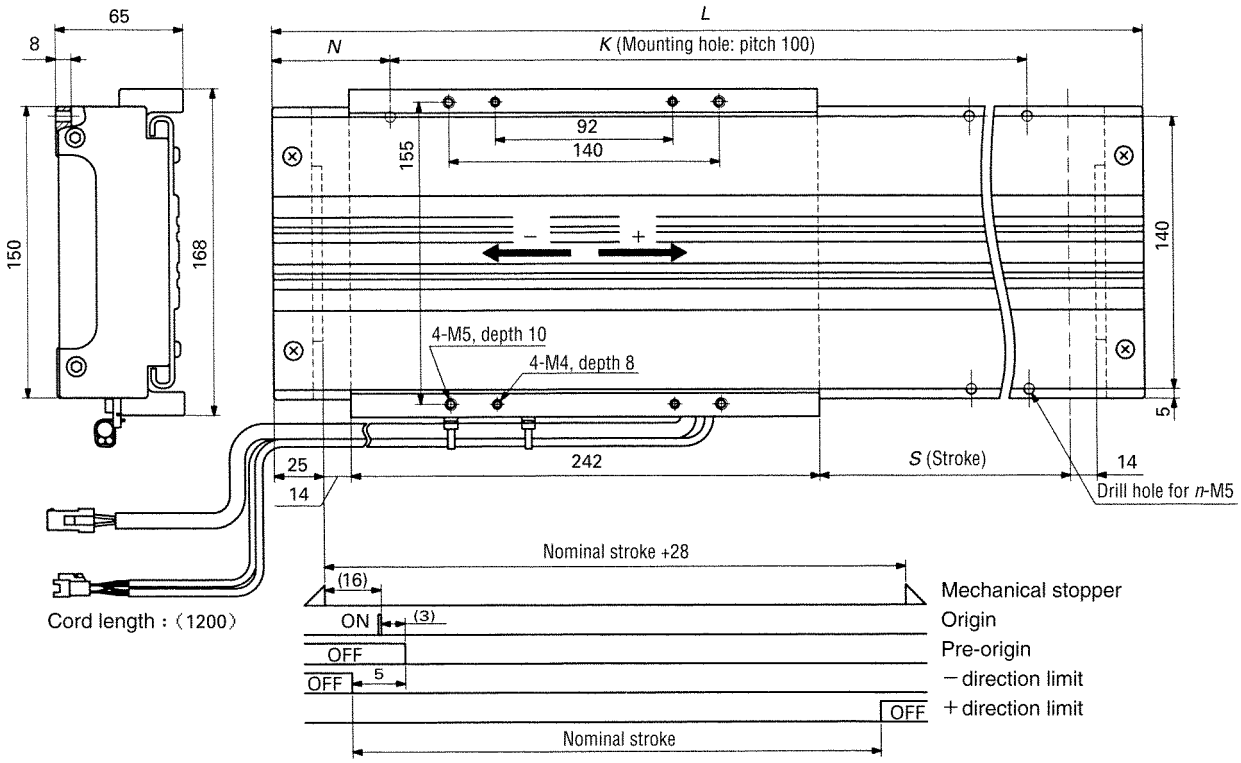
1N＝0.102kgf＝0.2248lbs.
1mm＝0.001m＝0.03937inch

Compact series • LT150C

Single table with cover

LT150CGF／D
LT150CMF／D

Maximum thrust : 450N (high-thrust specification)
130N (medium-thrust specification)



Identification number	Stroke length S(1) mm	Overall length L mm	Mounting hole in bed N mm	Mounting hole in bed K mm	Mounting hole in bed n (Number of holes)	Total mass of table kg	Mass of moving table kg
LT150CGF— 400／ 5D LT150CGF— 400／10D LT150CMF— 400／ 5D LT150CMF— 400／10D	400	720	60	600	14	14.8	
LT150CGF— 600／ 5D LT150CGF— 600／10D LT150CMF— 600／ 5D LT150CMF— 600／10D	600	920	60	800	18	18.1	
LT150CGF— 800／ 5D LT150CGF— 800／10D LT150CMF— 800／ 5D LT150CMF— 800／10D	800	1120	60	1000	22	21.5	2.4
LT150CGF—1000／ 5D LT150CGF—1000／10D LT150CMF—1000／ 5D LT150CMF—1000／10D	1000	1320	60	1200	26	24.8	
LT150CGF—1200／ 5D LT150CGF—1200／10D LT150CMF—1200／ 5D LT150CMF—1200／10D	1200	1520	60	1400	30	28.2	

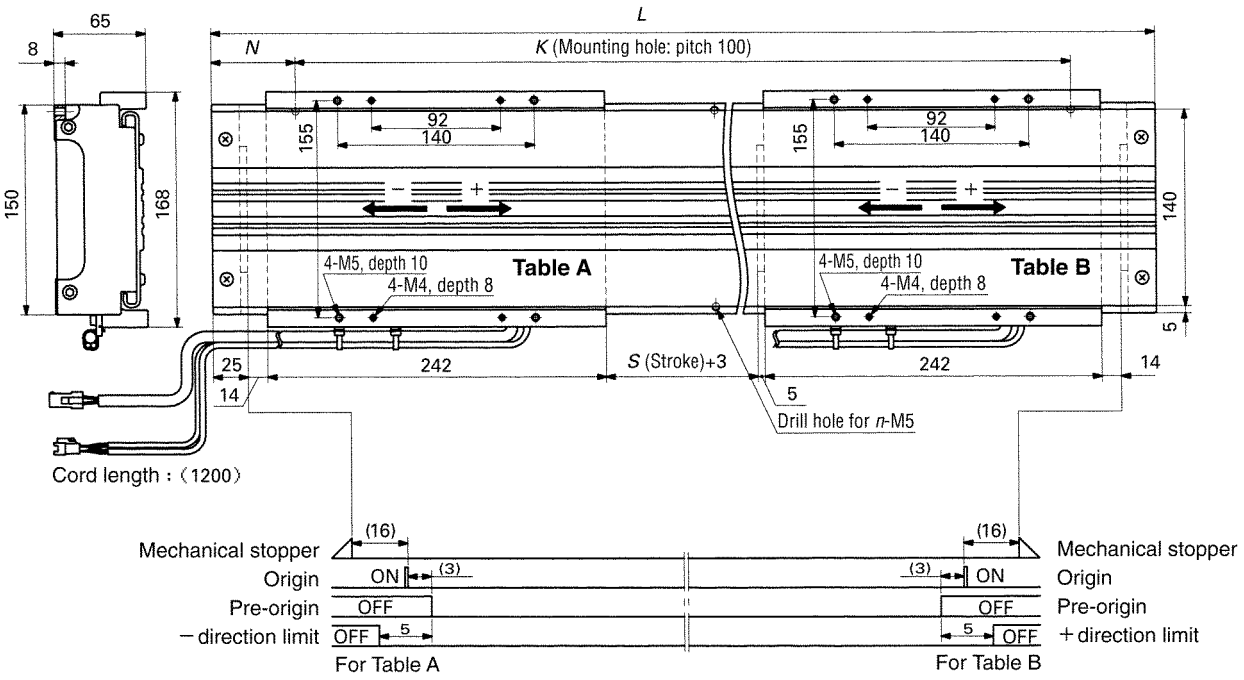
Note(1) : For models with stroke lengths other than those shown in the table, please consult IKO.

Compact series • LT150C

Twin tables with cover

LT150CGF／DT2
LT150CMF／DT2

Maximum thrust : 450N (high-thrust specification)
130N (medium-thrust specification)



Identification number	Stroke length S(1) mm	Overall length L mm	Mounting hole in bed N mm	Mounting hole in bed K mm	Mounting hole in bed n (Number of holes)	Total mass of table kg	Mass of moving table kg
LT150CGF－350／ 5DT2 LT150CGF－350／10DT2 LT150CMF－350／ 5DT2 LT150CMF－350／10DT2	350	920	60	800	18	20.5	2.4
LT150CGF－550／ 5DT2 LT150CGF－550／10DT2 LT150CMF－550／ 5DT2 LT150CMF－550／10DT2	550	1120	60	1000	22	23.9	
LT150CGF－750／ 5DT2 LT150CGF－750／10DT2 LT150CMF－750／ 5DT2 LT150CMF－750／10DT2	750	1320	60	1200	26	27.3	
LT150CGF－950／ 5DT2 LT150CGF－950／10DT2 LT150CMF－950／ 5DT2 LT150CMF－950／10DT2	950	1520	60	1400	30	30.6	

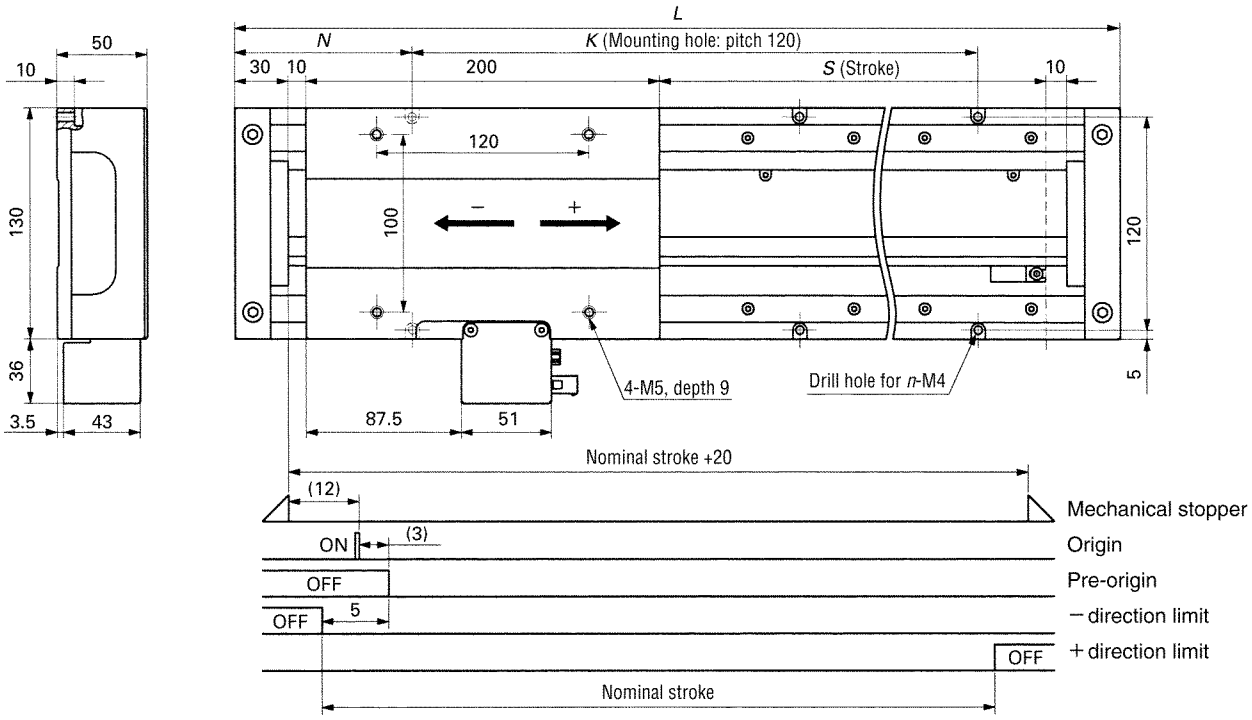
Note(1) : For models with stroke lengths other than those shown in the table, please consult IKO.

1N=0.102kgf=0.2248lbs.
1mm=0.001m=0.03937inch

Long Stroke series • LT130L

Single table
LT130LGS

Maximum thrust : 150N
(high-thrust and high-speed specification)



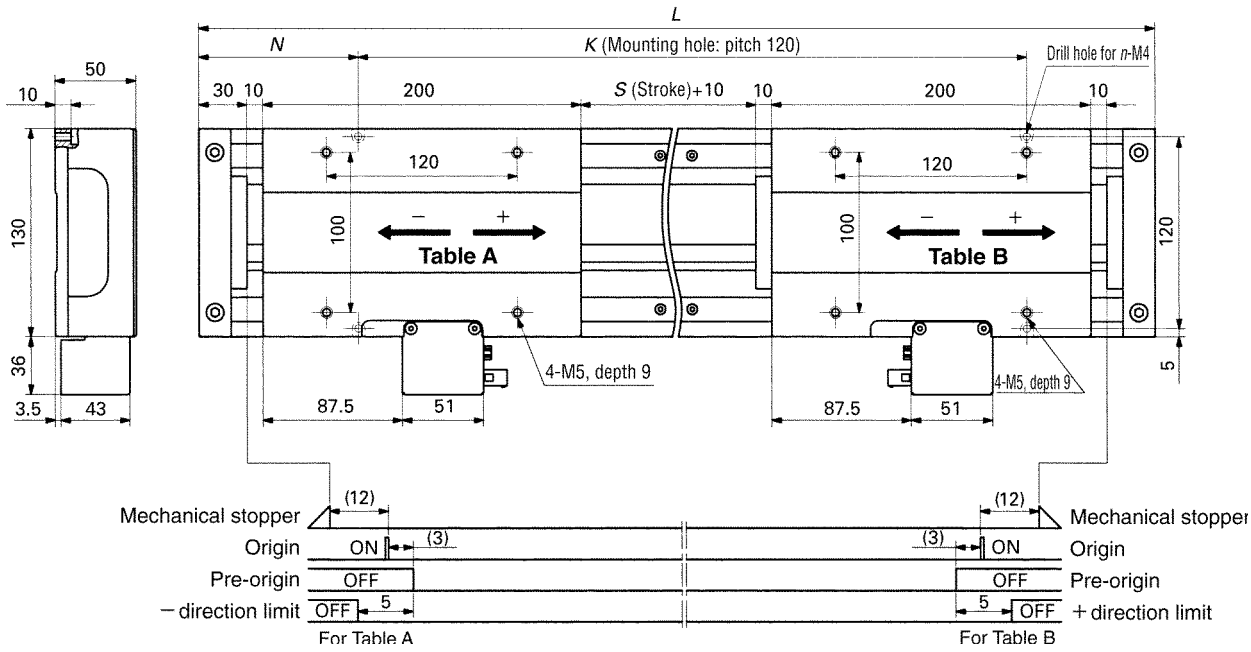
Identification number	Stroke length S(1) mm	Overall length L mm	Mounting hole in bed N mm	Mounting hole in bed K mm	Mounting hole in bed n (Number of holes)	Total mass of table kg	Mass of moving table kg
LT130LGS— 240／ 5 LT130LGS— 240／10	240	520	80	360	8	7.6	1.7
LT130LGS— 720／ 5 LT130LGS— 720／10	720	1000	80	840	16	13.5	
LT130LGS—1200／ 5 LT130LGS—1200／10	1200	1480	80	1320	24	19.4	
LT130LGS—1680／ 5 LT130LGS—1680／10	1680	1960	80	1800	32	25.3	
LT130LGS—2160／ 5 LT130LGS—2160／10	2160	2440	80	2280	40	31.2	
LT130LGS—2640／ 5 LT130LGS—2640／10	2640	2920	80	2760	48	37.1	
LT130LGS—2760／ 5 LT130LGS—2760／10	2760	3040	80	2880	50	38.6	

Note(1) : For models with stroke lengths other than those shown in the table, please consult IKO.

Long Stroke series • LT130L

Twin tables
LT130LGS／T2

Maximum thrust : 150N
(high-thrust and high-speed specification)



Identification number	Stroke length S(1) mm	Overall length L mm	Mounting hole in bed N mm	Mounting hole in bed K mm	Mounting hole in bed n (Number of holes)	Total mass of table kg	Mass of moving table kg
LT130LGS— 500／ 5T2 LT130LGS— 500／10T2	500	1000	80	840	16	15.2	1.7
LT130LGS— 980／ 5T2 LT130LGS— 980／10T2	980	1480	80	1320	24	21.1	
LT130LGS—1460／ 5T2 LT130LGS—1460／10T2	1460	1960	80	1800	32	27.0	
LT130LGS—1940／ 5T2 LT130LGS—1940／10T2	1940	2440	80	2280	40	32.9	
LT130LGS—2420／ 5T2 LT130LGS—2420／10T2	2420	2920	80	2760	48	38.8	
LT130LGS—2540／ 5T2 LT130LGS—2540／10T2	2540	3040	80	2880	50	40.3	

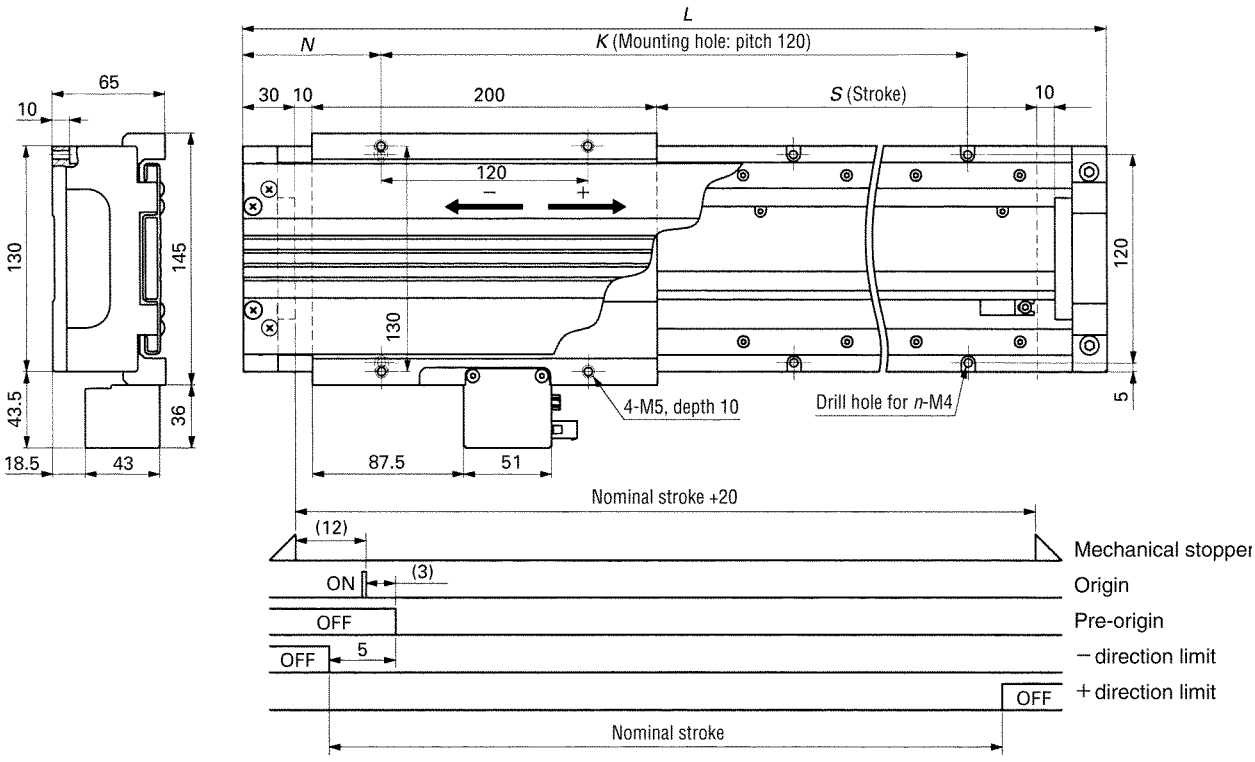
Note(1) : For models with stroke lengths other than those shown in the table, please consult IKO.

1N=0.102kgf=0.2248lbs.
1mm=0.001m=0.03937inch

Long Stroke series • LT130L

Single table with cover
LT130LGF／D

Maximum thrust : 150N
(high-thrust and high-speed specification)



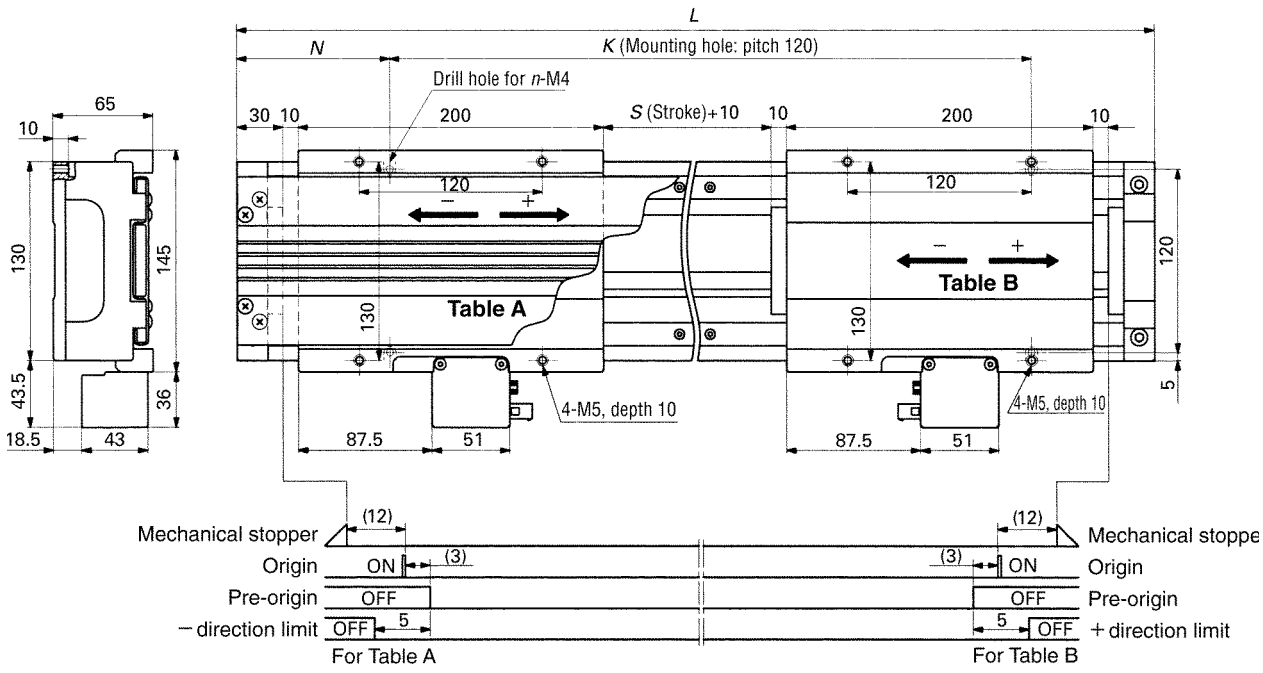
Identification number	Stroke length S(1) mm	Overall length L mm	Mounting hole in bed N mm	K mm	n (Number of holes)	Total mass of table kg	Mass of moving table kg
LT130LGF— 240／ 5D LT130LGF— 240／10D	240	520	80	360	8	8.3	2.0
LT130LGF— 720／ 5D LT130LGF— 720／10D	720	1000	80	840	16	14.6	
LT130LGF—1200／ 5D LT130LGF—1200／10D	1200	1480	80	1320	24	20.9	
LT130LGF—1680／ 5D LT130LGF—1680／10D	1680	1960	80	1800	32	27.2	

Note(1) : For models with stroke lengths other than those shown in the table, please consult IKO.

Long Stroke series • LT130L

Twin tables with cover
LT130LGF／DT2

Maximum thrust : 150N
(high-thrust and high-speed specification)



Identification number	Stroke length S(1) mm	Overall length L mm	Mounting hole in bed N mm	K mm	n (Number of holes)	Total mass of table kg	Mass of moving table kg
LT130LGF— 500／ 5DT2 LT130LGF— 500／10DT2	500	1000	80	840	16	16.6	2.0
LT130LGF— 980／ 5DT2 LT130LGF— 980／10DT2	980	1480	80	1320	24	22.8	
LT130LGF—1460／ 5DT2 LT130LGF—1460／10DT2	1460	1960	80	1800	32	29.1	

Note(1) : For models with stroke lengths other than those shown in the table, please consult IKO.

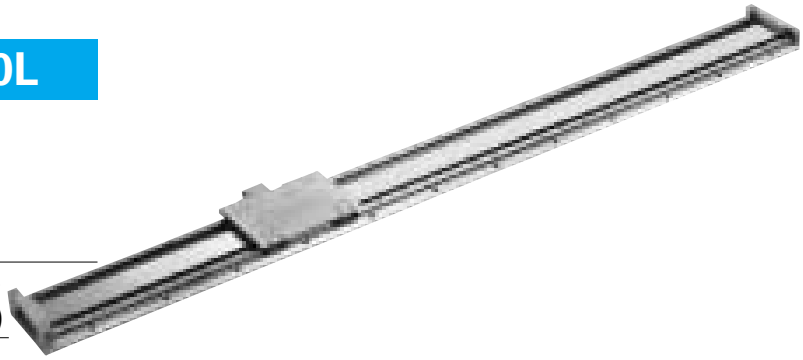
1N=0.102kgf=0.2248lbs.
1mm=0.001m=0.03937inch

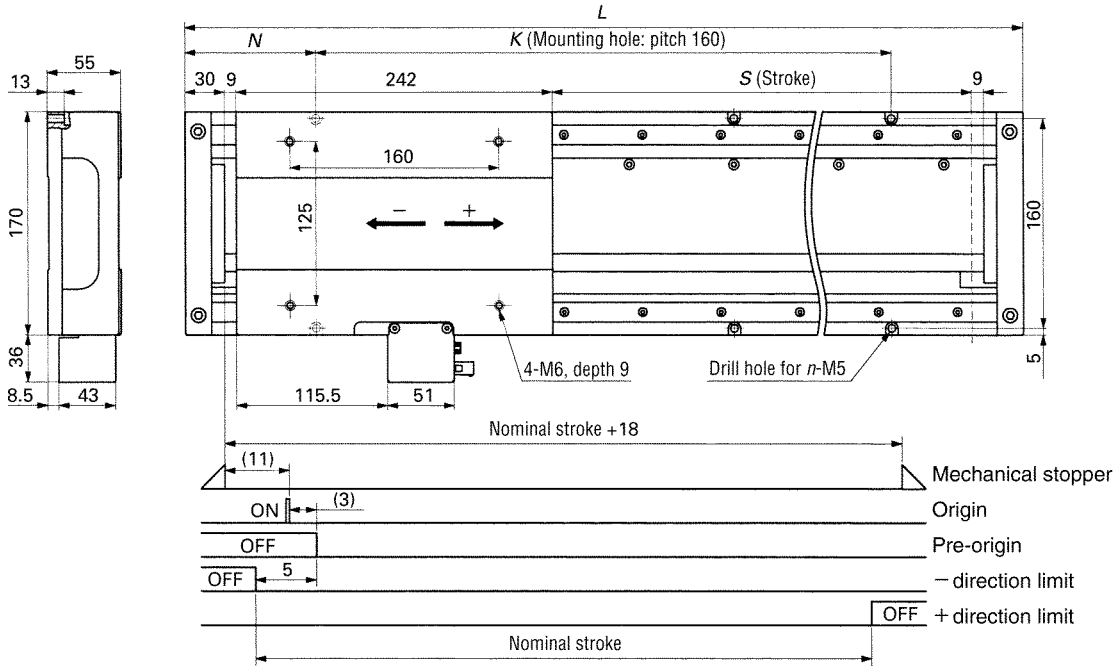
Long Stroke series • LT170L

Single table

LT170LGS
LT170LVS

Maximum thrust : 450N (high-thrust specification)
190N (high-speed specification)





Identification number	Stroke length S(1) mm	Overall length L mm	Mounting hole in bed N mm	K mm	n (Number of holes)	Total mass of table kg	Mass of moving table kg
LT170LGS− 680／ 5 LT170LGS− 680／10 LT170LVS− 680／ 5 LT170LVS− 680／10	680	1000	100	800	12	22.6	2.5
LT170LGS−1160／ 5 LT170LGS−1160／10 LT170LVS−1160／ 5 LT170LVS−1160／10	1160	1480	100	1280	18	32.7	
LT170LGS−1640／ 5 LT170LGS−1640／10 LT170LVS−1640／ 5 LT170LVS−1640／10	1640	1960	100	1760	24	42.7	
LT170LGS−2120／ 5 LT170LGS−2120／10 LT170LVS−2120／ 5 LT170LVS−2120／10	2120	2440	100	2240	30	52.8	
LT170LGS−2600／ 5 LT170LGS−2600／10 LT170LVS−2600／ 5 LT170LVS−2600／10	2600	2920	100	2720	36	62.9	
LT170LGS−2720／ 5 LT170LGS−2720／10 LT170LVS−2720／ 5 LT170LVS−2720／10	2720	3040	80	2880	38	65.4	

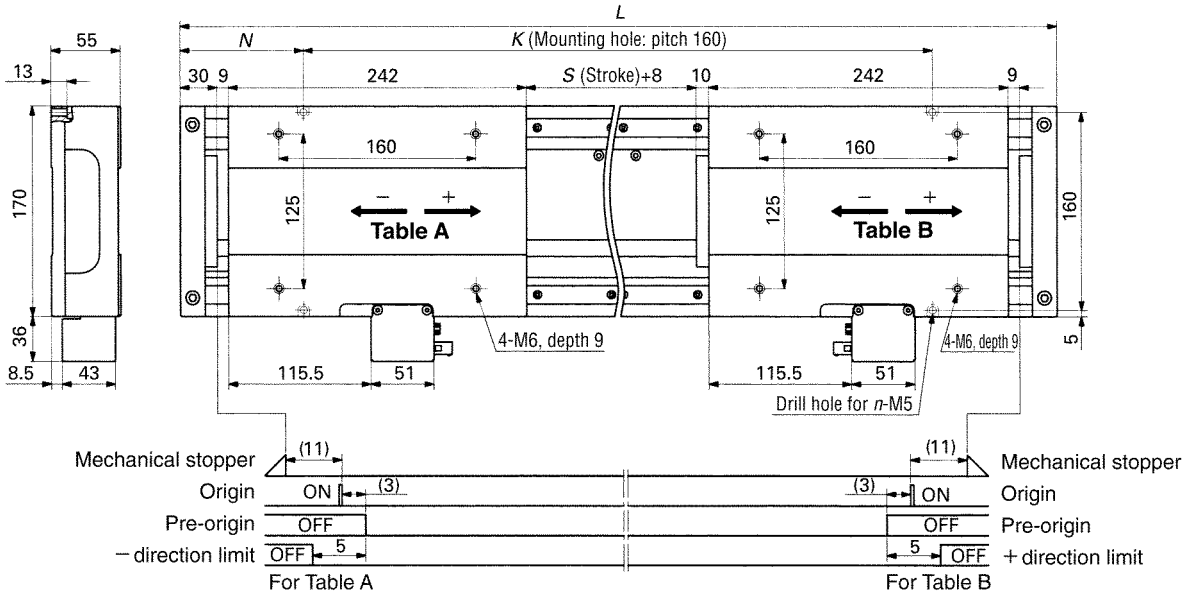
Note(1) : For models with stroke lengths other than those shown in the table, please consult IKO.

Long Stroke series • LT170L

Twin tables

LT170LGS／T2
LT170LVS／T2

Maximum thrust : 450N (high-thrust specification)
190N (high-speed specification)



Identification number	Stroke length S(1) mm	Overall length L mm	Mounting hole in bed N mm	Mounting hole in bed K mm	Mounting hole in bed n (Number of holes)	Total mass of table kg	Mass of moving table kg
LT170LGS— 420／ 5T2 LT170LGS— 420／10T2 LT170LVS— 420／ 5T2 LT170LVS— 420／10T2	420	1000	100	800	12	25.1	2.5
LT170LGS— 900／ 5T2 LT170LGS— 900／10T2 LT170LVS— 900／ 5T2 LT170LVS— 900／10T2	900	1480	100	1280	18	35.2	
LT170LGS—1380／ 5T2 LT170LGS—1380／10T2 LT170LVS—1380／ 5T2 LT170LVS—1380／10T2	1380	1960	100	1760	24	45.2	
LT170LGS—1860／ 5T2 LT170LGS—1860／10T2 LT170LVS—1860／ 5T2 LT170LVS—1860／10T2	1860	2440	100	2240	30	55.3	
LT170LGS—2340／ 5T2 LT170LGS—2340／10T2 LT170LVS—2340／ 5T2 LT170LVS—2340／10T2	2340	2920	100	2720	36	65.4	
LT170LGS—2460／ 5T2 LT170LGS—2460／10T2 LT170LVS—2460／ 5T2 LT170LVS—2460／10T2	2460	3040	80	2880	38	67.9	

Note(1) : For models with stroke lengths other than those shown in the table, please consult IKO.

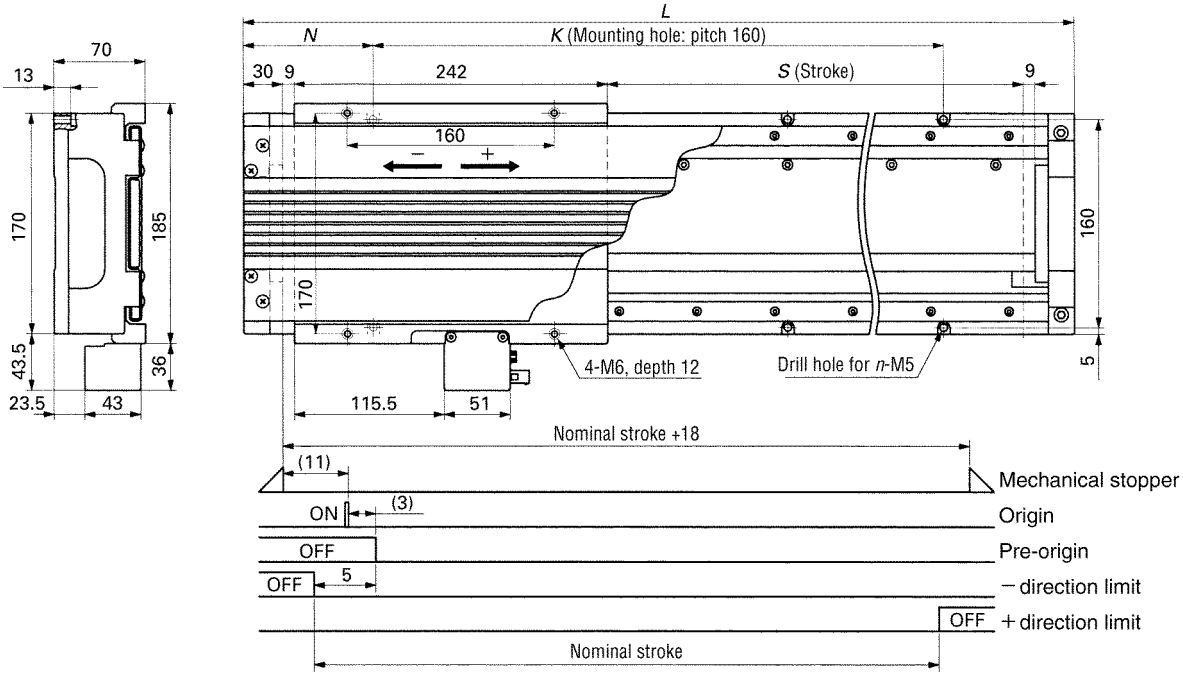
1N=0.102kgf=0.2248lbs.
1mm=0.001m=0.03937inch

Long Stroke series • LT170L

Single table with cover

LT170LGF／D
LT170LVF／D

Maximum thrust : 450N (high-thrust specification)
190N (high-speed specification)



Identification number	Stroke length S(1) mm	Overall length L mm	Mounting hole in bed N mm	K mm	n (Number of holes)	Total mass of table kg	Mass of moving table kg
LT170LGF— 680／ 5D LT170LGF— 680／10D LT170LVF— 680／ 5D LT170LVF— 680／10D	680	1000	100	800	12	24.0	2.8
LT170LGF—1160／ 5D LT170LGF—1160／10D LT170LVF—1160／ 5D LT170LVF—1160／10D	1160	1480	100	1280	18	34.6	
LT170LGF—1640／ 5D LT170LGF—1640／10D LT170LVF—1640／ 5D LT170LVF—1640／10D	1640	1960	100	1760	24	45.2	

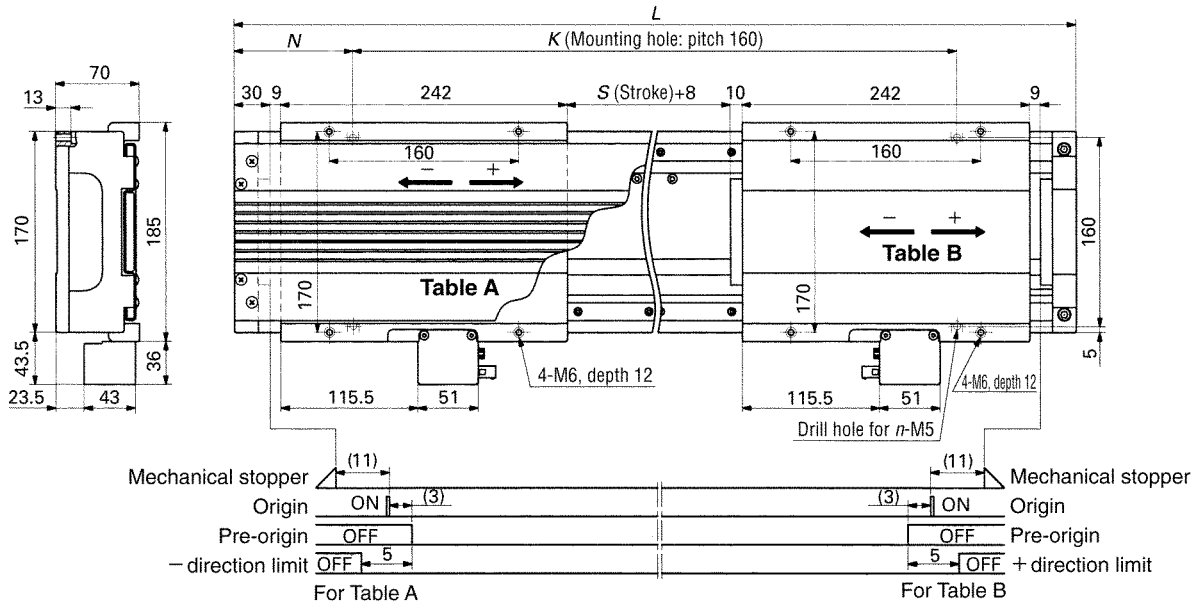
Note(1) : For models with stroke lengths other than those shown in the table, please consult IKO.

Long Stroke series • LT170L

Twin tables with cover

LT170LGF／DT2
LT170LVF／DT2

Maximum thrust : 450N (high-thrust specification)
190N (high-speed specification)



Identification number	Stroke length S(1) mm	Overall length L mm	Mounting hole in bed N mm	Mounting hole in bed K mm	Mounting hole in bed n (Number of holes)	Total mass of table kg	Mass of moving table kg
LT170LGF— 420／ 5DT2 LT170LGF— 420／10DT2 LT170LVF— 420／ 5DT2 LT170LVF— 420／10DT2	420	1000	100	800	12	26.9	2.8
LT170LGF— 900／ 5DT2 LT170LGF— 900／10DT2 LT170LVF— 900／ 5DT2 LT170LVF— 900／10DT2	900	1480	100	1280	18	37.5	
LT170LGF— 1380／ 5DT2 LT170LGF— 1380／10DT2 LT170LVF— 1380／ 5DT2 LT170LVF— 1380／10DT2	1380	1960	100	1760	24	48.0	

Note(1) : For models with stroke lengths other than those shown in the table, please consult IKO.

1N=0.102kgf=0.2248lbs.
1mm=0.001m=0.03937inch

LT

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