

DIGITAL TORQUE WRENCH TESTER with Motor Driven Unit
MODEL DOTE4-G-MD2
Retrofit Motor Driven Unit
MD2-SET

OPERATING INSTRUCTION



To use this product properly and safely, please read this manual carefully before use. If you have any question about the product and its operations, please contact your nearest distributor or TOHNICHI Mfg. Co., Ltd.


Safety Precautions


Before using this product, please read this operating instruction carefully to use it properly. If you have any question, please contact your nearest distributor or Tohnichi mfg. co., ltd. This operating instruction should be stored in a safe place.




Safety Symbol

This symbol is used for drawing attention to "safety precautions". If you see this symbol in this operating instruction, attention should be paid to safety. Take preventative actions according to the description and conduct "safety operations and proper control".

" **Danger**" Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

" **Warning**" Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

" **Caution**" Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

Warning

- Stop using the product when smoke comes out or strange smell or unusual noise occurs. In such occasions immediately turn off the power, remove the AC adapter from the outlet and contact your nearest distributor or Tohnichi mfg. co.,ltd.
- Do not disassemble or modify this tester other than the method described in this operating manual. It may result in loss of safety, degradation in functions, shortening of product life, or failure.
- Stop using the product when contaminant or liquid such as water is into main unit. You may be exposed to the danger of electric shock or fire.
- Do not use this tester with a power voltage other than that specified, AC100V-240V.
- When handling the power cable, follow the instructions below.
 - Do not handle the AC adapter with wet hand.
 - Do not damage, extend or heat the power cable.
 - Do not yank, pinch the power cable, nor put heavy objects on it.
 - Do not bend, twist nor bind the power cable by force.
 - Do not use the power cable for other purpose.
 - Do not use a damaged power cable of AC adapter.
- Do not place this tester on unstable place.
- Do not place this tester in a place where inflammable liquid or combustible gas is present.
- Use attached accessories. Do not use any other accessories.
- Do not hold the motor when relocate the tester. When move the tester, remove all accessories and operate with two or more staff.
- Do not approach the moving part of the loading device, it causes injury.
- Do not leave the power on when replacing the fuse, connecting the cable, it causes electric shock, malfunction or damage.
- Do not use a fuse other than instructed in this manual, it causes electric shock or damage.

Caution

- Do not put this tester in a place of much moisture or dust, in a place that is exposed to water or direct sunlight, or in a place where the humidity or temperature fluctuates largely. It may result in electric shock, fire, malfunction, degradation of performance or failure.
- Clean the AC adapter periodically. Before cleaning, disconnect the plug from power outlet and clean the root of the plug.
- If this tester is not to be used for a long time, be sure to disconnect the AC adapter from power outlet.
- Before moving this tester to another place, be sure to power off, remove the AC adapter and disconnect all connection cable. When moving the tester, avoid shock or vibration on it.
- Do not use this tester to conduct measurements beyond its capacity. For safe and efficient operation, use this tester to measure the torque wrenches suited to the capacity. Measurement beyond the capacity may cause accident or damage.
- Check for any damaged parts. Before use, check the tester and the accessories, and make sure that it operates normally and fulfills the specified functions. Check the parts and all other portions that may affect the operation for damage, installation status. For replacement or repair of damaged parts, contact your nearest distributor or Tohnichi mfg. co., ltd.
- Be sure to install an ground leakage breaker and safety circuit breaker on the power supply.
- Connect the plug (3 pin) of the power cable into the grounded power outlet (3 pin) for use.

Precautions for Use

Please operate this under recommended environment.

Do not disassemble or modify this tester.

Before use, make a start-up inspection and check the setting condition.

If this torque wrench tester gets wet with water or grease, it may bread down or burn out be careful not to drop water or grease.

Do not let this torque wrench tester fall or bump. It may result in damage or failure.

Use this torque wrench tester within the measurement range specified in the operating instruction.

Be sure to conduct a periodic inspection.

Before measurement, make sure that Zero is displayed.

Should the tester give out abnormal smell or catch fire during use, stop using immediately, move the tester to a safe place and contact your nearest distributor or Tohnichi mfg. co., ltd.

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1. Features

Model DOTE4-G-MD2 is a digital torque wrench tester with a motor driven loading device designed for calibrating or adjusting torque wrenches.

Model MD2-SET-S or MD2-SET-L are for modification of manual loading type DOTE4-G tester to modify it to motor driven type, and it has the following features:

- Reduce fatigue from large amount of calibration work
- Since giving constant loading force by motor driven unit, obtains smaller measurement validation than manual loading.
- Compact controller for easy operation with fingertips
- Inching dial for direct reading type torque wrenches such as Tohnichi DB, F and CEM3 models.
- Available globally with AC100V to 240V power source.

2. Components

DOTE4-G-MD2

- Main Unit
- DR-MD2 Motor driver unit
 - * Include, limit cable, motor cable, spare fuse
- C-MD2 Controller
- AC Adapter, BA-6
- Power cord * 3 pin plug with ground
- Pole Assembly
 - DOTE20N4-G unit has 2 sets
- Adapter Set
- Operating Instruction

MD2-SET-S

- M-MD2-S Motor unit w/Limiter
 - * Include: limit cable, motor cable, spare fuse, support foot
- C-MD2 Controller unit
- DR-MD2-S Power unit
- Power cord * 3 pin plug with ground
- Operating Instruction

MD2-SET-L

- M-MD2-L Motor unit w/Limiter
 - * Include: limit cable, motor cable, spare fuse,
- C-MD2 Controller unit
- DR-MD2-L Power unit
- Power cord * 3 pin plug with ground
- Operating Instruction

3. Specifications

3-1. DOTE4-G-MD2 Common Specifications

Display	LED height 11mm
Count Value	4 figures
Display Value	6 figures
Allow Mark Indication	RUN, Run Mode PEAK, Peak Mode M.R, Manual Memory/Reset A.R, Auto Memory/Reset Unit, cN.m/N.m/kgf.cm/kgf.m/lbf.in/lbf.ft
Output	Compliant with RS232C USB, B-type output connector for serial communication
Power Source	DC12V 1A
AC Adapter Power Source	AC100 to 240V +/-10%, 50/60Hz
Environmental Conditions	0 to 40 degree C Humidity below 85% RH, no condensation
Accuracy	+/-1%+1digit

3-2. Motor Drive Common Specifications

Item	DOTE20N4-G-MD2 to 200N4-G-MD2	DOTE500N4-G-MD2, 1000N4-G-MD2
Motor driver model	DR-MD2-S	DR-MD2-L
Power source	AC100V - 240V +/- 10% 50/60Hz	
Fuse capacity	3.15A/250V (Φ5.2 x L20)	
Rated power consumption	40W	100W
Weight	2.2kg	
Motor	M-MD2-S	M-MD2-L
Motor type	Stepping motor	
Controller	C-MD2	
Weight	0.4kg	
Loading key	Joystick, dial	
Loading direction	CW/CCW	
Speed controller	Low/High speed change	
Alarm function	Loading limit/Limit cord error/Motor cord/Motor/Motor driver/Joystick error detection	
LED	Power(Blue), Alarm 1 (Orange), Alarm 2 (Yellow)	
Connecting cable	DR-MD2 Motor cord, DR-MD2 Limit cord, AC power cord, C-MD2 Controller cord (fixed with controller).	
Environmental Conditions	0 to 40 C° Humidity below 85% RH, no condensation	

3-3. Torque Range and Accessories

Model		DOT E20N4-G-MD2	DOT E50N4-G-MD2	DOT E100N4-G-MD2	DOT E200N4-G-MD2	DOT E500N4-G-MD2	DOT E1000N4-G-MD2
cN·m	Range	200 - 2000	-	-	-	-	-
	1 Digit	0.2	-	-	-	-	-
N·m	Range	2 - 20	5 - 50	10 - 100	20 - 200	50 - 500	100 - 1000
	1 Digit	0.002	0.005	0.01	0.02	0.05	0.1
kgf·cm	Range	20 - 200	50 - 500	100 - 1000	200 - 2000	-	-
	1 Digit	0.02	0.05	0.1	0.2	-	-
kgf·m	Range	-	-	-	-	5 - 50	10 - 100
	1 Digit	-	-	-	-	0.005	0.01
lbf·in	Range	18 - 180	44 - 440	88 - 880	170 - 1700	440 - 4400	880 - 8800
	1 Digit	0.02	0.05	0.1	0.2	0.5	1
lbf·ft	Range	-	3.6 - 36	7.3 - 73	15 - 150	36 - 360	73 - 730
	1 Digit	-	0.005	0.01	0.02	0.05	0.1
Max. Effective Length L' [mm]		410			660	1100	1650
Inlet Drive [mm]		9.5		12.7		19.05	25.4
Dimension [mm]	L	506			756	1276	1856
	B	589			589	675	708
	H	267			269	394	
	L1	-				805	1195
	B1	339			359	438	498
	B2	-				90	150
	H1	113				162	
	H2	171		169		174	238
Weight [kg]		18.5			20.5	50.5	52.5
Accessory	Down Adapter	DA3-2		277 (Sq.1/2-Inlet 1/4) DA4-3	-	-	DA8-6
	Hex Adapter	10-13-19		12-14-17	17-22-27 19-24-30	22-27-29 30-32-36	34-41 46-50

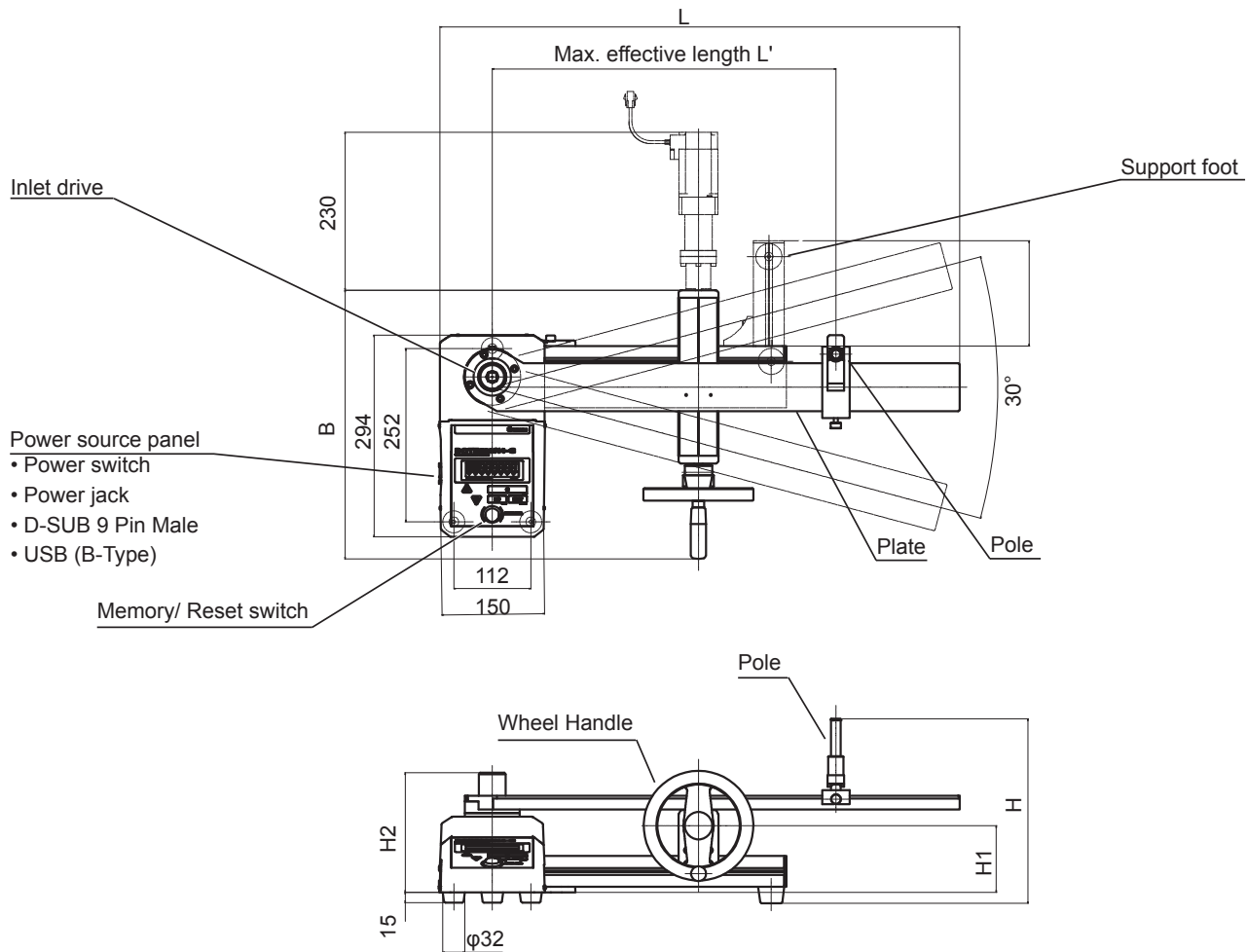
Accuracy +/-1% +1digit

Down Adapter, DA Specification

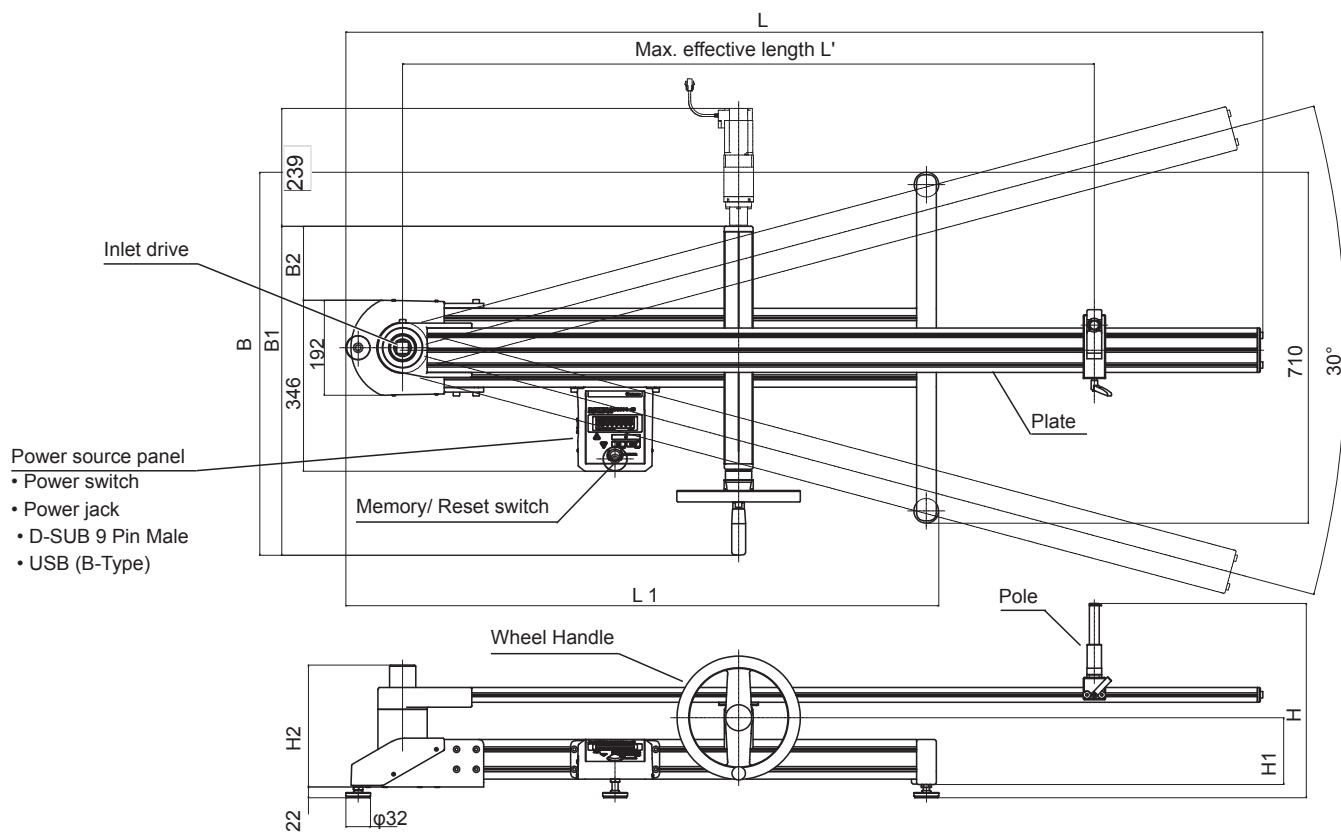
Model	Parts#	Dimension [mm]				Allowable Torque [N·m]	Weight [g]
		Sq. Drive	Inlet Drive	Height	Outside Width		
DA3-2	296	9.5	6.35	12	13	14	5
DA4-3	297	12.7	9.5	15	18	70	11
DA6-4	298	19.0	12.7	19	28	220	34
DA8-6	299	25.4	19.0	26	35	750	66
DA12-8	300	38.1	25.4	44	55	2100	320

3-4. Dimensions

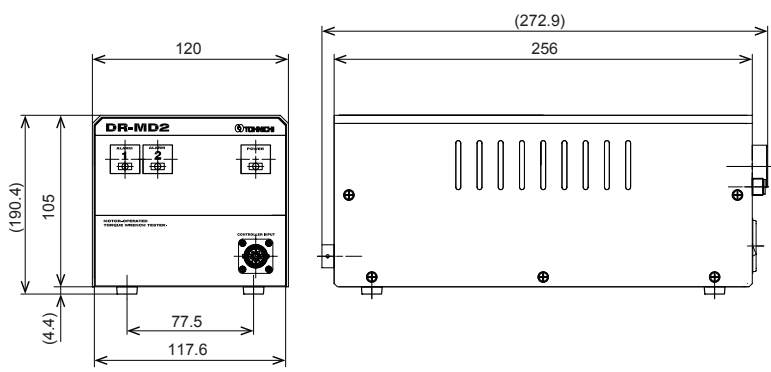
NOTE20N4-G-MD2, 50N4-G-MD2, 100N4-G-MD2, 200N4-G-MD2



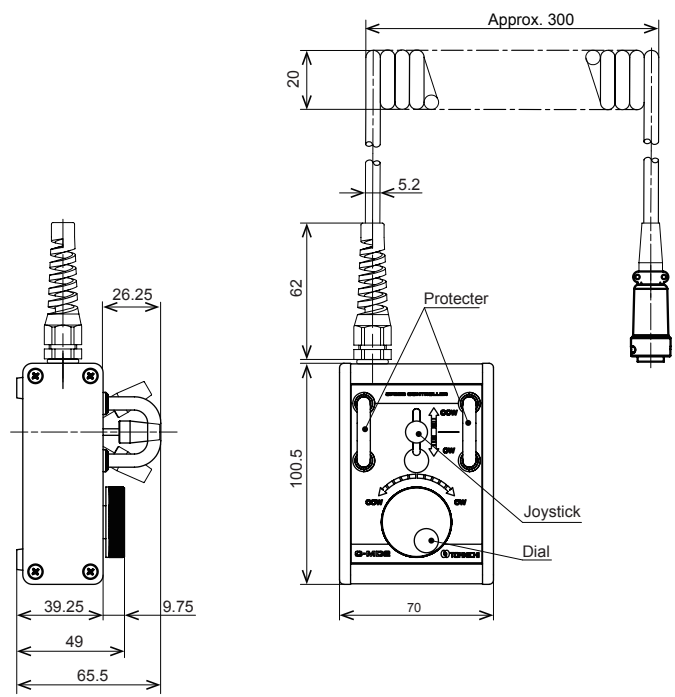
NOTE500N4-G-MD2, 1000N4-G-MD2



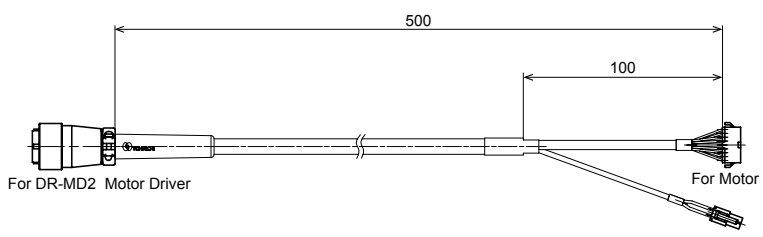
DR-MD2-L/DR-MD2-S Motor Power Unit



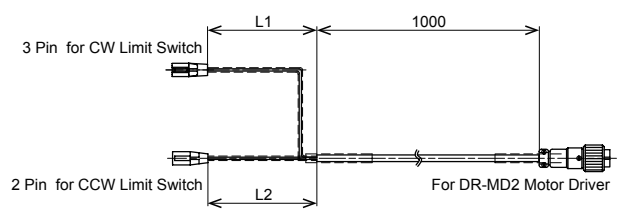
C-MD2 Controller



DR-MD2 Motor Cord



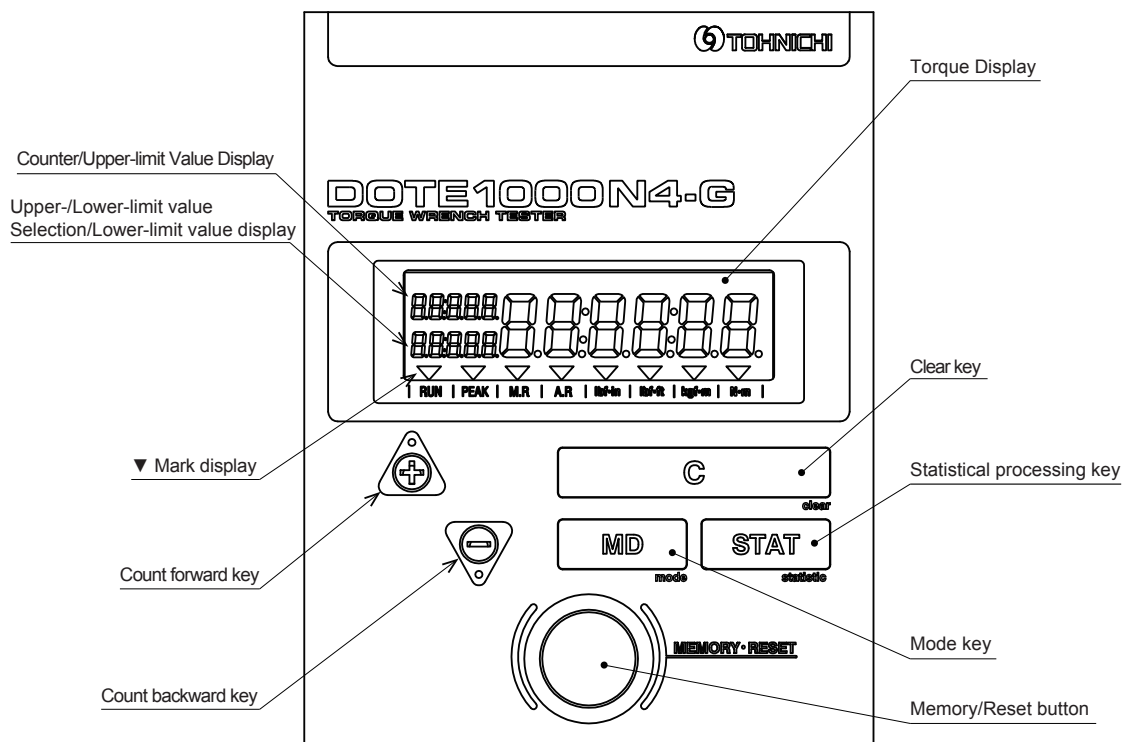
LM-MD2 Limit Cord



	L1	L2
DOTE20N4-G-MD2 - 200N4-G-MD2	140	30
DOTE500N4-G-MD2, 1000N4-G-MD2	750	50

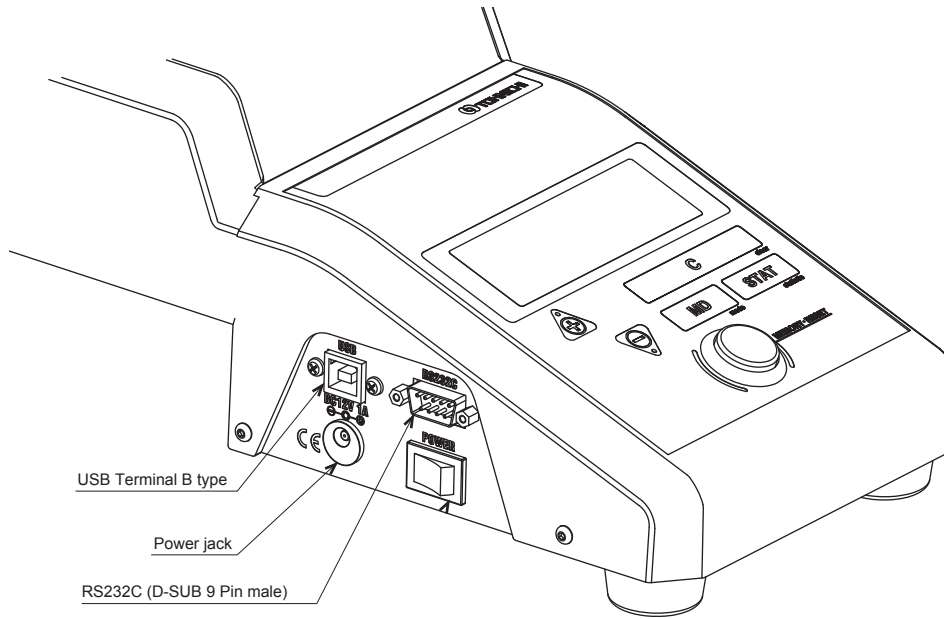
4. External View

4-1. Display and Operation Keys

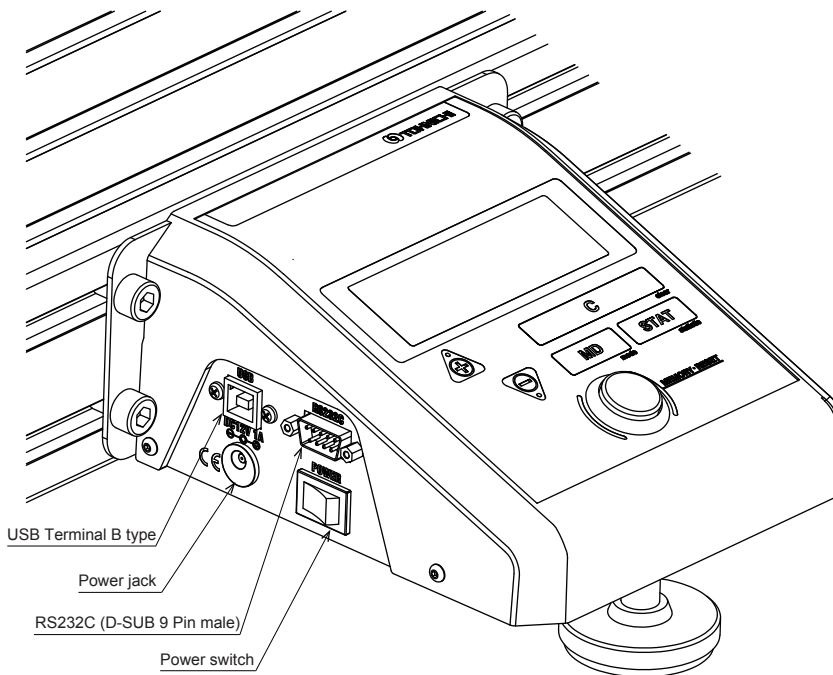


Display	Torque Display area indicates the torque value. Values are displayed in blue when an OK/NG judgment result is OK, in red when it is LO/HI, and in white when no OK/NG Judgment is made.
Counter/Upper-limit Value display	Display a serial number or an upper-limit value.
Upper-/Lower-limit value Selection/Lower-limit value display	Displays an upper-/lower-limit value selection status for OK/NG Judgment or a lower-limit value.
▼ Mark display	<p>RUN Lights up when RUN mode (Continuous display) is selected.</p> <p>PEAK Lights up when PEAK mode (Maximum value display) is selected.</p> <p>M.R Lights up when Auto memory/Reset is not set in the PEAK mode. Lights up in the RUN mode.</p> <p>A.R Lights up when Auto memory/Reset is set in the PEAK mode.</p> <p>Unit ▼ appears on the unit (lbf·in, lbf·ft, cN·m, N·m, kgf·cm, kgf·m) selected.</p>
Count forward Key	Moves the counter forward by one to read out measured data
Count backward Key	Moves the counter backward by one to read out measured data
Clear Key	In the PEAK mode, the peak value is reset. Or, the stored data is cleared. In the RUN mode, auto zero adjustment is performed.
Statistic processing Key	This is a key for selecting the number of samples, maximum value, minimum value or mean value.
Mode Key	This is a key for selecting the RUN mode or PEAK mode. The upper-/lower-limit value selection screen is displayed by holding down the key for 2 seconds or longer.
Memory/Reset button	Stores the measured data (measured torque, measurement date and time) and moves the counter forward by one after OK/NG Judgment of the measured data.

4-2. Power Source and Output



NOTE20N4-G, 50N4-G, 100N4-G, 200N4-G

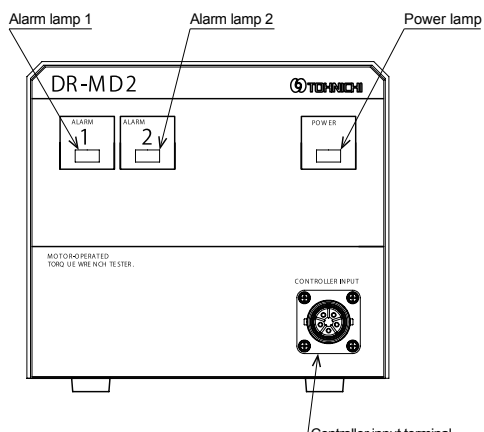


NOTE500N4-G, 1000N4-G

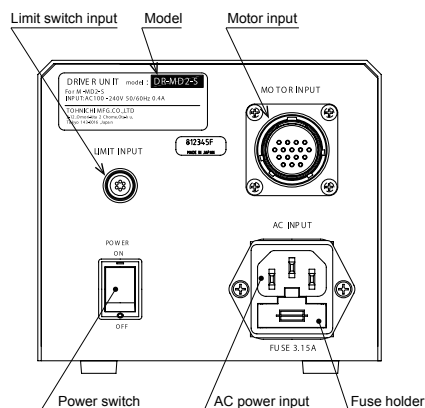
- Power jack, 12V-1A-Center positive: Connect the attached AC adapter BA-6.
- Power switch: Turns the power ON / OFF.
- RS232C terminal: Connect an RS232C communication cable.
- USB B-type connector for serial communication: Connect a USB communication cable.
- Do not connect RS232C and USB output connectors externally at the same time.

4-3. DR-MD2 Motor Driver

Front



Back

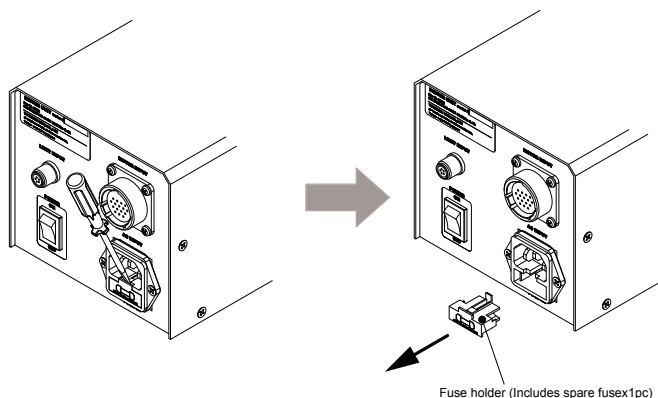


Front

- Power lamp: When the power is turned on, the lamp lights on in blue and goes off when it off.
- Alarm lamp 1: When an alarm occurs, lights up in orange and flashes.
- Alarm lamp 2: When an alarm occurs, lights up in yellow and flashes.
- Controller input terminal: Connect the C-MD2 controller

Back

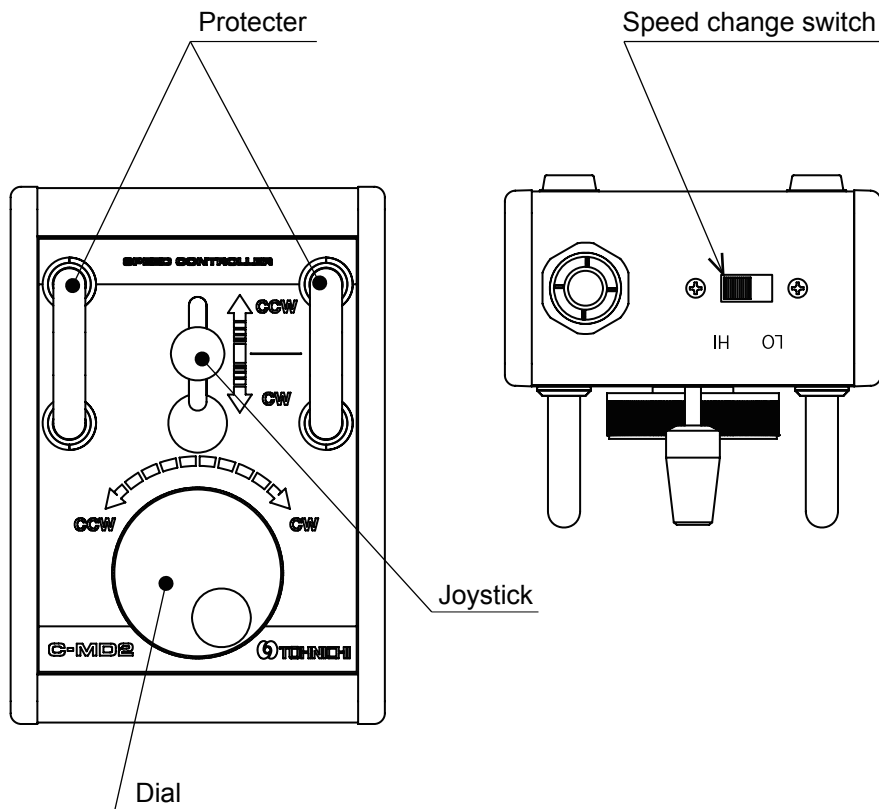
- Power switch: Turn the power ON/OFF
- Motor input: Connect the DR-MD2 motor cord
- Limit switch input: Connect the DR-MD2 limit cord
- AC power input: Connect the AC power cord. (AC 100-240 V ± 10% 50 Hz / 60 Hz)
- Fuse holder: Fuse is built in (Comes with spare 1 pcs.)
If the fuse blows, replace it with a spare fuse.
Fuse specification: Time lag type AC 250 V 3.15 A size $\Phi 5.2 \times L 20$
(Recommended fuse product number: ET 3.15 A Manufacturer: SOC)
- Model: DR - MD 2 - S: For DOTE 20 N 4 - MD 2 to 200 N 4 - MD 2
DR - MD 2 - L: For DOTE 500 N 4 - MD 2, 1000 N 4 - MD 2



● Fuse replacement method

1. Turn off the power and disconnect the AC power cord.
2. Remove the fuse holder with a minus screwdriver.
3. Replace the existing fuse with a spare fuse.
(If there is no spare fuse, replace it with fuse of specified capacity of the fuse.)
4. Insert the fuse holder to the original position.

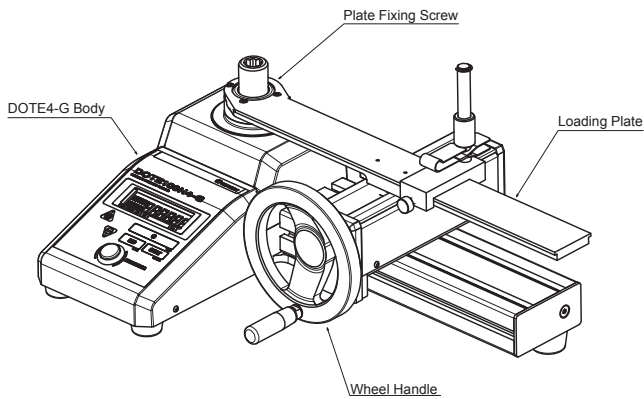
4-4. C-MD2 Controller



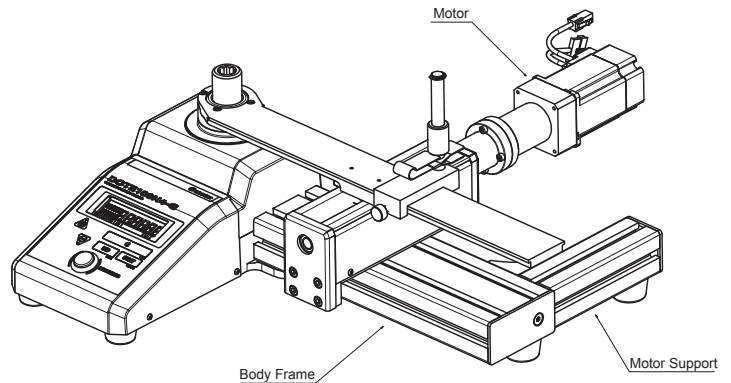
- Joystick : When the Joystick is pushed up the loading plate will move counter-clockwise.
When the Joystick is pulled down the loading plate will move clockwise.
- Dial : Performs inching operation, move the loading plate very small increments.
Use it for calibration of direct reading type torque wrenches (Tohnchi model DB, F/SF, CEM3-G etc.).
When the dial is turned counter-clockwise, the loading plate of the tester will move counter-clockwise.
When the dial is turned clockwise, the loading plate of the tester will move clockwise.
- Protector : Prevents unintentional Joystick operation.
- Speed change switch : Switches the loading speed to LO (low speed) or HI (high speed).

5. How to Attach Retrofit Motor Driven to DOTE4-G

Name of each Part



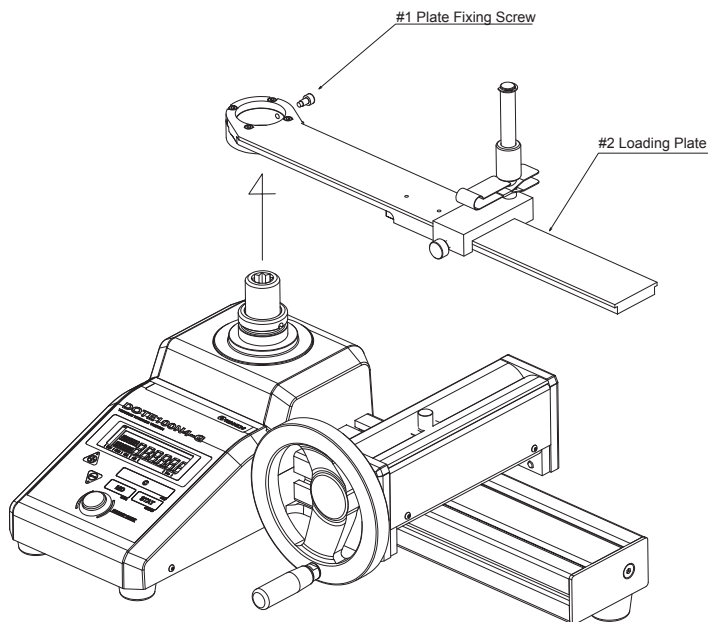
Model : DOTE100N4-G



Model : DOTE100N4-G-MD2

1. Removing the Loading Plate

Loosen the #1 Plate Fixing Screw and remove #2 Loading Plate

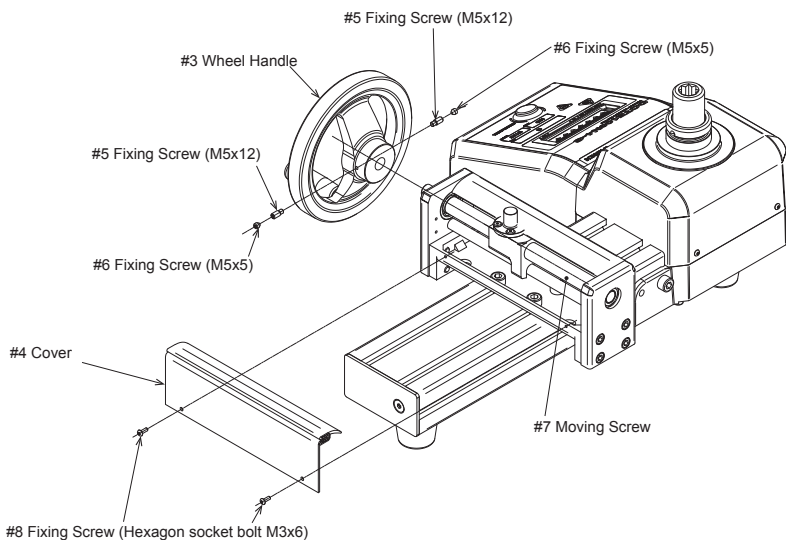


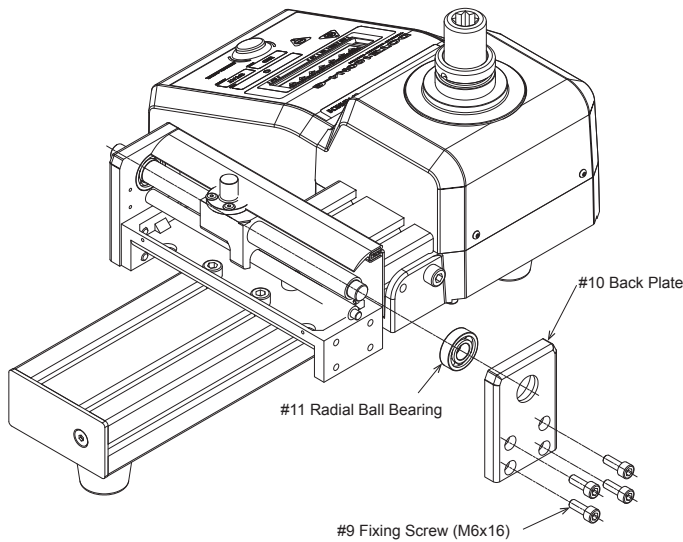
2. Removing Handle and Cover

Remove #5 Fixing Screws (hexagon socket head bolt M5x5) and #6 Fixing Screws (hexagon socket set screw M5x12)

Remove #3 Handle from #7 Moving Screw. If it is difficult to remove, slightly strike outer circumference with a hammer and remove.

Remove # 8 Fixing Screws (hexagon socket bolt M3x6) and take off #4 Back Cover.

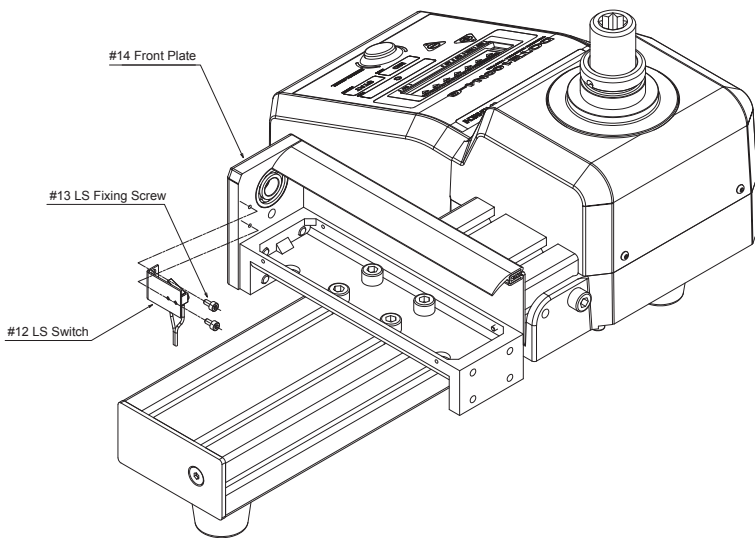




3. Removing the Back Plate

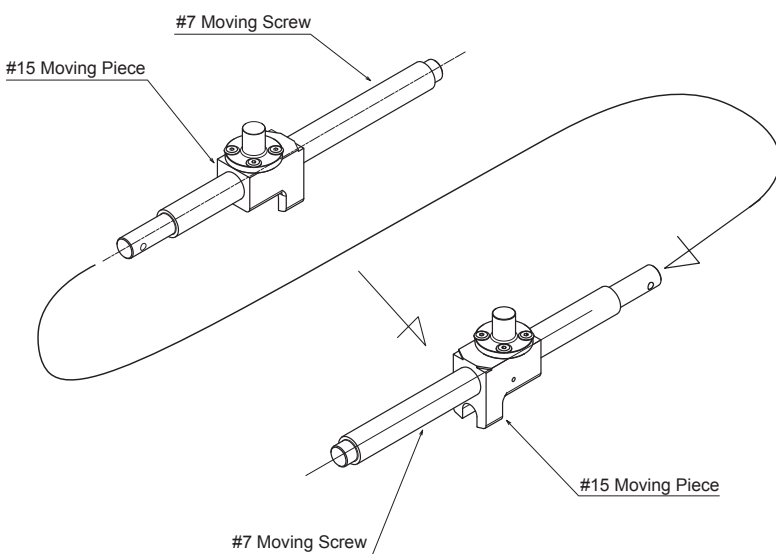
Loosen #9 Fixing Screws (hexagon socket head bolt M6x16) and remove #10 Back Plate.

Also remove the #4 Radial Ball Bearing from the Back Plate at the same time. Be careful not to break or drop the bearing, it will be reused.



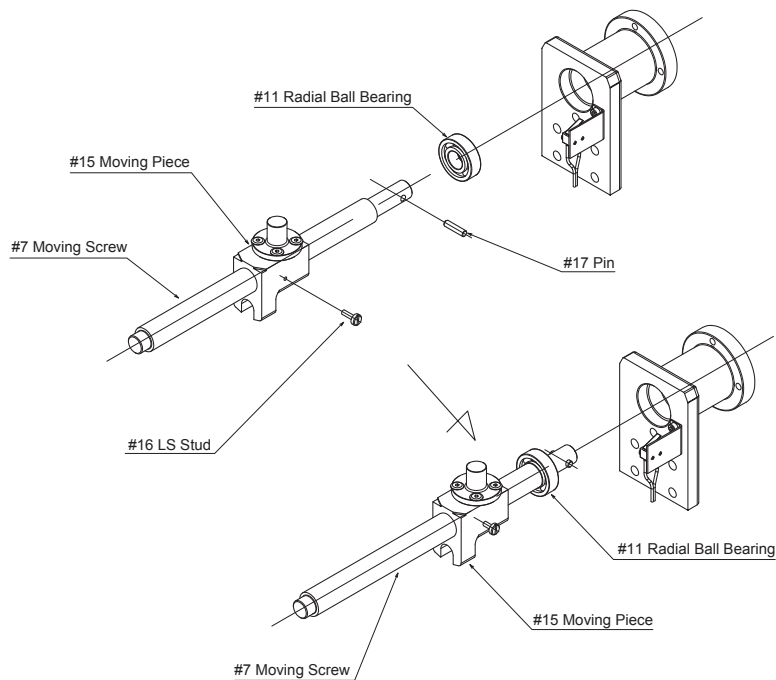
4. Installing LS Limit Switch on Front Plate.

Securely attach #12 LS Limit Switch on #14 Front Plate by #13 Fixing Screws (hexagon socket head screw bolt M3x6)



5. Change the direction of Moving Screw

Change the direction of front and back of #15 Moving Screw and #7 Moving Piece shown as figure.

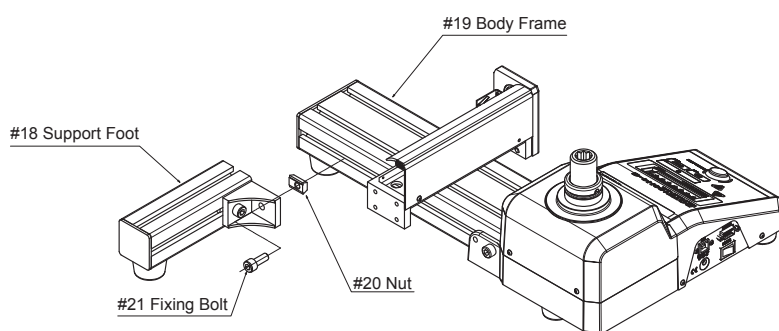


6. Assemble Moving Piece and Moving Screw.

Screw #16 LS Stud in #15 Moving Piece firmly.

Insert #11 Radial Ball Bearing into #7 Moving Screw.

Put #17 Pin in to the hole at the end of #7 Moving screw and assemble it as shown.

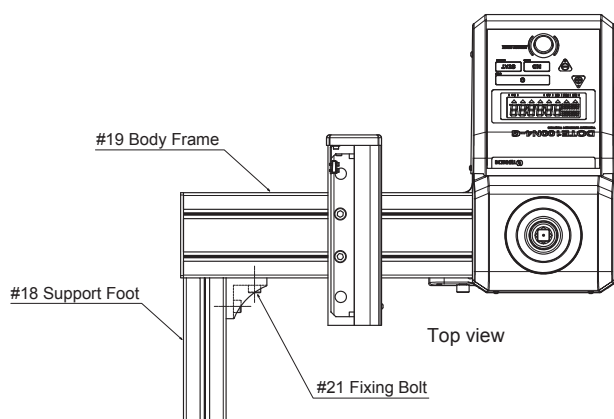


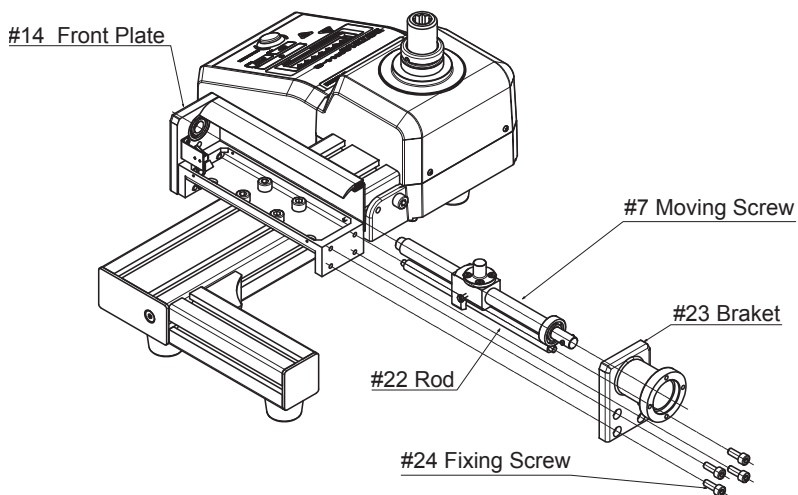
7. Install Support Foot

Set #20 Nut in the groove of #19 Body Frame.

Fix #18 Support Foot by #21 Fixing Bolts (hexagon socket head bolt M8x20) to the position shown.

* Support Foot comes with only for MD2-SET-S unit.



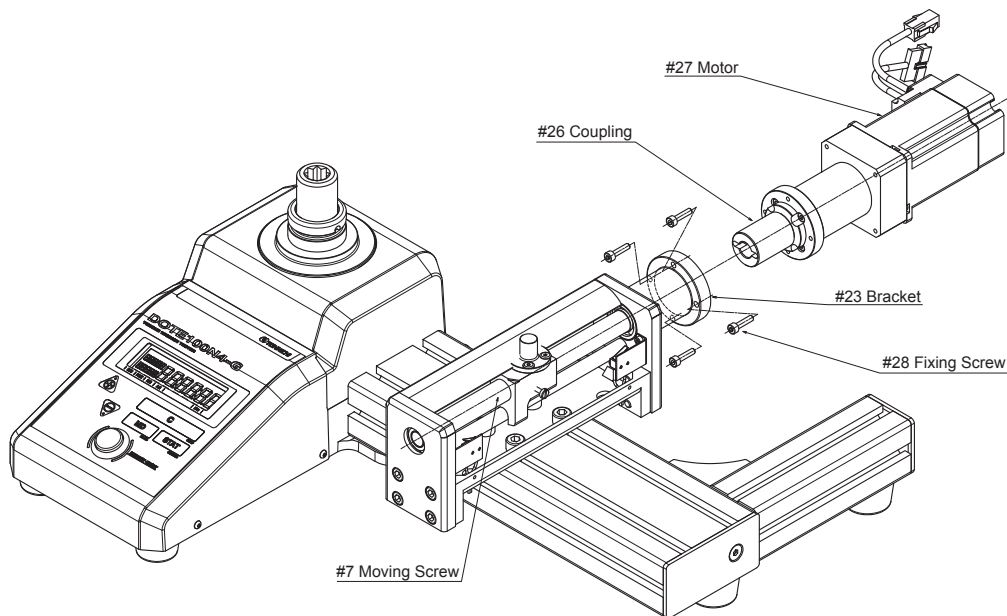
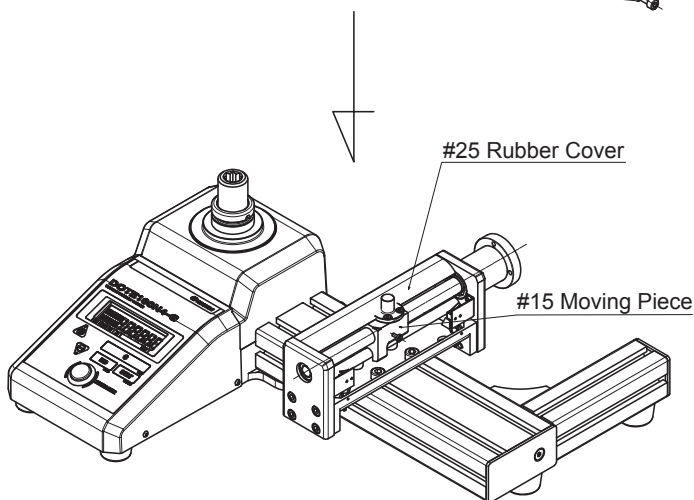


8. Mounting Moving Screw

Insert #7 Moving Screw and #22 Rod into each hole on #14 Front Plate.

Fix #23 Bracket with #24 Fixing Screws (hexagon socket head bolt M6 x 16).

Fit #25 Rubber Cover so that rubber does not come off #15 Moving Piece.

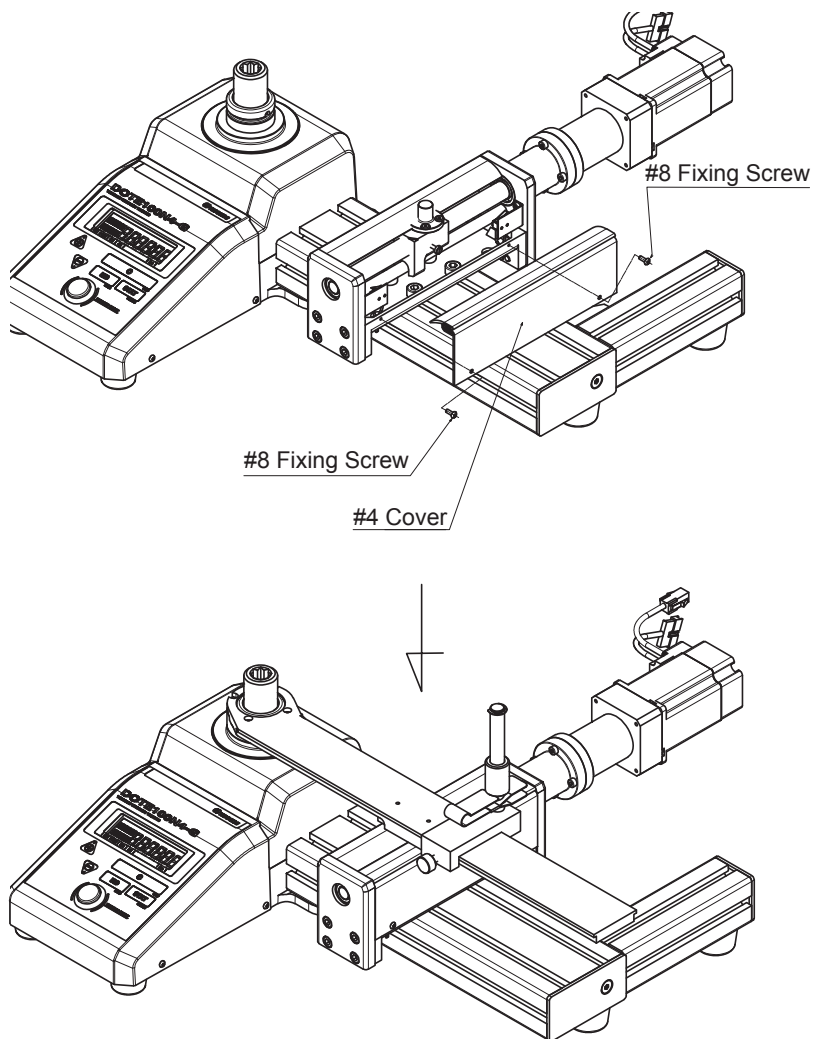


9. Fix #27 Motor to #23 Bracket with #28 Fixing Screws (hex socket head bolt M14x16).

Fit the groove of #26 Coupling and #17 Pin position, mounted on #7 Moving Screw together to insert them.

10. Attaching the Cover

Fix #4 Cover on DOTE4-G body with #8 Fixing Screws (hexagon socket bolt M3x6).



11. Check the Wiring Connections

Correctly connect the wiring from the motor and the LS Limit Switch (front side and rear side) and wiring of the driver unit DR-MD2-S/DR-MD2-L.

12. Operation Check

Please use C-MD2 (controller unit) to move Moving Piece back and front, and make sure that it stops and functions correctly with the front and rear LS switches.

If it does not work correctly, adjust the position of LS Limit Switches with #13 Fixing Screws (hexagon socket head screw bolt M3x6).

6. Functions and Settings

6-1. RUN Mode, Continuous Value Display

Torque value on display increases by loading torque and returns to 0 when load is released.

RUN mode is mainly used for measuring direct reading type torque wrench. Press “MD” key to change between RUN and PEAK mode. ▼ on RUN is RUN mode condition.

6-2. PEAK Mode, Maximum Value Display

Torque value on display increases by loading torque, and will keep the maximum torque on the display even after releasing the load. PEAK mode is mainly used for measuring click type torque wrench.

Press “MD” key to change between RUN and PEAK mode. ▼ on PEAK is PEAK mode condition.

6-3. Upper/Lower Limit Value Selection

#1 Press “MD” key for two seconds.

#2 Using ▼ or ▲ key, select registered Upper-/Lower-limit values.

#3 Press “STAT” key to select, and back to measurement mode. Press “MD” key for cancellation.

For registration of the upper- and lower-limit values, refer “Section #7 Various Settings”.

6-4. OK/NG Judgment and Data Memory

When press “Memory Reset” button or Auto Memory/Reset function is acting, OK/NG Judgment is performed. OK result is displayed in blue color for 0.5 second, and NG in red for one second.

Results are stored up to 1,000.

Decision Criteria HI: Registered upper limit value < Result torque value

OK : Lower limit value \leq Result torque value \leq Upper limit value

LO : Result torque value < Registered lower limit value

6-5. Auto Memory/Reset

When load is released, peak torque value will be displayed for between 0.1 to 5.0 seconds.

Value will then be stored and display will return to zero for the next operation.

6-6. Deletion of Data

#1 Delete one data:

Use ▼/▲ keys to show data for deletion, and press “C” key. The data is deleted.

#2 Delete data between two selected results:

Use ▼/▲ keys to select the last result which is to be deleted, then press the STAT key to show “Stt” on display. While “Stt” and count “1” is shown, press the ▼ key to show serial number of the selected last result.

Push ▼/▲ keys to select the serial number which is the beginning result to be deleted, and press STAT key to make a selection.

Total data stored number of the section is shown as “n”. With each push of the “STAT” key, “n”, “HI”, “Lo” and “Av” is displayed in order. While these statistical number shown on, press “STAT” first and “C” keys.

The selected data section will be deleted.

#3 Delete all stored data:

Turn on its main switch while pressing the Memory/Reset button. “CLEAR” is displayed at the start-up time, clearing all the data.

Caution: Before delete data, make sure whether or not the data should be deleted.

6-7. Statistical Processing Function, Number of samples, Max-Min-Mean Value

#1 Use ▼/▲ keys and show the last result of the section for statistical processing.

#2 Press **STAT** key to show “Stt” on display. And use ▼/▲ keys to show the first result of the section.

Press **STAT** key and the sampling number “n”, maximum value “HI”, minimum value “Lo” and mean value “Av” in the specified data range are displayed in order.

6-8. Auto Zero Adjustment

With no load on the tester, Auto Zero function is performed automatically by press “**C**” key or turn the power OFF/ON switch.

“Err9” on display

When loading torque exceeds more than 5% of the tester's maximum torque range, “Err9” is displayed.

When “Err9” is displayed, press “**C**” key with no load on the tester. “Err9” message disappears.

If “Err9” message is still on the display, turn off and on again.

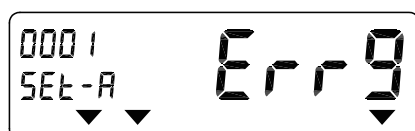
Torque sensor or the electric circuit board may have any problem if “Err9” shows again.

6-9. Over-Torque Alarm

When loading torque exceeds 110% of its maximum torque range, the display flashes as a warning.

6-10. Error Display

DOTE4-G has a self-diagnosis function. When a problem occurs, any of the error messages from Err1 to 9 is displayed.



For any other error messages, refer to "Section #12. Error Message"

7. Various Settings

7-1. Setting items

Item	Counter Upper limit Value Display	Upper/Lower-limit Value Selection/ Lower-limit Value Display	Main Display		
			Factory Default	Selectable range	
1	Setting item selection	--		torq-S	PARA-S
2	Measurement unit	Unit		N·m	4 units
3	A Upper-limit value	HI	SEt-A	0	0 to Maximum Range
4	A Lower-limit value	Lo	SEt-A	0	0 to Maximum Range
5	B Upper-limit value	HI	SEt-b	0	0 to Maximum Range
6	B Lower-limit value	Lo	SEt-b	0	0 to Maximum Range
7	C Upper-limit value	HI	SEt-C	0	0 to Maximum Range
8	C Lower-limit value	Lo	SEt-C	0	0 to Maximum Range
9	D Upper-limit value	HI	SEt-d	0	0 to Maximum Range
10	D Lower-limit value	Lo	SEt-d	0	0 to Maximum Range
11	E Upper-limit value	HI	SEt-E	0	0 to Maximum Range
12	E Lower-limit value	Lo	SEt-E	0	0 to Maximum Range
13	F Upper-limit value	HI	SEt-F	0	0 to Maximum Range
14	F Lower-limit value	Lo	SEt-F	0	0 to Maximum Range
15	G Upper-limit value	HI	SEt-g	0	0 to Maximum Range
16	G Lower-limit value	Lo	SEt-g	0	0 to Maximum Range
17	H Upper-limit value	HI	SEt-H	0	0 to Maximum Range
18	H Lower-limit value	Lo	SEt-H	0	0 to Maximum Range
19	I Upper-limit value	HI	SEt-I	0	0 to Maximum Range
20	I Lower-limit value	Lo	SEt-I	0	0 to Maximum Range
21	J Upper-limit value	HI	SEt-J	0	0 to Maximum Range
22	J Lower-limit value	Lo	SEt-J	0	0 to Maximum Range

Item	Counter/Up- per-limit Value Display	Main Display		
		Factory Default	Selection item	
1	Automemory/reset	Ar	0	0.1/0.2/0.3/0.4/0.5/1.0/2.0/3.0/4.0/5.0
2	Keyoperationsound	bU	on	oFF
3	External output	doUt	PC	Prn
4	Baud rate	bPS	115200	19200/9600/4800/2400
5	Data length	LngtH	8bit	7bit
6	Parity	PARty	nonE	odd/EVEN
7	Memorymode	dCnt	1000	99
8	Default	dFLt	dFLt-n	dFLt-y

7-2. Registration of Upper and Lower limit Values

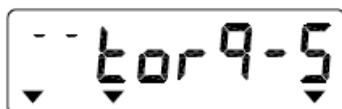
Setting screen reading

In measurement screen, press “C”—“STAT”—“MD” keys in order. After “- - -” appears on display, you will enter the selection screen.



Setting item selection

Register Upper/Lower limit values and select measuring unit for DOTE4-G-MD2 models. During “torq-S” on display, press the “MD” or “STAT” key to proceed to the next item. Press “C” key to return to the measurement display mode without making any setting.



Measurement unit setting

Select desired measuring unit by ▼/▲ keys, and press the “STAT” key to set. Press “MD” key to skip the setting. Press “C” key to go back to the measurement mode.



Factory Default Setting : N·m scale

Unit Conversion Table

	Conversion factors	
N·m to kgf·cm	10.1972	100.0N·m x 0.73756 = 73.756 = 73.8lbf.in 73.8lbf.in ÷ 0.73756 = 100.05 = 100.1N·m Converted figures are rounded as above. Accordingly, the resulted figures may have a margin of errors. Unit conversion is made based on N·m values with the above conversion factors.
N·m to kgf·m	0.010972	
N·m to lbf·in	8.858	
N·m to lbf·ft	0.73756	

All the saved data and torque setting values will be converted when making a unit change

Upper limit value registration for OK/NG judgment

Pick each digit by ▲ key and select a number by ▼ key, and register by “STAT” key. Press “MD” key, and skip the setting. Press “C” key to go back to the measurement mode. If a value exceeding the tester's maximum torque range is registered, “SEtErr” message appears on display, and return to the beginning.



Lower-limit value registration for OK/NG judgment

Pick each digit by ▲ key and select a number by ▼ key. Press “STAT” key to register the value, and next registration. Press “MD” key to skip the setting. Press “C” key and back to the measurement mode. If a value exceeding the tester’s maximum torque range or more than registered upper limit value are registered, “SEtErr” message appears on display, and return to the beginning.



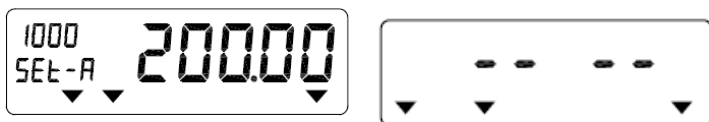
Subsequently, register Upper/Lower limit values until “J”. Back to measurement mode after “J” setting automatically. Also, to press “C” key, back to measurement mode from any stage.

Delete all existed torque results before setting Upper/Lower limit values. If changes Upper/Lower limit values, OK/NG function makes a judgment on stored data with new registered limits.

7-3. Parameter Settings

Setting screen reading

In the measurement screen (no-load), press “C”–“STAT”–“MD” keys in order. After “- - -” appears on display, you will enter the selection screen.



Setting item selection

Use ▲/▼ keys to change from “torq-S” to “PARA-S” on display. Press “MD” or “STAT” key to proceed to the next. Press “C” key to return to the measurement display mode immediately.



Auto memory/reset setting

Use ▲/▼ keys and select any time between 0.1 to 5.0 seconds. Press “STAT” key to enter.

To set manual memory/reset function, select “0.0” time. Press “MD” key to skip the setting.

Press “C” key and to go back to the measurement mode.

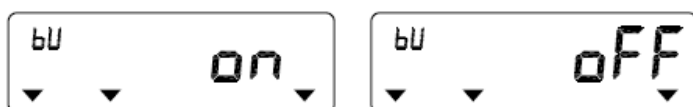


Factory Default Setting : 0.0

Key operation buzzer setting

Use ▲/▼ keys and select “on” or “off”. Press “STAT” key to enter. Press “MD” key to skip the setting. Press “C” key and to go back to the measurement mode.

Even in buzzer off condition, “over-torque” alarm sound occurs.



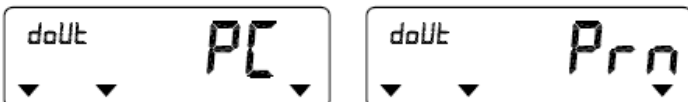
Factory Default Setting : on

Communication setting

#1 Output format setting (Factory default: PC output)

Use ▲/▼ keys and select “Prn” for printer output or “PC” for PC. Press “STAT” key to enter, and go to next setting, “Baud Rate Setting”. Press “MD” key to skip the setting.

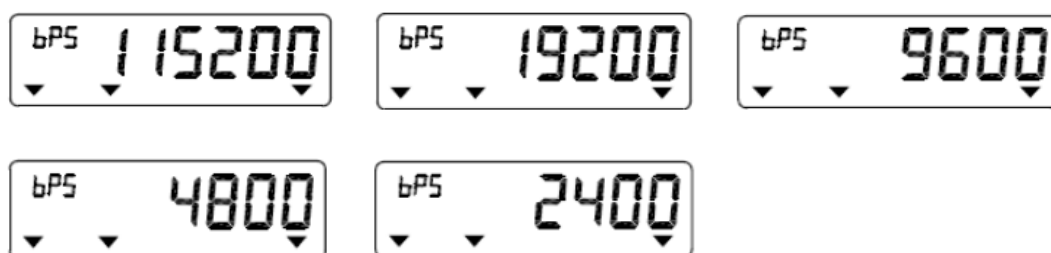
Press “C” key and back to the measurement mode.



Factory Default Setting : PC output

#2 Communication baud rate setting

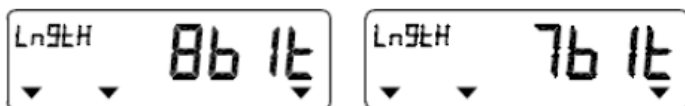
Use ▲/▼ keys and select “115200”, “19200”, “9600”, “4800” or “2400”. Press “STAT” key to enter and go to next setting, “Data length setting”. Press “MD” key to skip the setting. Press “C” key and to go back to the measurement mode.



Factory Default Setting : 115200

#3 Data length setting

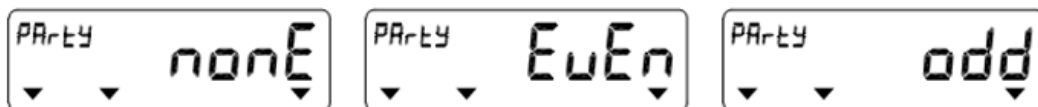
Use ▲/▼ keys and select “7bit” or “8bit”. Press “STAT” key to enter and got to next setting, “Parity Setting”. Press “MD” key to skip the setting. Press “C” key to go back to the measurement mode.



Factory Default Setting : 8bits

#4 Parity setting

Use ▲/▼ keys and select “nonE” for none, “EVEN” for even number or “odd” for odd number. Press “STAT” key to enter and go back to the measurement mode. Press “MD” key to skip the setting. Press “C” key to go back to the measurement mode.



Factory Default Setting : None

Memory mode setting

Set a measured data memory capacity.

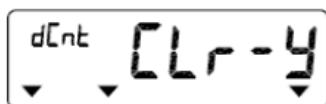
“1000”: 1,000 data memory

“99”: 99 data memory, communication format compatible with previous DOTE3-G model



Factory Default Setting : 1000

Use ▲/▼ keys and select 1000 or 99. Press “STAT” key to go confirmation screen. Press “MD” key to skip the setting. Press “C” key to go back to the measurement mode.



Press “STAT” key to confirm. Memory mode is changed and all stored data is cleared.

When memory mode is changed, existed memory is cleared. Press “C” key to go back.

Default setting



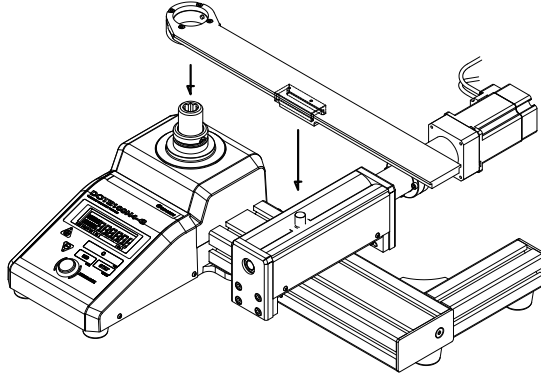
Use ▲/▼ keys to select “dFLt-Y”. Press “STAT” key to reset to the factory default settings. Press “MD” key to skip the setting. Press “C” key to go back to the measurement mode.

8. Preparation and Trial Run Before Use

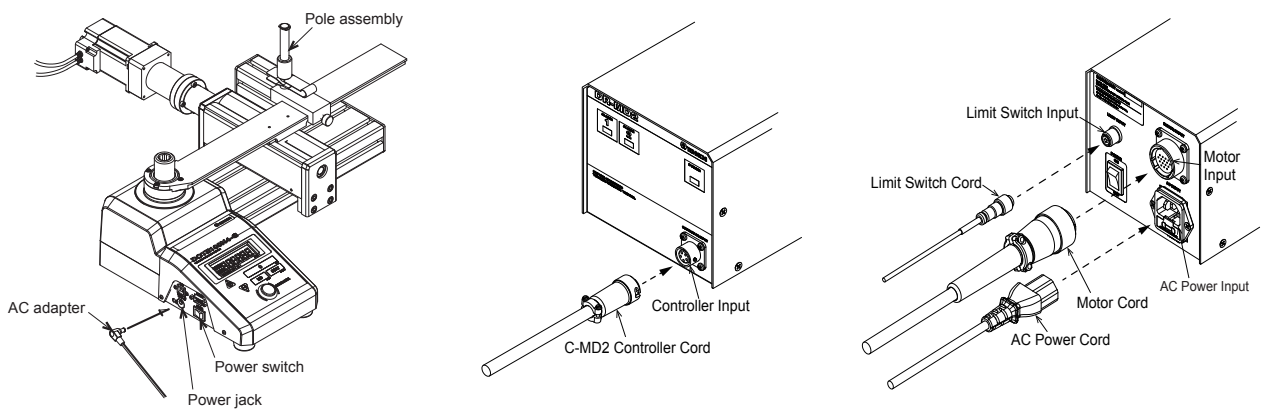
8-1. Preparation

- * Read "Safety Precautions" carefully before using in this manual.
- * Refer to "Various settings" and "How to Calibrate a Torque Wrench".
- * Make sure the power off the all component unit (hereinafter DOTE4-G-MD2) and DR-MD2 Power Unit (hereinafter DR-MD2).

- (1) Install DOTE4-G-MD2 on a rugged, horizontal work bench that does not cause vibration.
- (2) Place the Loading Plate on DOTE4-G-MD2 and securely tighten with the fixing screw on the side.



- (3) Set the Pole Assembly on the Loading Plate.
- (4) Connect the DR-MD2 Motor Cord, DR-MD2 Limit Switch cord and C-MD2 controller (hereinafter C-MD2) to DR-MD2.
- (5) Connect the connectors on the DR-MD2 to the Motor.
- (6) Connect AC adapter plug to DOTE4-G-MD2.
- (7) Connect AC power plug to the power input of the DR-MD2
- (8) Plug the AC Adapter and AC power cord to AC outlet.
(Power input range: AC 100 - 240 V 50/60 Hz)
- (9) Confirm the joystick of C-MD2 is in the neutral position.



8-2. Trial Run

1. For trial operation, please do not set a torque wrench on DOTE4-G-MD2.
2. Turn on the power of DOTE4-G-MD2 and DR-MD2.
3. Confirm the function C-MD2 joystick. Tilt the joystick to the "CW" side, the loading plate is driven toward the front side and tilt to "CCW" side, it drives to the opposite side.
4. Confirm the speed of loading varies depending on the angle of the joystick. Tilt the joystick deeply, the speed increases.
5. Make sure that the loading plate moves by operating the dial.
6. Rotate the dial and confirm that the Loading Plate moves.
Turn the dial to "CW" side, the loading plate moves to the front side and turning to the "CCW" side to move to the opposite side.
7. Check the loading speed by setting the speed change switch to low or high speed.
8. Turn off the power switch of DOTE4-G-MD2 and DR-MD2 once test run is completed.

9. How to Calibrate a Torque Wrench

9-1. Calibration Conditions

9-1-1. Calibration temperature

Calibration shall be performed at the ambient temperature in the 18 to 28°C range.
Temperature variations shall be within $\pm 1^\circ\text{C}$.

9-1-2. Check the following points before starting calibration of a torque wrench.

- (1) Place the torque wrench tester on a stable workbench.
- (2) For direct-reading type torque wrenches, read the measurement value in a direction perpendicular to the scale or dial (Parallax correction).
- (3) For click-type torque wrenches (QL/SP, etc) do a warm-up operation by loading the maximum torque of each model for both directions 5 times each before testing.
- (4) For direct-reading type torque wrenches (CEM/DB/F type, etc), do a warm-up operation by loading the maximum torque of each model for both directions once, and make sure the pointer, or the digital display shows "0" after loading.
- (5) Apply load at the center of the grip or at the marked loading point within the specified range in Fig. 1.

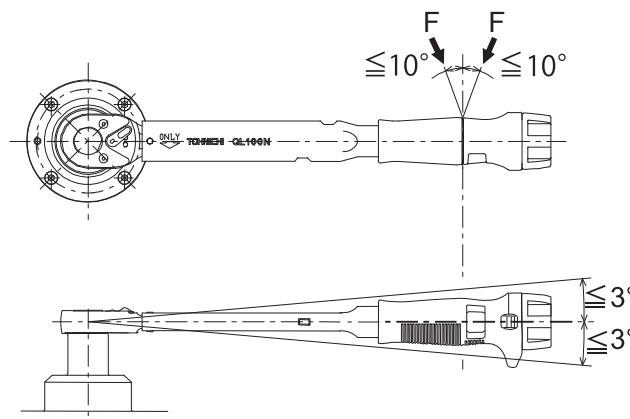


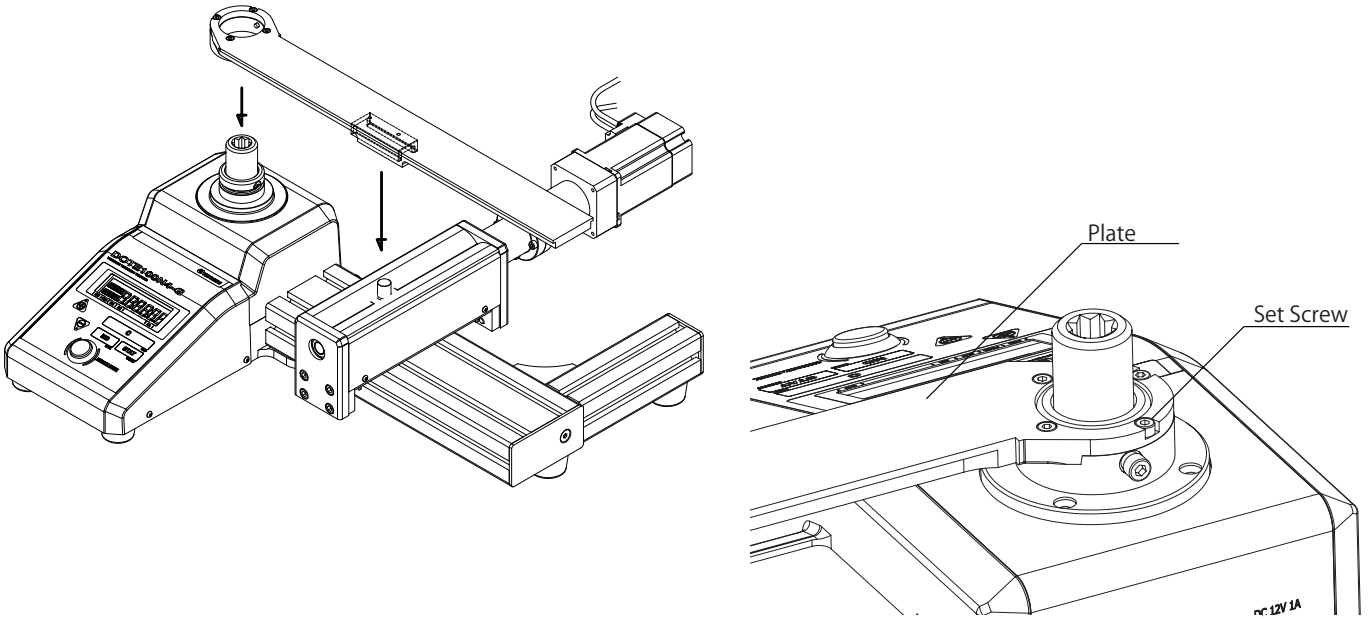
Fig. 1.

9-2. Precautions in Calibration

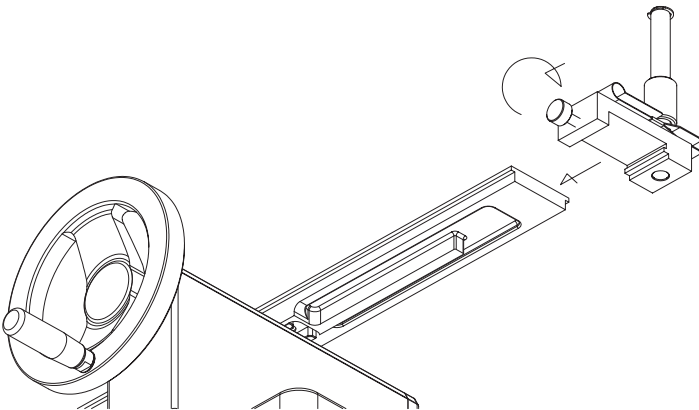
- (1) For click-type torque wrenches (QL/SP, etc), load the initial torque up to 80% of the target torque, then apply the rest slowly and evenly. (take 1 - 3 seconds to apply the last 20%.) Pre-set type torque wrench (except single-purpose type such as QSP) must start at low level, then adjust to the target torque. (Do not adjust to the target torque by lowering from the higher level.)
- (2) For direct-reading type torque wrenches (CEM/DB/F, etc), apply torque up to the target torque with attention not to exceed the target torque.
If you exceed the target torque by mistake, please release torque down to zero and do the process from scratch.

9-3. Operation

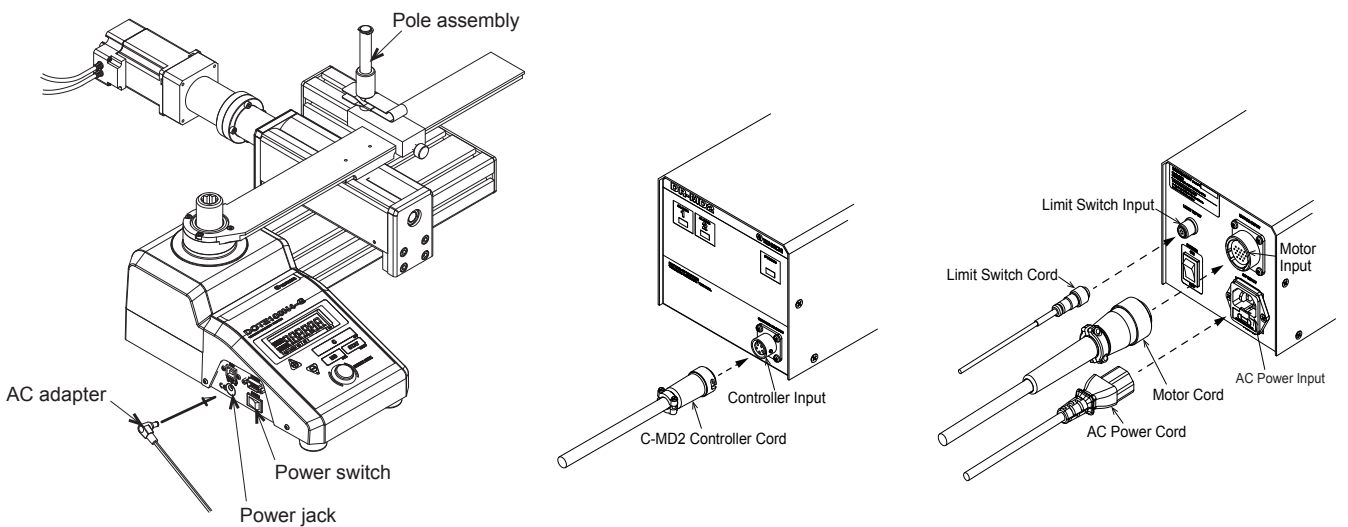
- (1) Place DOTE4-G-MD2 on a horizontal sturdy workbench.
- (2) Put Operation Sticker on DOTE4-G-MD2.
- (3) Put the Plate on to DOTE4-G-MD2 and fix the Plate with the set screw on the side.



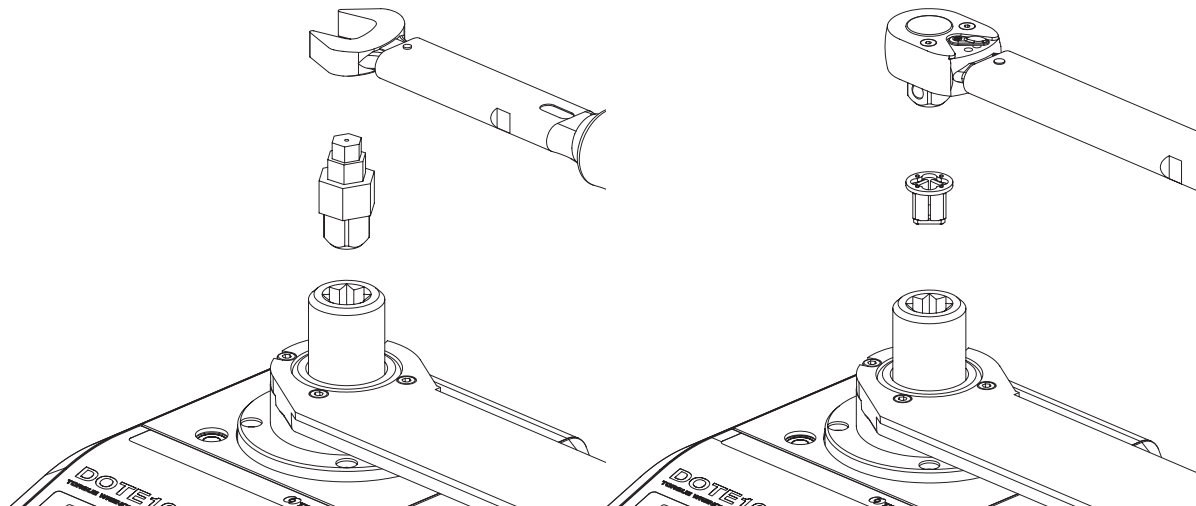
- (4) Place the Pole Holder Assembly on the Plate.



- (5) Connect the attached AC adapter to DOTE4-G-MD2 and Power Cord of DR-MD2.

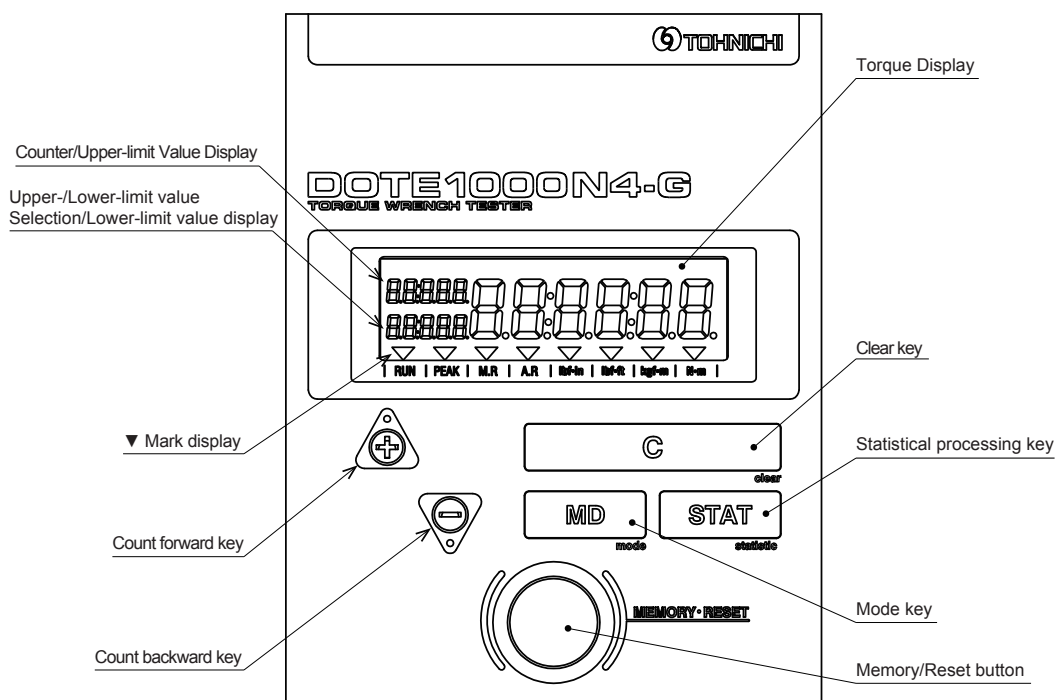


- (6) Turn the power switch on for both tester and motor drive.
 Before using, leave it on for at least 30 minutes for stabilization.
 Confirm the alarm lamp 1 and lamp 2 on the DR-MD2 turn off.
- (7) Set each mode. Auto memory/reset, communication setting.
 For the setting instructions, refer to section "6. Functions and Settings".
- (8) Select adapter or socket based on the torque wrench to be calibrated.

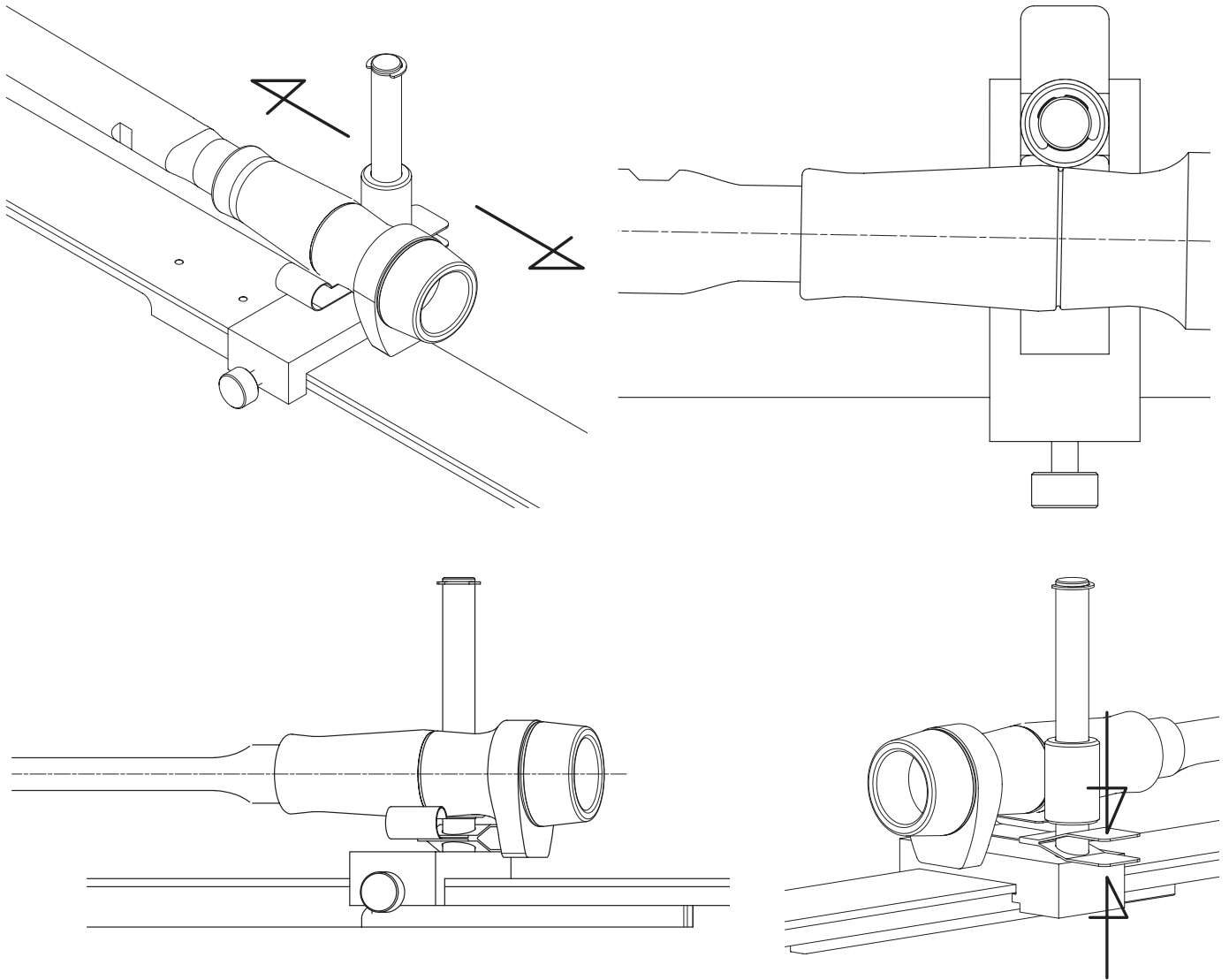


- (9) Set the measuring mode based on the torque wrench to be measured.
 - Click type (model QL, SP, etc): Peak Hold Mode (PEAK)
 - Direct-reading type (model CEM, DB, F, etc): Run Mode (RUN).
 For the setting instructions refer to section "6. Functions and Settings".

- (10) Press the "C" key with no load to zero the tester.



- (11) Confirm the calibration torque values of the torque wrench.
- (12) Move the Pole Holder assembly to the effective length of the torque wrench and adjust the height of the Pole Holder Plate to keep the torque wrench horizontal. Confirm the measuring stroke of the torque wrench before calibration.



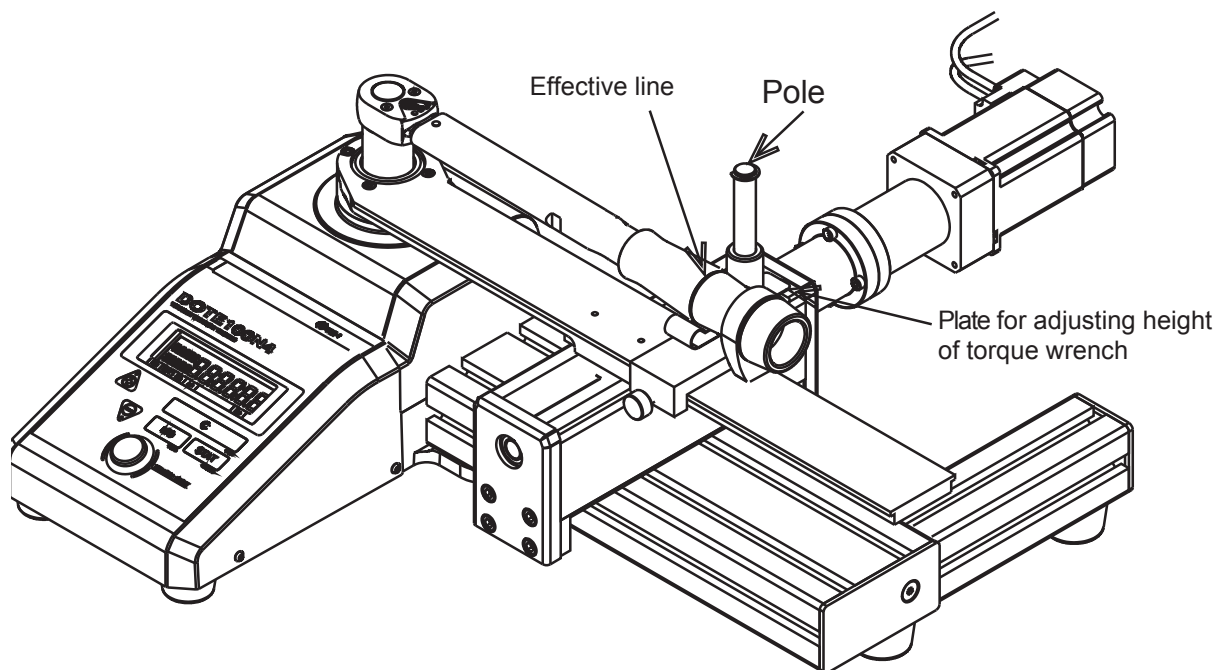
- (13) Set the speed change switch of C-MD2 to the low speed side.

(14) Click type (QL, SP, etc):

Tilt the joystick of C-MD2 till it reaches the set torque and "click".

(15) Direct-reading type (CEM, DB, F, etc):

Tilt the joystick of C-MD2 slowly till it approaches the measuring point.



(16) Click type (QL, SP, etc):

After reaching the measuring point and "click" sound, return the joystick to neutral and tilt it to CCW side to release the loading.

If you select manual operation, press **MEMORY/RESET button** to save the data, then it goes on to the next counter value.

If you select AUTO MEMORY/RESET, it saves the data automatically after releasing the load down to below 2% of the maximum torque of each measurement, and forward the counter to the next.

(17) Direct-reading type (CEM, DB, F, etc):

When it approaches the measuring point, turn the dial of C-MD2 to be set at measuring torque.

Press **MEMORY/RESET button** to save the data, and forward the counter to the next.

Tilt the joystick CW/CCW to release the loading.

(18) Repeat steps (14),(16) or (15), (17) to complete calibration.

10. External Output Function

10-1. Printer Output

Connect the DOTE4-G-MD2 and the Tohnichi printer (EPP16M3) using a printer cable (Catalog No. 382). Set the communication output format to “Prn” and ensure that other communication settings are consistent with the printer. See “5 Various Settings” for the setting methods.

* Do not use a printer cable and a USB communication cable at the same time.

- Communication settings for the EPP16M3

Data format	: RS232C-compliant
Transmission system	: Start-stop synchronization serial
Baud rate	: 2400 bps
Data length	: 7 bits
Stop bit	: 1 bit
Parity	: None

(1) Progressive printing

Press the **Memory/Reset button**. In the progressive printing, the results of statistical processing are not printed. In the Auto Memory/Reset mode, the results are automatically printed out.

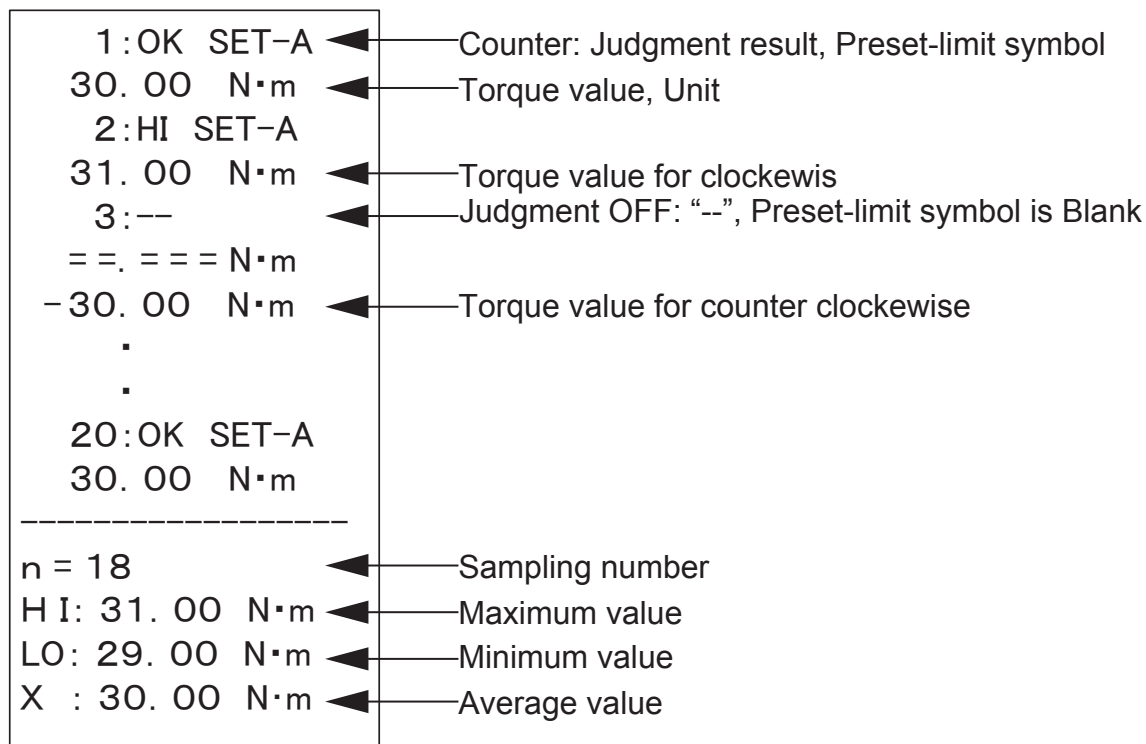
(2) Continuous printing

Display the last count value in the print range and press **STAT** key. “Stt” is displayed. Using **▲** or **▼** key, display the first count value in the print range and press **STAT** key. Then, press **▲** key while “n” is displayed. The data, sampling number “n”, maximum value “HI”, minimum value “LO” and average value “X” in the specified range are printed out.

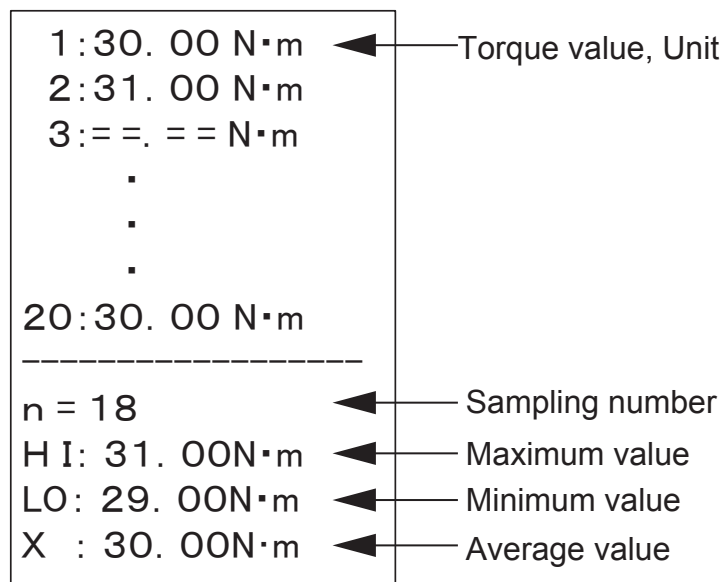
(3) Printing of only statistical processing value

Display the last count value in the print range and press **STAT** key. “Stt” is displayed. Using **▲** or **▼** key, display the first count value in the print range and press **STAT** key. Then, press **▼** key while “n” is displayed. The sampling number “n”, maximum value “HI”, minimum value “LO” and average value “X” in the specified range are printed out.

- Continuous printing example for memory mode 1000



- For memory mode 99



"====" denotes that the measured value displayed at the DOTE4-G-MD2 is either "0" or exceeds 110%. It is excluded from statistical processing and not printed.
 " - " shows in the front of calibrated value for counterclock wise measurement.
 The max, min and avarage is calculated by absolved value.

10-2. PC Output

Connect the DOTE4-G-MD2 and an external device with a communication cable (Catalog No.383 or 385). Set the communication output format to "PC" and ensure that other communication settings are consistent with the external device. (See "5 Various Settings" for the setting methods.)

- * Do not use an RS232C communication cable and a USB communication cable at the same time.
- * Driver is required for communications with the No. 385 cable.
Install the driver from the CD-R accompanying the No. 385 cable.

• Communication settings

Data format	: RS232C-compliant
Transmission system	: Start-stop synchronization
Serial Baud rate	: 2400/4800/9600/19200 bps
Data length	: 7 bits/8 bits
Stop bit	: 1 bit
Parity	: None/Even number/Odd number

(1) Progressive output

The data are output when the **Memory/Reset button** is pressed or the auto memory/reset function is activated.

(2) Batch output

Display the last memory count value in the output range and press **STAT** key.

"Stt" is displayed. Using ▼ or ▲ key, display the first memory count value in the output range and press **STAT** key. Then, press ▲ key while "n" is displayed.

The measured data of a selected range are collectively output.

The 7-digit of alphanumeric can be changed by command input.

Serial number of DOTE4-G-MD2 is registered at shipment.

PC Output Format

Judgment result

- Within preset Hi/Lo value: "OK"
- Higher than preset Hi value: "HI"
- Lower than preset Lo value: "LO"
- Judgment function is off: " " Blank

• For memory mode 1000

R	E	,	0	1	2	3	,	5	0	.	0	0	0	,	n	m	,	A	,	O	K	,	1	2	3	4	5	6	A	CR	LF
				Counter 4-digit				Direction CW : " " blank CCW : " - "		Torque value 6-digit				Torque unit kgf·cm: kgfcm kgf·m:kgfm cN·m:cnm N·m:nm lbf·in:lbfin lbf·ft:lbfft				Preset symbol "A" to "J"		7-digit of alphanumeric. Default : Serial number of the body											

• For memory mode 99 (Compatible with the DOTE3-G)

R	E	,	0	1	,	5	0	.	0	0	0	,	CR	LF
				Counter 2-digit		Torque value 6-digit								

10-3. Operation with Communication Command

Setting of DOTE4-G-MD2 can be changed by communication command from an external device. DOTE4-G-MD2 executes the command and sends back response command to the external device.

(1) Communication commands

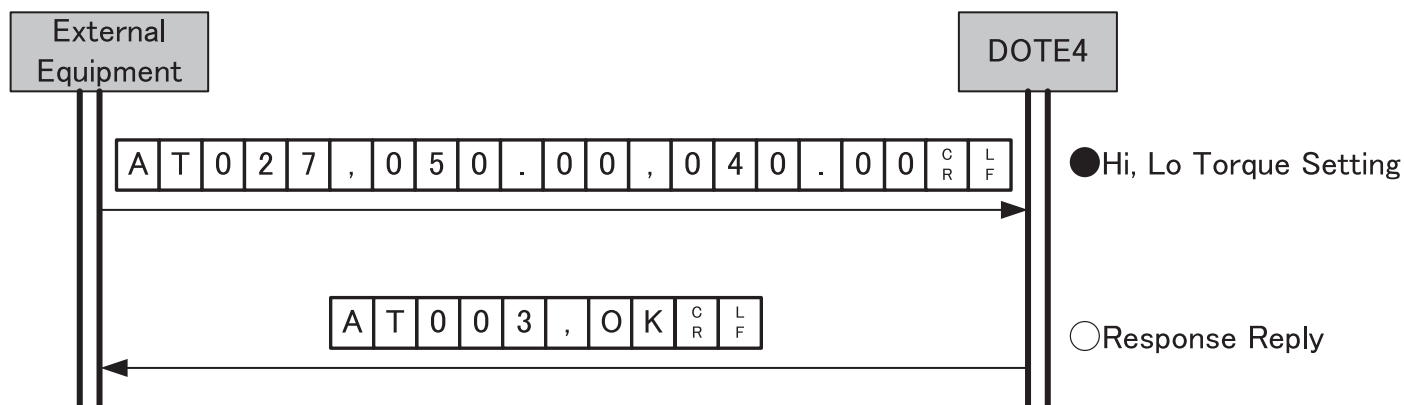
Command	Motion
AT219,*	Switch registered upper/lower limit. * must be A:0,B:1,C:3...J:9
AT037,*****,*****	Register upper limit and lower limit at the same time. * must be torque value in 6 digits including decimal point.
AT023,*****	Register 7-digit alphanumeric. * must be upper case alphabet or number. Registered 7-digit alphanumeric is appended to measurement data.

All commands are ASCII code

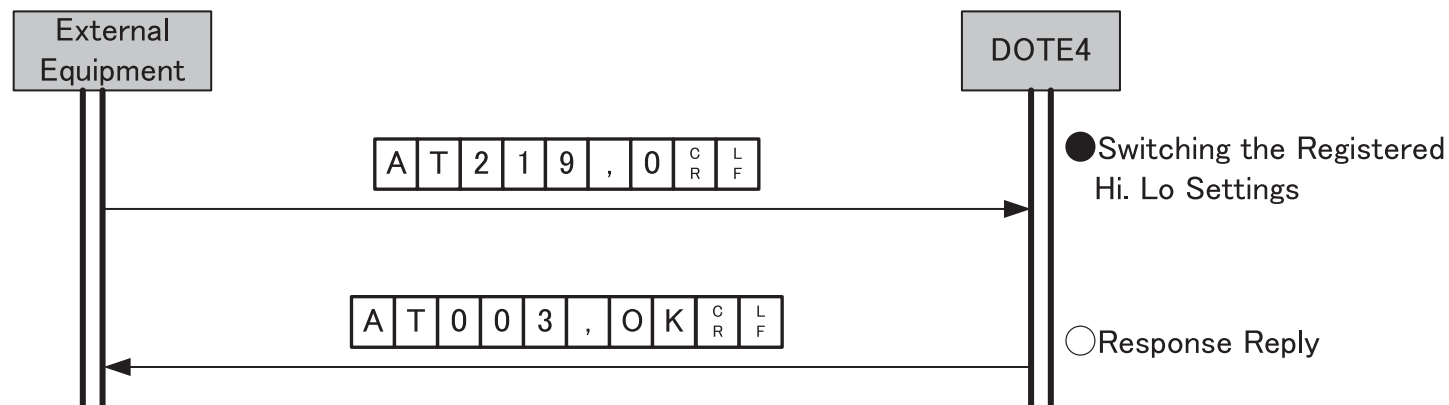
Append CRLF in the end of command

(2) Communication example

- In case of switching upper limit setting (A)



- In case of setting upper limit at 50.00 and lower limit at 40.00

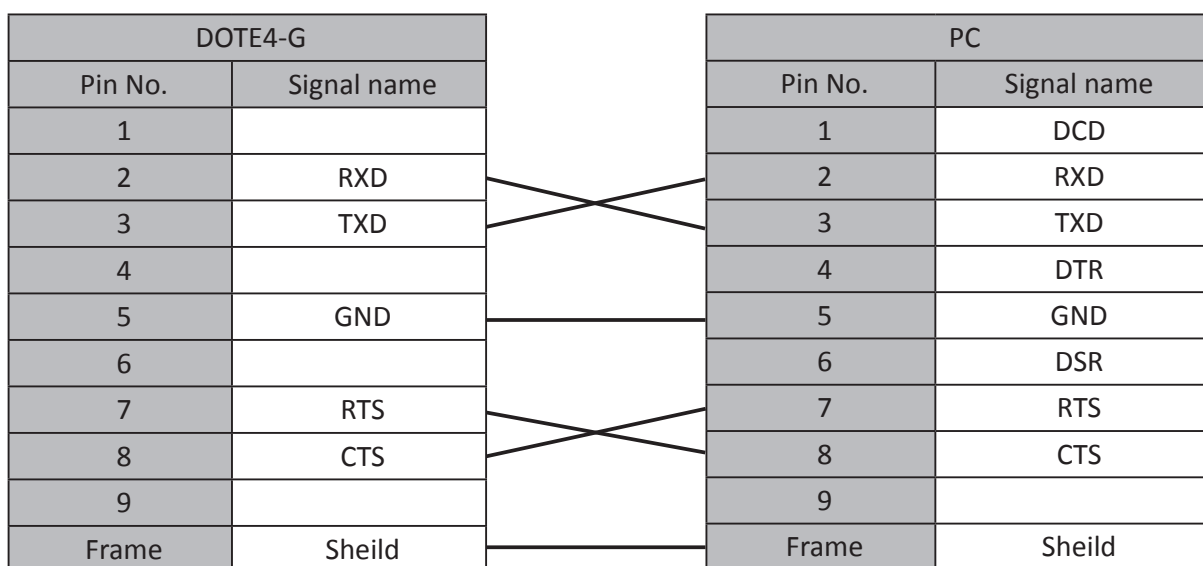


10-4. RS232C Output Connector Assignment

The connector of DOTE4-G is D-SUB 9 Male connector

Pin No.	Signal name	Detail
1		
2	RDX	Received data signal
3	TXD	Transmitted data signal
4		
5	GND	Ground
6		
7	RTS	Request send signal
8	CTS	Clear to send signal
9		

PC Connection Example



11. Optional Accessories

- (1) Printer EPP16M3
- (2) Connection Cable for Printer Part No.382
- (3) Connection Cable for PC
 - DOTE4→PC (D-SUB9 Pin Connector) Part No.383
 - DOTE4→PC (USB B-type Cable) Part No.385
- (4) Retrofit Motor Driven Unit
 - MD2-SET-S Applicable Model : DOTE20N4-G, 50N4-G, 100N4-G, 200N4-G
 - MD2-SET-L Applicable Model : DOTE500N4-G, 1000N4-G
 - * Power cord will be provided in different shapes depending on each country. Contact to Tohnichi.
- (5) Calibration Kit
 - DOTCL-S1 Applicable Model : DOTE20N4-G, 50N4-G
 - DOTCL-S2 Applicable Model : DOTE100N4-G
 - DOTCL-S3 Applicable Model : DOTE200N4-G
 - DOTCL-L3 Applicable Model : DOTE500N4-G
 - DOTCL-L4 Applicable Model : DOTE1000N4-G

12. Error Message

DOTE4-G-MD2 Display

Error Message	Indication	Solution
Err1 – 5	Operation key is continuously pushed.	Turn off DOTE4-G-MD2 once and turn it on without touching any keys. If Err disappears, it should work properly. If Err does not disappear, it needs to be repaired. Please contact TOHNICHI or your nearest distributor.
Err8	CPU / Memory error.	It needs to be repaired. Please contact TOHNICHI or nearest distributor.
Err9	Malfunction of the torque sensor or circuit board.	Push C key at no loading condition. If Err 9 disappears, it should work properly. If Err 9 does not disappear, it needs to be repaired. Please contact TOHNICHI or your nearest distributor.

DOTE4-G-MD2 Motor Power Unit Alarm Lamp

LED Status		Content	Cause
LED Alarm1 (Orange)	LED Alarm2 (Yellow)		
ON	ON	Disconnection of Limit Switch	Connection failure of DR-MD2 limit switch. (Defect of Driver Unit, CW/CCW limit switch cord), disconnection or defect of LS switch.
-	ON	CW Limit Switch On	Detect switching on CW site limit switch. (Defect of cable connection of CW cord, disconnection, or malfunction of limit switch). While showing this error, only for CCW side loading is possible.
ON	-	CCW Limit Switch On	Detect switching on CCW site limit switch. (Defect of cable connection of CCW cord, disconnection, or malfunction of limit switch). While showing this error, only for CW side loading is possible.
ON	Flashing	External defect	Defect of DR-MD2 Motor cord (Connection of Motor Power Unit or Motor), caused by disconnection.
Flashing	ON	Joystick defect	This error occurs the joystick is away from the neutral position while turning on the power. Defect of DR-MD2 controller cord. Defect of connection between Motor Power Unit or disconnection the cord.
Flashing	-	Motor driver defect	Defect for DR-MD2 (Overcurrent, Overspeed, PF start error, overload, overheat, regenerative voltage, motor voltage, PF start completion, ROM or excess the position error) of one or more reason.
Flashing	Flashing	Serial communication defect	Defect of DR-MD2 (Malfunction of serial communication between CPU board to the driver).

Designs and specifications are subject to change without notice.

■ **TOHNICHI MFG.CO.,LTD.**

2-12, Omori-Kita, 2-Chome Ota-ku, Tokyo JAPAN

TEL.+81 3 3762 2455 FAX.+81 3 3761 3852

E-mail: overseas@tohnichi.co.jp

Website: <http://www.global-tohnichi.com>

■ **N.V. TOHNICHI EUROPE S.A.**

Industrieweg 27, Boortmeerbeek, B-3190 BELGIUM

TEL.+32 16 60 66 61 FAX.+32 16 60 66 75

E-mail: tohnichi-europe@online.be

■ **TOHNICHI AMERICA CORP.**

1303 Barclay Blvd. Buffalo Grove, IL 60089 USA

TEL.+1 847 947 8560 FAX.+1 847 947 8572

E-mail: inquiry@tohnichi.com

Website: <http://tohnichi.com>

■ **TOHNICHI SALES SHANGHAI CO., LTD.**

RM.5 No.99 Nong1919, Du Hui Road, Minhang, Shanghai, P.R.China

TEL.+86 21 3407 4008 FAX.+86 21 3407 4135

E-mail: sales@tohnichi-sh.com

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