PATENT PENDING

IKO

Micro Precision Positioning Table

TM

CAT-57171

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June 2009 IKO Overseas Dept.

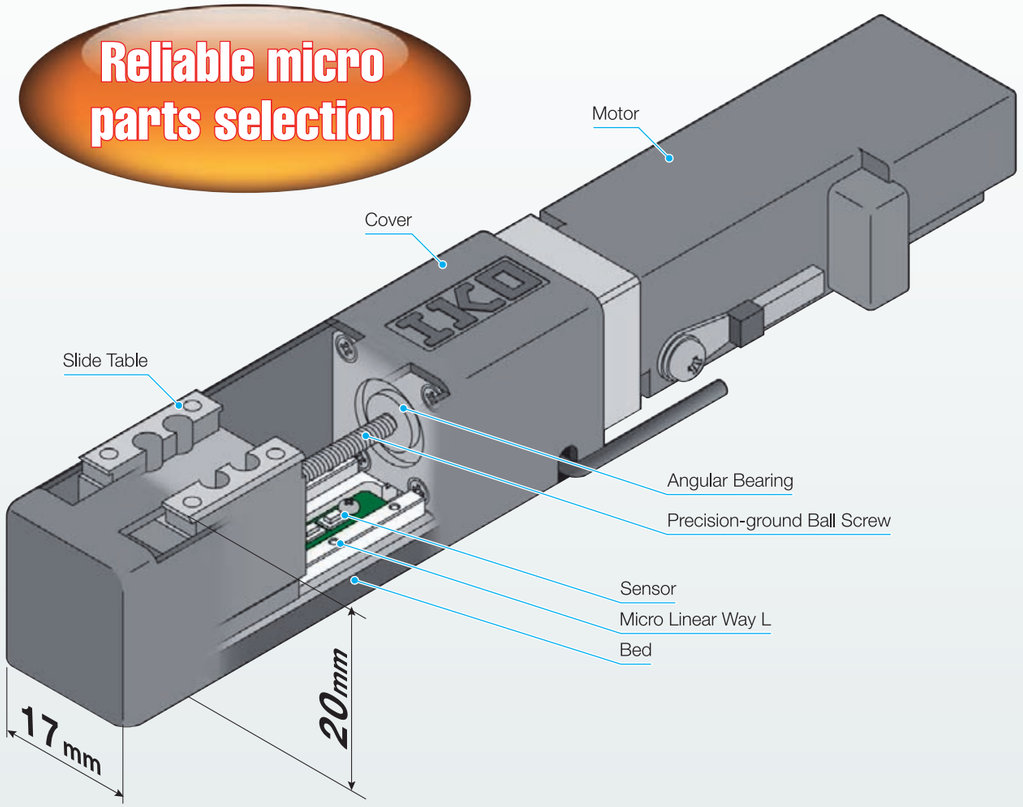
IKO Micro Precision Positioning Table TM

The lowest height 20mm driven by precision ball screw

IKO Micro Precision Positioning Table TM is an extremely compact precision positioning table comprising IKO Micro Linear Way L of a track rail width of 2 mm, which has a reputation in a micro device field and a precision-ground ball screw of 2 mm in diameter.
Micro Linear Way L, ball screw, and other steel parts are made of stainless steel and highly corrosion resistant.
This positioning table can satisfy the highest precision requirement that cannot be satisfied by conventional small positioning tables in addition to device downsizing and space saving requirements

IKO Micro Precision Positioning Table TM

Structure of Linear Motor Table LT···M



Model and size	Shape of table	Stroke length mm		
TM15	**Standard model**	20	40 New	60 New
TM15G New	**Long stroke model**	10	30	50

Features of Micro Precision Positioning Table TM

1 Very compact positioning table of 20 mm high (sectional) and 17 mm wide driven by a ground ball screw

IKO Micro Linear Way L of a rail width of 2 mm for the table guide and a miniature ball screw of a screw diameter of 2 mm for the feeding mechanism are used. The ground ball screw has the lowest sectional height that cannot be accomplished ever, and realizes smooth and stable sliding motion, high running accuracy, small backlash and high accuracy positioning of good follow-up property.

2 Long stroke model for higher rigidity

In long stroke model, stable high accuracy and rigidity can be obtained even under fluctuating loads and complex loads.

3 AC servo motor and stepping motor selectable

IKO provides various kinds of AC servo motors and stepping motors which are selectable according to user applications.

4 Optional miniature sensors (can be built in)

Micro Precision Positioning Table TM can contain Origin, Pre-origin, CW and CCW sensors without changing external dimensions.

Applications in wide range

Micro Precision Positioning Table TM is best suited to increase the accuracy of a positioning mechanism of a miniature device since it realizes high-precision positioning although it is very small. Moreover, Micro Precision Positioning Table TM uses stainless steel parts and can also be used in places that inhibit oil and grease and in damp places.

- Measuring apparatus
- Electronic part assembling equipment
- Robots
- Bio-related equipment
- Medical equipment
- Watch assembling machines
- Wire coiling machine, etc.

Best suited for positioning mechanism of miniature device

Identification Number

Example of identification number

TM	15	G	-	50	A	/	T001	05	1
❶	❷	❸		❹	❺		❻	❼	❽

❶Type	TM : Micro Precision positioning table TM
❷Size	15 : Table width 15 mm
❸Shape of slide table	Non-symbol : Standard table G : Long table
❹Stroke length	Stroke length can be selected from Table 1.

Table 1 Type of slide table and stroke length

Type of slide table	Stroke length mm
Standard table	20, 40, 60
Long table	10, 30, 50

❺Motor	A : With motor
❻Motor type	T001 : AC servo motor T002 : Stepping motor (5 phases) T003 : Stepping motor (2 phases)

For details of motor specifications, see pages 7 to 8. In case of using non-standard motor, consult IKO.

❼Ball screw lead	05 : Lead 0.5mm 10 : Lead 1mm

When slide-screw is required, consult IKO.

❽Sensor specification, direction of wiring	0 : Without sensor 1 : With sensor (on the right as viewed from the side opposite the motor) 2 : With sensor (on the left as viewed from the side opposite the motor)

In case "without sensor" is selected, adding a sensor afterward is not possible.
In case "with sensor" is selected, motor cord locates at the same side of sensor cord.

Remark : Table cover is made of resin. If a stainless steel table cover is required, consult IKO.

Characteristics

Table 2 Specification

Item \ Model code		TM15-20		TM15-40		TM15-60		TM15G-10		TM15G-30		TM15G-50	
Stroke length	mm	20		40		60		10		30		50	
Ball screw lead	mm	0.5	1	0.5	1	0.5	1	0.5	1	0.5	1	0.5	1
Positioning accuracy	mm	0.015											
Repeatability	mm	±0.001	±0.002	±0.001	±0.002	±0.001	±0.002	±0.001	±0.002	±0.001	±0.002	±0.001	±0.002
Table inertia J_T	$\times 10^{-5}$kg·m²	0.00013	0.00016	0.00016	0.00019	0.00018	0.00021	0.00014	0.00019	0.00016	0.00021	0.00018	0.00023
Starting torque T_0	N·m	0.005											
Maximum loading mass (1)	N	15											

Note(1) This is a maximum load applicable without causing problems with functionality or performance.

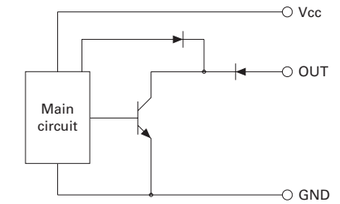
Table 3 Maximum speed

Item \ Motor type		AC servo motor	Stepping motor
Motor speed	r/min	4000	1800
Maximum speed	mm/s Lead 0.5mm	33	15
	mm/s Lead 1mm	67	30

Remark : The values of the maximum speed are applicable when the standard motor is used. The actual maximum operation speed must be determined by examining the operating pattern for the motor used, load conditions, etc.

Sensor Specification

Table 4 Sensor Specification

Item		Specification
Type		Magnetic sensor
Power supply voltage		DC12V～24V ±10%
Current consumption (1)		65 mA or less
Output (2)		Open corrector ・Maximum input current : 12 mA or less ・Applied voltage : DC30V or less ・Residual voltage : 1.7 V or less for 12 mA of input current 1.1 V or less for 4 mA of input current
Output operation	Limit and pre-origin	When approaching OFF
	Origin	When detected ON
Operation indicator		LED (green) : Power LED (yellow) : CW limit sensor LED (red) : Origin sensor Pre-origin sensor CCW limit sensor
Circuit diagram		

Note(1) This is the current consumption of the entire system including the sensor amplifier.
(2) This is the output per circuit.

Table 5 Specifications of Connector

Pin No.	Signal name	Connector (by Molex Japan Co., Ltd.) Body side	Other end(2)
1	Origin	Housing 43020-0600	Housing 43025-0600
2	Pre-origin		
3	CW limit		
4	CCW limit		
5	Power input	Terminal Contactor 43031-0010	Terminal Contactor 43030-0007
6	GND		

Note(1) When AC servo motor is selected, use an encoder C-phase as origin signal.
(2) Other end connector shall be prepared by customer.

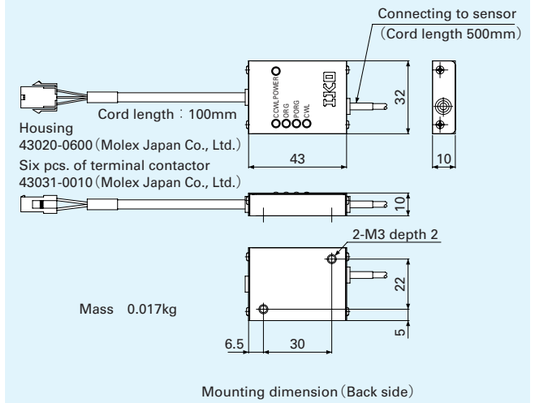
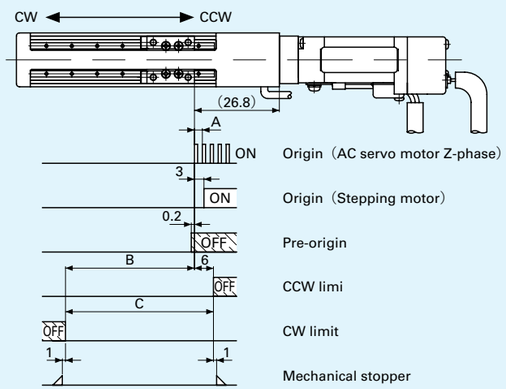


Fig. 1 Outside dimensions of sensor amplifier



unit : mm

Ball screw lead	A
0.5	0.25
1	0.5

unit : mm

Model code	B	C (Ref.)
TM15 -20	16	22
TM15 -40	36	42
TM15 -60	56	62
TM15G-10	4.5	10.5
TM15G-30	24.5	30.5
TM15G-50	44.5	50.5

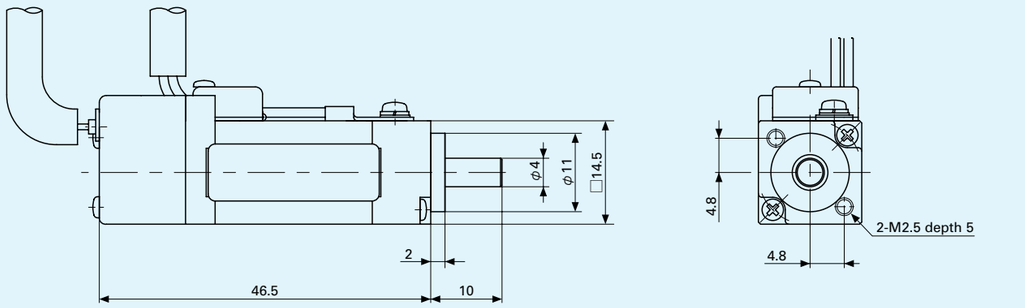
Fig. 2 Sensor timing chart

Remark : Dimension C shows the span between limit sensors.

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

Specifications of Motor and Driver

AC Servo Motor and Driver by Tamagawa Seiki Co., Ltd. (RoHS compliance)



unit : mm

Specifications of Motor

Motor code	Model	Power supply V	Rated output W	Rated torque N・m	Instantaneous peak torque N・m	Rated rotation speed r/min	Motor inertia J_M $\times 10^{-4}$ kg・m^2	Resolver specification pulse/rev	Mass kg
T001	TS4861N4020E500	24	4	0.0095	0.0285	4000	0.00064	2048	0.05

Specifications of motor wiring and connector

Motor code T001				Connectors (Tyco Electronics AMP K.K.)	
Pin No.	Code	Description	Sheath color of lead wire	Motor side	Connection side(1)
A1	U	Motor U-phase	Red	Tab housing 178964-3	Receptacle housing 178289-3
A2	V	Motor V-phase	White		
A3	W	Motor W-phase	Black		
B1	E	Frame ground	Green	Tab contact 175287-2	Receptacle contact 175218-2
B2	—	—	—		
B3	—	—	—		

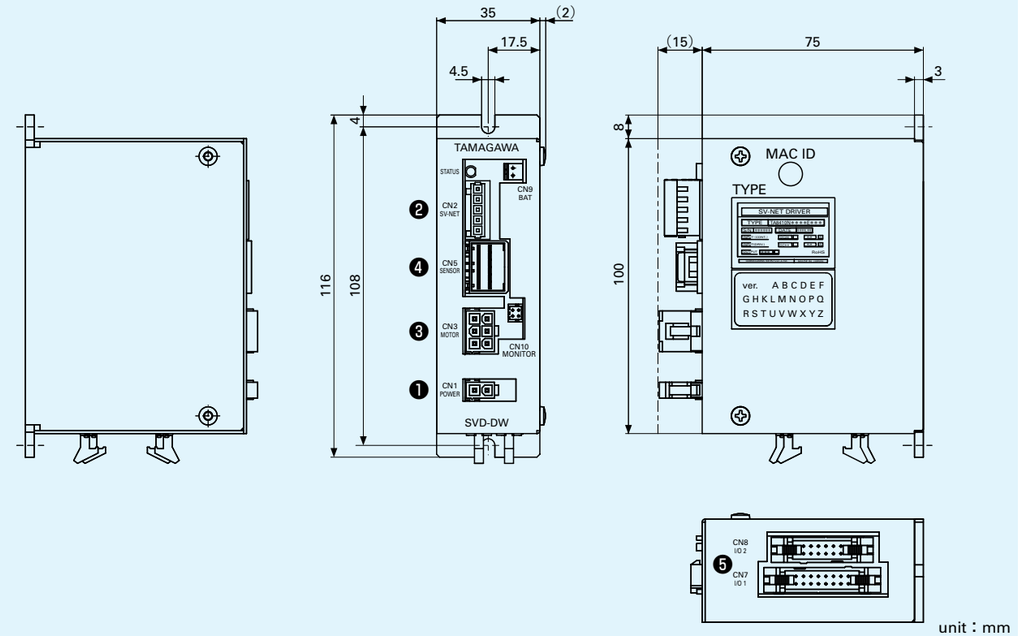
Note(1) Connection side connector shall be prepared by customer.

Specifications of resolver wiring and connector

Motor code T001				Connectors (Tyco Electronics AMP K.K.)	
Pin No.	Code	Description	Sheath color of lead wire	Motor side	Connection side(1)
A1	S2	Signal output	Yellow	Tab housing 1-1318115-6	Receptacle housing 1-1318118-6
A2	S1	Signal output	Red		
A3	R1	Excitation signal	White		
B1	S4	Signal output	Blue	Tab contact 1318112-1	Receptacle contact 1318108-1
B2	S3	Signal output	Black		
B3	R2	Excitation signal	Orange		

Note(1) Connection side connector shall be prepared by customer.

Functions and dimensions of components of driver for AC servo motor T001



unit : mm

No.	Name		Function
❶	CN1	Driving power supply connector	Connects a driving power supply.
❷	CN2	SV-NET connector	Connects a transmission unit with a SV-NET cord to set parameters.
		Control power supply connector	Connects a driving control power supply.
❸	CN3	Motor connector	Connects a motor cord.
❹	CN5	Sensor connector	Connects a resolver cord.
❺	CN7	I/O connector	Connects a pulse cord.
	CN8	I/O connector	

Specifications of driver for AC servo motor T001

Driver type	**TA8410N7318E936**
Motor code	T001
Rated output of motor	4W
Feedback	Brushless resolver
Type of command pulse input	CW/CCW signal, pulse signal, rotation direction signal
System of command pulse input	Line driver, Open corrector
Main circuit power voltage	DC24V ±10%
Control circuit power supply	DC24V ±10%
Continuous output current Arms	0.68
Maximum output current Arms	1.92
Ambient temperature in operation	0~40℃
Ambient temperature in storage	−10~85℃ (No freezing)
Ambient humidity (use and storage)	Less than 90% RH (No condensation)
Mass (kg)	0.3

Remark : DC24V power supply shall be prepared by customer.

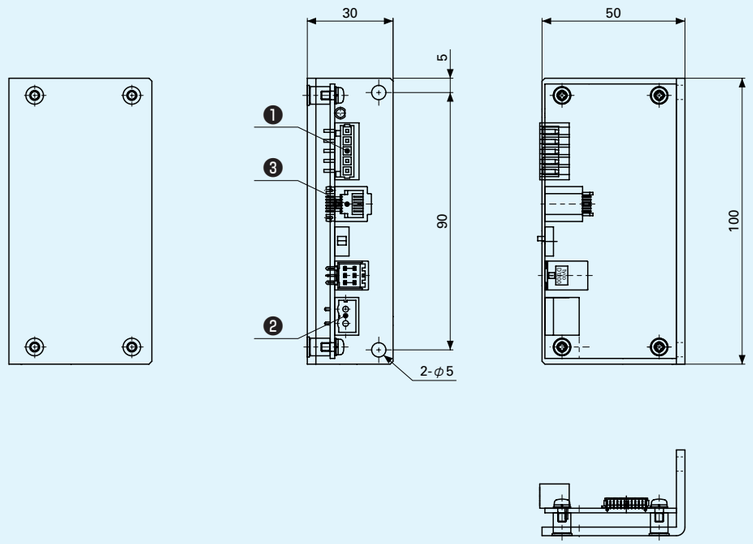
Accessories of driver for AC servo motor T001

Name		Description	Model	Remarks
CN1	Driving power supply connector	Receptacle housing	5557-02R	Molex Japan Co., Ltd.
		Terminal	5556TL	
CN2	Control power supply connector	Connector plug	734-105	WAGO Company of Japan, Ltd.
CN7	I/O connector	Socket	HIF3BA-16D-2.54R	Hirose Electric Co., Ltd.
CN8	I/O connector	Socket	HIF3BA-14D-2.54R	
CN10	Analog monitor connector	Socket	DF-4DS-2C	
		Contact	DF11-2428SC	

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

Specifications of Motor and Driver

Functions and dimensions of components of communication unit for AC servo motor T001



unit : mm

No.	Name		Function
❶	CN1	Communication connector	Connects a driver with a SV-NET cord.
❷	CN2	Power supply connector	Connects a power supply.
❸	CN3	Connector	Connects a personal computer with an RS-232C cord.

Remark : Use the communication unit to set driver parameters. See "System configuration" (on Page 11) for a system configuration for parameter setting.

Specifications of communication unit for AC servo motor T001

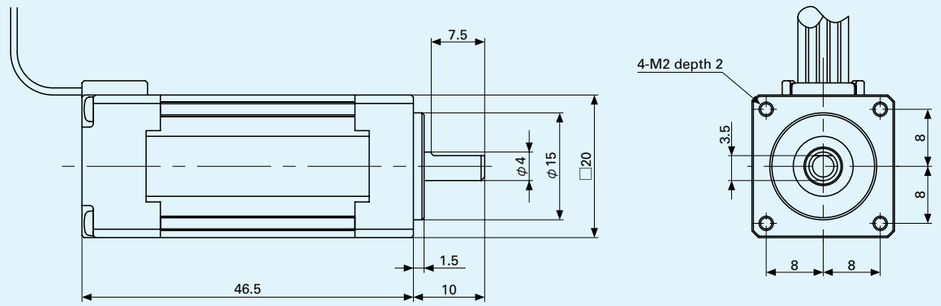
Communication unit model		TA8433N1
Input power voltage		DC24V ±10% (Unit consumption current 0.1A)
Control power supply output voltage		DC24V ±10%
Communication specification	PC side	RS-232C cable
	Driver side	SV-NET cord
Operating temperature range		0~40℃
Humidity in operation		Less than 90% RH(No condensation)
Mass kg		0.2

Remark : DC24V power supply shall be prepared by customer.

Accessories of communication unit for AC servo motor T001

Name		Description	Model	Remarks
CN1	Communication connector	Connector plug	734-105	WAGO Company of Japan, Ltd.
CN2	Power supply connector	Connector plug	231-102/026-000	

Stepping Motor and Driver by Tamagawa Seiki Co., Ltd. (RoHS compliance)



unit : mm

Specifications of Motor

Motor code	Model	Step angle degree	Maximum holding torque N・m	Current A-phase	Rotor Inertia JM ×10⁻⁴ kg・m²	Mass (Ref.) kg
T002	TS3682N2	0.72	0.024	0.35	0.004	0.085
T003	TS3692N2	1.80	0.024	0.35	0.004	0.085

Specifications of motor wiring and connector

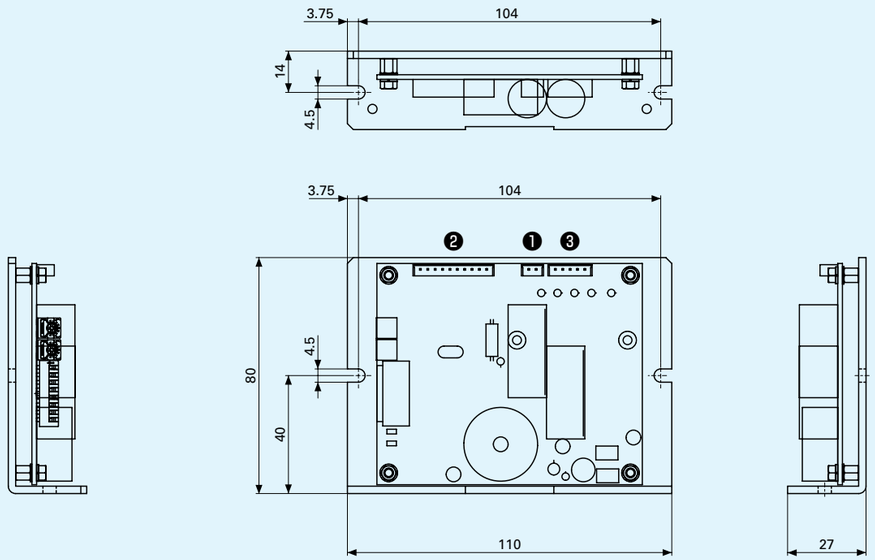
Motor code T002		Motor code T003		Connectors (Molex Japan Co., Ltd.)	
Pin No.	Sheath color of lead wire	Pin No.	Sheath color of lead wire	Motor side	Connection side(1)
1	Blue	1	Black	Housing 43025-0600	Housing 43020-0600
2	Red	2	No-use		
3	Orange	3	Blue		
4	Green	4	Red	Terminal contactor 43030-0007	Terminal contactor 43031-0007
5	Black	5	Orange		
6	No-use	6	Green		

Note(1) Other side connector shall be prepared by customer.

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

Specifications of Motor and Driver

Functions and dimensions of components of driver for stepping motor T002



unit : mm

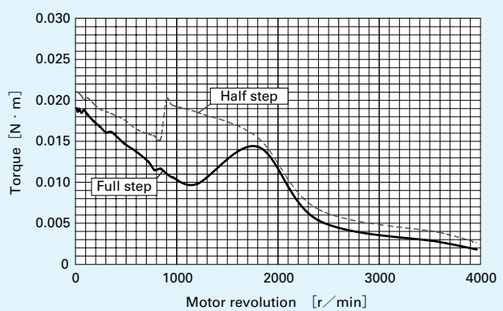
No.	Name		Function
❶	CN1	Power supply connector	Connects a power supply.
❷	CN2	I/O connector	Connects a pulse cord.
❸	CN3	Motor connector	Connects a motor cord.

Specification of driver for stepping motor T002

Driver type	**TD-5M13-L**
Applicable motor code	T002
Excitation type	Micro step 500 divisions maximum
Input	Photo coupler input, input resistance 220Ω
Input type	CW/CCW signal Pulse/Rotational direction signal
Power supply	DC15~35V 2.5A
Ambient temperature in operation	0~40℃ (No freezing)
Ambient humidity in operation	Less than 85% RH (No condensation)
Mass kg	0.17

Remarks : DC24V power supply is recommended. This shall be prepared by customer.

Torque charts of stepping motor T002

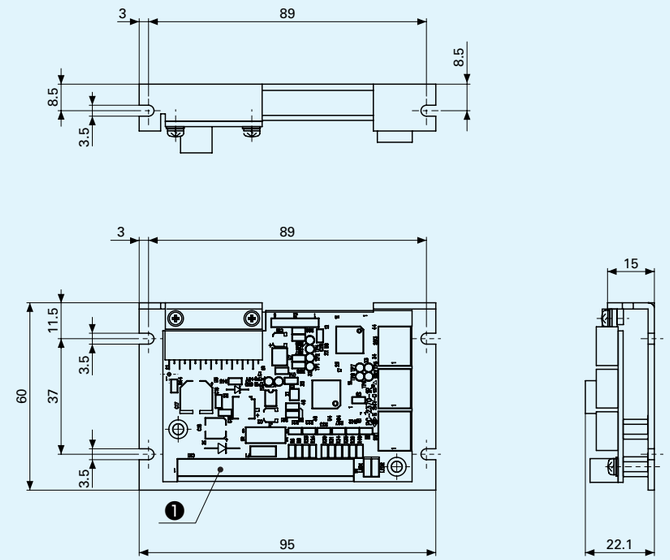


Motor code	Motor type	Driver type
T002	TS3682N2	TD-5M13-L

Torque charts of stepping motor T002

Name		Type: Housing	Type: Contact	Manufacture
CN1	Power supply connector	EHR-2	BEH-001T-P0.6	Japan Solderless Terminal Co., Ltd.
CN2	Control signal connector	EHR-10		
CN3	Driving power supply connector	EHR-5		

Functions and dimensions of components of driver for stepping motor T003



unit : mm

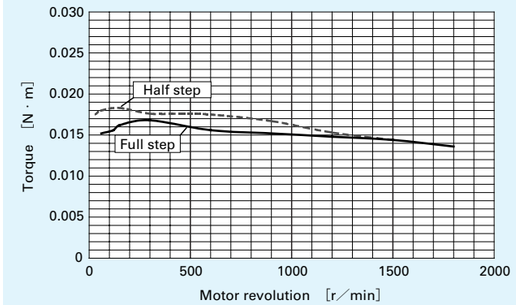
No.	Name	Function
❶	Interface connector	Connects power supply, pulse cord, and motor cord.

Specification of driver for stepping motor T003

Driver type	**eTD-24A**
Applicable motor code	T003
Excitation type	Micro step 500 divisions maximum
Input	Photo coupler input, Input resistance 220Ω
Input type	CW/CCW signal Pulse/Rotational direction signal
Power supply	DC24V±10% 3A
Ambient temperature in operation	0~40℃ (No freezing)
Ambient humidity in operation	Less than 85% RH (No condensation)
Mass kg	0.06

Remarks : DC24V power supply shall be prepared by customer.

Torque charts of stepping motor T003



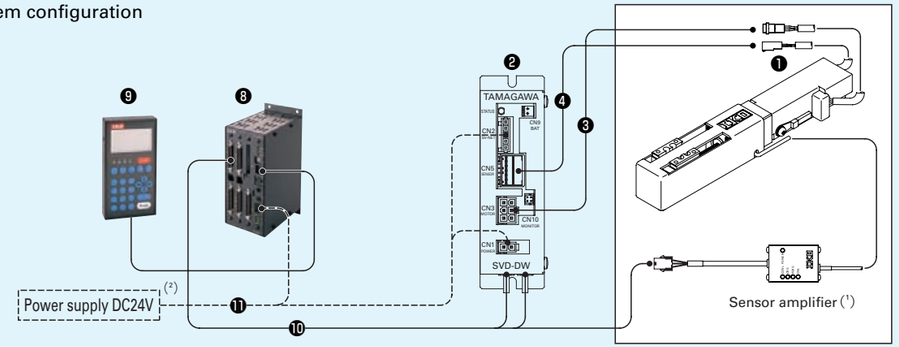
Motor code	Motor type	Driver type
T003	TS3692N2	eTD-24A

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

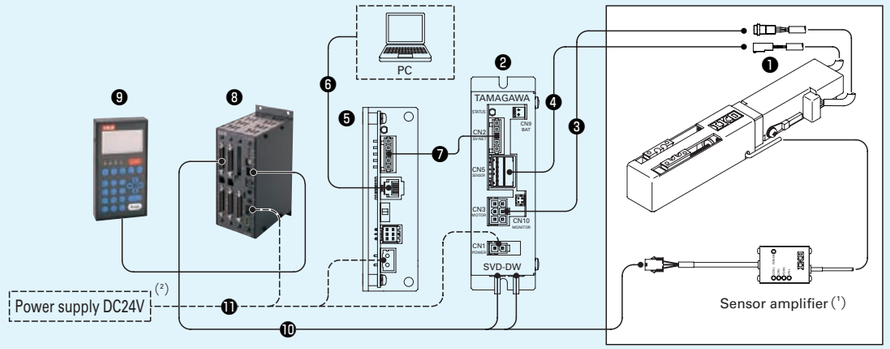
System Configuration

Micro Precision Positioning Table TM uses a specific driver. A typical system configuration is shown below. For specifications of the driver, see "Specifications of Motor and Driver" (on Page 5 to Page 10). For ordering, use the format shown below.

●System configuration



●System configuration for setting driver parameters for AC servo motor



No.	Name	Model code		
❶	Motor code	T001 [AC servo motor]	T002 [Stepping motor(Five phases)]	T003 [Stepping motor(Two phases)]
❷	Driver	TA8410N7318E936	TD-5M13-L	eTD-24A
❸	Motor cord	EU9614N□0	TAE20S6-SM0□ (TAE20S7-SN0□)	TAE20S8-SM0□ (TAE20S9-SN0□)
❹	Resolver cord	EU9615N□0	—	—
❺	Communication unit(3)	TA8433N1	—	—
❻	RS-232C cord(3)	EU6517N2	—	—
❼	SV-NET cord(3)	EU9610N20□0	—	—
❽	Program controller	CTN480G		
❾	Teaching box	TAE10M5-TB		
❿	Pulse limit cord(4)	TAE10U5-LD0□ (TAE10U6-LD0□)	TAE10U7-LD0□ (TAE10U8-LD0□)	TAE10U9-LD0□ (TAE10V0-LD0□)
⓫	Power supply cord	Prepared by customer (5)		Prepared by customer (6)

Note (1) If you specify "Without sensor," no sensor amplifier will be delivered.
(2) Power supply DC24V shall be prepared by customer.
(3) This is required for parameter setting. See "Driver parameter setting" (on Page 12). For specifications of the communication unit, see "Specifications of communication unit for the AC servo motor T001" (on Page 7).
(4) The customer should prepare a pulse limit cord when using any other programmable controller than CNT480G.
(5) Connectors are attached to the driver and the communication unit. See "Specifications of Motor and Driver" on Page 5 to Page 10.
(6) Connect the power supply cord directly.

Remarks : 1. Pulse limit cord in ( ), along with motor cord and resolver cord have high bending resistance.
2. The lengths of motor cord and resolver cord can be specified by increments of 1m up to 3m maximum in □ at the end of supplemental code. (Example of 3m: EU9614N30) The lengths of limit cord of pulse limit cord can be specified by increments of 1m up to 3m maximum in □ at the end of supplemental code. (Example of 3m: TAE10U5-LD03) If you wish to use one 3m or longer, consult IKO.
3. The lengths of SV-NET cord can be specified by increments of 1m up to 3m maximum in □ at the end of supplemental code. (Example of 3m: EU9610N2030) If you wish to use one 3m or longer, consult IKO.
4. The length of pulse cord of pulse limit cord is 1.5m.

●Driver parameter setting

Parameters of the driver for the AC servo motor must always be set before use. The communication unit, the RS-232C cord, and the SV-NET cord are required for parameter setting. These items must be ordered separately. Download the setting software from the following web site (Tamagawa Seiki Co., Ltd.).

http://sv-net.tamagawa-seiki.com/download/download_menu.html

These can be shared for maltiple drivers. Order them according customer's system requirements.

Cautions in Use

◆IKO Micro Precision Positioning Table TM is a precision device. Therefore, handle it with great care and do not apply any excessive load or strong impact on it.

◆Make sure that the mounting base is free from dirt and foreign objects.

◆The linear motion rolling guide and ball screws assembled in IKO Micro Precision Positioning Table TM are lubricated with grease. So take extreme care not to allow dirt or any foreign matters enter into the unit.

◆The best way to lubricate IKO Micro Precision Positioning Table TM varies by operating conditions. In general, wipe off the old grease every 6 months and apply new grease. A special-purpose re-greasing tool (a miniature grease injector) is available. If you require one, please consult IKO.

◆IKO Micro Precision Positioning Table TM makes use of a resin table cover. Therefore do not clean it with degreasing organic solvent, white kerosene or something similar.

◆IKO Micro Precision Positioning Table TM is machined, assembled and adjusted with high accuracy. Accordingly never disassemble or remodel it in any case.

◆The wiring in the motor, sensor and other electrical installations is very thin cabling. Therefore guard sufficiently against wire breaks due to hooking, pulling or other inadvertent action.

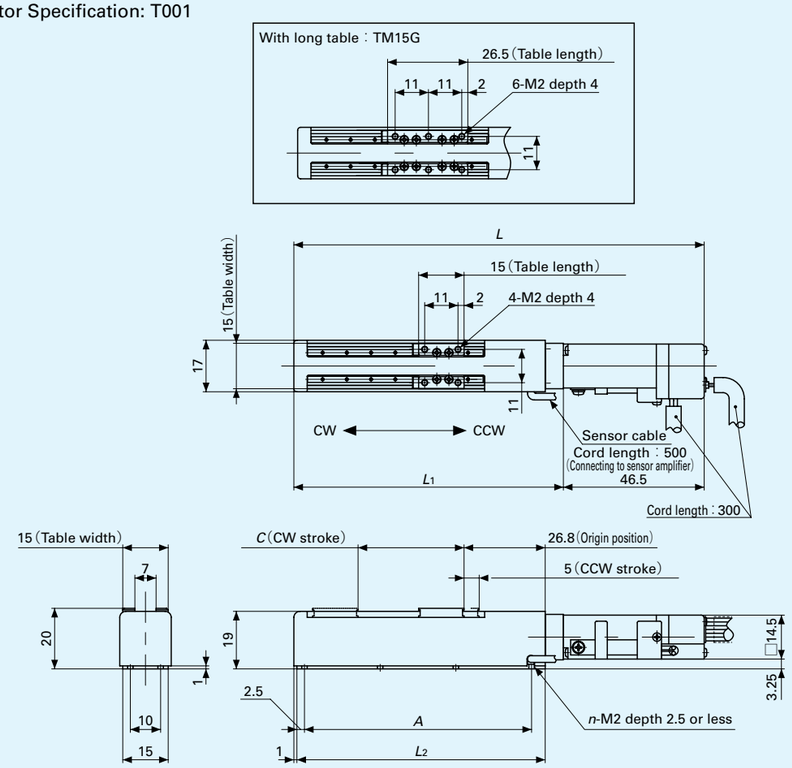
◎The appearance, specifications and other details of the products are subject to change without prior notice for improvement.

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

IKO Micro Precision Positioning Table TM

TM15

AC Servo Motor Specification: T001



unit : mm

Model code	Stroke dimension		Table dimension					Mass (Ref.) kg
	Stroke length	CW stroke C	Overall length L	L1	L2	Mounting holes A(Number of hall×pitch)	n	
TM15 -20	20	15	115.5	69	62	50(2×25)	6	0.15
TM15 -40	40	35	135.5	89	82	75(3×25)	8	0.16
TM15 -60	60	55	155.5	109	102	96(4×24)	10	0.17
TM15G-10	10	5	115.5	69	62	50(2×25)	6	0.16
TM15G-30	30	25	135.5	89	82	75(3×25)	8	0.17
TM15G-50	50	45	155.5	109	102	96(4×24)	10	0.18

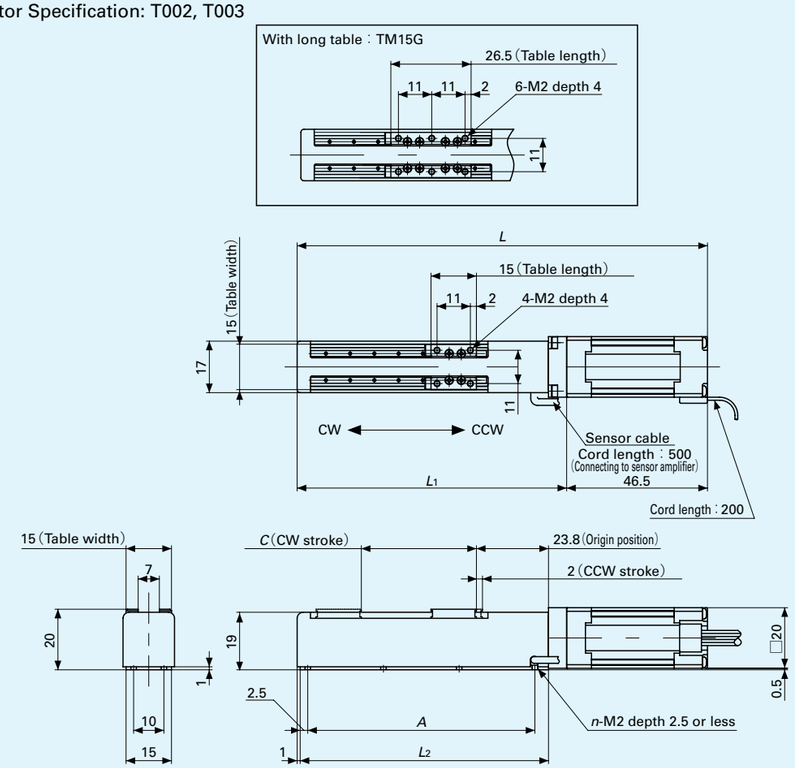
Remark : Table cover is made of resin. If a stainless steel table cover is required, consult IKO.

IKO

IKO Micro Precision Positioning Table TM

TM15

Stepping Motor Specification: T002, T003



unit : mm

Model code	Stroke dimension		Table dimension					Mass (Ref.) kg
	Stroke length	CW stroke C	Overall length L	L1	L2	Mounting holes A(Number of hall×pitch)	n	
TM15 -20	20	18	115.5	69	62	50(2×25)	6	0.18
TM15 -40	40	38	135.5	89	82	75(3×25)	8	0.19
TM15 -60	60	58	155.5	109	102	96(4×24)	10	0.20
TM15G-10	10	8	115.5	69	62	50(2×25)	6	0.19
TM15G-30	30	28	135.5	89	82	75(3×25)	8	0.20
TM15G-50	50	48	155.5	109	102	96(4×24)	10	0.21

Remark : Table cover is made of resin. If a stainless steel table cover is required, consult IKO.

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

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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