PATENT PENDING

IKO

Linear Motor Table

LT···M

CAT-57169

IKO *Clean Lubrication*

C-Lube

Friendly to Maintenance
Gentle to the Earth

June 2009 IKO Overseas Dept.

IKO Compact Type Linear Motor Table

LT···M

Great acceleration / deceleration & Quick response positioning

Compactness and Long stroke specification

High resolution & accuracy

Maintenance free

IKO Clean Lubrication

C-Lube

Friendly to Maintenance

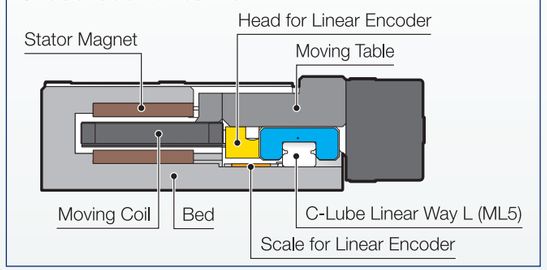
Gentle to the Earth

IKO Linear Motor Table LT···M

IKO Linear Motor Table LT···M is a compact positioning table having an AC linear servomotor between a steel moving table and a steel bed together with an optical linear encoder.
IKO C-Lube Linear Way ML is used for the table guide, realizing maintenance free for 5 years or 20,000 km. Moreover, high acceleration / deceleration and quick response positioning can be achieved due to the linear motor in combination.
IKO Linear Motor Table LT···M is the best suited for the compact positioning mechanism used in semiconductor/ LCD-related manufacturing equipment, test equipment, electronic part assembling facility, etc., which require clean environment.

Structure of Linear Motor Table LT···M

Cross-sectional view



LT45M-120

Features of Linear Motor Table LT···M

Compactness and Long stroke specification

Linear Motor Table LT···M uses a C-shaped magnet yoke which does not generate attraction of magnet and a compact linear motion rolling guides, realizing a very compact motor table of 17 mm high and 45 mm wide. Linear Motor Table LT···M also uses a moving coil system to extend the stroke length up to 300 mm as standard.

High acceleration / deceleration & Quick response positioning

A combination of a light weight moving table and a high thrust power cored linear motor realizes high acceleration / deceleration and quick response positioning of 1.3 m/s maximum (at a resolution of 0.5 μm selected).

High resolution & accuracy

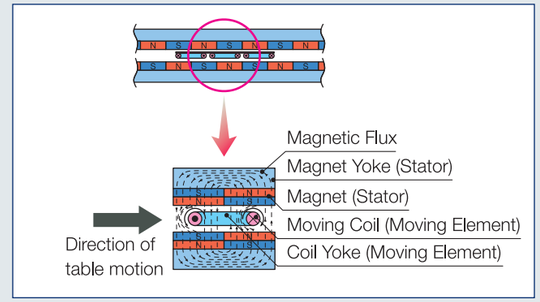
High resolution and high positioning accuracy can be obtained by full closed loop controlling with optical linear encoder and assures high stable accuracy for a long period.

Maintenance free

IKO C-Lube Linear Way L, maintenance free for 5 years or 20,000 km, is adopted for guiding part.

Principle of operation of Linear Motor Table LT···M

Linear Motor Table LT···M comprises a moving element with a field coil and a stator having magnets disposed opposite to each other inside a C-shaped yoke. The coil receives a horizontal force by the interaction between a magnetic flux which works vertically and a rotating magnetic flux which generates around the coil by current (Fleming's left-hand rule).
By switching the direction of the coil current to the direction of the magnetic flux, a continuous force in one direction is obtained and the moving element can keep a linear motion.



Two linear motor tables in parallel operation

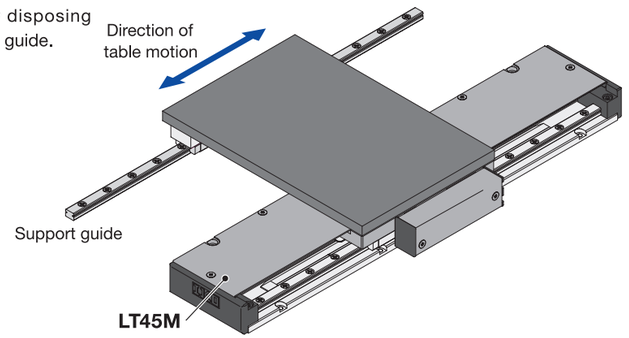
A single specific driver can operate two linear motor tables LT···M in parallel by connecting the motor tables to the driver in parallel.
This driving set-up provides larger thrust force and minimize torsion of the housing and the motion delay between left and right driving axes. This can build a stable positioning mechanism.

Example of table configuration using IKO Linear Motor Table LT···M

You can build a universal table configuration by using Linear Motor Table LT···M.
IKO is ready to assemble your table system for you. Please order when you need it.

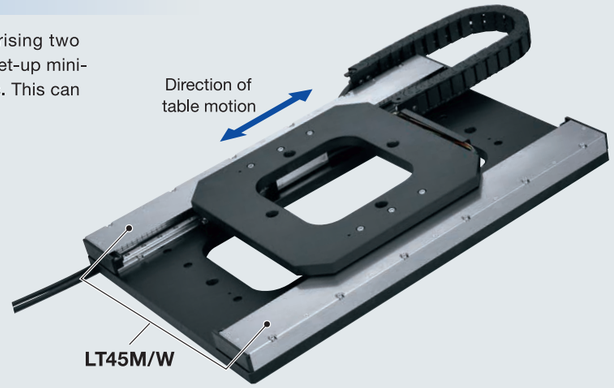
With support guide

A simple and compact stage can be built up by disposing Linear Motor Table LT···M in parallel with the support guide.



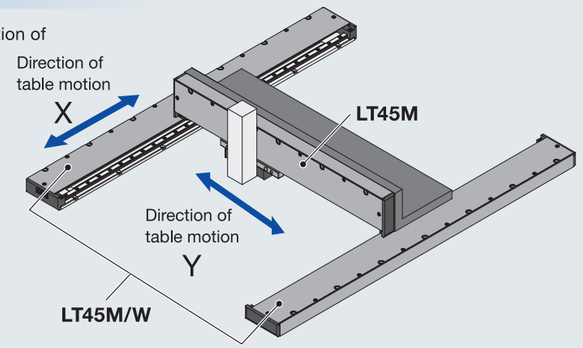
Bored stage

This example is two-axes parallel operation comprising two Linear Motor Tables LT···M in parallel. This driving set-up minimizes the motion delay between left and right tables. This can build a stable positioning performance.



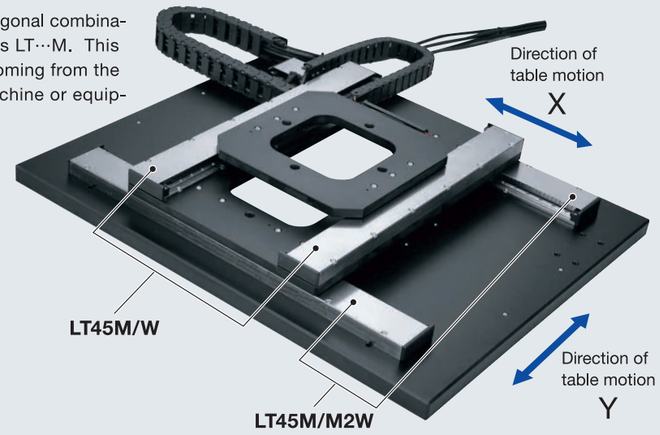
Gantry type stage

This example is gantry type stage comprising a combination of two Linear Motor Tables LT···M in parallel and a Y axis.



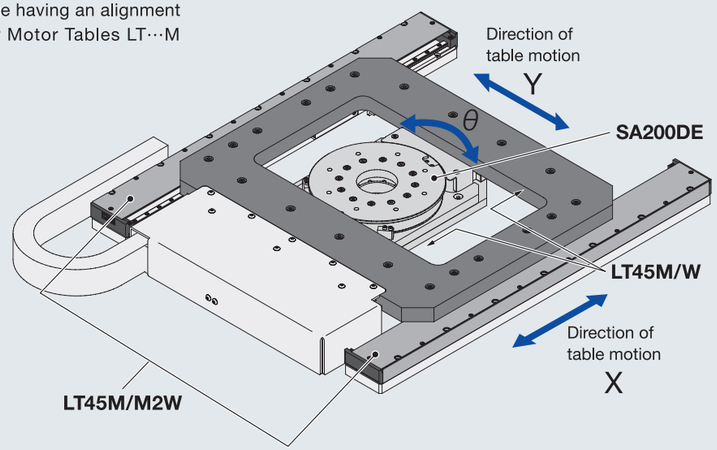
XY stage

This example is a XY stage comprising an orthogonal combination of two sets of parallel Linear Motor Tables LT···M. This driving set-up enables measurement of light coming from the downside of the table and arrangement of machine or equipment cables



XYθ stage

This example is a low-section XYθ stage having an alignment stage by a combination of two Linear Motor Tables LT···M capable of moving along X and Y axes.



Features of two-axes parallel operation using Linear Motor Tables in parallel

- Great thrust by two-axes driving
- Driving of left and right tables that can minimize a table delay and a chassis twist and assure a high positioning accuracy
- Lower cost than two-axes synchronous control system

Identification Number

Example of identification number

LT 45 M - 208 / 5 M2 W

- ❶Type
- ❷Size
- ❸Stroke length
- ❹Linear encoder resolution
- ❺Number of module
- ❻Number of bed

❶Type	LT···M : Linear Motor Table LT···M
❷Size	45 : Bed width 45 mm
❸Stroke length	Select from Tabel 1

In twin modules, Table 1 shows the stroke length in case twin modules are arranged with minimum space. Actual stroke length must be considered according to module span.

❹Linear encoder resolution	1 : 0.1 μm 5 : 0.5 μm
❺Nomber of module	No Symbol : Single module M2 : Twin module See Fig.1

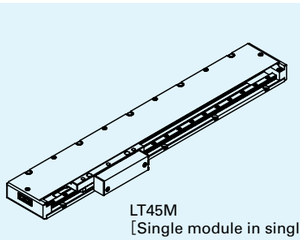
In twin modules, each module can not be operated independently. Mount them on one solid structure.

❻Nomber of bed	No Symbol : Single arrangement W : Parallel arrangement

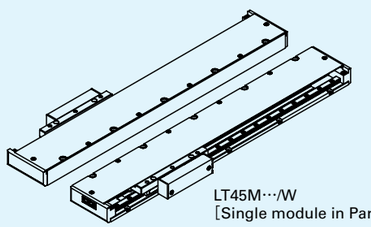
In /W specification, two beds and module(s)are delivered as one set. Do not combine bed and modules together with that of other set.

Table 1 Stroke lengthce Units mm

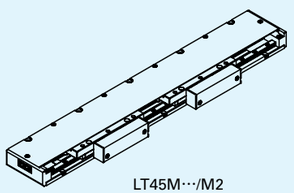
Model number	Stroke length
LT45M	120, 180, 240, 300
LT45M···/M2	28, 88, 148, 208



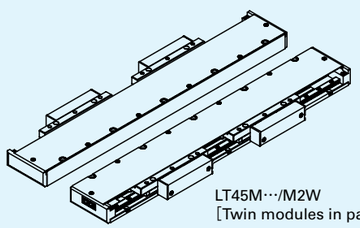
LT45M
[Single module in single arrangement]



LT45M···/W
[Single module in Parallel arrangement]



LT45M···/M2
[Twin modules in single arrangement]



LT45M···/M2W
[Twin modules in parallel arrangement]

Fig.1 Specifications of Linear Motor Table LT···M

Specification and Performance

Table 2 Specification and performance

Model	Number of moduies	Maximum thrust(1) N	Rated thrust(2) N	Maximum load mass kg	Resolution μm	Maximum speed m/s	Repeatability μm	Mass of the moving part kg
LT45M	1	20	4	1	0.1	0.27	±0.5(3)	0.13
					0.5	1.30		
LT45M···/M2	2	40	8	2	0.1	0.27		0.25
					0.5	1.30		
LT45M···/W				4	0.1	0.27		
					0.5	1.30		
LT45M···/M2W	4	60	16	8	0.1	0.27		0.5
					0.5	1.30		

Note(1) The maximum holding time of maximum thrust is 1 sec.
(2) This value is applicable when Linear Motor Table is mounted on steel made solid mounting base and ambient temperature at 20℃.
(3) This indicates the value when the temperature of Linear Motor Table LT···M has become stable.

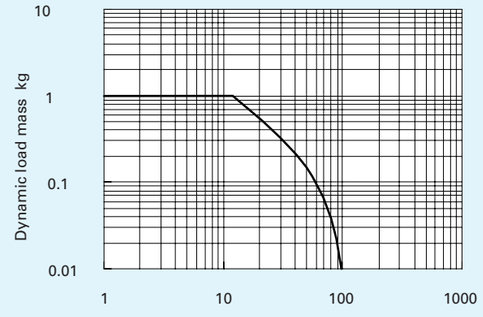


Fig.2 Dynamic load mass (In case single module in single arrangement)

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

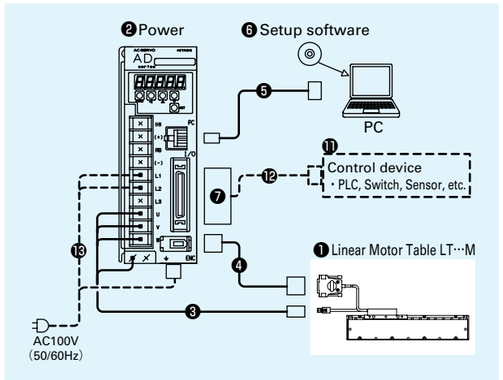
System Configuration

Dedicated driver is required to operate Linear Motor Table LT···M in Table 3 and the system configurations are shown in Table 4.1 to 4.4. For the specification of dedicated driver, see the information on page 12. When ordering, please indicate the type shown in Table 3 and 4.1 to 4.4.

Table 3 Number of modules and dedicated drivers

❶Model	❷Driver model
LT45M	ADAX3-R5ML2-N60
LT45M···/M2 **LT45M···/W**	ADAX3-01ML2-N61
LT45M···/M2W	ADAX3-01ML2-N62

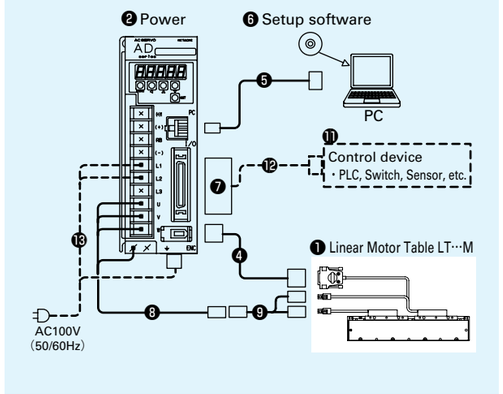
Table 4.1 System configuration of LT45M (Single module in single arrangement)



No.	Item	Model code
❸	Motor relay cord (3.5m(1))	TAE20T0-AM
❹	Encoder relay cord (2m(1))	TAE20R4-EC
❺	PC connecting cord (2m)	ADCH-AT2 (PC side D-sub 9 pins)
❻	Setup software	AHF-P02
❼	I/O connector	TAE20R5-CN(2)
⓫	Control device	to be prepared by customer
⓬	I/O connector connecting cord	
⓭	Power code	

Note(1) For the special cord length, ask IKO for further information.
(2) Manufacturer : Sumitomo 3M, 10150-3000PE (Plug) /10350-52F0-008 (Housing)

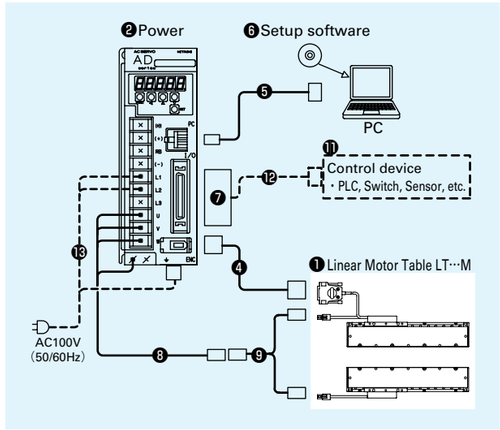
Table 4.2 System configuration of LT45M···/M2 (Twin modules in single arrangement)



No.	Item	Model code
❹	Encoder relay cord (2m(1))	TAE20R4-EC
❺	PC connecting cord (2m)	ADCH-AT2 (PC side D-sub 9 pins)
❻	Setup software	AHF-P02
❼	I/O connector	TAE20R5-CN(2)
❽	Motor relay cordfor sevelal motors (3.5m(1))	TAE20U1-AM
❾	Connection code for twin modules (0.3m(1))	TAE20U2-AM
⓫	Control device	to be prepared by customer
⓬	I/O connector connecting cord	
⓭	Power code	

Note(1) For the special cord length, ask IKO for further information.
(2) Manufacturer : Sumitomo 3M, 10150-3000PE (Plug) /10350-52F0-008 (Housing)

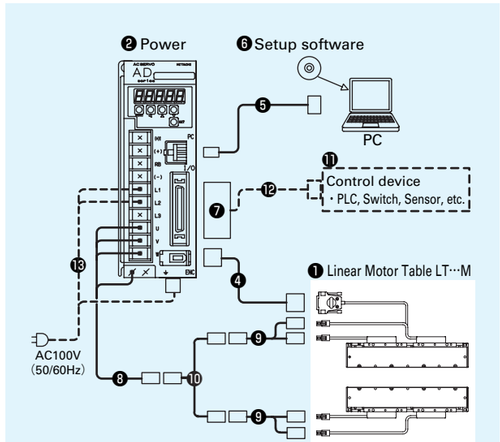
Table 4.3 LT45M···/W (Single module in parallel arrangemen)



No.	Item	Model code
❹	Encoder relay cord (2m(1))	TAE20R4-EC
❺	PC connecting cord (2m)	ADCH-AT2 (PC side D-sub 9 pins)
❻	Setup software	AHF-P02
❼	I/O connector	TAE20R5-CN(2)
❽	Motor relay cordfor sevelal motors (3.5m(1))	TAE20U1-AM
❾	Connection code for twin modules (0.3m(1))	TAE20U2-AM
⓫	Control device	to be prepared by customer
⓬	I/O connector connecting cord	
⓭	Power code	

Note(1) For the special cord length, ask IKO for further information.
(2) Manufacturer : Sumitomo 3M, 10150-3000PE (Plug) /10350-52F0-008 (Housing)

Table 4.4 LT45M···/M2W (Twin modules in parallel arrangement)



No.	Item	Model code
❹	Encoder relay cord (2m(1))	TAE20R4-EC
❺	PC connecting cord (2m)	ADCH-AT2 (PC side D-sub 9 pins)
❻	Setup software	AHF-P02
❼	I/O connector	TAE20R5-CN(2)
❽	Motor relay cordfor sevelal motors (3.5m(1))	TAE20U1-AM
❾	Connection code for twin modules (0.3m(1))	TAE20U2-AM
❿	Connection code for fouv modules (0.3m(1))	TAE20U3-AM
⓫	Control device	to be prepared by customer
⓬	I/O connector connecting cord	
⓭	Power code	

Note(1) For the special cord length, ask IKO for further information.
(2) Manufacturer : Sumitomo 3M, 10150-3000PE (Plug) /10350-52F0-008 (Housing)

●Parameter setting of driver

Initial setting of driver parameter is required to operate Linear Motor Table LT···M. Parameter setting of driver is operated by setup software.
Setup software and PC connecting cable are not supplied with the driver. They can be shared with multiple drivers, but at least one of each is required. Please order them accordingly.

●I/O connector

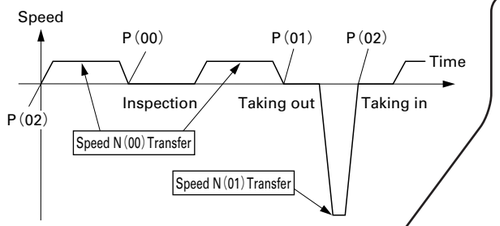
For servo on and alarm reset of driver, sending signal to I/O terminal is necessary.
Connecting code to I/O terminal needs to be prepared by customer. However, I/O connector is available from IKO.

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

■System Example

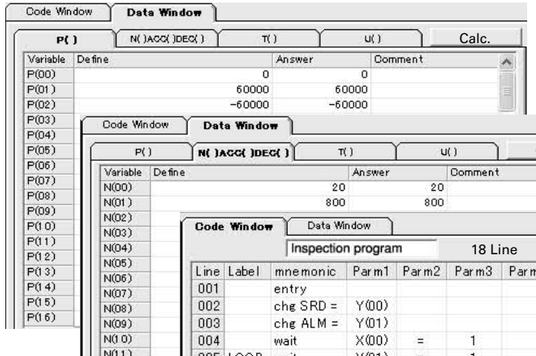
By using the programming function of dedicated driver, Linear Motor Table LT···M can be operated by a simple system configuration that does not require control device such as PLC or controller. System configuration and programming sample are shown as below.

●Operation pattern



●System configuration

●Setup Software operating windows and programming samples (Image)



Positioning data window

Speed and acceleration/deceleration data window

Programming window

Inspection program 18 Line

Line	Label	mnemonic	Parm1	Parm2	Parm3	Parm4	Parm5	Parm6	
001		entry							
002		chg SRD =	Y(00)						
003		chg ALM =	Y(01)						
004		wait	X(00)	=	1				
005	LOOP	wait	X(01)	=	1				←Waiting inspection completion input X(01) ON
006		Y(02) =	0						←Positioning completion signal OFF
007		mov	P(00)	N(00)	ACC(0)	DEC(0)			←Moving P(00) at speed N(00)
008		Y(02) =	1						←After moving completion, positioning completion signal is ON.
009		wait	X(01)	=	1				←Waiting inspection completion input X(01) ON
010		Y(02) =	0						←Positioning completion signal OFF
011		mov	P(01)	N(00)	ACC(0)	DEC(0)			←Moving P(01) at speed N(00)
012		Y(02) =	1						←After moving completion, positioning completion signal is ON.
013		wait	X(01)	=	1				←Waiting inspection completion input X(01) ON
014		Y(02) =	0						←Positioning completion signal OFF
015		mov	P(02)	N(01)	ACC(1)	DEC(1)			←Moving P(02) at speed N(01)
016		Y(02) =	1						←After moving completion, positioning completion signal is ON.
017		goto	LOOP						←Go to LOOP.
018		end							

■Dedicated Driver

- Maximum 512 steps of programming inputs are possible by basic PLC function.
- Easy positioning operation by simple programming language.
- Position command data 100 points and speed command data 16 points can be memorized.
- Control with 12 points of input, 8 points of output and analogue input (0 to 10V) are possible.
- Operating by pulse train input is also possible.

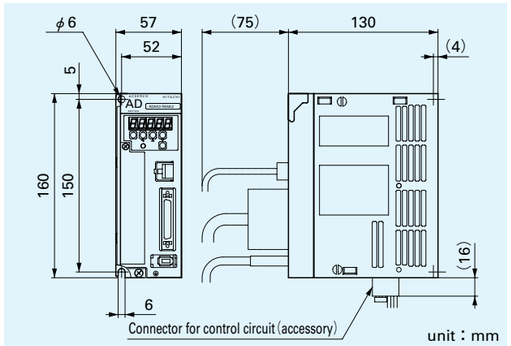


Table 5 Specification of driver

Item		Model: ADAX3-R5ML2-N60	ADAX3-01ML2-N61	ADAX3-01ML-N62
General specification	Continuous rated current (Arms)	0.9	1.8	
	Instantaneous maximum current (Arms)	2.7	5.4	
	Power supply capacity (kVA)	0.3	0.4	
	Power supply (Main)	Single phase 100～115V+10/-15% 50/60Hz±5%		
	Power supply (Control circuit)			
	Protection (1)	Open IP00		
	Control method	Line sinusoidal phase modulation PMW method		
	Control mode	Position control/Speed control/Thrust control		
	Feedback	A, B, and Z phases incremental linear encoder (Line driver : AM26LS31 equivalent) Power voltage 5V ±10%, Consumption current : max280mA, Maximum frequency 4MHz (×4 Multiplication)		
Specification of input and output	Speed command/Limit input	Analog input : 0 to ±10V/maximum speed (Gain setting possible)		
	Thrust command/Limit input	Analog input : 0 to ±10V/maximum thrust (Gain setting possible)		
	Position command	Line driver signal (2Mpps or less) ①+direction pulse/-direction pulse ②Code input/Command pulse ③90 degree phase, 2 phase pulse command (maximum frequency 500kpps) Selected from ① to ③		
	Input signal	DC 12/24V signal input (sink or source compatible) (DC24V power supply is incorporated.) ①Servo ON ②Alarm reset ③Control mode change ④Thrust limit ⑤+direction movement disabled ⑥-direction movement disabled ⑦Multiple speed 1/Electric gear change ⑧Multiple speed 2 ⑨Speed proportion control/Gain switch ⑩Speed zero Clamp/External trip (Temp signal) (2) ⑪Origin limit switch ⑫Return to Origin ⑬Pulse train input enabled/+direction signal ⑭Deviation counter clear/-direction signal		
	Output signal	Open collector signal output (Sink output) ①Servo ready ②Alarm ③Positioning completion ④Speed attainment/Alarm code 1 ⑤Detecting zero speed ⑥Releasing brake ⑦Thrust restriction on/Alarm code 2 ⑧Overload prior notice/Alarm code 3		
	Encoder	A, B phase signal output : Line driver signal output, Z phase signal output : Line driver and open collector signal output		
	Monitor output	2 ch, 0 to ±3V output Detected speed, Thrust command, etc. can be selected for output.		
Internal function	Built-in operator	5 figures monitor, Key input×5		
	External operator	Windows 95/98/Me, Windows NT/2000/XP, Connectable to PC (By RS-232C port)		
	Regenerating brake	Built in (Without Braking resistance)		
	Dynamic brake (3)	Built in (Operating condition settable)		
	Protection function	Current surge, Overload, Brake Overload, Main circuit over voltage, Memory error, CPU error, Main circuit low voltage, CT error, Earth Fault at servo on, Control circuit low voltage, External trip input (Motor temperature error), Power module error, Encoder error, Position deviation error, Position monitoring time error, Speed deviation error, Over speed error, Operating area error, Operation disabling error, Servo amplifier temperature error, Matching error, Invalid command error, Nesting time error, Run error, Magnetic polar position estimation error, Magnetic polar position estimation undone		
Operation environment	Ambient temperature in operation/Storage temperature (4)	0～55℃/-10～70℃		
	Humidity in operation	20～90%RH (No condensation)		
	Vibration and impact (5)	5.9m/s² (0.6G) 10～55Hz		
	Operating place	Altitude 1000m or less, Indoor (no corrosion gas, no dust)		
	Mass (reference) (kg)	0.8		

Note (1) Protection method conforms to JEM1030 standard.
(2) Applicable when temperature sensor signal goes to external trip input
(3) Please use dynamic brake as emergency stop.
(4) Storage temperature is also applied in transportation.
(5) Test method conforms to JISC0040 standard.

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

Table 6 Programming specification of driver

Item		Specification
Language specification	Language type	BASIC Like
	Program capacity	512 steps (Memory in driver is 512 steps, within 6K bites.)
	Supporting function for programming	Text input, Display Grammar check of program Loading program, all clear Single step Break point
	Run specification	Interpreter type 1.12ms/command Subroutine call : 8 nests maximum
Input/Output function	External digital terminal input	Terminal signal/Open collector signal input (Internal power supply DC 24V is available.), Servo ON, Alarm reset, General input terminal 12 points X(00) to X(11)
	External output	General output terminal 8 points Y(00) to Y(07)
	External analog input	2 points XA(0) to XA(1)
Preset language	Variable	Position : P(00) to P(99) (100 points) Speed : N(00) to N(15) (16 points) Thrust : T(00) to T(15) (16 points) Acceleration time : ACC(0), ACC(1) (2 points) Deceleration time : DEC(0), DEC(1) (2 points)
	Command	Program command (for~next, ifs~then~else~end if, until~loop, etc.) Motion program (mov, speed, nchg, smove, etc.)
Operator		+, −, *, /, and, or etc.

●Setup Software

- Setting, referring, change, print and save of driver parameter can be done.
- Real time monitoring of operation and output are possible.
- Speed and electric current are displayed.
- Helping test run and gain tuning
- Edit, compile, download and upload of program can be done.

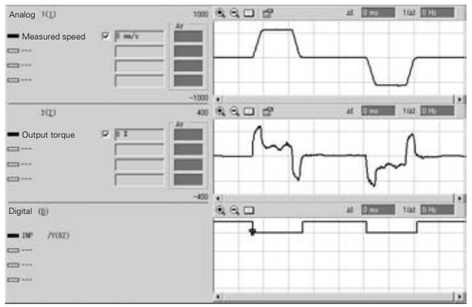


Fig.3 Monitor function

Table 7 Operating environment of setup software

Item	Condition
PC	DOS/V PC Memory : 32M bites or larger Free area of hard disk : 30M bites or larger Display graphic resolution : 800×600 or larger recommended
OS	Windows® 95/98/Me/XP Windows NT®, Windows2000®

Remark : Windows® is a trade mark of Microsoft Corporation in USA and other countries.

Thrust and Dynamic Load Mass

■What is Thrust?

Thrust is a force in the moving direction exercised by the moving coil as shown in the figure (Page 4) illustrating the Principle of Operation.

■What is Effective Thrust?

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···M, the motor may overheat or seize. When using this model, calculate the effective thrust and operate within it. However, the operation limit may vary according to the operating conditions, etc.
In general, the effective thrust (F_{rms}) is obtained as follows.

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

Where F_P is the force required for acceleration. F_L is the force due to running resistance. The running resistance consists of the frictions of the linear motion rolling guide incorporated in Linear Motor Table LT··· M, the cord wiring resistance, etc.

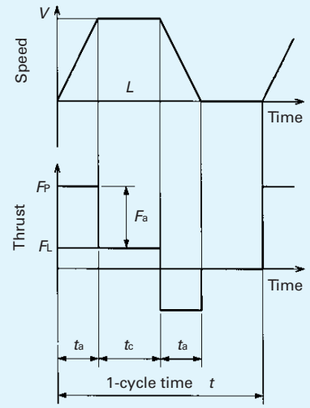


Fig.4 Operation pattern

■What is Dynamic Load Mass?

The dynamic load mass is the maximum weight that permits obtaining the required acceleration and deceleration. The acceleration or deceleration on Linear Motor Table LT···M becomes smaller as the weight on the table increases. Therefore, when using this model, examine the operation pattern taking the relationship between the weight and acceleration/deceleration into consideration.

Examination of Operation Pattern

■Calculation of acceleration/deceleration time

The thrust required for driving Linear Motor Table LT ···M reaches its peak during acceleration.
The thrust required during acceleration is limited by the maximum thrust of Linear Motor Table LT···M. Further, the substantial thrust is reduced by the running resistance. The running resistance is 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 F_f value is as belows

In LT45M : 1.5 [N]
In LT45M···/M2 : 3.0 [N]
In LT45M···/W : 3.0 [N]
In LT45M···/M2W : 6.0 [N]

・Force due to a running resistance F_L

$F_L=F_f+F_C$ [N]

Therefore, the limit acceleration time is calculated by the following :

・Force due to acceleration F_a

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

・Thrust required for acceleration F_P

$F_P=F_a+F_L$ [N]

・Limit acceleration time t_a

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

where,

μ : Frictional coefficient of the rolling guide 0.01
W_L : Load mass [kg]
W_T : Mass of the moving part [kg]
F_C : Pulling resistance of the cord(1) [N]
F_M : Maximum thrust of Linear Motor Table LT···M 20 [N]
t_a : Acceleration time [s]
V : Moving speed [m/s]
g : Gravitational acceleration 9.8 [m/s^2]
k : Safety factor (1.3)

Note(1) The pulling resistance varies according to the mass and wiring method of the cord. Calculate this using the estimated resistance value.

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

■Examination Example of Operation Pattern

In some cases, a working ratio of Linear Motor Table LT···M causes the effective thrust value to exceed the rated thrust value. As the result, the motor may be overheated and seized, causing a system trouble and personal injuries. Be sure to confirm that the effective thrust is equal to or less than the rated thrust.

An example of determining an operation pattern using the LT45M-120/5 is shown below. The following operation pattern is temporarily set in consideration of the load mass and the acceleration in the dynamic load mass graph on page 8.

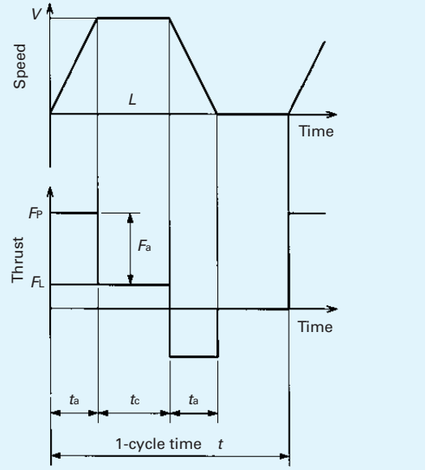


Fig.5 Operation pattern

Setting items

Specifications of table	Model	LT45M-120/5	
	Mass of the moving part	W_T	0.13 kg
	Maximum thrust	F_M	20 N
Load mass		W_L	0.5 kg
Travel distance		L	0.15 m
Moving speed		V	0.5 m/s
Time		t_a	0.1 s
		t_c	0.2 s
		t	0.6 s
Pulling resistance of the cord		F_C	1.0 N Estimated value
Safety factor		k	1.3

STEP1 Calculation of the thrust required for acceleration (deceleration)

❶Force due to running resistance F_L

$F_L=F_f+F_c=1.5+1.0=2.5$

❷Force due to acceleration F_a

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

$$=(0.5+0.13)\times\frac{0.5}{0.1}=3.15\ [N]$$

❸Thrust required for acceleration F_P

$F_P=F_a+F_L$

$=3.15+2.5=5.65$ [N]

Here, make sure that $F_P\times1.3$ (safety factor) does not exceed the maximum thrust F_M. If this value exceeds F_M re-examine the maximum speed, acceleration (deceleration) time and other factors of the operation pattern.

$F_P\times k=5.65\times1.3\fallingdotseq6.95<F_M$ $F_M=20$ [N]

In this example pattern, it can be judged that the acceleration operation can be performed.

STEP2 Calculation of effective thrust

Effective thrust F_{rms} can be determined as follows.

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

$$=\sqrt{\frac{5.65^2\times0.1+(5.65-2\times2.5)^2\times0.1+2.5^2\times0.2}{0.6}}$$

$\fallingdotseq2.73$ [N]

Here, make sure that effective thrust F_{rms} does not exceed the rated thrust. If Frms exceeds the rated thrust, re-examine the maximum speed, acceleration (deceleration) time, and other factors of the operation pattern.

In this example pattern, F_{rms}(2.73N) <4N (rated thrust) and it can be judged that the continuous operation is possible.

Cautions in Use

◆Linear Motor Table LT···M is a precision device. Therefore, handle it with great care and do not apply any excessive load or strong impact on it. Accordingly. Never disassemble or remodel it in any case.

◆Cords such as a motor cord are connected to the moving table. Therefore, a cord wiring space should be provided in addition to the installation space of the product. When wiring cords, be careful not to bend the cords sharply (to bend them with a great curvature) so as not to increase the running resistance or give any excessive force to the cords.

◆Use this product in a clean environment free from water, oil, dust and other foreign matters.

◆The flatness of the mounting base should be 10μm or better since it affects the positioning accuracy.

◆Linear Motor Table LT···M contains strong magnets in the bed. It is very dangerous because they strongly attract magnetic materials. Please contact IKO when using the product near equipment that may be sensible to magnetism.

◆To drive the product, it is necessary to set parameters of the dedicated driver. Correctly set parameters according to the driving motor.

◆The Setup software, a personal computer, a PC connection cable and an I/O connector are required to use the dedicated driver of Linear Motor Table LT···M.

◆Linear Motor Table LT···M cannot be used vertically.

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

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

Mounting Linear Motor Table LT···M

Follow the instructions below to mount Linear Motor Table LT···M

[Notices]

◆The parallel linear motor table set is factory-adjusted to eliminate mutual product differences. Do not use the linear motor table together with the other linear motor table to build a parallel linear motor table system.

◆When designing a system of a twin-modules specification, the distance between modules along the stroke should be 92 mm minimum or a sum of 92 mm plus a multiple of 18.4 mm. (See Figure 6.) If the other distances are used, motor poles are not aligned and the table cannot run. (This is applicable to supplemental code-"/M2" and "/M2W.")

◆When designing a multiple module specification, the positions of the modules should be adjusted so that their positional error along the stroke is 0.1 mm or less. If the error is greater, motor poles are not aligned and the thrust goes down. (This is applicable to supplemental code-"/W," "/M2" and "/M2W.")

◆When designing a system of a parallel specification, the positional error of the bed along the stroke should be 0.1 mm or less. If the error is greater, the motor poles are not aligned and the thrust goes down. (This is applicable to supplemental code-"/W" and "/M2W.")

◆When designing a system of a parallel specification, the parallelism of the bed to the linear motor table should be 10μm or less. If the parallelism is not right, the frictional resistance increases and consequently the accuracy and the life of the motor table are badly affected. (This is applicable to supplemental code-"/W" and "/M2W.")

[Example of assembling a twin-modules specification using parallel Linear Motor Tables LT45M/M2W]

❶Preparation

・The bed, table, and positioning pins shall be prepared by customer. IKO is ready to prepare them for customer. Please order if customer want them.

・Mount the following reference mounting surface having a parallelism of 10μm on the base and mount positioning pins Ⓐ and Ⓑ as mounting references along the stroke. Mount two positioning pins Ⓒ and Ⓓ as mounting references and four positioning pins Ⓔ to Ⓗ as mounting references along the table stroke on the table. (Fig.6)

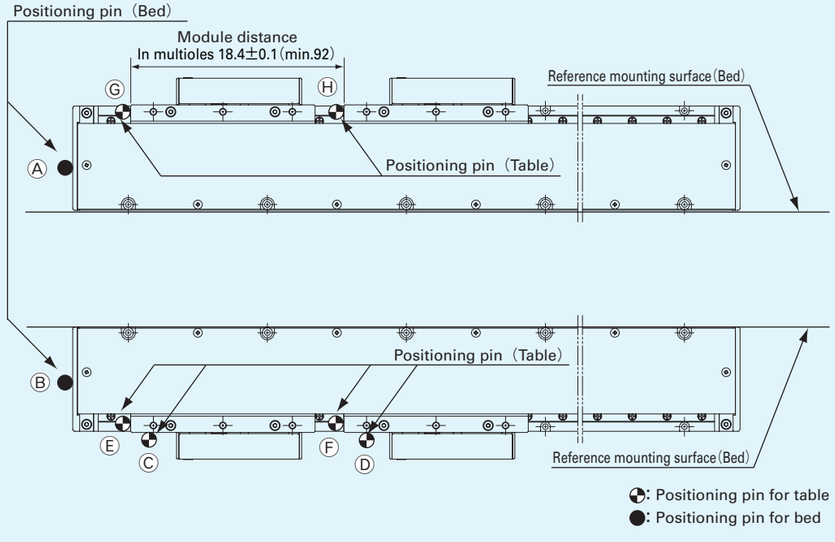


Fig.6 Location of reference mounting surfaces and positioning pins (LT45M/M2W)

❷Cleaning the mounting surfaces and the reference mounting surfaces

・Remove burrs and blemishes from mounting surfaces and reference surfaces of the machine or apparatus bed on which Linear Motor Tables LT···M are mounted by using an oil stone, etc and then wipe the surfaces with clean cloth.

・Remove rust preventive oil and dirt from mounting surfaces and reference surfaces of Linear Motor Table LT···M with clean cloth.

❸Securing the linear motor table to the bed

・Correctly match Linear Motor Table LT···M with the reference mounting surface and positioning pins of the base and secure it to the base. (Fig.7)

❹Securing the linear motor table to the table

・Correctly match the reference mounting surface of Linear Motor Table LT···M module to the positioning pin ⓒⓓ and temporarily tighten the mounting bolts. (Fig.8)

・Tighten the mounting bolts of one module while pushing the reference mounting surface of the module to the positioning pin Ⓔ that is the mounting reference of the table.

・Tighten the mounting bolts of the other module while checking its frictional resistance and pushing the surface of the module to the positioning pins ⒻⒼⒽ of the table along the stroke. (Fig.9)

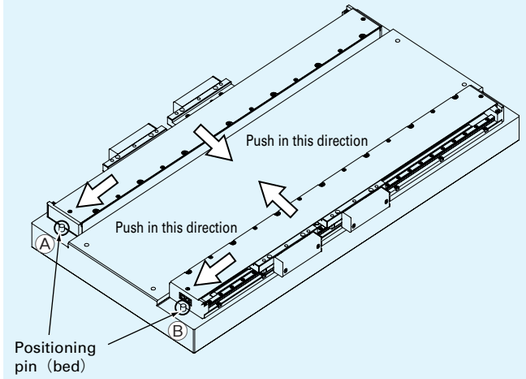


Fig.7 Mounting the LT45M/M2W on the bed

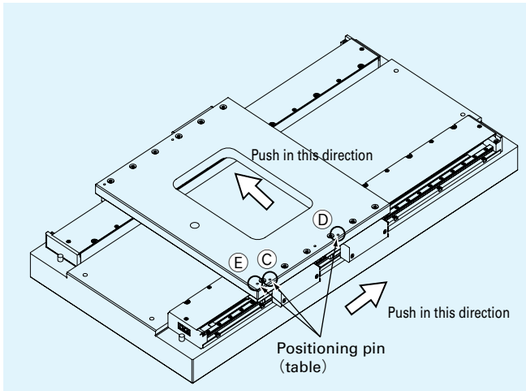


Fig.8 Mounting the LT45M/M2W on the table

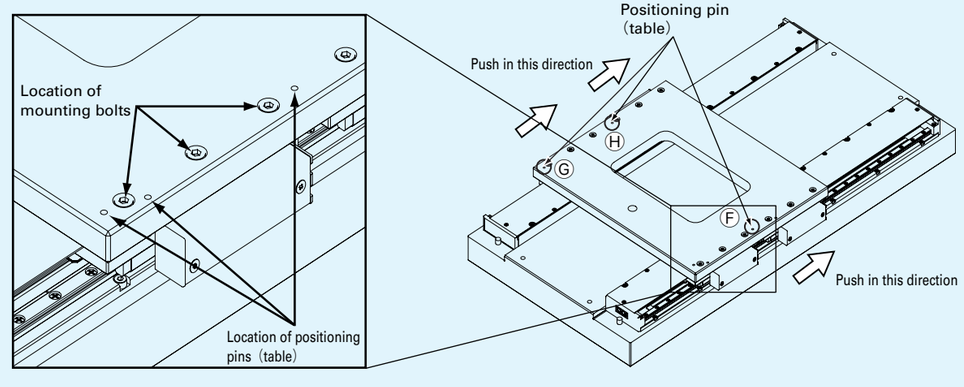
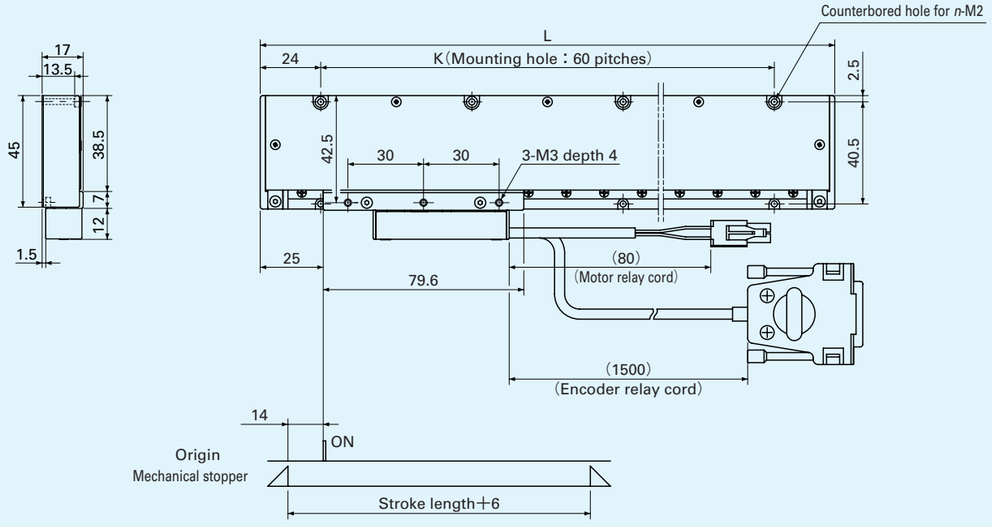


Fig.9 Mounting the LT45M/M2W on the table

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

IKO Linear Motor Table LT···M

LT45M Single module in single arrangement



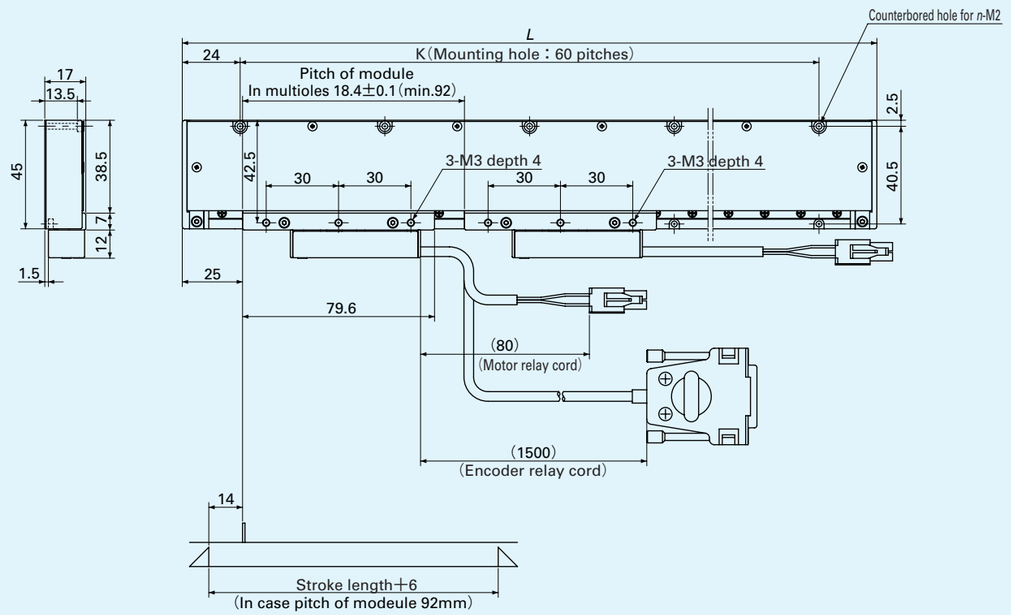
unit：mm

Model number	Stroke length	Overall length *L*	Bed mounting hole *K*	Bed mounting hole *n*	Total table mass(1) kg	Moving part mass(1) kg
LT45M−120/□	120	228	180	8	0.78	0.13
LT45M−180/□	180	288	240	10	0.96	
LT45M−240/□	240	348	300	12	1.14	
LT45M−300/□	300	408	360	14	1.31	

Note(1) The mass of the cord is not included.

IKO Linear Motor Table LT···M

LT45M···/M2 Twin modules in single arrangement



unit：mm

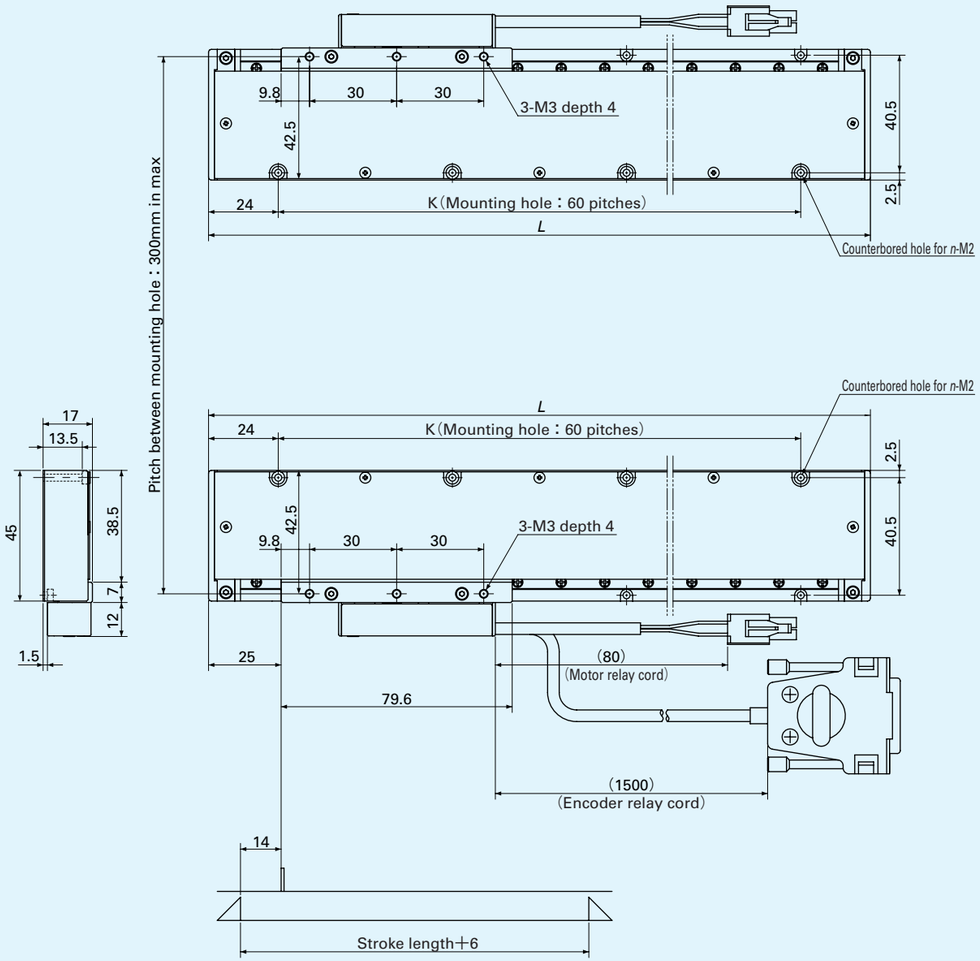
Model number	Stroke length	Overall length *L*	Bed mounting hole *K*	Bed mounting hole *n*	Total table mass(1) kg	Moving part mass(1) kg
LT45M− 28/□M2	28	228	180	8	0.90	0.25
LT45M− 88/□M2	88	288	240	10	1.08	
LT45M−148/□M2	148	348	300	12	1.26	
LT45M−208/□M2	208	408	360	14	1.43	

Note(1) The mass of the cord is not included.

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

IKO Linear Motor Table LT···M

LT45M···/W Single module in single arrangement



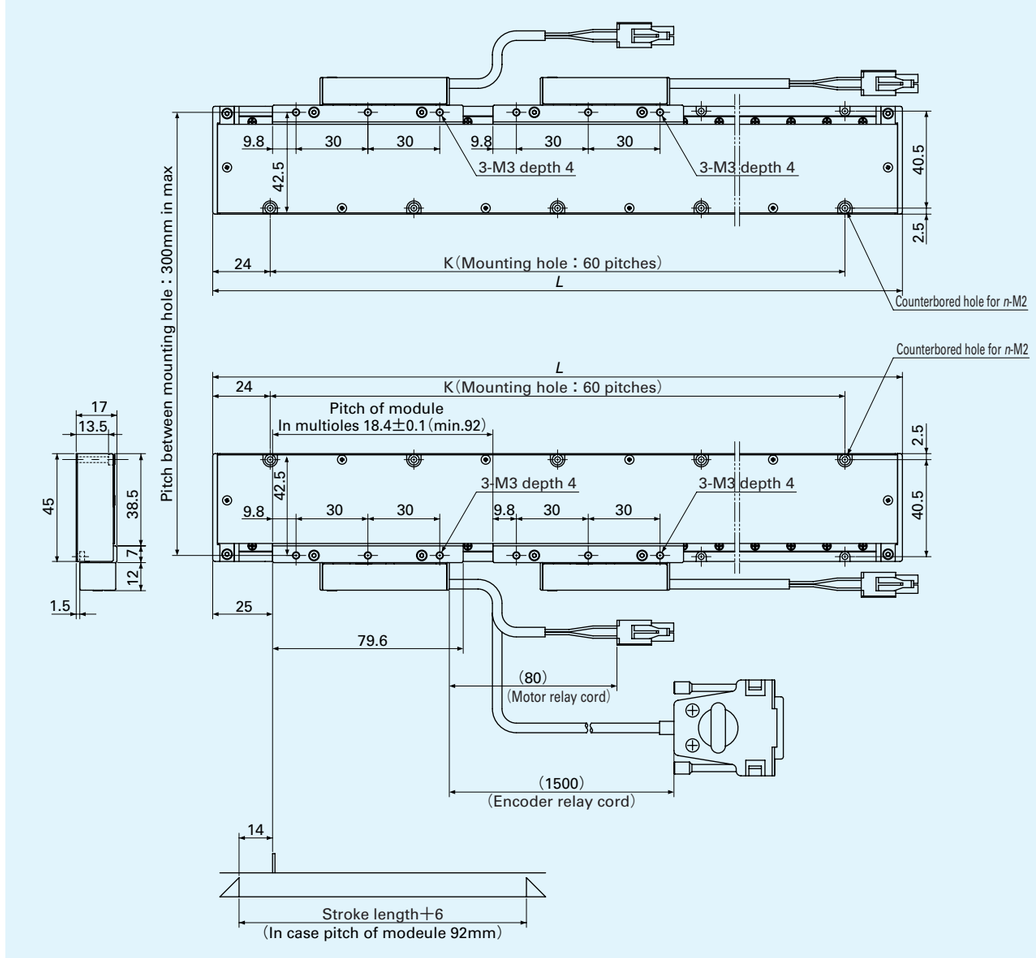
unit : mm

Model number	Stroke length	Overall length L	Bed mounting hole K	Bed mounting hole n	Total table mass(1) kg	Moving part mass(1) kg
LT45M−120/□W	120	228	180	8	1.55	0.25
LT45M−180/□W	180	288	240	10	1.91	
LT45M−240/□W	240	348	300	12	2.28	
LT45M−300/□W	300	408	360	14	2.61	

Note(1) The mass of the cord is not included.

IKO Linear Motor Table LT···M

LT45M···/M2W Twin modules in parallel arrangement



unit : mm

Model number	Stroke length	Overall length L	Bed mounting hole K	Bed mounting hole n	Total table mass(1) kg	Moving part mass(1) kg
LT45M− 28/□M2W	28	228	180	8	1.79	0.5
LT45M− 88/□M2W	88	288	240	10	2.15	
LT45M−148/□M2W	148	348	300	12	2.51	
LT45M−208/□M2W	208	408	360	14	2.86	

Note(1) The mass of the cord is not included.

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

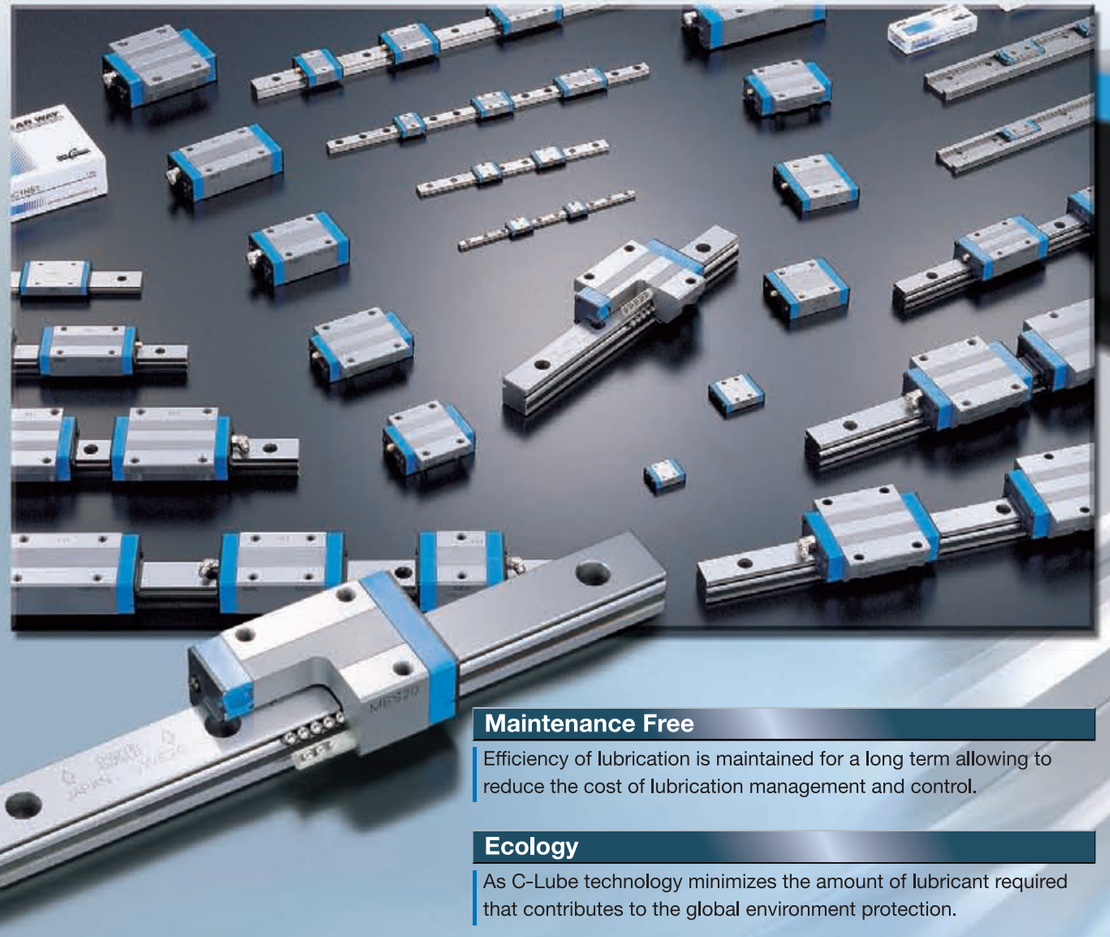
The invention in gratitude for rich global environment

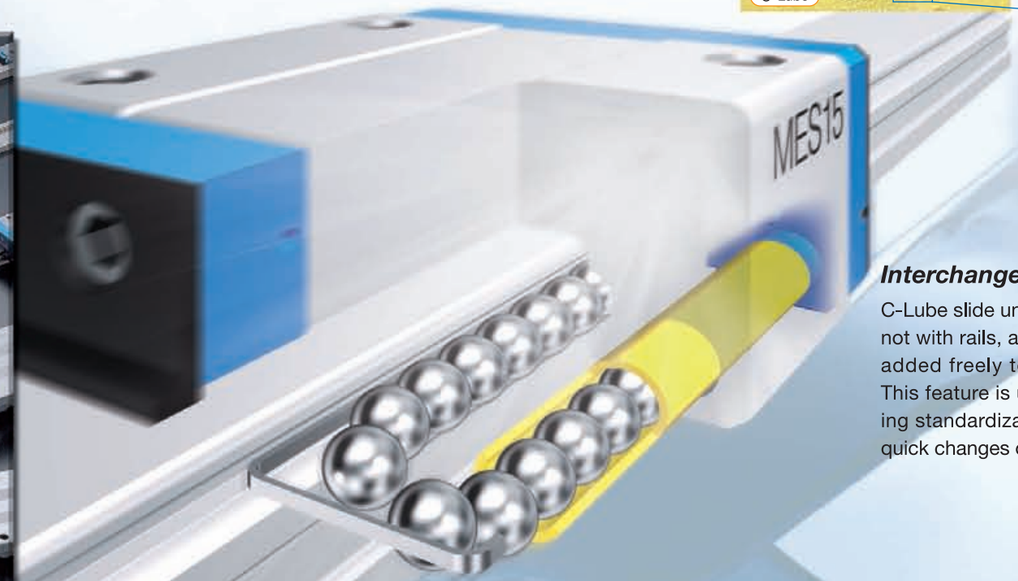
Maintenance free for 20,000km or 5 years

IKO Maintenance Free & Interchangeable CAT-57168

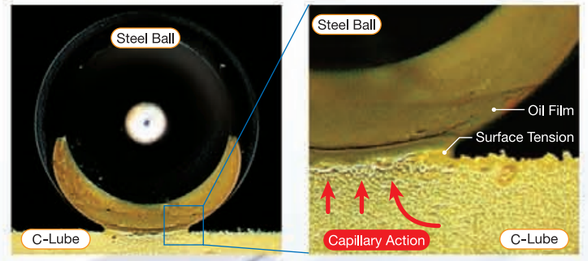
C-Lube Linear Way

ML ME MH MUL





The Capillary system that IKO has developed is a new method of lubrication. The Lube-body is formed by sintering fine resin powder to act as reservoir and the open pores are impregnated with a large amount of lubrication oil.
The capillary action deposits the appropriate amount of lubrication on the rolling elements to protect the raceways for long periods.



Interchangeable series is available.

C-Lube slide units can be supplied by themselves not with rails, and can be matched, replaced and added freely to the interchangeable track rail. This feature is useful in machine design, facilitating standardization of product specification and quick changes of specification.

Maintenance Free

Efficiency of lubrication is maintained for a long term allowing to reduce the cost of lubrication management and control.

Ecology

As C-Lube technology minimizes the amount of lubricant required that contributes to the global environment protection.

Compact

Unlike attached-on external lubrication parts, there is no increase in carriage length.
No loss of available stroke length when replacing standard units.

Smooth

Light and smooth running is achieved by the improvement of internal design. C-Lube is designed not to have direct contact with the track rail allowing very smooth operation.

IKO *Clean Lubrication*
C-Lube
Friendly to Maintenance
Gentle to the Earth

Miniature type ML series

Compact ME series

High load capacity MH series

U-shaped track rail MUL series

World Network of IKO

NIPPON THOMPSON CO., LTD.

Head office : 19-19 Takanawa 2-chome Minato-ku
Tokyo 108-8586, Japan
Phone : +81 (0)3-3448-5850
Fax : +81 (0)3-3447-7637
E-mail : ntt@ikonet.co.jp
URL : http://www.ikont.co.jp/eg/
Plant : Gifu, Kamakura

NIPPON THOMPSON CO., LTD.

ASEAN REPRESENTATIVE OFFICE
Level 8, #1 Silom Road, Silom
Bangrak, Bangkok
Thailand 10500
Phone: +66 (0)-2-231-8278
Fax: +66 (0)-2-231-8121
E-mail: ntar@ikonet.co.jp

IKO-THOMPSON (SHANGHAI) LTD.

1402-1404 Sunyoung Center
28 Xuanhua Road, Shanghai
People's Republic of China 200050
Phone: +86 (0)21-3250-5525
Fax: +86 (0)21-3250-5526
E-mail: ntc@ikonet.co.jp

IKO INTERNATIONAL, INC.

http://www.ikont.com/

East coast
91 Walsh Drive
Parsippany, NJ 07054
U.S.A.
Phone: +1 973-402-0254
Toll Free: 1-800-922-0337
Fax: +1 973-402-0441
E-mail: eco@ikonet.co.jp

Midwest
500 East Thorndale Avenue
Wood Dale, IL 60191
U.S.A.
Phone: +1 630-766-6464
Toll Free: 1-800-323-6694
Fax: +1 630-766-6869
E-mail: mwo@ikonet.co.jp

West coast
20170 South Western Avenue
Torrance, CA 90501
U.S.A.
Phone: +1 310-609-3988
Toll Free: 1-800-252-3665
Fax: +1 310-609-3916
E-mail: wco@ikonet.co.jp

Southeast
2150 Boggs Road, Suite 100
Duluth, GA 30096
U.S.A.
Phone: +1 770-418-1904
Toll Free: 1-800-874-6445
Fax: +1 770-418-9403
E-mail: seo@ikonet.co.jp

Southwest
8105 N. Beltline Road
Suite 130, Irving, TX 75063
U.S.A.
Phone: +1 972-929-1515
Toll Free: 1-800-295-7886
Fax: +1 972-915-0060
E-mail: swo@ikonet.co.jp

NIPPON THOMPSON EUROPE B.V.

http://www.ikont.eu/

The Netherlands
Sheffieldstraat 35-39
3047 AN Rotterdam
The Netherlands
Phone: +31 (0)10-4626868
Fax: +31 (0)10-4626099
E-mail: nte@ikonet.co.jp

Germany
Mündelheimer Weg 56
40472 Düsseldorf
Germany
Phone: +49 (0)211-414061
Fax: +49 (0)211-427693
E-mail: ntd@ikonet.co.jp

Im Gewerbepark D 30
93059 Regensburg
Germany
Phone: +49 (0)941-206070
Fax: +49 (0)941-2060719
E-mail: ntdr@iko-nt.de

Gruben Str.95c
66540 Neunkirchen
Germany
Phone: +49 (0)6821-999-860
Fax: +49 (0)6821-999-8626
E-mail: ntdn@iko-nt.de

UK
2 Vincent Avenue, Crownhill
Milton Keynes Bucks MK8 0AB
United Kingdom
Phone: +44 (0)1908-566144
Fax: +44 (0)1908-565458
E-mail: sales@iko.co.uk

Spain
Autovia Madrid-Barcelona, Km. 43,700
Polig. Ind. AIDA, A-8, Ofic. 2, 1ª
19200-Azuqueca de Henares
Guadalajara, Spain
Phone: +34 949-263390
Fax: +34 949-263113
E-mail: nts@ikonet.co.jp

France
Roissypole Le Dôme
2 rue de La Haye
BP 15950 Tremblay en France
95733 Roissy C. D. G. Cedex
France
Phone: +33 (0)1-48165739
Fax: +33 (0)1-48165746
E-mail: ntf@ikonet.co.jp

IKO Clean Lubrication
C-Lube
Friendly to Maintenance
Gentle to the Earth

Recognizing that conservation of the global environment is the top-priority challenge for the world's population, IKO will conduct its activities with consideration of the environment as a corporate social responsibility, reduce its negative impact on the environment, and help foster a rich global environment.

ISO 9001 & 14001 Quality system registration certificate

ISO 9001 Certified
ISO 14001 Certified