

FUJITEC

INSTRUCTION MANUAL

Electric Screwdriver
MO-1330 MO-1350

Controller
DO-1390AX DO-1390AX-2



Thank you very much for your purchasing. Electric Screwdriver (MO-1330, MO-1350, DO-1390AX, DO-1390AX-2). Please study this instruction manual for the correct use of the unit and preserve it so that you may refer to it when you come across anything unfamiliar.

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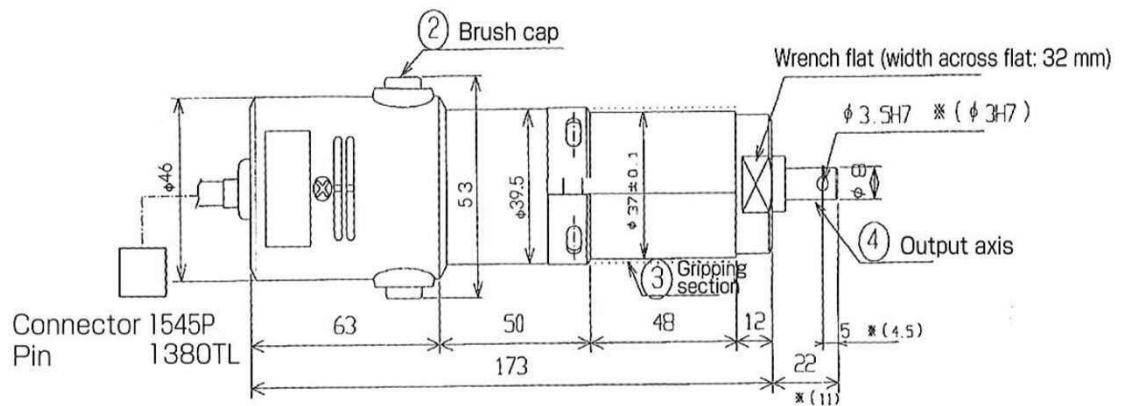
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1. Parts Identification

1 Screwdriver unit (MO-1330, MO-1350A)

Note) ※ () The size is applied to special type MO-1330.

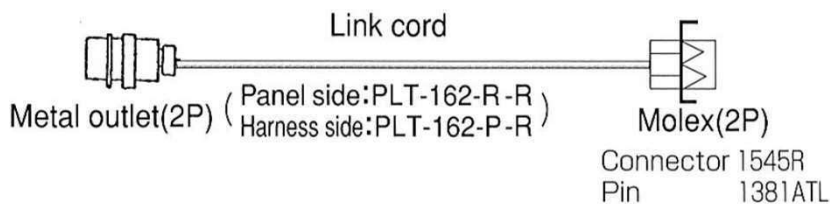
Driver Dimensions



note:※mark Out axis $\phi 6$ size. Shipped with a X each number end.

① Driver cord (standard 3.5m) Separate sale

910060250



①Screwdriver cord 910060250(separate sale)

Transmits input / output signals.

②Brush cap

Fixes and protects brush. If turned clockwise, brush cap tightens; if turned counterclockwise, it loosens.

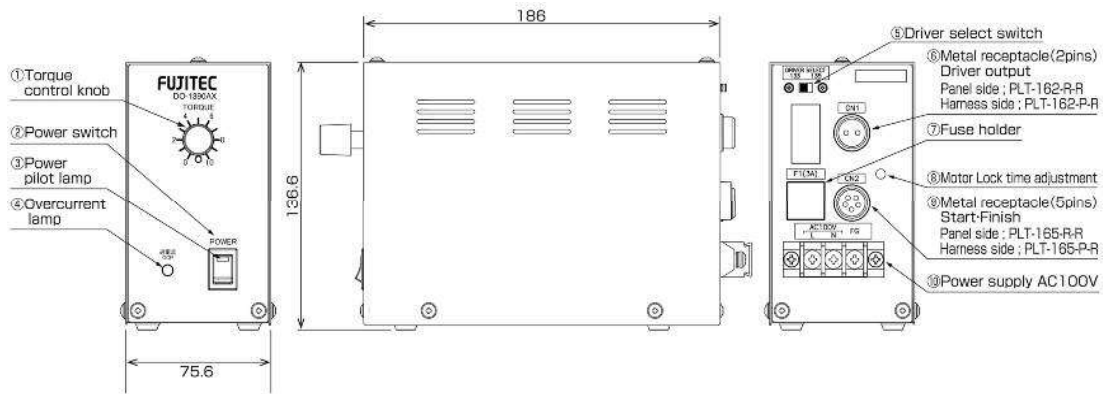
③Gripping section

Please tighten one-page driver's center of the gripper with 5~8 N.m.

④Output axis

Transmits screwdriver rotationn to bit.

2 Controller (DO-13390AX) For MO-1330-1350



① Torque control knob

Used to change torque.

② Power switch (POWER)

Used to ON/OFF power of control unit.

③ Power pilot lamp

Light while power control unit is ON.

④ Overcurrent lamp (OCP)

⑤ Screwdriver select switch

Set to screwdriver model No.

⑥ Metal receptacle (2P)

Used to connect to screwdriver.

Panel side : PLT-162-R-R Harness side : PLT-162-P-R

⑦ Fuse holder (3A)

Used to protect and replace fuse.

⑧ Adjustment at motor lock time

Can it tighten and the following maintenance officer be adjusted.

⑨ Metal receptacle (5P)

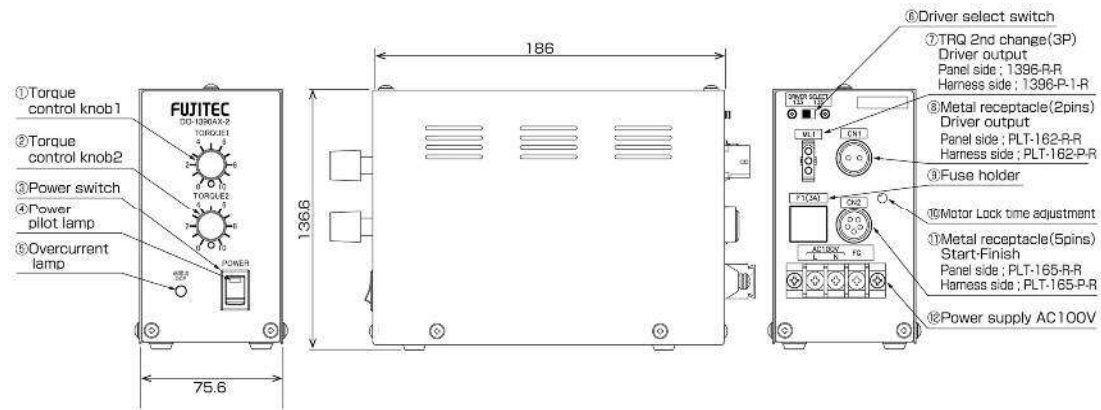
Connector to input/output signals.

Panel side : PLT-165-R-R Harness side : PLT-165-P-R

⑩ Power supply

Plugged into AC100V power source.

3 Controller (DO-1390AX-2) For MO-1330・1350



① Torque control knob 1

Use to change torque.

② Torque control knob 2

Use to change torque.

③ Power switch (POWER)

Use to turn ON / OFF power of control unit.

④ Power pilot lamp

Light while power of control unit is ON.

⑤ Overcurrent indicator lamp (OCP)

⑥ Screwdriver select switch

Set to screwdriver model No.

⑦ TRQ 2nd change (3P)

Torque 1 and torque 2 can be switched.

Panel side : 1396R-R Harness side : 1396-P-1-R

⑧ Metal receptacle (2P)

Connected to input/output signals.

Panel side : PLT-162-R-R Harness side : PLT-162-P-R

⑨ Fuse holder (3A)

Used to protect and replace fuse.

⑩ Adjustment at motor lock time

Can it tighten and the following maintenance officer be adjusted.

⑪ Metal receptacle (5P)

Connected to input/output signals.

Panel side : PLT-165-R-R Harness side : PLT-165-P-R

⑫ Power supply

Plugged into AC100V power source.

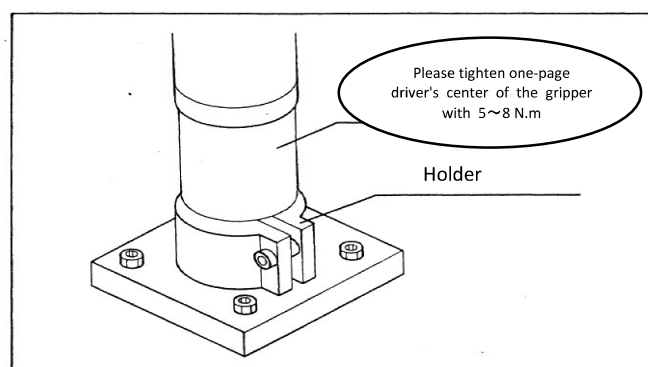
2. Precautions for Use

- ① Do not drop screwdriver unit and control unit or hit them against other substances.
- ② Keep the screwdriver free from water and oil.
- ③ Do not operate screwdriver select switch while screwdriver is working.
- ④ Never short-circuit screwdriver output terminal.
- ⑤ Be sure to perform daily inspection and maintenance. If any trouble should occur, please repair the unit as soon as possible.
- ⑥ No modification is allowed. To ensure safe use, never provide screwdriver unit and controller with any modification.

3. Preparation before Use

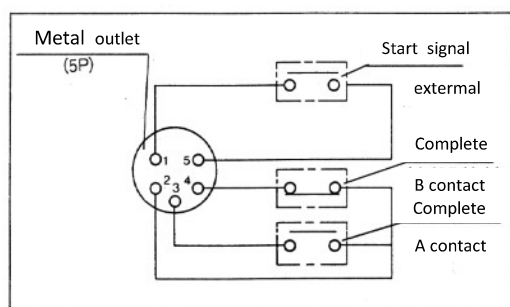
■ How to install

- ① Installation requirements
Do not install the unit near Heating element.
Do not subject it to direct sunrays.
- ② Fixing screwdriver unit
Fixing screwdriver unit to screwdriver holder using screwdriver grip.
※Use split type screwdriver holder.



■ How to connect

- ① Check that power switch on controller is OFF.
- ② Plug power cord on the back of controller into AC100V power supply outlet.
- ③ Plug screwdriver cord into metal outlet (2P) on the back of controller.
【Caution】Be sure to use exclusive controller.
※DO-1390A, DO-1390A-2 : 2P metal outlet (For MO-1330•1350)
- ④ Connect input signal (start signal) to input/output terminal (metal outlet ,5P) on the back of controller. Input signal must be no-voltage contact signal.
【Caution】If several-units are used at a time each input signal must be provided through respective contact
- ⑤ Complete signal can be obtained through input/output terminal.
Load capacity for complete signal must be kept below AC100V 0.1A.
- ⑥ Input/output signal connection diagram



Start Signal... Input signal terminal (1-5)
Complete Signal... Output signal terminal (2-3) (Relay A contact)
Complete Signal... Input signal terminal (2-4) (Relay B contact)

Metal outlet (5P)
Panel side : PLT-165-R
Harness side : PLT-165-P

4. Operation

※Be sure to perform inspection and test run before operation start.

■ Inspection before operation start check if that:

- ① Driving shaft of screwdriver unit is free from any trouble.
- ② Controller is free from any trouble.(Fusing,etc)
- ③ Each cable is free from any trouble.(Damage,crack,etc)
- ④ Each cable is connected correctly.

Please drive start of work when you can confirm the check above.

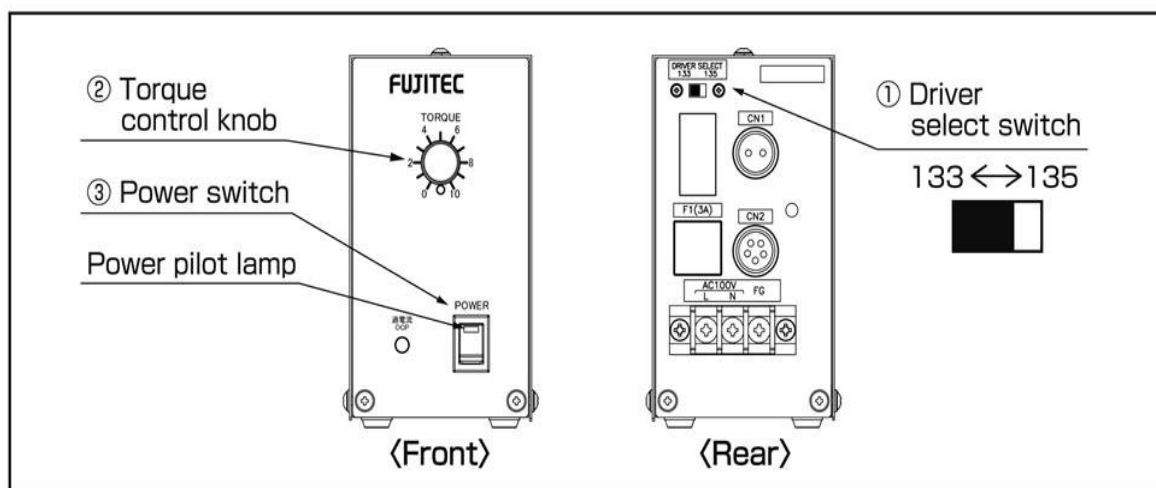
■ Trial operation

After inspection,perform trial operation to check the unit for trouble.

If any trouble should be found, be sure to repair as soon as possible.

■ Operation

- ① Set screwdriver select switch in the rear of controller in accordance with model No. of electric screwdriver used.
※MO-1330→133, MO-1350→135(DO-1390AX、DO-1390AX-2)
【Caution】If screwdriver's model No. does not coincide with the selected No. on the switch, screwdriver may not work or motor may be burned.
- ② Set torque knob on controller to desired fastening torque value.
(For torque value, refer to torque chart on page 7.)
- ③ Turn ON power switch on controller. Then, make sure that power indicator lights.



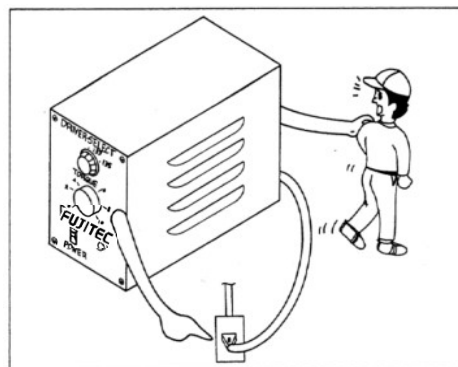
■ Stop

Turn OFF power switch on controller and make sure that power indicator goes off.

5. Maintenance

Before starting cleaning, be sure to turn OFF power switch on controller.

If the unit is to be disused for an Extended period, keep power cord unplugged.



■ Daily maintenance

Clean off dust and dirt from the unit with new cloth.

If dirt is very heavy, clean it off with cloth moistened by industrial alcohol.

■ Monthly maintenance

(Frequency varies depending on operation conditions.)

Brush inspection and replacement

Inspect brush periodically since brush wears out as its rotation time accumulates and replace it with new one as necessity requires.

※Do not use worn brush since this may affect motor performance and service life.

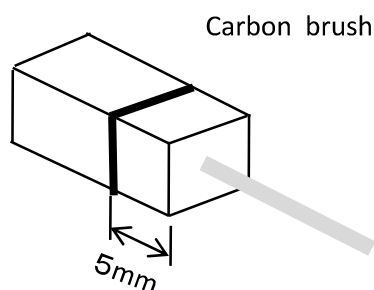
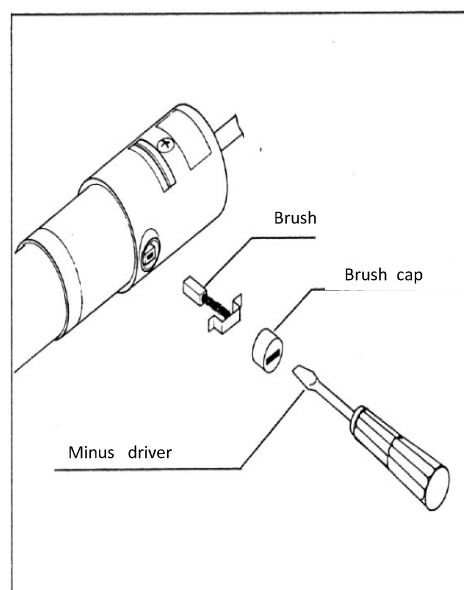
① Remove brush cap using minus thread driver.

② Wear gloves free from oil and water and pull brush out with hand.

※Touching brush with bare hands results in defective insulation.

※Be sure to remember proper orientation (top/bottom) of brush and holder position to return it to original position.
(To protect rectifier)

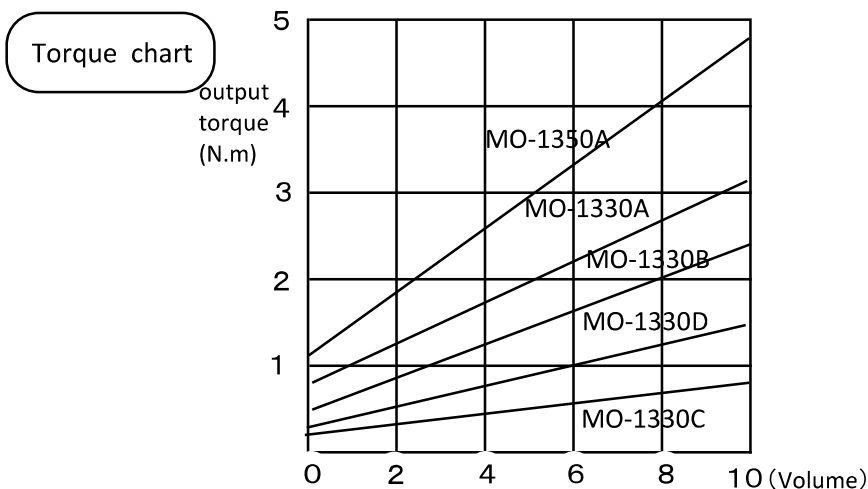
③ Replace brush before its length becomes 5mm or less.



■ Adjustment

① Torque volume knob adjustment

Set torque volume knob to the desired fastening torque. For the relation between torque volume knob calibration, fastening torque, and rotational speed of driving shaft, refer to torque chart shown below:



Product No.		Output torque (N·m)	No-load rotational speed
MO-1330	A※	0.73~3.20	130~450
	B※	0.48~2.33	170~640
	C※	0.16~0.90	590~2050
	D※	0.27~1.55	280~1060
MO-1350	A	1.19~4.80	130~450

【Note】 ※ When X character attaches to the part, the output axis become $\phi 6h8$.

Values presented in torque charts and tables are theoretical ones. Therefore, they are different from values used for actual screw fastening on workpiece.

Fastening torque varies depending on screw size, type, fastening depth, workpiece material, etc. To obtain the most appropriate torque take various condition into consideration. Output torque means stall torque provided through electrical energy of motor, so it is different from dynamic torque applied to actual fastening. Regard it as static torque and make a distinction between static torque and dynamic torque. For related information, page 12-14.

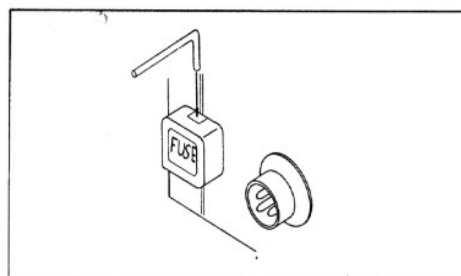
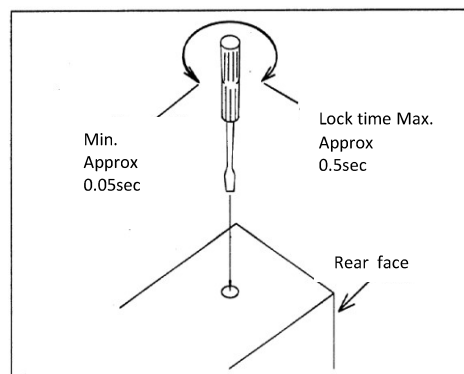
② Adjustment of motor lock time

※After fastening screw with a determined torque, keep motor torque at the same level for certain time (lock time). Adjust lock time by inserting minus thread screwdriver into adjust bolt hole on the top face of controller and turning it to right or left.

※If workpiece contains cushion material such as rubber packings, make lock time longer for better fastening.

【Note】

If lock time is kept long, keep motor surface temperature at 60°C or less.

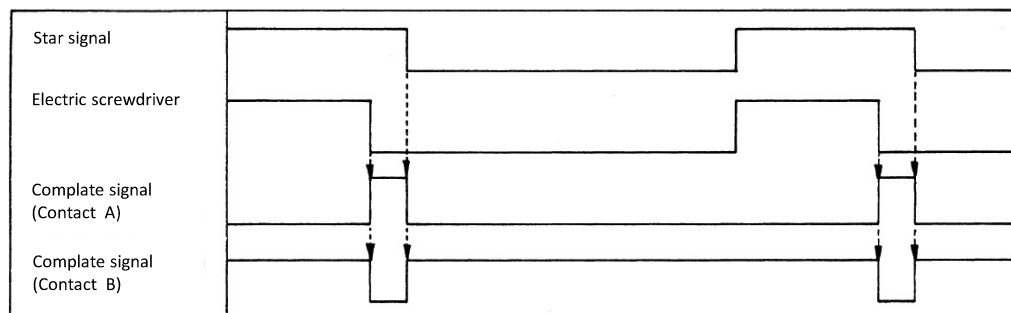


■ Consumable parts replacement

Fuse replacement

To remove fuse, insert pin into hole on the top of fuse holder on the rear panel of controller. If fuse is blown, replace it with new one.

6. Motion Timing Chart



7. Troubleshooting

※If any trouble should occur, perform the following troubleshooting.

If the troubleshooting below cannot solve the problem, please consult with your dealer.

Imperfect repair not only may affect machine performance but also may result in dangerous accidents.

Trouble	Cause	Measures
Power does not go on when turning power SW ON. (Power lamp does not light.)	Power cord is unplugged.	Check wiring
	Fuse is blown or is not insert.	Replace fuse or install fuse.
Motor does not rotate.	Screwdriver model No. does not coincide with screwdriver select No.	Set screwdriver select No.
	Screwdriver cord is not connected to screwdriver output terminal.	Check cable connecrion.
	Cable inside disconnection.	Replace cable.
Motor does not rotate smoothly.	Carbon brush wear.	Replace carbon brush.
Motor does not stop automatically when fastening is complete.	Carbon brush wear.	Setting of driver select No.

8. Specifications

Screwdriver unit

※MO-1330, MO-1350

Item		Specification				
Model No.		MO-1330				MO-1350
		A	B	C	D	A
Fastening torque (N·m)		0.73~3.20	0.48~2.33	0.16~0.90	0.27~1.55	1.19~4.80
No-load rotational speed (r·p·m)		130~450	170~640	590~2050	280~1060	130~450
Applicable	Machine screw	M3~M5	M3~M4	M1.4~M2.5	M2.5~M3	M4~M5
	Tapping screw	3~4	2.5~4	2~3	2.3~3	3.3~4.5
Weight (g)		750				750
Length (mm)		195 (including output shaft)				
Rated input		DC23~76V				

Controllers

※DO-1390AX, DO-1390AX-2 (For MO-1330, 1350)

Rated input	Rated output	Weight	External dimensions	Ambient temperature
AC100V 50/60Hz	DC23~76V	1,000g	D L H 75.6 × 186 × 136.6mm	0°C~40°C

【Note】

Electric screwdrivers mentioned in this manual employs a fastening control system which utilizes lock torque obtained when motor is bound. Thus, applying over-rating load to motor may damage motor.

Fastening load will be decided depending on screw size, preparatory hole on workpiece, fastening torque, fastening tact time, etc. For fastening tact time, the unit usually requires interval of approx. 3 sec for one-second fastening.

If fastening conditions are decided by user, please be careful to keep surface temperature of screwdriver at 60°C or less (in case of room temperature of 20°C), taking heat emission of motor into consideration.

【Note】

Overcurrent indicator lamp (OCP)

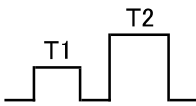
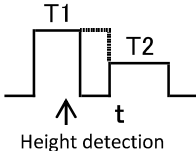
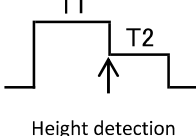
When an overcurrent lamp turned on by the trouble of the motor, the disconnection of the driver cable, off does a main switch and can continue it if I do ON 3 sec later.

9. DO-1390AX-2 1-phase , 2- phase Torque-changing Controller

1 Adjustment for Torque (DO-1390A-2)

For 2 types of torque , output (of screwdriver) to torque volume (of DO-1390AX-2) are as follows:

(Ex Fastening with 2 types of torque)

No.	Patterns of fastening	Torque	Aptitudes of screw and workpiece					Aptitudes and Notes of fastening
			Machine screws	Iron tapping screws	Plastic tapping board	tapping aluminum board	wood screw	
1		$T1 < T2$	○					*Reduce inertial energy of motor to fastening torque. *Needs fastening tact.
2	 ↑ Height detection	$T1 > T2$ t: Timer		○				*Strong start fastening torque and weak final fastening torque. *Needs height detection and timer.
3	 ↑ Height detection	$T1 > T2$		○	○	○	○	*Strong start fastening torque and weak final fastening torque *Reduce fastening tact.

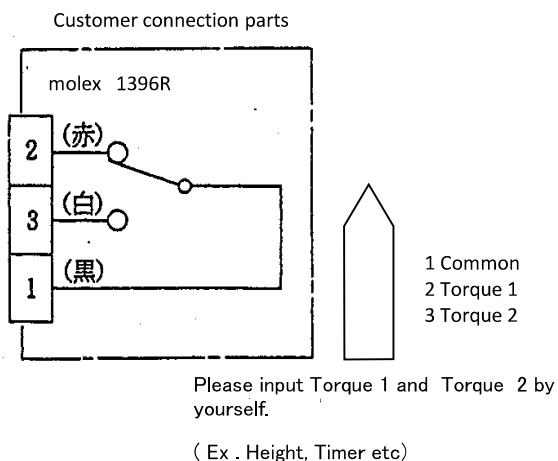
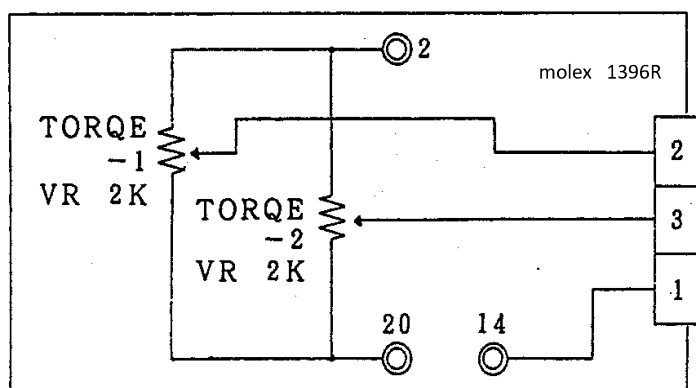
2 Changing Torque Wiring Diagram

If 2 types of torque is used, change torque by metal by metal outlet(3P) in the rear face of DO-1390AX-2. Wiring is as follows:

※Please avoid doing to make common when many use the numbe (connector NO.1 common.)

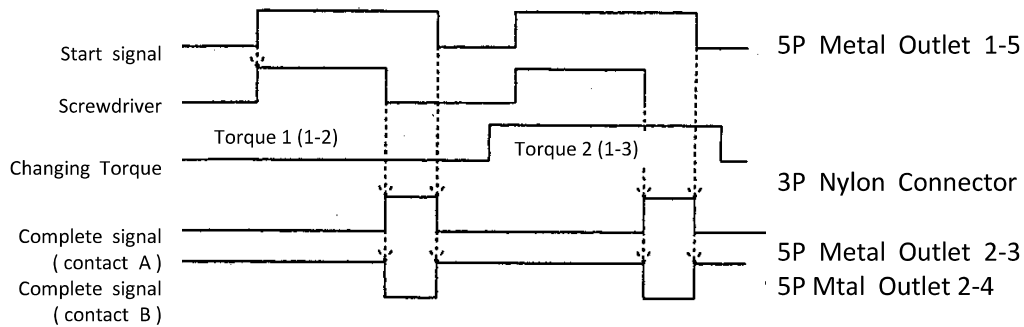
※Wiring is shown in the figure below.

DO-1390AX-2 Contorol Box

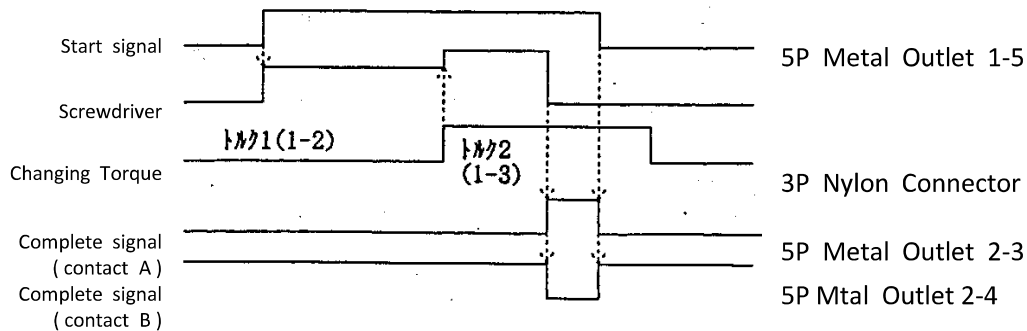


3 Motion Timing Chart

① Changing torque after the output of fastening complete signal.



② Changing torque while screwdriver is rotating



4 Note

Torque changing input terminal (3P Nylon Connector) should be used as "Common" and "2" or "3" should be connect as "Torque 1" or "Torque 2" without fail. Please input the start signal of the screwdriver after the connection.

Without connection with 2 or 3, input of start signal may damage motor.

10. Service

① Requesting repair service

Before requesting repair service, check the unit again in accordance with "Troubleshooting" on page 8. If the trouble can not be solved with measures given on page 8, please consult with your dealer.

② After sales service

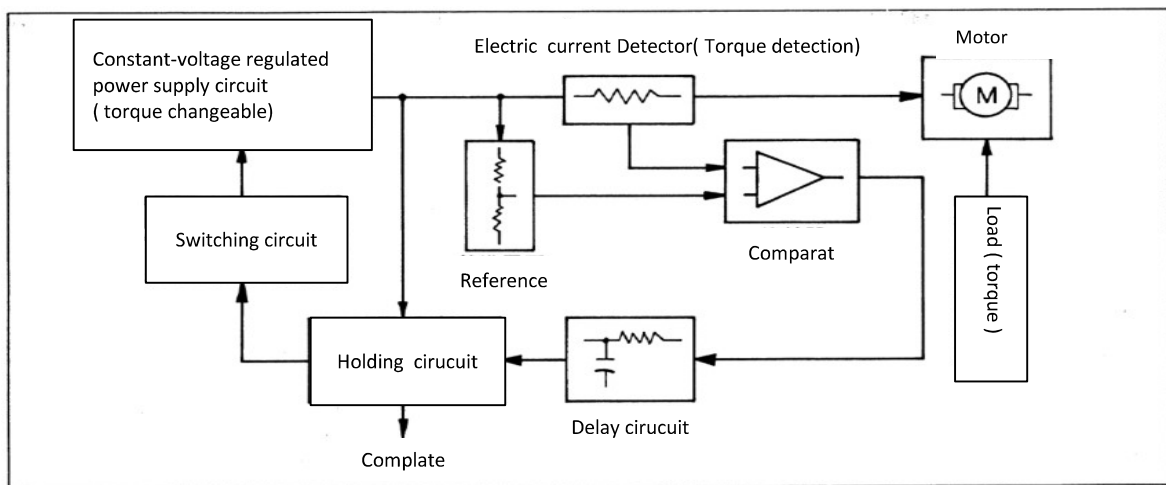
If you have any questions, please make inquiries to your dealer.

Please inquire an uncertain point of the shop.

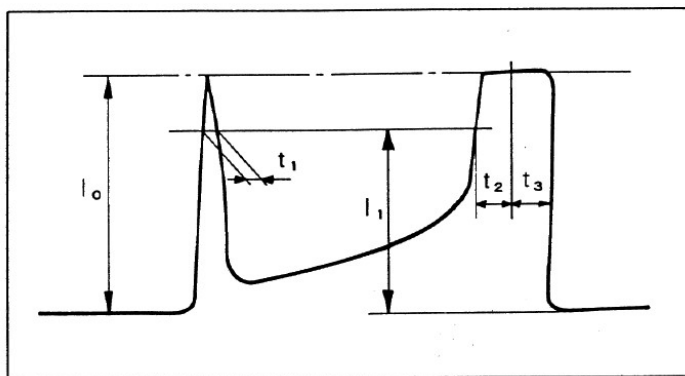
11. Appendix

■ Movement Principle of Electric Screwdriver Controller (DO-1390AX)

①Block chart



②Electric current waveform



I_0 : Motor starting current
 I_1 : Detected current ($0.75 \times I_0$)
 t_1 : Current delay time in I_1
 (50ms as follows)
 t_2 : Delay time ($t_2 > t_1$)
 $t_2 + t_3$: Holding time (0.05~)

③Movement principle

Load current value of motor goes up as screw is fastened. Controller compares this value with the preset one, and when the two values coincide, controller stops motors a determined time later.

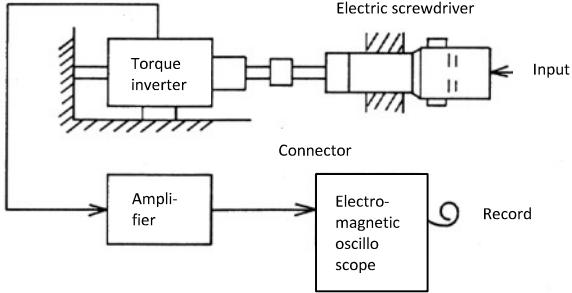
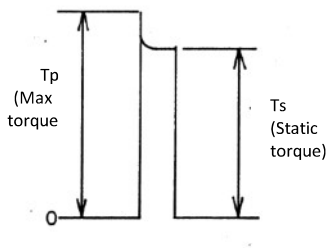
④Reference

- Load current is proportionate to fastening torque since DC motor is used.
- Not to stop motor with starting current, the following condition is adopted. $t_1 < t_2$
- Current detection level for I_1 is set to 75% of I_0 .

■ Electric screwdriver torque measurement.

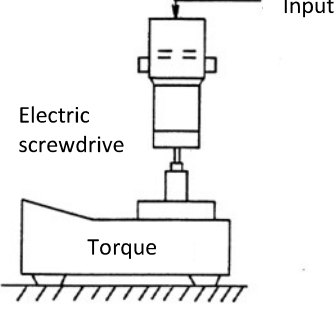

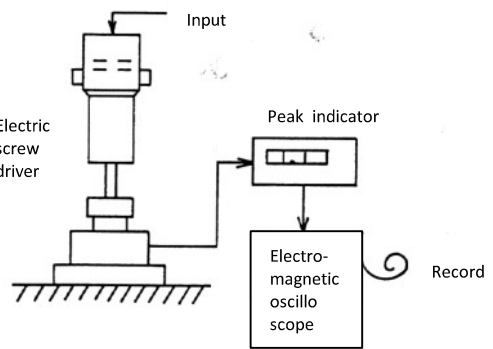

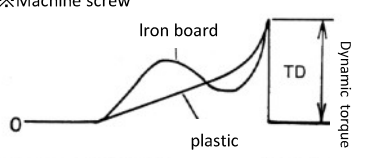
① Definition of dynamic / static torque

※Static torque (Theoretical torque) : means torque generated through motor's electrical energy (Stall torque of motor)

Type	How to measure	Torque waveform
static Torque (TS)		

※Dynamic torque (Fastening torque) : means torque generated at screw fastening.

(Stall torque of motor plus torque generated by inertial energy of motor rotor)

Type	How to measure	Torque waveform
(TD) Torque	<p>Torque Checker</p> 	
	<p>Actual screw fastening</p> 	<p>※Tapping screw</p>  <p>※Machine screw</p> 

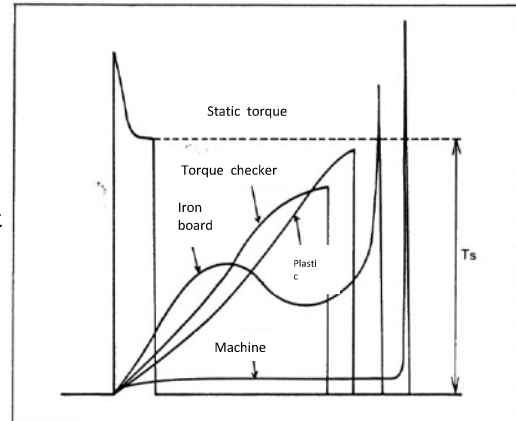
■ Theory of electric screwdriver torque

① Relation between dynamic torque and static torque.

Torque generated by screwdriver varies depending on screw types (iron tapping, plastic tapping, machine screw) and torque measurement methods as shown in the chart on the right.

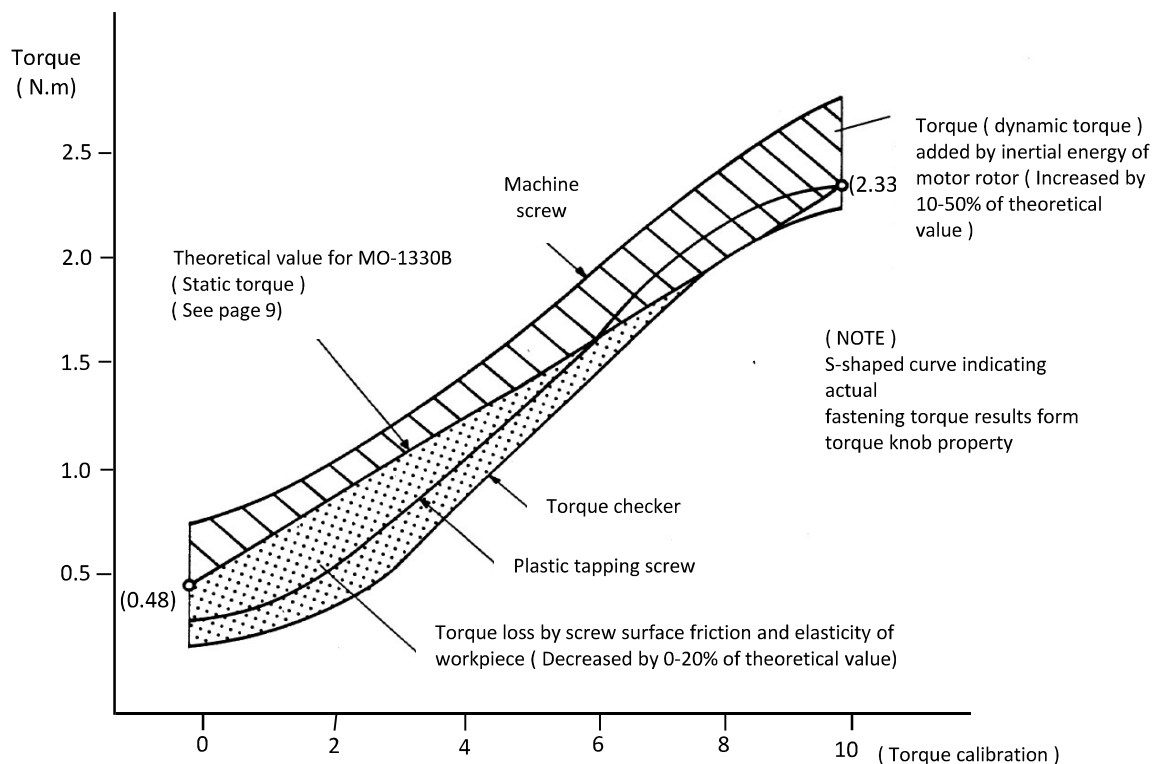
The relationship between these torque values is not fixed, but the following formula is usually Applied:

Torque checker value \leq Plastic tapping
 \leq static torque (TS) \leq Iron tapping
 $<$ Machine screw



② Relation between theoretical value (static torque) and actual fastening torque (dynamic torque)

(Ex: MO-1330B)



Item No.	
Dated purchased	年 月 日
Dealer	TEL:

FUJITEC

FUJITEC CO., LTD

1-10-6 Ryoke, Nakaku, Hamamatsu-city

Shizuoka-ken 430-0852, JAPAN

TEL : 053-462-3636

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