



OPERATION MANUAL

20MAY2021REV.1.02



Introduction

Thank you very much for purchasing our Torque Monitor TM380.

The TM380 is an indicator only for our company UTM III and UTF series. Equipped with peak hold and HI/LO limit comparison functions, the TM380 is used for a testing machine etc. (Connectable to UTM II series.)

To take full advantage of high performance of TM380, thoroughly read this operating manual first before use and understand the explanations contained herein for correct operating procedures. Also, carefully store this instruction manual so that it can be referred to at any time.



Safety Precautions

BE SURE TO READ FOR SAFETY

Installation, maintenance and inspection of the TM380 should be performed by personnel having technical knowledge of electricity.

In order to have an TM380 Torque Monitor used safely, notes I would like you to surely follow divide into " A WARNING " and " A CAUTION ", and are indicated by the following documents.

Notes indicated here are the serious contents related to safely.

Please use TM380 after understanding the contents well.

🕂 WARNING

This sign forewarns the presence of hazards that could result in serious injury or fatality when incorrectly handled.

▲ CAUTION

This sign forewarns the presence of hazards that could result in personnel injury or property damage when incorrectly handled.

This sign forewarns the presence of hazards that could result in serious injury or fatality when incorrectly handled.

Warning on design

- For the entire system to function safely when the TM380 becomes faulty or malfunctions, provide a safety circuit outside the TM380.
- Before using the TM380 as described below, make sure to consult with our sales personnel.
 Use in environments not described in the operation manual.
 - Use greatly impacting human lives and assets, such as medical devices, transport devices entertainment devices, and safety devices.

Warning on installation

- Do not disassemble, repair, or modify the TM380. Doing so may cause a fire or an electric shock.
- Do not install in the following environments.
 - Places containing corrosive gas or flammable gas.
 - Where the product may be splashed with water, oil or chemicals.

Warning on wiring

- Do not connect a commercial power source directly to the signal input/output terminals.
- Be sure to ground the protective ground terminal.
- Before performing the following, make sure that no power is applied.
 - Attachment/detachment of connectors of options, etc.
 - Wiring/connection of cables to the signal input/output terminals.
 - Connection to the ground terminal.
- For connection to the signal input/output terminals, check the signal names and pin assignment numbers, and then carry out wiring properly.
- Be sure to use crimp contacts for connection to the terminal blocks, and do not to connect bare wires as they are.
- After wiring, be sure to mount the attached terminal block cover. Otherwise, it may cause an electric shock.
- Do not connect anything to unused terminal(s).
- Before applying power, carefully check the wiring, etc.

Warning during startup and maintenance

- Use a power supply voltage and load within the specified and rated ranges.
- Do not damage the power cord. Doing so may cause fire or electric shocks.
- Do not touch any signal input/output terminal while applying power. Doing so may cause electric shocks or malfunctions.
- If the cover of the main body is opened, it may cause an electric shock internally. Even if the power is off, the internal capacitor is charged. Contact us for internal inspection or repair.
- In the case of smoke, an abnormal smell or strange sound, immediately turn off the power, and disconnect the power cable.

This sign forewarns the presence of hazards that could result in personnel injury or property damage when incorrectly handled.

Caution on installation

- Use the TM380 as it is incorporated in a control panel, etc.
- Do not install in the following environments.
 - Where the temperature/humidity exceeds the range of the specifications.
 - Where the temperature changes remarkably or there is a danger of freezing or condensing.
 - Outdoors, or where the altitude exceeds 2000m.
 - Places exposed to direct sunlight
 - Dusty places
 - Poor-ventilated places
 - Places containing large quantities of salt or iron powder.
 - Where the main body is directly affected by vibrations or shocks.
- Take adequate shielding measures when using at the following locations.
 - Near a power line.
 - Where a strong electric field or magnetic field is formed.
 - Where static electricity, relay noise or the like is generated.
- Install the TM380 as far away from devices generating high frequency, high voltage, large current, surge, etc., as possible. Also, carry out wiring separately from their power lines. Do not carry out parallel wiring and common wiring.
- Do not use it, broken down.

Caution on wiring

- Tighten the screws for the power input terminal at the specified torque. If they are loose, shorts, fire or malfunctions may occur. Tightening torque: 0.5N•m
- For external inputs/outputs and options, use shielded cables.
- The temporary overvoltage applied to the power should not exceed 1500V.

Caution during startup and maintenance

- For turning on/off the power, be sure to keep intervals of 5 seconds or more.
- After power-on, make sure to warm up the TM380 for at least 30 minutes or more before use.
- If the TM380 is not used by the specified method, its protective performance may be impaired.
- Maintenance
 - When performing maintenance, disconnect the power.
 - Do not wipe with a wet rag, or with benzine, thinner, alcohol, etc. Doing so may cause discoloration or deformation of the TM380. In the case of heavy contamination, wipe off the contamination with a cloth after dipping it into a diluted neutral detergent and wringing it well, and then wipe with a soft, dry cloth.

Caution during transportation

 When the TM380 is shipped, spacers made of corrugated cardboard are used as cushioning materials.

Though it is factory-designed so that shocks can sufficiently be absorbed, breakage may result if shocks are applied when the spacers are reused for transportation. If you send the TM380 to us for repair, etc., take adequate measures against shocks by using polyurethane materials, etc., separately.

Caution during disposal

● If you dispose of the product, handle it as industrial waste.

Product Compliant to RoHS2 Directive

The parts and attachments (including the instruction manual, packaging box, etc.) used for this unit are compliant with the RoHS2 Directive, restricting the use of hazardous substances with regard to adverse effects on the environment and human body.

RoHS2 Directive

It is based on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE). The Directive restricts the use of specific substances in electrical and electronic equipments that could harm environment and human body. The substances are lead, mercury, cadium, hexavalent chromium, PBB (polybrominated biphenyls), PBDE (polybrominated diphenyl ethers), DEHP (bis(2-ethylhexyl) phthalate), BBP (benzyl butyl phthalate), DBP (dibutyl phthalate), and DIBP (diisobutyl phthalate).

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MEMO

1 OUTLINE

1-1. Main features of the TM380

- The TM380 is a simple torque monitor that can easily be connected to our torque meter UTMII and UTF series (UTMII) with a dedicated cable (optionally available).
- In addition to torque, rotation speed and angle can also be displayed.
- The TM380 is equipped with hold functions with respect to torque. (sample, peak, bottom, P-P, average, and angle peak)
- The TM380 is equipped with the function of recording data according to a print command of the SI/F (up to 30 pieces of the most recent data). Also, data can be checked on the spot by key operation.
- The TM380's compact size of DIN96×96 realizes space-saving.
- By mounting an optional interface according to the purpose, ease of load control can be further improved.

1-2. Contents of the package

The packaging box contains the following. Be sure to check them before use.





TM380 body.....1



External input/output connector.....1



Connector for BCD parallel data output.....1 (with BCD parallel data output option)

TM380 operation manual.....1



Unit seal.....1



Operating tool.....1 (with D/A converter (3ch) option)

Mini screwdriver for terminal block connection.....1 (with D/A converter option)

1-3. About connectable devices



1-4. Appearance description

■Front panel

	TM380 TORQUE	
Torque HI LO	HOLD Nm	Main status display section
		Main numerical display section
Speed rpm Ang	gle rad deg	Sub unit display section (angle)
	88888	Sub numerical display section
FNC ESC HI/LO	ZEROHOLD	
		Setting key pad
		J

OUTLINE

Main status display section

The status with respect to torque is indicated.

HI:	Lights when the indicated value is larger than the HI limit. Indicates that the external output "HI" is ON.
LO:	Lights when the indicated value is smaller than the LO limit. Indicates that the external output "LO" is ON.
HOLD:	Blinks during hold detection, and lights when a hold is confirmed. Also, it blinks when hold waiting in all section sample hold.

Main numerical display section

The following display patterns exist.

Indicated value:	Displays torque during measurements.
Error display:	Displays an error message when an error occurs.
Setting value:	Displays setting values in setting mode.

Sub numerical display section

The following display patterns exist.

Indicated value:	Displays rotation speed and angle during measurements.
Error display:	Displays an error message when an error occurs.
Setting value:	Displays the mode number and item number at the rotation speed display
	section in setting mode; the load value may be displayed at the angle display
	section according to the setting item.

Sub unit display section (angle)

The unit of angle is indicated.

rad: Lights when the unit of angle is configured as rad.

deg: Lights when the unit of angle is configured as deg.



OUTLINE

Chapter 1 Setting key pad

These are keys for commanding settings and operations.



- Use this key to go to a setting mode state.



- Use this key to cancel setting/execution.
- Use this key to go back from a setting mode state to an indication display state.



- Use this key to take a shortcut from an indication value display state to HI/LO limit setting.



- Use this key to go from an indication value display state to Digital Zero ready state of the torque, or to execute Zero Clear (Angle).



- Use this key to execute/release the hold in an indication value display state.



- Use this key to switch the setting in HI/LO limit setting mode.
- Use this key to set whether or not to sign a setting value, when available, in a setting value input state.



- Use this key to select a trailing setting item number in a setting mode state.
- Use this key to select the previous item number in a setting item select state.
- Use this key to increment the numerical value by one in a setting value input state.



- Use this key to go from an indicated value display state to history mode (record data display).
- Use this key to select a leading setting item number in a setting mode state.
- Use this key to select the next item number in a setting item select state.
- Use this key to decrement the numerical value by one in a setting value input state.



- Use this key to execute Digital Zero reset in a Digital Zero ready state.
- Use this key to increment the leading setting mode number by one in a setting mode state.
- Use this key to move the setting digit by one in the lower direction in a setting value input state.



- Use this key to execute Digital Zero in a Digital Zero ready state.
- Use this key to move to a setting value input state in a setting item select state.
- Use this key to validate the setting value in a setting value input state.

■Rear panel





UTMII/UTMII connection connector

Connect a UTMII/UTMII with a dedicated cable. * For connection, see "■UTMII/UTMII connection" on page 11.

Rotary encoder connection connector

Connect the optional rotary encoder for UTMII/UTM II with a dedicated cable. * For connection, see "■UTMII/UTM II connection" on page 11.

Voltage output terminal

The approximate input voltage from UTMII (UTM II) can be confirmed. (approx. 1V per sensor input voltage of 1V, with load resistance of $2k\Omega$ or more)

* For connection, see "■Voltage output" on page 13.

Signal input/output connector

Connect external input/output signals or SI/F (serial interface).

* For connection, see "External I/O connection" on page 14.

DC power input terminal block

Connect the DC power cord. The power supply voltage is 24V DC ($\pm 15\%$).

* For connection, see "**DC** power input terminal connection" on page 10.

Frame ground ,

Please ground the frame ground terminal to prevent failures due to static electricity. (The frame and the frame ground terminal are conducted.)

It may be better to remove depending on the environment of the installation location.

Options slot

One option board can in stall in the option slot.

- BCD parallel data output	(BCO)
- RS-232C interface	(232)
- D/A converter voltage output (3ch)	(D3V)
 D/A converter voltage output 	(DAV)
 D/A converter current output 	(DAI)
- USB interface	(USB)

■UTF (option)



UTF connection connector

Connect a UTF with a dedicated cable.

* For connection, see "■UTF connection" on page 12.

Voltage output terminal

The approximate input voltage from UTF can be confirmed. (approx. 1V per sensor input voltage of 1V, with load resistance of $2k\Omega$ or more)

* For connection, see "■Voltage output" on page 13.

Signal input/output connector

Connect external input/output signals or SI/F (serial interface).

* For connection, see "■External I/O connection" on page 14.

Communication connection connector

For RS-485 communication with UTF, dedicated cable is needed.

* For connection, see "External I/O connection" on page 14.

DC power input terminal block

Connect the DC power cord. The power supply voltage is $24V DC (\pm 15\%)$.

* For connection, see "■DC power input terminal connection" on page 10.

Chapter

Frame ground ,,,

Please ground the frame ground terminal to prevent failures due to static electricity. (The frame and the frame ground terminal are conducted.)

It may be better to remove depending on the environment of the installation location.

Options slot

One option board can in stall in the option slot.

- BCD parallel data output	(BCO)
- RS-232C interface	(232)
- D/A converter voltage output (3ch)	(D3V)
- D/A converter voltage output	(DAV)
- D/A converter current output	(DAI)
- USB interface	(USB)

2 INSTALLATION & CONNECTION

The following are precautions related to connection. The precautions described here are important for safety. Make connections after properly understanding the description.

- Do not connect commercial power directly to the signal input/output terminals.
- Make connection to the signal input/output terminals with no power applied because you may receive an electric shock.
- For connections to the signal input/output terminals, carry out wiring properly after confirming the signal names and pin assignment numbers.
- Be sure to use crimp contacts for connection to the terminal blocks, and do not to connect bare wires as they are.
- After wiring, make sure to mount the attached terminal block cover. Otherwise, you
 may receive an electric shock.
- Turn on the power after carefully checking the wiring, etc.
- Do not touch the signal input/output terminals while the power is on. Otherwise, you may receive an electric shock, or a malfunction may occur.

- Tighten the terminal screws at specified torque. If the terminal screws are loose, short-circuiting, fire, or a malfunction may occur.
- Use shielded cables.

Chapter

2-1. Installation

To install the TM380 into a control panel, use the following procedure.

- **1.** Make a hole in the panel according to the panel-cut dimensions.
- **2.** Remove the screws (two), and remove the guide rails from both sides.
 - * Do not use other screws than those installed to the TM380 body.
- **3.** Fit in the TM380 from the front of the panel.
- **4.** Install from the rear the guide rails having been removed from both sides in Step 2, and fix them with the screws (two).





2-2. Connection

■DC power input terminal connection

Connect the DC power cord. (DC24V (±15%) 24W)



- 1. Ensure that the power is OFF.
- **2.** Remove the terminal block cover.
- 3. Remove the screws from the power input terminal block (two locations).
- **4.** After fitting crimping terminals into the screw holes, secure them with screws.
 - $+: \operatorname{Red} \operatorname{screw}$
 - -: Black screw
- **5.** Connect the frame grounding.
- **6.** Attach the terminal block cover.

- Connect with no power applied because it may cause an electric shock.
- Be careful, as the voltage will drop depending on the diameters and lengths of the wires. Also, never input an AC power supply. Doing so may cause failure.
- Since the TM380 has no power switch, install a breaker.
- Be sure to ground the frame grounding terminal to prevent malfunctions arising from noise. Do not use screws other than those used for attaching the main unit.
 Furthermore, in some installation environments, it may perform better without the grounding.

■UTMII/UTMII connection

A UTMII/UTMII can easily be connected with the dedicated cable (Sold separately). Connect paying attention to the orientation of the connector.

- UTMII



- UTM II



Pin assignments (torque)

Pin	Pin	Cable color		Signal name	Function	
arrangement	No.	UTMII	UTMI	Signarhame	UTMII	UTMI
	1	Red		PWR (+24V)	Power supply	
	2	Black		PWR GND		
	3	Green		SIG OUT (±10V)	Torque signal	
	4	White		SIG GND		
$ \begin{array}{c} 1 \\ 2 \\ $	5	Yellow		PULSE OUT	Rotation signal	
	6	Brown		PULSE GND		
	7	Orange		DIGITAL ZERO IN	DIGITAL ZERO	
	8	Purple	—	TX+ (B+)		
	9	Gray	—	TX- (A-)	RS-485 Unus	Unused
	10	Pink	—	RX+ (B+)		
	11	Light blue	—	RX- (A-)		
	12	Blue	_	СОМ	COM	

* Cable color is based on dedicated cable. (Sold separately)

* Compatible connector: HR10-10P-12P (HIROSE)

Pin arrangement	Pin No.	Cable color		Signal name	Function	
		UTMII	UTMI	Signarhame	UTMⅢ	UTMI
	1	Red		PWR (+5V)	Power supply	
	2	Black		PWR GND		
	3	Green		В	B phase pulse	
	4	White	_	N.C.	Uni	ısed
	5	Yellow A A pl		A phas	e pulse	
	6	Brown	_	N.C.	Uni	ısed

Pin assignments (encoder)

* Cable color is based on dedicated cable. (Sold separately)

* Compatible connector: HR10-7P-6S (HIROSE)

■UTF connection

A UTF can easily be connected with the dedicated cable (Sold separately).

The cable is nonpolar. Connect paying attention to the orientation of the connector.

* Please prepare power supply for UTF.



Pin assignments (OUTPUT)

Pin arrangement	Pin No.	Cable color	Signal at TM380 side	Signal at UTF side
	1	Red	SIG IN (±10V DC)	SIG OUT (±10V DC)
	2	Black	SIG GND	SIG GND
	3	Green		
	4	White		
(1)	5	Yellow	RS-422A A phase + IN	RS-422A A phase + OUT
	6	Brown	RS-422A A phase - IN	RS-422A A phase - OUT
	7	Orange	RS-422A B phase + IN	RS-422A B phase + OUT
	8	Purple	RS-422A B phase - IN	RS-422A B phase - OUT
	9	Gray	COM	COM
	10	Pink		
	11	Light blue		
	12	Blue		

* Cable color is based on UTF dedicated cable. (Sold separately)

* Compatible connector: HR10-10P-12S (HIROSE)

Pin arrangement	Pin No.	Cable color	Signal at TM380 side	Signal at UTF side		
	1	Orange Red dot	RS-485 TX+ (B+)	RS-485 RX+ (B+)		
	2	Orange Black dot	RS-485 TX- (A-)	RS-485 RX- (A-)		
	3	Gray Red dot	RS-485 RX+ (B+)	RS-485 TX+ (B+)		
	4	Gray Black dot	RS-485 RX- (A-)	RS-485 TX- (A-)		
	5	White Red dot	СОМ	СОМ		
	6	Shield	FG	FG		
	7					
	8					
	9					
	10					

●Pin assignments (COM)

* Cable color is based on UTF dedicated cable. (Sold separately)

* Compatible connector: HR10A-10P-10P (HIROSE)

■Voltage output

The voltage output terminal outputs the input voltage from the UTMIII and UTF (UTMII) as it is turned back.

The check of voltage is possible at the probe of a voltmeter, etc.

Since the output voltage is taken out in a step prior to A/D conversion of the sensor input signal, it is not synchronized with indicated values processed digitally, such as Digital Zero and digital filter. Output in synchronization with indicated values requires an optional D/A converter.

The \pm MONITOR terminals are not insulated from the internal circuit.

Use terminal: PF-8-1-A (manufactured by MAC8 or an equivalent) ϕ 2, Depth: 6mm Compatible terminal: OP-7-1 (manufactured by MAC8 or an equivalent)

▲ CAUTIONWARNING

• Do not short-circuit. Doing so will cause a failure.

• Do not apply voltage externally. Doing so will cause breakage.

External I/O connection

Details of signal, see "8-1.External I/O" on page 68.

- How to connect external output (Sink type)

The external output circuit is operated through an open collector. A1(A7) COM1 is the common terminal. The open collector output capacity is 30mA and the withstand voltage is up to 30V.



Output transistor status

Output data	Tr
OFF	OFF
ON	ON

For driving, have an external power source ready. (24V DC is shown in the illustration.)

- How to connect external input (minus common connection of no-voltage contact input type)

A signal is inputted to the signal input circuit by short-circuiting or opening the input terminal and the COM2 terminal. Short-circuiting is effected by means of a contact (such as a relay or a switch) or a noncontact (such as a transistor or an open-collector TTL)



Chapter

How to assemble the connector



- 1. Set the connector and screws (two) into the grooves of the case (one side).
- **2.** Cover with the other case, and fit the cases.
- 3. Tighten the M2×8 pan-head machine screws (two).
 Tighten the M2×10 pan-head machine screws (two).
 Be aware that washers should be set to the M2×10 pan-head machine screws (two).

■SI/F interface connection

Two-wire serial interface (SI/F) for connecting printers and external display from UNIPULSE. Connect from A11 and A12 of the external input/output connector.

The interface is nonpolarized and up to three external devices can be connected.

Wiring materials should use a two-core parallel cable, cabtyre cable (electric wire with covering thickened for construction), etc. When a two-core parallel cable or a cabtyre cable is used, the transmission distance is approximately 30m. When a two-core shielded twisted pair wire is used, the transmission distance is approximately 300m.

Do not parallel it with AC lines and high-voltage lines. Doing so will cause malfunction.



) Point

For purchasing peripheral devices, consult our sales department.

INSTALLATION & CONNECTION

3 SETTING MODE CONFIGURATION

3-1. Setting mode composition



Chapter 3



3-2. Key operation

≪Setting procedure≫



Point If key operation is not performed for one minute or more between the time of pressing the FNC key and the time of validating with the V key, the setting is stopped to go back to the indicated value display. In that case, the setting value is not saved.



«Setting item select state»

[Normal setting item]



【Calibration operation item】 (Zero calibration, equivalent input calibration, actual load calibration)



Indicated value Example) Torque 29.97

≪HI/LO limit setting mode function≫

By pressing HI/LO on the indicated value display screen, you can enter a HI/LO limit setting item select state.

Press **C** at the setting value you want to change, and you will go to a setting value input state.

After inputting the setting value, you will go back to the HI/LO limit setting item state.



3-3. Calling a setting mode

Example) For changing the digital filter (torque) from "000" to "256"



SETTING MODE CONFIGURATION

4 CALIBRATION PROCEDURE

4-1. How to perform calibration

"Calibration" refers to an operation whereby matching between the TM380 and a sensor is obtained. The TM380 uses the two calibration methods as described below.

Equivalent input calibration

Calibration is performed without an actual load by entering the rated output value (V) and the capacity (to be indicated) of the sensor by the keys. Calibration is easily performed when no actual load is available.

For example, gain will be automatically decided by registering the values as follows.

for UTMII-0.1Nm:	10.000V-0.100Nm
for UTMII-2Nm:	10.000V-2.000Nm
for UTF-500Nm:	10.000V-500.00Nm
for UTMI -0.1Nm:	5.000V-0.100Nm
for UTMI -2Nm:	5.000V-2.000Nm

Actual load calibration

This approach provides calibration by applying an actual load to the sensor and inputting the actual load value. This calibration is without little errors and more correct.

* Perform either actual load calibration or equivalent input calibration.

If an actual load cannot be applied, make sure to perform equivalent input calibration alone.

4-2. Procedure of equivalent input calibration and calibration protect (torque)

The equivalent input calibration and the calibration protect uses the following procedure :



★ : It is indispensable.

①Releasing the calibration protect

Turn off the calibration protect that inhibits calibration.

≪Setting value≫

- 0: OFF Enables rewriting of setting values.
- 1: ON Disables rewriting of setting values.

♦ Calibration protect setting method

1. Select setting mode 9.

Press	FNC	\rightarrow		seven times
-------	-----	---------------	--	-------------

2. Set "Calibration protect."



calibration protect blink.

Input the setting value with

(Initial value: 0)

Press 🛃 to validate it.

3. Press ESC twice to go back to the indicated value display.





2 Voltage input setting

Select according to the torque output (V) of torque sensor. Depending on selection, range of calibration & ±LOAD changes. After this setting, make sure to perform calibration. For UTF (option), "0 : 10V" is fixed.

or UTF (option), "0 : 10V" is fixed.

≪Setting value≫ 0: 10V (UTMⅢ/UTF) 1: 5V (UTMⅡ)

♦Voltage input setting method

1. Select setting mode 4.

Press $[FNC] \rightarrow [\blacktriangleright]$ three times.

2. Set "Voltage input" according to spec of torque sensor.

Press $\mathbb{R}_{\text{RCALL}}$ nine times. \Rightarrow "Voltage input select" is displayed.

Press \blacksquare , and present set value blinks. Input the setting value with \blacksquare \blacksquare

Press **V** to validate it. (Initial value: 0)





3. Press ESC twice to go back to the indicated value display.

③Unit (torque) setting

Set the unit for performing calibration.

After this setting, make sure to perform calibration.

≪Setting value≫ 00: mNm 01: Ncm 02: Nm 03: kNm 04: kgm 05: kgcm 06: gcm

(4) Decimal place (torque) setting

Set the decimal place for load-value-related display, setting items, etc.

≪Setting value≫ 0: None 1: 0.0 2: 0.00 3: 0.000

(5)Min. scale division (torque) setting (This step may be omitted if there is no change.)

Set the minimum unit (scale interval, scale division) of the torque.

≪Setting value≫ 0: 1 1: 2 2: 5 3: 10 4: 20 5: 50 6: 100

♦ How to set the unit, decimal place, and min. scale division of torque

- **1.** Select setting mode 4. Press $FNC \rightarrow \blacktriangleright$ three times.
- 2. Set "Unit," "Decimal place," and "Min. scale division" of torque.
 - Press $\boxed{\mathbb{R}}_{\text{RECALL}}$ once. \Rightarrow "Calibration function select 1" is displayed.

Press < , and the highest digit blinks.



- ② Select decimal place.
 Input the decimal place with
 Input the lower digit with
 Initial value: 2)
- ③ Select min. scale division.
 Input the min. scale division with scale division with scale, and validate it with scale. (Initial value: 0).



rpm Angle rad deg

HOLD

p

LO

Þ

Nm

o F

Speed

FЧ

Torque

HI

3. Press ESC twice to go back to the indicted value display.

Chapter

^{05:} kgcm (kgfcm)

^{06:} gcm (gfcm)
6 Zero calibration

Register the zero point with the sensor unloaded. Also, if there is any initial load, such as a jig, for measurements, the zero point can be registered with the initial load applied, but the signal input range needs to be considered as the initial load is subtracted from it.

In addition, there is a way of considering the initial load by using the digital offset. See "®Digital offset (This step may be omitted if there is no change.)" on page 30.

- UTMII, UTF

≪Setting value≫ -10.000 to +10.000 [V]

- UTM II

≪Setting value≫ -5.000 to +5.000 [V]

By performing zero calibration, the setting value of zero calibration becomes the sensor output value (V) of the time when it was executed. The load with which zero calibration was performed can be confirmed. However, it stays unchanged when an error occurs.

♦Zero calibration setting method

1. Select setting mode 4.

Press $|\mathsf{FNC}| \rightarrow |\mathsf{F}|$ three times.

2. Set "Zero calibration."

Press \bigvee_{RECALL} twice. \Rightarrow "Zero calibration" is displayed. Enter a setting value input state with , and the entire setting value blinks. (Initial value: 0.000)

Unload the sensor, check the current load value on the sub display (angle display side), and press

Speed	rpm	Angle	rad deg
FЧ		ļ7	oFF

Torque	ні	LO	HOLD	Nm
		ΓĤ	Ĥ	Ϋ́́
Speed	<i>. (</i>	rpm A	ngle rad	deg
F4.	7		<i>[</i>].	97

LO

HOLD

3. Zero calibration is executed.

A message as shown on the right-hand side is displayed. If zero calibration is not executed normally, the alarm sounds and an error is displayed.

4. Go back to the setting item select state.

If zero calibration is executed normally, you will go back to the setting item select state, and the output (V) of the time when it was performed will appear.



HI

The example shows that zero calibration was performed at 0.017V.

5. Press ESC twice to go back to the indicated value display.

(7)a.Equivalent input calibration

Check the specification of the sensor, and register the rated output value and the value you want to display at that time (rated capacity value).

Input the rated output value and display value (rated capacity value) successively.

Equivalent input calibration is not executed by simply inputting the rated output value.

- UTMII

≪Setting value≫	
Rated output value [V]:	-10.000 to 10.000 (except 0)
Display value (rated capacity):	-99999 to 99999 (except 0)
- UTM II	
≪Setting value≫	
Rated output value [V]:	-5.000 to 5.000 (except 0)
Display value (rated capacity):	-99999 to 99999 (except 0)

By performing equivalent input calibration, the setting value of actual load calibration becomes the input rated capacity value.

However, it stays unchanged when an error occurs.

ζ	Point
1	Set a display value (rated capacity value) converted according to the set unit and decimal place of torque.
	For unit conversion, see "4-7.Unit conversion table" on page 39.

♦ Equivalent input calibration setting method

- **1.** Select setting mode 4.
 - Press $FNC \rightarrow \blacktriangleright$ three times.
- **2.** Set "Rated output value" of the sensor.

Press $\mathbf{v}_{\text{RECALL}}$ three times. \Rightarrow "Equivalent input calibration" is displayed.

Enter a setting value input state with \checkmark , and the highest digit blinks.

Check the specification of the sensor in use, and input the

rated output value (V) with \bigwedge \bigvee_{RECALL} .

Move to the lower digits with \blacktriangleright . (Initial value: 10.000)

Press 🛃 to validate it.

3. Set "Rated capacity value."

Decide the load you want to display at the rated output

value, and input it with \square \square RECALL Move to the lower digits with \square

Press 🛃 to validate it.

* For inputting a negative sign, press +/-.







CALIBRATION PROCEDURE

4. Equivalent input calibration is executed.

A message as shown on the right-hand side is displayed. If equivalent input calibration is not executed normally, the alarm sounds.

5. If equivalent input calibration is executed normally, you will go back to the setting item select state.



Point

If the calibration error ($_{C}E_{rr}$) is displayed, take measures according to each error, and redo calibration. For details, see "12-7.Error/message list" on page 131.

After completion of calibration, make sure to turn on the calibration protect.

⑦b.Actual load calibration

Apply an actual load, and register the value of the actual load (rated capacity value).

≪Setting value≫ -99999 to 99999 (except 0)

By performing actual load calibration, the setting value of equivalent input calibration becomes the sensor output value (V) of the time when it was executed. The load with which actual load calibration was performed can be confirmed. However, it stays unchanged when an error occurs.

🔵 Point

Set a display value (rated capacity value) converted according to the set unit and decimal place of torque.

For unit conversion, see "4-7.Unit conversion table" on page 39.

Speed

♦Actual load calibration setting method

1. Select setting mode 4.

Press

it.

- FNC Press three times.
- **2.** Set "Actual load" of the sensor.



3. Actual load calibration is executed.

If actual load calibration is executed normally, a message as shown on the right-hand side is displayed.

If actual load calibration is not executed normally, the alarm sounds and an error is displayed.

4. If actual load calibration is executed normally, you will go back to the setting item select state.



rpm Angle rad deg



Torque	ні	LO	HOLD	Nm
		7!	5	P
Speed	r	pm 4	Angle rad	deg
FY	-{		<u>99</u>	97



Chapter

4

⑧Digital offset (This step may be omitted if there is no change.)

This function is to subtract a set value from the indicated value. This function is convenient when zero cannot be obtained with no load for some reason or for offsetting. When not using, set "0."

```
(Displayed value) = (Actual indicated value)-(Setting value of digital offset)
```

≪Setting value≫ -99999 to 99999

♦ Digital offset setting method

- **1.** Select setting mode 4.
 - Press $FNC \rightarrow \blacktriangleright$ three times.
- 2. Set "Digital offset." Press Free press → "Digital offset" is displayed. Press → and the highest digit blinks. Input the setting value with Free press Free press → (Initial value: 0) Validate it with →.
 * For inputting a negative sign, press +/-.



3. Press ESC twice to go back to the indicated value display.

Digital zero limit (This step may be omitted if there is no change.)

Set the load limit that allows digital zero.

If the absolute value of the load at which digital zero is about to be performed is larger than the setting value, an error will result, and the indicated value will not be zeroed.

≪Setting value≫ 0 to 99999

The amounts of digital zero obtained from the point where zero calibration was performed are monitored.

♦ Digital zero limit setting method

- 1. Select setting mode 4. Angle rad deg Speed rpm Press FNC ГЧ ► three times. 2. Set "Digital zero limit." LO HOLD HI Torque Nm Press $|\mathbf{v}_{\text{RECALL}}|$ six times. \Rightarrow "Digital zero limit" is displayed. rpm Angle rad deg Speed Press , and the highest digit blinks. <u>E 45</u> Input the setting value with Move to the lower digits with \blacktriangleright . (Initial value: 99999) Validate it with
- **3.** Press | ESC | twice to go back to the indicated value display.

DLocking the calibration protect

Turn on the calibration protect that inhibits calibration.

- \ll Setting value \gg
 - 0: OFF Enables rewriting of setting values.
 - 1: ON Disables rewriting of setting values.

♦ Calibration protect setting method

1. Select setting mode 9.

Press $FNC \rightarrow \blacktriangleright$ seven times.

2. Set "Calibration protect."

Press $|\mathbf{\nabla}_{\text{RECALL}}|$ once. \Rightarrow "Setting protect" is displayed.

Press \frown twice to make the digit of

the calibration protect blink.

Input the setting value with $| \mathbf{A} | |_{\mathsf{RECALL}}$. (Initial value: 0)

Press 🗸 to validate it.

3. Press ESC twice to go back to the indicated value display.







4-3. Rotation speed display settings

Make settings related to the display of rotation speed.

①Pulse rate (rotation speed) setting

Select the rate of a pulse input. Set the number of pulses per rotation.

When [4: Encoder pulse] is selected, the encoder pulse of the rotary encoder option is used for rotation speed calculation. (F7-2)

≪Setting value ≫ UTM (standard specification) 0: 1 pulse 1: 4 pulses 2: 60 pulses 4: Encoder pulse 5: 60 pulses (high speed)

UTF (option specification) 3: 90 pulses 6: 90 pulses (high speed)

Point

If "2: 60 pulses", "3: 90 pulses" is set, scale interval of rotation speed (high speed) will be higher than min. scale division. (At approx. 5000 rpm, scale interval is 1 rpm or more)

By selecting "5: 60 pulses (high speed)", "6: 90 pulses (high speed)", min. scale division can be displayed at high speed. However, reponse to rotation pulse input becomes slower and minimum input rotation speed becomes larger. (Aprrox. 20 rpm)

Chapter

4

2 Min. scale division (rotation speed) setting

Set the minimum unit (scale interval, scale division) of the rotation speed.

≪Setting	g value	≫		
0: 1	1: 2	2: 5	3: 10)
Durin	g low s	peed r	otation	mode
0: 0.1	1: 0	.2 2	: 0.5	3: 1.0

♦ How to set the pulse rate and min. scale division of rotation speed

1. Select setting mode 4. Speed Angle rad deg rpm FЧ Press FNC ► three times. 2. Set the "Pulse rate" and "Min. scale division" of LO HOLD HI Nm Torque rotation speed. Press seven times. \Rightarrow "Calibration function rad deg Speed rpm Angle select 2" is displayed. Press , and the highest digit blinks. 《Setting value》 ①Select pulse rate (rotation speed). 0 0 0 0 Undefined ▼ RECALL Input the pulse rate with , and move to Undefined the lower digit with ► (Initial value: 1) Undefined ②Select min. scale division (rotation speed). Min. scale division 0: 1 1: 2 2: 5 3: 10 (rotation speed) Input the min. scale division with and validate it with Ţ Pulse rate (rotation speed) (Initial value: 0) 0: 1 pulse 1: 4 pulses 2: 60 pulses **3.** Press | ESC | twice to go back to the indicated 3: 90 pulses (Fixed for UTF option) value display. 4: Encoder pulse

Low speed rotation mode

When meet requirements below, it changes to low speed rotation mode and is able to indicate the rotation speed down to one decimal place.

- Pulse rate (rotation speed) (F4-7)
- Encoder pulse (F7-2)

4: Encoder pulse Over 600 pulses

4-4. Rotation stop settings for rotation speed

■Minimum input rotation speed (Only for UTMII & UTMII)

Minimum input rotation speed that can be displayed is selectable.

Max. detection time of UTF/60 pulses (F4-7) is 1sec, with min rotation speed at 1rpm.

For encoder pulse (F4-7), min input rotation speed will be smallest in corresponding to max. detection time at 1 sec.

≪Setting	va	lue≫
----------	----	------

Pulse rate	Minimum input rotation speed (frequency)				
4 pulses	0: 15 rpm	1: 10 rpm	2: 5 rpm	3: 3 rpm	4: 2 rpm
1 pulse	0: 60 rpm	1: 40 rpm	2: 20 rpm	3: 12 rpm	4: 8 rpm
Max. detection time	1 sec	1.5 sec	3 sec	5 sec	7.5 sec

Example) When set at "2rpm"

Since waiting for pulse detection for the duration of maximum detection time is required when rotation stops suddenly from high speed state, the previous rotation speed is not updated; therefore, the display will become 0 rpm after the display of the rotation speed that was last detected has held for 7.5 seconds.



Rotation stop mode

Cut-off looks unclear when the rotation stops suddenly due to the constraint of maximum detection time corresponding to the minimum input rotation speed. For this reason, 0 rpm display can be forcibly set with "the cycle of the rotation speed last detected × a certain multiple".

≪Setting value≫

0: OFF (invalid)

After detection is waited for the duration of the maximum detection time corresponding to the minimum input rotation speed, the display becomes 0 rpm.

1: 2 times 2: 4 times 3: 8 times (valid)

If pulse is not detected from the cycle of the rotation speed last detected to the cycle of the set multiple, the display becomes 0 rpm forcibly.

Example) When stopped suddenly with the setting of "4 times"





Example) When decelerated suddenly with the setting of "4 times"

♦ How to set the rotation stop mode and minimum input rotation speed

1. Select setting mode 4.

Press $FNC \rightarrow \blacktriangleright$ three times.

2. Set "Rotation stop mode" and "Minimum input rotation speed".

Press $\underset{\text{RECALL}}{}$ eight times. \Rightarrow "Rotation stop settings" is displayed.

Press , and the highest digit blinks.

- Because the highest digit is undefined, move to the lower digit with .
- 2 Select rotation stop mode.
 Input the rotation stop mode with RECALL, and move to the lower digit with .

(Initial value: 0)

③ Select minimum input rotation speed.
 Input the minimum input rotation speed with

RECALL, and validate it with . (Initial value: 0).

3. Press ESC twice to go back to the indicated value display.



4-5. Settings/operations relevant to calibration of encoder (Only when encoder is used)

Calibration for the encoder uses the following procedure:



①Use of encoder

Select whether to use encoder or not. When not use, angle is indicated as 0.

> ≪Setting value≫ 0: Not use 1: Use

♦Use of encoder setting method

1. Select setting mode 7.



2. Set "Use of encoder."







3. Press **ESC** twice to go back to the indicated value display.

②Encoder pulse

Set the number of pulse input from the rotary encoder per a rotation.

≪Setting value≫ 1 to 9999

♦ Encoder pulse setting method

1. Select setting mode 7.



- 2. Set "Encoder pulse."
 - Press \bigvee_{RECALL} twice. \Rightarrow "Encoder pulse" is displayed.

Press , and the highest digit blinks.

Input the setting value with RECALL

Move to the lower digits with \blacktriangleright . (Initial value: 3600)

Validate it with



Torque	HI	LO	HOLD	Nm
	_	╡┟	5 🗍	
Speed	r	pm A	ngle rad	deg
F 7.2	Ĵ			

3. Press ESC twice to go back to the indicated value display.

③Unit (angle)

Set the unit of value to display.

≪Setting value≫ 0: deg 1: rad

♦Unit (angle) setting method

1. Select setting mode 7. Press $FNC \rightarrow \blacktriangleright$ six times.

- 2. Set "Unit (angle)."
 - Press $\mathbb{R}_{\text{RECALL}}$ three times. \Rightarrow "Unit (angle)" is displayed. Press $\mathbb{R}_{\text{RECALL}}$, and present set value blinks. Input the setting value with $\mathbb{R}_{\text{RECALL}}$.

1		Berning	 	U
(Ir	itial v	alue: 0)		





Torque	HI	LC) Но	OLD	Nm
					[]
Speed	r	pm	Angle	rad	deg
F 7.	3				

3. Press ESC twice to go back to the indicated value display.

rpm Angle rad deg

î

HOLD

Nm

Sneed

(4) Direction

Set the rotation direction of torque meter.

≪Setting value≫ 0 [.] NORMAI	Select this option when using the torque meter counterclockwise
0.1101110712	Select this option when using the torque meter counterclockwise
	viewing from the drive side.
1: REVERSE	Select this option when using the torque meter clockwise viewing
	from the drive side.

♦ Direction setting method

- **1.** Select setting mode 7.
- F $\operatorname{Press} \mid \mathsf{FNC} \mid \rightarrow$ six times. 2. Set "Direction." LO HI Torque Press $|_{\text{RECALL}}$ four times. \Rightarrow "Direction" is displayed. Press , and present set value blinks. Speed rpm Angle rad deg RECALL Input the setting value with Ľ 74 (Initial value: 0) Validate it with
- **3.** Press ESC twice to go back to the indicated value display.

(5)Minimum scale (angle) (This step may be omitted if there is no change.)

Set the minimum unit of rotary encoder such as scale interval and scale division.

≪Setting value≫ - When the unit (angle) is [0: deg] 2: 0.5 3: 1 0:0.1 1: 0.2 4: 2 5:5 6:10 7:20 8:50 9:100 - When the unit (angle) is [1: rad] 4: 0.02 5: 0.05 3: 0.01 6: 0.1 7:0.2 8:0.5 9:1

♦ Minimum scale (angle) setting method

1. Select setting mode 7.

Press FNC

(Initial value: 3) Validate it with



Press	RECALL	five times.	\Rightarrow	"Mir	nimum	scale (angle)" i	s
displa	yed.							
Press	₹7,	and presen	t set	value	e blinks			
Input	the set	ting value w	vith [RECALL			

six times.



Speed F 7 rpm Angle rad deg

1

X

3. Press ESC twice to go back to the indicated value display.

⑥Zero clear (This step may be omitted if there is no change.)

Set the timing to reset the angle display to zero.

When reached to the specified number of rotations, it goes back to zero.

- ≪Setting value≫
 - When the unit (angle) is [0: deg]
 - 1 to 55 (It becomes 1 to 5 when the minimum scale is 0.1 to 0.5.)
 - When the unit (angle) is [1: rad]

1 to 31

1. Select setting mode 7.

Press $|\mathsf{FNC}| \rightarrow |\mathsf{FNC}|$ six times.

2. Set "Zero clear."

Press $|\mathbf{v}_{\text{RECALL}}|$ six times. \Rightarrow "Zero clear" is displayed.

Press , and the highest digit blinks.

Input the setting value with \mathbf{A} \mathbf{RECALL} .

Move to the lower digits with \blacktriangleright . (Initial value: 55)

Validate it with

Speed	rpm	Angle	rad	deg
F7		P	٥	FF

Torque	HI	LO	HOLD	Nm
				5
Speed	I	pm A	ngle rad	deg
F7.	5			

3. Press ESC twice to go back to the indicated value display.

4-6. Unit seal

For torque, affix a seal according to the unit at which calibration has been performed. Rotation speed does not matter either way.



4-7. Unit conversion table

Refer to the table for calibration of torque and unit setting. After the unit is changed, make sure to affix the attached unit seal.

	mNm	Ncm	Nm	kNm	kgm	kgcm	gcm
mNm	1	0.1	10 ⁻³	10 ⁻⁶	1.0197×10 ⁻⁴	1.0197×10 ⁻²	10.197
Ncm	10	1	10 ⁻²	10 ⁻⁵	1.0197×10 ⁻³	0.10197	1.0197×10^{2}
Nm	10 ³	10 ²	1	10 ⁻³	0.10197	10.197	1.0197×10^4
kNm	10^{6}	10 ⁵	10^{3}	1	1.0197×10^{2}	1.0197×10^{4}	1.0197×10^{7}
kgm	9.8067×10 ³	9.8067×10^2	9.8067	9.8067×10 ⁻³	1	10^{2}	10 ⁵
kgcm	98.067	9.8067	9.8067×10 ⁻²	9.8067×10 ⁻⁵	10 ⁻²	1	10 ³
gcm	9.8067×10 ⁻²	9.8067×10 ⁻³	9.8067×10 ⁻⁵	9.8067×10 ⁻⁸	10 ⁻⁵	10 ⁻³	1

■Torque unit conversion table

5 EXPLANATION OF INDICATED-VALUE-RELATED FUNCTIONS

5-1. About each indicated value

Torque

Analog signal (±10V) from the UTMIII and UTF is displayed as torque.

Rotation speed

Pulse signal from the UTMII, UTF and UTMII is displayed as rotation speed.

Angle

Indicate pulse signal from UTF or optional rotary encoder of UTMII and UTM II as an angle.

5-2. Digital low-pass filter

This is a low-pass filter for filtering input signals from the sensor, and canceling unwanted noise components (a filter that passes only the signals with a specific frequency or less, and attenuates signals with higher frequencies). With an increase in the cut-off frequency, the response becomes faster, but noise components may be displayed.

≪Setting value≫ 3 to 1k, PASS [Hz]

■Digital low-pass filter (torque) setting method

- **1.** Select setting mode 3.
 - Press $FNC \rightarrow \blacktriangleright$ twice.
- **2.** Set "Digital low-pass filter (torque)."
 - Press $\mathbb{R}_{\text{RECALL}}$ twice. \Rightarrow "Digital low-pass filter (torque)" is displayed.

Press 🤁 , and the highest digit blinks.

Input the setting value with |

Move to the lower digits with \blacktriangleright . (Initial value: 0300)

Validate it with





3. Press ESC twice to go back to the indicated value display.

) Point

You can only choose either digital low-pass filter or digital high-pass filter. If digital low-pass filter is selected at (3 to 1k [Hz]), digital hi-pass filter (F3-8) will be set as 0 (PASS).

5-3. Digital hi-pass filter

This is a high-pass filter for filtering input signals from the sensor, and canceling unwanted noise components (a filter that passes only the signals with a specific frequency or more, and attenuates signals with lower frequencies). This is convenient when you want to remove DC components and low frequency signals.

≪Setting value≫ 3 to 1k, PASS [Hz]

Digital hi-pass filter (torque) setting method

- **1.** Select setting mode 3.
 - Press $FNC \rightarrow \blacktriangleright$ twice.
- **2.** Set "Digital hi-pass filter (torque)."



Input the setting value with $\bigwedge_{\text{RECALL}}$

Move to the lower digits with \blacktriangleright . (Initial value: 0000)

3. Press ESC twice to go back to the indicated value display.

You can only choose either digital low-pass filter or digital high-pass filter.

If digital high-pass filter is working, below functions are not usable.

If you want to use digital high-pass filter, at digital low-pass filter (F3-2) set 0

Validate it with

Point

(PASS).

Digital zero
Digital zero reset
Digital low-pass filter

- Zero tracking





Chapter

5

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5-4. Digital filter

The digital filter is a function for reducing fluctuations of the indicated value by means of a moving average of data converted. With an increase in the number of filterings, the indicated value becomes more stable, but the response to inputs becomes slower. It can be set for each of the torque, the rotation speed and angle.



Digital filter (torque) setting method

1. Select setting mode 3. rpm Angle rad deg Speed Press $|\mathsf{FNC}| \rightarrow |\mathsf{F}|$ twice. EB \mathbf{p} **2.** Set "Digital filter (torque)." LO HOLD ΗΙ Torque Nm Press $|\mathbf{\nabla}_{\mathsf{RECALL}}|$ once. \Rightarrow "Digital filter (torque)" is displayed. Press , and the highest digit blinks. rpm Angle rad deg Speed Input the setting value with FZ ! (Initial value: 030) Press 🛃 to validate it. **3.** Press | ESC | twice to go back to the indicated value display. * Digital filter for rotation speed is F3-4. * Digital filter for angle is F3-7.

5-5. Dead band

With respect to torque, the display is forcedly zeroed in a certain range by this function. Use this function when you do not want to display minute changes, such as microvibration, near zero.

≪Setting value≫ 0 to 9999

Dead band setting method

- 1. Select setting mode 3.
 - Press $|\mathsf{FNC}| \rightarrow | \blacktriangleright$ twice.
- 2. Set "Dead band."
 - Press RECALL three times. \Rightarrow "Dead band" is displayed. Press recall, and the highest digit blinks.

Input the setting value with RECALL. Move to the lower digits with . (Initial value: 0000) Validate it with .



3. Press | ESC | twice to go back to the indicated value display.

5-6. Digital zero

This function is to zero the indicated value.

Digital zero / Digital zero reset by means of keys

With respect to torque, digital zero can be executed. Digital zero reset can also be executed.

1. Press ZERO on the normal measurement screen.





Press < once to zero the indicated value.

Press **b** once to perform digital zero reset of the indicated value.

Press ESC once to cancel the state for execute-wait and

go back to the indicated value display state.



Point

- When digital zero is performed, if the difference from the zero calibration point exceeds the digital zero limit, the digital zero limit error ($d \neq E r r$) will result. Also, only the digital zero limit is subtracted.
- If the digital offset is set, even if digital zero is executed, zero will not result. (Indicated value = -Setting value of digital offset)
- When digital zero reset is performed, the condition previous to correction by digital zero is restored.

■Digital zero by means of the external signal "D/Z input"

The instant when D/Z and COM2 of the external input/output connector are short-circuited from an open state (ON edge), digital zero functions to zero torque.



5-7. Zero clear (Angle)

1. Press

screen.

This function changes the indicated value of angle to zero.



2. The display becomes as shown on the right-hand side, and execution is waited.

once to zero the indicated value. Press

Press | ESC | once to cancel the state for execute-wait and go back to the indicated value display state.

Zero clear (angle) by means of the external signal "zero clear (angle) input"

The instant when zero clear (angle) and COM2 of the external input/output connector are shortcircuited from an open state (ON edge), zero clear (angle) functions to zero angle.

Zero clear (angle) ON



5-8. Motion detect

Set the parameters to detect stability of torque.

If the difference between the current indicated value and the 50-msec-previously indicated value becomes less than the set count and that condition continues for more than the set time, the indicated value is regarded as stable.

≪Setting value≫

Motion detect (time)	0.0 to 9.9 [second]
Motion detect (range)	000 to 999 [count]

Point

When the time is 0.0 sec. and the width is 000 markings, stable is not detected. Stability detection by motion detect is closely related to the SI/F print (stable value) function and comparison timing. For details, see "6-4.Comparison timing" on page 53 and "■SI/F print" on page 69.

Setting example

```
Motion detect (time)0.4 sec.Motion detect (range)010
```



When the condition of dn \leq set count (010) continues for the set time (0.4 sec.) or more (d1 \leq 10, and d2 \leq 10, and ..., and d8 \leq 10), the indicated value is regarded as stable.

Motion detect setting method



5-9. Zero tracking

This function is to automatically track and correct gradual changes in the zero point due to drifts (phenomenon in which outputs fluctuate slowly due to temperature change or change with time), etc.

≪Setting value≫	
Zero tracking (time) 0.0 to 9.9 [second]	
Zero tracking (range) 000 to 999 [count]	
Zero Tracking setting method	
1. Select setting mode 2.	Speed rom Angle rad deg
Press $FNC \rightarrow \blacktriangleright$ once.	F2 P oFF
2. Set "Zero tracking (time)."	Torque HI LO HOLD Nm
Press $\mathbb{R}_{\text{RECALL}}$ three times. \Rightarrow "Zero tracking (time) displayed.)" is
Press 🛃 , and the highest digit blinks.	Speed rpm Angle rad deg
Input the setting value with \square \mathbb{RECALL} .	F 2.3
Move to the lower digits with • . (Initial value	: 0.0)
Press 🛃 to validate it.	
3. Set "Zero tracking (range)."	
Press $\mathbb{R}_{\text{RECALL}}$ once. \Rightarrow "Zero tracking (range)" is	Iorque Nill
displayed.	
Press , and the highest digit blinks.	Speed rpm Angle rad deg
Input the setting value with $\begin{bmatrix} \bullet \\ RECALL \end{bmatrix}$.	F 2.9
Move to the lower digits with \blacktriangleright . (Initial value	: 000)
Press 💙 to validate it.	
. —	

4. Press ESC twice to go back to the indicated value display.

Point

- When displacement of the zero point is within the set count of tracking and it continues more than the set time, it is automatically made zero by zero tracking function.
- The time (tracking delay) is set in the range of 0.1 9.9 sec., and the band (tracking band) is set in the range of 001 to 999.

If the time is set at 0.0 sec. and the band at 000, the zero tracking function does not work.



- Zero tracking is equal to digital zero functioning automatically. Therefore, the digital zero limit is also monitored.
- Zero tracking does not function if the indicated value has already exceeded the tracking band.

5-10. Display frequency

Set the per-second display update frequency of the indicated value. However, the A/D conversion speed does not change.



Display frequency setting method

1. Select setting mode 2.



3. Press | ESC | twice to go back to the indicated value display.

Chapter 5

HOLD

Nm

5-11. Display ON/OFF

The display of rotation speed and angle can be turned ON/OFF by this function. Torque is always displayed.

Also, internal computation is not stopped.

Display ON/OFF setting method



5-12. Absolute value display select

This setting allows judgement according to torque absolute value display. Use this setting if you want judge in situation where torque value is always + sign in left or right rotation.

```
≪Setting value≫
  0: Not valid
                 1: Valid (marked)
                                      2: Valid (Without mark)
```

Absolute value display select setting method

1. Select setting mode 2.



2. Set "Absolute value display select."

Press $|\mathbf{v}|$ eight times \Rightarrow "Absolute value display select" is displayed.



Press C to validate it. (Initial value: 0)



Undefined

Nm

3. Press ESC | twice to go back to the indicated value display.

Point

After judgement of absolute value, select "1: Valid (marked)" if you want to know whether the current torque is positive or negative.

The mark is displayed for current torque only, as it does not link with hold value. If reading is minus, "_" is shown instead of "-".

If absolute value is selected at B2 output selection, it will turn ON based on 2 conditions: (1) Value is minus (2) "1: Valid (marked)" is selected.

For details, see "■Timing output" on page 54.

6 EXPLANATION OF COMPARISON FUNCTIONS

6-1. HI/LO limit comparison

Set the HI/LO limit of torque and rotation speed. (Hold synchronized)

≪Setting value≫

- Torque
 - HI limit/LO limit: -99999 to 99999
- Rotation speed
 - HI limit/LO limit: 0 to 99999 (During low speed rotation mode: 0 to 9999.9)

<HI/OK/LO output conditions>

- HI Indicated value > HI limit
- LO Indicated value < LO limit
- OK LO limit \leq Indicated value \leq HI limit

O Point

With ±LOAD, OFL1, or OFL2 on torque, torque HI, LO is forcedly turned on. With OFL2 on rotation speed, rotation speed HI, LO is forcedly turned on.

Overload of the torque and rotation speed is monitored. (Hold not synchronized) When they exceed the alarm HI limit or fall below the alarm LO limit, the external output "ALM" turns ON.

≪Setting value≫	
- Torque	
Alarm HI limit:	-99999 to 99999 (invalid at 99999 (initial value))
Alarm LO limit:	-99999 to 99999 (invalid at -99999 (initial value))
- Rotation speed	
Alarm HI limit:	0 to 99999 (invalid at 99999 (initial value))
	(During low speed rotation mode: 0 to 9999.9)
Alarm LO limit:	0 to 99999 (invalid at 0 (initial value))
	(During low speed rotation mode: 0 to 9999.9)

- For initial value, since both the alarm HI and LO limits are invalid as default settings, set them again for use.
- Since the alarm HI limit and LO limit are independent, simple use of either one of them is also possible.

HI/LO limit setting method

See " \ll HI/LO limit setting mode function \gg " on page 20.

Alarm HI and LO limits setting method

See " \ll HI/LO limit setting mode function \gg " on page 20.

6-2. Hysteresis

This function is to allow a margin for timing at which HI/LO of the HI/LO limit comparison is turned off. Normally, HI is turned on when the indicated value exceeds the HI limit and is turned off when the indicated value falls below it. However, by setting the hysteresis, HI is turned off when the indicated value falls below the HI limit further lowered by the hysteresis value. This function is effective to prevent chattering (phenomenon in which signals repeat turning on/off immediately after switching of relay contacts and switch contacts) in such a case where signals fluctuate (vibrate) subtly.

≪Setting value≫

Hysteresis range: 0 to 9999 (During low speed rotation mode: 0 to 999.9)

<hi lo<="" th=""><th>output</th><th>conditions</th><th>></th></hi>	output	conditions	>
<	output	oomanaomo	-

- HI	
ON conditions	Indicated value > HI limit
OFF conditions	Indicated value \leq (HI limit setting value – Hysteresis setting value)

- LO	
ON conditions	Indicated value $<$ LO limit
OFF conditions	Indicated value \geq (LO limit setting value – Hysteresis setting value)





Torque and rotation speed can be set to HI/LO limit comparison, respectively. However, this does not apply to timing output and alarm HI and LO limits.



For details, see "6-4.Comparison timing" on page 53, and "■SI/F print" on page 69.





Chapter

6

6-4. Comparison timing

Set the operating conditions of HI/LO limit comparison (Torque). Select the conditions from the following.

0: All time	HI/LO limit comparison is always performed.
1: Stable	When stable, HI/LO limit comparison is performed.
2: Near zero OFF	HI/LO limit comparison is performed when
	Near zero is off.
3: Stable and Near zero OFF	When stable and near zero is off, HI/LO limit
	comparison is performed.
4: Hold	HI/LO limit comparison is performed when a hold is
	decided.

Set the operating conditions of HI/LO limit comparison (Rotation speed). Select the conditions from the following.

0: All time	HI/LO limit comparison is always performed.
1: Torque synchronized	HI/LO limit comparison is performed at the same timing
	as that of the torque comparison timing.

■Comparison timing (Torque), Comparison timing (Rotation speed), B2 output selection setting method

1. Select setting mode1.

Press FNC once.

F Ŭ Ū 2. Set "Comparison timing (Torque), Comparison HOLD н LO Torque timing (Rotation speed), B2 output selection." once. \Rightarrow "Comparison function select"

Speed

Speed

«Setting value»

is displayed.

Press RECALL

►

Press , and the highest digit blinks.

① Set "Comparison timing (Torque)."

Input the comparison timing (torque) with RECALL, and move to the lower digit with (Initial value: 0)

② Set "Comparison timing (Rotation speed)."

Input the comparison timing (rotation speed) with and move to the lower digit with



③ Set "B2 output selection."

(Initial value: 1)

Input the B2 output selection with (Initial value: 0)

Press to validate it.

3. Press ESC twice to go back to the indicated value display.

Chapter 6

Angle rad deg

Angle rad deg

1: Absolute value output

B2 output selection 0: Timing output

Nm

rpm

rpm

) Point

B2 output can be either timing output or absolute value output. Refer to "5-12.Absolute value display select" on page 48 for absolute value display select.

■ Timing output

Outputs a signal in synchronization with current torque value.

- ON: Torque timing output LO limit \leq Torque \leq Torque timing output HI limit
- OFF : Torque < Torque timing output LO limit Torque > Torque timing output HI limit

Torque timing output HI limit: -99999 to 99999 Torque timing output LO limit: -99999 to 99999

1. Select setting mode1.

Press FNC once.

2. Set "Torque timing output HI limit."

Press $\mathbb{P}_{\text{RECALL}}$ five times. \Rightarrow "Torque timing output HI limit" is displayed.

Press , and the highest digit blinks.

Input the setting value with \blacktriangle

Move to the lower digits with **•** . (Initial value: 99999)

Press 🛃 to validate it.

3. Set "Torque timing output LO limit."

Press \Pr_{RECALL} once. \Rightarrow "Torque timing output LO limit" is displayed.

- Press 🤍 , and the highest digit blinks.
- Input the setting value with $A = \begin{bmatrix} \mathbf{v} \\ \mathbf{F} \end{bmatrix}$

Move to the lower digits with . (Initial value: -99999)

Press 🛃 to validate it.

Press ESC twice to go back to the indicated value display.

Speed	rpm	Angle	rad	deg
F I		P	<u>a</u> i	F F





Chapter

6

7 EXPLANATION OF HOLD FUNCTIONS

7-1. Hold functions of torque

The hold functions are to take out a specific point of torque for HI/LO limit comparison. Here, the operation of each hold will be described in detail.

Hold mode	Hold section		
0: OFF	None		
1: Sample	0: All section 1: External signal		
2: Peak			
3: Bottom	0: All section 1: External signal 2: External signal+Time 3: Level+Time		
4: P-P			
5: Average			
6: Peak (angle)			
6: Peak (angle + torque)			

Flow of hold measurement

- **1.** Select a hold you want to use.
- **2.** If the hold has the setting of section, set a section you want to use. For details, see "7-3.Setting of hold section" on page 61.
- **3.** Set the special setting value required for the hold used.
- **4.** After confirmation of wiring, perform hold control by external input etc., and start measurement.

7-2. Setting of hold mode

■Hold mode setting method

- **1.** Select setting mode 1. Press FNC once.
- 2. Set "Hold mode."

Press $\mathbb{R}_{\text{RECALL}}$ seven times \Rightarrow "Hold function select " is displayed.

Press 🕗 , and the highest digit blinks.

Move to the lower digits with \blacktriangleright . Input the setting value with \land RECALL

Input the setting value with [] R(Initial value: 0)

Validate it with

3. Press ESC twice to go back to the indicated value display.



■Sample hold

The start point of the specified section is held. The section is specified by the setting of "all section" or "external signal."

(Example) All section sample hold



t1: A delay time between the instant when the T/H signal is inputted and the instant when the indicated value

is held

Approximately 1.0ms (MAX.)

t2: A delay time between the instant when the T/H signal is released and the instant when the indicated value

returns to tracking Approximately 1.0ms (MAX.)

t3: A minimum reset signal width required for releasing the hold Approximately 1.0ms (MIN.)

Peak hold

The maximum value in the positive direction (peak value) of the specified section is held. The section is specified by the setting of "all section", "external signal", "external signal+time", or "level+time".

(Example) Externally specified section peak hold



- t1: A delay time between the instant when the SECTION signal is inputted and the instant when the value to be held is detected Approximately 1.0ms (MAX.)
- t2: A delay time between the instant when the SECTION signal is released and the instant when the value to be held is determined Approximately 1.0ms (MAX.)
- t3: A minimum reset signal width required for releasing the hold Approximately 1.0ms (MIN.)

■Bottom hold

The maximum value in the negative direction (bottom value) of the specified section is held. The section is specified by the setting of "all section", "external signal", "external signal+time", or "level+time".

(Example) All section Bottom hold



- t1: A delay time between the instant when the T/H signal is inputted and the instant when the indicated value is held Approximately 1.0ms (MAX.)
- t2: A delay time between the instant when the T/H signal is released and the instant when the indicated value returns to tracking

Approximately 1.0ms (MAX.)

- t3: A minimum reset signal width required for releasing the hold Approximately 1.0ms (MIN.)
- Note: During the undetermined section, the judging output varies with fluctuations in the input waveform. However, the H/E output remains on during the undetermined Section. Read the judging result when the indicated value becomes stable (immediately before the T/H signal rises).

■Peak-to-Peak (P-P) hold

The difference value between the peak and valley over the specified section is held. The section is specified by the setting of "all section", "external signal", "external signal+time", or "level+time".

(Example) All section Peak-to-Peak (P-P) hold



t1: A delay time between the instant when the T/H signal is inputted and the instant when the indicated value is held

Approximately 1.0ms (MAX.)

- t2: A delay time between the instant when the T/H signal is released and the instant when the indicated value returns to tracking Approximately 1.0ms (MAX.)
- t3: A minimum reset signal width required for releasing the hold Approximately 1.0ms (MIN.)
- Note: During the undetermined section, the judging output varies with fluctuations in the input waveform. However, the H/E output remains on during the undetermined section. Read the judging result when the indicated value becomes stable (immediately before the T/H signal rises).

Average hold

The average of the sampling values over the specified section is calculated and updated, and then held.

The section is specified by the setting of "all section", "external signal", "external signal+time", or "level+time".

(Example) Externally specified section average value hold



- t1: A delay time between the instant when the SECTION signal is inputted and the instant when the value to be held is detected Approximately 1.0ms (MAX.)
- t2: A delay time between the instant when the SECTION signal is released and the instant when the value to be held is determined Approximately 1.0ms (MAX.)
- t3: A minimum reset signal width required for releasing the hold Approximately 1.0ms (MIN.)

) Point

Detection time for maximum average value in average value hold

Although the detection section is specified by the SECTION signal, etc., detection cannot be carried out exceeding the maximum average value detection time. If the maximum average value detection time is exceeded, detection ends automatically, when the average value is held.

■Peak hold (angle)

In specified section, holds the max. value (peak value) of angle in positive direction.

At angle hold point, torque and rotation speed will also be hold.

The section is specified by the setting of "all section", "external signal", "external signal+time", or "level+time".

(Example) Externally specified section peak hold (angle)



- t1: A delay time between the instant when the SECTION signal is inputted and the instant when the value to be held is detected Approximately 1.0ms (MAX.)
- t2: A delay time between the instant when the SECTION signal is released and the instant when the value to be held is determined Approximately 1.0ms (MAX.)
- t3: A minimum reset signal width required for releasing the hold Approximately 1.0ms (MIN.)

Peak hold (angle + torque)

In specified section, holds the max. value (peak value) of torque in positive direction and max. value (peak value) of angle in positive direction.

The section is specified by the setting of "all section", "external signal", "external signal+time", or "level+time".





- t1: A delay time between the instant when the SECTION signal is inputted and the instant when the value to be held is detected Approximately 1.0ms (MAX.)
- t2: A delay time between the instant when the SECTION signal is released and the instant when the value to be held is determined Approximately 1.0ms (MAX.)
- t3: A minimum reset signal width required for releasing the hold Approximately 1.0ms (MIN.)



When a hold is used, rotation speed and angle is also held. The hold value is as follows:

- < Sample/ Peak/ Bottom > Hold at the hold point of torque
- < P-P/ Average >
 - Hold at the end point of section
- < Peak (angle) >

Holds max. value (peak value) of angle in positive direction.

< Peak (angle + torque) >

Rrotation speed: Holds max. value (peak value) of torque in positive direction.Angle: Holds max. value (peak value) of angle in positive direction.





All section

By this method, the hold detection section is specified by the T/H signal. Detection starts with the T/H signal ON to perform each hold operation. Control is performed simply by the T/H signal without using the SECTION signal.

Therefore, there are tracking sections and detection sections, but there are no hold deciding sections.

(Example) All section peak hold



t1: A delay time between the instant when the T/H signal is inputted and the instant when the indicated value is held

Approximately 1.0ms (MAX.)

- t2: A delay time between the instant when the T/H signal is released and the instant when the indicated value returns to tracking
 - Approximately 1.0ms (MAX.)
- t3: A minimum reset signal width required for releasing the hold Approximately 1.0ms (MIN.)
- Note: During the undetermined sections, the judging output varies with fluctuations in the input waveform. However, the H/E output remains on during the undetermined ections. Read the judging result when the indicated value becomes stable (immediately before the T/H signal rises).

EXPLANATION OF HOLD FUNCTIONS
External signal

By this method, the hold detection section is specified by the SECTION signal. Detection starts with the SECTION signal ON, and ends with the SECTION signal OFF to perform each hold operation.

The hold value is maintained until the hold reset signal is turned on.

The hold is released by turning on the T/H signal as a reset signal.

There are tracking sections, detection sections, and hold deciding sections.

(Example) Externally specified section peak hold



- t1: A delay time between the instant when the SECTION signal is inputted and the instant when the value to be held is detected Approximately 1.0ms (MAX.)
- t2: A delay time between the instant when the SECTION signal is released and the instant when the value to be held is determined Approximately 1.0ms (MAX.)
- t3: A minimum reset signal width required for releasing the hold Approximately 1.0ms (MIN.)

By turning on the SECTION signal again without turning on the T/H signal while the hold is decided, the hold is released and re-detection is started. For details, see "7-4.Auto reset function" on page 65.

■External signal + time

By this method, the hold detection section is specified as a timer. Detection starts with the SECTION signal ON, and ends when the set time (detection time) has elapsed.

The hold value is maintained until the hold reset signal is turned on.

The hold is released by turning on the T/H signal as a reset signal.

There are tracking sections, detection sections, and hold deciding sections.

(Example) External signal + Time specified section peak hold



t1: A minimum SECTION signal width

required for beginning detection Approximately 1.0ms (MAX.)

- t2: A delay time between the instant when the detection time is ended and the instant when the value to be held is determined Approximately 1.0ms (MAX.)
- t3: A minimum reset signal width required for releasing the hold Approximately 1.0ms (MIN.)

By turning on the SECTION signal again without turning on the T/H signal while the hold is decided, the hold is released and re-detection is started.

For details, see "7-4. Auto reset function" on page 65.

Detection time

Set the hold detection time.

Setting value》
0.01 to 9.99 [sec.]

♦ Detection time setting method

1. Select setting mode 1.



2. Set "Detection time."

Press recall eight times \Rightarrow "Detection time" is displayed. Press recall, and the highest digit blinks. Move to the lower digits with ightharpoondown. (Initial value: 1.00) Input the setting value with ightharpoondown.Press ightharpoondown.Press ightharpoondown.





3. Press | ESC | twice to go back to the indicated value display.

Level + time

By this method, the hold detection section is specified as a timer. Hold is detected during the predetermined time (hold section time) from the point in time when the torque crosses the hold start level.

The hold value is maintained until the hold reset signal is turned on.

The hold is released by turning on the T/H signal as a reset signal.

There are tracking sections, detection sections, and hold deciding sections.

(Example) Level + Time specified section peak hold



- t1: A delay time between the instant when the indicated value exceeds the hold start level and the instant when the value to be held is detected Approximately 0.5ms (MAX.)
- t2: A delay time between the instant when the detection time is ended and the instant when the value to be held is determined Approximately 1.0ms (MAX.)
- t3: A minimum reset signal width required for releasing the hold Approximately 1.0ms (MIN.)

■Hold start level

Set the start level in the case where the Section setting is Level + Time for Peak, Valley, P-P, Average, or Angle peak hold.

«Setting value»
-99999 to 99999

♦ Hold start level setting method

1. Select setting mode 1.

Press FNC once.

2. Set "Hold start level."

Press \bigvee_{RECALL} nine times \Rightarrow "Hold start level" is displayed.

Press 🔁 , and the highest digit blinks.

Move to the lower digits with ► . (Initial value: 100)

Input the setting value with Press **C** to validate it.

Speed rpm Angle rad deg F I P O F F Torque HI LO HOLD Nm



3. Press ESC twice to go back to the indicated value display.

Chapter

7

7-4. Auto reset function

It is factory-set that each hold is automatically reset at the start of the detection section, and therefore, simple control can be performed by one signal without releasing the hold.



Example) Auto reset in externally specified section peak hold

However, when the auto reset functions, if the signal causes chattering, the point that should be taken originally may deviate. Switching is provided so as to prevent the next detection from being performed until the T/H signal is turned on even if the SECTION signal is turned on again.

《Setting value》

- 0: OFF After a hold is decided, the next detection is not started until the T/H signal is turned on even if the SECTION signal is turned on.
- 1: ON After a hold is decided, the next detection is started when the SECTION signal is turned on again even if the T/H signal is not turned on. This is the initial setting (factory default setting).



EXPLANATION OF HOLD FUNCTIONS

■Auto reset setting method



7-5. B8 OFF detect wait

Hold is controlled by the T/H signal alone, detection/hold section is assured during the set waiting time. This is convenient for ignoring chattering parts.

The timer functions so as to also ignore chattering when the OFF edge is detected.

《Setting value》 0.00 to 9.99 [sec.]

■B8 OFF detect wait

1. Select setting mode 3.

Press $[FNC] \rightarrow [FNC]$ twice.

2. Set "B8 OFF detect wait."

Press $\mathbb{R}_{\text{RECALL}}$ five times \Rightarrow "B8 OFF detect wait" is displayed.

Press \blacksquare , and the highest digit blinks. Input the setting value with \blacksquare \blacksquare .

Move to the lower digits with \blacktriangleright . (Initial value: 0.01)

Press 🛃 to validate it.





3. Press ESC twice to go back to the indicated value display.

7-6. B9 OFF detect wait

In hold controlled by the T/H signal alone, detection/hold section is assured during the set waiting time. This is convenient for ignoring chattering parts.

The timer functions so as to also ignore chattering when the OFF edge is detected.

&Setting value & 0.00 to 9.99 [sec.]

■B9 OFF detect wait

1. Select setting mode 3.

Press $[FNC] \rightarrow [\blacktriangleright]$ twice.

- 2. Set "B9 OFF detect wait."
 - Press $\boxed{\mathbb{RECALL}}$ six times \Rightarrow "B9 OFF detect wait" is displayed.

Press , and the highest digit blinks.

Input the setting value with \square RECALL. Move to the lower digits with \square . (Initial value: 0.01)

Press 🛃 to validate it.





3. Press [ESC] twice to go back to the indicated value display.

Example) Sample hold



When the waiting time is 0.00 sec.



Chapter 7

8 STANDARD INTERFACE

8-1. External I/O

Connector pin assignment

A1		COM1	B1		COM1
A2	OUT	ALM HI (Torque)	B2	OUT	Timing output/ Absolute value output
A3	OUT	HI (Torque)	B3	OUT	H/E
A4	OUT	OK (Torque)	B4	OUT	ALM HI (Rotation speed)
A5	OUT	LO (Torque)	B5	OUT	ALM LO (Rotation speed)
A6	OUT	ALM LO (Torque)	B6	OUT	RUN
A7		COM1 (Torque)	B7		COM2
A8	OUT	HI (Rotation speed)	B8	IN	SECTION
A9	OUT	OK (Rotation speed)	B9	IN	T/H
A10	OUT	LO (Rotation speed)	B10	IN	Zero clear (Angle)
A11	OUT	SI/F	B11	IN	DZ
A12	OUT	SI/F	B12	IN	CLEAR

Compatible connector: Connector cover:

FCN-361J024-AU (manufactured by FUJITSU COMPONENT or equivalent) FCN-360C024-B (manufactured by FUJITSU COMPONENT or equivalent) (connector & cover optional type: CN50)

■About outputs

A1, A7, B1	Common for external output signals.	\rightarrow " External I/O connection " on page 14	
A2	Outputs the alarm HI limit signal of torque.		
A3	Outputs the HI limit signal of torque.		
A4Outputs the OK signal of torque.A5Outputs the LO limit signal of torque.			
		\rightarrow "6.EXPLANATION OF COMPARISON	
A6 Outputs the alarm LO limit signal of torque.		FUNCTIONS " on page 50	
A8 Outputs the HI limit signal of rotation speed.			
A9 Outputs the OK signal of rotation speed.			
A10	Outputs the LO limit signal of rotation speed.		
B2	Output signal varies. Choose either timing output or absolute value output.	 →"5-12.Absolute value display select " on page 48 "■Timing output " on page 54 	
B3	Outputs the hold complete signal.	→"7.EXPLANATION OF HOLD FUNCTIONS " on page 55	
B4 Outputs the alarm HI limit signal of rotation speed.		\rightarrow "6.EXPLANATION OF COMPARISON	
B5	Outputs the alarm LO limit signal of rotation speed.	FUNCTIONS " on page 50	
B6	Outputs the normal run signal.	\rightarrow " About the RUN signal " on page 69	
A11, A12	2-wire serial interface for connecting a UNIPULSE- manufactured printer, external display, etc.	→"■SI/F interface connection " on page 15 "8-2.SI/F (serial interface) " on page 69	

■About inputs

B7	Common for external input signals.	\rightarrow " External I/O connection " on page 14
B8, B9	Inputs the hold control signal.	→"7.EXPLANATION OF HOLD FUNCTIONS " on page 55
B10	Inputs the zero clear (Angle) signal.	→"5-7.Zero clear (Angle) " on page 44
B11	Inputs the Digital Zero signal.	→"5-6.Digital zero " on page 43
B12	Input for record data clear.	\rightarrow "9-3.Record data clear " on page 78

■About the RUN signal

The RUN output stops when an abnormal state of the indicated value is detected. The conditions under which the output stops as in an abnormal state are as follows.

- ±LOAD
- OFL1, OFL2
- Calibration error
- Digital zero limit error
- * See "12-7.Error/message list " on page 131 about the contents of errors.



8-2. SI/F (serial interface)

■SI/F indicated value format

GROSS area:	Torque
NET area:	Rotation speed
TARE area:	Angle

■SI/F print

<pre>《Setting value》</pre>	
0: None	No print command is sent.
1: Stable value	When stability is detected, a print command is sent to the SI/F to make the
	connected printer print automatically. When near zero is OFF, the torque
	is held until near zero ON after stable ON.
	Hold is reset in 1.5 sec. after near zero ON.
2: Hold value	When hold is reset, a print command is sent to make the connected
	printer print the hold value automatically.
	(When the hold mode is OFF, turn on T/H or press $HOLD$.)

STANDARD INTERFACE



STANDARD INTERFACE

Chapter

8

Automatic printing For the "Stable" parameter, see "5-8. Motion detect " on page 44, and for the "Near zero" parameter, see "6-3.Near zero " on page 52.

1.5seconds

Hold

Automatic printing

Point

The print command and the record function are closely related. For details, see "9-1.Record timing " on page 77.

1 5seconds

Hold

8-3. RS-485

Usable when connecting to UTMII & UTF (TM380 option).

You can use RS-485 to change settings, digital zero, display torque and rotation speed of UTMII & UTF (TM380option).

Communication specifications

Signal level	Based on RS-485
Transmitting distance	Approx. 1 km
Transmitting method	Asynchronous, Full duplex
Transmitting speed	230.4kbps
Bit configuration	Start bit: 1bit
	Character length: 8bit
	Stop bit: 1bit
	Parity: none
	Terminator: CR
Code	ASCII

■RS-485 communication mode

In communication mode, select RS-485 command mode / RS-485 display mode / invalid.

《Setting value》

0: RS-485 command mode 1: RS-485 display mode 2: Invalid

Speed

FE

Speed

F **E**. ł rpm Angle rad deg Ŭ

LO

HI Torque

HOLD

rpm Angle rad deg

Nm

1. Select setting mode 6.



2. Set "RS-485 communication mode."



Press **C**, and present set value blinks.

Input the setting value with		RECALL	J
------------------------------	--	--------	---

Press 🛃 to validate it. (Initial value: 0)



STANDARD INTERFACE

Read setting values from UTM/UTF

Read the following setting values from UTM/UTF.

* Only applicable when "0: RS-485 command mode" "1: RS-485 display mode" is selected in communication mode.

```
《Setting value》
```

0: Cancel 1: Filter setting 2: Rotation speed filter 3: Minimum rotation speed display

1. Select setting mode 6.



2. Set "UTM/UTF setting value read."



Input the setting value with

to validate it. (Initial value: 0)





3. Press | ESC | twice to go back to the Indicated value display.

Point

Press

E.g. To read filter setting, enter 1 & validate. After reading setting from UTM/UTF, Mode F6.2 of TM380 will return to 0. (Initial value) If restart power, Mode F6.3 - F6.5 will display 0. (Not value from UTM/UTF) Please note that setting read from UTM/UTF will not be kept.

■Write filter setting to UTM/UTF

Write the following filter setting to UTM/UTF.

In addition, after reading filter setting from UTM/UTF, the setting value from UTM/UTF will be shown at this item no.

* Only applicable when "0: RS-485 command mode" "1: RS-485 display mode" is selected in communication mode.

(S	etting	value》									
	0:1	1: 3	2: 10	3: 30	4: 100	5: 300	6: 1k	7: PA	SS [Hz]		
1.	Selec	ct settir	ng mode	6.			Γ	Speed	rpm A	ngle rad	deg
	Press	FNC	\rightarrow	five tim	es.			F	ļ	[,] 0	F F
2.	Set "	'UTM/L	JTF filte	r setting	."		ſ	Torque	I LO	HOLD	Nr
	Press	RECALL 1	three time	es. \Rightarrow "	UTM/UTF	filter setti	ng" is	lorque		_	Y7
	displa	yed.						Speed	rom A	nale rad	deg

Press , and present set value blinks. Input the setting value with

Press to validate it. (Initial value: 0)

- F & 3
- 3. Press | ESC | twice to go back to the Indicated value display.

Chapter

Write rotation speed filter to UTM/UTF

Write the following rotation speed filter to UTM/UTF.

In addition, after reading rotation speed filter from UTM/UTF, the setting value from UTM/UTF will be shown at this item no.

* Only applicable when "0: RS-485 command mode" "1: RS-485 display mode" is selected in communication mode.

《Setting value》

0: OFF 1: 2 2: 4 3: 8 4: 16 5: 32 [times]

1. Select setting mode 6.

Press \square \square \square \square \square five times	Press	FNC	\rightarrow		five times.
--	-------	-----	---------------	--	-------------

- **2.** Set "UTM/UTF rotation speed filter."
 - Press $\mathbb{P}_{\text{ECALL}}$ four times. \Rightarrow "UTM/UTF rotation speed filter" is displayed.
 - Press **Press**, and present set value blinks. Input the setting value with **Press**

Press **V** to validate it. (Initial value: 0)



LC	р но	DLD	Nm
om	Angle	rad	deg
	LC OM	LO HO	Dom Angle rad

3. Press | ESC | twice to go back to the Indicated value display.

Write minimum rotation speed display to UTM/UTF

Write the following minimum rotation speed display to UTM/UTF.

In addition, after reading minimum rotation speed display from UTM/UTF, the setting value from UTM/UTF will be shown at this item no.

* Only applicable when "0: RS-485 command mode" "1: RS-485 display mode" is selected in communication mode.

《Setting value》 00 to 99

- **1.** Select setting mode 6.
 - Press $FNC \rightarrow \blacktriangleright$ five times.
- **2.** Set "UTM/UTF minimum rotation speed display."

Press $\mathbb{R}_{\text{RECALL}}$ five times. \Rightarrow "UTM/UTF minimum rotation speed display" is displayed.

Press , and the highest digit blinks.

Input the setting value with |

Move to the lower digits with \blacktriangleright . (Initial value: 00)

Press C to validate it.



rpm

Speed

Angle rad deg

Chapter **8**

3. Press ESC twice to go back to the Indicated value display.

■UTM/UTF assigned action

UTM/UTF will execute assigned action.

* Only applicable when "0: RS-485 command mode" "1: RS-485 display mode" is selected in communication mode.

《Setting value》

0: Cancel 1: Digital zero 2: Digital zero reset

1. Select setting mode 6.



- **2.** Set "UTM/UTF assigned action."

six times. \Rightarrow "UTM/UTF assigned action" Press is displayed. , and present set value blinks. Press

Input the setting value with Press ſ to validate it. (Initial value: 0)





3. Press ESC twice to go back to the Indicated value display.

RS-485 dedicated rated capacity value

Set rated capacity value for RS-485 display mode.

Since the torque value obtained from RS-485 is %FS, it is necessary to set rated capacity value.

* Decimal point is linked to Calibration Function Select 1 (Torque). (Mode 4)

《Setting value》 0 to 99999

Press

Press

 $\mathbf{ }$

1. Select setting mode 6.

Press FNC five times.

capacity value" is displayed.

Input the setting value with

to validate it.

2. Set "RS-485 dedicated rated capacity value."

, and the highest digit blinks.



- LO HOLD HI Torque Nm Press $|_{\text{RECALL}}$ seven times. \Rightarrow "RS-485 dedicated rated Angle rad deg Speed **b**.
- **3.** Press | ESC | twice to go back to the Indicated value display.

Move to the lower digits with ► . (Initial value: 10000)

■RS-485 terminator

Set termination resistor on receiving side of RS-485 at TM380.

- 《Setting value》 0: OFF 1: ON
- **1.** Select setting mode 6.

Press	FNC	\rightarrow		five times.
-------	-----	---------------	--	-------------

2. Set "RS-485 terminator."







3. Press ESC twice to go back to the Indicated value display.

■About RS-485 command mode & RS-485 display mode

With "0: RS-485 command mode" "1: RS-485 display mode as communication mode, you can easily execute assigned action, read & write setting values or indicated value display from UTM/ UTF.

RS-485 command mode

- Read/write setting values
- Assigned action

RS-485 display mode

- Read/write setting values
- Assigned action
- Digital data display of torque value or rotation speed

Read/write of setting values & assigned action will be executed according to setting mode 6, item no. 2 to 6.

Digital data display of torque value or rotation speed are data from RS-485. They can be seen on main & sub display of TM380.

* Digital data of RS-485 display mode is displayable if : communication status is confirmed after turning ON UTM/UTF & communication check.

Communication confirmation time depends on condition of UTM/UTF.

In case of failing communication, error message is displayed on main numerical display section. (Refer to "12-7.Error/message list " on page 131)

If error message appears, check the wiring at UTM/UTF side.

STANDARD INTERFACE

Acquired data will be displayed in reference with setting of RS-485 dedicated rated capacity value. Rotation speed is displayed from acquired data.

Signals input from the encoder are not digital data.

Acquirable data from RS-485 is 300 times/sec.. Perform comparison / hold with acquired data. However, the following functions are not reflected.

- Digital zero and digital zero reset (keys input, external signal, option)
- Zero tracking
- Filter settings
- (digital filter (torque and rotation speed), digital low-pass filter, digital hi-pass filter)
- Deadband
- Absolute value display
- Min. scale division (torque and rotation speed)
- Digital offset
- Pulse rate (rotation speed)
- Rotation stop settings
- Low speed rotation mode

Chapter

9 RECORD FUNCTION

9-1. Record timing

Each value (torque, rotation speed, and angle) is recorded according to a print command. Up to 30 pieces of the most recent data can be stored. If 30 pieces are exceeded, the oldest data in chronological order will be overwritten. Select hold value (when hold is reset) or stable value (at stable-time out of near zero) of the SI/F print setting. (For details, see " \blacksquare SI/F print" on page 69.) Even without using hold, data can be immediately recorded by setting SI/F print to hold value and by pressing \square OLD or turning T/H ON.



In addition, when using hold with SI/F print at hold value, the value is recorded at the time of release.

9-2. History

Recorded data can be checked on the indicated value display screen in history mode.



🔵 Point

- Even while the history is displayed, when the record is updated, the record data are updated. In that case, the displayed data No. does not change but the record data alone change.

Speed

F q

Torque

Speed

 $F \overline{q} \overline{q}$

HI

rpm Angle rad deg

LO

Ē

HOLD

rpm Angle rad deg

Nm

- The record data are saved in F-RAM.

9-3. Record data clear

All 30 pieces of data are cleared to zero. However, they cannot be cleared if work protect is ON.

■Clear by means of keys

1. Select setting mode 9.

Press $|\mathsf{FNC}| \rightarrow |\mathsf{FNC}|$ seven times.

2. Execute "Record data clear."

Press $\mathbb{R}_{\text{RECALL}}$ five times \Rightarrow "Record data clear" is displayed.

Press , and blinks.

Input a value other than zero with \square and $\mathbb{R}_{\text{ReCALL}}$

Press 🛃 to validate it.

* Upon validation, they are cleared and the set values go back to 0.

3. Press ESC twice to go back to the indicated value display.

Clear by means of the external signal "CLEAR input"

The record data are cleared at the instant when the external input/output connectors CLEAR and COM2 are short-circuited from an open state (at the ON edge).



■Clear by means of communication (232/USB option)

The record data are cleared when a record data clear command is received in communication (232/USB option).

) Point

If you enter the history mode after clearing, all data show zero.

Chapter

10 OPTION INTERFACE

10-1. BCD interface

The BCD data output is an interface to extract the indicated value of the TM380 as BCD data. This interface is convenient to process controls, totals, records, etc., by connecting the TM380 to a computer, process controller, sequencer or the like.

The I/O and internal circuits are electrically insulated by photocoupler.



Connection



The signal output circuit employs the open collector output.



Internal transistor status

Output data	Negative	Positive	
0	OFF	ON	
1	ON	OFF	

• Output pin level

Output data	Negative	Positive
0	Н	L
1	L	Н

—Through logic switching (pin B14)

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- Do not apply external voltage to the signal input circuit.
- The external element is required to withstand Ic=10mA.
- Leakage from the external element is required to be 30µA or below.

Connector pin assignment

A1	*	COM	B1	*	COM
A2	OUT	1	B2	OUT	1000
A3	OUT	2	B3	OUT	2000
A4	OUT	4	B4	OUT	4000
A5	OUT	8	B5	OUT	8000
A6	OUT	10	B6	OUT	10000
A7	OUT	20	B7	OUT	20000
A8	OUT	40	B8	OUT	40000
A9	OUT	80	B9	OUT	80000
A10	OUT	100	B10	OUT	Minus (polarity)
A11	OUT	200	B11	OUT	OVER
A12	OUT	400	B12	OUT	STAB
A13	OUT	800	B13	OUT	STROBE
A14	IN	Data hold	B14	IN	Logic switching
A15	IN	Data switching 0	B15	IN	Data switching 1
A16	-		B16	-	

Compatible connector: Connector cover:

FCN-361J032-AU (manufactured by FUJITSU COMPONENT or equivalent) FCN-360C032-B (manufactured by FUJITSU COMPONENT or equivalent) (connector & cover optional type: CN51)

■Output data select

«Setting value»

0: Torque (hold synchronized)

Torque synchronized with a hold is output.

1: Rotation speed The rotation speed is output.

- 2: Angle The angle is output.
- 3: Torque (hold not synchronized)

Torque in real time is output.

4: External select Data selected by the data select input (A15, B15) is output.

Data select 1	Data select 0	Output data
OFF	OFF	Torque (hold synchronized)
OFF	ON	Rotation speed
ON	OFF	Angle
ON	ON	Torque (hold not synchronized)

* In the case of external selection, read after at least 2 cycles.

\diamondsuit Output data select setting method

1. Select setting mode 5.



2. Set "Output data select."

Press \bigvee_{RECALL} once. \Rightarrow "Output data select" is displayed.

Press once, and present set value blinks.

Input the setting value with RECALL.

(Initial value: 0)

Press **V** to validate it.

F5 P oFF

Speed

F5. 1

rpm Angle rad deg

3. Press ESC twice to go back to the indicated value display.

■Signal timing

STROBE

- Minus Turns on when the output indicated value data is negative.
 - OVER Turns on at over-scale time.
 - -LOAD, +LOAD, OFL1, OFL2
- STAB Turns on at stable-time. See "5-8.Motion detect" on page 44.

Strobe pulses are output in synchronization with BCD data. For reading the data, use the rising edges of the pulses when the logic is negative, and the falling edges of the pulses when the logic is positive.



OPTION INTERFACE

Logic switching

Select the logic of the BCD data output signal. Make selection with B14.

When COM and B14 are open:	Negative logic
When COM and B14 are short-circuited:	Positive logic

Read at least 2 cycles after inputting the logic switching.

BCD data hold

Updating of the BCD data output signal is stopped. Also, the STROBE output turns OFF. Make selection with A14.



Read at least 2 cycles after inputting the BCD data hold.

As long as the BCD data hold is input, data can be read reliably, but because the data is not updated, it may be different from original data.

■Output rate

```
《Setting value》
0: 10 1: 25 2: 50 3: 100 4: 250 5: 500 6: 1000 [times/sec.]
```

) Point

Even if this setting is changed, A/D conversions speed does not change. Make the output rate slower when reading fails due to a low processing performance of the device that should receive BCD.

♦ Output rate setting method





2. Set "Output rate."

Press \bigvee_{RECALL} twice. \Rightarrow "Output rate" is displayed. Press \swarrow , and present set value blinks.

(Initial value: 3)

Press 🛃 to validate it.

Input the setting value with



3. Press ESC twice to go back to the indicated value display.

■BCD/binary select

The output data selection can be changed to binary.

《Setting value》
0: BCD 1: Binary

♦BCD/binary setting method

displayed.

(Initial value: 0)

1. Select setting mode 5.



2. Select "BCD/binary select."

Input the setting value with

Press 🛃 to validate it.



3. Press ESC twice to go back to the indicated value display.

RECALL

Press R_{RECALL} three times. \Rightarrow "BCD/binary select" is

Press , and present set value blinks.

■Pin assignment at binary

A1	*	COM	B1	*	COM
A2	OUT	2 ⁰	B2	OUT	2 ¹²
A3	OUT	2 ¹	B3	OUT	2 ¹³
A4	OUT	2 ²	B4	OUT	2 ¹⁴
A5	OUT	2 ³	B5	OUT	2 ¹⁵
A6	OUT	2 ⁴	B6	OUT	2 ¹⁶
A7	OUT	2 ⁵	B7	OUT	
A8	OUT	2 ⁶	B8	OUT	Data switching 0 (response)
A9	OUT	2 ⁷	B9	OUT	Data switching 1 (response)
A10	OUT	2 ⁸	B10	OUT	Minus (polarity)
A11	OUT	2 ⁹	B11	OUT	OVER
A12	OUT	2 ¹⁰	B12	OUT	STAB
A13	OUT	2 ¹¹	B13	OUT	STROBE
A14	IN	Data hold	B14	IN	Logic switching
A15	IN	Data switching 0	B15	IN	Data switching1
A16	_		B16	_	

* With the B8 and B9 outputs, the data specified by the output data selection or by A15 and B15 (data select) can be checked.

10-2. RS-232C interface

The RS-232C is an interface to read the indicated value and status of the TM380 and to write parameters into the TM380.

This interface is convenient to process controls, totals, records, etc., by connecting the TM380 to a computer, process controller, sequencer or the like.

Communication specifications

Signal level:	Based on RS-232C	
Transmitting distance:	Approx.15m	
Transmitting method:	Asynchronous, Ful	ll duplex
Baud rate:	9600, 19200, 3840	0, 57600bps selectable
Bit configuration:	Start bit:	1bit
	Character length:	7 or 8 bit selectable
	Stop bit:	1 or 2 bit selectable
	Parity:	Parity none, odd or even selectable
	Delimiter:	CR, CR+LFSelectable
Code:	ASCII	

Connector pin assignment

1	-	
2	IN	RXD
3	OUT	TXD
4	OUT	DTR
5	*	GND
6	-	
7	—	
8	—	
9	_	
Case	*	SHIELD

Adaptable connector 9-pin D-SUB connector

Connector: XM3D-0921 (Omron) or equivalent

Cover:

XM2S-0913 (with inch screw thread #4-40)(Omron) or equivalent (connector & cover optional type: CN34)

■Connection

Exa	mple) TM3 XM3	80 3D-0921 or equiva	D	PC etc. -sub9pin	
	1			1	CD
	2	RXD		2	RXD
	3	TXD		3	TXD
	4	DTR		4	DTR
	5	GND		5	GND
	6			6	DSR
	7			7	RTS
	8			8	CTS
	9			9	RI

This connection diagram shows cabling applicable to the case where your PC is DTE (data terminal equipment). For connection with DCE (data circuit-terminating equipment), such as a modem, use straight type cabling.

Prepare cabling after reconfirmation of the connector shape and signal lines (pin assignments) of the equipment you use.

Communication mode

«Setting value»

0: Send/receive mode

This mode performs communication by a command from the host computer. In this mode, you can read out the indicated value, status, set values and write in set values.

1: Continuous transmission (hold synchronized) mode

This mode continuously transmits the indicated values and the status. Indicated value and status are synchronized with hold.

2: Printed transmission mode

When the indicated value is printed (a print command is output to the SI/F), the indicated value and status are sent from the TM380 to host.

3: Continuous transmission (hold not synchronized) mode

This mode continuously transmits the indicated values and the status. Only indicated value is not synchronized with hold.

	\diamond	Comm	unication	mode	setting	method
--	------------	------	-----------	------	---------	--------

1.	Select setting mode 5.
	Press $FNC \rightarrow \blacktriangleright$ four times.
2.	Set "Communication mode."
	Press $\boxed{\mathbb{R}}_{\text{RECALL}}$ once. \Rightarrow "Communication mode" is
	displayed.
	Press , and present set value blinks.
	Input the setting value with $\bigwedge \bigvee_{\text{RECALL}}$.
	(Initial value: 0)
	Press 🛃 to validate it.
3.	Press ESC twice to go back to the indicated



value display.

Communication conditions

Set the communication conditions according to the host.

♦ Communication conditions setting method

1. Select setting mode 5.

Press $|\mathsf{FNC}| \rightarrow |\mathsf{Four times}|$.

2. Set "Communication conditions."

Press $|\mathbf{V}_{\text{RECALL}}|$ twice. \Rightarrow "Communication conditions" is displayed.

Press , and present set value blinks.

Input the setting value with (Initial value: 11100) Move to the lower digits with

Press 🛃 to validate it.

3. Press | ESC | twice to go back to the indicated value display.







Delimiter

Set the delimiter for sending messages from the TM380.

```
《Setting value》
0: CR 1: CR+LF
```

♦Delimiter setting method

- **1.** Select setting mode 5.
 - Press $FNC \rightarrow \blacktriangleright$ four times.
- 2. Set "Delimiter."
 - Press $\mathbb{R}_{\mathsf{ECALL}}$ three times. \Rightarrow "Delimiter" is displayed. Press \mathbb{R} , and present set value blinks. Input the setting value with \mathbb{R} $\mathbb{R}_{\mathsf{ECALL}}$. (Initial value: 0) Press \mathbb{R} to validate it.



3. Press ESC twice to go back to the indicated value display.

Communication format

1.Send/receive [reading the indicated value/status]

Reading the indicated value/status				
Eunction	Hea	ader	Protocol	
1 unction	Main	Sub		
Torque (Hold synchronized)	R	A	Host R A CR TM380 R A + 1 0 0 . 0 0 Delimiter Sign, 5-digit, decimal place	
Rotation speed	R	В	Host R B CR TM380 R B + 0 0 6 0 0 . Delimiter Sign (fixation), 5-digit, decimal place	
Angle	R	С	Host R C CR TM380 R C + 0 1 8 0 . 0 Delimiter Use of encoder (F7-1) Not use: Use: Sign, 5-digit, decimal place	

OPTION INTERFACE



Reading the indicated value/status					
Function	Hea	ader	Protocol		
Main Sub					
Read all (hold synchronized)	R	I	Host R I CR 0 1 2 3 4 5 6 7 8 9 10 TM380 R I , + 1 0 0 . 0 0 , Torque (sign, 5-digit, decimal place) I1 12 13 14 15 16 17 18 + 0 0 6 0 0 . , Rotation speed (sign (fixation), 5-digit, decimal place) I9 20 21 22 23 24 25 + 0 1 8 0 . 0 Delimiter Use of encoder (F7-1) Not use:		
Torque (hold not synchronized)	R	J	Host R J CR TM380 R J + 1 0 0 . 0 0 Delimiter Sign, 5-digit, decimal place		
Read all (hold not synchronized)	R	К	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		

2. Send/receive [setting value writing/reading]

				Se	etting	j vali	ue w	riting)				
Function	Eunction Header			Protocol									
1 difetion	Main	Sub											
Various settings	w	_	Host TM380	W * Wh put Ex W * Wh	Comr en th a zer ampl * en th *	e nur o in t e) 3 c * e set	mber he hi digits + ting v	Set (For of dig igher 0 value	titing v r a se the gits c digiti 0 is ur	value etting nume f the sign 0	e (sig valu erical setti 2 ed, p	n, 5-cc e witl valu ng va 3 ut a z	CR digit, no decimal place) h a decimal place, simply write e excluding the decimal place.) alue is smaller than five, CR zero in the sign digit. CR



* Command definition



* The mode number of the setting value of HI/LO limit is "0."

* For setting mode numbers and setting item numbers,

see "12-1.The list of initial setting value" on page 118.

Point

- "Initialize" and "password" cannot be either read or written.
- When the protect of the setting value you are going to write is ON, it cannot be written. Turn OFF the protect.
- If an output value is written in command 42 (zero calibration), simulated zero calibration is executed with the written value. Also, if an output value is written in command 43 (equivalent input calibration), equivalent input calibration is executed.

			Movement directive
Function			Protocol
	Main	Sub	
Zero calibration	С	z	Host C Z CR TM380
Equivalent input calibration	С	s	Host C S CR TM380 * Set the rated capacity value before sending an actual load calibration command.
Digital zero	С	G	Host C G CR TM380
Digital zero reset	С	н	Host C H CR TM380
Record data clear	С	J	Host C J CR TM380
Zero clear (Angle)	С	к	Host C K CR TM380
SECTION ON	С	1	Host C 1 CR TM380
SECTION OFF	С	2	Host C 2 CR TM380
T/H ON	С	3	Host C 3 CR TM380
T/H OFF	С	4	Host C 4 CR TM380

3. Send/receive [operation command]

) Point

If the calibration protect is ON, zero calibration and span calibration cannot be performed.

4. Send/receive [returning an error]

			Returning an error					
Function	Function		Protocol					
Main		Sub	11010001					
Error occurrence (send/receive mode)	E	R	Host Command TM380 E R * Delimiter 1: The command or message length is improper. 2: The protect of the setting value you are going to write is ON, or a calibration command is received while the calibration protect is ON. 3: The format errors of the setting value which tried to write in. 4: Other communication errors (parity error, frame error, etc.)					

OPTION INTERFACE



9600 bps

12 times/sec.

10-3. D/A converter voltage output (3ch)

This converter is used for obtaining analog outputs synchronized with torque, rotation speed and angle.

The analog output ranges are -10 to +10V output.

By using the D/A zero setting and D/A full scale setting functions, analog output can be obtained between zero (0V) and full scale (+10V) with respect to the predetermined digital value.

The output circuit and the main unit circuit are isolated.

The resolution is 1/10000 with respect to the ranges of -10 to +10V, and the conversion speed is 8000 times per second.

The maximum voltage output range are about ± 11 V.



Connector pin assignment

1	Torquo	+	VOUT
	loique	—	GND
2	Rotation speed	+	VOUT
		—	GND
2	Anglo	+	VOUT
3	Angle	_	GND

Compatible plug 7 Operating tool 7

734-106/037-000

734-230

■Connection

A two-piece terminal block is used. Perform wiring with the plug pulled out from the option. Use of the operating tool included is recommended to facilitate wiring.

1. Strip the casing 6.5 to 7.5mm on the cable to be connected.

Twist the bare wire to fit the terminal hole.

- **2.** Press the operating tool attached to the operation slot at the upper part with a finger and push down the spring.
- **3.** While pressing the operating tool, insert the electric wire into the insertion opening until it hits the wall.



6.5 to 7.5mm

4. The wire will be connected once the operating tool is released. For confirmation, tug the electric wire gently.

The wire can be connected likewise without the operating tool by using a tool such as a flathead screwdriver to press down the spring from the top.

- Cable can be from 28 to 14AWG (0.08 to 1.5 mm²).
- It is not necessary to solder the cable wires or to fix a solderless terminal.
- If several cables to be inserted to the same hole, twist those cable wires together and insert.
- Connect the cable with the power supply of the main body turned off without fail.
- For the protection from the damage, do not operate the lever without removing the plug.

■Output mode

Setting value 0: Data select	The output of each channel corresponds to the data select setting.
1: Zero scale fix	All outputs of the channels are fixed to zero scale output (0V). After confirmation, it will enter the output adjustment mode and zero adjustment for each channel will be enabled.
2: Full scale fix	All outputs of the channels are fixed to full scale output (+10V). After confirmation, it will enter the output adjustment mode and gain adjustment for each channel will be enabled.

Angle rad

Ē

HOLD

rad deg

 \square

rpm

LO

rom

Data select 1

Data select 2

Data select 3

Output mode

0: Data select 1: Zero scale fix

2: Full scale fix

(torque) 0: Hold synchronized

(rotation speed) 0: Hold synchronized

(angle) 0: Hold synchronized

1: Hold not synchronized

1: Hold not synchronized

1: Hold not synchronized

НI

deg

Nm

Data select

When the output mode is "0: Data select", the analog output for torque, rotation speed and angle will be synchronized with the indicated value.

The output data for each indicated value can be selected.

《Setting value》

0: Hold synchronized

Outputs value synchronized with the indicated value.

1: Hold not synchronized Or

Outputs value without hold even when the indicated value is on hold.

Speed

Fς

Torque

Speed

«Setting value»

F 5.

0 0 0 0

RECALI

\diamond Output mode/ data select setting method

1. Select setting mode 5.

Press $[FNC] \rightarrow [\blacktriangleright]$ four times.

2. Set " Output data select."

Press $\underbrace{\mathbb{P}}_{\text{RECALL}}$ once. \Rightarrow "Output data select" is displayed.

Press < , and the highest digit blinks.

① Set "Output mode."

Input the output mode with \square RECAI and move to the lower digit with \square (Initial value: 0)

② Set "Data select 3 (angle)."

Input the data select 3 (angle) with and move to the lower digit with . (Initial value: 0)

- ③ Set "Data select 2 (rotation speed)."
 - Input the data select 2 (rotation speed) with

- ④ Set "Data select 1 (torque)."
 Input the data select 1 (torque) with RECALL. (Initial value: 0)
 Press rest to validate it.
- **3.** Press ESC twice to go back to the indicated value display.

Zero/Full scale s	etting
Zero scale 1 to 3	Set the indicated value to output 0V.
Full scale 1 to 3	Set the indicated value to output 10V. The gain will be "full scale - zero scale". Outputs value within the range of ±gain with the set zero scale at the center.
《Setting value》 -99999 to 999 * Setting rang F5-8 Wher F5-8 Wher	99 (Zero/Full scale value 1, 2) e of zero/full scale 3 (angle) vary with the following condition: n [0: Number of rotations] is set: -55 to 55 * According to setting of zero clear (F7-6) n [1: Pulse rate] is set: -9999 to 9999
♦ Zero/Full scale	e setting method
1. Select setting Press FNC –	speed rpm Angle rad deg F F F F F
 2. Set "Zero so value 1 (torque 1) (torque 1)	ale value 1 (torque)," and "Full scale tele." twice. \Rightarrow "Zero scale value 1 (torque)" , and the highest digit blinks. tting value with \bigwedge $\bigwedge_{\text{RECALL}}$, and move to the lower digit with \blacktriangleright . e: 0) ting a negative sign, press $+/-$. to validate it.
 ② Set "Full sc Press	ale value 1 (torque)." once. \Rightarrow "Full scale value 1 (torque)" is , and the highest digit blinks. thing value with \bigwedge $\bigwedge_{\mathbb{R} \subset ALL}$, and move to git with \blacktriangleright . (Initial value: 10000) ting a negative sign, press $+/-$. to validate it.

 3. Set "Zero scale value 2 (rotation speed)," and "Full scale value 2 (rotation speed)." ① Set "Zero scale value 2 (rotation speed)." Press Press "Zero scale value 2 (rotation speed)" is displayed. Press Press (number of the setting value with (Initial value: 0) * For inputting a negative sign, press +/
Press voltate it. (2) Set "Full scale value 2 (rotation speed)." Press \overrightarrow{RECALL} once. \Rightarrow "Full scale value 2 (rotation speed)" is displayed. Press \overrightarrow{REC} , and the highest digit blinks. Input the setting value with \bigwedge \overrightarrow{RECALL} , and move to the lower digit with \blacktriangleright . (Initial value: 10000) * For inputting a program proces $\frac{1}{1}/2$
 Press to validate it. 4. Set "Zero scale value 3 (angle)," and "Full scale value 3 (angle)." Set "Zero scale value 3 (angle)." Set "Zero scale value 3 (angle)." Press
Press 2, and the highest digit blinks. Input the setting value with (Initial value: 0) <u>* For inputting a negative sign, press</u> +/ Press 2 to validate it. 2 Set "Full scale value 3 (angle)."
Press $\overrightarrow{\text{RECALL}}$ once. \Rightarrow "Full scale value 3 (angle)" is displayed. Press $\overrightarrow{\text{Press}}$, and the highest digit blinks. Input the setting value with $\overrightarrow{\text{RECALL}}$, and move to the lower digit with $\overrightarrow{\text{Pres}}$. (Initial value: 1) <u>* For inputting a negative sign, press</u> $\cancel{+/-}$. Press $\overrightarrow{\text{Press}}$ to validate it.
5. Press ESC twice to go back to the indicated value display.

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Angle analog output select

Can specify zero/full scale for angle analog output.

《Setting value》

0: Number of rotations Select number of rotations at encoder as standard.

1: Pulse rate	Select pulse rate at encoder as standard.
	Can set in small scale.

Example) For 360° (1 rotation), set full scale value when outputting full scale at 10V

(0: When number of rotations is selected)

3600 (1: When pulse rate is selected, and encoder pulses are 3600)

♦Angle analog output select setting method

1. Select setting mode 5.

1

Press $|\mathsf{FNC}| \rightarrow |\mathsf{FNC}|$ four times.

2. Set "Angle analog output select."

Press $\mathbf{P}_{\text{RECALL}}$ eight times. \Rightarrow "Angle and	nalog output
select" is displayed.	
Press , and present set value blinks.	
Input the setting value with \square \mathbb{RECALL} .	
(Initial value: 0)	
Validate it with	

Speed	rpm	Angle	rad	deg
FS		P	ai	E F

Torque	ні	LO	н	DLD	Nm
					\square
Speed	r	pm	Angle	rad	deg
F 5.8	7				

3. Press ESC twice to go back to the indicated value display.

Adjustment by fixed output

Make output adjustment on the adjustment screen appearing after selecting each fixed output by D/A output data select setting and pressing

Select the adjusting output channel with +/-, and make fine adjustment of the output with while monitoring the output value.

The adjustment values (%) is registered by pressing **C** and confirming adjustment after completing adjustments for all channels to be adjusted.



♦ Full fixed output



- * Keeping on pressing \bigwedge $\underset{\mathsf{RECALL}}{\bigvee}$ results in continuous operation.
- * The adjustable range is approximately ± 2.0 V.
- * Press ZERO to bring the adjusted value back to the central point (0%).
- * Press ESC to stop adjustment and go back to the indicated value display screen.
- * By initializing the system settings, the adjusted value is cleared to go back to 0%.

10-4. D/A converter output

A D/A converter is provided for obtaining analog output synchronized with the indicated value of the TM380. The analog output ranges are -10 to +10V output and 4 to 20mA constant-current output.

By using the D/A zero setting and D/A full scale setting functions, analog output can be obtained between zero (0V, 4mA) and full scale (10V, 20mA) with respect to the predetermined digital value. The output circuit and the main unit circuit are isolated.

The resolution is 1/10000 with respect to the ranges of -10 to +10V and of 4 to 20mA, and the conversion speed is 8000 times per second.

The maximum voltage output range are about ± 11 V, the maximum current output range are about 2.4 to 21.6 mA.

■ Connection



For the output terminals of the D/A converter option, a cage clamp type terminal block is used. Make connections by the following procedure.

Connecting to cage clamp terminal block

1. Strip the casing 0.2in (6mm) on the cable to be connected.

Twist the bare wire to fit the terminal hole.

- **2.** Insert the supplied screwdriver into the right hole and lift right.
- **3.** Insert the twisted wires into the left hole.
- **4.** Pull the screwdriver out from the upper hole.
- **5.** Make sure cable is clamped securely and does not come out with a slight tug.







- Cable can be from 24 to 14AWG (0.2 to 2.5mm²).
- It is not necessary to solder the cable wires or to fix a solderless terminal.
- If several cables to be inserted to the same hole, twist those cable wires together and insert.
- Connect the cable with the power supply of the main body turned off without fail.

■Output data select

《Setting	value》
« • • • • • • • • • • • • • •	

0: Torque (hold synchronized)

Torque synchronized with a hold is output.

- 1: Rotation speed The rotation speed is output.
- 2: Angle The angle is output.
- 3: Torque (hold not synchronized)

Torque in real time is output.

4: Zero fix Output is fixed at the zero output (0V for voltage output, 4mA for current output). After fixing, you will go to the output adjustment mode, so that zero adjustment can be made.

See " \blacksquare Adjustment by fixed output" on page 104.

5: Full scale fix Output is fixed at the full scale (10V for voltage output, 20mA for current output). After fixing, you will go to the output adjustment mode, so that gain adjustment can be made.

See "■Adjustment by fixed output" on page 104.

0

♦ Output data select setting method

1. Select setting mode 5.

Press $|\mathsf{FNC}| \rightarrow |\mathsf{F}|$ four times.

2. Set "Output data select."

Press	RECALL	once.	\Rightarrow	"Output data select" is
display	ved.			

Press , and the highest digit blinks.

Press Hree times to make the digit of the output

data select blink. (Initial value: 0)



3. Press ESC twice to go back to the indicated value display.



OPTION INTERFACE

■Zero/Full scale setting

- Zero scale Set the indicated value to output 0V for voltage output, and 4mA for current output.
- Full scale Set the indicated value to output 10V for voltage output, and 20mA for current output.

《Setting value》

- Zero/Full scale value -99999 to 99999 (torque, rotation speed)
- * When output data select [2: Angle] is selected, setting range varies with the following condition:

F5-4 When [0: Number of rotations] is set: -55 to 55

* According to setting of zero clear (F7-6)

rpm

Angle rad deg

F5-4 When [1: Pulse rate] is set:

-9999 to 9999

Speed

FS

♦ Zero/Full scale setting method

1. Select setting mode 5.

Press $[FNC] \rightarrow [FNC]$ four times.

2. Set "Zero scale value," and "Full scale value."



3. Press | ESC | twice to go back to the indicated value display.

■Angle analog output select

Can specify zero/full scale for angle analog output.

《Setting value》	
0: Number of rotations	Select number of rotations at encoder as standard.
1: Pulse rate	Select pulse rate at encoder as standard.
	Can set in small scale.
$E_{1} = 260^{\circ} (1 = 4 + 4)^{\circ}$)

Example) For 360° (1 rotation), set full scale value when outputting full scale at 10V 1

(0: When number of rotations is selected)

3600 (1: When pulse rate is selected, and encoder pulses are 3600)

♦Angle analog output select setting method

1. Select setting mode 5.

Press FNC \rightarrow ► four times.

2. Set "Angle analog output select."

FS		}) 01	FF
Torque	ні	LO	HOLD	Nm

Speed

rpm Angle rad deg

is displayed.	
Press , and present set value blinks.	
Input the setting value with \bigwedge \bigvee_{RECALL} .	
(Initial value: 0)	
Validate it with C .	

Press $\left| \bigvee_{\text{RECALL}} \right|$ four times. \Rightarrow "Angle analog output select"

Torque	HI	LO	HOLD	Nm
				Ϋ́́Τ
			,	Ц
Speed	r	pm Aı	ngle rad	deg
F 5.	Ч			

3. Press ESC twice to go back to the indicated value display.

Adjustment by fixed output

Make output adjustment on the adjustment screen appearing after selecting each fixed output by D/A output data select setting and pressing

press 🛃 to validate it, so that the adjusted value (%) is registered.



Zero scale adjusted value

♦Full fixed output



- * Keeping on pressing $| \mathbf{A} | |_{\text{ReCALL}}$ results in continuous operation.
- * The adjustable range of voltage output is approximately ± 2.0 V, and that of current output is approximately ± 1.6 mA.
- * Press ZERO to bring the adjusted value back to the central point (0%).
- * Press ESC to stop adjustment and go back to the indicated value display screen.
- * By initializing the system settings, the adjusted value is cleared to go back to 0%.

10-5. USB interface

The USB is an interface to read the indicated value of the TM380 and to write parameters into the TM380. This interface is convenient to process controls, totals, records, etc., by connecting the TM380 to PC. Moreover, set values can be read and written by specific PC software, and also input signal can be shown in wave form.

Communication specifications

Communication standard:	Compliant with USB Ver.2.0, Full speed (12Mbps)			
Class:	Communication device class			
Baud rate:	9600, 19200, 38400, 57600, 115.2k, 230.4k bps selectable			
Bit configuration:	Start bit: Character length: Stop bit: Parity: Delimiter:	1bit7 or 8 bit selectable1 or 2 bit selectableParity none, odd or even selectableCR, CR+LFSelectable		
Code:	ASCII			
Connector:	mini-B TYPE			

■PC hardware requirement

OS:	Windows7/10 Home Premium/Professional/Ultimate 32/64		
	Japanese edition		
Display:	1024×768 pixels or more		
USB port:	One empty port (USB 2.0 or more)		
USB driver:	Virtual COM Port(VCP) Drivers by FTDI Ltd.		
Memory:	2GB or more		
Hard disk:	15GB free space or more		

■Installation of a USB driver

Please install a USB driver for connecting with USB of the TM380.

Please see the homepage of FTDI for details and perform download and installation of the driver according to a procedure.

* If the PC is already connected to the network, the driver may be automatically installed via the network when the TM380 is connected to the PC.

Guide:	http://www.ftdichip.com/Support/Documents/InstallGuides.htm
Driver:	http://www.ftdichip.com/Drivers/VCP.htm

■Connection of USB

Connects a USB cable. The USB connector of the TM380 is mini-B TYPE.

The check of a virtual COM port

Please check the virtual COM port number which the TM380 is connected from the device manager of PC.



Port: COM8 V OK Cancel
Baudrate: 280400 bps Data bit: 8 → Parity Even → Stop bit: 1 →

The check of a indicating value

Check if indicating value on the TM380 is displayed.



Communication mode

- 《Setting value》
 - 0: Send/receive

This mode performs communication by a command from the host computer.

In this mode, you can read out the indicated value, status, set values and write in set values.

- * Please be sure to use this setting in the case of use of the TM380 PC application software.
- 1: Continuous transmission (hold synchronized) mode This mode continuously transmits the indicated values and the status.

Indicated value and status are synchronized with hold.

2: Printed transmission mode

When the indicated value is printed (a print command is output to the SI/F), the indicated value and status are sent from the TM380 to host.

3: Continuous transmission (hold not synchronized) mode

This mode continuously transmits the indicated values and the status. Only indicated value is not synchronized with hold.

♦ Communication mode setting method

1. Select setting mode 5.

Press $FNC \rightarrow \blacktriangleright$ four times.

2. Set "Communication mode."

Press $\mathbf{P}_{\text{RECALL}}$ once. \Rightarrow "Communication mode" is displayed.

Press \checkmark , and present set value blinks. Input the setting value with \land \bigcirc \bigcirc RECALL. (Initial value: 0)

Press 🛃 to validate it.

Speed	rpm	Angle	rad deg	
FS		P	oFF	



3. Press ESC twice to go back to the indicated value display.

Point
 Please be sure to use the following setting in the case of use of the TM380 PC application software.
 Communication mode: Send/receive
 Baud rate: 230.4k bps
 Delimiter: CR
 Character length, parity bit, and stop bit do not have specification.
 The communication conditions can be united with PC application software.

Communication conditions

Set the communication conditions according to the host.

♦ Communication conditions setting method

- **1.** Select setting mode 5. Press $FNC \rightarrow \blacktriangleright$ four times.
- 2. Set "Communication conditions."

Press $\mathbb{R}_{\text{RECALL}}$ twice. \Rightarrow "Communication conditions" is displayed.

Press , and present set value blinks.

Input the setting value with \square

(Initial value: 51100)

Move to the lower digits with Press V to validate it.

3. Press ESC twice to go back to the indicated value display.



rpm Angle rad deg

Speed



Delimiter

Set the delimiter for sending messages from the TM380.

《Setting value》
0: CR 1: CR+LF

♦ Delimiter setting method

1. Select setting mode 5.

Press $|\mathsf{FNC}| \rightarrow |\mathsf{FNC}|$ four times.

2. Set "Delimiter."

Press

Press $\begin{bmatrix} \mathbf{v} \\ \text{RECALL} \end{bmatrix}$ three times. \Rightarrow "Delimiter" is displayed.

, and present set value blinks.

Input the setting value with (Initial value: 0)

Press 🛃 to validate it.





3. Press ESC twice to go back to the indicated value display.

■Communication format

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The communication format is the same as an RS-232C interface (option). For details, see "■Communication format" on page 87.

Communication baud rate	Continuous transmission interval
230.4k bps	300 times/sec.
115.2k bps	150 times/sec.
57600 bps	100 times/sec.
38400 bps	50 times/sec.
19200 bps	25 times/sec.
9600 bps	12 times/sec.

11 SPECIFICATIONS

11-1. Specifications

■Analog section

Sensor input for torque (voltage input)

IMΩ
-10 to +10V (UTMIII/UTF(option)) -5 to +5V (UTM II/UTMV)
Within 0.02%/F.S.±1digit
Within 0.2mV/°C RTI
Within 0.01%/°C
Selectable from 3 to 1k Hz and PASS. (Selectable from low-pass and hi-pass)
16000 times/sec.
24bit (binary) Approx. 1/30000 with respect to 10V
 Input voltage cuff (For test point) Use terminal: PF-8-1-A (manufactured by MAC8 or an equivalent) φ 2, Depth: 6mm Compatible terminal: OP-7-1 (manufactured by MAC8 or an equivalent)

Pulse input for rotation speed (open collector input)

(UTMII/UTMII/UTMV/UTF option)

Maximum input rotation speed	In accordance with the output frequency of		
	the UTMIII/UTM II /UTMV/UTF		
Minimum input rotation speed	15, 10, 5, 3, 2 rpm selectable 60, 40, 20, 12, 8 rpm selectable	* Pulse rate: 4 pulses* Pulse rate: 1 pulse	
Minimum detection pulse width	50µs		
Circuit configuration	No-voltage contact input (minus common) Open collector connectable (Ic = Approx.10mA)		

Drive power supply for UTM $\rm I\!I$ /UTM $\rm I\!I$ /UTMV

Power supply voltag	DC24V * One UTMIII/UTMII /UTMV at the maximum
i owei suppiy voltag	DC24V One of Will/Of Will/Of Will v at the maximum

* Please prepare power supply for UTF.

Drive power supply for UTMII/UTMII rotary encoder option Power supply voltag DC5V

■Display section				
Display	7-segment LED, LED lamps			
	Main display:	Character height 15mm,		
		6-digit, indicated value: -99999 to 99999		
	Sub display:	Character height 8mm,		
	Rotation speed	5-digit, indicated value: 0 to 99999		
	Angle	5-digit, indicated value: -19999 to 19999		
		(The highest digit of a negative value is -1)		
	Status display:	HI, LO, HOLD: Red LED		
	Unit display (angle): rad, deg: Red LED			
	Decimal place:	0, 0.0, 0.00, 0.000 (torque)		
		0 (rotation speed)		
		0.0 (rotation speed		
		* During low speed rotation mode)		
		0, 0.0 (angle)		
		0.00 (angle * When the unit is rad)		
Display item	Display frequency:	Selectable from 3, 6, 13, and 25 times/sec.		
■Setting section				
Setting method	Setting by inputting with membrane keys			
Setting value	NOVRAM (non-volatile RAM) or F-RAM (non-volatile RAM)			
Record data	F-RAM (non-volatile RAM)			
■External input/outp	ut section			
External input	Dry contact input ci (Internal circuit pow	ircuit (minus common type) for hold control, etc. ver supply voltage: 12V)		
External output	Open collector outp Rated voltage: 30V,	out circuit (sink type) for comparison output, etc. driving current: 30mA or less		

Interface

SIF

2-wire serial interface for connecting a UNIPULSE-manufactured printer, external display, etc.

Transmitting method	Asynchronous
Baud rate	600bps
Output data	Torque (GROSS area), Rotation speed (NET area),
	Angle (TARE area)

RS-485 (Only for UTMII/UTF)

Signal level	Based on RS-485
Transmitting distance	Approx. 1 km
Transmitting method	Asynchronous, Full duplex
Transmitting speed	230.4kbps
Bit configuration	Start bit: 1bit
	Character length: 8bit
	Stop bit: 1bit
	Parity: none
	Terminator: CR
Code	ASCII

Options

* Only one of the following options can be selected.

BCD parallel data output (BCO)

Open collector output circuit (sink type)

Data format	BCD or binary selectable
Output rate	10, 25, 50, 100, 250, 500, 1000 times/sec.
Rated voltage	30V
Driving current	30mA or less
Output data	Selected by the setting of torque, rotation speed, or angle, or externally.

D/A converter voltage output (3ch) (D3V)

Output range	±10V	
Load resistance	$2k\Omega$ or more	
D/A conversion speed	8000 times per second	Common for
Resolution	1/10000	all channels
Zero/span adjustment range	±10%F.S.	
Non-linearity	±0.05%F.S.	
Output data	Outputs torque, rotation speed and angle at the same time.	

D/A converter voltage output (DAV)

$\pm 10 \mathrm{V}$
$2k\Omega$ or more
8000 times per second
1/10000
±10%F.S.
±0.05%F.S.
Selected by the setting of torque, rotation speed, or angle.

D/A converter current output	(DAI)
Output range	4 to 20mA
Load resistance	350Ω or less
D/A conversion speed	8000 times per second
Resolution	1/10000
Zero/span adjustment range	±10%F.S.
Non-linearity	±0.05%F.S.
Output data	Selected by the setting of torque, rotation speed, or angle.
RS-232C interface (232)	
Transmitting method	Asynchronous
Baud rate	9600bps to 57600bps
USB interface (USB)	
Communication standard	Compliant with USB Ver.2.0, Full speed
	Communication device class
Baud rate	9600 to 230.4k bps
Virtual COM port	Graph display, write & read of setting parameters is possible through dedicated software.
Connector	mini-B TYPE

■General performance

Power supply voltage	$DC24V\pm\!\!15\%$		
Power consumption	8W typ.		
Operating conditions	Temperature:	Operation Storage	-10 to +50°C -40 to +80°C
	Humidity:	85%RH or le	ss (non-condensing)
Dimension	96 (W)×96 (H)×	138 (D)mm (P	Projections excluded)
Panel cutout size	92×92 $^{+1}_{-0}$ mm		
Weight	Approximately 1	.2 kg	

■Attachment

- External input/output connector
- Unit seal1
- Ferrite core
- Connector for BCD output (with BCD output option)1
- Operating tool (with D/A converter (3ch) option)1
- Mini screwdriver for terminal block connection (with D/A converter option)1
- Operation manual1



■ Standard equipment



Equipped with BCD parallel data output interface option



[Unit: mm]

[Unit: mm]





Equipped with D/A converter (3ch) option





Equipped with USB interface option



11





SPECIFICATIONS

12 SUPPLEMENTS

12-1. The list of initial setting value

* Initial value Factory default value

* Protec	○: ◎: ●:	Work protect System protect Calibration protect	In accordance with "1. Setting protect" in mode 9.
* NOVRAM	⊚: No mark:	Saved in NOVRAM Saved in F-RAM	
* Reference	Reference	page on which the det	ails of each item are described

Mode 0: Work setting (HI/LO limit setting mode)

ltem No.	Setting value name	Setting value range	Initial value	Protect	NOV RAM	Reference
1	Torque HI limit (HI)	-99999 to 99999	750	0		
2	Torque LO limit (LO)	-99999 to 99999	250	0		
3	Torque Alarm HI limit (ALM HI)	-99999 to 99999	99999	0		
4	Torque Alarm LO limit (ALM LO)	-99999 to 99999	-99999	0		P20
5	Rotation speed HI limit (HI)	0 to 99999	3000	0		P50
6	Rotation speed LO limit (LO)	0 to 99999	100	0		
7	Rotation speed Alarm HI limit (ALM HI)	0 to 99999	99999	0		
8	Rotation speed Alarm LO limit (ALM LO)	0 to 99999	0	0		
9						

	■Mode 1: Work setting (comparison/hold)							
ltem No.	Setting value name	Setting value range	Initial value	Protect	NOV RAM	Reference		
1	Comparison function select	0 0 0 0 B2 output selection 0: Timing output 1: Absolute value output Comparison timing (Rotation speed) 0: All time 1: Torque synchronized Undefined (0 fixed) Comparison timing (Torque) 0: All time 1: Stable 2: Near Zero OFF 3: Stable and Near Zero OFF 4: Hold	0010	0	Ø	P53		
2	Near zero	0 to 99999	100	0	O	P52		
3	Hysteresis (Torque)	0 to 9999	0	0	0	P51		
4	Hysteresis (Rotation speed)	0 to 9999	0	0	0	P51		
5	Torque timing output HI limit	-99999 to 99999	99999	0	O	P54		
6	Torque timing output LO limit	-99999 to 99999	-99999	0	0	P54		
7	Hold function select	0 0 0 1 Auto reset 0: OFF 1: ON This setting is required when the hold section is "external signal" or "external signal" or "external signal + time" or "level + time." Hold section 1: External signal 2: External signal 2: External signal 2: External signal 3: Level + time This setting is required only when the hold mode is other than "0: OFF." Hold mode 0: OFF 1: Sample 2: Peak 3: Bottom 4: P-P 5: Average 6: Peak (angle) 7: Peak (angle + torque) Undefined (0 fixed)	0001	0	Ó	P55		
8	Detection time ^{*1}	0.01 to 9.99 [sec.]	1.00	0	0	P63		
9	Hold start level ^{*2}	-99999 to 99999	100	0	0	P64		

*1: This setting is required only when the hold section is "External signal + Time" and "Level + Time."

*2: This setting is required only when the hold section is "Level + Time."

Made O. Overtere estimation	4 \				
■ Wode 2: System setting (operation	1)	Torque HI	LO	HOLD	Nm
, , , , , , , , , , , , , , , , , , , ,	,	54	5.		

Item No.	Setting value name	Setting value range	Initial value	Protect	NOV RAM	Reference
1	Motion detect (time)	0.0 to 9.9	0.0	0	0	P44
2	Motion detect (range)	000 to 999	000	0	0	P44
3	Zero tracking (time)	0.0 to 9.9	0.0	0	0	P46
4	Zero tracking (range)	000 to 999	000	0	0	P46
5	SI/F function select	0 0 0 Undefined (0 fixed) Undefined (0 fixed) SI/F print (record) 0: None 1: Stable value 2: Hold value	000	0	0	P69
6	Display frequency	0: 3 1: 6 2: 13 3: 25 [times/sec.]	3: 25	0	0	P47
7	Display ON/OFF	0 1 1 1 Angle display 0: OFF 1: ON Rotation speed display 0: OFF 1: ON Torque display 1: ON fixed Undefined (0 fixed)	0111	O	0	P48
8	Absolute value display select	0: Not valid 1: Valid (marked) 2: Valid (Without mark)	0: Not valid	O	O	P48
9						

■Mode 3: System setting (operation 2)

Item No.	Setting value name	Setting value range	Initial value	Protect	NOV RAM	Reference
1	Digital filter (torque)	0 (OFF), 2 to 999 [times]	030	0	0	P42
2	Digital low-pass filter (torque)	3 to 1000, PASS [Hz]	0300	0	0	P40
3	Dead band	0000 to 9999	0000	0	0	P42
4	Digital filter (rotation speed)	0 (OFF), 2 to 999 [times]	030	0	0	P42
5	B8 OFF detect wait	0.00 to 9.99 [sec.]	0.01	0	0	P66
6	B9 OFF detect wait	0.00 to 9.99 [sec.]	0.01	0	0	P67
7	Digital filter (angle)	0 (OFF), 2 to 999 [times]	000	0	0	P42
8	Digital hi-pass filter (torque)	3 to 1000, PASS [Hz]	0000	O	0	P41
9						

	■Mode 4: Calibration setting						
ltem No.	Setting value name	Setting value range	Initial value	Protect	NOV RAM	Reference	
1	Calibration function select 1 (torque)	0 2 2 0 Min. scale division (torque) 0: 1 1: 2 2: 5 3: 10 4: 20 5: 50 6: 100 Decimal place (torque) 0: None 1: 0.0 2: 0.00 3: 0.000 Unit (torque) 00: mNm 01: Ncm 02: Nm 03: kNm 04: kgm (kgfm) 05: kgcm (kgfcm) 06: gcm (gfcm)	0220	•	Ø	P25	
2	Zero calibration	-10.000 to 10.000 [V] (UTMIII/UTF (option)) -5.000 to 5.000 [V] (UTMII)	0.000	•	O	P26	
3	Equivalent input calibration	-10.000 to 10.000 [V] (UTMIII/UTF (option)) -5.000 to 5.000 [V] (UTM II) (except 0)	10.000	•	0	P27	
4	Actual load calibration	-99999 to 99999 (except 0)	10000	•	0	P28	
5	Digital offset	-99999 to 99999	0	•	0	P30	
6	Digital Zero limit	0 to 99999	99999	•	0	P30	
7	Calibration function select 2 (rotation speed)	1 0 0 0 0 Undefined (0 fixed) Undefined (0 fixed) Undefined (0 fixed) Undefined (0 fixed) Min. scale division (rotation speed) 0: 1 1: 2 2: 5 3: 10 * During low speed rotation mode 0: 0.1 1: 0.2 2: 0.5 3: 1.0 Pulse rate (Rotation speed) 0: 1 pulse 1: 4 pulses 2: 60 pulses 3: 90 pulses 4: Encoder pulse 5: 60 pulses (high speed) 6: 90 pulses (high speed)	10000	•	O	P31	
8	Rotation stop settings	0 0 0 0 Minimum input rotation speed 0: 15 1: 10 2: 5 3: 3 4: 2 [rpm] * 4 times the above, when the pulse rate is "1 pulse". * Fixed as 0 (1rpm) if UTF/60 pulses, encoder pulse are selected or pulses less than 600. * Fixed as 0 (0.1rpm) when set as low speed rotation mode. Undefined (0 fixed) Rotation stop mode 0: OFF 1: 2 times 2: 4 times 3: 8 times Undefined (0 fixed)	0000	•	O	P33	
9	Voltage input select	0: 10V (UTMIII/UTF) 1: 5V (UTMII)	0: 10V	•	O	P24	

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Mode 5: Option setting (BCO option)



Item No.	Setting value name	Setting value range	Initial value	Protect	NOV RAM	Reference
1	Output data select	 0: Torque (hold synchronized) 1: Rotation speed 2: Angle 3: Torque (hold not synchronized) 4: External selection 	0: Torque (hold synchronized)	0	0	P81
2	Output rate	0: 10 1: 25 2: 50 3: 100 4: 250 5: 500 6: 1000 [times/sec.]	3: 100	0	0	P82
3	BCD/binary select	0: BCD 1: Binary	0: BCD	0	0	P83
4						
5						
6						
7						
8						
9						

Mode 5: Option setting (232/USB option)



Item No.	Setting value name	Setting value range	Initial value	Protect	NOV RAM	Reference
1	Communication mode	 0: Send/receive 1: Continuous transmission (hold synchronized) 2: Printed transmission 3: Continuous transmission (hold not synchronized) 	0: Send/receive	Ø	Ø	P85
2	Communication condition	1 1 1 0 0 (232) 5 1 1 0 0 (USB) Undefined (0 fixed) Stop bit 0: 1bit 1: 2bit Parity bit 0: None 1: Even 2: Odd Character length 0: 7bit 1: 8bit Baud rate 0: 9600 1: 19200 2: 38400 3: 57600 4: 115.2k* 5: 230.4k* [bps] * Only USB option	232: 11100 USB: 51100	O	O	P86
3	Delimiter	0: CR 1: CR+LF	0: CR	0	0	P87
4						
5						
6						
7						
8						
9						

■Mode 5: Option setting (D3V option)

ltem No.	Setting value name	Setting value range	Initial value	Protect	NOV RAM	Reference
1	Output data select	0 0 0 0 Data select 1 (torque) 0: Hold synchronized 1: Hold not synchronized 0: Hold synchronized 1: Hold not synchronized 1: Hold not synchronized 0: Hold synchronized 1: Hold not synchronized 1: Zero scale fix 2: Full scale fix	0000	Ø	O	Р94
2	Zero scale value 1 (torque)	-99999 to 99999	0	\odot	0	P96
3	Full scale value 1 (torque)	-99999 to 99999	10000	\odot	0	P96
4	Zero scale value 2 (rotation speed)	-99999 to 99999	0	O	0	P96
5	Full scale value 2 (rotation speed)	-99999 to 99999	10000	O	0	P96
6	Zero scale value 3 (angle)	-55 to 55 (When number of rotations is set) -9999 to 9999 (When pulse rate is set)	0	0	0	Р96
7	Full scale value 3 (angle)	-55 to 55 (When number of rotations is set) -9999 to 9999 (When pulse rate is set)	1	0	0	Р96
8	Angle analog output select	0: Number of rotations 1: Pulse rate	0: Number of rotations	Ô	Ô	Р98
9						

Item

Mode 5: Option setting (DAC (DAV/DAI) option)

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Item No.	Setting value name	Setting value range	Initial value	Protect	NOV RAM	Reference
1	Output data select	0 0 0 0 Output data select 0: Torque (hold synchronized) 1: Rotation speed 2: Angle 3: Torque (hold not synchronized) 4: Zero fix 5: Full scale fix Undefined (0 fixed) Undefined (0 fixed)	0000	O	O	P101
2	Zero scale value	-99999 to 99999 (totque, rotation speed) -55 to 55 (angle, When number of rotations is set) -9999 to 9999 (angle, When pulse rate is set)	0	Ø	0	P102
3	Full scale value	-99999 to 99999 (totque, rotation speed) -55 to 55 (angle, When number of rotations is set) -9999 to 9999 (angle, When pulse rate is set)	10000	Ø	0	P102
4	Angle analog output select	0: Number of rotations 1: Pulse rate	0: Number of rotations	Ô	0	P103
5						
6						
7						
8						
9						

Initial

otoct NOV Por

ltem No.	Setting value name	Setting value range	Initial value	Protect	NOV RAM	Reference
1	RS-485 communication mode	0: RS-485 command mode 1: RS-485 display mode 2: Iinvalid	0: RS-485 command mode	Ô	0	P71
2	UTM/UTF setting value read	0: Cancel 1: Filter setting 2: Rotation speed filter 3: Minimum rotation speed display	0: Cancel	0	*	Р72
3	UTM/UTF filter setting	0: 1 1: 3 2: 10 3: 30 4: 100 5: 300 6: 1k 7: PASS [Hz]	0: 1	O	*	P72
4	UTM/UTF rotation speed filter	0: OFF 1: 2 2: 4 3: 8 4: 16 5: 32 [times]	0: OFF	O	*	P73
5	UTM/UTF minimum rotation speed display	0 to 99	00	0	*	P73
6	UTM/UTF assigned action	0: Cancel 1: Digital zero 2: Digital zero reset	0: Cancel	0	*	P74
7	RS-485 dedicated rated capacity value	0 to 99999	10000	0	0	P74
8	RS-485 terminator	0: OFF 1: ON	1: ON	0	0	P75
9						

■ Mode 6: RS-485 setting (UTMII/UTF)

* Setting values are not kept.

SUPPLEMENTS

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Item No.	Setting value name	Setting value range		Initial value	Protect	NOV RAM	Reference	
1	Use of encoder	0: Not use	1: Use	1: Use	●	0	P35	
2	Encoder pulse	1 to 9999		3600	•	0	P36	
3	Unit (Angle)	0: deg	1: rad	0: deg	•	0	P36	
4	Direction	0: NORMAL	1: REVERSE	0: NORMAL	•	0	P37	
5	Minimum scale (Angle)	When the unit i 0: 0.1 2: 0.5 4: 2 6: 10 8: 50 When the unit i 3: 0.01 5: 0.05 7: 0.2 9: 1	s [0: deg] 1: 0.2 3: 1 5: 5 7: 20 9: 100 s [1: rad] 4: 0.02 6: 0.1 8: 0.5	3: 1	•	Ø	P37	
6	Zero clear	When the unit is [0: deg] 1 to 55 (Minimum scale: 1 or more) 1 to 5 (Minimum scale: 0.1, 0.2, 0.5) When the unit is [1: rad] 1 to 31		55	•	0	P38	
7								
8								
9								



Item No.	Setting value name	Setting value range	Initial value	Protect	NOV RAM	Reference
1	Setting protect	0 0 0 Calibration protect 0: OFF 1: ON System protect 0: OFF 1: ON Work protect 0: OFF 1: ON	000		Ø	P128
2	Key protect	0 0 0 Undefined (0 fixed) HOLD key protect 0: OFF 1: ON ZERO key protect 0: OFF 1: ON	000	Ø	Ø	P129
3	Initialize	1: Work setting 2: System setting 3: Calibration setting	0	$\bigcirc \bigcirc \bullet$	_	P130
4	Password		0000	_		P130
5						
6						
7						
8						
9	Record data clear	0: Cancel 1: Execution	0	\bigcirc		P78

12-2. Self-check function

The self-check function is to automatically check the memory and detect problems. This function is to checksum the software, check the NOVRAM operation, check the F-RAM operation, and check the lighting of indicators. This function is not to diagnose the analog circuit.

Self-check method

- **1.** Turn off the power of the TM380.
- **2.** Turn on the power while pressing ESC
- **3.** If "PASS" is displayed at the end, it is normal.



Self-check display items



12-3. Setting protect

Each category of setting values can be locked to prevent rewriting. For each category, see the setting value list.

《Setting value》

- 0: OFF Enables rewriting of setting values.
- 1: ON Disables rewriting of setting values.

Setting protect setting method

1. Select setting mode 9. rpm Angle rad deg Speed Press FNC FgIJ seven times. 2. Set "setting protect." LO HOLD Torque HL Nm Press $|\mathbf{v}|_{\text{RECALL}}$ once. \Rightarrow "Setting protect" is displayed. , and the highest digit blinks. Press rpm Angle rad deg Speed Input the setting value of "Work protect" with F9.1 «Setting value» Move to the lower digit with \blacktriangleright . (Initial value: 0) 0 0 0 Calibration protect Input the setting values of "System protect" and 0: OFF 1: ON "Calibration protect" in a like manner. System protect 0: OFF 1: ON to validate it. Press Ψ Work protect 0: OFF 1: ON 3. Press ESC twice to go back to the indicated value display.

) Point

For the setting items protected by the setting protect, see "12-1.The list of initial setting value" on page 118.

SUPPLEMENTS

Speed

Fg

rpm

Angle rad deg

HOLD

Nm

Ū

 \mathcal{D}

12-4. Key protect ZERO key and HOLD key operations are disabled to prevent misoperation.

≪Setting value≫

- 0: OFF Enables key operations.
- 1: ON Disables key operations.

Key protect setting method

1. Select setting mode 9.

Press FNC seven times.

2. Set "Key protect."



3. Press ESC twice to go back to the indicated value display.

Chapter

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12-5. Initialize

Each category of setting values can be initialized. For each category, see the setting value list.

≪Setting value≫

- (0: Undefined)
- 1: Work setting (Including record data)
- 2: System setting (Including setting protect and key protect)
- 3: Calibration setting

After inputting the number of the setting value category you want to initialize, press validate it, and initialization is executed.

However, if the category is protected, initialization cannot be performed.

Normally, the setting value of "initialize" is "0 (undefined)."

Initialize setting method

1. Select setting mode 9.

Press $[FNC] \rightarrow [\blacktriangleright]$ seven times.

2. Excecute initialization.

Press $\mathbf{P}_{\text{RECALL}}$ three times. \Rightarrow "Initialize" is displayed. Press $\mathbf{P}_{\mathbf{R}}$, and blinks.

Input the setting value for initialization with

RECALL .

Press 💙 to validate it.



* Upon validation, initialization is executed and the setting value goes back to "0."

3. Press ESC twice to go back to the indicated value display.

12-6. Password

This setting is for maintenance and inspection. Do not operate it.

12-7. Error/message list

■Main numerical display section

-LoAd - L o Ä d	Below the signal input range -10V over (UTMIII/UTF) -5V over (UTMII)	The input electric signal greatly exceeds the signal input range. This also occurs when an excessive load is applied to
LoAd LoAd	Beyond the signal input range +10V over (UTMIII/UTF) +5V over (UTMII)	the sensor or the input terminal is opened due to a break in the cabling, etc.
ala R L R	Beyond the alarm HI limit	This occurs when a larger load than expected is applied to the sensor or calibration is performed below the
-ALA - ALA	Below the alarm LO limit	measurement range. Check the calibration and measuring object.
oFL1 oFL /	Below -99999	This occurs when a larger load than expected is applied to the sensor or calibration is performed below the
oFL2 oFL2	Beyond 99999	measurement range. Check the calibration and measuring object.
сЕrr2 сЕгг2	Beyond the zero calibration range in the positive direction	The signal input range is greatly exceeded when zero
cErr3 c 	Below the zero calibration range in the negative direction	applied to the sensor and for breaks.
сЕгг4 с Е г г Ч	Beyond the rated output value in the positive direction/ negative direction. Beyond the rated capacity value.	The signal input range is greatly exceeded when calibration is performed. In the case of equivalent input calibration, check the rated output value, and in the case of actual load calibration, check for an excessive load applied to the sensor and for breaks. Also, Check the setting of rated capacity value (display value) sets it exceeding "±99999".
сЕrr5 с Е г г 5	Rated capacity value = 0	Check the setting of rated capacity value (display value) for being "0" when calibration is performed.
сЕгг6 сЕггб	Rated output value 0.000V at the time of equivalent input calibration Rated output value in the range of -0.010 to +0.010V at the time of actual load calibration	Check the rated output value for being 0.000V when equivalent input calibration is performed, and the load for being too light in weight when actual load calibration is performed.
dZ Err d2Err	Digital Zero limit error	When the range of zero point correction (deviation from the zero calibration registered point) by Digital Zero or Zero Tracking exceeds the setting value of Digital Zero limit, Digital Zero limit error occurs. Perform Digital Zero, etc., in a proper range.
CALZE [R L 2 E	Zero calibration in progress	
calsp [# L 5 P	Actual load calibration in progress	These are not errors. They indicate that each calibration is in execution.
CALEq [Equivalent input calibration in progress	
485non 485	RS485 display mode communication error	In RS-485 display mode, communication is being established or format is not regularly received from UTMII/UTF. Please check if the connection is correct.

oFL2 oFL2	Beyond +99999	The rotation speed exceeds the display range. Check the connection with the sensor.
ALA # 1 #	Beyond the alarm HI limit	Rotation speed is at a faster or slower speed than expected.
-ALA - ALA	Below the alarm LO limit	and so forth.

12-8. Troubleshooting

Item	Question	Answer/remedy
Sensor	Is a correct indicated value displayed by simply connecting sensor(s)?	Match the sensor output and indicator by equivalent input calibration or actual load calibration. Then, the indicated value is displayed in proportion to the sensor output.
	The neuron connect he turned on	Check to see if the power cord is properly connected. If not, connect the power cord properly.
	The power cannot be turned on.	Check to see if the power source is within the specified range. If not, use a power source within the specified range.
Wiring and		Check to see if the sensor is properly connected. If not, connect the sensor properly.
connection	The indicated value is	Check the sensor for damage. Connect a normal sensor.
	abnormal.	Check the sensor for a mechanical load. Prevent such a load.
		Use MONITOR terminal to check if the voltage is within the specified output range of torque meter. (UTM III /UTF: within ±10V, UTM II : within ±5V)
	It is desired to decrease the number of digits of the numerical value.	Since there is a need to decrease the number of digits of the value input during equivalent input calibration or actual load calibration, perform calibration again. Also, set the load-related setting values, such as HI and LO limit values, again according to that number of digits.
	How to get hold is unclear.	The control method may differ according to the hold mode used. See "7-1.Hold functions of torque" on page 55.
		Check to see if the output cable is properly connected. If not, connect the output cable properly.
Setting and operation	Judgment results are not output.	In the case of comparison output, the output conditions differ according to the setting of comparison timing. See "6-4.Comparison timing" on page 53.
	Lower digit(s) of the indicated value fluctuates.	Check for calibration exceeding 10000 at approximately 3.3V. Since the resolution is approximately 10000 with respect to approximately 3.3V, calibration exceeding it will cause coarseness, and the indicated value will fluctuate and not become stable. For using as it is, ignore the lower digit(s), or set the min. scale division again.
	Is the voltage output and D/A option different?	The monitor output is made by turning back the sensor input. It is different from the D/A converter that converts from digital to analog through digital processing. Consider that the D/A converter is synchronized with the indicated value.

Item	Question	Answer/remedy		
	The output is abnormal.	Check for parallel wiring with AC lines. Carry out wiring again so as not to become parallel with AC lines.		
SI/F	The print on the printer is abnormal.	Check to see if the print data setting of the printer side is correct. GROSS area, NET area, and TARE area exist. Check that the areas and setting correspond.		
	Automatic printing cannot be	Check to see if the SI/F print setting of the TM380 is correct. Check the setting.		
	performed.	Check to see if the printer side print setting is automatic printing. Check the setting.		
Option	Can two or more options be mounted?	Cannot be mounted. Only one optional function can be mounted.		
		Check to see if wiring is correct. Check the wiring, and connect the communication cable properly.		
		Check to see if the logic is recognized properly. Negative logic/positive logic selection is available.		
BCD output	The output is abnormal.	Check to see if synchronization is maintained with the strong signal. Check the setting.		
op son		Check to see if it is in synchronization with the strobe signal. Make the output rate slower or use the BCD data hold if the processing performance of the device that should receive BCD is low.		
	Hold values do not result.	The output data differ according to the setting or external selection. Check to see if it is a torque (hold synchronized).		
		Check to see if the communication cable is properly connected. After turning off the power, connect the communication cable properly.		
	Communications fail.	Check to see if a proper communication cable is used. Check to see if wiring is correct. Check the wiring, and connect the communication cable properly.		
RS-232C option		Check to see if the communication conditions of the master and TM380 correspond. Check the communication conditions, and match the settings.		
	Reading cannot be performed.	Check to see if the transmission command from the master is correct. Check for any unwanted code included at the head of the transmission command. Check the transmission command.		
	Is any program necessary for communicating with PC?	Some program or tool for serial communication is necessary. Create software to exchange commands at required timing.		
		Check for greatly exceeding the scale.		
D3V/DAV/DAI option	The output is abnormal.	Check for fixed output setting. Set the output setting properly again.		
12-9. Conformity with EC directives

The TM380 Torque Monitor is a CE-marked EC-Directive-conforming product (by the Council of the European Union).

- EMC Directives;

EN61326-1 EN55011 EN61000-4-2 EN61000-4-3 EN61000-4-4 EN61000-4-5 EN61000-4-6 EN61000-4-8

🔵 Point

EMC Directive EN61000-4-5 (Lightning Surge Immunity) is met by the TM380 body in combination with a lightning surge protector.

- Since the TM380 is defined as open type (built-in equipment), be sure to use it as installed and fixed to a panel, etc.
- Use shielded cables (for encoder, USB, external input/output, UTM, and option(s)).

Attachment of the ferrite core

Wind the power cable around the included ferrite core (SEIWA ELECTRIC MFG.: E04SR211132). Attach the ferrite core as close to the TM380 body as possible.

Fix it with cable tie(s) as necessary.



Connection of a lightning surge protector

Attach a lightning surge protector against lightning surge.

EMC Directive EN61000-4-5 (Lightning Surge Immunity) is met by the TM380 body in combination with a lightning surge protector.



<Connect>



🔵 Point

No lightning surge protector is included as standard (optionally available). Our company carries an optional lightning surge protector (TSU03). Contact our sales department for details.

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